



March 2022

# SandRose

Magazine



Kingdom of Saudi Arabia Section

DECODING  
THE FUTURE OF  
ENERGY



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## MARCH 2022 ISSUE

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# SandRose

## Magazine

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### We want to hear from you.

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58

### NEW FEATURE!

Share your favorite pieces by scanning the QR codes accompanying each article and feature!



04 Message from the editor-in-chief

05 SandRose Team

06 Message from chairman

07 SPE-KSA Executive Board



08 Eyes on IPTC 2022

28 IPTC 2022: Diversity and Inclusion Workshop

32 IPTC 2022: Education Week

40 Member Spotlight

42 Decoding the Future of

46 The Basic Elements of AI

50 Automatic Generation of Drilling Schedules using ML

54 Technical Paper Digest



56 AI for Energy Efficiency

60 SYNC: Ithra's Answer to Promoting Digital Wellbeing

62 Esports the Next Frontier

66 SandRose Reviews

68 SPE-KSA Wins the SPE Biannual Membership Competition

70 SPE-KSA T&PP Introduces New Roundtable Series NMO

75 SPE-KSA's YP Team Relaunches ELEV8

76 SPE-KSA D&I: Celebrating International Day of Persons with Disability



80 SPE-KSA D&I: Celebrating International Women's Day

82 International Women's Day: Women of SPE-KSA

86 SPE-KSA Student Outreach Activities

92 Reader's Lens





# Letters from

## THE EDITOR-IN-CHIEF

**Dear reader,**

I am pleased to welcome you to the second edition of SPE-KSA's SandRose Magazine for the 2021-2023 term. This special installment is launched under "Decoding the Future of Energy," exploring the nexus between the energy industry and the technology industry and the increasingly growing role digital solutions will play in the energy transition. Furthermore, in the March edition of SandRose, we also report on the 14th installment of the International Petroleum Technology Conference (IPTC) 2022, which took place between February 21st - 23rd, 2022, in Riyadh, Saudi Arabia, under the theme of "Fueling Global Recovery through Sustainable Energy." Additionally, we curated several technical and general interest articles under the theme of digital solutions and technology.

In this issue, we introduce an editorial exploring the partnership between two of the largest sectors in the world economy: tech and the oil and gas industries. In the editorial, we examine the current landscape by looking at partnerships between these industries and how they have addressed technical challenges, tackled climate change, and explore the impact of digital solutions on the future energy outlook. In this issue of SandRose, we also sat with Hiba AlMubayedh, CEO of Vanguard, to learn about the emerging Saudi esports and gaming industry. We also feature an article written by the Ithra team covering SYNC, an initiative created by Ithra to promote digital wellbeing.

In our Member Spotlight, we are proud to feature Dr. Ali Al-Meshari, SPE-KSA Vice-Chairman of the Board of Directors and Chief Petroleum Engineer at Saudi Aramco. Honoring SPE's mission to promote knowledge dissemination, we also include recommendations for technical papers in the SandRose Technical Paper Digest provided by Subject Matter Experts (SMEs) in the areas of petrophysics, machine learning and sustainability. We also highlight several key events and programs organized by SPE-KSA teams between December of 2021 to March 2022. SPE-KSA proudly inaugurated a new staple in the Technical & Professional Programs committee, NMO, a roundtable series hosting regional leaders and innovators built around the art of discussion. SPE-KSA's D&I also celebrated International disabled persons day and international women's day with two hugely successful events. The Student Outreach Committee also organized many successful Energy4Me workshops, Meet the Experts session, and launched the Energy Ambassador program.

I would like to thank SandRose contributors and the editorial team for their dedication and enthusiasm. Finally, we are always looking for talented writers and artists to feature in future issues. Please don't hesitate to contact us for feedback or contributions at [sandrose@spe-ksa.org](mailto:sandrose@spe-ksa.org) 

**REEM ALSADOUN**

Editor-in-Chief

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# Letters from

## SPE-KSA CHAIRMAN



together the Society of Petroleum Engineers (SPE), the American Association of Petroleum Geologists (AAPG), the European Association of Geoscientists & Engineers (EAGE) and the Society of Exploration Geophysicists (SEG). The collaboration of the societies creates a platform that uniquely connects energy ministers, leaders, industry experts, young professionals, and students from around the world to discuss industry challenges and technology breakthroughs to continue to foster growth within the industry. The success of IPTC was made possible with the support of the Kingdom, industry leaders, the dedication of the organizing committees, sponsoring companies and societies, and the efforts of its volunteers in demonstrating the uniqueness and interconnectedness of the energy industry.

As chairman of SPE-KSA, I am proud to have witnessed and played a role in IPTC 2022. At the 14th edition, SPE-KSA is pleased to have had a booth for the first time in this conference's history to raise awareness around section activities, grow its membership, and connect with both our existing members and our sponsors. Finally, I would like to reiterate SPE-KSA's unwavering commitment to upholding the mission of SPE International to promote knowledge exchange and professional development of its members by continuing to bring you a host of exciting programs and initiatives revolving around two key themes: Sustainability and Digital Transformation. **SR**

**ABDULAZIZ AL-NUAIM**

SPE-KSA Chairman

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Treasurer

*Dear reader,*

The 14th installment of the International Petroleum Technology Conference (IPTC) was proudly held in the Kingdom of Saudi Arabia for the second time in its prestigious history. Following the success of IPTC 2020 in Dhahran, the new event was held in the Kingdom's capital, Riyadh with Saudi Aramco, once again, as the exclusive host. The conference comes at a unique time for the industry, two years after the COVID pandemic halted global economies and resulted in industry-wide disruption. In the face of these challenges, IPTC 2022 was a tremendous success. With over 30,000 visitors and delegates. This year's conference shattered the record previously held by IPTC 2020 by over 12,000 visitors, making it the most attended IPTC conference to date. The triumphant conclusion of the conference in February of 2022 is a sign of global recovery and a testament to the industry's resilience.

With the theme of "Fueling Global Recovery through Sustainable Energy," IPTC reaffirms the industry's commitment to fueling the world with energy sustainably to create a better and brighter future for all. IPTC is also the largest intersocietal conference in the energy industry bringing



eyes on

# IPTC 2022

INTERNATIONAL PETROLEUM  
TECHNOLOGY CONFERENCE (IPTC)

Fueling Global Recovery  
Through Sustainable Energy

21st to 23rd of February, 2022

*Yasir Al-Rumayyan, Saudi Aramco  
Chairman of the Board of Directors*



**F**ebruary 2022, the 14th edition of IPTC was held in the Kingdom of Saudi Arabia for the second time at the Riyadh International Convention and Exhibition Centre (RICEC), with Saudi Aramco as the exclusive host. The conference was held under the patronage of HRH Prince Mohammed bin Salman bin Abdulaziz Al-Saud, Crown Prince, Deputy Prime Minister, and Minister of Defense of the Kingdom of Saudi Arabia. The conference was inaugurated by HRH Prince Abdulaziz Bin Salman Bin Abdulaziz Al-Saud, Minister of Energy of the Kingdom of Saudi Arabia. IPTC is an inter-societal conference consisting of Geologists (AAPG), the European Association of Geoscientists and Engineers (EAGE), the Society of Exploration Geophysicists (SEG), and the Society of Petroleum Engineers (SPE).

Over three days, a remarkable 30,000 attendees from over 70 countries attended IPTC. Visitors consisted of ministers, top industry figures and executives, technical experts, professionals, and university students. IPTC 2022 set a new record in attendance exceeding that previously held by IPTC 2020, held in Dhahran, Saudi Arabia, by over 10,000 additional attendees. The opening ceremony was held on the 20th of February, 2022, with a keynote speech by HRH Prince Abdulaziz bin Salman Bin Abdulaziz Al-Saud, followed by remarks from Saudi Aramco Chairman of the Board of Directors, Yasir Al-Rumayyan. The ministerial session was also held on opening day with energy ministers from Saudi Arabia and UAE, oil ministers from Kuwait, Bahrain, Iraq, and Egypt's petroleum and mineral resources minister.





H.E. Suhail Al Mazrouei,  
Minister of Energy &  
Infrastructure, UAE



H.E. Shaikh Mohammed bin Khalifa  
bin Ahmed Al Khalifa, Minister  
of Oil & Gas Bahrain



HRH Prince Abdulaziz bin  
Salman Bin Abdulaziz Al-Saud



Nasir K. Al-Naimi, IPTC 2022 Executive  
Committee Chair, Senior Vice President  
of Upstream, Saudi Aramco

### Conference's Program

- 🔥 Ministerial Plenary Session
- 🔥 CEO Plenary Session
- 🔥 Four Executive Plenary Sessions
- 🔥 IPTC Society Presidents Panel
- 🔥 Two Ask the Expert Sessions
- 🔥 Diversity and Inclusion Workshop
- 🔥 Emerging Leaders Forum
- 🔥 Education Week
- 🔥 Technical & E-Poster Sharing Sessions



The exhibition consisted of 130 exhibitors from over 70 countries with state-of-the-art technologies on display. The setting created the perfect environment fostering knowledge exchange among delegates and visitors. Over 100 technical sessions were held throughout the conference, covering 50 technical categories and 530+ topics. The second day of the conference also coincided with the National Saudi Founder's Day on the 22nd of February, 2022. To celebrate the special day, visitors were treated to a demonstration of the "Alardah" at the exhibition hall, a folkloric Saudi group dance with swords and drums. Finally, the conference ended with the customary passing of the IPTC flag to the 15th host of IPTC, PTT Exploration and Production Public Company Limited (PTTEP). IPTC 2023 will officially be held in Bangkok, Thailand, from 28th of February to 2nd of March 2023 under the theme of "Balancing the Energy Landscape through Innovation and Sustainability."

The Kingdom of Saudi Arabia looks forward to hosting the 16th edition of IPTC in 2024. [SR](#)







MC Danah Alsana, Saudi Aramco



## Ministerial Plenary Session

2022 INTERNATIONAL PETROLEUM  
TECHNOLOGY CONFERENCE (IPTC)

Ministerial Session  
Fuelling Global Recovery Through Sustainable Energy







# Executive Plenary Sessions

2022 INTERNATIONAL PETROLEUM TECHNOLOGY CONFERENCE (IPTC)







# Exhibition Tour

2022 INTERNATIONAL PETROLEUM TECHNOLOGY CONFERENCE (IPTC)

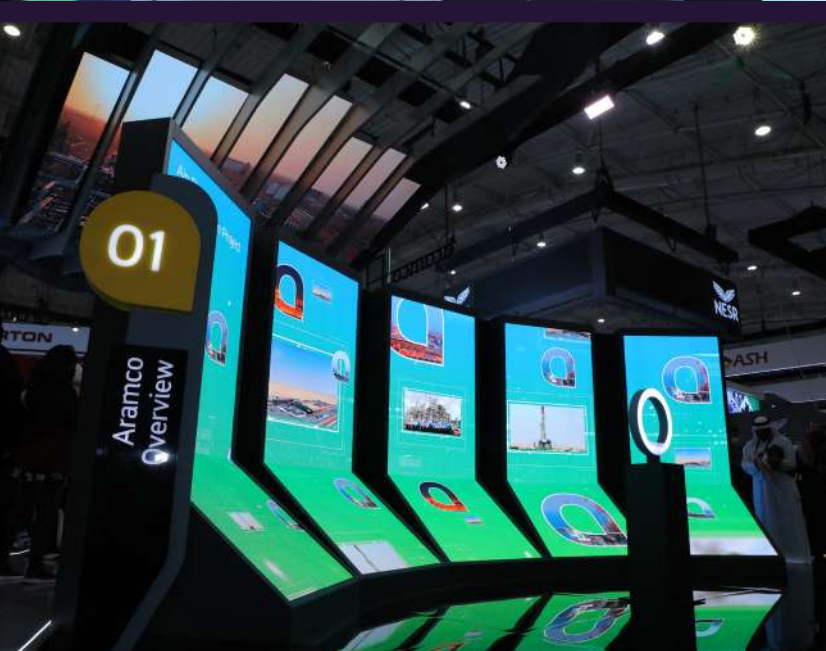






# Aramco Booth

2022 INTERNATIONAL PETROLEUM TECHNOLOGY CONFERENCE (IPTC)







# Sponsor Booths

2022 INTERNATIONAL PETROLEUM TECHNOLOGY CONFERENCE (IPTC)







**SPE-KSA Booth**  
 2022 INTERNATIONAL PETROLEUM  
 TECHNOLOGY CONFERENCE (IPTC)





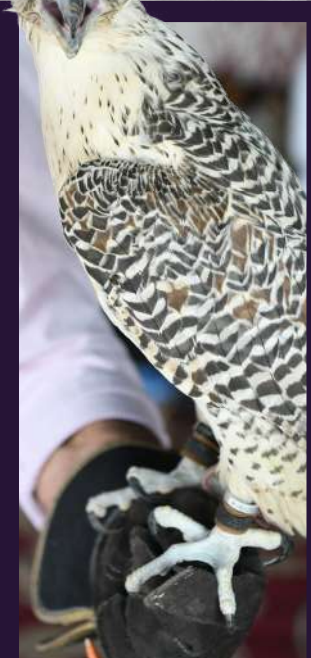


# Closing Ceremony

2022 INTERNATIONAL PETROLEUM TECHNOLOGY CONFERENCE (IPTC)







# IPTC 2022

2022 INTERNATIONAL PETROLEUM  
TECHNOLOGY CONFERENCE (IPTC)







Najwa Azaimi, Saudi Aramco  
IPTC Diversity & Inclusion  
Workshop Chairperson

## IPTC 2022: Diversity & Inclusion Workshop

# Beyond Diversity: Focusing on Inclusion



By: **Rowa Tawfiq**, SPE-KSA D&I Team Member

**T**he “I” in D&I was the focus of the IPTC Diversity and Inclusion workshop chairperson, Najwa Azaimi’s opening remarks. The time has come to emphasize inclusion, especially with rapidly changing ecosystems around the world. The past years have seen an increasing trend in the adoption of artificial intelligence, introducing another aspect of diversity and inclusion. “D&I is no longer about race, gender, age,” said Najwa as she welcomed a special guest to the stage. A robot, who was deemed the “new face of D&I.” Within the next decade, we will see AIs as new members of our workforce, and it is our responsibility to embrace them and incorporate them into our workplace, as we did for others.

The day-long workshop also included facilitated sessions, panel discussions, and interviews hosting industry leaders from across the world to discuss the newly evolving trends of D&I.

### Holding Courageous and Difficult Conversations that Matter

The first facilitated session, moderated by Christian Hobson of Saudi Aramco, hosted Faisal Alhajji, Executive Director of Human Resources at Saudi Aramco, and Aseel Humoodi, Senior Vice President, Human Capital, and Administration at Borouge.

The panelists shed light on the difference between tolerance and acceptance. In an ever-increasingly diverse world, we need to understand tolerance and differentiate it from total acceptance of differences among others. Tolerance means going along with what you don’t fully accept in your heart.

The discussion also included various steps to hold difficult conversations and approach them without making assumptions but with an attitude of tolerance.

### Driving Sustainable Results through D&I

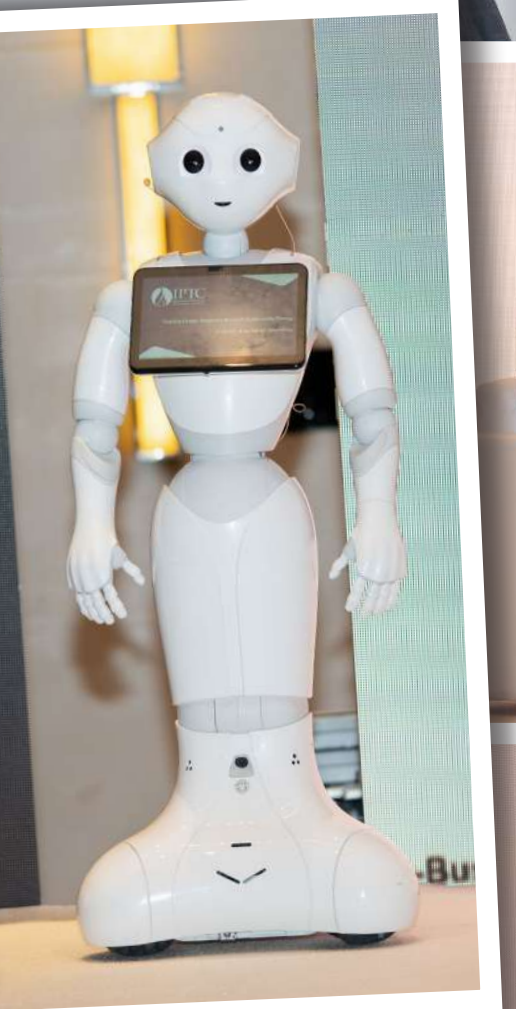
The concept of sustainability has been one of the hot topics recently, especially in the oil and gas industry. However, we rarely incorporate D&I into the discussion. Moderating the second panel was Rowa Tawfiq of Saudi Aramco, joined by Ziad Jeha, Vice President and General Manager, Saudi Arabia and Bahrain at Schlumberger, and Hind Alzahid, Riyadh Human Capital Leader, as panelists.

The panel discussed various aspects of D&I strategies and policies and how they can contribute to creating sustainable businesses and dealing with the complexity of a rapidly changing world.

The panelists also shared their success stories of how small changes incorporated into business models could lead to impactful results. *continued...*







### The Future of Artificial Intelligence through the Lenses of Inclusion

The next facilitated session dove deeper into the role of D&I in the realm of artificial intelligence. Moderating this session was Aseel Al Omair of Saudi Aramco, who hosted the panelists, Nabil Al Nuaim, Vice President of Digital Transformation at Saudi Aramco, and Moudhi Aljamea, Vice President at STC.

The endless debate of whether AI will replace humans in the future was one of the topics discussed during this panel. The panelists stressed that we need to understand the role of AI better and disseminate this knowledge to foster an inclusive workplace. On the other hand, developing AI can introduce some bias from developers, which was an engaging concept amongst the audience.



### Equity vs. Equality

The last session of the day was moderated by Mohammed AlAbbad of Saudi Aramco, who interviewed Nicole Durham, the Chief Diversity and Inclusion Officer at Baker Hughes. The moderator started by engaging the audience and asking them how they felt when they were treated with equality and fairness at work. "Empowered" was the word that was echoed by Nicole as she initiated the discussion on the topic. Nicole stressed on the difference between equality, which means equal treatment regardless of any specific needs or individual differences. On the other hand, equity means everyone is provided with what they need to succeed. Therefore, equity and equality are two processes by which we can achieve fairness. **SR**





IPTC 2022: Education Week Program

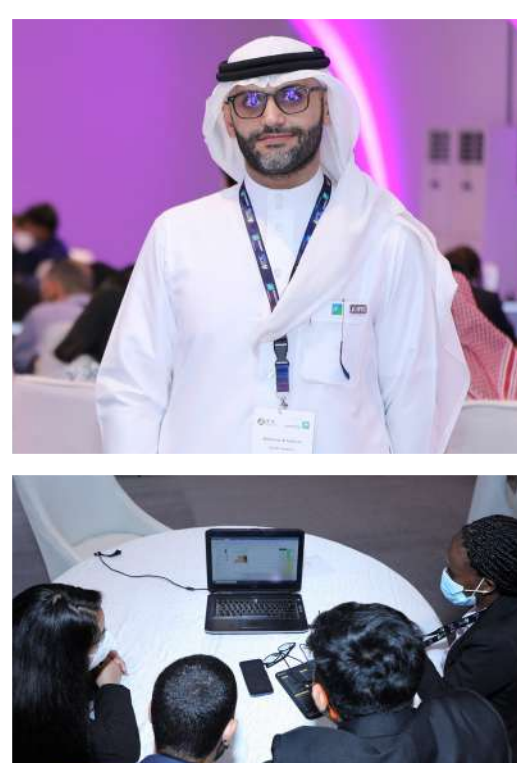
# transitioning top-achievers

By: *Asma Al-Ahmadi, SPE-KSA Student Outreach Team Member*  
& *Fatima Almarzooq, SPE-KSA SandRose Magazine Associate Editor*

**T**he International Petroleum Technology Conference hosted Education Week Program for the 2nd time in Saudi Arabia. The program aims to create a forum tailored for a diverse group of top-achieving students from across the globe to aid them in transitioning from academia to industry. The education week program was attended by 95 of the brightest students from more than 19 countries who were selected from a pool of 1200 applicants to travel to Riyadh to participate in the Education Week Program of IPTC 2022.







The opening ceremony was held in the Hilton Garden Inn Hotel in the heart of Riyadh city. IPTC Young Member Activities Committee Chair, Hind Al-Rayes, commenced the event with a welcoming message to the students encouraging them to make the most of this experience to develop their technical and professional capabilities.

During Education Week, numerous events and programs were held to develop students' technical, interpersonal, and communication skills. In addition, students were given the opportunity to meet and engage with Subject Matter Experts (SMEs), industry leaders, and professionals.

The organizing team put together a diverse technical and cultural agenda for students to expose them to the energy industry and Saudi Arabia. This consisted of the following:

**Geological Visit & Cultural Experience**

Visit Dahil Heet locality and cultural visit to Najd Village to understand the regional geology and to expose students to Saudi culture

**Technical Development**

Organize hands-on sessions with professionals on geo-steering and field development, applying the knowledge they gained over the week by completing and competing in the field development challenge.

**Professional Development & Networking**

Learn from industry veterans' experience by attending panel discussions with executives in academia and industry. Gain an appreciation and understanding of the industry's future challenges and opportunities by engaging in rich discussions with professionals and executives from the industry.

The event concluded by recognizing the winners of the field development contest and distributing participation tokens presented to all students in recognition for their hard work and dedication to the Education Week Program. SR





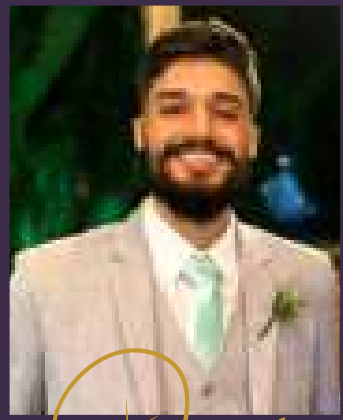




## Student Testimonials on IPTC 2022 Education Week

# Student Testimonials

The outcome of this enriching and the highly motivating journey has left a significant mark on the participants.



Davi

**" I used to think that my high grades were not valuable because I couldn't get an internship. But, I am now mind blown to see the results of my hard work. "**

**Name:** Davi Almeida

**School:** Federal University of Rio de Janeiro (Brazil)

Davi highlights how IPTC 2022 has been an enriching experience for him; he met and worked with a diverse group of students and learned from experienced professionals in the industry. Now that he has completed the 3-day program, Davi wishes to continue the same momentum going back to University.



Riadh

**" What a rich experience I had during IPTC Education Week. The perfect blend of stress and excitement allowed me to gain valuable knowledge and further solidified my interest in the field. "**

**Name:** Riadh Goucem

**School:** University of Boumerdes (Algeria)

Riadh is a mechanical engineering student, shares how enriching his experience was attending the four-day educational week program at IPTC 2022. Riadh learned about the oil discovery in Saudi Arabia and visited geological sites showing the Dahl Heet locality, a cave leading to a breathtaking underground lake. Riadh learned about the geology and petroleum systems in Saudi Arabia, met people with various cultural backgrounds/mindsets, and connecting with industry leaders from around the world.



Diana

**" For me, the experience at IPTC Education Week has been unforgettable. My main takeaway is that consistency and discipline will take you farther along your journey, no matter how challenging life is. "**

**Name:** Diana La Cruz Martinez

**School:** University of Zulia (Venezuela)

Diana is a petroleum engineering student at the University of Zulia shared that although this isn't her first time applying to IPTC, she took the past rejection letter in stride, focusing on her self-growth and development, which got her accepted into IPTC 2022—adding that IPTC was an excellent opportunity for her to not only gain access to technical information but to network with bright-minded industry professionals from all over the world.



Bariya

**" Attending IPTC allowed me to engage with different professional societies, be immersed in an innovative learning environment. "**

**Name:** Bariya Khan

**School:** Dawood University of Engineering and Technology (Pakistan)

Bariya shared that she was thrilled to work in an innovative environment and to have the chance to attend enriching technical sessions, especially those focused on environmental sustainability. In addition, she also remarked that attending IPTC 2022 educational week allowed her to link the theories she learned inside the classrooms to industry applications.



Namugwe

**" Attending IPTC 2022 broadened my depth and breadth of knowledge. Going back to Uganda more confident to share how important energy is to our day-to-day lives with other young professionals in my country. "**

**Name:** Namugwe Victoria

**School:** Nkumba University (Uganda)

Aspiring leader and Petroleum and Mineral Geoscience student at the Nkumba University is part of the organizing committee of the Young Professionals Debate Club in her hometown Uganda. Driven by passion and curiosity about the Oil and Gas Industry, Namugwe sought answers to critical questions surrounding the industry's sustainable development. In doing so, Namugwe hopes to return to Uganda with her objective set to disseminate the knowledge and essential role that oil and gas play in our day-to-day lives.



# Member Spotlight

*In this section, we select a distinguished member of the SPE-KSA community to highlight in each issue*

## FAST FACTS

**Name:** Dr. Ali A. Al-Meshari

**Job title:** Chief Petroleum Engineer, Saudi Aramco

**SPE involvement:** Vice-Chairman of the board of directors, SPE-KSA

### **Why did you decide to join the energy industry?**

Observing the kingdom's involvement in the global energy scene created a sense of eagerness to contribute to the country and the company's mission of supplying the world with energy. This eagerness evolved to be a personal driver in ensuring that Saudi Aramco continues to be the leader in providing the world with sustainable and affordable energy.

### **What event, person, or life experience has had the most influence on the direction of your life?**

There are many, but my parents influenced my life direction where they shaped my values that always kept me in the right direction. Saudi Aramco also influenced me, and I am so indebted to the leadership and career advancement opportunities provided to me. In terms of events and to limit it to a recent one, my involvement with the G-20 S-20 (Science 20) as a task force lead deepened my realization of the interconnectedness of this world in essential aspects such as health, fair access to water and energy, and circular economy amongst other topics. This realization was amplified as the G-20 S-20 was held during 2020, a challenging year due to the pandemic and disruptions to energy markets and supply chains. This ties back to my decision to join the energy industry.

### **What's one thing – either industry/work-related or not – you learned recently?**

The flexibility and agility of our industry and its response to the recent challenges it went through due to the pandemic. This allowed me to reflect on and learn from what went well and what needs to be enhanced, leading to achieving a positive and sustainable working culture that aligns with the Kingdom and the company's goals and objectives.

### **Is there an achievement or contribution of which you are most proud? Why?**

Although they are many, my contributions on the carbon circularity and sustainability front are dearest to me, as this ensures a steady supply of energy to the whole world.



### **What does SPE mean to you?**

An excellent stage and venue for networking, sharing experiences, and knowledge. SPE, and SPE-KSA specifically, provided me with the opportunity to learn leadership skills and styles through others. SPE also serves me as a window with a view of the industry as a whole as I learn something new every day, whether technical or not.

### **When you're not working, how do you enjoy spending your time?**

I enjoy spending time with my family and perfecting my steak cooking skills. In addition, I like reading about leadership and new technology for personal development, especially digital transformation. I also make sure I spend adequate time exercising to be fit and healthy.

### **How do you define success?**

Success is relative and is also a personal challenge for every person. You need to set your ambitious goals with a timeline, challenge yourself to meet them, and then set more goals. Success is achieving my goals and staying hungry to set and achieve more. The goals that I am talking about are not business only, they are around five dimensions: spiritual, social, health, financial, and career. The success is to strike a balance around these five dimensions.

### **What are you looking forward to in the future?**

More ambitious goals around these five dimensions to set and achieve...

### **Advice you would give to other SPE members:**

SPE is a great society that presents an excellent opportunity for everyone, especially young professionals, to network, learn, and stay up to date, so be sure to utilize it fully and contribute to it. Be resilient and work hard, good things happen to those who wait. SPE is great because of the contributions others made and continue to make.

### **Quote or motto you live by:**

***The greatest danger for most of us is not that our aim is too high and we miss it, but that it is too low and we reach it." Michelangelo***



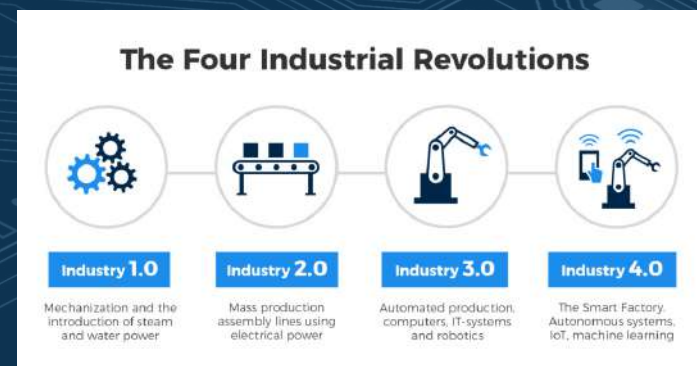
# Decoding the Future of Energy: EXPLORING THE NEXUS BETWEEN THE TECH AND OIL AND GAS INDUSTRIES

By SandRose Editorial Team

The oil and gas industry and the technology industry are two of the world economy's largest sectors. With that being said, they are often painted in an adversarial light. Much focus is given to their differences when they have a long-standing and mutually-beneficial relationship as partners in each other's success. This dynamic has steadily grown over the past century. It will continue to evolve well into our shared future, shaping advancements in many joint goals, including developing sustainable energy technologies and the race to net zero. This edition of the SandRose editorial aims to shed some light on the realities and trends that characterize the relationship between these two mutually-dependent industries and their shared future.

## HISTORIC PERSPECTIVE

Historically technology has been defined as any tool, machine, utensil device, and skill created by humans. However, over the past 200 years, this definition has evolved to refer to the use of science and engineering to invent objects and entities to solve problems and extract some value. This evolution of "tech" as we know it today



dates back to the first industrial revolution when water and steam power were used to mechanize production in the 1700s. The second industrial revolution began with electric power in production and the creation of assembly lines in 1870. In the 1970s, the third industrial revolution was kicked-off by the birth of the modern computer and with the automation of processes. Today we are in the era of IR 4.0 where cyber-physical systems, the internet of things, and networks have disrupted governments and industry, with global tech giants leading the charge. In the 1940s, however, the industrial world transitioned to hydrocarbons from coal due to the higher energy density, the favorable fluid state of oil, and the lower transportation costs. The rise of the hydrocarbon era also resulted in a period dubbed "the great acceleration" in the 1950s and 1960s, leading to the birth of modern consumer societies and unprecedented economic growth. The rapid pace at which IR3.0 developed can be attributed to the rise of the hydrocarbon age.

Because the process of economically and safely extracting hydrocarbons is contingent upon several primarily technical disciplines (petroleum engineering and geosciences, among others), it is evident that technology has played a fundamental role in the conception and progression of the oil and gas industry. With every transition to a new stage of the industrial revolution, there has ensued a corresponding leap in the technological prowess put to work in the petroleum industry.

Reservoir simulation software has been used for decades to simulate subsurface conditions that would otherwise be impossible to visualize, enabling engineers to more effectively and strategically manage

the process of extracting hydrocarbons. Several of the world's major petroleum producers have constructed purpose-built supercomputers for this express function, ranking among the most powerful supercomputers globally. This also offers tech companies valuable and rich datasets which can be used to train machine learning algorithms. On the other hand, computer-aided design (CAD) has been similarly employed in designing all manner of tools and technologies at the core of upstream, midstream, and downstream. These include, but are not limited to: drill bits, logging tools, and process control tools. The internet has also enabled the seamless transfer of on-site and in-situ data from the well-site to the computer screens of engineers from the comfort of their offices. Conversely, the tech companies that have powered these advancements have also benefited from sharpening their tools and capabilities to serve their business advantage at large. Patents from the petroleum industry have also given rise to technologies that can be applied and commercialized in several other sectors.

## THE CURRENT STATE OF AFFAIRS

The long-standing, robust, and mutually-beneficial relationship between the oil and gas and tech industries continue to evolve to respond to the ever-changing realities and challenges of both sectors and the world. As the world's energy needs continue to grow, oil companies have uniquely positioned to respond to this growing demand while meeting the pressing and equally important need to reign-in emissions and setting ambitious net-zero targets within a few decades. In many ways, large tech companies have been a primary partner in achieving both of those priorities in effective and innovative ways.

As the oil and gas industry grows through the ongoing digital transformation, many IR4.0 technologies have enabled value creation and optimization in virtually every facet and sub-discipline of the industry. One example is in companies such as Google and Amazon lending their robust cloud services to the massive amounts of data regularly stored, accessed, and analyzed from upstream to downstream. For example,

Saudi Aramco has teamed up with Google Cloud to offer "high-performance, low-latency" cloud services throughout the Kingdom. Similar agreements between Amazon and Petrobras and IBM and Total have been in effect.



Figure 2- LDES Council CEO-led organization guidance to governments and grid operators and major electricity users on the deployment of long-duration energy storage.

Conversely, Amazon has enlisted the help of ammonia as a fuel to minimize shipping-related emissions, where oil and gas companies have played a key role in providing ammonia and advancing the technology to both derive and extract clean power from it. Finally, some tech and energy companies themselves have been proactive in tackling some of the most pressing challenges facing renewables, such as Microsoft, Google, NEOM, Shell, and Baker Hughes who have recently joined the Long Duration Energy Storage Council (LDES), which was launched at COP26 to "push for the global deployment of technologies that can store and discharge energy for eight hours or longer." Further towards achieving the pledged goals in COP26, tech companies are also a primary driver for a slew of technologies designated as carbon trackers, which are an invaluable tool in the quest to attain net-zero.



## OUTLOOK & FUTURE OPPORTUNITIES

In the oil and gas industry ML alone has been an enabler of significant cost avoidance by reducing data gathering requirements (logging, coring, fluid sampling, etc) through the utilization of data-based predictive models. Further development in such ML applications will lead to enhanced operational efficiency and reduced cost per barrel.

Digital technologies, such as artificial intelligence (AI), blockchain, machine learning, advanced data analytics, Internet-of-things (IoT), big data, cloud computing, sensors, automation, robotics, among many others, are vital to enabling the net-zero transition as they facilitate new industry opportunities to establish a more circular carbon economy by generating, delivering, and consuming energy more sustainably. There are many routes to net zero, but digital technology has a central role regardless of sector or region. Adopting these solutions can help decarbonize industries much more rapidly and offer unparalleled opportunities to tackle these challenges. For example, supplementing the growing carbon capture and storage (CCS) operations with process automation, predictive maintenance, flow surveillance, and control systems can significantly improve operational efficiency, safety, and profitability. These applications can also extend further to produce automated drilling rigs and robots to inspect and repair subsea infrastructures and smart drones to inspect pipelines and hard-to-reach equipment such as flare stacks and remote, unmanned offshore facilities.

## THE KINGDOM'S EFFORTS

By royal decree in 2019, the Kingdom of Saudi Arabia established the Saudi Authority for Data and Artificial Intelligence (SDAIA) to transform the Kingdom's workforce to be data-driven and technology-centered by developing professionals in ML and AI. Withing SDAIA, the National Center for AI (NCAI) was established in cooperation with the Saudi Ministry of Energy (MOE) with the mandate to invest and create AI technologies and build local expertise in the energy

sector. However, among the challenges of accelerating the adoption of AI in the energy sector is the existing silos in data structures among different entities. Therefore, open data structures are required further to create more intelligent systems through AI. The use of such AL and ML is also expected to aid in diversifying energy sources by solving challenges such as the intermittency of renewables, grid stabilization, and the placement of solar panels. In addition, the growing use of AI and digital solutions can further optimize oil and gas operations leading to increased production at lower costs. Collectively AI allows the Kingdom to continue to cement its position as a leader in oil and gas while extending our portfolio to include renewables.

Digitalization is paramount to the success of energy transition. As the oil and gas industry navigates this shifting landscape, we will see more wearables, robotics, and the application of artificial intelligence in day-to-day operations. Investing in the right digital technologies and open data structures is how the industry can ensure that the clean energy projects undertaken over the coming decades will be delivered more efficiently, in reliability, and sustainably.

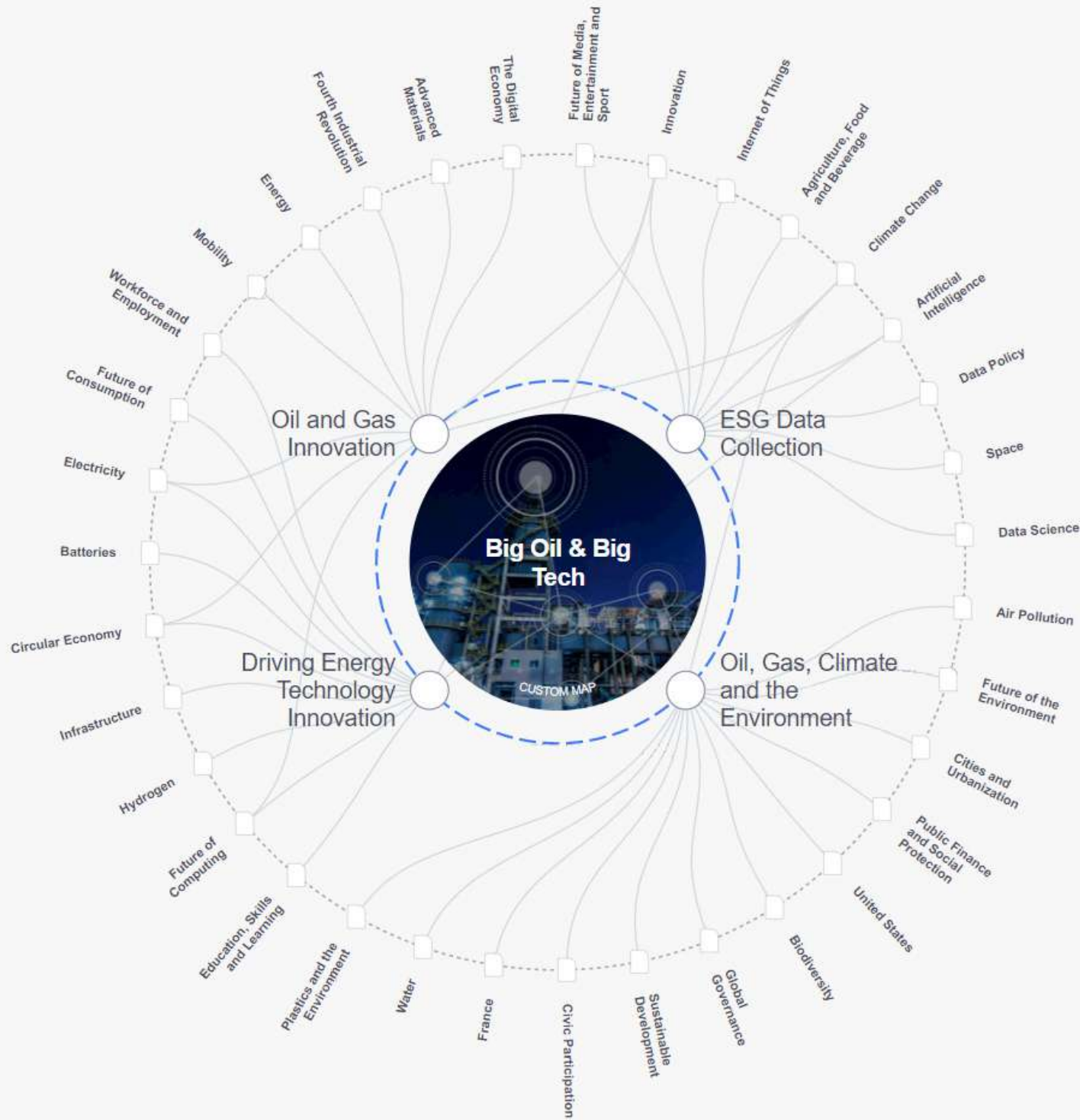


Figure 3 - A map showing the interconnected nature and spheres of influences between big oil and big tech (Source: WEF)





# The Basic Elements of Artificial Intelligence

By Fatai Anifowose, Research Scientist, EXPEC Advanced Research Center, Saudi Aramco

## INTRODUCTION

Artificial intelligence (AI) is transforming the way we live, work, and interact. It is reshaping our professional and social engagements as well as how we conduct our private and corporate businesses. From the age-old medical expert systems and search engines to intelligent chatbots and predictive models, the enthusiasm for AI practice is growing rapidly. This article will help AI enthusiasts to take strategic steps to contribute to the digital transformation efforts of the oil and gas industry.

## THE BASIC ELEMENTS

According to John McCarthy, a Professor of Computer Science at Stanford University, AI is “the science and engineering of making intelligent systems”. AI is a branch of computer science that attempts to program a computer or robot to “think” the way humans do. The product of AI practices is an intelligent system which could be in the form of a software, a hardware, or a combination of both.

The key elements of AI include:

- Natural language processing.*
- Expert Systems.*
- Robotics.*
- Intelligent agents.*
- Computational intelligence.*

An illustration of AI key elements is shown in *Figure 1*. Each of the elements will be discussed in sufficient details within the scope intended for this article.

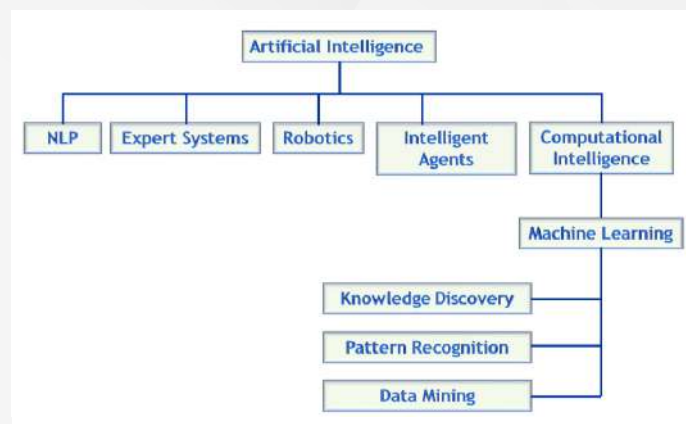


Figure 1: The AI Family Tree Showing the Key Elements

## NATURAL LANGUAGE PROCESSING

Natural Language Processing (NLP) is an element of AI that allows machines to use and understand language the way humans do. It is built into devices such as automatic language translators used in multilingual conferences, text to speech translation, speech to text translation, and knowledge extraction from text. Some of the various aspects of NLP and its applications in information extraction, personal voice assistants, sentiment analysis, relationship extraction, chatbots, Q&A analysis, and social media analysis is illustrated in *Figure 2*.

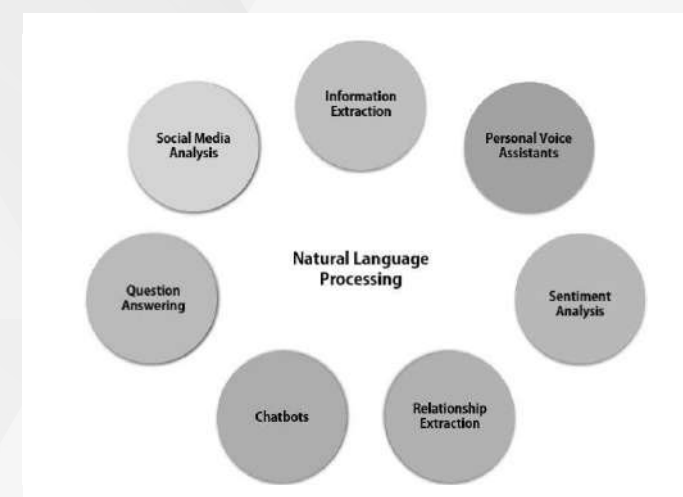


Figure 2: The Applications of Natural Language Processing

According to Oracle, a database software company, structured data only accounts for about 20% of generated data. The rest is locked away in emails, diaries, notes, audio, video, images, analog data, and legacy handwritten or typewritten reports. These types of records are rarely used since they were originally meant only for the use of humans. Recent applications of this element in the oil and gas industry include the ability to:

*Extract structured data from free text embedded in well drilling, safety, plant equipment, and reservoir planning reports.*

*Extract and analyze data from PVT laboratory reports.*

*Extract information from production details, which can be used to improve operational efficiency.*

*Interact with machines to troubleshoot unexpected problems swiftly and accurately. This not only makes maintenance work safer and easier, but can greatly reduce asset downtime due to unexpected issues.*

## EXPERT SYSTEMS

Expert Systems are machines or software applications that guide users through a set of rules from a problem to a solution through knowledge on a given subject. The rules are provided by an expert in the subject’s domain and programmed into a software to reproduce the knowledge for non-experts to solve a range of actual problems. Expert Systems have been built and used in the fields of medicine, pharmacy, law, food science and engineering, and maintenance. The illustration in *Figure 3* shows how expert knowledge is programmed into a rule-based system for non-experts to benefit from.

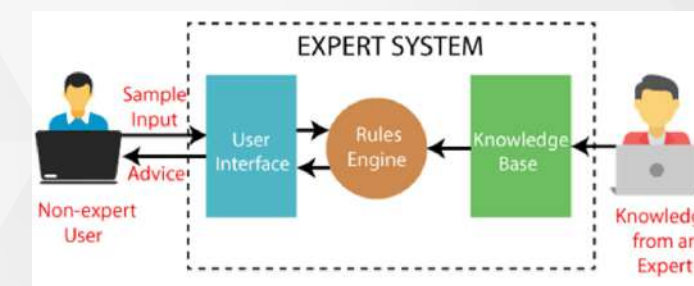


Figure 3: Programming Expert Knowledge into a Rule-based System for Non-experts' Use



In the oil and gas industry, Expert System applications have been used from exploration through production, from research through operations, from training through fault diagnosis. Examples of such applications include:

*Dip-meter interpretation: to translate tadpoles into strata and formations.*

*Electrofacies determination: to guide users on the electrofacies identification.*

*Blowout prevention: to train new drilling engineers on how to prevent drilling hazards.*

*Drilling fluid selection: to offer support on selecting appropriate drilling fluids for the relevant lithologies.*

*Lead finder: to estimate probability of exploratory drilling success using neighboring hole histories.*

*Pipe sticking advisor: to provide guidelines on why drill strings get stuck and how to free them.*

*Wellhead configuration: to guide on how to configure wellhead assemblies for production wells.*

**ROBOTICS**

Intelligent robots are mechanical structures in various shapes that are programmed to perform specific tasks based on the instructions given by a human. Robots can travel across land, air, and water. They are also called drones and rovers depending on the environment or nature of use. Robots that operate on land are usually referred to as Unmanned Ground Vehicles (UGVs). Those that operate in the air are usually referred to as Unmanned Aerial Vehicles (UAVs). Underwater robots are usually called Autonomous Underwater Vehicles (AUVs). Robots can be designed to move on wheels, walk on two or four legs, crawl, or fly, all depending on the nature of the terrain where they are intended to be used.

Robots have been used in the petroleum industry in

many innovative and beneficial ways. Some of the innovative ways that robots have been used in the oil and gas industry include:

*Production: They are used as remotely-operated aerial drones and as subsea vehicles majorly for inspection tasks. Whether on land or in the sea, drones are equipped with high-resolution sensors and hyper-spectral cameras to collect visual data on the condition of assets such as rigs, platforms, tanks, columns, elevated structures, pipelines, foundations, and submarine composite cables thereby reducing operational cost and enhancing safety.*

*Drilling: Robots are now used to connect different segments of drill pipes. They are enablers of autonomous drilling.*

*Exploration: Drones are used to map outcrops and build digital models for geologists.*

**INTELLIGENT AGENTS**

Intelligent Agents System is a sub-field of AI that develops systems that are capable of making decisions and taking actions in an autonomous way. Agents maintain information about their environment and make decisions based on their perception about the state of the environment, past experiences, and objectives. Agents can also interface with other agents and collaborate to reach common goals, all in emulation of the human social behavior. Agents have been successfully implemented mostly in the manufacturing industries. An illustration of the agents' description is shown in **Figure 4**.

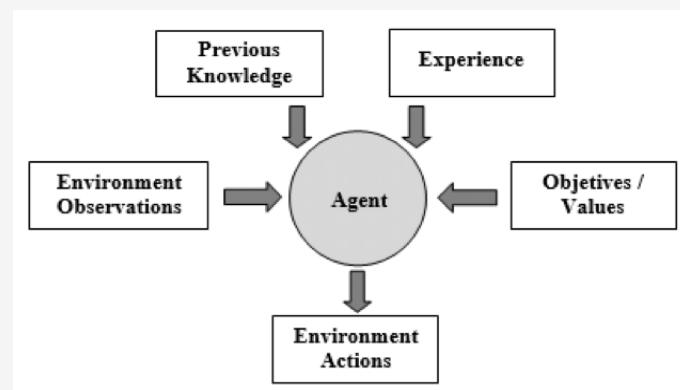


Figure 4: Intelligent Agents and how they Interact with their Environment

The petroleum industry has proven to have the potential to benefit immensely from the application of Multi-agent Systems. Several R&D groups are working in specific applications of agent technology especially in asset operation and management. Several studies have explored the potential uses of intelligent systems along with Machine Learning (ML) to achieve the following benefits:

*Manage supply chain and maintenance related tasks.*

*Manage the global and distributed nature of the oil and gas business.*

*Address issues such as orchestrating different data sources, owners and formats, verifying, validating and securing data streams as they move along the complex business process pipelines.*

*Improve business efficiency and increase operational efficiency by getting insights from data, thereby preventing theft and fraud.*

**COMPUTATIONAL INTELLIGENCE**

Computational intelligence, also known as soft computing, is the computational aspect of AI that focuses on utilizing and extracting insights from data. As shown in Figure 1, it uses the knowledge discovery and data mining processes to develop Machine Learning workflows, and learn from historical data to predict future events. Machine Learning (ML) is the computational aspect of AI that employs various techniques to discover new knowledge from data. There are several algorithms to build ML models. Examples include: artificial neural networks, decision trees, random forest, support vector machines, extreme learning machine, fuzzy logic types I and II, adaptive neuro fuzzy inference system (popularly known as ANFIS), gaussian process regression, bayesian belief network, and K nearest neighbor. The new and evolving field that uses various scientific methods, processes, algorithms and systems to extract knowledge or insight from data is called Data Science.

**CONCLUDING REMARKS**

This article has introduced the basic elements of AI to encourage readers, especially young professionals, to get started with this technology trend. A follow-up article will go beyond the basics to discuss the types of learning and various advances in ML including hybrid, ensemble, and deep learning.

Just like any other thing in life, getting started with a new venture involves three major steps: developing deep passion, acquiring knowledge, and applying the knowledge through practical exercises. The key to mastering AI is to understand the basic building blocks, which this article has succinctly provided. Once the foundation is strong, then the "icing on the cake" would come easier. SR



# Automatic Generation of Drilling Schedules Using Machine Learning: A Paradigm Shift in Planning and Resource Allocation

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## INTRODUCTION

A planning cycle – as the name implies – is an annual process where oil and gas companies update schedules mainly for budgeting forecasts and resource allocation. It involves addressing the following key steps:

*Producing the drilling program; This step addresses the question of how many wells are needed in the subsequent years. A typical development-drilling program includes the number of wells needed and their attributes (e.g., vertical, horizontal, oil producer, gas producer, water injector ... etc.)*

*Identifying the resources required to execute and implement the development drilling program; Under this step, capital expenditure by the company is estimated for the future.*

For reliable budgeting forecasts and resource allocation, a detailed drilling schedule has to be generated. A typical drilling schedule usually contains forecasts about the start of drilling for every well, the completion of drilling, in addition to the name and type of the drilling rigs. The forecasts have to take many factors into consideration. These factors include; the location of the well (i.e., onshore or offshore), the type of the well (i.e., horizontal, vertical, or deviated well), in addition to other attributes and features that will be demonstrated later.

Our focus in this paper is on the second step of the planning cycle where we introduce a new procedure

to automatically generate drilling schedules. These schedules will consider the various attributes of the wells and rigs, the dynamic nature of rig movement between wells, as well as the many rules and logic derived from both historical records and user knowledge.

## DRILLING SCHEDULING AUTOMATION COMPONENTS

For the generation of drilling schedules, an algorithm called Rig Scheduling Assistant (RiSA) has been developed. Its key functionalities and components are listed below and will be described in more detail in the subsequent sections. These key components are:

- Generating initial rig information data.
- Generating a Markov Chain model.
- Generating drilling cost and time for all wells.
- Generating drilling schedules.
- Generating budget forecasts, rig years, and well counts.

## SPECIFYING RIG INFORMATION

A key component of RiSA is the specification of initial rig information. The objectives of this component are to: identify the initial rigs that will be used to generate the schedule ,specify the wells at which these rigs will start ,and determine when these rigs will be ready to start drilling from the planned wells.

## MARKOV CHAIN MODELS

A key element of RiSA is the learning algorithm in which rig capabilities are inferred from their history and used

*This article contains highlights of IPTC-22147-MS, prepared for the 2022 International Petroleum Technology Conference and Exhibition (IPTC), Riyadh, Saudi Arabia, 21-23 February 2022.*

for prediction. This is achieved by building a Markov Chain (MC) model that tracks the movement of each rig in history and analyses the type of wells drilled in the process. From this, the algorithm computes transition probabilities that control the assignment of rigs to future wells in a predictive manner. The MC states are defined by the user and typically contain information about the field such as: the fluid type - oil or gas -, location - onshore or offshore -, drilling operation - new well, re-entry, or workover -, and well type - vertical, horizontal, multilateral.

Figure 1 displays a global MC model that was built from individual rig MC models and used in one of the simulations.

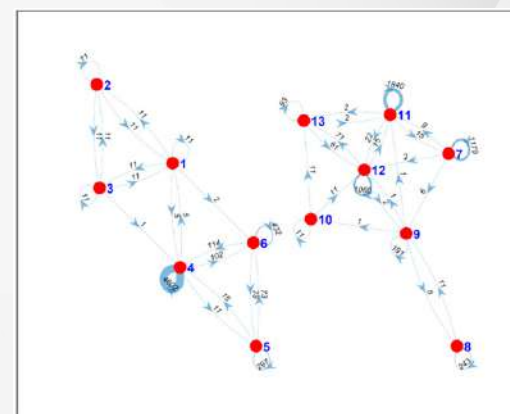


Figure 1: An example of a global Markov Chain model. The red circles indicate well classes, and the class numbers represent a well class with a unique set of well attributes as defined by the user. The arrows indicate the total number of times rigs have crossed between classes.

Once this step is done, the next step is to map this class definition to all rigs, as observed in Figure 2. The algorithm then tracks how many times a rig moved between the different classes. These are called the

number of visits, from which transition probabilities can be calculated for prediction.



Figure 2: An illustrative example of mapping well classes to wells as defined by their selected attributes.

## SPECIFYING RIG MOVEMENT PRIORITIES

Markov Chain models are not the only parameter that influences how a rig moves during simulation. Another set of conditions and priorities can be specified which becomes handy when a rig has multiple wells under the same well class to choose from. Figure 3 displays a schematic illustration of this option and how it works.

The priority list in RiSA can be easily set up to consider many attributes which can include distance, field, year, well cost, and well drill time. The default settings in RiSA are based on the shortest paths.

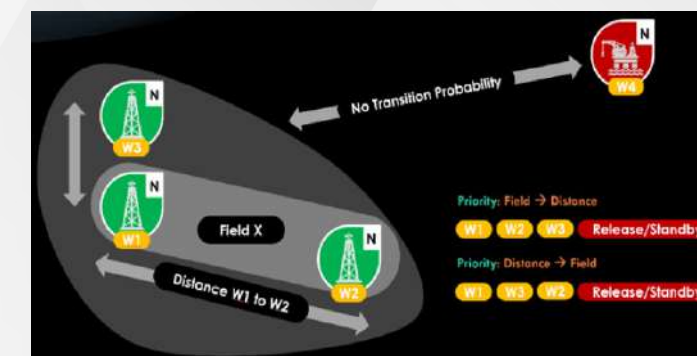


Figure 3: A schematic illustration of the use of priorities to control rig movement



## DRILLING COST AND TIME ESTIMATIONS

A very crucial step in the drilling scheduling process is the estimation of the drilling cost and time for all future wells. RiSA provides users with multiple modeling approaches which can be categorized broadly into two main approaches:

**Deterministic approaches.**

**Stochastic approaches.**

Under the deterministic approaches, a single estimate of cost and time is assigned to each well in our prediction. We have developed three different deterministic models:

**Analytical model.**

**Artificial Neural Network model.**

**Regression Tree Ensemble model.**

**Analytical Model**

As mentioned previously, analytical models fall under the deterministic modeling approach in which a single value of cost and time will be estimated for each future well. This will be done by matching new wells in the planning cycle with similar wells that were drilled in the past to estimate the drill time and cost. Using the match, a group of analog wells for each well in the plan is defined to be used for the estimates.

The analogues wells identification approach takes into consideration many variables such as fluid type, shore type, drilling type, well configuration, well objective type, field, and reservoir.

**Artificial Neural Network Model**

The second deterministic approach is the artificial neural network. Since most of the input data are categorical, a pre-processing step was necessary to feed the data into the network. For this, the one-hot encoding algorithm - which converts all categorical inputs into binary variables - was used. Figure 4 shows an example of this where categorical inputs of a well were converted into a synthetic image using the one-hot encoding algorithm. Each box in this image represents binary information such that when it is not empty, the information for that particular well will be true.



Figure 4: An example of a synthetic image generated using the one-hot encoding algorithm as input to the artificial neural network model.

### Regression Tree Ensemble

The third model is based on the regression tree ensemble which is a predictive model composed of a weighted mixture of several regression trees. In general, this approach improves the predictive performance of the model. The model was validated using the cross-validation algorithm, and the learning algorithm used was based on a Bagging classifier – a very powerful machine learning algorithm that utilizes the bootstrap technique to generate multiple replicas of the dataset and grows a decision tree on them.

### Stochastic Modeling Approach

The stochastic modeling approach uses a bi-normal distribution to fit actual drilling cost and drilling time data for a given group of wells. The distributions are inferred by determining the average cost, average drilling time, cost, and time variances along with their covariances as well. Once estimated, the distribution can then be used to draw cost and time values at random in a given simulation. Each time a drilling schedule is run, cost and time values will be redrawn from the same distributions.

## SCENARIO PLANNING OPTIONS

At this stage, we are ready to generate a drilling schedule. Here, all previous workflows and algorithms are encapsulated to generate a schedule that includes all drill cost and time models, initial rig information models, and Markov Chain models. Under the scenario

planning option, users are provided with a set of features that control the scheduling process and help the planner in making the plan they want. Below is a description of the main features RiSA provides.

### Rig Additions and Releases

Another scenario is that a rig drills all accessible wells in a given year before it reaches the end of that year. In this case, the rig is released and might be brought back when the simulation moves to the following year, depending on when the rig was released, and a pre-set cutoff date called: re-activate released rigs time.

RiSA also provides the ability to add rigs as needed. The built-in logic gives priorities to capitalize on existing rigs as much as possible. This logic allows the simulator to scan wells and assign them to the relevant rigs. The rig addition logic was done in such a way to ensure that any new rig starts from the right time in the year, extends to the end of that year, and continues throughout the subsequent years. This feature ensures the avoidance of making gaps in the drilling schedule and/or illogical rig addition/release activities. Figure 5 demonstrates the concept of rig additions and rig releases graphically.

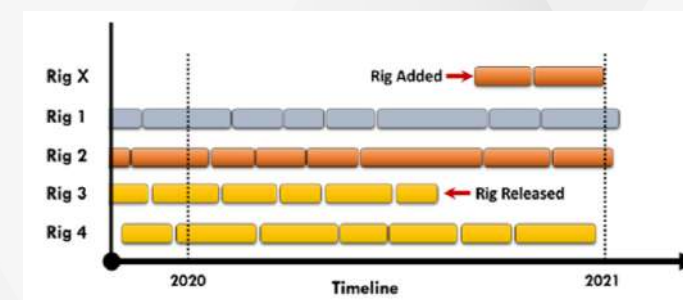


Figure 5: Demonstration of rig addition and rig release logic. Rig 3 is released as all yellow requirements are scheduled. Rig X is added to schedule the remaining orange requirements.

## GENERATING DRILLING SCHEDULES

Once all simulation parameters are specified, the simulations are ready to launch. RiSA enables detailed drilling scheduling for the planning cycle to be produced within minutes.

When the simulation is run, the initial rig location information is analyzed as stated above. The global MC model is then referenced to determine probabilities

for moving rigs from well to well. The logic assigns rigs to the wells matching a well class with the highest probability according to the global MC model. User preferences are also accessed to ensure that user-defined preferences and rules are followed when assigning rigs. Rigs are added and dropped from the drilling schedule according to the rig addition/removal logic as described above.

Finally, a complete drilling schedule is generated for the specified planning period and rig level; a count of completed wells per year and annual cost are calculated. When stochastic modeling is chosen, dozens of drilling schedules are run, and the most likely candidate is presented to the user with its count of wells to be completed, projected cost, along with the expected standard deviation around these results.

## CONCLUSIONS

The new method to automate the generation of drilling schedules for the planning cycle and long-term plan brings about a paradigm shift in planning and resource allocation where time and efforts are reduced by orders of magnitude, thereby allowing planners to explore an unlimited number of scenarios. The speed, practicality, and level of accuracy demonstrated by the algorithm provide a clear example of the value of embedding IR4.0 technologies in oil and gas planning. This capability permits resource management, sensitivity analysis, and scenario planning. In addition to that, quantification of the uncertainty in drill-cost and drilling-time was addressed by assigning a bi-normal distribution with a known mean and variance. In each scenario, drilling time and cost were drawn from these distributions to determine the overall budget. Dozens of cases were performed, and histograms of the yearly budget, rig year, and well count were generated, indicating the range of possible figures due to uncertainties in well-drilling cost and time. <sup>SR</sup>



# SandRose Technical Paper Digest

Curated by **Nora Hamidaddin**, Associate Editor *SandRose Magazine*

In this section, we curate a number of recommendations for technical papers from subject matter experts on topics relating to their respective disciplines.



## JPT

### AI/Petrophysics

#### AI IN PETROPHYSICS: IS IT GRACE OR GRAVE

Recommended by **Salah Al-Ofi**, Team Lead – Physics, Baker Hughes

*Cuddy, Steve. "The Benefits and Dangers of Using Artificial Intelligence in Petrophysics." Paper presented at the SPWLA 61st Annual Logging Symposium, Virtual Online Webinar, June 2020.*

Reservoir formation evaluation domain witnessed rapid growth in AI applications in the last decade. AI techniques showed significant advantages by learning from data and making predictions with minimal human intervention. However, petrophysicists are still skeptical whether AI approaches can solve standing formation evaluation issues or cause additional issues when dealing with large data sets. This paper presents the main advantages and risks of applying different AI methods. The author stressed the "risk assessment" process and advised on how to avoid the 'rubbish in, rubbish out' and 'AI runaway' challenges. Finally, different cases were shared using AI methods for interpreting and upscaling well data for better reservoir evaluation.

### Carbon Management

#### CCUS – LEADING THE SOLUTION OF GLOBAL CLIMATE CHANGE

Recommended by **Hassan Al Zayer**, Petroleum Engineer, Saudi Aramco

*Jacobs, Trent. "CO2 EOR Could Be Industry's Key to a Sustainable Future or Its Biggest Missed Opportunity." J Pet Technol 72 (2020): 17–20.*

This paper highlights how the oil and gas industry can lead the solution of global climate change by grand-scale projects of carbon sequestration, usage, and storage (CCUS). Using Oxy's "Midwest CO2 Superhighway" project as an example, the author highlights the potential of such a project to reduce the US annual emission by 4%. The author further elaborates on the feasibility, cost, and challenges of CCUS projects by using the Petro Nova, the world's largest post-combustion CO2 EOR facility, as an example. The paper also discusses the role of policies and incentives by the governments in the success of such projects.



Kingdom of Saudi Arabia Section

### Petrophysics

#### NOVEL SLIM-HOLE NMR TECHNOLOGY

Recommended by **James Dolan**, Principal Petrophysicist, Schlumberger

*Hursan, G., Silva, A, Van Steene, M., and Mutina, A. 2020. Paper SPE-202897-MS presented at Abu Dhabi IPTC, Abu Dhabi, UAE, 9-12 November 2020*

This paper describes a novel slim-hole NMR technology that provides real-time relaxation time (T1 and T2) measurements tested in Saudi Arabia. It addresses the challenges of applying the new technology to complex and challenging environments. The paper investigates the NMR measurement response across several vertical and horizontal wells that run through complex carbonate and clastic lithologies. The environmental effects of drilling assembly motion, filtrate invasion, and high mud salinity were also examined. The paper describes a novel technology, the methodology carried out, and the value of the results achieved.

## JPT

### Sustainability

#### CIRCULAR ECONOMY—DRIVING SUSTAINABILITY IN INDUSTRY BY SAMI ALNUAIM, 2019 SPE PRESIDENT

Recommended by **Ahmed Attar**, Ph.D., Supervisor of Economic Evaluation, Saudi Aramco

*"Circular Economy: A Sustainability Innovation and Solution for Oil, Gas and Petrochemical Industries" by Sami Alnuaim (former 2019 SPE president), JPT, May 2019.*

In the past decades, the world followed a linear economy in the oil and gas industry where oil is produced, and by-products are manufactured and then disposed. Sami Alnuaim, the 2019 SPE International President and the author of this paper, stresses the importance of leveraging a circular economy framework in the oil and gas industry by promoting the recycling and reuse of oil by-products. Furthermore, he sheds light on some oil industry-related methods of utilizing the circular carbon economy in the upstream, downstream, and petrochemicals sectors. Therefore, this paper is considered an eye-opener for readers interested in the topic of "Circular Carbon Economies."



# AI For Energy Efficiency:

## How Google Applied Reinforcement Learning to Reduce Energy Spending

By Osama Kheshaifaty, YP Vice-chairperson, and Reservoir Engineer at Saudi Aramco



The growing demand for cloud services is leading to an increased usage of data centers. For modern data centers, dealing with excess heat is a critical factor; as cooling the running components adds a heavy cost load and increases the carbon footprint as an energy-extensive process. The data center cooling market is predicted to reach \$20 billion US dollars' worth by the year 2024, which makes finding an efficient solution for this problem a key objective for tech companies. (Patrizio, 2017) For end-users, reduced cooling costs translate into enhanced services at lower prices.





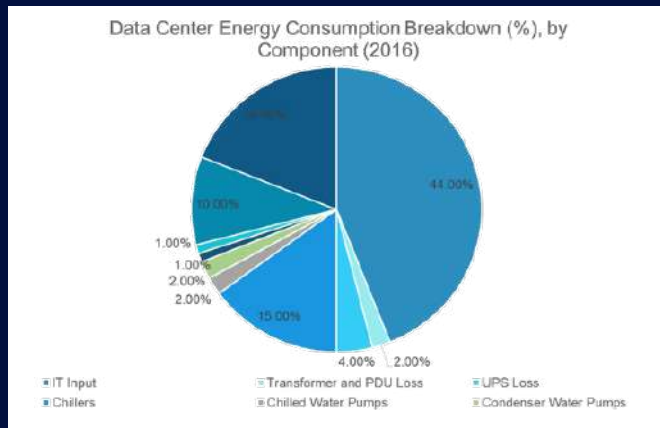


Figure 1: Data Center Energy Consumption Breakdown for 2016 (Modern Intelligence, 2021)

Several attempts have been made in the past to solve the data centers heating problem, such as relocating to cooler climates, or even placing data centers underwater as Microsoft did in Project Natick. (Benveniste, 2020) Google, instead, took an AI approach rather than going through a costly relocating of their data centers. Through collaborating with DeepMind, a British AI company, Google implemented an algorithm that successfully reduced their data center cooling energy expenditure by 40%. (DeepMind, 2016) (Knight, 2018)



Figure 2: Microsoft testing an underwater data center (ALYSSA NEWCOMB, MICROSOFT, 2016)

## HOW IT WORKS

### The algorithm:

Reinforcement Learning (RL) is a feedback-based unsupervised machine learning algorithm where an agent is trained to perform a set of actions and the results are simulated. The agent receives positive feedback, or points, through favorable actions, and is penalized for bad actions. In other words, such a model is used when a simulation model of the environment is available, but not an analytical solution, and the information about

the environment is collected through interacting with it. (JavaTPoint, 2020)

### The system:

A system of neural networks was initially trained using data from a center's operating parameters collected by sensors spread across the data center. The data includes power, temperatures, setpoints and pump speeds. The neural networks were then trained on the average future Power Usage Effectiveness, (PUE), which is the ratio of the energy consumption in the building to IT

energy consumption. Next, two other deep networks were trained for pressure and temperature prediction for the next hour; in order to simulate the results of recommendations from the first model with PUE ensuring they do not exceed operational constraints. The PUE control model was tested on a data center throughout an operating day, during the testing the model control was turned on and off. The results are shown below:

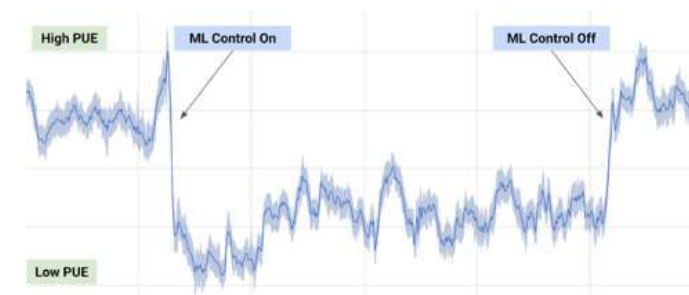


Figure 3: PUE measured throughout a typical testing day (DeepMind, 2016)

The graph of the PUE shows the effectiveness of the ML's control in lowering the energy consumption of the cooling process, with a 40% total reduction in PUE. Moreover, the algorithm produced the lowest measured PUE in the center's history. The potential of this algorithm goes beyond data center operations. Other applications of this algorithm include increasing power plant energy conversion efficiency, enhancing semiconductors manufacturing process by reducing resources usage, and overall improvement in manufacturing processes through increasing output per input unit. (DeepMind, 2016) (Adhikari & Chen, 2021)

## CONCLUSION

Google and DeepMind unveiled the remarkable potential of unsupervised learning in increasing operational efficiency for the tech industry. The significance of this application of ML goes beyond reducing cost. In the long run, and when implemented at a larger scale across various industries, unsupervised learning will enable operators to lower energy consumption, reduce carbon footprint, and with the help of AI get a step closer towards a sustainable future. (ADG Efficiency, 2017) SR

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# Sync: Ithra's Answer to Promoting Digital Wellbeing

*Global survey shows the need for individual action on digital wellbeing*

DHAHRAN, SAUDI ARABIA, JANUARY, 2022 – From smart homes to autonomous vehicles, we are closer than ever to living in one version of humanity's imagined future. As the digital revolution has shown, the pace of technological breakthroughs is only set to increase. Before we can tackle the threats envisioned by writers such as Arthur C. Clarke, Isaac Asimov, or H. G. Wells, we will first need to navigate the confluence of science and what seemed like fiction not that long ago.



Artwork depicting social media addiction by Farah Alshammari, Associate Editor at SandRose  
Instagram @alshammarihart



Digital technology enables us to live, work and play like never before. During the pandemic, our connected devices made it possible to attend meetings and go to school from home. We could order whole wardrobes for our changed environments and have it delivered, along with breakfast, lunch, and dinner. With museums and cinemas closed, we had access to culture and other forms of entertainment in the palms of our hands. But with the convenience of this "new normal", many of us also became aware of how easy it is for this online world to take over our existence – for it to become our whole world. Contrary to the belief that being locked down together would bring people closer, many experienced the opposite, that they spent less time communicating in person and instead took to digital solutions.

This begs the question: is technology a blessing or a curse? As much as we'd like clear-cut answers, the truth is that technology is both a blessing and a curse, and neither option negates the other. Curious about how the general public would respond to this question, "SYNC", King Abdulaziz Center for World Culture's (Ithra) digital wellbeing initiative canvassed 15,000 people in 30 countries around the world, with the resultant study exploring digital consumption as well as the mental, physical, and emotional effects technology has on us. One eyebrow-raising result from

the study shows that half of us would rather live without a close friend than our cellphone! Suddenly it doesn't seem as far-fetched to ask if technology will eventually replace humans.

Sync global digital wellbeing report reveals both how indispensable



**"Our research reconfirms that Saudi Arabia has some of the highest, if not the highest, smartphone and social media usage in the world," says Abdullah Al-Rashid, Director of Ithra. "This is particularly relevant to us because of the elevated use by Gen-Z, which makes up almost half of the Kingdom's population. However, this is also a global concern."**

technology has become as well as how detrimental it can be. The research highlights several concerns about the digital divide and where effort is needed to improve digital literacy. It reaffirms the threat of dependence, especially among social media users and gamers,

and would suggest many parents are fighting a losing battle when it comes to limiting screen time. One key finding, however, is that people in different markets think about digital wellbeing differently.

"Because of this great need to consider, understand and debate these issues, Sync is creating a platform for conversation, and encouraging the sharing and building of evidence, ideas and solutions," adds Al-Rashid. "As an organization dedicated to positively impacting human development, we are committed to contributing proactively to the narrative and solutions."

Sync hopes to bridge these gaps by facilitating conversations around this topic through creating a platform for all stakeholders, where the public, scientists, content producers and providers, and policymakers can engage in dialogue based on research.

The fusion of technologies blurring the lines between the physical, the digital and the biological is with us to stay. As consumers, we have a responsibility to think about our digital consumption; it is a burden we cannot heedlessly resign ourselves to, because the possibilities heralded by digital technologies are endless. However, our adoption of said technologies offers but two choices – healthy, or not. <sup>SR</sup>





# Esports: The Next Frontier

## An interview with Vanguard CEO, Hiba Almubayedh

By SPE-KSA SandRose Editorial Team

In March of 2020, the global economy came to a sudden halt as covid-19 spread worldwide. Many industries suffered from massive financial loss, namely the oil and gas industry resulting in sharp declines in demand, industry-wide cuts, and record-high lay-offs. However, amid unprecedented times, the esports industry was amongst the biggest winners of one of the world's most prolific recessions. In 2018 the global gaming industry was valued at \$138 billion. In 2021, this figure increased to \$170 billion and was forecasted to rise beyond \$200 billion in 2023.

**A study conducted by Boston Consulting Group in 2021 indicates that at \$200 billion, the esports and gaming industry value is higher than that of global box office, music streaming services, and the five largest sports leagues combined!**

### DEFINING ESPORTS

Short for electronic sports, Esports are competitions involving video games and can be played in organized teams or individually against other players. In Saudi Arabia alone, 67% of the total population identified gaming enthusiasts. In 2020, the Saudi gaming industry was valued at 3.6 billion Saudi Riyals and is anticipated to grow tenfold by 2030, contributing 1% of GDP. Global esports competitions have attracted talent from all around, with top prizes in the millions of dollars. For example, in 2018, Saudi esports pro player Musaed Al-Dossary won the FIFA eWorld Cup-Grand Final, walking away with a \$250,000 reward. To learn more about the budding industry of esports, the SandRose editorial team sat with Vanguard CEO Hiba Almubayedh.

### INTRODUCING HIBA

At 26 years old, Hiba Almubayedh is the CEO and co-founder of Vanguard Holdings. This leading Saudi esports company manages and operates all aspects of the esports business, from event planning, talent management, marketing, and consulting. Vanguard is one of the few first Saudi-born companies within the local esports industry. Since she joined the industry in 2018, however, Hiba had to pave her way in a niche that hadn't existed within the Kingdom. When asked about what sparked her interest in the industry, she credits her early exposure to video games as the source stating, "the moment I laid my eyes on games whether I was spending time on my Gameboy, or my PlayStation playing Call of Duty, Resident Evil, or FIFA I had an innate passion for it." However, the moment she took gaming seriously was back in 2017, when she was thinking of her entertainment options that she and her friends could enjoy, and no such place existed. After graduating from Prince Mohammed University with a degree in Information Technology, Hiba worked within the IT industry while continuing her internship in one of her other passions, social entrepreneurship, with the Eastern Province Council for Social Responsibility. Her role within the council included managing the summer camp, a four-month program held in collaboration with the ministry of education, which accommodated over 2500 students with 22 different classes back in 2018.

### BRINGING GAMING TO THE PUBLIC

While brainstorming ideas for the summer program, she was still exploring avenues to bring esports to the masses. She says, "to build a nation, you need to build an education." While reflecting on possible options, she saw no venue to teach people about esports and gaming. So, she worked hard to advocate through the creation of an esports summer program. The program was designed to partner students, from 1st grade – to college-level students, with professional gamers, to hone their skills in the area of esports classes and to guide them on how to develop within the industry. During that period, messages circulated within the news and social media, dissuading kids and parents from video games which presented an additional hurdle she had to navigate. Determined, Hiba wanted to challenge this taboo and lobbied for the classes by working with the ministry of education to provide the program. She was initially met with resistance; nonetheless, she persisted until they agreed. While the summer program proved successful, Hiba still required sponsors to achieve her vision of bringing esports to the public.





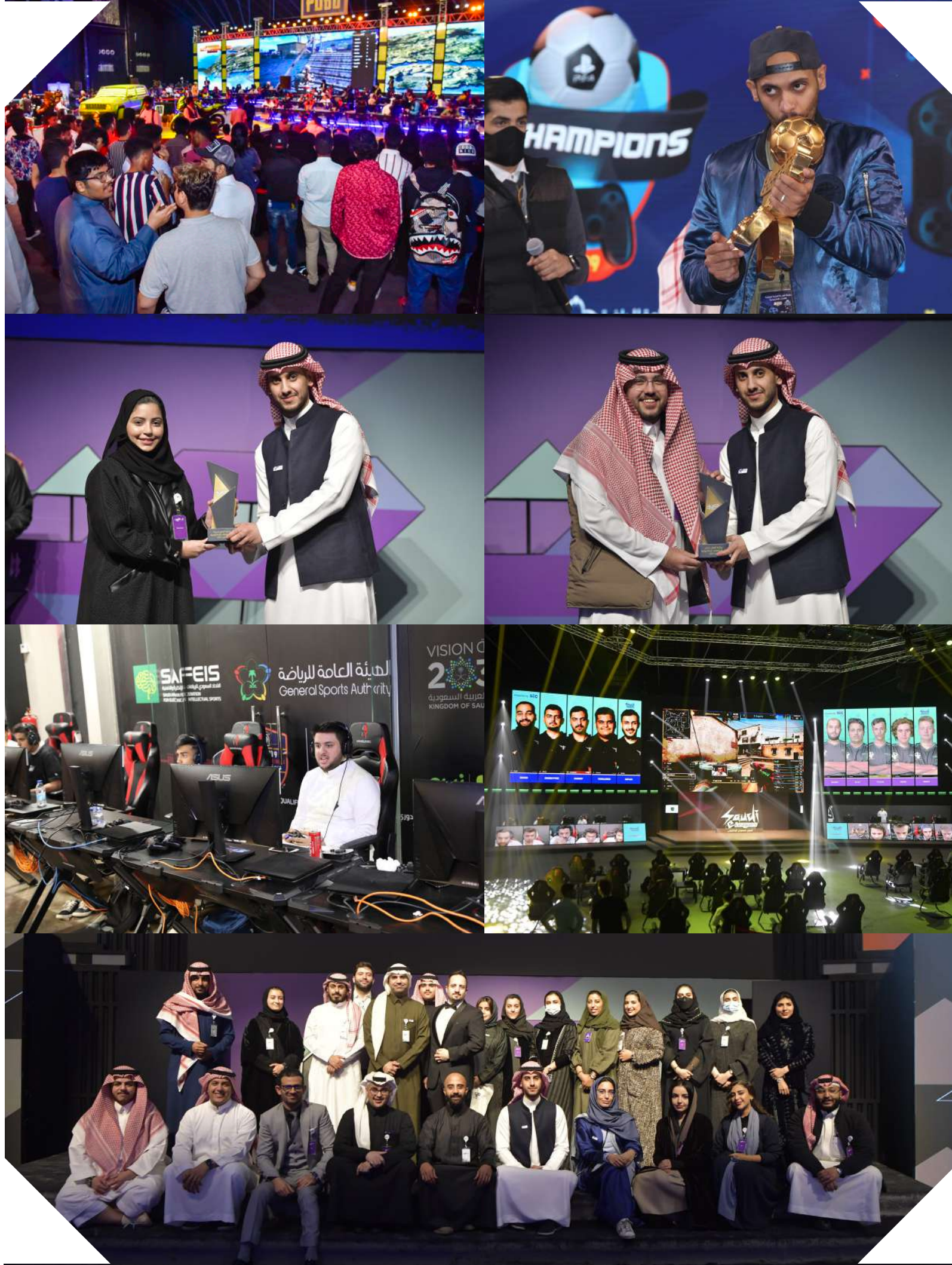
## THE BIRTH OF VANGUARD

In late 2017, the Saudi Esports Federation (SEF) had just been established, and word quietly got around within this hidden industry. Through the summer program, Hiba had a chance to meet Mohammed Al-Otaibi, an engineer and investor within the space, also future founder and CEO of Vanguard. After several conversations, Hiba saw an opportunity to chase after her dream and built up the courage to ask him for opportunities to join the industry. Reflecting on this moment, Hiba comments on how challenging it was to voice her interest; however, she also affirms the importance of being tenacious in pursuing one's dreams. Over several meetings, she began to act as an official consultant representing the female voice in the gaming community, building an inclusive and safe space for females. She later joined Vanguard part-time, balancing two jobs with the council and Vanguard. Initially, she helped build Vanguard and gradually rose from executive director to CEO and head of Vanguard Holding at 26 years old.

## THE RISE OF A GIANT: THE KINGDOM'S INVESTMENT IN ESPORTS

Many countries such as Saudi Arabia, South Korea, the United Kingdom, and France have bolstered the gaming and esports industry through subsidies and regulation. The growing interest in esports is attributed to the industry's potential in increasing GDP by leading growth in other sectors such as software development, digitalization, and tourism.

Looking at the Kingdom of Saudi Arabia, several landmark partnerships and programs have been introduced to strengthen the esports and gaming industry in recent years. In November of 2021, the Saudi esports Federation signed a Memorandum of Understanding (MOU) with Global Esports Federation (GEF) to use their resources to contribute to the global gaming and esports industry's prosperity. As a part of the MOU, the Kingdom is among the many countries lobbying for the recognition of esports as an official Olympic sport. In addition, recently, at the LEAP global



tech conference held in Riyadh in February 2022, the Kingdom introduced the "Ignite" program to support the digital content market, including the gaming industry, backed by 1.1 billion US dollars investments.

## PURSuing A CAREER IN THE SAUDI ESPORTS AND GAMING INDUSTRY

When speaking to Vanguard CEO Hiba Almubayedh on how working in the industry has changed the way she enjoys the sport, she remarked that it is now more challenging for her to find the time to enjoy as much as she used to due to work commitments. In addition, she also noted that she now views games as a source of inspiration for ideas to apply to her job or to leverage in marketing campaigns or, as she said, "Honing in on the nuances instead of zoning out for fun." Finally, when asked for tips for individuals interested in joining the industry, she notes that there's a space for everyone! Whether an individual has a knack for public speaking, graphic design, marketing, software engineering, project management, all these skills are required and transferable to esports. As for gamers interested in going professional, there are many companies and programs, including SEF looking to sponsor individuals. There is also a plethora of tournaments and events for people to attend to participate and learn about the industry within the Kingdom.

Hiba's story sheds light on the emerging billion-dollar esports and gaming industry filled with many investment and development opportunities for those passionate and interested. However, her journey to where she is today also teaches that you can cultivate your passion into an opportunity with drive. **SR**



# SandRose Reviews

By Basmah Alotaibi and Dana Dabbousi, Associate Editors SandRose Magazine

For our multifaceted readers, in this edition of SandRose Reviews we bring you a whole variety of media to explore the dynamic world of Tech today. Uncovering stories of startups gone wrong and innovations gone right, as well as the wonders of a technological societal revolution, we hope this issue offers great insights into navigating the new Tech frontier.

Stories come in all shapes and sizes, whether you're tuning into a podcast, watching a documentary, or reading a book, there's so much to learn from these fascinating stories.

Check out our top picks below!

For future editions, we will be taking 'Recs from our Readers' so if you want to submit your reviews, send them to SandRose for a chance to be included.

## Recs from our Readers

We're lucky to have incredible expertise in our readership these days. Check out these submissions from local Tech enthusiasts in our SandRose community below.

### Books



**Dr. Yousef Alshammari,**  
OPEC+ Fellow and Research Fellow at Imperial College London

### Queen of the Oil Club By Anna Rubino

This book reports the story of Wanda Jablonski, the most influential oil journalist and the so-called midwife of OPEC. Wanda was very well connected that she introduced the Saudi Oil Minister to the Venezuelan Oil Minister in an Arab league conference in Egypt. The two ministers then conceived the idea of OPEC which was founded in Baghdad later in 1960 to unify states' oil policies against the control of the Seven Sisters. Jablonski revealed many mysteries of the oil club, an elite group of Western executives who once controlled the international oil business. She was one of a kind, a reporter who revealed the secret world of the oil business, a woman who penetrated the inner sanctums of the Arab oil sheiks, and an entrepreneur who created later the Petroleum Intelligence Weekly, a publication that was the industry's bible.

### Film



**Abdullah Albriakan,**  
Petroleum Engineer

### Seaspriacy (2021)

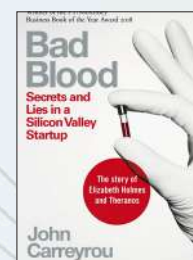
Seaspriacy is an eye-opening documentary showcasing the effects of commercial fishing on local fishing communities, slavery, and ecology. The film features interviews with formerly enslaved fishermen, highlighting first-hand how painfully deep-seated corruption is in the fishing industry. It's an underrated film with an incredibly important message.

### Podcast

#### Philosophize This!

An engaging podcast with a sprinkle of comedy. The host, Stephen West, does a great job covering topics that are generally complex and daunting while still keeping the -25minute episodes entertaining. If you'd like to dip your toes into philosophy, "Philosophize This!" will give you an unbiased peek into the great minds of history.

### Books



### Bad Blood: Secrets and Lies in a Silicon Valley Startup

John Carreyrou

*"[Elizabeth] was so laser-focused on achieving her goals that she seemed oblivious to the practical implications of her decisions."*

John Carreyrou, a Pulitzer Prize-winning journalist for the Wall Street Journal, covers the rise and fall of the multibillion-dollar biotech startup Theranos. The infamous startup was led by Elizabeth Holmes. At the age of 19, she dropped out of Stanford University to pursue the idea of making blood tests faster, easier, and more affordable for consumers. Holmes was an incredibly charismatic person with an eerily resemblance to Steve Jobs, and to investors, she was the golden ticket to revolutionize the medical industry. Holmes was able to raise over 700\$ million to develop the technology. And up until its demise, Theranos was valued at 9\$ billion. Only hiccup; the medical device was virtually useless. Carreyrou won a Financial Times and McKinsey's Business Book of the Year Award in 2018 for his exceptional job uncovering the outlandish lies and deceitfulness of Silicon Valley's «Unicorn» startup.

Listen to «Bad Blood: The Final Chapter» for more in-depth coverage of Elizabeth Holmes' recent trial.

*If you enjoyed "Bad Blood" by John Carreyrou, you'll enjoy "Billion Dollar Whale: The Man Who Fooled Wall Street, Hollywood, and the World" by Bradley Hope and Tom Wright.*

### Film



### Lo and Behold, Reveries of the Connected World (2016)

*"On the internet, no one can tell you're a dog."*

Lo and Behold, Reveries of the Connected World is an American documentary film directed by Werner Herzog. The film is divided into ten short chapters, beginning at the first piece of internet equipment ever to be installed, advantages the internet has provided to humankind, and a grieving family dealing with online harassment following the tragic death of their daughter. Thereafter, the documentary discusses an electronics-free institute and the community's experiences living in close proximity to the institute, including a group of people who are acutely affected by their electromagnetism sensitivity condition. At the end of the film, Herzog touches upon Artificial intelligence and interviews Elon Musk and other pioneers in the technology realm. Finally, Herzog poses a question that puzzled scientists and researchers, does the internet dream of itself?

Due to the nuances of the internet, Herzog failed to delve further and examine some of the facets of living in the digital age, nonetheless providing an interesting macroscopic lens of humankind on the internet.

*If you enjoyed Lo and Behold, check out Struggle: The Life and Lost Art of Szakalski.*

### Podcasts



### How I built this with Guy Raz

For all the ambitious techies and entrepreneurs (current or future) 'How I Built This with Guy Raz' offers an inside look into how many of the most successful start-up founders got started. From Khan Academy's Sal Khan to Moderna's Noubar Afeyan, listeners will get the full picture of what the journey to success looks like. Though each guest has a very different origin story, consistent actions, strong character, and perseverance pervade each episode.

The podcast doesn't just offer a boost of motivation and inspiration, but actually demonstrates the kind of opportunities people can leverage to help their ideas stand out. It's this kind of authentic and raw storytelling from the most talked-about innovators that get you excited about going after your own goals. A mini-autobiography that's worth a listen. Tune in to 'How I Built This with Guy Raz' on your favorite podcasting app.

*If you enjoyed How I build This, be sure to give Masters of Scale by Reid Hoffman a listen.*





# SPE-KSA Wins SPE Biannual Membership Competition

By Akram Al-Barghouti, SPE-KSA Memberships Chairperson

SPE-KSA is delighted to announce that the section was recognized as one of the winners of the SPE biannual membership competition for November, 2021. The membership competition recognizes professional sections and student chapters that achieved target member retention of at least 75%. The competition occurs twice a year in May & November of each year. Such recognition motivates sections to recruit and retain members. Furthermore, it identified best-in-place sections that impose best practices for membership growth. Similar to other sections, SPE-KSA has submitted its best practices to SPE International to be shared amongst other sections. A total of 4 winners were announced in the MENA region; Namely, SPE-KSA, Bahrain section, Egyptian section and Kuwait section.

SPE-KSA spared no efforts so far with retention rate of 81.46% YTD exceeding the retention goal by 712 professional members. As of today SPE-KSA stands as the **largest section in the world** with 11,497 professional members. It is worth noting that this is the highest membership number SPE-KSA has ever reached, breaking the previous record of 11,366 members in 2019.

As part of the recognition, SPE-KSA received a congratulatory letter from 2022 SPE International President Kamel Ben Naceur.

For further information, please feel free to contact the SPE-KSA section membership chairperson, Mr. Akram R. Al-Barghouti at [akram.albarghouti@spe-ksa.org](mailto:akram.albarghouti@spe-ksa.org).

To learn more about SPE-KSA, please visit our website: <https://spe-ksa.org/>

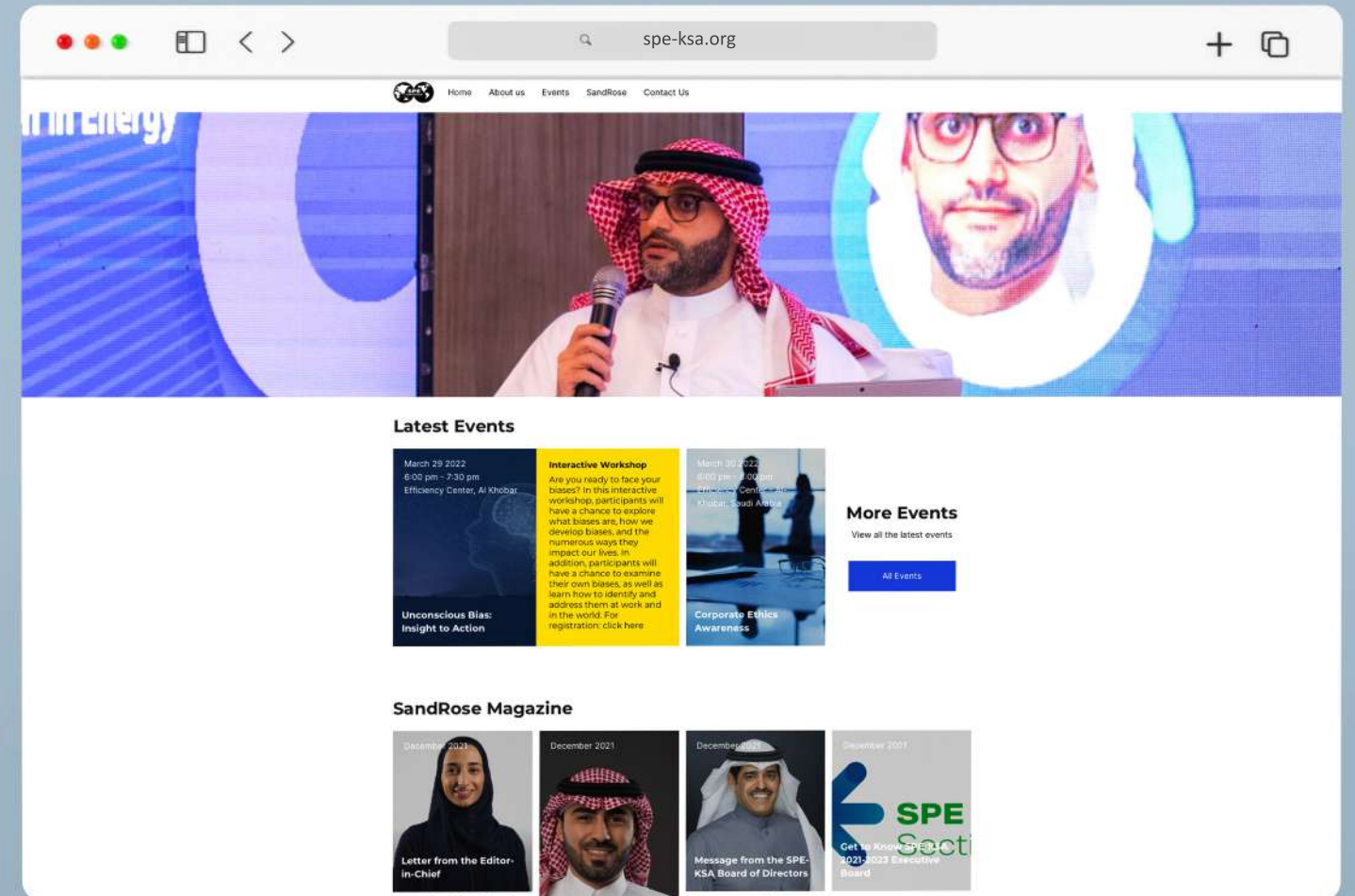
To learn more about the competition, please visit: Membership Competition (spe.org)

To join SPE-KSA, please scan the QR code:



scan the QR Code  
Visit: [SPE-KSA.org](https://spe-ksa.org)

## Introducing the new SPE-KSA website



Provides **event registration** feature for swift enrollment in SPE events

**User-friendly** design

**Optimized navigation** for mobile users

**Read and navigate** the SandRose page for the latest articles



scan the QR Code  
Visit: [SPE-KSA.org](https://spe-ksa.org)



# SPE-KSA T&PP Introduces New Roundtable Series NMO

By SandRose Editorial Team

*SPE-KSA's Technical and Professionals Program (T&PP) officially introduced NMO derived from the Arabic word for growth "نمو". The NMO program is a new technical roundtable series built around the art of discussion. Each session the team hosts regional professionals, leaders and innovators to participate in a round-table discussion revolving around technology, leadership, entrepreneurship and globalization.*

## NMO #1 AI IN THE ENERGY INDUSTRY WITH MR. SALEM AL-GHARIB

*Al-Khobar, SAUDI ARABIA, October 2021*— For the first installment in the NMO series, T&PP proudly hosted Mr. Salem Al-Gharbi, General Manager of Energy Sector Planning and advisory at SDAIA and National Center for AI and moderated by Moataz Alsuhaimi. In addition, Mr. Al-Gharbi is also the current director of SPE-Drilling Uncertainty Predication Technical Section (DUPTS) and holds two master's degrees in petroleum engineering and computer science.

For this roundtable discussion, Al-Gharbi spoke on the topic of "AI in the Energy Industry" starting off with a brief introduction of the Saudi Authority for Data and Artificial Intelligence (SDAIA) as the driver for the National Strategy for Data and Artificial Intelligence (NSDAI) to enable the Kingdom to become a leading digital economy. SDAIA will achieve this vision by transforming the workforce to be data-driven and technology-centered by developing professionals in the fields of ML and AI and increasing the amount of research and technologies produced in the Kingdom. Then, looking at the energy sector, Al-Gharbi focused spoke about the National Center for AI (NCAI), one of the three sub-entities currently managed under SDAIA, which invests and creates new AI technologies and builds local expertise. Under NCAI, the Ministry of Energy (MOE) and SDAIA signed a historic memorandum of understanding to establish the Artificial Intelligence Center for Energy (AICE) to enhance the Kingdom's position in adopting AI in the energy sector.



**SPE-KSA T&PP Chairperson, Seba Almaglouth**



During the discussion, Al-Gharbi also spoke about the challenges in adopting AI in the energy sector. While the Saudi energy industry is among the most mature in its data journey, the high data security and the existing silos among different entities hinder the deployment of AI. Therefore, open data structures and improved collaboration among the public and private sectors are required to enable the creation of more intelligent systems through AI.

Attendees were able to engage with Mr. Al-Gharib by asking questions on the discussion topic. Addressing the speculation of whether AI will take jobs away, Al-Gharbi argues that while it will indeed eliminate some jobs by automating data processes, AI and ML will advertently create higher-level employment and opportunities in the sector. The speaker ended with some advice for students and professionals looking to develop their AI acumen by urging them to take advantage of the many courses readily available online and at local institutes. Al-Gharbi also encouraged attendees to develop practical expertise by joining platforms such as Kaggle, where you can collaborate with other data scientists and machine learning engineers to solve existing data science challenges.

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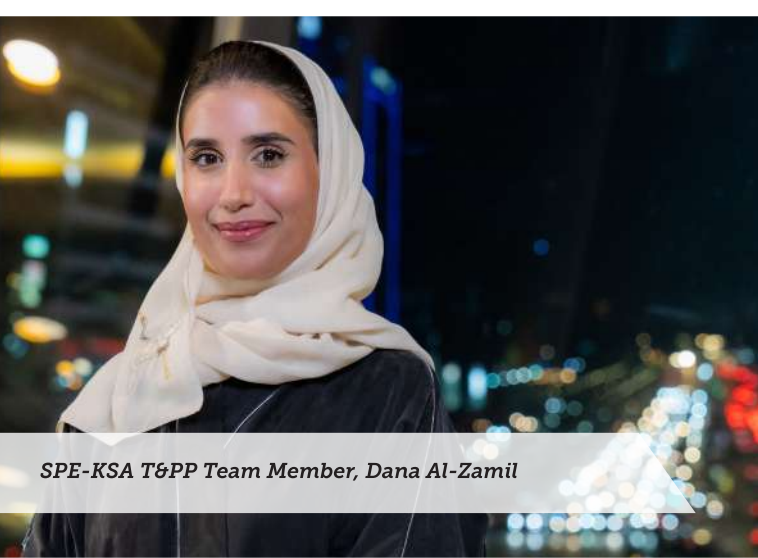


To view this recording from this session, scan the QR Code.





NMO featured guest speaker, Mr. Salem Al-Gharbi (right) and session moderator Moataz Alsuheimi (left).



SPE-KSA T&PP Team Member, Dana Al-Zamil



## SPE-KSA T&PP X YP NMO SERIES: OPEC+ AND OIL MARKETS DYNAMICS WITH DR. YOUSEF ALSHAMMARI

Fawaz Al-Boghail, SPE-KSA University Outreach Team Lead

Al-Khobar, SAUDI ARABIA, JANUARY 11, 2022– In collaboration with the SPE-KSA's Young Professionals Team (YP), SPE-KSA'S Technical and Professional Programs (T&PP) hosted renowned energy market consultant, founder and CEO of CMarkits, and Honorary Senior Research Fellow at Imperial College London, Dr. Yousef Alshammari, for the second NMO roundtable session at Al-Khobar Efficiency Center. Fawaz Al-Boghail, a Petroleum Engineer at Saudi Aramco and SPE-KSA University Outreach Team Lead moderated the session.

Dr. Alshammari spoke about the evolution of the Organization of the Petroleum Exporting Countries (OPEC), and shared his insights on the historical and current trends in oil prices. Dr. Alshammari also spoke about the future global energy mix and the challenges ahead for the global energy industry. The discussion centered on understanding energy markets dynamics and how sustainability and the fourth industrial revolution will continue to impact future energy demand and play a larger role in shaping the energy industry's future. The discussion also shed light on the impact of the COVID-19 pandemic in igniting the global energy crisis, leading OPEC and its non-OPEC allies, known as OPEC+ to impose historic production cuts. Dr. Alshammari also spoke about the impact of the cuts on reinvigorating oil prices, ultimately stabilizing the oil market.

Attendees were able to engage in a lively discussion with Dr. Alshammari on the topic in a casual setting. In addition, the event allowed young professionals in attendance to gain an appreciation and understanding of the principles of global energy governance. This discussion helped young professionals in attendance recognize the far-reaching impact of significant market forces on energy dynamics and relay them to their day-to-day lives. **SR**



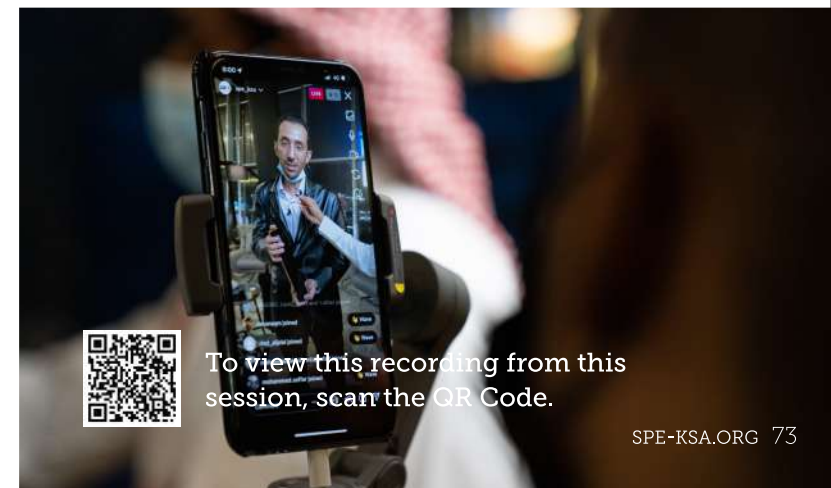
NMO featured guest speaker, Dr. Yousef Alshammari (right) and session moderator Fawaz Al-Boghail, (left).



SPE-KSA YP Chairperson, Fatimah Al-Balawi,



Public Relations Chairperson Abdullah Al-Thuwaini and Event Management Chairperson, Mohammed AlMuslem



To view this recording from this session, scan the QR Code.





## Stay Healthy this Ramadan

*Find out how you can keep your health and fitness in check this Ramadan*

*By John Hopkins Aramco Healthcare*

The Holy month of Ramadan is a spiritual time when one feels closer to God and fasting is a means to feel the suffering of those less fortunate.

It also is a time for some to over-indulge and to let go of their healthy lifestyle habits.

Fasting can affect your usual routine, with the hours of eating being significantly different than what you are used to, it can be easy to slip into a cycle of unhealthy and sedentary lifestyle habits. Nevertheless, it is possible for you to watch out for your health this Ramadan but not letting the bad habits hold you hostage, it is possible to stay healthy and fit while fasting and keeping the positive lifestyle habits you have adopted.

### **Eating healthy:**

Aim to consume slow-digesting food during Suhoor such as grains and seeds like barley, wheat, oats, millet, semolina, beans, lentils and unpolished rice. Include fiber-dense foods such as bran, whole wheat, grains and seeds. Most vegetables are a good source of fiber, such as green beans, peas, cabbage, zucchini and spinach. Most fruits are excellent sources of fiber, including dried unsweetened fruits. To avoid weight gain and

negative health affect, stay away from fried and fatty foods. Try to stay hydrated by drinking a lot of water at Suhoor, as well as between the Iftar and bedtime so that your body can adjust fluid levels over time. Try to avoid consuming caffeine at Suhoor as coffee is a diuretic and makes you pass urine. This will make you lose water from your body, as well as mineral salts that are needed as you fast during the day.

### **Exercising:**

Exercising is essential for a healthier and longer life. Exercising makes you burn calories and strengthens your body. During Ramadan, you should avoid doing vigorous aerobic exercise during the day because you will lose water as you fast. You don't have to do rigorous exercising during Ramadan, but try to aim for at least 30 minutes of moderate activity per day such as brisk walking or any other type of aerobic exercise to stay fit, try to also fit in some strength training.

### **Sleeping:**

Sleeping 7 to 8 hours per day is essential for a healthy and vigorous adult body. During Ramadan, your schedule may change from non-fasting months because you have to rise earlier than usual for Suhoor. SR



## SPE-KSA'S YP TEAM RELAUNCHES ELEV8

*Fawaz Al-Boghail, SPE-KSA University Outreach Team Lead*

SPE-KSA Young Professionals launched "ELEV8", a virtual program, targeting young professionals and university students from around the world. ELEV8 is a self-taught 12-week program that is offered from January 17th to March 14th.

ELEV8 sheds light on the critical methodologies of the most important career skills, with simple and engaging video-based experience. Each learning skill in ELEV8, boosts the participants business quotient and allows them to experience real-world scenarios.

Learning career skills is key in becoming a self-sufficient professional. ELEV8 supports participants in exploring eight of the most in-demand skills in business today while taking a deep dive into four of them:

**Organization Structure:** Includes understanding and evaluating different types of organizations and the roles and opportunities they offer

**Strategic Project Planning and Management:** Includes how to run a successful business which delivers projects on time and on budget.

**Decision-Supporting Research:** Includes learning how to make an informed decision supported by factual data, that helps in constructing a strong argument that is data-driven to support the decision

**Real-World Financial Analysis:** Includes understanding the latest core financial analysis strategies, that will

help organizations to make and manage money well to survive.

ELEV8 was exclusively offered to SPE-KSA by Fullbridge, a world-leading educational technology company that equips individuals with the necessary tools to bridge the knowledge and skills gap. ELEV8 is the most diverse virtual program in SPE-KSA, with more than 140 participants from various technical backgrounds and companies.

A kick-off event took place virtually on January 17th, 2022 to welcome all participants. The kick-off event was hosted by Steve Brazell, CEO of Fullbridge, who stated: "Whether you want to be an entrepreneur and start your own business or whether you want to keep climbing the corporate ladder, there are critical skills that each one of us needs to be able to master, if we want to be really successful and those skills will become your foundation, that you will use throughout your entire life". He continued saying: "You have got to define what is your quality of life and what really makes you happy. It is not really about money, I know this sounds cliché, but as you get older, you start to find what is important to you. Whatever it is, you want to have a work-life balance, and that is by pursuing your passion and really focusing on what brings you joy."

ELEV8 is another testament to SPE-KSA's continuous commitment to developing its most valuable asset, its people, for an ever more dynamic future. SR



# *SPE-KSA Diversity & Inclusion* Celebrating International Day of Persons with Disability: Towards a more Inclusive and Sustainable Environment

By *Mustafa Kidwai, SPE-KSA D&I Publication  
Team Editor*

SPE-KSA Diversity and Inclusion committee successfully held an event in honor of the International Day of Persons with Disabilities on December 12th at the Prince Sultan Rehabilitation Complex. The main goal of this event was to help people understand the journeys of persons with disabilities and how to support them.

The activities included speeches by two successful persons with disabilities - Mr. Abdulrazaq Al-Turki & Mr. Wael Alomari, an open panel discussion with the two speakers, a workshop on sign language, and a corner where attendees could have their names written in

braille which is the writing system used by persons with visual impairment.

The first speaker of the day was Mr. Abdulrazaq Al-Turki who started his speech by declaring that persons with disabilities are capable of performing any role provided that they are supported with three things:

*A proper level of trust.*

*An appropriate degree of tailored training.*

*Tools and technologies required to perform the respective duties.*



Mr. Alturki then highlighted the power of having hope by retelling his own experience of proving that the real disabled person is the one who is unable to achieve his hopes and dreams. He emphasized that as long as hope, ambition, and self-confidence still exist, then one will be able to achieve all their goals with ease. Mr. Alturki concluded by affirming that to be a prosperous community, all members of society should be strongly integrated and in touch with one another; that is how we will reach true happiness.

The second speaker of the event was Mr. Wael Alomari. Mr. Alomari emphasized the importance of the support families provide from a young age. He then clarified that if they were confident enough, society will not judge them for their disability because their accomplishments and achievements will eventually overshadow it. Mr. Alomari went on to add that he has noted an increase in awareness among Saudi youth; he has been hearing more and more proposals on methods to improve the quality of life for persons with disabilities by further integrating them into our societies and workplaces. This – as Mr. Alomari highlighted – is an important step that showcases the significance of removing obstacles persons with disabilities face in proceeding with their daily lives.

After having an engaging panel discussion with Mr. Alturki and Mr. Alomari, the next event was a workshop on sign language. The workshop was led by Mrs. Abeer Al-Saloom and Mr. Turki Alajmi who are certified sign language instructors and board members of the Bahrain Deaf Association. The workshop was interactive in nature and the attendees were provided infographics - such as the ones below - to help them grasp the presented techniques.

The event was well attended by over 150 participants which included members of SPE-KSA and the Prince Sultan Rehabilitation Center community. The event was also well received by the attendees who felt inspired by the two speakers' stories and praised the practicality of the sign language workshop. SPE-KSA Diversity and Inclusion committee would like to thank the Prince

Sultan Rehabilitation Complex and everyone involved for helping this event succeed in delivering its message.

SR







**Wael Alomari**  
Head of Diversity and Inclusion  
Division at Aramco



**Abdulrazzaq Al-Turki**  
Businessman and Entrepreneur



**Rana Taibah**  
General Manager at Prince Sultan  
Rehabilitation Complex



**Rowa Tawfiq**  
SPE-KSA Diversity and Inclusion  
committee member



**Yara Alzahid**  
SPE-KSA Diversity and Inclusion  
Chairperson







## Celebrating International Women's Day: Gender Equality Today for a Sustainable Tomorrow

By Mustafa Kidwai, SPE-KSA D&I Publications Team Editor

SPE-KSA's Diversity and Inclusion committee successfully held an event in honor of the International Women's Day on March 8th at the Kempinski Al Othman Hotel. The main goal of this event was to highlight and celebrate the contributions women have made to the energy industry. The event also aimed to present the attendees with methods of overcoming the inherent biases that exist within.

The event was opened with a keynote speech from Mr. Ziad Jeha, a Managing Director in Schlumberger. Mr. Jeha emphasized the strength and resilience of women by sharing personal anecdotes about his life with his mother, wife, and daughter. He also reaffirmed Schlumberger's commitment to its vision of promoting diversity and inclusion within the energy industry.

Following that, the proceedings shifted to the panel discussion hosted by Sarah Alkulaibi. The panelists for this session were: Mr. Abdulaziz Alsufayan, a division head in Aramco; Ms. Norah Alkhursany, a senior strategist in the Ministry of Energy Ecosystem; Mr. Suliman Azzouni, a division head in Aramco; and Ms. Shaikha Al-Rashid, an operational coordinator in Baker Hughes. The panelists held an open discussion where they shared their experiences in breaking the

biases against women in the workplace – specifically in the energy industry. The diverse backgrounds of the panelists allowed for unique sets of thought-provoking responses. At the end of the session, all panelists and presenters were awarded commemorative plaques to honor their contributions to this event.

The event was well attended by a diverse group of participants who appreciated the celebration of the strides made by our industry towards a more inclusive future. SPE-KSA Diversity and Inclusion committee would like to thank the panelists, speakers, and everyone involved for being a part of this successful celebration.

SR





# International Women's Day: Celebrating the Women of SPE-KSA

By Danna Khattab, SPE-KSA D&I Team Member



**Shaikha Aldossary,**  
Young Professionals  
Chairperson 2016-2017



**Hind Al-Rayes,**  
SandRose Editor-in-Chief  
2017-2018

**W**omen are challenge driven. Being a woman in the oil & gas industry is one of the many challenges women have been tackling head on. A 2019 study by the International Renewable Energy Agency estimates that only 22% of the global oil and gas workforce are women.

However, the industry has begun openly encouraging diversity, equity, and inclusion; Saudi Arabia's own Vision 2030 is committed to increasing female participation in the workforce from under 20% to 40%. This commitment is one of the main drivers of the oil & gas industry's diversity journey.

While the world has made many powerful strides towards promoting gender equality and social sustainability, there is still much more progress left to achieve true balance. In order to reach the desired equilibrium, we must encourage and spread women empowerment. Women's empowerment can be defined as promoting their sense of self-worth, ability to determine their own choices, and right to influence social change for themselves and others.

This article includes an interview with prominent women associated with SPE-KSA. These women will provide us with some insight on why they joined the energy industry, the main changes they observed during their time at SPE-KSA, important advice they would like to share with young professionals both male and female, and their personal definition of SPE-KSA.



**Suha Kayum,**  
Young Professionals  
Chairperson 2018-2019



**Hala Al-Hashmi,**  
SandRose Editor-in-Chief  
2019-2021



**Seba Al-Maghlouth,**  
Student Outreach Chairperson  
2019-2021  
Technical and Professional  
Programs Chairperson  
2021-2023

## **Q1) Why did you decide to join the energy industry? What prompted you to get involved with SPE-KSA?**

"Seeing how this industry helped shape the kingdom's economy and progression, it was my first choice to be part of this energetic industry" – Seba Al-Maghlouth.

Increasing women's involvement will aid the Kingdom's progression. Seba's motivation was clearly stated and supported by Shaikha Aldossary's own willingness to seek development and innovation. "Energy is an evolving industry with a lot of challenges as well as plenty of opportunities for development and innovation, so it is the career that I have always been looking for." – Shaikha Aldossary. This view was also shared by Hind AL-Rayes who said: "I chose to work in the energy industry since it is Saudi Arabia's lifeline and what has allowed us to thrive as a country". The industry is changing from social and technical points of view; the move towards being a diverse and energy focused industry is on the rise. Hala Al-Hashmi shared: "The energy industry is a dynamic and ever-changing industry, and it's a very exciting industry to be a part of, especially now." The industry's global impact was further highlighted by Suha Kayum who stated: "The energy industry impacts the entire world which makes it a fulfilling and rewarding industry to be a part of".

While many reasons contributed to these women's decision to join the industry, they all acknowledged the importance of this industry's development towards the kingdom's progression and were determined to seek out the opportunities to be involved.

## **Q2) What are some of the most significant changes you have observed in the energy industry during your time at SPE-KSA?**

The industry is currently witnessing a substantial move towards environmental sustainability; This is best exemplified by Saudi Arabia's 2050 zero carbon emissions vision. "The shifting focus from oil and gas industry to an energy focused industry. I also noticed how SPE adopted this shift and pushed their members worldwide by introducing new topics such as sustainability, carbon emission challenges and technology advancements." – Seba. Furthermore, the industry is also moving towards achieving social sustainability as viewed by Suha: "The main change I observed was the move towards sustainability and particularly social sustainability through empowering women and increasing their involvement." Adding to this, Shaikha highlighted her biggest observation "How diverse the SPE-KSA executive board members were in terms of gender and background diversity". This belief was also supported by Hala's view of her time with SPE-KSA "Definitely diversity. And diversity yes has many aspects but it makes me, as a female, specifically proud to see more and more females in technical and non-technical professions." In addition to the diversity aspect, Hind also noted an increase in the ambition for excellence: "SPE-KSA has always aspired to be the finest in the industry. The incremental development that we experienced was something that really attracted my attention".



**Q3) What is the most important piece of advice you would give to young professionals and career-bound students wSPE-KSA?**

The importance of joining SPE-KSA while being in the energy industry was highlighted by Suha who shared her personal advice to young professionals “My advice would be to join SPE-KSA as early as possible. With SPE-KSA, you will expand your horizon, improve on soft skills like presenting, working with a team, and coordination. It will make you a better person and employee.” Additionally, Hala shared how her non-technical background did not stop her from joining the industry as well as SPE-KSA. On the contrary, it was a major step towards her professional development: “Broaden your horizons and explore new opportunities beyond your comfort zone, because that’s where you’re going to see true growth and development, both personally and professionally.” Hind echoed this statement and emphasized the value of hardwork: “Because we are growing, and our abilities are growing, we are seeing more and more skilled, competitive, and ambitious young people every year. So, if you want to succeed in this industry, you must be extremely ambitious and work tirelessly to achieve your goals”.

Shaikha also provided motivating words directed towards professionals at the beginning of their journey “Be passionate and focus on what motivates you. Be willing to go the extra mile to achieve your goals and when you are there, encourage yourself and people around you. And don’t forget, always appreciate your accomplishments.” Finally, Seba highlighted the collaborative efforts that are currently being implemented in order to establish the energy transition

“This is an exciting era for the energy industry and the outstanding collaboration between technology, science, and professional advancement creating a unique opportunity for energy transition. SPE-KSA is at the heart of this new movement.”

**Q4) What does SPE-KSA mean to you?**

SPE-KSA has been proven to have multiple definitions to its members due to the myriad remarkable and diverse experiences it provides to all of its members. “SPE means to me creativity, collaboration, growth, and more.” – Seba Al-Maghlouth. Shaikha pointed out the wealth of networking gateways by stating “It gave me a great opportunity to network with young professionals, experienced professionals, and executive leaders from all around the globe”. Next, Hind noted the freedom of expression and creativity afforded by SPE-KSA “It is a place where you can put your best foot forward and show everyone what you are capable of”. Finally, Hala defined it as “A gateway into the energy industry and a place I can always call home with people whom I formed long lasting relationships with.”

# Call for writers

## SPE-KSA SandRose Magazine: Call for Contributions

**Attention writers and creatives, SPE-KSA invites you to submit your technical and general interest articles or your unique artwork for a chance to be featured in future issues of SandRose Magazine.**

**Share your work today by contacting us at  
[SandRose@spe-ksa.org](mailto:SandRose@spe-ksa.org)**

**To learn more about the different ways to contribute,  
scan the QR code**



**SandRose Magazine is the official publication of the SPE-KSA section published digitally on our website and in print.**



## SPE-KSA Student Outreach Activities

### Student Outreach Hosts the Third Energy4Me Train the Trainer Workshop

Zainab Albaharna and Mohammed Alatigue, Student Outreach Team Members

After nearly two years of suspension due to the pandemic, Energy4me resumed its "Train the Trainer" physical workshops on Saturday, January 22, 2022. Thirteen industry professionals were trained by four current Energy4me ambassadors to become the next certified ambassadors. The workshop aimed to introduce the Energy4Me Program to the trainees and prepare them for their roles and responsibilities as ambassadors. Trainees conducted five exciting science experiments that touched on fundamental oil and gas concepts, followed by short discussions. The trainers and trainees found the workshop rewarding and were enthusiastic about performing the experiments during school visits and other events. The workshop was held at Al Othman Office Tower in Khobar. It started by welcoming all volunteers and enlightening them more about Energy4me history, which sparked their excitement about completing the program. Some experiments have been delivered to the volunteers, such as



exploring oil seeps, core sampling, exploring porosity, perforated well casing, and getting the oil out. All of those experiments were well explained by using interactive materials. The logic behind each experiment was clarified after challenging trainees. This workshop contributed to collaboration between diverse integrated groups of young professionals & students to embrace synergies. SR



## KFUPM Mega Beach Day Event

By Abdulrahman Alrumaih,  
Student Outreach Team Members

The Society of Petroleum Engineers at King Fahd University of Petroleum and Minerals organized a mega beach day event at the university's beach facilities in Half-Moon Bay. This end-of-year activity was to promote and enhance the interpersonal skills of participants as well as an off-campus networking activity between students, faculty members, and industry representatives. Hosted by the Department of Petroleum Engineering in KFUPM, Dr. Abdulaziz Alkaabi, the Dean of College of Petroleum Engineering & Geosciences, commenced the event, which started with an interactive session organized by SPE-KSA Student Outreach members, Abdulrahman Alrumaih and Fawaz Alboghail. The importance of getting engaged with student organizations, the endless opportunities, and the new horizons they can reveal was discussed. Advocating for a healthy work-life balance, sports activities, and competitions, including faculty members and students, participated in the event. Moreover, the event included environmental efforts as part of the SPE-KFUPM corporate social

responsibilities, where participants engaged in a beach cleaning activity to reduce harmful waste footprint. Finally, the SPE-KFUPM chapter president, Clement Afagwu concluded the event. All-in-all the event was attended by over 80 participants, including the Dean of College of Petroleum Engineering & Geosciences, notable faculty members, students, researchers, and industry representatives. SR



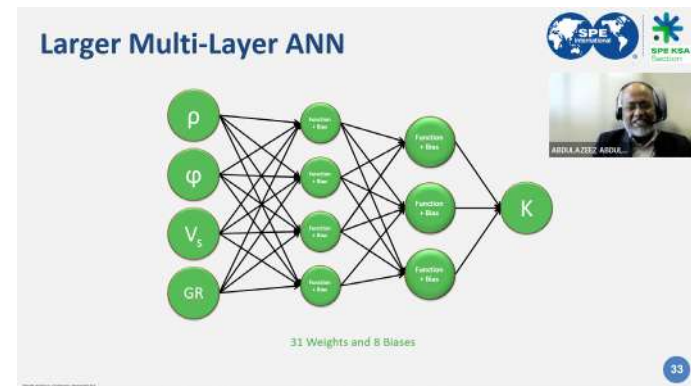


## Expand Your Horizon: Meet the Experts First Session in 2022

By Abdulrahman Bahamdan and Ibrahim Al-Mulhim, Student Outreach Team Members

Under the theme "Expand your horizon," the SPE-KSA University Student Outreach team held the "Meet the Experts" Event virtually on January 19th, 2022, as a continuation of the successful events of the program back in 2021. Meet the Experts program provides an avenue for university students and young engineers to explore essential skills in the industry by interacting with experts to observe their success and learn from their experiences.

The event consisted of two sessions technical and soft skills sessions. The event started with a technical session that discussed the importance of artificial intelligence in the energy industry and its applications delivered by Dr. Abdulazeez Abdulraheem. Dr. Abdulazeez is an Associate Professor at KFUPM, focusing mainly



on geomechanics and artificial intelligence applications in different areas of petroleum engineering. After that, Mr. Alex Gonzales presented the soft skills session to discuss the traits for a successful career. Mr. Alex is the director of business development of Weatherford Company in KSA and Bahrain. Both speakers presented informative and valuable sessions. Some attendees were very enthusiastic about the topics and asked questions through pre-recorded videos. The interaction between the presenters and attendees was significant, and it contributed to the success of the event. SPE University Student Outreach team is committed to conducting more informative sessions that can help students during their academic journey to have a smooth transition into their professional careers during their educational trip.<sup>2</sup> SR

## School Outreach: Energy Ambassador Program

By Heba AlSoqair, Student Outreach Team Member

SPE-KSA Student Outreach continued its efforts to reach schools across Saudi Arabia by conducting multiple visits as part of the Energy Ambassador Program. In this program, young professionals volunteer their time and effort to visit schools and educate future generations about the oil industry, sustainability and conduct lively discussions with students about the industry, its future, and how they can participate in its success. Although rising COVID-19 cases made physical visits limited to the reach of students, our volunteers were able to reach upwards of 130 students in attendance across the three visits highlighted. The visits took

place at each of the following schools: the 4th and 20th high schools in Dammam, KFUPM schools, and Saudi Aramco's College Preparatory Center (CPC). Alongside the workshops, the Energy4me team conducted scientific experiments in one of our visits to educate the students about some petroleum concepts such as porosity and coring operations. The program was well received with positive feedback from both students and faculty who will capitalize on their learning by considering the possible innovation opportunities in the Energy and sustainability industry as inspiration for their future careers. SR





# Why Should Sign language BE TAUGHT IN SCHOOLS?

By Judi AlMulla, Student at Dhahran Ahliyya Schools

Edited by Deem Aldossary, Junior Editor and Student at Dhahran Ahliyya Schools

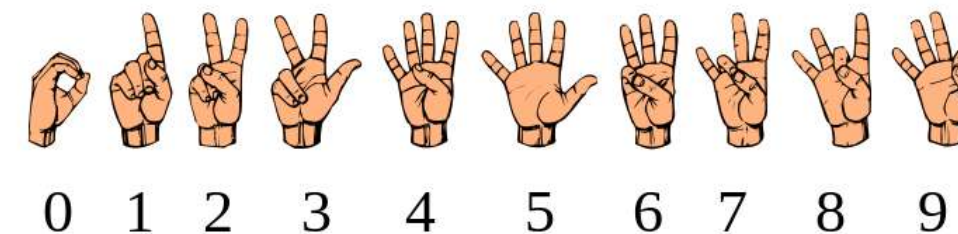
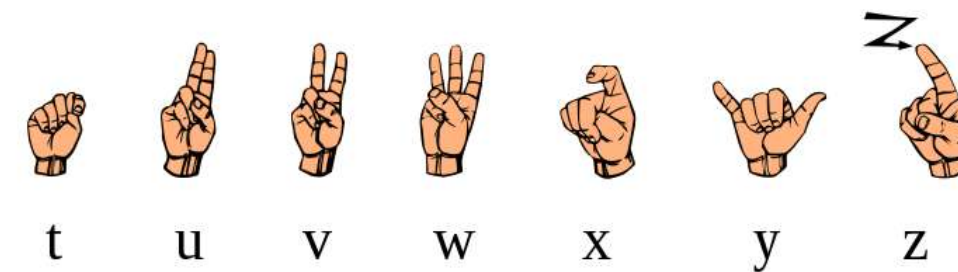
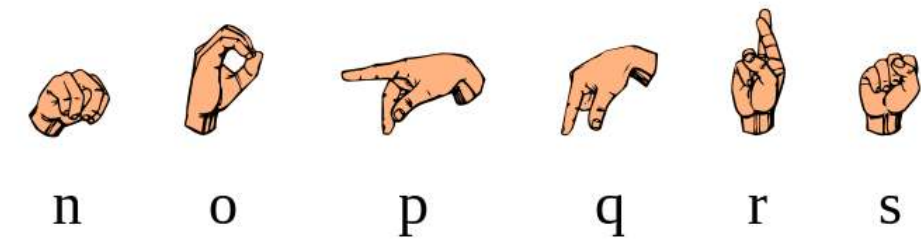
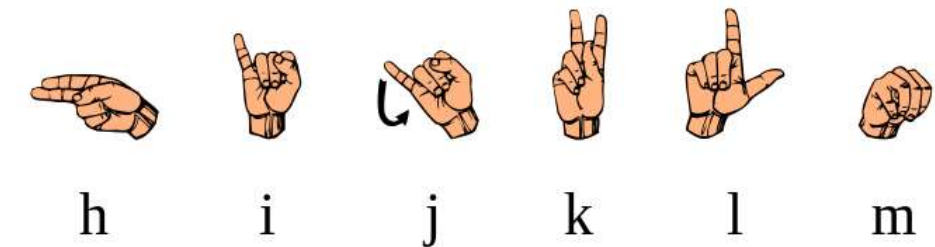
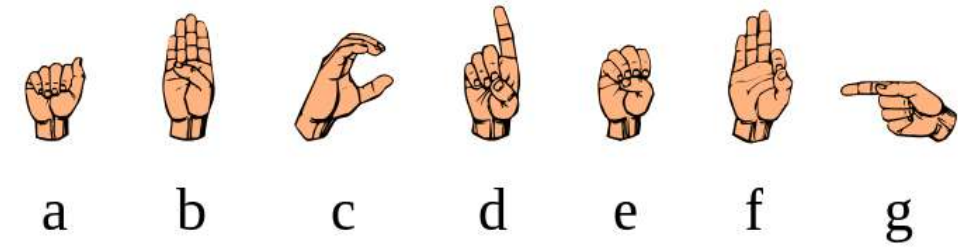
People with no hearing problems frequently underestimate how different the world may seem to a deaf person, and the COVID pandemic has sadly amplified this difference. Individuals who are deaf or are hard of hearing rely heavily on lip-reading to communicate, as most people are unfamiliar with American Sign Language (ASL) or other forms of sign language. However, due to the current need for protective face masks, deaf people are now constrained to utilize just hand signals as their primary form of communication.

Providing sign language classes in schools can help students and teachers interact with deaf and hard-of-hearing colleagues, making communication easier. Kids will connect in new and different ways and reach out and interact with hard-of-hearing children. It is also considerate to children with other disabilities who cannot communicate effectively through speech.

Sign language is crucial in the classroom, but it is also a skill that can be valuable in the future. On a resume, communicating in sign language is a unique quality that distinguishes you from others. Also, learning sign language can help deaf or hard-of-hearing individuals become active members of society. They'll interact more easily with others due to fewer barriers between them and community members.

The deaf community and culture are firmly embedded in ASL. Learning ASL helps people become more aware of and sensitive to the needs of the deaf and hard-of-hearing society. An ASL communicator will promote language understanding and acceptance, among others. This ability will build a profound admiration for deaf culture.

Many languages captivate us because of their beauty and the emotional sentiments they elicit. The same is true with sign language. American Sign Language (ASL) is a visual language with grammatical rules and semantics. Unlike spoken languages, its distinct beauty is seen rather than heard. <sup>SR</sup>





# Sandrose Readers Lens



**IN THIS SECTION WE SHARE PHOTO SUBMISSIONS FROM OUR READERS, SHARING THEIR UNIQUE ABILITY TO CAPTURE IMAGES THAT SPEAK TO THEM**

*"I took this photo in late 2021 on a work assignment at Shaybah. The beauty of the dunes and desert mesmerized me, which prompted me to take the photo. Standing in front of the dunes made me feel incredibly small and yet bewildered by the majestic topography"*

**Ali Alshuwaikhat,**  
*Petroleum Engineer at Saudi Aramco*

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