

The Kuwaiti Digest

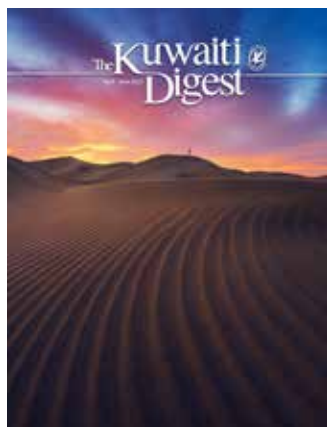
April - June 2022



Editor-in-Chief
DCEO Administration

Correspondence concerning
The Kuwaiti Digest should be addressed to:
Editor-in-Chief, Kuwait Oil Company (K.S.C.)
Information Team
P.O. Box 9758
Ahmadi 61008, Kuwait
Telephone: 965-2398-2747
Facsimile: 965-2398-1076
E-mail: kocinfo@kockw.com
or visit the KOC homepage at
www.kockw.com

The Kuwaiti Digest invites newspaper, magazine and trade journal editors to reprint or otherwise make use of articles or illustrations appearing in this issue. Material should be credited and a copy mailed to the Kuwait Oil Company.



The Kuwaiti Digest is a quarterly magazine published by the Kuwait Oil Company (K.S.C.) since 1973.



CONTENTS

03		HH the Amir Inaugurates Kuwait's Clean Fuels Project
05		KOC Meets Kuwait's Energy Requirements
08		KOC Data Analytics
14		The Kuwaiti Maritime Association: A Dream Turned into Reality
18		The Digital Innovation & Geospatial Services Unit – An Introduction
23		Preventing Cyber Attacks at KOC
26		Kuwait & Saudi Arabia Sign Agreement to Develop Durra Gas Field
27		KOC Establishes New Environmental Project
31		Ramadan and Eid Al-Fitr at KOC
34		Celebrating Gergean
37		The Historic Art of Falconry
40		Understanding Sleep Deprivation
44		Astronomy in the Arab World



Letter from the Editor



Qusai Al-Amer

Deputy Chief Executive Officer
Administration

When this issue of The Kuwaiti Digest reaches your hands, the pleasant weather of another beautiful Kuwaiti spring will be giving way to the warmer months of summer. As the new season approaches, I encourage all KOC employees to recommit their efforts toward the creation of better efficiency and innovation in all areas of the Company's operations. As we strive to accomplish the goals of our 2040 Strategy, it is the responsibility of every individual at KOC to aid in the conservation and streamlining of the important work we do for the State of Kuwait.

The way forward for the remainder of 2022 and beyond calls for us to remain innovative and attentive to our strategic objectives, as we strive to retain our position as the State of Kuwait's most vital economic engine. In addition, I believe that I speak on behalf of everyone at KOC when I say that we are proud of the very important achievements we have made over the past quarter. Naturally, the most visible of these achievements occurred in the month of February, when KOC was active in its support of our national holiday.

In addition to the work that KOC does for the benefit of Kuwaiti society, our Company continues to focus on the various ways we can improve our operations

by raising the bar in terms of the standards we set for safety, efficiency, and the protection of the environment. In the pages that follow, I encourage readers to learn about some of the very important work your fellow employees have been conducting toward the causes of safety, sustainability, talent development, and more. In this regard, some of our lead stories for this issue include important technical breakthroughs and innovations KOC employees have been involved with.

KOC continues to play a pivotal role in achieving our strategic objectives by discovering new hydrocarbons and maximizing the country's oil and gas reserves in a cost-effective manner. For example, in our quest to deliver on KOC's strategy, the Exploration Group is moving from "success" towards "excellence" and taking a step forward toward establishing a Center of Excellence to provide geophysical support and solutions for the company's Exploration and Fields Development operations. This ambitious initiative is being led by KOC's In-house specialized technical staff. The initiative focuses on the effective utilization of state-of-the-art geophysical technologies in processing, analysis and characterization of seismic data to gain deeper insights and reduce exploration and development uncertainties.

In addition to the aforementioned topics, this issue also contains a number of submissions from KOC employees who continue their hard work in the pursuit of excellence. These articles are testament to the ability of our people and their willingness and determination to meet the challenges before them, especially in times of adversity.

Our commitment to the goals of our 2040 Strategy is as strong as ever, and I look forward to witnessing even more accomplishments over the next quarter. In this regard, I encourage each and every KOC employee to renew their commitment to the Company and the State of Kuwait as we continue to work toward delivering energy to the world in a safe, efficient, and responsible manner.

HH the Amir Inaugurates Kuwait's Clean Fuels Project

His Highness the Amir Sheikh Nawaf Al-Ahmad Al-Jaber Al-Sabah commended the completion of Kuwait National Petroleum Company's multibillion-dollar Clean Fuels Project, proclaiming it as a new "wealth" bestowed upon the Kuwaiti people. "I congratulate the Kuwaiti people on the completion of this project," HH the Amir said during a ceremony to inaugurate the now fully-operational facility, where he was joined by HH the Crown Prince Sheikh Mishal Al-Ahmad Al-Jaber Al-Sabah and Saudi Arabia's Energy Minister Prince Abdulaziz Al-Saud. Also present were HH the Prime Minister Sheikh Sabah Al-Khaled Al-Hamad Al-Sabah, Deputy Prime Minister, Minister of Oil and Minister of State for Cabinet Affairs Mohammad Al-Fares, Kuwait Petroleum Corporation (KPC) Deputy Chairman and CEO Sheikh Nawaf Saud Al-Nasser Al-Sabah and KNPC CEO Waleed Al-Bader.





H.H. the Amir and senior government officials inaugurated the new project.

HH the Amir unveiled a memorial plaque during the inauguration. Addressing the event, HH the Crown Prince, representing HH the Amir, highly commended the project as reflecting Kuwait's commitment to fulfilling local needs and international demand for clean fuel, in compliance with global endeavors to cut air pollutants.

He underlined Kuwait's ambition for attaining a clear-cut development strategy that would promote the country's status in the global oil refining industry. He also cited top priorities for creating new jobs for young Kuwaitis, enabling them to work in their own country's most vital sector. HH the Crown Prince voiced much appreciation to all Kuwaitis for their efforts and achievements in carrying out the project.

Deputy Prime Minister, Minister of Oil and Minister of State for Cabinet Affairs Mohammad Al-Fares commended HH the Amir's patronage and attendance of the ceremony, together with HH the Crown Prince's presence, as reflecting the commitment of the country's wise political leadership to follow up

on and support national development projects in various domains.

The minister said the Clean Fuels Project is one of the major projects in the history of the Kuwaiti oil sector, which includes a wide-scale and unprecedented revamp and development of the Mina Al-Ahmadi and Mina Abdullah refineries, with a view to producing high-quality oil byproducts that comply with relevant global criteria and requirements. He added that the project mirrors Kuwait's endeavor to become an attractive economic hub, and is part of KPC's strategic goals of making the best use of the country's oil resources, given that they will contribute to boosting national earnings, open new markets, and promote Kuwait's leading status in the global oil industry.

Al-Fares also said the significance of the project stems from the fact that the oil sector is the key pillar of Kuwait's national economy, which is why Kuwait, through HH the Amir and HH the Crown Prince, pays much attention to this natural resource and wishes to develop this vital sector. He noted that to maintain its competitive edge, the Kuwaiti oil sector has always been eager to keep up with the latest developments of this industry and to fulfill its various requirements by using cutting-edge technology and developing human capabilities and skills. The minister concluded by speaking highly of the oil sector's strategic policies and plans in qualifying and training Kuwaiti youth in efficiently running the country's oil affairs.





KOC MEETS KUWAIT'S ENERGY REQUIREMENTS

KOC operates according to a fixed, unwavering objective, which is to serve Kuwait and its society in every possible way. The achievements in this context are numerous, and the areas of support provided by the Company to elevate the status of the country and the quality of life of its citizens and residents has increased throughout the years.

The two goals of support and service are embedded in all the activities carried out by the Company, whether in its oil operations that secure the largest part of the country's revenues, or through other initiatives and projects that it launches and implements in the areas of community service, environment, health, sports, education, culture, entertainment, and many more, earning its position as the leading and largest company in Kuwait.

With this distinguished position comes great responsibility, which the Company lives up to by striving to meet all the needs of Kuwaiti society. One of the needs that grows steadily with an increase in demand is fuel, which is one of the main components produced as a result of KOC's oil and gas operations.

The Company has strived for decades to enhance

gas and fuel production to meet the local demand of all sectors of the country. In the following article, Ghazi Al-Osaimi, Team Leader of the Consumer Networks Team, discusses various aspects related to KOC's core operational responsibilities and the Company's desire to live up to its responsibilities to the community it operates in.

Extensive Networks

During the interview, Al-Osaimi explained that KOC's main tasks are related to the exploration and production of oil and gas and its derivatives, but there are other related tasks that are no less important than exploration and production. This includes securing the fuel needs of consumers in the State of Kuwait, especially for power generation and water desalination plants affiliated with the Ministry of Electricity, Water and Renewable Energy.

Al-Osaimi maintained that the Company is contributing to the realization of the "Kuwait 2035" development plan, noting that it provides consumers with fuel through networks consisting of pipelines extending throughout the State of Kuwait, to cover all the needs of the country's commercial and residential sectors.

This is considered a key role for the Company in implementing the National Development Plan 2035 for the State of Kuwait, which includes a number of strategic projects that aim to achieve a new vision for Kuwait. It is therefore imperative for KOC to keep pace with this development by increasing the ability to provide the fuel needs necessary to operate vital projects in the State. Including, for example, the new Al-Zour Refinery, whose feeding lines were recently launched and operated, in addition to the future projects of the Ministry of Electricity, Water and Renewable Energy, such as the Al-Khairan plant, the second phase of the Al-Zour North, and the Nuwaiseeb Power Generation and Water Desalination Plant in the South of Kuwait.

Significant Increase

In regard to the development of the feeding network that provides consumers with fuel, Al-Osaimi explained that KOC has developed the feeding network through the completion of many projects that have subsequently succeeded in increasing it by four times its previous size. KOC has also worked to expand it to provide full support that guarantees continuing the operation of this network around the clock, while also doing everything in its power to reliably supply energy for consumer operations.

A question arose about the role the Company provides to Kuwaiti nationals to implement and complete its projects. Al-Osaimi emphasized that KOC goals were not limited to securing fuel for the State sectors alone, but extended to employing and training citizens, which is the main element behind supporting progress and development in the country.



Al-Osaimi maintained that KOC is highly devoted to its national workforce, which is evidenced through training them to reach the highest levels of efficiency and effectiveness, and providing all resources to achieve the highest levels of progress and development.

Stations and Companies

Regarding the sectors and companies that KOC supplies with fuel, the Consumer Networks Team Leader pointed out that it supplies power generation and water desalination plants of the Ministry of Electricity, Water and Renewable Energy, such as the Subiya, East and West Doha, North and South Al-Zour, North Shuaiba, and Shuwaikh stations.

The Company also supplies some facilities in other oil sector companies affiliated with the Kuwait Petroleum Corporation, including refineries and petrochemical plants, in addition to the factories of private sector companies, such as the National Industries Group and the Aquasan factory.

With regard to how to meet con-

sumers' fuel needs and the type of products that consumers are supplied with, he stated that the Company supplies fuel according to the plan approved by the Kuwait Petroleum Corporation, in which the largest share of fuel consumption is allocated to power generation and water desalination plants of the Ministry of Electricity and Water and Renewable Energy.

He pointed out that the Company supplies consumers with all types of gas and liquid fuels, such as diesel gas oil, heavy fuel oil, and crude oil.

Various Responsibilities

Al-Osaimi explained the tasks carried out by the Consumer Networks Team and said the Team is responsible for managing, following up, and operating the fuel pipeline networks throughout Kuwait. This includes coordinating on a daily and direct basis with the Ministry's power generation and water desalination plants, in order to ensure the continuity of fuel supplies in the best way according to the quotas set by the Kuwait Petroleum Corporation.

The Team also coordinates with consumers through central control rooms equipped with the latest remote monitoring and control systems, working around the clock.

Another one of the Team's tasks is to maintain the efficiency of the pipes, through periodic inspections using the best and most up-to-date international methods, in addition to taking samples of the fuel sent to ensure its quality for all consumers.

In addition to the daily operations and follow-up, KOC, represented by the Team, maintains these networks, following the approved maintenance programs to ensure the continuity of fuel supplies and maintain the readiness and reliability of the infrastructure.

Vital Project

Every line of work faces specific challenges and difficulties. Al-Osaimi talked about some of these challenges and how to overcome them. He considers one of the biggest challenges faced by the Team, especially in light of the construction of new cities and urban expansion in the country, is the increasing demand for gas from the power generation and water desalination plants of the Ministry of Electricity, Water and Renewable Energy, as locally produced gas does not cover the needs of the country.

However, he continued by saying that after the establishment of a project to import liquefied gas facilities in the Al-Zour region, which is affiliated with the Kuwait Integrated Petroleum Industries Company (KIPIC), this vital project contributed to providing additional quantities of gas that succeeded in reduc-

ing the consumption of liquid fuel, as gas is an economically and environmentally viable alternative to other liquid fuels used in electric power generation.

Meeting Requirements

Regarding infrastructure support projects that contribute to supporting the increasing demands on fuel, Al-Osaimi said that the high consumption of electrical energy in the State of Kuwait was accompanied by an increase in demand for fuel in power generation and water desalination plants. This resulted in the need to establish infrastructure support projects, in order to meet the entirety of the country's needs.

He added that KOC has implemented projects to raise the capacity of the infrastructure extending from North to South Kuwait, and was keen to provide it with the latest developments in the oil and gas industry in terms of measurement technology, quality assurance, and remote control.

The Company is also in constant coordination with the Kuwait Petroleum Corporation to study the future needs of fuel for all consumers in the State of Kuwait.

The Consumer Networks Team Leader revealed that the total length of the KOC network pipelines, which are dedicated to feeding fuel from the fuel sources of the oil sector companies to all consumers in the north and south of the State of Kuwait, is approximately 2,000 km, in addition to the necessary pipe accessories, such as safety and isolation valves, burning points, and emergency unloading.

He also talked about other facilities set up by KOC to meet the needs of consumers, in particular Gas Booster Station 180, which consists of three main units dedicated to serving the gas fuel network, including:

- Gas Condensate Separation Unit that is used in emergency cases to ensure the continuity of supplying gas fuels of the required quality to the power generation and water desalination plants of the Ministry of Electricity, Water and Renewable Energy.
- Compressors dedicated to low pressure lean gas, which aims to reduce burn rates by raising gas pressure and converting it to a high pressure fuel network.
- Fuel gas compressors that enhance gas pressure in proportion to the needs of gaseous fuel for electric power plants.

Safety is a Priority

To conclude, it was necessary to discuss security, safety, and control procedures of the fuel supply networks. In this context, Al-Osaimi said that the field of safety is a priority for KOC, which is responsible for monitoring the operations of these networks through central control rooms equipped with the latest monitoring systems, such as cameras, and the Pipeline Leak Detection System. In addition, KOC conducts continuous inspection tours through vehicles equipped with leak detection devices in order to ensure that there are no fuel leaks or violations that threaten the safety and security of lives, property, and facilities.

KOC Data Analytics

Submitted by the Corporate Information Technology Group





Figure 1: KOC Data Analytics

KOC Data Analytics Journey

Businesses still struggle to make data-driven business decisions, relying instead on all classic strategies-experience, status quo and “gut feeling” to do the right thing. Hence the need for BI systems was derived from the concept that managers with inaccurate or incomplete information will tend, on average, to make worse decisions than if they had better information. Creators of financial models recognize this as “garbage in, garbage out.”

With this in mind and the fact that the Information Technology Group (CITG) has continuously been working to support the business by deploying the latest suitable technologies and following the best approaches/ methodology that effectively contributes to increased work productivity and ensuring excellence, hence the introduction of Business Intelligence (BI) in KOC.

Information Technology Services Team (ITS) has come to the forefront with the introduction of powerful BI technology in 2014 to support the data analysis of KOC, which transformed the business in a tremendous way by driving new returns and gaining competitive advantage. The ITS Team cooperates with other Groups & Teams to develop dashboards in various core and non-core fields including production, drilling, HSSE, etc. that effectively allowed access to the required information, instantly enabling decision making based on a clear vision and comprehensive evaluation.

Business Intelligence (BI) refers to the procedural and technical infrastructure that

collects, stores, and analyzes the data produced by a company’s activities.

BI is a broad term that encompasses data mining, process analysis, performance benchmarking, and descriptive analytics. BI deconstructs all the data generated by a business and presents it in the form of easy-to-digest reports, performance measures, and trends that facilitate making business decisions at various levels in the company.

BI attempts to solve this problem by analyzing current data that is ideally presented on a dashboard of quick metrics designed to support better decisions.

KOC data analytics helps executives, managers, and other operational staff to make better and more informed business decisions in various departments in KOC. Some areas that have benefited include KOC oil and gas production core business, drilling services, finance, HSE, oil spill, HR and recruitment, asset management, etc.

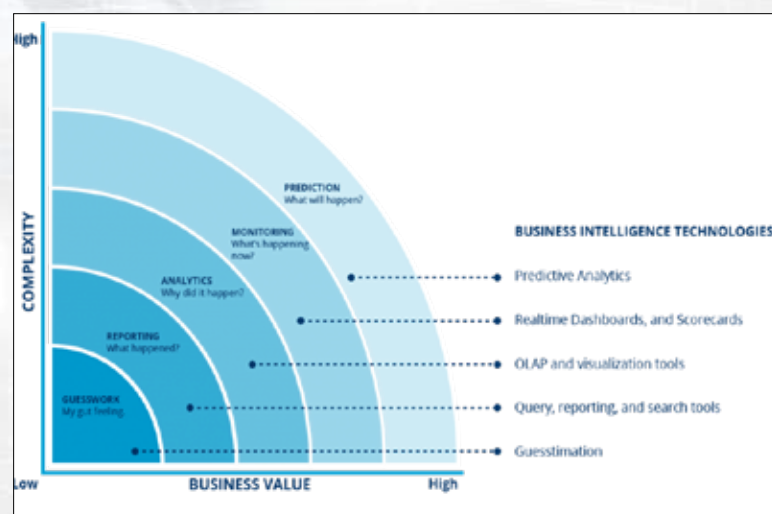


Figure 2: Business Value & Complexity



Business Value

The valuable information that data analytics/dashboards provide enables the top management to react quickly and efficiently across all decision-making processes and make effective and timely decisions.

Analytics dashboards saved around 50% of user's time, as the manual approach requires much time to aggregate data from multiple sources and reveal the key/most important KPIs.

Automated dashboards aggregate, compile and present data consistently and cohesively in real-time which helps conduct detailed analyses and reduce unnecessary work and repetitive tasks.

Lead to Better Decision-Making in KOC: The biggest benefit we achieved through the business dashboard is better decision-making. It allows the user to

look at summaries of aggregated data to make informed business decisions. Not only is data easier to consume, but it can be analyzed faster.

Time-Saving: Business dashboards saved our users time because they aggregate data from multiple sources and reveal the most important KPIs. Without dashboards, KOC would have to manually compile data from multiple sources and aggregate the data themselves. The manual approach requires more resources than an automated dashboard and increases the chance of human error. Automation frees valuable time to perform more detailed analyses and improves employee satisfaction with a reduction in mundane, repetitive tasks.

Improved Goal-Setting: Business dashboard helped to improve KOC's goal settings. Now, KOC can make more data-driven decisions with goal setting because

the right data can be delivered at the right time. This leads to more accurate benchmarks and actionable goals at every level of KOC. Our executives can see how the business is performing in real-time throughout the quarter and can make tactical pivots if they observe an objective isn't working. With new information, goals and expectations can be adjusted as needed. When data is visible securely throughout KOC, KPIs can be aligned to strategy and business goals in order to improve business processes.

Shared Insights: Full implementation of an analytics platform allowed users throughout KOC to gain visibility into KPIs in each department.

Improved Internal and External Communications: Dashboards are a great communication tool because it's easy to see how KOC and its departments are performing. Telling our company's story through data visualization made it easy to create powerful presentation material for meetings on a large or small scale.

Boost Employee Performance: Consistently and accurately evaluating employee performance is essential not only to individual success, but to the overall success of our organization; this is made possible by providing staff access to these dashboards for their business use.

Increased KOC Profitability: Through the use of dashboards, our executives are able to identify organizational obstacles and can better deal with the competition. Once you know where you need to make improvements, you know where to focus your time, energy, and resources to improve results and your bottom line.

Some of the Major Successful Cases

KOC Data Analytics Unit accomplished 300+ successful dashboards in all business areas and integrated with different systems.

The projects mentioned below are examples of some successful analytics projects:

- PEP Dashboard
- COVID-19 Dashboard
- HSSE Dashboard
- Planning Group Analytics Dashboard (CEO Dashboard)
- KOC Hospital Analytics Dashboard
- Leadership Dashboard

PEP Dashboard: KOC Production Excellence & Planning dashboards help in analyzing the production history. It gives an overview of crude production, water export, details about gas, GC/booster station shutdown, gas flaring etc. The PEP master dashboard supports the senior management to monitor daily crude production against set target. This ensures that KOC's commitment to KPC for delivering agreed quantity of crude is met which in turn ensures that KPC can meet its commitment to international customers.

COVID-19 Dashboard: COVID-19 dashboard presents the health status of the COVID-19 infected employees of the Gas & Innovation Directorate of KOC. It gives an overview of the total COVID cases by employee type, month, Directorate, Group, and Team. It also provides G&I vaccination status, distribution of PPEs, disinfection and awareness information.

HSSE Dashboard: KOC Health, Safety, Security, and Environment dashboard provides an overall monthly analysis of total fatalities, volume spilled, environmental incidents and total fires.

Planning Group Analytics Dashboard (CEO Dashboard): CEO dashboard shows the summary of gas figures, gas flared, oil gain, wells connected, system production capacity, drilling and work-over rigs, well surveillance, production facilities, strategic initiatives, HSE, financial details etc.; an overview of the main overall company activities.

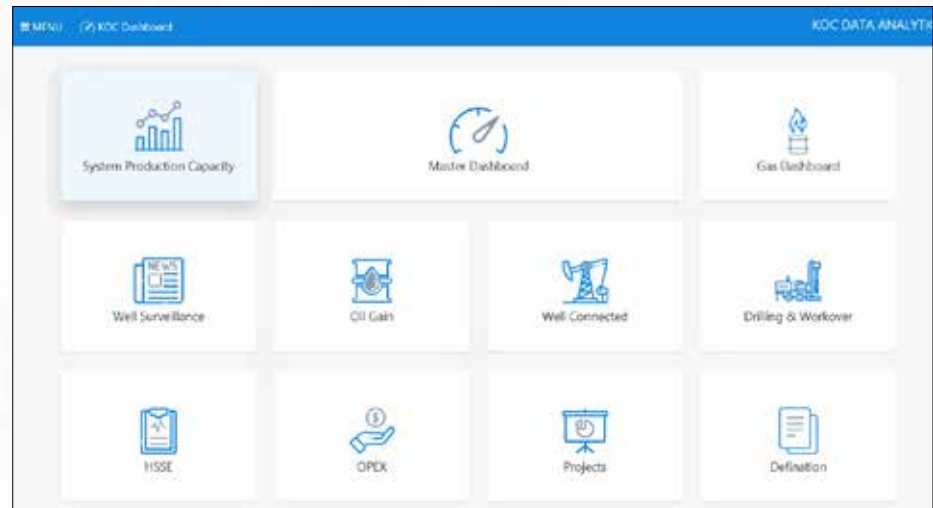


Figure 4: KOC Dashboard

Ahmadi Hospital Analytics Dashboard: Ahmadi Hospital analytics dashboard mainly focuses on all admission analysis, bed utilization, inpatient and outpatient figures, etc.

Financial Analytics Dashboard: Financial analytics dashboard displays revenue analysis, sales volume, expenses analysis, profit margin, operating profit, etc.



Figure 5: HSSE Dashboard

Quotes

"The PE&P dashboard helps the management to monitor its commitment of crude dispatch to its customer (KPC) on a daily basis which in turn ensures that KPC's can meet its commitment to international customers."

-Production & Excellence & Planning Team

"The advanced data analytics solution, developed by ITS Team, empowers the Drilling Standards and Excellence Team to reduce drilling operational inefficiencies, it is imperative to track, measure and compare the operational duration for each well activity to a corresponding benchmark figure. This would enable the operational Groups to identify the primary areas of loss along with the responsible parties and to take the necessary decisions to minimize them."

-Drilling Standards & Excellence Team



"We are constantly working within strategies toward achieving our mission & vision through a digital ecosystem that promotes collaboration, knowledge sharing, innovation, and data analytics which support decision-making in all company's areas/ sectors."

Bader Al-Attar
@Deputy CEO -
Planning & Finance



"We are always looking to apply new technologies and provide diverse services that align with KOC's strategic objectives such as data analytics, which is a highly effective way to improve operational efficiency and boost processes and support decision making based on a comprehensive vision."

Ali Al-Naqeeb
CIT Manager



"Data analytics can be applied in various business areas, in KOC, we have applied this technology for top management to enable informed data-based decisions."

The data is usually analyzed from past events which leads us to identify current and new trends, KOC data analytics services has become one of the most important service due to its great return on business efficiency."

Yacoub Al-Bash
ITS TL



We have developed various actionable insights to streamline analytics processes and visualize data, which leads to faster and more confident decisions."

Ali Al-Neama – IT Supervisor



"We have successfully built high standard data analytics platform with the latest technology to support all KOC business cases and needs and standardize the processes to expand and cover business cases which has a significant impact for continuous business improvements and better resource utilization."

Ghada Barakat
TPL Specialist



"We have been cooperating with many groups & teams in KOC to implement data analytics in their business areas,

Over the years, we had many successful dashboards in many areas like Crude & Oil Production, Contracts, Medical services, HSSE, etc."

Ahmad Marwan
Lead IT specialist



"Success is a journey, not an action. We started our journey by identifying a need and using technology to solve these problems, it has grown to cover all types of areas and how to facilitate daily work for engineers, employees, and senior management to obtain the correct information needed to make timely accurate decisions."

Ahmad Matouq
Lead IT

Future Plan

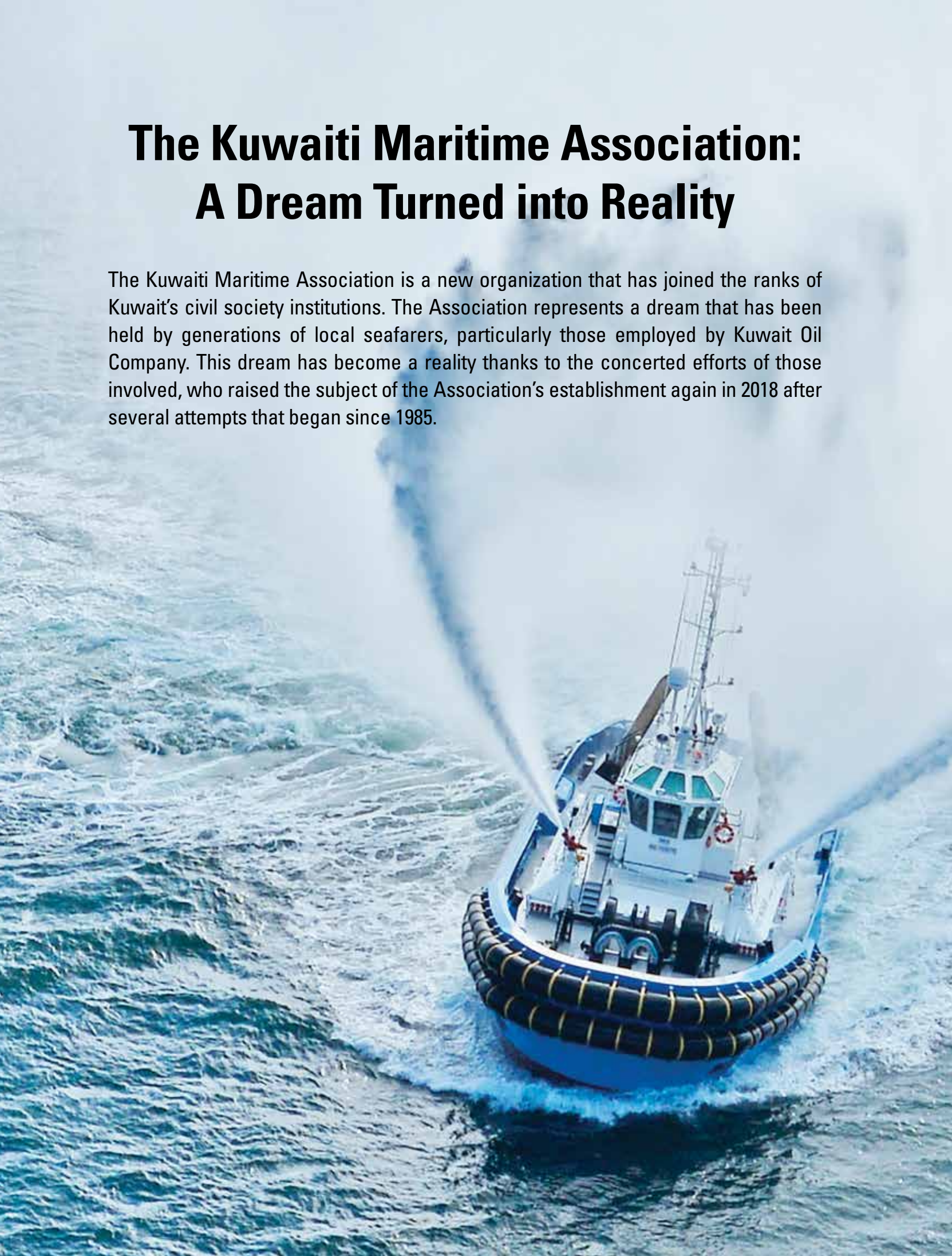
As business intelligence is constantly growing in response to changing corporate needs and technological advancements, we identify current trends to keep users informed about the new developments. Moreover, artificial intelligence and machine learning will continue to advance and that may include AI-derived technologies and insights into a larger business intelligence and analytics strategy. Creating an effective organizational structure to govern the development, deployment, and operation of AI applications at scale is essential for achieving sustained results in KOC. Therefore, KOC is establishing an Artificial Intelligence CoE (Center of Excellence) team to fulfill scalable AI initiatives which will drive business value in the organization.

KOC's efforts to exchange data and collaborate will grow as companies strive to become more data driven. Data visualization is expected to become even more important as teams and departments collaborate.

CITG is always looking to apply the latest technologies, such as Business Intelligence, Artificial Intelligence, and many others which align with KOC's strategic objectives and 2040 Strategy to be an upstream leader recognized globally for excellence.

The Kuwaiti Maritime Association: A Dream Turned into Reality

The Kuwaiti Maritime Association is a new organization that has joined the ranks of Kuwait's civil society institutions. The Association represents a dream that has been held by generations of local seafarers, particularly those employed by Kuwait Oil Company. This dream has become a reality thanks to the concerted efforts of those involved, who raised the subject of the Association's establishment again in 2018 after several attempts that began since 1985.



Since its conceptual inception in 1985, the Association has experienced several challenges, including the fact that it was compared to the Fishermen's Association. However, after confirming that the mission and objectives of the two societies are different, the authorization was approved.

The Association is the entity comprising all academic specialists in the maritime field. It has an educational awareness objective which aims to utilize research, studies, certification checks, and put forward proposals, in addition to counseling for the development of Kuwait's maritime sector.

The Association is relevant to the K-Companies in general and Kuwait Oil Company in particular, considering the fact that about half of its founding members are employees of the oil sector. Captain Saud Al-Awadhi, the President of the Association's Board Council and a Pilot Captain at Al-Shuaiba Port, discussed the details of the new Association, as he played a critical role in establishing the organization.

The Association's Official Establishment

Al-Awadhi said that since 1985, there had been attempts to establish the first Maritime Association in Kuwait, but those endeavors were not successful for a number of reasons. Each attempt had its own circumstances, including government procedures and the requirements for publicity of public benefit associations. Therefore, every attempt took time and resources, and there



**Captain Saud Al-Awadhi,
President of the Association's
Board Council.**

were some complications such as not having enough founding members.

"The idea of the association has always been on our minds. Kuwait is a maritime country and is almost entirely, if not 100%, dependent on export operations. Between 60 and 70% of our oil exports are by sea, and imports come by sea. We have three commercial ports: the ports of Al-Shuwaikh, Al-Shuaiba and Doha. Therefore, the main objective of the Association's establishment is a qualified maritime sector that includes graduates and experts who try to communicate their ideas, objectives and activities by explaining the nature of their work, which is not entirely known to many people in Kuwait," Al-Awadhi said.

He pointed out that even if most people in the maritime domain were asked about the nature of a marine pilot's job, they would not know the answer, because Kuwait's maritime sector is relatively unknown in public or professional settings. There-



**Captain Ahmed Al-Awadhi,
Secretary of the Association.**

fore, at the beginning of 2018, organizers re-established the Statute, and began collecting signatures that numbered more than 50 for the founders of the Association. The government action took time because of the COVID-19 pandemic; however, in May 2021, the adoption of the Ministerial Decision announcing the Association

“
Several attempts have
been made to establish
a maritime association
in Kuwait since 1985,
with the endeavors
finally succeeding in
May of 2021.
”

came into effect, with the announcement becoming official after it was publicized in Kuwait's newspapers in June of that year.

He explained that the Association is an old dream inher-

“
The Kuwait Maritime Association is the second maritime association in the Arab world.
”

ited by generations of maritime specialists in Kuwait, particularly from Kuwait Oil Company, since 1985. In 2018, Al-Awadhi revisited the topic and brought back an attempt to turn it into reality. Nobody expected it to become approved because the Association faced many challenges in the past, including the fact that it was compared to the Fishermen's Association. However, it was approved after confirming that the purpose and function of the two Associations were different, they are not related, and their activities do not conflict.

Educational Target

“As a Public Welfare Association, our educational objective is to hold conferences, informative sessions, and workshops aimed at development. We can develop, present, and adopt an idea as a proposal, as well as prepare studies on a particular topic about marine needs that the Association considers important and useful to the maritime sector,” Al-Awadhi said.

He maintained that the Association represents the maritime entity for each specialized graduate in this field, by supporting him in presenting its views, proposals and ideas, contributing effectively to develop Kuwait's maritime sector, and preparing research, consultations and proposals.



The Team shortly after their successful bid to establish the Kuwait Maritime Association.

Second Arab Maritime Association

Al-Awadhi noted that the Association is seeking to cooperate with similar associations around the world, adding that this Association is only the second Arab organization of its kind to be established, after the long-standing Association that was founded in Alexandria, Egypt. There are no other similar associations in the Arab world.

He noted that the Association has started to correspond with other organizations around the world to cooperate on various matters. This correspondence includes communication with a similar organization in the United Kingdom. In addition, the Kuwaiti Maritime Association is seeking membership in the World Maritime Organization.

Al-Awadhi indicated that one of the Association's tasks is to sign cooperation protocols with several entities. It is currently working on a cooperation protocol with associations in Kuwait, covering all areas related to marine activity.

Bridges of Cooperation

“We are building bridges of cooperation with all maritime

sectors in Kuwait. We visited KOC Marine Operations Group Manager Sami Al-Sawagh, who welcomed us and expressed his pleasure at the establishment of the Association,” Al-Awadhi said.

He added that they had visited Kuwait Fire Force Chief Lieutenant General Khaled Al-Makrad and awarded him an honorary membership, as he is a marine graduate. They agreed on a number of items which govern future cooperation between the two sides. They also visited the Kuwait Oil Tanker Company and met with the DCEO of Fleet Operations, Captain Yousef Al-Sagr, as well as communicating with the Kuwait Ports Authority, the Ministry of Communications (Department of Shipping), in addition to cooperation with the military, specifically the Navy and Coast Guard.

Mutual Benefit

Al-Awadhi explained that there was a strong link with KOC, as it is the only company in the country involved in the export of petroleum products by sea. In addition, nearly half of the Association's founding members are employees of K-Companies, which serve the offshore sector, as Kuwait depends heavily on oil exports. Therefore, those

companies are very important to the offshore sector in Kuwait.

He maintained that the promotion of maritime issues in Kuwait is very important for workers in the field, as the Association aspires to carry weight in the country and to have all maritime disciplines and certificates known.

He confirmed that the Association is concerned with maritime affairs and strives to overcome all challenges. It adopts ideas in the maritime space and then



The Kuwait Maritime Association was established after many meetings such as this one were organized.

adapts them for the benefit of civil society. That is the main objective of the Association's establishment, Al-Awadhi said.

He pointed out that, for example, the issue of transferring the maritime sector of the Ministry of Communications to a particular entity has been currently raised. The proper governing body should have a certain perception of the issue and express its opinion in the public interest.

On the subject of the business conflict between the Association and the Company, Al-Awadhi said, "We have not actually started working because of the conditions imposed by COVID-19. If there are meetings or travel requirements outside Kuwait, an official letter will be

submitted to exempt members of the Association from working during the travel period."

Terms of Accession

Al-Awadhi noted that the Association has 50 members, with more than half in the oil sector, and the majority work at KOC (21 members). It has social media accounts and it started providing services to members by granting discounts in hotels and other locations.

He emphasized that the 50 current members were just the beginning. Many want to join, but currently the Association is still in the process of establishing, processing and developing its rules and regulations.

The Board Council has seven members: Captain Saud Al-Awadhi, Vice-

President Captain Hamid Al-Heneedi, Secretary Captain Ahmed Al-Awadhi, and Treasurer Abdullah Al-Qalaf. Other members include Alaa Hassan, Abdul Amir Al-Faraj, and Talal al Al-Abdullah.

Al-Awadhi recalled that the Board Council was chosen and only the secretarial post elected, adding that elections will be held every year.

Membership is open to all nationalities holding recognized maritime certificates and paying the subscription fee, and any non-Kuwaiti member can enjoy all the advantages of Kuwaiti members but without the right to run for office.

He revealed that people of dif-

“Of the 50 founding members, 21 work at KOC, including three Board Council Members.”

ferent nationalities want to join the Association, because it is the second in the Arab world, and it does not exist in their countries.

He asserted that the Association will only accept members if they are a marine specialist or engineer, except for the honorary president. The search is still ongoing and its conditions have not been specified yet. The honorary membership requires a maritime certificate, naval engineer, naval captain, or a two-year certificate from the Navigation Institute of Kuwait. The Nakhuda (Pilot) is accepted on the condition that he has a certificate, whereas if a person has a naval degree and does not work in the sea, he can join the Association.

Training Sessions

"We are currently in the process of establishing the rules and procedure and financial regulations, which will take time until they are approved by the founders. Then accounts and income will be formalized and membership will be opened," Al-Awadhi said.

He noted that the Association planned to organize training courses presented by qualified lecturers for those interested in marine operations. For example, the Association will organize a course on how to obtain an operator's license from the Maritime Transport Department.



The Digital Innovation & Geospatial Services Unit – An Introduction

Submitted by the Digital Innovation & Geospatial Services Unit

Location data and analytics underpin every element of the energy industry's exploration and production activities. Additionally, location data and analytics play a valuable role in protecting Health, Safety and the Environment (HSE), as well as in technology innovations in this industry.

Understanding and integrating location information and geospatial analysis at the enterprise level enables staff to gain more insights, drive intelligent operations, and deliver a safer and more sustainable business. Geographic Information Systems (GIS) is the spearhead of location data analytics and intelligence. Therefore, GIS represents the forefront of Geospatial Technology. In the past 20 years, GIS has become the indispensable technology in energy companies all over the world to provide tools for supporting planning and operation at the enterprise level for the entirety of location-related functions in this business domain.

At KOC, the Digital Innovation and Geo-Spatial Services Unit is responsible for providing GIS software and geospatial services, Geo-AI (Geospatial Artificial Intelligence), Digitalization and Geo-enablement services, mobility GIS, and other modelling services to the organization. In addition to Training and Technical support, the services also include solutions development and spatial data management.

Led by Senior Engineer Shaima Shihab, the Digital Innovation & Geospatial Services Unit operates under the Information Technology Services (ITS) Team to provide (GIS) solutions to a wide range of users and business operations. The Unit also is involved in conducting Proof

Of Concepts (POCs) on Digital Innovations such as Artificial Intelligence, Machine Learning, Internet of Things, and Robotics.

In 2019, the Unit embarked a new project to modernize KOC's Geospatial Technology by implementing a Unified Geospatial Platform for GIS maps and Apps, the KOC MapsPortal. This new technology provides secured sharing capabilities of Maps and Apps among users throughout the organization. Such collaborative sharing would directly support the quality, safety and efficiency of KOC business processes by saving time and facilitating collective knowledge and awareness. KOC MapsPortal meets these needs by providing a vessel for assets and operational spatial information, paving the way towards complete Modeling and Digital Transformation of the organizational business.

tem Research Institute (esri®) which is the global leader in GIS technology and offers the SAG Award once a year. KOC won the award after careful assessment of applications submitted by nearly 100,000 companies and institutions around the world.

The selection of the winning organizations is made based on a set of standards that include the novelty of technologies and the architectural engineering and components used in the system, in addition to the quality and diversity of its Maps and Applications, and the extent to which they meet the operational requirements of the whole organization. This is besides many other aspects of system implementation that measures the impact that it has on enhancing and supporting the business operations of the organization and to which level it is customized and utilized in its activities.



Figure 1: MapsPortal Landing Page

Consequently, KOC has won the Special Achievement in GIS "SAG" Award for 2020 in recognition of its Unified Geospatial Platform, KOC MapsPortal. The award was announced as part of the annual GIS User Conference held by the Environmental Sys-

For example, the KOC MapsPortal has solved significant technical challenges, such as: removed barriers to collective spatial information making, sharing, and utilizing throughout the organization; eliminated redundancy by unification

of spatial data, maps and apps architectural and implementation standards. This is in addition to the centralization of Geospatial infrastructure which neutralized hindrances to GIS integration with other key organizational Information and Control systems. In addition,

tent and infrastructure of this technology makes it ready for advanced implementations of Mobility, VR/AR Modelling, Imagery, and Digital Innovations which is in line with the Company's goals for Digital Transformation.

of HSE policies and regulations which were greatly supported with the Geo-Analytical Tools of this platform. Additionally, it enhanced work quality by providing employees and management with spatial awareness and location-based decision-making support tools.



Figure 2: Land Reservation New Request Screen

KOC MapsPortal fortified spatial data security via advanced, unified, easy-to-manage Access Control mechanisms and dissolved limitations to GIS usability by providing this technology to a wider range of expert and non-expert users. In addition, modernized Geospatial con-

Business-wise, MapsPortal has also achieved significant return on investment through time and cost savings by leveraging business operations performance with the power of geographic maps and analytic means. This is in addition to the planning and implementation

Also, several business process automations were implemented using the new MapsPortal framework. This includes urban planning in North Kuwait, Drilling Planning, Fuel Tanker and Security Vehicle tracking, Instrument and Land reservation processes.

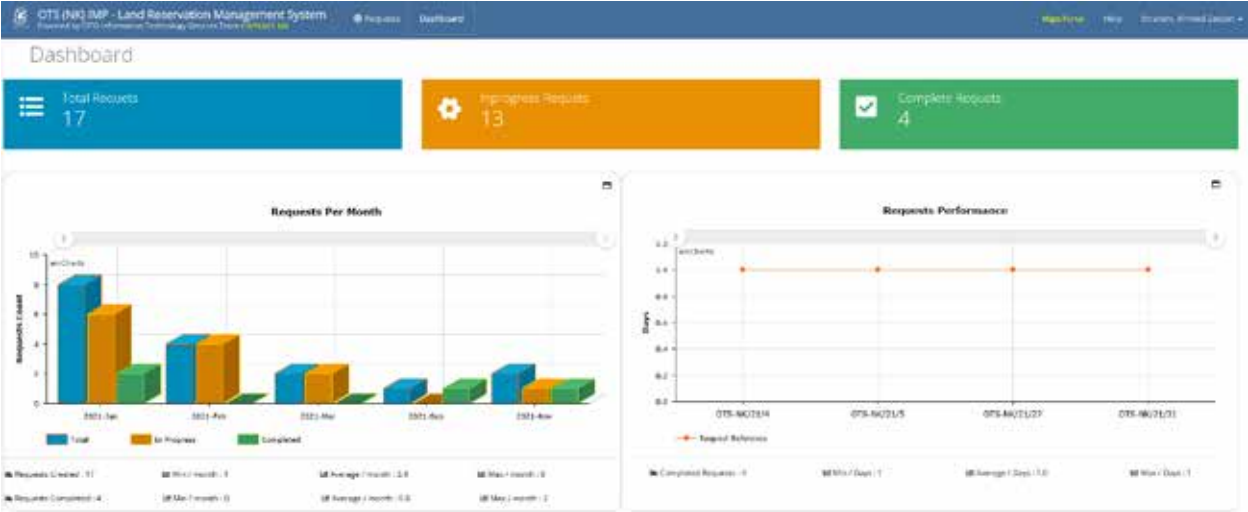


Figure 3: Land Reservation Dashboard Screen

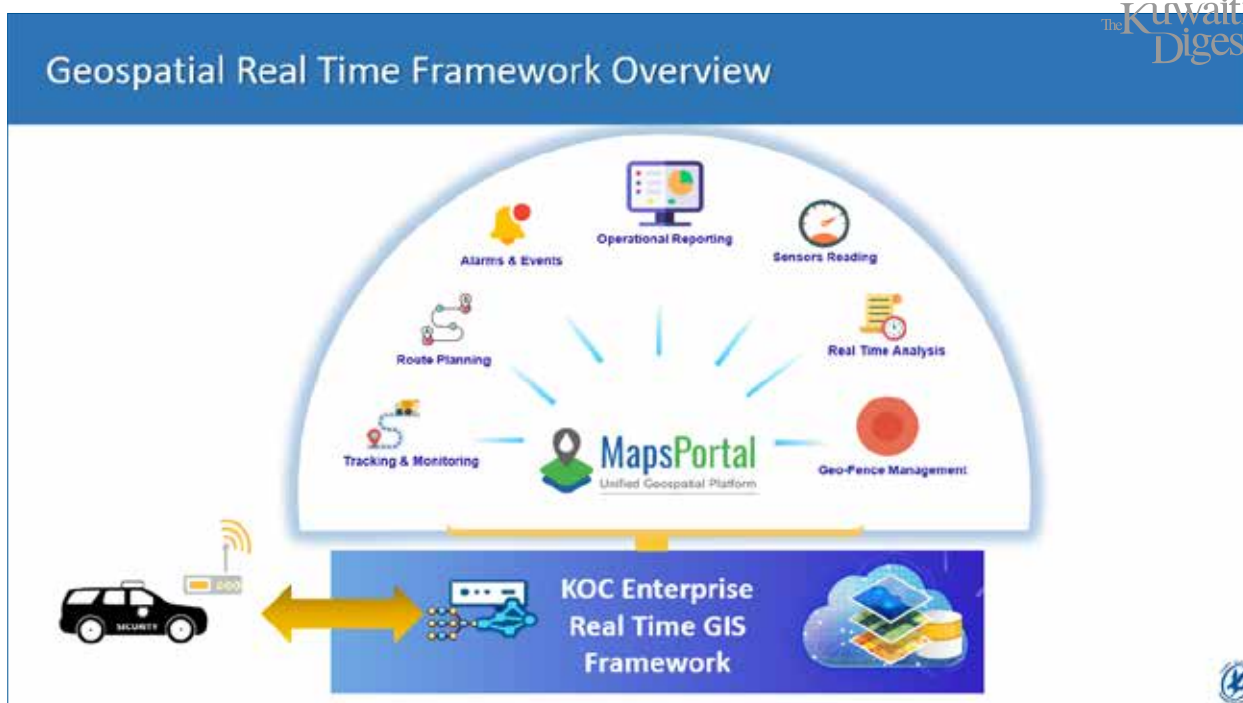


Figure 5: Geospatial Real Time Framework Overview

For example, the Land Reservation Management System (IMP NK) provides a full automation of land reservation from the request initiation until the final approval. The importance of this automation emerges from the fact that reserving land is a key step in the initiation process of KOC projects where the suitability and availability of the requested land is thoroughly investigated, and land reservation requests are processed by OTS Teams. However, the Land Reservation Management System provides Mapping and Geo-Ana-

lytical capabilities to help OTS North Kuwait to automate the process in a more efficient way with centralized records.

Another example of applications delivered by the Geospatial Unit is the Inspection and Corrosion Geospatial Analytics Application. This solution offers inspection and corrosion-teams with comprehensive capabilities to automate capturing, reporting and visualization of Inspection Process information such as leak incidents. For management, a Leak Register Dashboard was created to enable visualization and analysis of these incidents using a variety of criteria such as: date, asset area, service type, asset type, and expected reason of failure.

Another Business Process Automation conducted using the MapsPortal is the Security Vehicle Tracking Solution. Security Operations stretch over the entire operational areas of the Company, and this creates the need for utilizing the mapping and real-time monitoring capabilities of GIS. Due to the criticality and urgency of security operations, especially during emergencies, geospatial analysis and location awareness are needed to enhance the efficiency and reduce the response time considerably.



Figure 4: Inspection & Corrosion Dashboard Screen

lytical capabilities to help OTS North Kuwait to automate the process in a more efficient way with centralized records.

Additionally, a Land Reservation Operation Dashboard is made available to provide management with request tracking and reporting. Each request has a performance and the dashboard shows the

To assist the security teams, the Geospatial Unit has created an Enterprise GIS Real-time Framework to provide the needed capabilities such as real time tracking and monitoring, alarms, real time analysis, geo-fencing and operational reporting. This framework makes it possible to integrate real-time functionalities with our organizational GIS Maps.

A custom solution for Security Vehicles Tracking & Operations Monitoring was implemented using

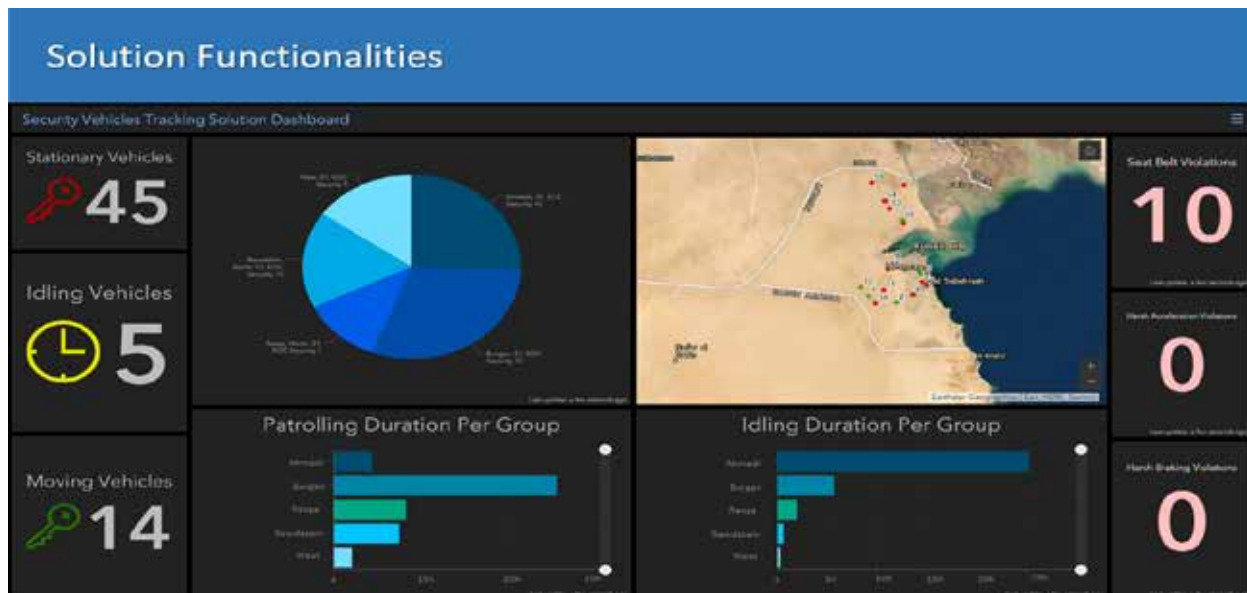


Figure 6: Security Vehicles Tracking Solution Dashboard

these Geospatial Real-time capabilities. The solution has a Real-time Viewer for vehicle location and patrolling parameters. It also has an interactive dashboard for security operations monitoring besides the administrative module for the management of vehicles and driver information. This solution saves time by automating surveillance processes, enhances decision making for better operational efficiency, simplifies management of incident responses, and facilitates operational safety through monitoring and instant alerts.

Following these accomplishments in establishing, upscaling and diversifying the Geospatial Technology applications at enterprise level, the Digital Innovation & Geospatial Services Unit is working on projects to provide more technologies and services for Modelling and Digitalization. In this regard, Process Execution Monitoring technology will be procured to provide modelling of assets and Engineering Processes for KOC facilities, as well as to automate the Management of Change (MOC) operations.

In parallel, drone technology will also be utilized to provide a wide-range of services for security, inspection, corrosion, and many other operations. In addition, the drone services will be the backbone of continuous data updates for both asset and process modelling due to the capability of drones to scan and create cartographic mapping.

The Unit is also planning on implementing advanced visualization techniques for Three-Dimensional Mapping, Virtual Reality and Augmented

Reality. These new techniques will push the limits of the modelling capability to a completely new level and open doors for more process automation and integration solutions on the way to achieve the ultimate Digital Transformation for Kuwait Oil Company.





Preventing Cyber Attacks at KOC

Cyber attacks refer to the deliberate exploitation of computer systems by individuals who use malicious computer code in order to alter, disrupt and compromise data.

By exploiting computer systems in this way, hackers have the ability to conduct cybercrimes such as information and identity theft. Recent reports from Symantec Internet Security indicate that approximately 10% of global cyber attacks are focused on industries in the energy and utilities field, with 45% of those attacks having cyber-crime as a main motivation behind them.

The recent rise in cyber-related attacks has led KOC to increase security within its systems. The following information outlines how KOC is protecting the security of its digital information.

What measurements has KOC implemented to prevent cyber attacks?

The steps being taken at Kuwait Oil Company in order to prevent cyber-attacks include the formation of an Information Security Team empowered by the Company's senior officials to handle all aspects related to the security of KOC's information. This includes gathering intelligence, monitoring activity throughout the Company's systems, assessing vulnerabilities and risks in the system and penetration testing. It also includes raising information security awareness across KOC through all communication channels (trainings and workshops, portal messages, email notifications, screen

savers, and social engineering activities), information security compliance, studying the market for new security solutions and trends, governance and cyber threat management.

KOC focuses on the three corners of the information security triangle that is composed of Process, People and Technology. Information Security Operations at KOC always consider the importance of utilizing standard industry processes, acquiring experienced personnel and resources to operate such processes and making use of the latest technology to enhance the efficiency of the information security automated operations.

What is KOC's Information Security Program?

KOC's Information Security Program is a process that requires continuous monitoring and updates. The difference between a project and program is



that the latter does not have an end date that indicates the nature of the information security operations. The technology component of the Information Security Program is continuously updated to ensure that KOC is always up-to-date in terms of information security trends.

Today, information security threats are developing and evolving on a daily basis. This requires our efforts to be at the same level so that we can secure our environment against every new threat.

In a recent study conducted by Symantec, a staggering number of 28,765 breached records per incident was noted, which indicates widespread breaches across the globe. These types of cybercrimes and information security incidents have cost organizations across the globe hundreds of billions of dollars in losses.

The Corporate Information Technology group at Kuwait Oil Company is currently in the process of implementing a wide-scale Information Security Program. The program includes the assessment of risks present at the organization, the identification of controls for those risks and the implementation of suit-

able monitoring and preventive solutions and multiple layers of security in order to strengthen the Company's Information Security vision.

Are other parties assisting the Company in the implementation of security measures, or does KOC rely on its own internal competencies?

As the Corporate Information Technology Group of Kuwait Oil Company has taken steps towards strengthening its information security posture and the maturity level of information security operations, it has contracted with multiple leading organizations in the information security domain.

Over the years, KOC has had information security agreements with Deloitte (a leading global firm in information security and privacy risk consulting), Symantec and McAfee (the global leaders in endpoint protection), and many other leading information security vendors and service providers. All of KOC's information security programs consider the importance of developing national capabilities through cooperation with leading companies, knowledge transfer and investing in education and specialized training

and certification to ensure the required caliber exists in this domain in the near future.

What types of cyber attacks are the most costly, and what type of cyber attacks present the most difficulty to the Company?

The consequences of cyber attacks range from information and identity theft, fraud, denial of critical services, system infiltration, Intellectual Property (IP) theft and defacement of public websites. Such attacks also have the potential to negatively affect the human interface of the organization (commonly referred to as Social Engineering attacks).

According to Symantec, cybercrime represents its highest cost to the global oil and gas industry. Sophisticated attacks are the most difficult and costly, as they use multiple techniques that target weaknesses in the three corners of the information security triangle (People, Process and Technology).

Facing such attacks requires continuous review of the information security processes, focusing on incident management, timely escalation and reporting and continuous monitoring and implementation of reviewed and updated policies and procedures. Additionally, it requires the utilization of the latest and strongest technologies that will facilitate implementing the information security processes. From a people perspective, it requires a highly mature environment with high awareness levels among employees (best achieved by implementing robust information security awareness campaign and mandatory training courses) to ensure that employees don't participate or fall victim

to social engineering attacks that can result in facilitating the attackers' job of breaking into our systems.

KOC is the backbone of the oil sector in Kuwait, which makes it a constant target for cyber-attacks. Does this create added pressure for those entrusted with the Company's protection?

In the past, Kuwait Oil Company has been the target of major attacks by the notorious group "Anonymous" in what they labelled "Operation Petrol," which included attacks at oil companies throughout the GCC. The Corporate Information Technology Group took steps to mitigate the impact of this massive operation by forming an Information Security Incident Response Team with direct supervision from top management. This team has monitored and analyzed activities in order to minimize the possible breaches of such attacks before they occur.

Being responsible for the information security of an organization that has the size and importance of KOC is definitely overwhelming, but with the assistance of KOC's partners (contractors and vendors), the Information Security Team at KOC is able to manage with the ever increasing pressure of limiting risks and reducing impacts to an acceptable level.

KOC is a major player in the oil and gas industry, and it has long been the target of cyber attacks, especially when "black-hat hackers" are concerned. A commitment to improving the overall security posture is always KOC's goal, and major enhancements are constantly being implemented. Such statistics only mean that KOC should

always focus on continuous improvement of information security programs and ensure that it is being given the right attention and required investments to minimize any potential impacts.

Is it true that hackers can infiltrate vulnerabilities in an oil company's systems and stop all major operations, resulting in a catastrophe?

Integrated Controls Systems (ICS) are the core information systems that control the day-to-day operations of oil and gas organizations. Due to their criticality, they are strategically placed separately from the regular information system network of the organization and protected by several layers of security. Therefore, attacks performed from the internet have an extremely low rate of success in disrupting daily operations, yet in the rare event of a successful exploit or breach of computer systems, the impact may be devastating and prevent normal operations.

What are the immediate steps that are taken in the case that the Company has been hacked?

Incident Management is a defined process for logging, monitoring and resolving incidents. Combined with Problem Management, the Information Technology Group will have the necessary preventive and detective controls in place to cover a wide range of possible scenarios and breaches. Staff members specially trained to address such breaches will form a Security Incident Response Team (SIRT) tasked with resolving those situations. Based on the Incident Response Process, the following are the steps that need to be followed following an attack: Preparation, Identification,

Containment, Eradication, Recovery, and documenting Lessons Learned.

Upon identifying a security breach (defined as incident), the SIRT will take over and assess the current state and impact of the breach by checking the relevant assets. Once the threat impact is assessed and affected systems are identified, the team will be able to contain it correctly and attempt to image the affected systems in a forensic manner for later analysis. Moreover, the analysis will highlight and answer how the breach occurred, what is being targeted, why we were targeted, and what systems are affected and if there was any data exfiltration. In a later stage, the team will mitigate the breach and then document the incident and lessons learned to enhance the process in case a similar incident occurs in the future.

How will employees be trained in regard to improving security at KOC?

Part of Kuwait Oil Company's plan includes a full-fledged Information Security Awareness program which covers all the essentials for all information system users as well as specialized subjects for the different Information Technology Teams throughout 13 information security topics. KOC's top management has provided full support and has agreed to enforce mandatory topics in order to better their security posture from the human interface factor. Moreover, ongoing security programs have provided extensive experience-sharing that has proven to be very beneficial to enhancing the organization's capabilities.



Kuwait & Saudi Arabia Sign Agreement to Develop Durra Gas Field

Kuwait Petroleum Corporation recently announced that Saudi Arabia's Minister of Energy, Prince Abdulaziz bin Salman, signed an agreement with Kuwait to develop the Durra gas field. KPC expects the Durra field, which is shared between the two states, to produce one billion standard cubic feet per day of gas and 84,000 barrels per day of condensates.

The plan entails the use of cutting-edge and environmentally friendly methods to ramp up gas output from the vital project, a joint endeavor between Saudi-based Aramco Gulf Operations Company and Kuwait Gulf Oil Company. According to the deal, gas output will be divided evenly between the neighbors, at a time where soaring consumption has led to growing demand for energy in the two countries. Durra is located in the Kuwait-Saudi Neutral Zone, where production is divided equally between the two countries.

Oil prices continue to climb as recent attacks on Saudi facilities and EU discussions on banning

Russian crude raise concerns over global supplies. Saudi Arabia has warned that attacks on the kingdom's oil facilities pose a "direct threat" to global supplies. Saudi Arabia "will not incur any responsibility" for shortages in oil supplies in light of the Iran-backed Houthi attacks, the foreign ministry said in a statement. These cross-border assaults are a "direct threat to the security of oil supplies in these extremely sensitive circumstances witnessed by the global energy markets," it added.

The statement comes after the kingdom acknowledged a temporary drop in production after attacks on a refinery with an armed drone. It urged the inter-

national community to "stand firm" against the insurgents. Oil prices have remained above \$100 per barrel recently, driven by supply concerns centered on Russia's invasion of Ukraine. Brent crude was at more than \$115 per barrel at one stage, with the price of oil approaching historic all-time highs.

Analysts said the main mover of the market was news of the EU considering a ban on Russian oil imports, although the attacks on Aramco were also cited. The drone assault on the Yasref refinery in Yanbu Industrial City on the Red Sea "led to a temporary reduction in the refinery's production," the Saudi energy ministry said. It added that the drop would "be compensated for from the inventory," but did not provide numbers.

Oil-rich Gulf countries, including Saudi Arabia, have been under pressure to open the supply taps, but have so far held firm, stressing their commitment to output cuts agreed by the OPEC+ alliance of oil producers.



KOC Establishes New Environmental Project

Over the many decades through which it has been operating, KOC has set a formidable challenge in making every possible effort to maintain an ideal and healthy environment in Kuwait.

KOC attributes this enormous challenge to the fact that Kuwait is a desert country with a harsh climate. Despite this natural challenge, the Company has made considerable effort to preserve the environment as one of its top priorities. In this context, KOC has launched many initiatives and implemented pioneering projects, allowing it to remain at the forefront of institutions in Kuwait which support a clean and healthy environment for all.

The projects established by the

Company are the best evidence of this, which is clearly demonstrated through the nature reserves and oases KOC has established throughout Kuwait. In addition, several other projects were initiated by the Company, including Ahmadi Park. The Company is also engaged in a long-standing effort to beautify and maintain Ahmadi's environmental, agricultural, and aesthetic aspects, in addition to many other ongoing initiatives centered around environmental and health promotion.

Because the Company's efforts are continuous, KOC recently inaugurated a new environmental initiative, the Ahmadi Walkway, which aims to provide an outstanding new way for Ahmadi residents to im-

prove their physical health in a natural environment.

The details of this new project are provided in the following article, which were largely provided by Manager Operations Group (East Kuwait) Omar Sadeq, a man who encourages and is greatly devoted to the Company's environmental initiatives.

INAUGURATION

Under the patronage of DCEO Major Projects and Technical Services Khaled Al-Otaibi, KOC recently inaugurated the Ahmadi Environmental Walkway, which is a pioneering new project that provides a clean environment for walking and other activities.

The inauguration was attended by DCEO Exploration and Drilling Ahmed Al-Eidan, DCEO Commercial and Corporate Services Abdul Wahab Al-Mithin, and DCEO South & East Kuwait Eisa Al-Maraghi, in addition to a number of Group Managers and Team Leaders involved in establishing this project. The new project falls under the framework of the Company's efforts to protect and preserve the environment and enhance the climatic situation in Kuwait.

Bader Al-Attar, DCEO Planning and Finance, and Bader Al-Munaifi, DCEO Gas & Innovation, also paid a visit to the walkway, where they were accompanied by Omar Sadeq, Manager Operations Group (East Kuwait).

THE CONCEPTION

In a statement he made, Omar Sadeq explained that visitors to Kuwait Oil Company were previously provided with tours of the Abdaliya Reserve. However, this reserve was not accessible to everyone because the area is remote and has many security restrictions due to its location within the field.

Therefore, the idea of creating an ecological outlet in Ahmadi was conceptualized, as the city has an abundance of trees and other plant life. Therefore the idea was to take advantage of its lush land.

The basic plan for the chosen area was to turn into a garden, but the Company decided to do something unique that would be distinct compared to the neighboring areas, and thus the idea was born to create an environmental walkway that includes many wild plants. Most importantly, it was decided to have it open to the public, and allow everyone to enter it regardless of age, provided that bicycles and cars are forbidden to enter to avoid destroying plants as great efforts have gone into preserving them.

He said that this project is considered an internal environmental reserve in the middle of the Ahmadi residential area, where visitors can walk surrounded by nature. The goal is to enjoy the desert atmosphere inside the city without the need to visit remote places, in addition to the educational aspect, as the Company was keen to diversify

the local trees and plants that are abundant externally, which are compatible with the Kuwaiti climate and environment.

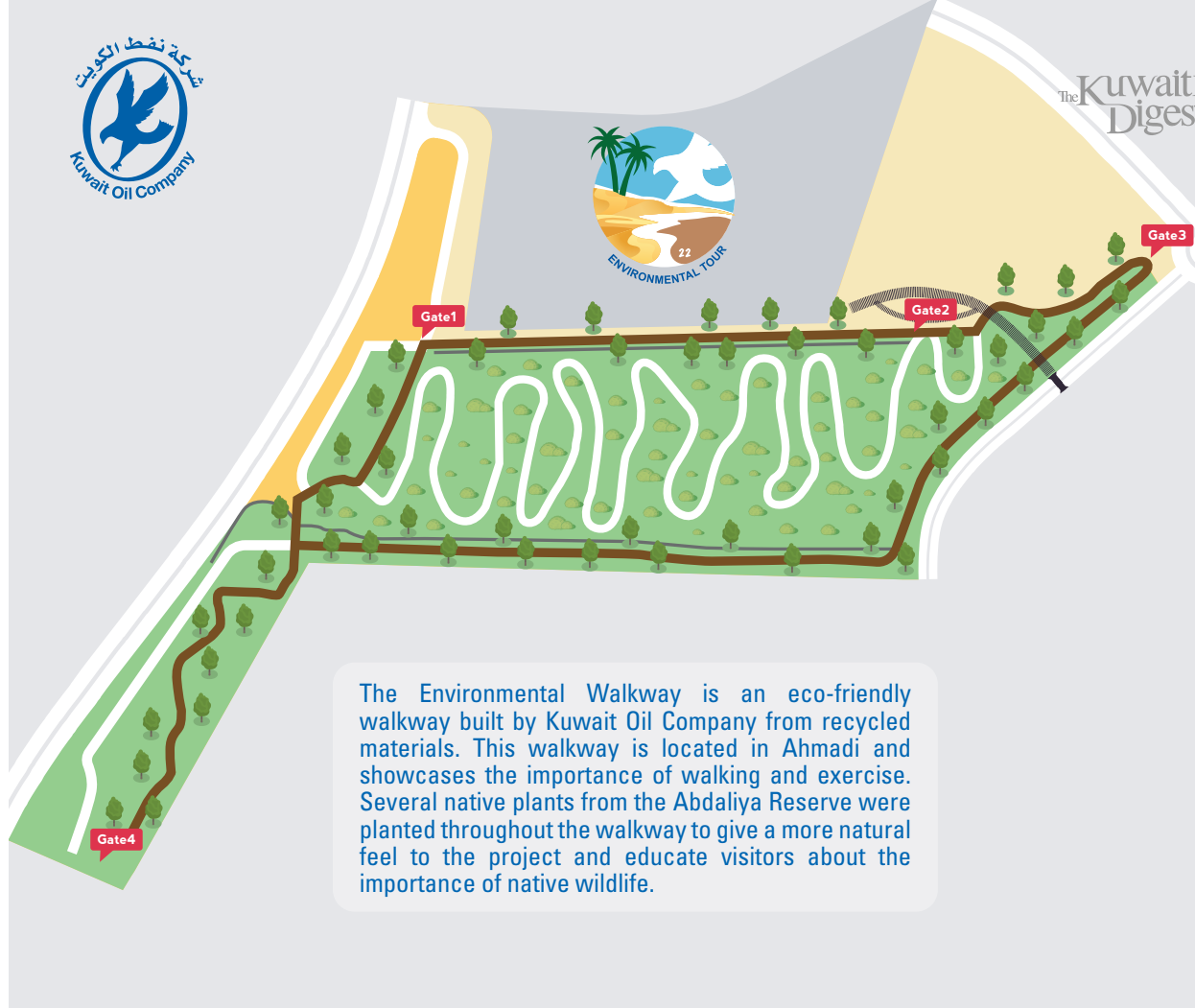
AN INSPIRING PROJECT

Sadeq stated that work on the project started before the month of Ramadan last year and progressed quickly, with contacts made with the Ahmadi Projects Group and agricultural experts. Work then began by moving trees and cleaning the area. Paths were built and hills were made, similar to the structure of the hill in Abdaliya.

At the walkway, visitors are surrounded by plan and wildlife. Some trees have fruits, such as sidr trees, lasura trees (bambar), palms, and olive trees. Wherever the visitor goes, they will see flowering plants blooming, and even sand dunes that have been built are now covered with grass. There are also miswak trees, arak, arfaj, and arta, which are distinguished by their pleasant smell, in addition to some medicinal plants.

Sadeq added that another unique aspect is the presence of rocks in the walkway that





The Environmental Walkway is an eco-friendly walkway built by Kuwait Oil Company from recycled materials. This walkway is located in Ahmadi and showcases the importance of walking and exercise. Several native plants from the Abdaliya Reserve were planted throughout the walkway to give a more natural feel to the project and educate visitors about the importance of native wildlife.

were used in the fields when preparing rigs, one of which weighs 93 tons, and another 50 tons. There is also a place with wooden bridges made entirely of recycled wood that has been utilized after being at KOC for 85 years or more.

Next to the walkway is a unique park filled with sandy hills that children will enjoy playing on, and water is available through recycled pipes. The walkway takes the form of a slope, so that while walking on it, a view that extends from Ahmadi to the sea can be seen, and it is located north of the golf course, adding to the beauty and splendor of the place.

Sadeq expressed his hope that people will take good care of this walkway, adding that there are benches made of tree trunks that fell during storms, which are also very old, as well as markers indicating the distance

traveled by a person for those who wish to track it, and they are made of the same wood. This is also something unique to Kuwait and the region.

In the walkway there are parking spaces, bins for dumping garbage, and there will be staff members responsible for supervising the cleanliness of the place and maintaining and caring for the plants. He explained that the project is completed, but needs some finishing touches, pointing out that the opening was expedited to give people a chance to use it before the weather gets too hot.

He pointed out that signs for plants will be introduced, including some basic details of them, such as the Arabic, English, and Latin names, in addition to their uses and benefits. There are also plans to introduce solar lights for walking at night.

ADDITIONAL INFORMATION

More than 3,000 trees and plants, including 26 different species, were planted at the walkway. Among the most prominent plants are henna, ar-faj, arrowroot, and fennel. The trees include eucalyptus, willow, and Arabic gum in particular, with the aim of establishing it in the State of Kuwait and in the local environment, noting that the majority of plants cultivated in the project are produced by the nurseries of Kuwait Oil Company and the nursery of the Abdaliya Nature Reserve.

The project area consists of 15 peninsulas, each of which includes a type of plant, and they vary according to their sizes and qualities, and all of them were overseen through a special study and in a manner that is consistent with the nature of

their presence in the environment to which they belong. The rocks resulting from drilling activities were also collected from several locations of KOC's operations, and reused to create a terrain that adds an aesthetic touch to the area.

Most importantly, all of this was implemented from recycled materials, even the pathways, as they were paved from the output of drilling lakes previously established by the Kuwait Oil Company to collect rainwater, in addition to the irrigation network, where the project organizers were keen to use steel pipes that are usually used in drilling operations, which were recycled for use in the implementation of the irrigation network for the new area. The walkway also contains educational boards placed along its path, made of recycled wood, which encourage visitors to preserve the environment.

TEAMWORK

Sadeq maintained that much effort has been made in the construction of this walkway, which shows the extent of KOC's concern for the environment, which is part of its responsibility to the community. Regarding the participants in this effort, Sadeq

explained that the Groups and Teams contributing to this project include: Operations Group (East Kuwait), Roads & Support Team of the Ahmadi Projects Group, Transportation Team, and Central Workshops Team. The Roads & Support Team will be responsible for managing the walkway, as they are responsible for the agricultural aspect of the Company.

CHALLENGES & ACHIEVEMENTS

- The project is located in the East of the Ahmadi plateau and North of the city of Ahmadi, in a special and strategic location, where the temperature in the area drops two degrees below the normal rate.
- The walkway is 5 kilometers long and 8 meters wide, and its design is suitable for several activities, including walkathons, marathons, off-road bike races, and much more.
- Some trees were removed from the sites where KOC projects are located and replanted at the walkway, including a henna tree that was present at one of the old houses at KOC.
- The irrigation network was constructed using pipes used in drilling operations, which are supposed to be out of service. However, the Maintenance Teams transformed these pipes to an irrigation network, which contributed to reducing costs of the project.
- Taking into account the establishment of areas to drain rainwater, pathways were made for this purpose while taking the necessary precautions, in addition to preserving the environmental form of the desert area. The land was also reclaimed and all rubble and waste removed. This work is considered one of the most important and most prominent difficulties that the Team faced.
- The project, in general, is a new facility that has been added to the recreational and educational facilities of Ahmadi. It serves various parties, including schools, universities, and colleges, as well as benefitting people interested in the environment by giving them the opportunity to learn about local trees and plants.





Ramadan and Eid Al-Fitr at KOC

Ramadan, the ninth month of the Muslim lunar year, is a time of fasting, blessings and prayers. It also commemorates the revelation of the first verses of the Qur'an to the Prophet Muhammad. As a way of giving thanks to God during this holy month, and as a way of unifying the worldwide community of believers, Muslims - with special exceptions for the sick, nursing mothers, pregnant women and travelers - spend the daylight hours fasting. The hours of the night, until dawn, are marked by prayers, ceremonial meals and celebration of the day's spiritual victory over human desires. After sunset, streets and squares all over the Muslim world are crowded with people out buying food after the long day's fast, or visiting friends, or preparing for sahur, the last meal of the night, which takes place before dawn.

At KOC, a long-standing Company tradition involves the hosting of Iftar banquets for the faithful. These often occur at the Unity Center, but the Company often lends it support and sponsors numerous Ramadan-related activities throughout Kuwait. Often included in these activities is the organization of Umrah trips for KOC employees.

KOC Ramadan Activities

Within the framework of the events it organizes every year during the Holy month of Ramadan, and in the context of its continuous support for the community, the Community Services Team distributed Gergean sweets to children at Ahmadi Hospital. The event included distributing Gergean to children in the Old Ahmadi Hospital, which was delivered several months ago to Adan Hospital to receive and treat sick children. The distribution of sweets was also delivered to sick children in the ward of the new Ahmadi Hospital.

The Community Services Team also held another party to distribute Gergean to the children of KOC employees. The party was held in the Company Tent in Ahmadi, where the distribution process also included the children of the family nursery (orphanage), and the children of the Care and Rehabilitation Center for the Disabled.

In addition, the Community Services Team also organized the annual Holy Ramadan Quran memorization competition for the children of Company employees. Certificates were distributed to the winners at the conclusion of the event

Eid Al-Fitr

Eid Al-Fitr, translated into English as the Festival of Fast-Breaking, falls on the first day of Shawwal, the month which follows Ramadan in the Islamic calendar. It is a time to give charity to those in need and celebrate the completion of a month of blessings and joy with family and friends.

Before the day of Eid, during the last few days of Ramadan, each Muslim family gives a determined amount as a donation to the poor. This donation is of actual food such as rice, barley, dates, rice, etc., to ensure that the needy can have a holiday meal and participate in the celebration. This donation is known as sadaqah al-fitr (charity of fast-breaking).

On the day of Eid, Muslims gather early in the morning in outdoor locations or mosques to perform the Eid prayer. This consists of a sermon fol-

lowed by a short congregational prayer. After the Eid prayer, Muslims usually visit various family and friends, give gifts (especially to children), and make phone calls to relatives to give well-wishes for the holiday. These activities traditionally continue for three days. In most Muslim countries, the entire three-day period is an official government/school holiday.

About Ramadan

Ramadan commemorates the ninth lunar month of the year 610 CE, when revelations began from Allah (SWT) through the angel Gabriel to the Prophet Muhammad (PBUH). These revelations, which were communicated in Arabic, were memorized, passed on orally, and written down as the Qur'an.

During the Holy Month of Ramadan, Muslims abstain from food, drink, and other sensual pleasures from the first light of dawn until sunset. Ramadan is the fourth pillar of the five pillars of Islam.

Because the timing of Ramadan is based on a lunar calendar, the Holy Month starts about ten or eleven days earlier each year according to the Gregorian Calendar. Beginning in the early 2010s, Ramadan has fallen in the summer months in the Northern Hemisphere. This is especially challenging for Muslims in hot, arid climates like Kuwait and the Arabian Gulf region, where sweltering temperatures make daily fasts much more challenging.

Ramadan is a time for Muslims to practice self-restraint and self-reflection. Fasting is seen as a way to cleanse the soul and display empathy for those in the world who are hungry and less fortunate. Muslims go to work and school and take care of their usual activities during Ramadan; however, some also read the entire Quran, say special prayers and visits mosques more frequently during this time.

All Muslims who have reached puberty and are in good health are required to fast. The sick and elderly, along with travelers, pregnant women and those who are nursing are exempt, although they are supposed to make up for the missed fast days sometime in the future or help feed the poor.

The first pre-dawn meal of the day during Ramadan is called "suhoor." Each day's fast is broken with a meal known as "iftar." Traditionally, a date is eaten to break the fast. Iftars are often elaborate feasts celebrated with family and friends. The types of foods served vary according to culture.

The conclusion of Ramadan is marked with a major celebration known as Eid Al-Fitr, the Feast of Fast-Breaking. It starts the day after Ramadan ends and lasts for three days. Eid Al-Fitr includes special prayers and meals with friends and relatives, and gifts are often exchanged.

The Benefits of Fasting

While many fast as a religious obligation, few truly understand the potential health benefits that fasting can provide. Fasting, if properly implemented, can promote the elimination of toxins from the body, reduce blood sugar, decrease stores of fat and boost your immune system.

Below are 10 potential health benefits one can attain by fasting in a safe and healthy way:

1. **Fasting Promotes Detoxification:** Processed foods contain many additives, and these additives can become toxins in the body. Most of these toxins are stored in fat, and fat is burnt during fasting, especially when it is a prolonged fast.
2. **Fasting Gives the Digestive System a Rest:** When fasting, the digestive organs rest. The normal physiologic functions continue, especially the production of digestive secretions, but at reduced rates. This exercise helps to maintain a balance of fluids in the body.
3. **Fasting May Resolve Inflammatory Responses:** Some studies have shown that fasting promotes resolution of inflammatory diseases and allergies. Examples of such inflammatory diseases

are rheumatoid arthritis, arthritis and skin diseases such as psoriasis. Some experts assert that fasting may promote the healing of inflammatory bowel diseases such as ulcerative colitis.

4. **Fasting Can Reduce Blood Sugar.** Fasting increases the breakdown of glucose so that the body can obtain energy. It also reduces the production of insulin, which rests the pancreas. Glucagon is produced to facilitate the breakdown of glucose, and the outcome is a reduction in blood sugar.
5. **Fasting Can Increase the Breakdown of Fat.** The first response of the body to fasting is the breaking down of glucose. When the store of glucose is exhausted, ketosis begins, which is the breakdown of fats to release energy.
6. **Fasting Can Correct High Blood Pressure.** Fasting is one of the non-drug methods of reducing blood pressure because it can help reduce the risk of atherosclerosis. Atherosclerosis is the clogging of arteries by fat particles. When you are fasting, glucose and fat stores are used to produce energy. The metabolic rate is also reduced when fasting, and hormones such as adrenaline and noradrenaline are also reduced.

7. **Fasting Promotes Weight Loss.** Fasting promotes weight loss by reducing stores of fat in the body. However, fasting is not a good weight loss strategy. Reducing fat and sugar intake and increasing fruits and rest are better measures to achieve weight reduction.
8. **Fasting Promotes a Healthy Diet.** It has been observed that fasting reduces cravings for processed foods. It promotes a desire for natural foods, especially water and fruits.
9. **Fasting Boosts Immunity.** Immunity can be boosted when an individual is on a balanced diet between fasts. The elimination of toxins and the reduction in fat stores also helps the body. When individuals eat fruits to break a fast, they increase the body's store of essential vitamins and minerals. Vitamins A and E are good antioxidants readily available in fruits. They help to boost immunity.
10. **Fasting May Help to Overcome Addictions.** Some studies have shown that fasting can help addicts reduce cravings for nicotine, caffeine and other substances. Although there are other regimens required to resolve addictions, fasting can play a role.





Celebrating Gergean

Gergean is a traditional celebration that happens twice a year throughout a number of Gulf countries, with especially strong roots in Kuwait. During Gergean, which takes place on the 15th night of the Islamic month of Sha'ban and on the 15th night of Ramadan (or when the moon is full), children dress in traditional attire and go door-to-door to receive sweets and nuts from neighbors while singing traditional songs.





ORIGINS

The Gergean tradition has existed for hundreds of years in the region and is strongly rooted in Gulf culture; however, many historians note that some speculation exists about the tradition's exact origin. Even the origin of the word "Gergean" cannot be agreed upon. Many people from the Gulf hold the view that "Gergean" is derived from the Arabic word "qarqa'ah" which means click or knock. They attribute this association to the sound the sweets and nuts make when they are dropped into the iron pots the children carried. Still others believe "Gergean" is derived from children in Medina singing "Qarrat Al-Ain," which over time was changed to "Gergean."

Many believe Gergean is rooted in the time of the birth of Prophet Muhammad's (PBUH)

grandson, when the Prophet's daughter Fatimah handed out colored sugar cubes in celebration of her newborn child on the 15th night of Ramadan. The story goes that when the children of Medina heard about the news of the birth, they gathered around the Prophet's house singing "Qarrat Al Ain, Qarrat Al Ain Wa Ajr AlJo'an" which means "Congratulations, congratulations, blessed for feeding the hungry."

GERGEAN IN KUWAIT

In Kuwait, children celebrate Gergean by going from one house to the next, knocking on neighbors' doors and asking for candy and nuts. The children gather in small choir groups in front of a house and sing a song that is intended to call on Allah (SWT) to bless the youngest child of the family, to keep him or her healthy and that the mother will remain happy. The

more they sing, the more nuts and sweets they receive. The Gergean tradition is intended to spread love, happiness and affection among adults and children during Ramadan.

In modern Kuwait, however, many families are increasingly moving any type of Gergean celebration indoors and foregoing the outdoor activity. As Kuwait has grown, the country's close-knit sense of community has increasingly been weakened, with many citizens preferring to keep Gergean celebrations indoors with family and friends. But, regardless of whether the tradition is celebrated indoors or in the streets, Gergean represents a time of happiness and is a shared celebration of joy, faith and compassion for all.

GERGEAN TREATS

As Gergean approaches, a number of cooperative societ-



ies throughout Kuwait offer a wide range of quality sweets packaged in attractive boxes or baskets in preparation for the mid-Ramadan children's celebration. In addition to the many varieties of Gergean packages that can be found at the cooperative societies, those looking forward to the event can count on an entire cottage industry of Gergean packet producers to spring up during Ramadan. Many of these businesses prepare for Gergean long before Ramadan in order to provide the best quality Gergean treats. These packages often contain chocolates, nuts, sweets and even toys for those wishing to celebrate the long-standing Kuwaiti tradition.

While the cooperative societ-

ies continue to offer some of the best Gergean packages available, many Kuwaiti entrepreneurs have utilized social media sites to promote their home-made businesses. These businesses often feature a wide display of Gergean treats and packages that are targeted at a more discerning consumer. But while many feel they have to go out and purchase the latest or trendiest form of Gergean package, others are perfectly content with creating their own Gergean treats. Home-made treats are totally unique and impossible to find in any store, which for some people, makes their appeal so much greater.

A KUWAITI TRADITION

Gergean is a Kuwaiti tradition that plays a historic and very

important role in Kuwaiti culture, especially during Ramadan. On the 13th, 14th and 15th nights of the Holy Month, Kuwaiti children go door-to-door singing festive songs in the hope of receiving candy, and if they are lucky, loose change.

While Gergean is quite a treat for children, it serves another more important function. In a rapidly changing world, new modes of living are increasingly seeing tradition sidelined throughout all walks of life. Gergean is an important tradition that allows Kuwaitis to understand their history and keep it alive. By passing on this tradition from generation to generation, Kuwait can continue its legacy of goodwill, community and trust amongst neighbors.

The Historic Art of Falconry

The traditional practice of falconry involves keeping falcons and other birds of prey and training them to hunt their quarry in cooperation with humans. Whether considered an art, a sport or a means of sustenance, this symbiotic relationship between human and wild raptor long predates the written word. There is much speculation about its precise origins, but evidence suggests falconry developed on the steppes of Central Asia or in Persia at least 4,000 years ago. There appears to be a representation of a falconer holding up dead prey on an incense burner found at Tell Chuera, in northeastern Syria, that dates back to 2,500 bce.





Perhaps because of its antiquity, but also because of its broad geographical spread, the art of falconry is diverse. The term “to hawk” applies to the flying of a spectrum of raptors, birds defined by their powerful talons and beaks, which they use to hunt live prey. They can be as small as the 120-gram American kestrel or as monumental as the golden eagle, with its wingspan of two and a half meters. Arabs favor peregrine falcons, as well as gyrfalcons from the Arctic. Mongolians hunt with golden eagles and the Dutch with goshawks. Harris hawks, a South American species, have recently come into fashion in Britain. Falconers hunt crows and hares, foxes and wolves, pheasants and houbara bustards. They travel on foot or horseback, by camel or by sports utility vehicle. They may bring along a hunting dog or not, and may travel alone or with a party.

But there is also universality. The tools of falconry have remained virtually unchanged

for centuries, if not millennia. Leather jesses that wind around the bird’s legs allow a person to tightly hold the flighty creature. A thick leather glove or a padded cuff protects the hawker’s arm. A leather hood not much larger than a golf ball slips over the bird’s head and eyes to keep it calm—a simple method learned by European Crusaders in the Middle East that replaced the crueler practice of temporarily sewing the bird’s eyelids shut. There is the falconer’s bag, slung across a shoulder: It contains a lure, something fashioned out of feathers that, when swung at the end of a short line, attracts the bird back to the fist. Some fresh meat serves the same purpose. In the last 20 years, falconers have begun using tiny telemetry units attached to the bird’s back feathers to track down wayward individuals, a luxury unavailable to those who flew birds during the last few thousand years.

Today, Middle Eastern falconry, like falconry everywhere in the

world, has changed. With the advent of guns, hunting with a bird became somewhat anachronistic. The sustenance part of the equation fell away, and the debate about art versus sport intensified. The big business of birds now involves great sums of money that change hands as birds are traded around the world for prices that are often comparable to those of automobiles: Some birds can be had for a modest \$1,000 or so, while others might cost a hundred times that. Some are born in legal captive-breeding facilities that have the feel of small factories and that might tinker with genetic hybrids; others are born wild and trapped, some legally, many not.

The movement of birds of prey is not new. They travel on their own epic migration routes, and once they were exchanged as fancy gifts between noblemen or members of grand hunting entourages. Marco Polo wrote of Kublai Khan that the Mongolian ruler “Takes with him full

10,000 falconers and some 500 gyrfalcons, besides peregrines, sakers, and other hawks in great numbers." In the late 14th century, when the Ottoman sultan Beyazit captured the son of Philip the Bold, Duke of Burgundy, he turned down an offered ransom of 200,000 gold ducats but accepted instead a dozen white gyrfalcons and a jeweled gauntlet, paid for by Carl vi of France.

The Holy Roman Emperor Frederick ii of Hohenstaufen, arguably the best-known falconer of all time, was the author of the classic tome *Ars Venandi cum Avibus* (The Art of Hunting with Birds), completed in 1241 and still in print. But much of Frederick's inspiration apparently came from other treatises already in existence, many of them from the Arab world: *Kitab Dawari Al-Tayr* (Book of the Birds of Prey), by Al-Ghitrif ibn Qudama Al-Ghassani, master of the hunt for the Umayyad caliphs, dates to 780 ce. Frederick's work was also informed by other, earlier Arab manuscripts,

including those by Muhammad ibn Abdullah Al-Bayzar and an Arab falconer known in the West as "Moamyn."

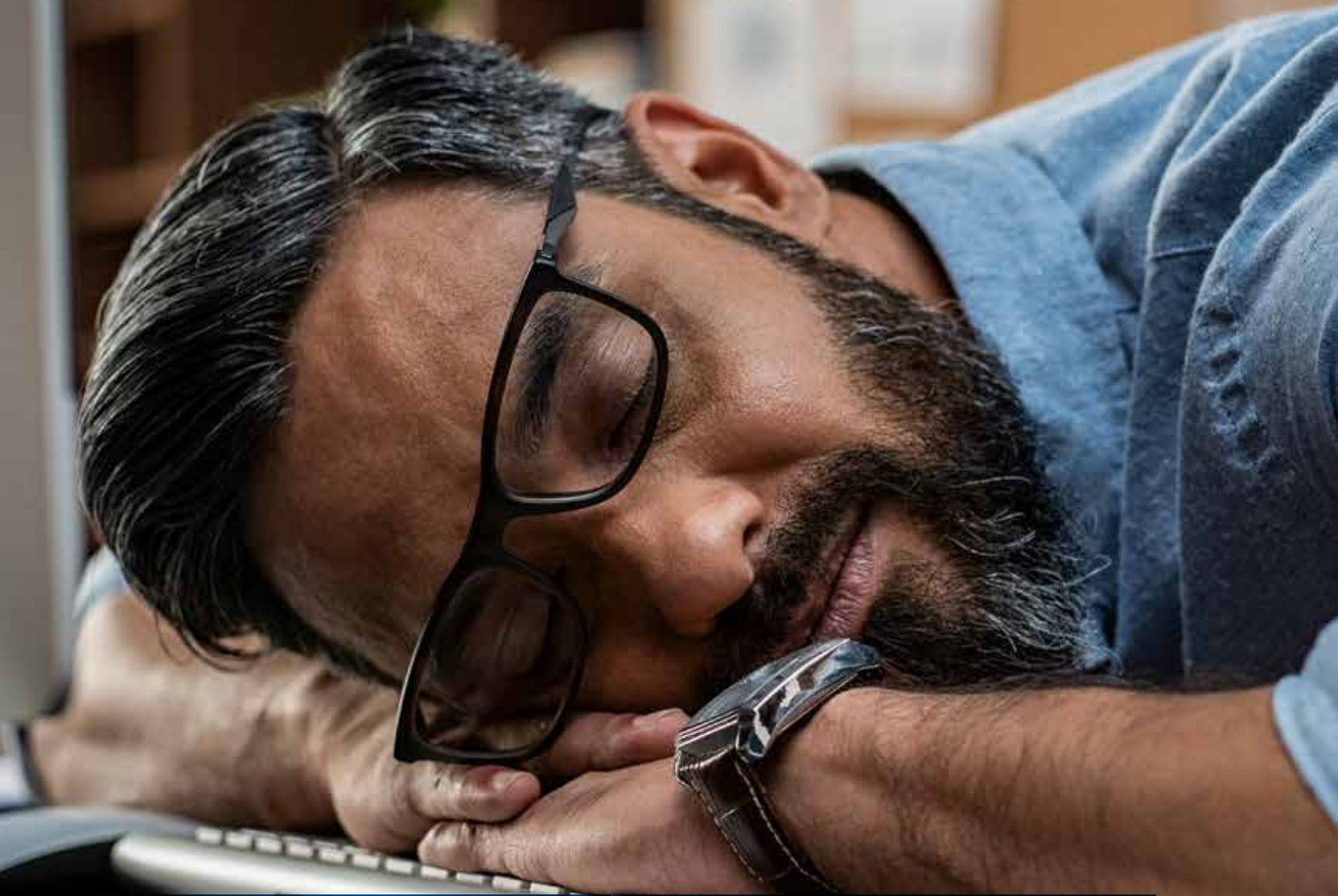
UNESCO has long been known for protecting humanity's most cherished monuments and physical objects, but it wasn't until 2003 that the organization, seeking a way to secure the human traditions that are fast fading, adopted the Convention for the Safeguarding of Intangible Cultural Heritage. In the era of YouTube, what would become of the epic oral storytelling of the Ramayana, or of Azerbaijani carpet weaving, or the language of the Garifuna? Although there had been discussion among falconers since the mid-1990s about seeking some sort of UNESCO recognition, the 2003 convention, which now lists more than 200 heritage traditions, opened the doors. Abu Dhabi falconers took on coordination of the listing effort, aided by British colleagues, even though Great Britain is not a UNESCO signa-

tory. Part of their motive was a reaction to the increasing restrictions and outright bans on falconers worldwide, including in places like Kenya, Finland, Norway, Sweden and Denmark, where falconers must cross the border to Germany to fly their birds. India allegedly has just a few individuals who are legally allowed to keep birds. New Zealand recently legalized the sport, after a 30-year effort by falconers. The limitations come from an increasing tendency away from hunting and toward conservation, away from captive animals toward wild ones, and amid concerns about species declines. The fact that falconry has often been seen as an elite, even aristocratic sport hasn't helped it, either.

"Falconry fits all three requirements of an intangible cultural heritage," says Katalin Bogay, president of the General Conference of UNESCO. "It is traditional, it is contemporary, and it is living. Falconry doesn't belong in a museum. It is alive."



UNDERSTANDING SLEEP DEPRIVATION



Sleep deprivation is a commonplace occurrence in modern culture. Every day there seems to be twice as much work and half as much time to complete it in. This results in either extended periods of wakefulness or a decrease in sleep over an extended period of time. While some people may like to believe that they can train their bodies to not require as much sleep as they once did, this belief is false.



Sleep is needed to regenerate certain parts of the body, especially the brain, so that it may continue to function optimally. After periods of extended wakefulness or reduced sleep, neurons may begin to malfunction, visibly affecting a person's behavior. Some organs, such as muscles, are able to regenerate even when a person is not sleeping, so long as they are resting. This could involve lying awake but relaxed within a quiet environment. Even though cognitive functions might not seem necessary in this scenario, the brain - especially the cerebral cortex - is not able to rest, but rather remains semi-alert in a state of "quiet readiness."

Certain stages of sleep are needed for the regeneration of neurons within the cerebral cortex while other stages of sleep seem to be used for forming new memories and generating new synaptic connections. The effects of sleep deprivation on behavior have been tested with relation to the presence of activity in different sections of the cerebral cortex.

The temporal lobe of the cerebral cortex is associated with the processing of language. During verbal learning tests on subjects who are fully rested, functional magnetic resonance imaging scans show that this area of the brain is very active. However, in sleep deprived subjects there is no activity within this region. The effects of this inactivity can be observed by the slurred speech in subjects who have gone for prolonged periods with no sleep.

Even severely sleep deprived people are still able to perform to some degree on a verbal learning test. This implies that some other area of the brain

must become active to compensate for the loss of temporal lobe functioning. In fact, activity can be seen in the parietal lobe that is not present during verbal learning tests using rested subjects. Greater activity within this region corresponded to better performance by subjects in research studies. Still, sleep deprived people do not perform as well on these tests as do fully rested subjects. One possible reason for the poorer performance after missing sleep, aside from unregenerated neurons, could be the fact that since the parietal lobe is not usually used to performing tasks such as these, it is not as adept at carrying them out. Therefore, when control switches from the temporal lobe to the parietal lobe, some speed and accuracy is naturally lost. Interestingly, sleep deprived subjects have been shown to have better short-term memory abilities than their well-rested counterparts. Since memory is associated with this region of the cerebral cortex, the fact that it is already active in sleep deprived people could make it easier for new synapses to be created, thus forming new short-term memories more easily.

While activity is seen within the parietal lobes of rested people as they think through math problems, no corresponding activity is visible within the brains of sleep-deprived subjects. Also, no new area of the brain becomes active while the sleep deprived people work on math problems. Since sleep deprived people can still complete math problems, albeit with less speed and accuracy than a well-rested individual, this data implies that a region of the brain already in use is used for this task.

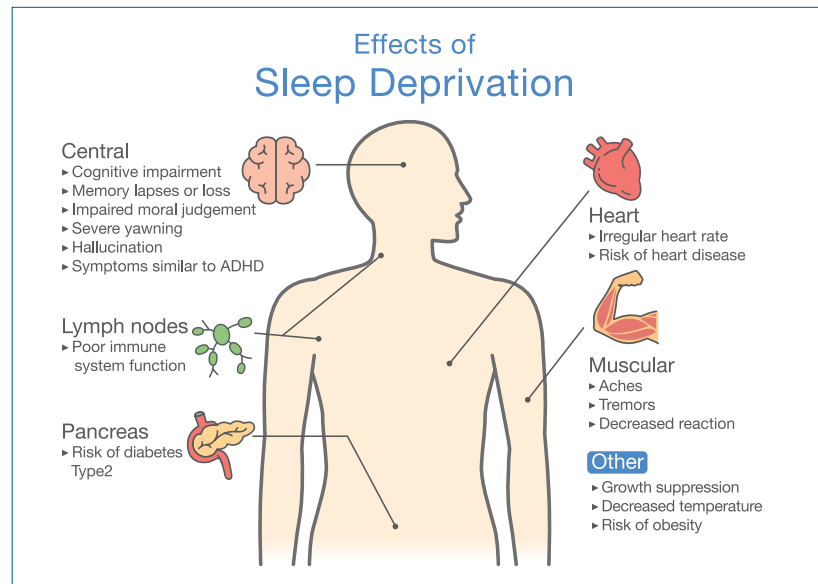
The frontal lobe is the most fascinating section of

the brain with relation to sleep deprivation. Its functions are associated with speech as well as novel and creative thinking. Sleep deprived test subjects have difficulties thinking of imaginative words or ideas. Instead, they tend to choose repetitious words or clichéd phrases. Also, a sleep-deprived individual is less able to deliver a statement well. The subject may show signs of slurred speech, stuttering, speaking in a monotone voice, or speaking at a slower pace than usual. Subjects in research studies also have a more difficult time reacting well to unpredicted rapid changes. Sleep deprived people do not have the speed or creative abilities to cope with making quick but logical decisions, nor do they have the ability to implement them well. Studies have demonstrated that a lack of sleep impairs one's ability to simultaneously focus on several different related tasks, reducing the speed as well as the efficiency of one's actions. A person may be able to react to a complex scenario when suddenly presented with it but, similar to the verbal tests, the subject will most likely pick an unoriginal solution. If presented with a similar situation multiple times with slight variations in the information presented, the subject chooses the same solution, even though it might not be as applicable to the new scenario.

Part of the frontal lobe, the prefrontal cortex, has several functions specifically coupled with it. Judgment, impulse control, attention, and visual association have all been related to this region of the cerebral cortex. A recent study has shown that the prefrontal cortex, usually the most active area of the brain in rested individuals, becomes more active as a person remains awake for long periods of time. This region regenerates during the first stage of sleep, giving a person the ability to feel somewhat refreshed after only a short nap. The length of the first stage of sleep cycle is somewhat dependent upon how long the person had previously been awake. The longer the period of wakefulness, the longer the brain remains in the first stage of sleep. When the brain enters into the REM stage of sleep the prefrontal cortex is active once more.

The implications of this data seem to be fairly important in supporting the location of the I-function within the brain. The prefrontal cortex is active whenever a person is awake, no matter how little sleep they have had. Also, this area is active while dreaming. Since the individual is aware of him or herself during both of these instances, but is not aware during the stages of sleep when the prefrontal cortex is shut down, it seems logical that the I-function is located within this region. This indi-

cates that the I-function is what is resting and re-generating during the first stage of sleep. It would be interesting to study prefrontal cortex activity while a person is conscious, but unaware of his or her actions, due to an influence such as drugs or alcohol. According to the results of the sleep deprivation studies, little or no activity should be seen in the prefrontal cortex at any time when the individual is unaware of his or herself.



Symptoms of Sleep Deprivation

One of the symptoms of prolonged sleep deprivation is hallucinations. This could also be related to the I-function since it is the system that integrates the input from all other areas of the brain. If the neurons composing the I-function become too taxed then the picture in the head that the I-function produces may be more dissimilar from reality than usual. The neurons, under pressure to continue functioning but unable to perform optimally, create an image useful enough for a person to see most of his or her surroundings. Metabolic activity in the prefrontal cortex can drop as much as eleven percent after a person has missed sleep for only twenty four hours. As a person loses more sleep or continues to receive less-than-adequate amounts of sleep, the neurons become even more taxed and the I-function may begin to generate even less coherent images, possibly resulting in temporary insanity.

Another piece of evidence supporting the location of the I-function is that mammals have REM sleep whereas cold-blooded animals do not and mammals have a neocortex, located within the prefrontal cortex, while cold-blooded animals do not. REM sleep

stimulates areas of the brain used for learning and memory. When a person is taught a new skill, his or her performance does not improve until he or she receives at least eight hours of sleep. An extended period of sleep ensures that the brain will be able to complete the full sleep cycle, including REM sleep. The necessity of sleep for learning could be due to the fact that sleep increases the production of proteins while reducing the rate at which they are broken down. Proteins are used to regenerate the neurons within the brain. Without them, new synapses may not be able to be formed, thus limiting the amount of information a sleep-deprived individual can maintain.

One of the possible side effects of a continued lack of sleep is death. Usually this is the result of the fact that the immune system is weakened without sleep.

The number of white blood cells within the body decreases, as does the activity of the remaining white blood cells. The body also decreases the amount of growth hormone produced. The ability of the body to metabolize sugar declines, turning sugar into fat. One study stated that people who sleep less than four hours per night are three times more likely to die within the next six years. Although the longest a human has remained awake was eleven days, rats that are continually deprived of sleep die within two to five weeks, generally due to their severely weakened immune system.

In a way sleep deprivation studies help us to study the relationship between the brain and behavior in a very unique way by observing how a person's behavior changes as the brain shuts down. By taking images

of the brain showing where activity is located, it is possible to correlate the behavior exhibited by a subject with his or her brain patterns. Just like a person cannot jog for three continuous days, a person's brain cannot operate without rest breaks. Since different regions of the brain rest during different stages of the sleep cycle, sleep cannot be cut short. In fact, if the brain does not receive a break it will soon begin to shut down for periods of microsleep. This is essentially several seconds of actual sleep; delta waves that interrupt the regular EEG of an awake person thereby impairing his or her continuity of cognitive function. Microsleep generally happens directly before performance failure occurs. Without sleep our brains deteriorate, and if the argument that brain = behavior is true, then our behavior will also suffer accordingly.



ASTRONOMY IN THE ARAB WORLD



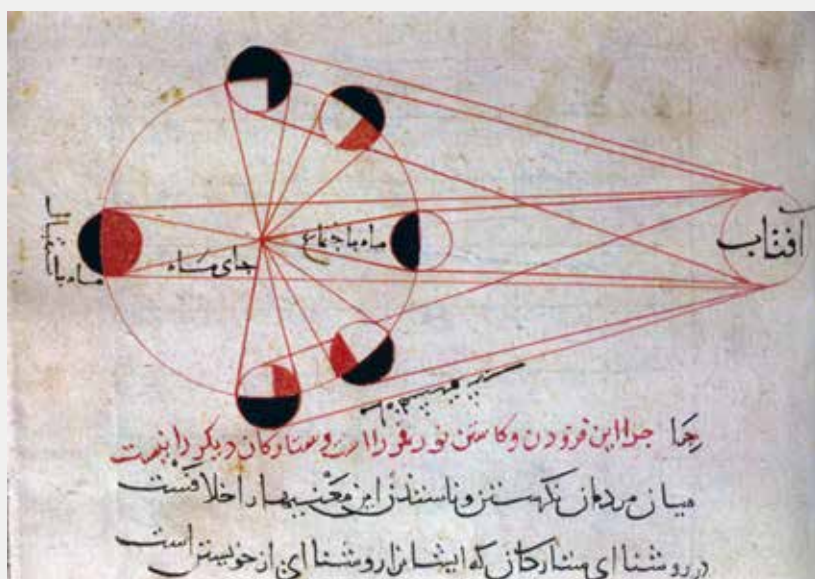
An attention to the heavens and astronomy has long been a feature of scholarly interest in the Arab world. The observation of the new moon, for example, was, and is, important to Muslims. For religious purposes, Muslims follow a lunar calendar, and the new moon marks the beginning and end of the fast of Ramadan and determines the date of the pilgrimage to Mecca - the Hajj - two of the five religious duties incumbent upon all Muslims.

Mapping too sprang from a religious concern: the need to establish correct coordinates of cities so that Muslims could determine the direction of Makkah - the qibla - towards which all Muslims prostrate themselves in prayer five times a day. And though observation of the new moon and determination of the qibla may seem prosaic subjects today, it was by pondering just such everyday phenomena that advances in science were made.

The mathematical determination of the qibla, for example, was no easy matter; in fact, it was one of the most advanced problems in spherical astronomy faced by medieval astronomers and mathematicians. The trigonometric solution eventually found was of great sophistication, and trigonometry itself, largely an Arab development, is fundamental to the computation of planetary orbits as well as to terrestrial mapping. Nevertheless, medieval qibla tables often attained great accuracy. That of Al-Khalili, who wrote in Syria in the 14th century, gives the coordinates of a large number of towns in degrees and minutes and is generally accurate to within one or two minutes. In Europe, this sort of accuracy in establishing geographical coordinates was not attained until much later.

It could be argued, in fact, that precise observation and an ability to find new mathemati-





cal solutions to old problems were the two main strengths of Muslim scientists in the Middle Ages. And though they, like their European counterparts, never fully escaped the tyranny of Aristotle and Ptolemy - whose models of terrestrial geography and of the heavens dominated men's minds until the Renaissance and were not finally demolished until the publication of Newton's *Principia* in 1687 - Muslim scientists were the first to express doubts about many of the details of the Ptolemaic system. Indeed, it was the growing awareness of the divide between Ptolemy's theoretical model of the universe and observed reality that culminated in the discoveries of Nicolaus Copernicus, Tycho Brahe and Johannes Kepler during the 15th to 17th centuries, and some of those doubts had been transmitted to European scientists from Spain in 12th and 13th century translations of Arabic scientific works.

Al-Battani, called by his European translators "Albategni," is a case in point. He wrote in the ninth century on a wide number of scientific topics and some of his observations struck

at cherished Ptolemaic dogmas. He showed, for example that, contrary to Ptolemy, annular eclipses - in which a ring of light encircles the eclipsed portion - were possible, and that the angular diameter of the sun was subject to variation. He showed - again contrary to Ptolemy - that the solar apogee was subject to the precession of the equinoxes; he corrected a number of planetary orbits; he determined the true and mean orbit of the sun. Interestingly, in the light of Prince Sultan's observation of the new moon, Al-Battani also developed a theory of the conditions of visibility of the new moon.

Other Muslim astronomers also came up with data that conflicted with Ptolemy, one of them perhaps the greatest Muslim physicist of them all: Ibn al-Haytham, called "Alhazen" in the medieval West. Al-Haytham argued that the Milky Way was quite far from the earth no matter what Aristotle said, and estimated the height of the earth's atmosphere at 52,000 paces - a pace being roughly one meter, or three feet. Al-Haytham worked that out from his observation that the astronomic twilight be-

gins when the negative height of the sun reaches 19 degrees. Since the atmosphere is about 50 kilometers up (31 miles) and 52,000 paces is roughly 31 kilometers (32 miles), Ibn al-Haytham was not far wrong.

In the pre-telescope age, observational astronomy was, of course, carried out with the naked eye. Muslim scientists, however, perfected observatories in a number of places; those at Maragha and Samarkand are the most famous. At these observatories, astronomers gathered to refine Ptolemy's coordinates for the stars and, eventually, to revise Ptolemy's catalog of stars. This catalog gave the positions of 1,022 stars and classified them by magnitude, or brightness. It was heavily revised, notably by the 10th century astronomer Abd Al-Rahman al-Sufi, whose *Book of the Fixed Stars* is the earliest illustrated astronomical manuscript known. A copy in the Bodleian Library, the work of the author's son, is dated to the year 1009 and the author expressly states that he traced the drawings from a celestial globe.

There is an even earlier representation of the heavens in an Umayyad hunting lodge built about A. D. 715 in Jordan. It is called Qasr Al-'Amra and in the dome of the bathhouse in the lodge are fragments of a fresco showing some 400 stars and parts of 37 constellations, drawn on a stereographic projection - which implies a familiarity, even at that early date, with Ptolemy's *Planisphaerium*.

Arabs also excelled at making astronomical instruments - particularly astrolabes which were used for navigational purposes, for determining the positions of stars and for solving prob-

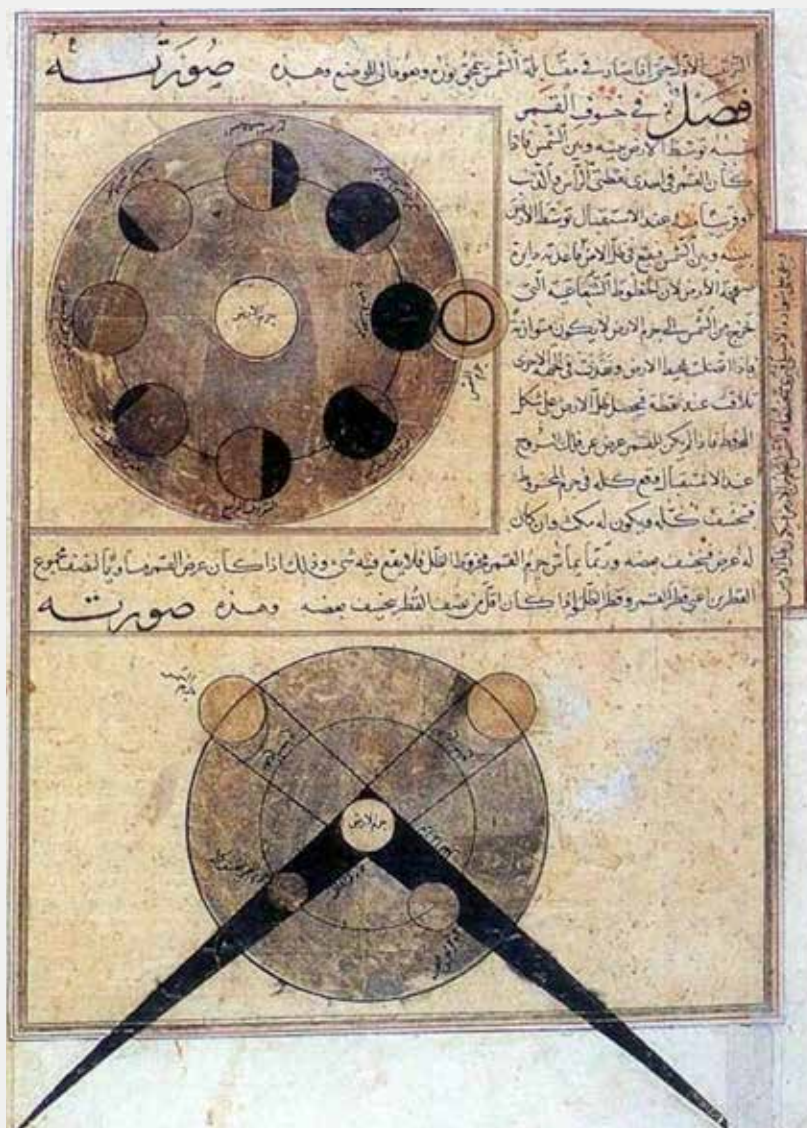
lems in spherical astronomy. There were three sorts of astrolabes: planispheric, linear and spherical. These were used at the observatories of Maragha and Samarkand, and were substantially the same as the instruments used by European astronomers until the invention of the telescope.

The observatory at Maragha was founded by the famous mathematician Nasir Al-Din Al-Tusi in 1259, one year after the fall of Baghdad to the Mongols. Because the Mongol invasions into the lands of Islam had opened a land route to China, Muslim astronomers were eventually able to work together with their Chinese counterparts.

The main theoretical work done at the observatory had to do with simplifying the Ptolemaic model and bringing it into line with the Aristotelian model, which postulated uniform circular orbits for the planets. Although they were often misguided, they made very important contributions; Ibn Al-Shatir, for example, came up with models of the movement of the moon and of Mercury that are strikingly similar to those of Copernicus.

The observatory of Ulugh Beg at Samarkand, built between 1420 and 1437, was used to compute the positions of the stars in Ptolemy's catalog, and there is little doubt that the organization of this observatory and the instruments employed there influenced Tycho Brahe's observatories at Uraniborg and Stjerneborg.

Another observatory thought to have influenced Tycho Brahe was one built in Istanbul in the 16th century. In 1571 in Istanbul, Taqi Al-Din Mohammed



ibn Ma'ruf, a former judge from Egypt and author of several books on astronomy, was appointed head-astronomer of the Ottoman Empire and immediately proposed construction of an observatory. He wanted to begin the urgent task of updating the old astronomical tables describing the motion of the planets, the sun and the moon. His request was well received by the Grand Vizier and patron of sciences, Sokullu Muhammad, but between 1571 and 1574 the Ottomans had to fight no less than three costly wars against the three major powers

of Europe, Venice, Spain and Portugal, so it was not until mid-1577 that the project was completed. Taqi Al-Din's observatory consisted of two magnificent buildings, perched high on a hill overlooking the European section of Istanbul and offering an unobstructed view of the night sky. Much like a modern institution, the main building was reserved for the library and the living quarters of the technical staff, while the smaller building housed an impressive collection of instruments built by Taqi Al-Din himself - including a giant armillary sphere and

a mechanical clock for measuring the position and speed of the planets; aware that Europe was beginning to move ahead in astronomy he was determined to restore the Islamic world's once uncontested supremacy.

A few months later, unfortunately, on a cold November night - the first night of the holy month of Ramadan - a comet with an enormous tail unexpectedly edged into sight and set off a controversy that would put an end to his dream - and the observatory. Twisting and twirling, the comet grew brighter and steadier by the day for 40 days, and soon became a fireball soaring in the heavens like the sun and terrifying observers on earth.

One such observer was the Sultan, Murad III, whose own father, Sultan Salim, had died shortly after another comet had appeared. About to open a campaign in the Caucasus against Persia and its allies, Murad demanded a prognostication on the comet and Taqi Al-Din, working day and night without food and rest, did so. He noted first that both the tail and head of the comet seemed to point east towards Persia - as if, he thought, to discharge their ominous fire there. He also noted that the comet appeared first in the house of Sagittarius, symbolizing, he decided, the Ottoman archer, and that it would disappear in Aquarius, a sign of peace and plenty awaiting the archer.

Unfortunately for Taqi Al-Din, his predictions didn't quite turn out right. Though two Persian armies were defeated in the war, the Ottomans experienced certain reverses, a devastating plague broke out in some parts of the empire and several

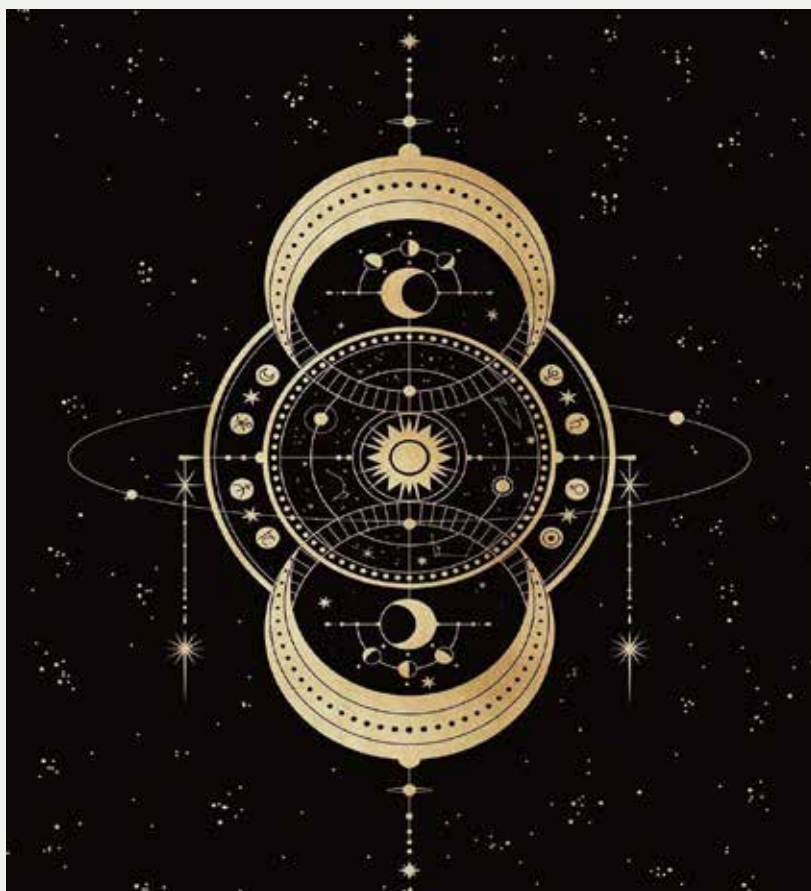
important persons died, and within a short period of time the Ottoman court began to quarrel about the observatory. One faction, headed by the Grand Vizier Sokullu, favored continued support of the institution, and the other, led by Sokullu's political rival, said that prying into the secrets of the future was not only beyond man's power but was also a waste of funds.

For a short period Sokullu prevailed and Taqi Al-Din plunged into astronomy at a feverish pace for two years. But then Sokullu was killed and in 1580 a wrecking squad from the Marine Ordnance Division appeared on the premises, and its commander, citing the misfortunes that had befallen the Ottomans since the apparition of the comet, gave orders to level the buildings.

Another subject allied to astronomy that deeply interested Muslim scientists - and to which they made important contributions - was optics. Thus Newton's Optics, published in

1704, had a long history of experimentation behind it. Classical theories of vision held that sight was the result of rays emanated from the eyes, rather than the reflection of light from the object viewed. It was Ibn Al-Haytham who broke with this classical theory and developed a theory, with mathematical proof, in accord with the facts. His work with the camera obscura and discovery of the mathematical principles behind the phenomenon of the rainbow were important steps in the development of optical instruments - though an explanation of the colors of the rainbow had to wait for Newton.

Other Muslim scientists also made important contributions to this subject, including the famous Al-Biruni. One of the scientists connected with the Maragha observatory, Kamal Al-Din Al-Farisi, wrote an important commentary on Ibn Al-Haytham's work on optics, in which he gives the results of a fascinating series of experiments with the camera obscura.





Technical Site Inspection

1970s



إحدى شركات مؤسسة البترول الكويتية
A Subsidiary of Kuwait Petroleum Corporation