Acknowledgement

The Kuwait Foundation for the Advancement of Sciences (KFAS) is a private, non-profit organization, established by an Amiri Decree issued on December 12th, 1976.

The foundation is governed by a Board of Directors and chaired by H.H. the Amir of the State of Kuwait.

KFAS acknowledges with appreciation the valuable continued support it receives from private shareholding companies to fund its operation. These companies are currently providing one percent of their annual net profit to KFAS as part of their corporate social responsibility.

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My greatest wish and aspiration is building Kuwaiti individuals and developing their capabilities in order to enable them to build and develop their homeland.
Dr. Adnan A. Shihab-Eldin  
Director General

Directors

Dr. Essam Al Sayed Omar  
Research

Dr. Salam Al Ablani  
Scientific Culture

Dr. Mohammad Salman  
Innovation and Enterprise

Dr. Amani Al Bedah  
International Relations and Knowledge Managements

Mr. Firas Al Oda  
Finance and Investment

The Late Eng. Mijbil S. Al Mutawa  
Chairman & Managing Director  
The Scientific Center

Dr. Omar Al Bannai  
General Manager  
Sabah Al Ahmad Center for Giftness and Creativity

Dr. Qais Al Duwairi  
Director General  
Dasman Diabetes Institute

Dr. Naheel Al-Nafisi  
Director General  
Jaber Al Ahmad Center for Nuclear Medicine and Molecular Imaging

Dr. Salam Al Ablani  
Chairman  
Al-Taqaddum Al-Elmi Company

Dr. Ziad Najem  
CEO  
KFAS Academy for Continued Learning

KFAS Management

KFAS CENTERS
**Wall of Achievements**

**Investing in Solar Energy**

As a result of the success of our rooftop solar panels project, the Supreme Council for Planning and Development has adopted this pilot project as part of its development plan for 2017-2020, expanding its scope from 2 co-ops to 10 co-ops and from 150 homes to 1,500 homes.

**New Prizes Awarded in 2016**

- **The Al-Sumait Prize for African Development** in the fields of Health (2015) and Food Security (2016) was awarded at the African Arab Summit in Equatorial Guinea in November 2016.
- **Anwar Al-Nouri Prize** for the best Ph.D. thesis in education in the Arab world was awarded for the first time during KFAS Prizes Ceremony in Kuwait in December 2016.

**International Collaborations**

221 research and training opportunities were provided for students and junior researchers in the International Center for Theoretical Physics (ICTP), Sciences Po, The Havard Business School, and Havard Kennedy School.

**Building a Culture of Science**

More than 9 million visitors visited The Scientific Center since it opened in 2000.

- **The Sabah Al-Ahmad Center for Giftedness and Creativity** opened the first academy for talented students, The Giftedness Academy of Intermediate and Secondary School for Boys, in collaboration with the Ministry of Education.
- **KSAG**, one of the first scientific electronic libraries in the Arab world was launched containing 120 books and more than 10,000 scientific articles in the Arabic language.

<table>
<thead>
<tr>
<th>Al-Oloom Magazine App</th>
<th>Number of Sponsored Public Events (conferences, workshops, seminars) that promote a scientific culture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unique number of Downloads (Thousands/Year)</td>
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<td>2015</td>
<td>56</td>
</tr>
<tr>
<td>2016</td>
<td>93</td>
</tr>
</tbody>
</table>

**Investing in the Private Sector’s Human Capital**

In 2016 KFAS funded nearly 30 seminars, workshops, studies and conferences locally for the private sector compared to 24 similar activities in the previous year and awarded grants to support the training of over 2,200 individuals across various private sector industries.

**Enabling Research Capacity**

KFAS continues to receive a growing number of proposals to support scientific research.

<table>
<thead>
<tr>
<th>Number of Received Proposals</th>
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<tbody>
<tr>
<td>65 proposals</td>
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<td>72 proposals</td>
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<td>62 proposals</td>
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<td>105 proposals</td>
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<tr>
<td>103 proposals</td>
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<td>122 proposals</td>
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</tbody>
</table>

**Supporting Kuwaiti Inventors**

As part of fostering talented individuals KFAS supports and assists in the commercialization of inventions through Sahab Al-Ahmed Center for Giftedness and Creativity.

- 22 Prototypes developed in China
- 22 Inventions viable for commercialization
- 22 Prototypes developed in SAC Fab Labs
- 11 Inventions to be commercialized and can be converted to new products
- 11 Prototypes developed through SAC Strategic Stakeholders
- 4 Inventions converted into new products
In 2016, KFAS launched and presented two new prizes, introducing the Al Sumait Prize for African Development and the Anwar Al-Nouri prize for the best Ph.D. thesis in education in the Arab world. The awarding of the new prizes were both patronized and attended by H.H the Amir of Kuwait, Sheikh Sabah Al Ahmed Al Sabah, during two ceremonies; in Equatorial Guinea and in Kuwait.

Furthermore, KFAS, has expanded its cooperation with renowned global academic and research institutions leading to the participation of 10 private sector executives, researchers and policy makers in 65 different activities ranging from fellowships to workshops and lectures.

In an effort to make science more accessible than ever to the public, KFAS launched the Kuwait Scientific Advancement Gate (KSAG); one of the first electronic scientific libraries in the Arabic language. This library already holds 120 books and more than 10,000 scientific articles with a vision to expand further in the coming years.

The four centers of the Foundation have continued to witness significant successes this year. The Scientific Center celebrated receiving more than nine million visitors and it has launched its new Discovery Place. The Jaber Al-Ahmad Center for Nuclear Medicine and Molecular Imaging launched a national project with the International Atomic Energy Agency (IAEA), to establish an accredited training center in the field of clinical nuclear medicine and basic sciences. The Sabah Al-Ahmad Center for Giftedness and Creativity, in collaboration with the Ministry of Education, opened the first Giftedness Academy of Intermediate & Secondary School for Boys. The Dasman Diabetes Institute formulated its new strategy for research and signed an agreement with the Ministry of Health to fund training provided by the Institute to medical cadres.

KFAS also initiated a wide range of other activities placing science and innovation at the forefront of the minds of the public in Kuwait through hosting various science, innovation and leadership seminars. One of the most popular seminars and lectures, attended by all age groups, was the space exploration seminar presented by the renowned former Director of Jet Propulsion Laboratory at the US Space Agency (NASA) Professor Charles Elachi. Professor Elachi has supervised space missions to solar system planets such as Mars, Saturn, Jupiter, and Titan.

In November 2016, the Foundation concluded drafting its new strategic plan for 2017-2021. The Board of Directors approved the draft strategy, which was prepared following a series of independent assessments by international peer review panels of the performance of the Foundation’s programs and centers over the past two years. The new strategy also considered an independent survey that captured feedback of our major partners and beneficiaries from the public and private sectors. In addition it took into account the results of a study carried out by a specialized international agency to examine the impact of research outputs in Kuwait between 2003-2013 and to identify the Foundation’s priority areas of intervention.

The 2017-2021 strategy which addresses the main outcomes of the evaluation and studies aims to promote a stronger knowledge-based economy and ultimately contribute to a sustainable Kuwait through enhancing public awareness of science, improving math and science education, focusing research funding on national priorities and accelerating the deployment of beneficial technology, as well as, building innovation capacity at the individual and enterprise levels. Through this new strategy, KFAS is looking forward to building a rich culture of scientific innovation and enhanced appreciation of science in Kuwait.

I am pleased to present to you our 2016 annual report. I invite you to explore the report and to learn more about the successes and achievements of KFAS and its centers in 2016.

Dr. Adnan A. Shihab-Eldin
Director General
Introduction to KFAS

The Kuwait Foundation for the Advancement of Sciences was established in 1976 by an Amiri Decree under the direction of the late Amir of Kuwait, H. H. Sheikh Jaber Al-Ahmad Al-Sabah with a vision to create and nurture a thriving culture of science, technology, and innovation for a sustainable Kuwait.

KFAS operations are funded by contributions from the private shareholding companies of Kuwait as part of their corporate social responsibility. The contributions currently amount to one percent (1%) of their annual net profit.

KFAS mission to “stimulate and catalyze the advancement of Science, Technology and Innovation (STI) for the benefit of society, researchers, and enterprise in Kuwait,” continues to be at the heart of all the Foundation’s activities and plans.

Since its creation, KFAS has successfully established a number of dedicated research and educational centers of excellence in Kuwait. These are: The Scientific Center, Dasman Diabetes Institute, Sabah Al-Ahmad Center for Giftedness & Creativity, and Jaber Al-Ahmad Center for Nuclear Medicine and Molecular Imaging. These centers are recognized as world-class facilities and pioneering scientific research institutes. In addition, KFAS has established Al Taqaddum Al Elmi Company, the Foundation’s publishing arm and most recently, KFAS Academy, an online university for continued education.

The year 2016 saw the completion of the 2012-2016 strategic plan that has guided the Foundation’s focus over the past five years. Looking forward, KFAS is preparing to implement the 2017-2021 strategy that will guide the focus of the Foundation’s activities for the next five years. This new strategy will continue to deliver on the KFAS core mission focusing on three key thrust areas:

1. Advocating a scientific culture throughout society by offering programs and initiatives focused on improving science and math education in cooperation with the Ministry of Education, and using new media for the dissemination of Arabic scientific content to the public, especially the youth.
2. Enhancing R&D capacity in Kuwaiti scientific institutions while addressing national priorities through supporting mission oriented applied research in addition to accelerating the deployment of new beneficial technologies to society as a whole.
3. Building innovation capacity for businesses and individuals through fostering and supporting innovation of human capital in the private sector as well as among the youth at large, and supporting technology-based innovation as well as SME’s.

The limited resources for R&D and STI in Kuwait presents constraints and challenges in the drive towards a knowledge based economy. The new 2017-2021 strategy, therefore also aims to work with the government to help increase in multiple folds the rate of government funding of research to reach the minimum international average of 1% of GDP by the year 2020.

With the conclusion of the previous five-year strategy and the commencement of the next (2017-2021), KFAS is continuing to contribute towards the creation of a rich scientific culture in Kuwait and to enable a sustainable and robust knowledge based economy.
In 2016, KFAS continued to work with its partners to unlock the creative potential found within the Kuwaiti society with the aim of transforming Kuwait into a knowledge-based economy. Through funding and organizing workshops, seminars, and trainings; individuals, companies, and organizations have been inspired to think differently and see science and innovation as a key driver of long-term sustainable development.

Human Capital in the Private Sector

KFAS strongly believes in the importance of executive education and its role in enhancing business leaders’ expertise in management and leadership through science, technology, and innovation. Such education provides a wealth of knowledge, skills, and tools that facilitate company growth.

In 2016, KFAS funded nearly 30 activities for the private sector in addition to 5 research projects.

The ten teams selected for the Innovation Challenge 2016 program represent the following companies:

1. Kuwait Finance House
2. Agility Global Integrated Logistics
3. Boubyan Bank
4. Warba Bank
5. Kuwait Energy
6. International Turnkey Systems
7. Advanced Technology
8. Axis Solution
9. M. H. Alshaya
10. TABCo International Food Catering

The style of teaching and the opportunity to interact with others made it an amazing experience, it far exceeded my expectations.

Hasan Akbar
Chief Information Officer,
Axis Solution
Over the past two years, the KFAS Innovation Challenge has contributed to the introduction and adaptation of innovative projects in 18 companies in a structured and systematic approach. The program assisted effectively in implementing the launch of new services such as; Interactive Teller Machine (ITM) by one of the banks in Kuwait and car leasing services within the Islamic Sharia framework. Additionally, the program helped a Kuwaiti company to aptly tackle manifesting cashflow issues related to bankruptcy.

II | Driving Innovation in the Corporate World

The KFAS Open Enrollment Program offers private sector companies the opportunity to access a vast network of leading training providers. Companies involved in the program can further enhance their internal knowledge and capabilities in innovation and in turn drive growth.

KFAS additionally provides grants to private companies to be used for high caliber training programs in the fields of technology, innovation and management. These grants aim to improve human capital in the private sector and enhance business productivity and competitiveness.

In 2016, KFAS awarded grants to support the training of over 2,200 individual participants across various sectors.

II | Enhancing Human Capital of Graduates and Scientists

I | US Business Internships for Kuwaiti Graduates

In 2014, the Professional Development Initiative (PDI) was launched in a partnership between KFAS, Kuwait’s Ministry of Higher Education (MOHE), the Embassy of the State of Kuwait in Washington DC and the National U.S. Arab Chamber of Commerce (NUSACC).

Funded by KFAS and MOHE, the aim of this program is to develop U.S. - Kuwaiti businesses and build the capacity of Kuwait’s human capital through one-year professional fellowships in the U.S. The Kuwaiti PDI fellows gain valuable on-the-job experience in a U.S. professional work environment that they can bring home to Kuwait once their tenure is completed with their host company.

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The PDI program enhanced many of my skills and knowledge, from creativity, motivation, leadership, adaptability, goal achievements, flexibility, and strategies, to masterminding new skills.

Mohammad Molani
Completed a one-year PDI term with The Dow Chemical Company as maintenance engineer

II | Bridging First Year Scholarships for Ph.D. and Master’s Students

In 2015, KFAS announced the launch of a new program designed to provide financial assistance in the form of a one-year grant to high achieving graduates in science and technology disciplines. This grant would assist these students during that year to kick start their studies until they obtain a full scholarship from other sources of funding. Besides bridging funds for Ph.D. and Master’s degrees, the scope of the program is also aimed at enabling high achieving and motivated young scientists who are not yet employed to enroll in an internship, interim research and post-doctoral research.

III | Grants for Scientific Missions

KFAS provides special opportunities for scientists and researchers to participate in high caliber international conferences to advance their research knowledge. These opportunities also allow Kuwaiti scientists and researchers to network with top researchers in the world of similar science and technology disciplines, and to have their scholarly research work published in top international refereed journals.

In addition to enhancing innovative capabilities in the private sector and supporting potential scientists; KFAS also fosters innovation through the Sabah Al Ahmed Center for Giftedness and Creativity (SAGC).

"Read more on page 42".

Investing in Pioneering Research and Accelerating Technology Deployment

KFAS is actively tackling some of the key challenges facing the country today through funding applied research in national priority fields such as diabetes, supporting initiatives that accelerate the deployment of technology, more specifically in the field of solar energy, and co-funding research in the private sector to help diversify and sustain the national economy.

As part of this effort, KFAS continues to fund joint research projects with national research institutions such as Kuwait University, Kuwait Institute for Scientific Research, and counterparts at renowned international research centers such as Interuniversity Microelectronics Center (imec).
I | Dasman Diabetes Institute (DDI)

KFAS established The Dasman Diabetes Institute (DDI) in 2006, to address a national priority issue, diabetes, which is a major health concern in Kuwait. The center works at the forefront of research in diabetes and its related conditions.

"Read more on page 47".

II | Feasibility Study: Establishing a National Gene Bank

The feasibility study for establishing a national gene bank in Kuwait was commissioned and fully supported by KFAS. The feasibility study was intended to investigate the need for such a repository, recommend the best approach and potential to establish such a facility in Kuwait that would allow the possible preservation of a variety of native species from both the marine and desert ecosystems, and facilitate regional and international collaboration. During the one year feasibility study the core research team visited biobanking facilities in Washington DC.

The results of the feasibility study strongly supported the need and importance of establishing a centralized biobanking facility in Kuwait. Therefore, the Kuwait National Biobank was formed to ensure a facility for cryopreservation of a wide range of biological as well as environmental specimens from local habitats.

III | The Use of Killer-cell Immunoglobulin-like Receptor (KIR) Genotyping in Related Stem Cell Transplantation

Stem cell transplant treatment is best suited for numerous blood malignant tumor patients but many of these patients do not find immune tissue matching donors for surgery to proceed. Killer-cell Immunoglobulin-like Receptors (KIR) play a vital role in the immunological bursts against viruses and malignant cells and thus they could be used to destroy cancer cells in the body as long as they match the KIR cells of the patient. Furthermore, the study introduces the types of natural killer-cell Immunoglobulin in the National Stem Cells Register of donors.
A total of 150 Kuwaiti homes, at a rate of 50 homes per year over the course of three years will have solar panels (RTPV) installed on their rooftops. The project aims at studying the obstacles facing the implementation of these systems in the residential sector in order to formulate technical guidelines necessary to ensure safe and high output for these systems.

Furthermore, the project will serve to develop local capacity in the installation, operation and maintenance of residential solar panel systems.

Thanks to ongoing progress being realized in advancing renewable technologies locally and worldwide, Kuwait is working towards achieving its target of 15% of electricity demand to be generated via renewable energy sources by 2030, the target set by H. H. Sheikh Sabah Al-Ahmad Al-Jaber Al-Sabah, the Amir of Kuwait and the Chairman of KFAS Board of Directors.

Hence, since 2013 KFAS initiated two pilot projects to promote the accelerated deployment of solar energy, the first project covers two cooperative societies while the second project covers 150 homes. The savings in the long run are expected to cover more than the invested capital and the operating cost of the pilot projects.

KFAS launched its solar energy pilot projects in 2013

Solar Panels for Kuwaiti Homes

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Energy Efficiency and Solar Panels at Co-operative Societies

Photovoltaic (PV) systems, or solar panels, were installed in the car parks of two cooperative societies:

- Al-Adailiya Co-op in 2016
- Al-Zahra Co-op in 2015

Energy efficiency measures were applied in both co-ops. Al-Zahra co-op had retrofitted its lighting system and upgraded its air-conditioning system, while Al-Adailiya co-op had retrofitted its lighting system.

Energy saved from the use of PV cells in Al-Adailiya Co-op alone will amount to around 460 MWhr annually. This can meet the electricity needs of more than 5 homes for one year and save at least 280 barrels of oil per year.

As a result of the KFAS initiated pilot projects the Supreme Council for Planning and Development adopted the expansion of the solar projects as part of its development plan for (2017-2020).

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Co-Funding Research for the Private Sector

In 2016, KFAS continued to co-fund research projects in the private sector acting as a catalyst to build research and development (R&D) capacity.

The number of companies in the private sector that received co-funding research support doubled in 2016. Companies such as Boubyan Petrochemicals Co., Agility and Kuwait Catalyst Co. are among the recipients of this co-funding support. This highlights KFAS’ continuous support to R&D in the private sector which leads to a diversified knowledge-based economy.

Co-funding research grew in all supported sectors, led by manufacturing and IT services in 2016.

For the first time since KFAS began its private sector co-funding programs, a bridge between graduate students and private sector companies was formed whereby KFAS supported the implementation of two senior graduate projects at a local private company.

KFAS Success Stories:

Proof of Concept
SYNTHETIC LIGHTWEIGHT AGGREGATE
KISR & KFAS

KISR and KFAS coordinated a workshop to highlight the successful development of a new type of construction material by in-house KISR researchers known as "Synthetic Lightweight Aggregate". The workshop hosted attendees from the private sector – including National Industries Company, Union Construction Materials Manufacturing Co, Arab International Industrial Projects Co., BASF and Environment Preservation Industrial Co.

The workshop was designed to demonstrate the benefits of the locally-manufactured technology to producers, in order for them to support a test pilot program within their own organizations.

The technology was met with resounding interest, resulting in at least one company requesting a pilot implementation of the technology on the spot. KFAS pledged its support to funding the pilot project to completion.

Prolonging Shelf-Life of Food Products
KUWAIT FOOD CO.
AMERICANA

Americana, headquartered in Kuwait, is the largest integrated food company in the Middle East. The company was interested in prolonging the shelf-life of their food products by integrating new technologies into their manufacturing and storage processes. Upon being introduced to Fraunhofer’s Institute for Process Engineering and Packaging, Americana successfully completed a multi-stage feasibility study comprising of: an assessment of Americana’s product line, production, packing and storage processes. The feasibility study concluded with recommendations of best solutions addressing the most important issues and needs of Americana.
Advocating and Enabling a Scientific Culture

Through strategic partnerships with key organizations, KFAS promoted science, math, technology and innovation among the youth and society as a whole. The Foundation also invested in the publication of scientific magazines and books, and provided forums for discussions, debates and exchange of knowledge in STI.

Science, Innovation & Leadership Seminars – Hosted and Organized by KFAS

KFAS organized and hosted several science, innovation and leadership seminars delivered by international experts specifically intended to instigate interest in STI and act as a platform for knowledge exchange and professional networking leading to new business opportunities.

I | Business Innovation Seminars

KFAS encouraged innovation in Kuwaiti businesses by hosting several seminars exploring the theme of innovation in business leadership and economics. The most prominent of those seminars was led by eminent economic expert Professor Ricardo Hausmann of Harvard University, who gave a lecture on the “Economic Complexity Index and Secrets of Economic Growth”. Hausmann, Director of the Center for International Development at Harvard University, tackled the issues of global economic challenges, institutional capability and policy design and accelerating growth. The seminar received a great level of enthusiasm with over 100 attendees joining from a wide spectrum of public and private sector organizations.

KFAS also facilitated business development seminars conducted by world leading business innovation and leadership experts. Mr. Rohit Bhargava and Mr. Paresh Shah both international innovation, strategy & leadership experts ran three leadership and innovation seminars. Those seminars which were a resounding success with over 200 attendees from different business sectors focused on:

II | Kuwait-imec Visionary Seminar

In the field of technology, research and innovation KFAS organized The Kuwait-imec Visionary Seminar: “Exploring Technology for a Sustainable Future”, the first of its kind in Kuwait. The one day forum was attended by more than 300 researchers, specialists and other representatives from private companies, universities, ministries and embassies in Kuwait.

The event allowed scientists, businessmen, industrialists and anyone interested in the establishment and development of technology based industries in Kuwait, the chance to be exposed to Research and Development activities that lead to futuristic technologies aiming towards sustainability. The seminar was a platform to exchange ideas leading towards opportunities for further research and investment partnerships.

The Interuniversity Microelectronics Center (imec) is considered one of the largest nanoelectronics research centers in the world and works in collaboration with hundreds of prestigious universities and international private companies, across a broad scope of advanced technology fields, including advanced solar cells. Since 2012, KFAS has continued to collaborate with imec, funding several projects between the center and Kuwait University.
III | Space Exploration Lecture: Inspiration for the Future Generation

In the field of Science, KFAS hosted Professor Charles Elachi, former Director of the Jet Propulsion Laboratory at the US Space Agency (NASA) who supervised more than 50 exploratory space missions to the solar system planets like Mars, Saturn, Jupiter and Titan (the Giant), the largest of Saturn’s moons. His lecture titled: “Space Exploration: Inspiration for Future Generations” inspired around 400 space “enthusiasts” from all age groups.

Conferences and Workshops - Funded by KFAS

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<td>2015</td>
<td>56</td>
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<tr>
<td>2016</td>
<td>93</td>
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- The 9th International Invention Fair in the Middle East, Kuwait Science Club
- “Smart solutions for future cities” seminar and fair - Kuwait Society of Engineers in collaboration with The Gulf Engineering Union
- Youth Employment Conference - Tamkeen
- The 1st Bones Conference in Kuwait - Kuwait University - Medical School
- Heading Global: Journey to Excellence Conference – Public Authority for Applied Education and Training - Basic Education College

Engaging the Next Generation in Science

By creating certain initiatives and spaces, KFAS continues to engage the youth of Kuwait, foster their abilities and nurture their scientific ambitions to become the scientists of tomorrow.

I | Science Academy at Kidzania

KFAS launched “The Science Academy” at Kidzania in the Avenues. It is the first multi-disciplinary Science Academy at a Kidzania park in the world. Children visiting the academy at Kidzania are inspired to try different engaging experiments in the fields of science, math, innovation and technology.

Since the opening, in Sept 22nd to Dec 31st, there has been a remarkable attendance to the Science Academy with a total of 8,314 youth visitors.

II | Olympiads

KFAS supported the Kuwait National Olympiads training initiative which was attended by 24 math teachers and supervisors. This two-week workshop was conducted for teachers and supervisors who were to participate in the Math Olympiad with their students. As a result of this teacher training initiative 1,109 students participated in the first round of the 2016/2017 Math Olympiad.

III | Interactive Lessons Project: Minhaji

KFAS managed the development of 288 interactive lessons based on the Kuwaiti curriculum in Mathematics, Science, Arabic and English for grade 6 students. As many as 480 students from the 10 participating schools took part in the pilot project, in addition to almost 200 teachers, supervisors and school administrators. These lessons are being used on tablets, classroom wifi networks, and lesson-management software all supplied by KFAS.

KFAS further supports talented youth and nurtures their scientific ambitions through specialized classes offered by The Sabah Al Ahmed Center for Giftedness and Creativity (SACGC), one of the KFAS centers, in collaboration with the Ministry of Education.

"Read more on page 42".

Meanwhile, The Scientific Center continues to inspire and encourage young minds reaching over 9 million visitors this year.

"Read more on page 45".

Enhancing Scientific Culture Through Publications

Through its online and print publications in Arabic, KFAS can reach large Arab speaking audiences, inspiring a passion for science among society and showcasing and translating international best-selling books within the science and technology fields.
I | KSAG: One of the First Electronic Libraries in Arabic

Kuwait Scientific Advancement Gate (KSAG) is one of the first scientific electronic libraries that posts scientific content in the Arabic language. It provides students, teachers and researchers with accredited scientific information and documentaries. The library was launched posting 120 books – all copyrighted by KFAS – with more than 10,000 scientific articles that were extracted and uploaded to KSAG with the aim to expand the number of titles even further.

II | Two New Magazines

To ascertain the leading role of KFAS and to diversify scientific content and make it available to the general Arabic reader, KFAS has launched two new flagship publications:

i. How it Works

The ‘magazine that feeds minds’ was launched at the Kuwait International Book Fair in 2016. The magazine targets Arabic youth below 18 years of age with sections relating to science, environment, technology, history, space and transport.

ii. AAAS Science News-Digital

In collaboration with the American Association for the Advancement of Science, AAAS Science News, a weekly magazine was added to the KFAS Digital Bookstore App, bringing latest news to the Arabic reader.

II | Book Fairs

KFAS was present at International Book Fairs in Kuwait, Musqat, Sharja and Abu Dhabi spreading the latest knowledge far and wide. More than 4,521 copies of KFAS books were sold.

Additionally, more than 26,617 KFAS books were distributed for free as part of a national campaign in Kuwait to spearhead the dissemination of scientific culture.

Ibn Al Haytham Book Launch at Kuwait International Book Fair

KFAS and 1001 Inventions partnered to launch a newly released National Geographic and 1001 Inventions children’s book about 11th century Arab Scientist, Ibn Al-Haytham in the Arabic language at the Kuwait International Book Fair.

Going Mobile

In 2016, KFAS opted to consolidate all its digital publications in one single APP - KFAS Digital Bookstore that includes:

- Al-Oloum Magazine
- Al-Taqaddum Al-Ilmi Magazine
- AAAS Science News

<table>
<thead>
<tr>
<th>Year</th>
<th>Al-Oloum Magazine App Unique Number of Downloads (thousands/year)</th>
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<td>2016</td>
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</tbody>
</table>

A 150 sqm space was allocated at the book fair to house the interactive exhibits.
Collaboration with International Academic and Research Institutions

KFAS continues to extend its global vision to create strategic partnerships with the world’s finest scientific and research institutions. By providing a range of collaborative research programs, workshops and conferences, KFAS offers policymakers, researchers and business executives the chance to work alongside prestigious universities, think tanks and professional associations worldwide to up-skill and inspire the future STI drivers in Kuwait. Our collaborations with some of the world’s finest scientific and research institutions enable an exchange of knowledge, best research and management practices, evidence-based policy making, and innovation. A sample of these renowned institutions include:

i. Harvard Business School
ii. Harvard Kennedy School
iii. Massachusetts Institute of Technology (MIT)
iv. University of California, Berkley (UCB)
v. Paris Institute of Political Studies (Sciences Po)
vi. London School of Economics and Political Science

Some of the notable achievements of the year include:

• A workshop on “Resource Urbanisms Kuwait” by researchers from LSE Cities, was organized for 31 policy-makers and researchers in both the public and private sectors, which brought together KFAS team members, representatives of the private sector, local experts, architects, planners and academics to discuss the preliminary results of the LSE Cities Resource Urbanisms project.

• A collaborative research project that brings together researchers from LSE and Kuwait University was commissioned. The research aims to evaluate Kuwait's public health sector and to create a strategy to develop the health sector in Kuwait to meet international best practices.

• To inform the local policy-makers about the results of the collaborative research with MIT, two outreach activities took place in 2016. Researchers from Kuwait University and MIT showcased/disclosed the major results of the research that serves energy conservation and urbanization policies on one hand, and investment opportunities for the private sector on the other.

• A workshop on Teaching Excellence was held in Kuwait and was attended by 67 KU faculty members from different professional ranks, including junior staff, mid-career staff, senior faculty and teaching assistants.

• A visit by a group of UCB faculty members and 13 UCB students was organized in October 2016, to interact with 17 of their peers at KU. A Joint Studio session took place at KU and students from both institutions presented their preliminary designs to KFAS Board Members.

• A workshop for 40 senior executives in the public and private sectors was held at the Harvard Kennedy School on ‘Decision Making Strategies Under Risk and Uncertainty’ to address the need to navigate business in a volatile market.

• 221 research and training opportunities were provided for students and junior researchers in the International Center for Theoretical Physics (ICTP), Sciences Po, Harvard Business School and Harvard Kennedy School.

• 23 lectures under KFAS international collaborations took place in 2016 both in Kuwait and abroad with 715 attendees.

• More than 85% of the executives attending the workshops at Harvard and the educators attending the MESPA Study Tour said the programs were ‘very useful and effective’.

• 12 executives from KFAS contributing companies benefited from Harvard’s prestigious short-term executive education programs while another 9 executives benefited from the long-term study programs.

• 221 research and training opportunities were provided for students and junior researchers in the International Center for Theoretical Physics (ICTP), Sciences Po, Harvard Business School and Harvard Kennedy School.

9 senior leaders in the field of education from local public and private sectors attended a customized eight-day workshop titled “Building Capacity for Regional Support of School-Based Reform in Kuwait”. The workshop was held in Massachusetts, in collaboration with Massachusetts Elementary School Principal’s Association (MESPA) and Boston University.
Celebrating Achievements of the Champions of Pioneering Research

Under the patronage and attendance of Hs Highness the Amir of Kuwait, Sheikh Sabah Al Ahmed Al Sabah, KFAS held its 2016 award ceremony for the Kuwait Prize, the Scientific Production Prize and Al-Nouri Prize at Bayan Palace on the 21st of December.

The Kuwait Prize

The Kuwait Prize was launched in 1979, to recognize and award outstanding scientific lifetime achievements of Kuwaiti and Arab scientists at the global level. The Kuwait Prize has dedicated awards in five fields; four of these fields are announced annually for Arabs, while the fifth field, Arabic and Islamic Scientific Heritage, is open to all nationalities and announced every three years. KFAS awards each field a cash sum of K.D. 40,000. The topics of the fields are subject to change annually.

Prize is equally shared by:

**The Late Prof. Nehad Mohammed Selaiha***

- Worked as a professor of drama and criticism at the Higher Institute of Art Criticism, at the Arts Academy in Egypt.
- Published a number of unique research papers in refereed journals, and authored and translated a number of published books and chapters in books. She is characterized by her distinctive activities in the Egyptian, the Arab, and the international modern drama, creativity in using postmodernism art criticism and the multiplicity of her interests in the field.

**Professor Afif Ahmad Rafik Al-Bahnassi**

- Professor of History, Arts, and Architecture at the University of Damascus in Syria.
- Published over 70 internationally renowned books, many of which were translated to foreign languages and contributed in authoring international encyclopedias.

2016 Winners of the Kuwait Prize, The Scientific Production Prize and Al-Nouri Prize

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In the field of Fundamental Sciences - Physics

**Professor George Tanious Helou**

- Executive Director of the Infrared Processing and Analysis Center (IPAC) and Research Professor of Physics at the California Institute of Technology (Caltech) in Pasadena, California.
- Published over 250 scientific research papers and articles in refereed international journals resulting in over 26,895 citations and a rate of 80 in the global H-Index that measures the impact of publications.

In the field of Applied Sciences - Food and Agriculture

**Professor Sophien Abdul Salam Kamoun**

- A Professor of Biology at the University of East Anglia and a Senior Scientist at the Sainsbury Laboratory, John Innes Center, UK.
- Published 186 scientific research papers in international journals, and 15 chapters in different books in the field of molecular plant pathology. His research received 12,730 citations, and a rate of 63 in the global H-Index that measures the impact of publications.

In the field of Arts and Literature Studies - Arts, Drama and Music

**Professor Afif Ahmad Rafik Al-Bahnassi**

- Professor of History, Arts, and Architecture at the University of Damascus in Syria.
- Published over 70 internationally renowned books, many of which were translated to foreign languages and contributed in authoring international encyclopedias.

* Passed away after she was awarded
The Scientific Production Prize

The Prize was established in 1988, in response to an initiative by the late Amir Sheikh Jaber Al-Ahmad Al-Jaber Al-Sabah to encourage distinguished Kuwaitis holding a doctorate degree in various fields of knowledge to further pursue research for the benefit of the society.

The Prize comprises six scientific fields with a cash prize of KD 10,000 allocated to each field.

Winners of the Scientific Production Prize 2016

In the field of Physical Sciences and Mathematics

Dr. Halema Ali Mohammed Al-Kandari

- Associate Professor, College of Health Sciences, Environmental Health Department, at the Public Authority for Applied Education and Training.
- Published over 20 research papers in refereed journals and 38 research and reviews in scientific conferences.

In the field of Engineering Sciences

Dr. Eisa Mohammed Eisa Al-Safran

- Associate Professor at the Department of Petroleum Engineering, Faculty of Engineering and Petroleum, Kuwait University.
- Published over 20 research papers in refereed journals and 25 research papers in refereed scientific conferences.

In the field of Medical Science and Allied Health Sciences

Dr. Waleed Ebrahim Al-Herz

- Associate professor at the Department of Pediatrics, Faculty of Medicine at Kuwait University.
- Published 58 research papers in scientific refereed journals and authored two books in 2013 and 2014.

Anwar Al-Nouri Prize for Best Ph.D Thesis in Education 2016

The Board of Directors of the Kuwait Foundation for the Advancement of Sciences approved the Anwar Al-Nouri Philanthropic Trust proposal to create a prize for the best Ph.D. thesis in education in the Arab world. The prize is in recognition of the major role played by the late Anwar Al-Nouri in the field of education at the national level in the State of Kuwait and the Arab world, as well as his services to KFAS as a member of its Board of Directors. KFAS administers the operational aspects of the prize. Funded by the Trust, the cash prize for the first-place winner is USD 35,000 and for the second runner up is USD 25,000.

Winners of Anwar Al-Nouri Prize

First Place:
Dr. Amira Husein Traish

- Ph.D. in Educational Administration in 2015 from the College of Education at King Saud University.
- The Vice-Dean of Quality and Development, Head of the Self-Development of Quality and Development at the Preparatory year Deanship - University of Dammam, Kingdom of Saudi Arabia.

Second Place shared by:
Dr. Nasser Saud Abdul Aziz Al-Rayes

- Ph.D. in Educational Administration in 2015 from the College of Education at King Saud University.
- The Elementary & Intermediate Cycle Director, at Notre Dame Antonine Sisters’ School Hazmieh/Jamhour - Trilingual Section.

Dr. Dalal Samir Rizkallah

- Ph.D. in Educational Administration in 2015 from the Institute of Advanced Studies of Arts and Humanities at the Lebanese University.
- The Elementary & Intermediate Cycle Director, at Notre Dame Antonine Sisters’ School Hazmieh/Jamhour - Trilingual Section.
Al-Sumait Prize For African Development

Celebrating scientists who are transforming lives on a grand scale

His Highness the Amir of Kuwait Sheikh Sabah Al-Ahmad Al-Jaber Al-Sabah, announced an initiative during the third African Arab Summit hosted by the State of Kuwait in November 2013, in support of the development of African Nations. The initiative establishes an annual award by the State of Kuwait named after the late, Dr. Abdulrahman Al-Sumait, a Kuwaiti physician who dedicated his lifetime to humanitarian and charitable work in the fields of health, education and food security for the less fortunate in Africa.

The prize is awarded annually to individuals or institutions within one of the three fields (Food Security, Health and Education) and has a value of (One million US dollars) paid by the State of Kuwait.

The Prize is administered by KFAS under the supervision of an international board of trustees.

Winner of 2015 Al-Sumait Prize for Health

Prof. Kevin Marsh
The University of Oxford and African Academy of Sciences, Kenya

In recognition of his sustained research and field work to control and eradicate malaria, which affects the health of tens of millions of African children. His work, over more than three decades, has been definitive and groundbreaking and has produced substantial and direct health and economic benefits for African countries and has contributed in major ways to building research and scientific capacities in Africa.

Winner of 2016 Al-Sumait Prize for Food Security-Evenly Shared

International Potato Center (CIP)
Sweet Potato-For-Nutrition Team, Lima, Peru

In recognition of its sustained research and field work that lead to the production of biofortified varieties of sweet potato resulting in the decline of vitamin A deficiency among African children, which limits growth, weakens immunity, affects sight and increases mortality rates. CIP made valuable contributions to improving food production with substantial impact on nutritional value and the performance of food crops curbing vitamin A deficiency in nearly two million households in countries across Sub-Saharan Africa.

The International Institute of Tropical Agriculture (IITA)
Ibadan Nigeria

In recognition of its sustained research and field work that led to a substantial impact on improving the productivity and nutritional quality of major staple food crops. The crops were made available to the smallholder farm families in the African region to balance calories, diversity diets, and safeguard health and nutrition. IITA was also able to increase incomes and enhance the sustainability of production systems across the Sub-Saharan African region.

Kuwait e-Content Award

300 team members, working on 176 different projects, competed for the Kuwait e-Content Award in 2016 out of which 25 winners were ultimately chosen.

The Kuwait e-Content Award was established in 2008 with the aim to drive forward advances in the field of e-content. Since then, the prize has grown in both prestige and popularity.

The award celebrates and recognizes excellence in eight separate categories, with total prizes of KD 50,000.

Projects that won first place at the e-Content Award are:

- In e-Government, Statistical Service System Website, by Public Authority for Civil Information in Kuwait
- In e-Inclusion, The Holy Quran Radio Channels, a mobile application by Alnajat Charity
- In e-Learning, ‘Chef In Hand’ mobile application by Mohammad Almuhaitaib
- In e-Culture, first prize has been withheld, and Khaleejesque online magazine by S. Fouz Alsabah came in second
- In e-Entertainment, ‘Dama’ game, a mobile application, by Mezyad Alabduljalil
- In e-Health, Automated Drilling HSE Notification System, by Kuwait Oil Company
- In e-Business, ‘Ajar Online website’ by Shaheen Alkhudari, Talal Alyaseen and Ali Taqi

Eight of the 2016 e-Content award winners were nominated to compete internationally in the World Summit Award (WSA).
Our Centers

KFAS has successfully established four distinguished research and educational centers of excellence. These are:

- The Scientific Center of Kuwait (TSCK)
- Dasman Diabetes Institute (DDI)
- Sabah Al Ahmad Center for Giftedness and Creativity (SACGC)
- Jaber Al Ahmed Center for Molecular Imaging (JACMI)

II | National and International Competitions and Events

The Center sponsored the Kuwaiti team attending the Smart Brain International Competition held in Thailand in 2016. Smart Brain is an educational and training mathematics program for students aged 6 to 18 which aims to develop a range of skills related to problem solving. Four Kuwaiti gifted students received top ranks and three Thai Kingdom cups.

III | Enabling Science and Technology Enthusiasts

Fab Labs offer a venue for students to take advantage of learning science and practice at the same time. In 2016, approximately 700 young students participated in workshops at the Fab Labs and received scientific training and attended sessions in robotics, automation, Math Club and other enrichment programs. The opening of two new Fab Labs in Al Jahra and at the headquarters of the Center in Shuwaikh has doubled the number of students who can participate in the workshops.

Furthermore, the Center also established a Nano Club that targets young people at various Educational stages. Seventy teachers from the Ministry of Education have benefited as trainees of the Nano Club courses.
IV | Supporting Kuwaiti Inventors

KFAS, through SACGC, supports individual inventors every step of the way starting from registering their innovative ideas into patents, manufacturing the prototypes and commercializing viable products.

- 22 Prototypes developed in China
- 22 Inventions viable for commercialization
- 22 Prototypes developed in SAC Fab Labs
- 11 Inventions to be commercialized and can be converted to new products
- 10 Prototypes developed through SAC Strategic Stakeholders
- 4 Inventions converted into new products

Development and Marketing of Inventions

Turning Patents into Prototypes

Abdulmuhsen A. Al-Sahhaf
X-Ray Stick Marker

The marker is configured for marking the skin of a patient with a handle while allowing the user to avoid exposure to radiation by maintaining a suitable distance away from the patient.

Al-Jouharah Al-Hmalan & Manar Al-Mutairi
System and Method for Disabled Parking Spot Enforcement

The invention uses a proximity sensor for detecting a parked vehicle in a disabled parking spot by using a radio frequency identification (RFID) tag reader. If a disabled tag is not detected and the vehicle does not exit the parking spot within a specific time, an alarm would go off and a camera will capture the license plate.

Transforming A Patent into A Product

- Prepared 11 industrial prototypes ready for marketing and eligible for commercial launch.
- Obtained trademarks for four inventions.
- Launched the marketing plan of Dr. Ibrahim Al-Rashdan’s invention: Expendable Sheets and System for Intravascular Insertion for Cardiac Catheterization.
- Presented 25 inventions to the ‘National Fund for Small and Medium Enterprise Development’ (SME) for potential funding.
- Launched the first Kuwaiti invention ‘Bookmark with Timer and Alarm’ to Promote Reading in the United States.

The Scientific Center: Bringing the Magic of the Oceans to the Heart of Kuwait

The Scientific Center of Kuwait (TSCK) has welcomed more than 9.5 million visitors since it opened in 2000 inspiring the youth to learn more about the natural wonders around them. TSCK offers year-round interactive attractions and educational programs, as well as films, lectures and workshops for all age groups.

+ 9.5 million visitors since it opened in 2000.

+ 356,000 people marvelled at the wonders of the aquarium in 2016.
Dazzling IMAX 3D Brings Science To Life

The Scientific Center carefully curates the films presented on the huge IMAX screen, ensuring that they not only entertain, but they also provoke a sense of awe and inspire an interest in science and nature. In 2016, the Center introduced 3 IMAX films:

In 2016, 127,963 visitors experienced the Wonders of the natural world come to life in the IMAX 3D

Discovery Place, which was developed with over 50 interactive exhibits, attracted 86,952 visitors. The new exhibit covers a variety of scientific topics, such as physics, bubbles, genetics, science of food and sports and an infant zone.

Furthermore, the 1.4 km seafront of the Scientific Center was brought to life with 18 interactive exhibits.

Dasman Diabetes Institute: A Leading Research Institute

Since its establishment in 2006, Dasman Diabetes Institute (DDI) has worked at the forefront of research in diabetes as it continues to be recognized by Accreditation Canada International, receiving Platinum Level in 2016. Alongside its pioneering research, the Institute also works to prevent and control diabetes in Kuwait through a range of innovative healthcare, educational, and outreach programs.

In 2016, DDI published 78 papers, up from 33 publications in 2015.

The institute is currently involved in 86 ongoing national and international research projects, including 15 registered in 2016.

Over 40 conferences, seminars and lectures were organized by DDI; and more than 900 students attended over 200 training courses, classes and workshops in 2016.

Summer Volunteering Program in 2016, with 49 young Kuwaitis.
On the occasion of World Health Day 2016, DDI, in cooperation with Zain Telecommunications, launched the DDI/Zain Mobile Diabetes Clinic that will be traveling throughout the country to offer free glucose checks and professional consultations to help promote diabetes awareness.

In January 2016, DDI and the University of Dundee hosted the second graduation at the Institute, where 41 Diploma and Master’s degrees’ students graduated in the field of Diabetes Education, Care and Management, along with 17 students of vocational courses in the field of diabetes.

Highlighting the benefits of international collaboration

In January 2016, DDI and the University of Dundee hosted the second graduation at the Institute, where 41 Diploma and Master’s degrees’ students graduated in the field of Diabetes Education, Care and Management, along with 17 students of vocational courses in the field of diabetes.

Prof. Mairi Scott
Program Director,
University of Dundee

"We are very excited about the global reach of this partnership. This innovative network embeds education, informatics & quality improvement at the heart of health care transformation."

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Number of Patients</th>
<th>Number of Patient Participation in Research</th>
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<td>2016</td>
<td>5,784</td>
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</table>

Jaber Al-Ahmard Center for Molecular Imaging (JACMI): A Regional Center in Progress

Opened in September 2013, the Jaber Al-Ahmad Center for Nuclear Medicine and Molecular Imaging (JAC) was established towards making Kuwait a regional leader in the field of nuclear medicine and molecular imaging, providing a central hub for research, diagnosis, training and production. Established by KFAS and operated in partnership with the Ministry of Health and Kuwait University, the center has focused on providing an avenue of engagement and collaboration between researchers and clinicians for biomedical research and medical diagnosis.

The Center is equipped with a cyclotron for radioisotope production, which is used for providing clinical imaging services to patients through Positron Emission Tomography (PET) and Single Positron Emission Tomography (SPECT), as well as promoting innovative research projects through its state-of-the-art facility. The Center also offers a unique atmosphere for teaching and training. These features place JAC at the forefront of enhancing biomedical research, as well as building research capacity, and providing the population of Kuwait with novel therapeutics.

2016 Highlights:

Launched a national project in January 2016 with the International Atomic Energy Agency (IAEA) to establish an accredited training center in the field of clinical nuclear medicine and basic sciences.

The number of patients who underwent medical testing of cardiovascular, bone and brain diseases, cancer and other diseases at the center increased from 800 patients in 2015 to more than 1,600 patients in 2016.
Contributions from shareholding companies
KFAS receives financial contributions from Kuwaiti shareholding companies, amounting to 1% of their net annual profit. These funds enable KFAS to carry out its mission towards promoting science, technology and innovation within the State of Kuwait.

KFAS is grateful to the shareholding companies for their continuous support towards the advancement of science.

KFAS endowment investment strategy
KFAS implemented a new long-term investment strategy with a primary objective to invest KFAS endowment to provide a sustainable source of funds to support KFAS mission.

This strategy helps maintain the real purchasing power of its assets after inflation, costs and spending. In order to achieve this objective, KFAS aims to seek investment risks relative to expected return, and apply a conservative approach to minimize the risk appetite.

KFAS objective is to spread risks across a range of different assets classes, the objective of this effective diversification of assets is to improve the risk return characteristics of the endowment. KFAS expects to earn a conservative investment return over the long-term with relative liquidity.

KFAS endowment fund has witnessed an improvement in the investment returns compared to the previous year given that it’s the first year of executing the new investment strategy.

50% of KFAS budget was allocated to its centers.

In 2016, 43% of KFAS budget was allocated to its centers.