Society of Petroleum Engineers
Distinguished Lecturer 2022-23 Lecture Season

Entrepreneurship in the Transitioning Oilfield

Omar Abou-Sayed
Advantek Waste Management Services

Abstract:

Building an entrepreneurial venture is a challenge underestimated by most founders. During periods of stability within a given industry, founders face the normal stresses that come from building a startup: a lack of resources, having to serve in multiple functional roles, powerful customers, unclear business model, loneliness, stress to personal finances, and more. During periods of substantial upheaval, as the oil and gas industry is facing today, the challenges – and the rewards – can be even greater. This lecture will equip attendees with a thorough understanding of how to build a successful entrepreneurial venture during this time of energy transition. Core universal concepts applicable to creating a successful startup will be presented, while industry-specific trends will be explored to highlight areas that are ripe for innovation. At the end of the lecture, attendees should have a grounding in how to approach building a successful startup during this period of intense transition in the oilfield.

Biography:

Omar Abou-Sayed's experience spans the global energy, chemicals, oilfield services, and clean tech industries. He has worked in a variety of engineering, business, and leadership roles within SuperMajors, management consulting firms, private equity funds, and venture-backed startups. He currently serves as CEO of Advantek Waste Management Services, a private equity-backed industrial waste management company. He advises or has invested in nearly a dozen early-stage companies and venture funds. Omar holds a Bachelor of Science degree in Mechanical Engineering from the University of Texas at Austin, and an MBA from the Harvard Business School.

Unlocking Unconventional Reservoirs using Magnetic Resonance as the Key

Ron Balliet
Halliburton

Abstract:

Unconventional reservoirs now comprise a large segment of global oilfield exploration, development and production. A major challenge for the oil industry is quantifying the storage volume or reservoir porosity where pore size is dramatically smaller than in conventional reservoirs. Correct estimation of reservoir storage can determine the economics of an unconventional field. The initial myth of uniformity across these source rock reservoirs has now evolved to understanding how very different these global deposits truly are. A few of the major differences include thermal maturity, mineral composition and amount of kerogen present. Magnetic Resonance logging and T1T2 analysis have become a “Revolution in Resolution” for Unconventional Reservoir Formation Evaluation for several reasons. Unlike conventional logs, porosity from these T1T2 measurements are unaffected by kerogen presence or varying mineralogy, and provide a more accurate porosity estimation. A log measured porosity that correlates well with laboratory core porosity, but also provides full fluid quantification for clay bound water, organic pore hydrocarbons, producible water, free gas and mobile oil. The method also encompasses any inter-bedded conventional sands, silts and carbonates. This presentation describes the measurement principles, formation evaluation methodology and applications of Magnetic Resonance for Unconventional Reservoir challenges. New formation evaluation concepts are introduced for obtaining and quantifying individual reservoir fluid volumes. A range of global case studies are used to demonstrate the differences in source rock reservoirs, their challenges and proposed solutions. The primary message is to provide a new perspective being adopted by the industry for formation evaluation in Unconventional Reservoirs.

Biography:

Ron Balliet is the Halliburton Global Product Champion for Magnetic Resonance. He supports formation evaluation and operations for Halliburton Wireline & Perforating and Sperry Drilling product lines. He has a 33 year involvement with oilfield magnetic resonance and has worked in several locations around the world. He has been involved with the design and interpretation methods for seven wireline and LWD magnetic resonance sensors including applications for Unconventional reservoirs.
He has published twenty technical papers, seven NMR related patents and has been a member of SPE for 23 years. He holds Bachelor of Science Degrees in Geophysics and Geology.

Streamline Reservoir Surveillance Models to Improve Mature Floods through Low-Cost Actions

Rod Batycky
Streamsim Technologies, Inc.

Abstract:

In today's economic environment operators must work to extend the lives of mature fields using low-cost measures. However, identifying reservoir opportunities and forecasting scenarios prior to implementation typically relies on reservoir flow simulation, yet most operators do not have time to build or calibrate such models. Instead, streamline-based surveillance modelling, which has matured greatly over the past few years, offers a practical solution. Streamline surveillance models are easier to build than simulation models as they are driven directly by the history, include geology, and they then provide unique well-pair metrics for low-cost improvements. For example, while it is easy to identify high water cut/water rate producers, it is often difficult to identify which offset injectors are responsible for fluid cycling. Since streamlines naturally define well-pairs, engineers can identify the correct offset injectors and then promote sweep vs. fluid cycling by adjusting rates at the correct wells. With more recent technology enhancements, streamline based surveillance models are used to determine remaining oil in place distributions by applying material balance to dynamic well-pairs. Finally, coupled with machine learning techniques, streamline-based surveillance models are used for rapid forecasting of low-cost management scenarios such as new rate targets, well shut-ins, well reactivations, and/or producer-injector conversions, prior to implementation.

Biography:

Rod Batycky is a cofounder of Streamsim Technologies, Inc. and an expert in reservoir flow simulation. He is involved in the development of new simulation technologies and he has also consulted on reservoir modeling of water, polymer, CO2 and WAG floods world-wide. Prior to Streamsim, he was a reservoir engineer at Shell Canada. He has also authored several publications in SPE, was awarded SPE's Cedrick K. Ferguson Medal, the SPE Canada Region Reservoir Description and Dynamics Award, is a life-time member of SPE, a past associate editor for SPEJCPT, and a current associate editor for SPEREE. He holds a BSc from the U. of Calgary, and MSc and PhD degrees in petroleum engineering from Stanford University.

Watch your losses!
A Case Study of Design Choices and their Economic Impact in a Low Temperature Geothermal Project

George C. Brindle
Skoki Energy Advisors Inc.

Abstract:

We live in a world where there is increasing public will and Government support for lower carbon energy sources. The interest extends beyond the traditional "renewables", arguably peak load supply, into geothermal power, which can provide base load power and to power heating and cooling systems.
O&G Corporations and investors are contemplating a variety of projects in many locales. However, most of the new opportunities are not blessed with the resource quality powering existing geothermal operations in California, Italy, Iceland, the Philippines, and New Zealand and must seek success off assets with less heat and/or unstimulated well deliverability.

The Laws of Thermodynamics create or destroy the geothermal potential inherently present in each project. Embracing the concept of the Second Law and the irreversibility of heat losses is necessary in project choices. Pressures, temperatures and other attributes of the energy-containing streams require optimum degrees of preservation throughout industrial processes. Mid-grade thermal assets, arguably the target of most geothermal firms, will operate at the financial margins. Project planners, investors, and executors are trying to maximize fiscal gains and manage inherent risks. While finding and using heat sources has challenges, managing heat streams at surface correctly is best left to facilities engineers.

This lecture illustrates and discusses typical decision points, heat loss locations and steps for winning at managing energy in geothermal projects. Careful choices in working fluid, condenser temperature and exchanger design, are required. **What are the right questions for heat management and what are the right answers?**

Biography:

George Brindle is an internationally experienced professional engineer with 32 years of broad background in general upstream facilities, production treatment, pilot testing and deployment of new technology deployment. He is a leader in project and technical reviews, technical mentoring, oversight, education, and project audit services, as well as plant troubleshooting. George has a Bachelor of applied Science from Queen's University and an EMBA from the University of Calgary. He is a long-time member of SPE.

Integrated Project Development of Offshore FIelds

Antonio Capeleiro
Pre-Sal Petroleo S.A. (PPSA)

Abstract:

In this lecture, the author presents an integrated view of the development of oil fields in deep and ultradeep waters, based on his experience of more than 20 years as a technical leader in this area.

A didatical approach is used, discussing the desired and necessary information and technical analysis for the approval in each project gate: opportunity identification; conceptual design; basic design; execution; operation.

The presentation starts discussing the data acquisition plan and the value of additional information. Then, several issues are addressed, such as: uncertainties or insecurities; value of flexibility and robustness; how to optimize recovery factor and NPV; gas management; CO2 capture and use for EOR; metrics for deepwater field development, among others.

Throughout the lecture, the author presents several examples of his 10-year experience as the technical leader of the development of the Brazilian pre-salt fields in ultradeep water, detaching the importance of multidisciplinary teams to maximize the final recovery and the project value.

Biography:

Mr. Antonio Pinto holds a MSc in Petroleum Engineering from UNICAMP and a bachelor in Electrical Engineering. He has 38 years experience with offshore fields development. For 10 years he headed the technical area of the Santos Basin Pre-Salt. In 2018-19, Antonio was the Reservoir Executive Manager at Petrobras. Currently, at Pre-Sal Petroleo S.A., he is the Executive Manager for the PSC of the giant ultra deepwater Buzios Field. Antonio was president of the SPE Brazil Section and, in 2015, received the OTC Brazil award, for his individual contribution for the development of deep and ultradeep water fields.In 2021 Antonio was elected member of the Brazilian Academy of Engineering.

The Hydraulic Fracturing Test Site Program: A Successful Public/Private Partnership to Advance the Science of Hydraulic Fracturing in the Permian Basin, and Beyond

Jordan Ciezobka
GTI

Abstract:

The Hydraulic Fracturing Test Sites (HFTS) are an integrated data-driven hydraulic fracture diagnostic field pilots funded by the US Department of Energy and the oil/gas industry. The projects' main objective is to capture the hydraulic fracturing process through use of advanced diagnostics and collection of through-fracture cores to provide undisputable evidence and attributes of the created hydraulic fractures.

At the HFTS I and II test sites in the Permian Midland and Delaware basins, three slant core wells were drilled through created hydraulic fractures and over 1,800 feet of core was recovered, capturing thousands of hydraulic fractures in their natural state, as well as deposited proppant. Proppant detection and quantification capabilities enabled collection of a proppant-log in a in-fill/child well, provided insight on proppant distribution in the created fracture geometry.

Data from the through-fracture cores captured at the HFTS I and II provide direct evidence of the created hydraulic fractures and proppant distribution. The findings are challenging the understanding and current modeling capabilities of hydraulic fracture geometry, fracture propagation, and proppant distribution. Results from these field pilots are applicable to the global stacked-pay shale resources and provide for the foundation for the Environmentally Prudent Development of stacked-pay Unconventional Resources.

This presentation provides results from the slant core wells and implications on future unconventional well development.

Biography:

Jordan is a Senior R&D Manager at the Gas Technology Institute (GTI) in the Subsurface Technology Group. He has over 15 years of experience in the oil and gas industry, much of it spent on unconventional resource development managing data-driven integratred diagnostic field pilots. He is the principal investigator and project manager for the DOE /NETL Hydraulic Fracturing Test Site I & II (HFTS). These are large collaborative field based hydraulic fracturing research programs valued at over $30 million each, which enable transformational understanding of the hydraulic fractuing process. Jordan holds several patents in hydraulic fracturing technology and has authored and co-authored many technical papers on the topic. Before joining GTI in 2010, he held various technical positions at Halliburton. He holds a BS degree in Mechanical Engineering from Purdue University.

How do CEOs lead for success?
Insights to boost your leadership skills

Elizabeth Coffey
Spark Leadership Ltd.

Abstract:

What actions do CEOs take behind the scenes to create success? What can go wrong that leads to CEO failure? How long do most CEOs have in post? What skills do they need to create high performance?
What can you learn from these insights to accelerate your own leadership journey, no matter what your current point? You'll hear behind the scenes stories and practical guidance grounded in 25 years of collaborating with energy CEOs.
We look at what CEOs actually DO. During a CEO's tenure, a leader focuses on 3 activities: destroying aspects of the inherited organisation that don't work, creating new elements to improve performance and preserving aspects that work well. Ideally, the leader delivers these empathetically.
We consider the (often brief) life cycle of the CEO. Upon entry, the CEO plans a strategic path for the business. Next, the CEO disrupts the status quo by operationalising those ambitions. Third, a CEO tries to stabilise the organisation to establish a positive legacy.
What are the upsides of this high wire act? Company growth plus status, wealth and power for the CEO. If a high visibility CEO fails, it can devastate the organisation's valuation and the individual's reputation.
Which core skills do CEOs need? We look beyond the myths to explore real examples from the oil and gas industry to reveal the most important 4 skills for CEO success.
Which skills are crucial for you to achieve your own career peak? We highlight the critical few skills that sign-post the way to your leadership achievement.

Biography:

Elizabeth Coffey is an internationally recognised senior advisor, speaker, and author, who develops CEOs and Board Executives of Global 500 companies. Through Spark Leadership Ltd (established 2005), she consults across diverse industries in 30+ countries.
Elizabeth wrote several leadership books, including McGraw Hill's '10 Things That Keep CEOs Awake' (2002). She develops organisations through ground-breaking strategic changes, notably with ADNOC, Citigroup and the UK's Cabinet Office.
Her numerous awards include Pioneering Woman Leader, Top 10 Leadership Development Companies, Top 101 Global Leaders, Mentor of the Year and European Woman of Achievement. Leadership clients include BP, Shell, ExxonMobil, ADNOC & KPC.

On Repurposing Oil and Gas Wells to Geothermal Wells

Arash Dahi Taleghani
Penn State University

Abstract:

The number of abandoned oil and gas wells are growing over millions, significant costs are imposed to companies and government for decommissioning these wells. However, it would be very encouraging for the oil and gas industry to take advantage of these wells and use them as a source of geothermal energy. Huge upfront costs have always been a major obstacle for the development of geothermal energy. As a rule of thumb, a quarter of the costs for harvesting geothermal energy is going toward drilling and one third of the costs is spent for completions. One obvious solution is avoiding these costs by repurposing existing oil and gas wells to generate geothermal power at the end of their economic production life. In some regions of extensive hydrocarbon explorations, the geothermal gradient can be very steep, providing potential well candidates for conversion. Taking into consideration the local energy demand, potential market, existing infrastructure, and technical challenges, a conversion strategy for the existing wells is discussed specially in terms of the wellbore integrity requirement and steps to ensure hydrocarbon containment during the heat extraction process. Potential challenges in inspection and preparation of these wells in terms of well integrity and productivity with possible remedies will be discussed in this presentation.

Biography:

Dr. Arash Dahi Taleghani is a tenured associate professor of petroleum engineering at Pennsylvania State University. Before joining Penn State, he was an associate professor of Petroleum Engineering at Louisiana State University. He earned his Ph.D. in Petroleum Engineering from the University of Texas at Austin. He has about 12 years combined experience in applied engineering, research and in academia and is a registered professional engineer. Dr. Dahi Taleghani is the associate editor of ASME journal of Energy Resources and Technology and has numerous publications and six patent applications in the field of drilling and completion. In 2014, he received the Distinguished Achievement Award for Petroleum Engineering Faculty from the Society of Petroleum Engineering (SPE). He has also received SPE Eastern North America Regional Completion Optimization and Technology in 2017. He is currently conducting research in reservoir geomechanics, hydraulic fracturing, wellbore integrity, and geothermal energy.

Turning the Tide:
from Noise to Reservoir Monitoring Tool

Mehdi El Faidouzi
ADNOC

Abstract:

Reservoirs are subjected to pressure loading from earth and ocean tides. The resulting pressure oscillation, in the order of a fraction of psi, are typically recorded during long shut-ins periods, especially in high-diffusivity reservoirs.
The tidal pressure disturbance during pressure build-ups can be seen as "noise" because it distorts the pressure derivative and makes the well-test interpretation more uncertain. Although the removal of tidal "noise" from the pressure response has been widely covered, the use of tidal "information" as a reservoir characterization and monitoring tool was rarely addressed. There are things to learn from its amplitude and phase, from rock mechanical properties, to fluid type and reservoir heterogeneity. During this lecture, we will learn through actual field cases how tidal information helped characterize a fractured reservoir, and how it was used to monitor a CO2 plume migration in a CCS project.

Biography:

Mehdi is a Specialist Reservoir Engineer with ADNOC. His 14 years global career includes technology deployment at BP, and subsurface advisory at Xodus Group. He has numerous publications to his name, featured on the SPE Journal and JPT (2019), and is the winner of the 2020 ADIPEC award for his work on digital transformation. Mehdi holds an M.Sc. in Petroleum Engineering from Imperial College London and an M.Sc. in Applied Mathematics from Ecole des Ponts ParisTech. His passion lies in data-driven analytics, pressure transient analysis and special core analysis.

Sidetracking with Whipstocks:
An Efficient Method for Increasing Your Operational and Asset Value

Tom Emelander
Weatherford Intl.

Abstract:

As the demand increases to lower overall cost of accessing reserves, more reliable operations during the well construction process are required and refined methods for maximizing the value of existing assets must be considered. In drilling operations, there are numerous reasons why sidetracking may be a planned or contingency event. Additionally, many if not all, fields have existing assets that can potentially be utilized to reestablish or increase production while reducing cost and footprint associated with a new drill. One option of sidetracking a well involves a ramp directionally anchored in the casing or open hole to create a window for future drilling and completion assemblies. Whipstock sidetracking has evolved as a viable solution to add operational value in both new and mature wells.

Through technological advances, whipstock operations have become more efficient and can cover most applications for new drills and re-entries. With additional evolutions in drilling capabilities and more complex wellbore design, sidetracking in casing or open hole can provide an economical advantage over traditional contingency solutions. From an overall cost per foot perspective, multilateral and re-entry projects can reduce the operational spend to access additional reserves while reducing the environmental footprint.

With extensive run history and ever-increasing developments in equipment, competency, and data driven analytics, the scope and success for whipstock sidetracking operations provides operators with lower risk options to further industry optimization.

This presentation will focus on identification of applications and methods to increase operational efficiency in the process of drilling and completing wells along with recovering stranded production in existing fields.

Biography:

Tom Emelander is the Product Line Manager for Weatherford's Whipstock Systems. His early career focused on support and implementation of Casing Exit Technologies. After gaining operational experience, he was elevated to Technical Specialist where he guided his team to significant improvements in service quality. His recent role is focused on increasing efficiencies, developing new technologies, and working with operators on highly innovative re-entry projects including multiple industry first installations.

Regarded as a subject matter expert, he has authored multiple technical papers and industry articles. Tom has a Mechanical Engineering degree from Western Michigan University.

Success and Failure Factors for Cyclic Gas Injection in Unconventional Reservoirs

Tuba Firincioglu
NITEC LLC

Abstract:

Field application of cyclic gas injection (CGI) has proven to increase rates and recovery factors in Eagle Ford. However, despite years of experience in conventional reservoirs, a comprehensive undersanding of the factors that yield to a succesful CGI project in unconventional plays is yet to be developed. Because a hydraulically created fracture system controls the flow while the fluid is stored in ultra-tight, nanoporous matrix, integrated understanding of the physics of the unconventional reservoir, the fluid system, exchange between matrix and fracture media, and the dynamic nature of the hydraulic fracture properties is essential for the successful design and implementation of CGI in unconventionals. This presentation focuses on the unconventional aspects of CGI and demonstrates utilization of modeling solutions to understand the reservoir, design a successful gas injection project, and quantify its success. The key take aways of the presentation are the success factors of CGI projects, importance of containment of gas and contact of gas with oil, and the impact of timing on the economic viability of implementation.

Biography:

Tuba Firincioglu is the Managing Director at NITEC LLC. Since joining NITEC as a Reservoir Engineer, she has focused on the application of reservoir engineering technologies for the resolution of complex reservoir development programs. She has performed or managed over 150 reservoir studies involving dry gas, gas condensate, volatile oil, and black-oil fields; including modeling and design of many conventional and unconventional EOR applications. Her experience covers most geological depositional environments from fluvial sands to carbonates.

Dr. Firincioglu is an expert in numerical simulation of fractured reservoirs and hydrocarbon phase behavior under confinement. She has been involved in unconventional oil and gas resource plays since 2009, and has worked on all the major unconventional basins in North America. During this period she also designed and taught Unconventional Reservoir numerical simulation courses.

Dr. Firincioglu has served in technical committees of various SPE Conferences and has chaired sessions. She currently serves in the SPE Reservoir Advisory Committee. She is also the recipient of 2020 Rocky Mountain Regional Reservoir Description and Dynamics Award.

Dr. Firincioglu holds a B.S. degree from Istanbul Technical University, an M.S. degree from Stanford University, and a Ph.D. degree from Colorado School of Mines, all in Petroleum Engineering.

Rigs as Reefs:
Re-imagining Our Energy Past as our Eco-Friendly Future

Emily Hazelwood
Blue Latitudes

Abstract:

Increasingly, the world's offshore oil and gas platforms are transitioning into aging relics, leftover designs from an era in hot pursuit of developing and extracting the world's offshore oil reserves, with little thought given to their eventual removal. However, as the global economy has begun to shift away from traditional energy resources (i.e., oil and gas) towards renewables (i.e., wind, wave, and solar energy), the removal of many offshore structures has become inevitable, and the technical, economic, and environmental implications associated with their decommissioning must now be addressed. Many of these platforms are home to some of the most productive ecosystems on the planet, making decommissioning via complete removal and onshore disposal environmentally detrimental, and needlessly expensive. Repurposing an object, which was once environmentally taxing, into something sustainable and environmentally friendly is inherently fresh, and perhaps most critically, timely. This lecture will shed light on how scientists, operators and regulators are beginning to think creatively about our ocean resources, and radically changing the way society views ocean conservation. By examining several case studies, ranging from traditional fixed platforms to floating facilities to subsea infrastructure in the super deep sea, this lecture will demonstrate the ecological, social, and economic benefits of repurposing oil and gas infrastructure as marine habitats. Ultimately, this lecture will demonstrate to members how implementing Rigs to Reef programs globally provides not only a viable alternative to traditional decommissioning but also a replicable, scalable and significantly more commercially viable solution which can catalyze sustainable ocean resource development.

Biography:

Emily is a marine conservation biologist and co-founder of Blue Latitudes, a women-owned marine environmental consulting firm, where she works to unite science, policy, and innovative technology to solve the complex ecological challenges associated with re-purposing offshore oil and gas platforms as artificial reefs through the Rigs to Reefs program. She has a B.A. in Environmental Science from Connecticut College and an M.A.S in Marine Biodiversity and Conservation from Scripps Institution of Oceanography. In 2018, Emily was recognized on the Forbes 30 Under 30 (entrepreneurs) list for her work developing sustainable, creative, and cost-effective solutions for the offshore energy industry.

Acid Stimulation of Carbonate Formations: Matrix Acidizing or Acid Fracturing?

Dan Hill
Texas A&M University

Abstract:

Carbonate reservoirs contain about 40% of the world's conventional oil and gas reservoirs, including some of the largest oil reservoirs in the world. These formations are very amenable to stimulation by acids, either through matrix acid injection below fracturing pressure, or by acid fracturing. This talk will present the latest methodologies for design and evaluation of carbonate acid stimulation treatments. Comparison of predictions of the latest models of matrix acidizing and acid fracturing leads to a coherent criterion for selecting which stimulation method is best for any given reservoir. So rather than relying on simple rules of thumb based exclusively on reservoir permeability, the engineer can now select the best acid stimulation method for any carbonate reservoir. We now have a rigorous, straightforward methodology to select the best acid stimulation method for any well completed in a carbonate formation.

Biography:

Dr. A. Daniel Hill is Professor and holder of the Noble Endowed Chair in Petroleum Engineering in the Harold Vance Department of Petroleum Engineering at Texas A&M University. Dr. Hill joined the Texas A&M faculty in 2004. Previously, he taught for twenty-two years at The University of Texas at Austin after spending five years in industry. He holds a B.S. degree from Texas A&M University, and M.S. and Ph.D. degrees from The University of Texas at Austin, all in chemical engineering. He is the author of 5 books, over 200 technical papers, and five patents. Through his career, he has received many SPE awards, including the SPE John Franklin Carll Award in 2014, and was named an Honorary Member of SPE and AIME in 2020. From 2014 to 2017, he was a member of the SPE Board of Directors. In 2019, Professor Hill was named a Regents Professor by the Texas A&M System Board of Regents.

The Geomechanics of Drilling Weakly Bedded Shale in Conventional & Unconventional Wells

Julie Kowan
Baker Hughes

Abstract:

The energy industry has a responsibility to drill wells as safely and efficiently as possible. We have made enormous progress toward this goal in recent decades, yet geomechanics-related incidents still account for significant non-productive time (NPT) and cost. In order to do even better, there must be a concerted effort to de-risk drilling programs. A geomechanical model comprises a thorough understanding of the local stress field and geology and is a means to diagnose the root cause of previous drilling problems. A geomechanical model should be considered an essential tool in challenging drilling environments because we must first understand the mechanism for failure before we can determine appropriate de-risking and mitigation measures.

One example of a challenging drilling environment is when bedding planes lack the strength to remain intact during drilling, sometimes resulting in severe borehole instability. This phenomenon is called weak bedding and has been observed in conventional and unconventional wells drilled all over the globe. The geomechanics and rock mechanics communities have studied weak bedding planes for decades and have developed several effective mitigation techniques that vary somewhat depending on the local environment. The key takeaways of this presentation are an understanding of what comprises a geomechanical model, what weak bedding planes are, where they have been observed and how geomechanical models have been employed to reduce wellbore instability while drilling through these weak planes, thus driving an increase in drilling safety and efficiency.

Biography:

As a Geomechanics Advisor at Baker Hughes, Julie Kowan enables operators to drill safer, more cost-effective wells by reducing non-productive time (NPT) from wellbore instability. Julie earned a BS in Geology from Rutgers University and a MS in Geology from Brown University, after which she joined GeoMechanics International (GMI) in 2005. Since then Julie has performed over 125 geomechanics studies worldwide, and has held various positions at both GMI and Baker Hughes as well as operated her own consulting company for two years. Julie has volunteered for SPE and SPWLA and served as a SPWLA Distinguished Speaker for 2020-2021.

From digital rocks to gigatonne scale CO2 storage: two revolutions in one

Samuel Krevor
Imperial College London

Abstract:

Many assessments suggest that the widespread storage of CO2 in deep subsurface sedimentary rocks will be needed to avoid dangerous climate change. It is estimated that storage rates will be needed of the order 1-10 GtCO2 per year by 2050, as much fluid handling as in the oil & gas industry today. The management of individual storage sites is increasingly understood with a number of projects injecting at rates around a million tCO2 per year. However, challenges remain for the scale-up of injection rates to gigatonnes per year. Central to these challenges are the limitations to modelling and predicting injected CO2 movement and immobilization in the subsurface. I will present research in three areas in which digital rock techniques are used to analyse fluid dynamics and develop models of subsurface flow across scales: (1) an exploration of the pore scale fluid dynamics underlying the use of Darcy's law to model two-phase flow (2) the upscaled impacts of small scale heterogeneity on CO2 migration and trapping, and (3) an analysis of the implications of climate change mitigation targets to growth rates and global resource capacity of subsurface CO2 storage. The one idea I would like the members to take away is that these revolutions can and will drive each other; Technology advance in digital rock reservoir characterisation is revolutionising our ability to manage subsurface fluids just at the moment that we need it to apply our skills as petroluem engineers in rising to the grand challenge of mitigating climate change.

Biography:

Sam Krevor is a Reader at Imperial College London where he leads the Subsurface CO2 group and is the Faculty Advisor for the SPE student chapter. He develops digital rock techniques to characterise CO2 storage underground with over 70 highly cited papers. He manages over £10M in industry and government funded research. He received his BSc, MSc, and PhD from Columbia University and was a Postdoctoral Scholar in Energy Resource Engineering at Stanford University.

The Role of CCS and Hydrogen in the Energy Transition

Hon Chung Lau
Low Carbon Energies

Abstract:

Contrary to popular belief, the ongoing energy transition from a high to low carbon economy requires more than harnessing renewable energies. Currently, only 11% of global energy consumption come from renewable energy while 85% come from fossil fuels. The current pace of installing renewable power plants is inadequate for nations to achieve net-zero by the second half of the century. Achieving net-zero will require each country to decarbonize all three major energy consumptions sectors: power, transport and industry. There are essentially five ways to achieve this. They are renewable energy, carbon capture and storage (CCS), hydrogen, nuclear energy and reducing energy demand. How each country will utilize these ways to go through the energy transition will depend on its specific energy mix and the need to balance energy security, affordability, and sustainability. This seminar will show how CCS and hydrogen are key to achieving net-zero in all three energy consumption sectors. Furthermore, there is enough storage capacity in oil and gas fields, and saline aquifers in the world to store two centuries of anthropgenic carbon dioxide emission. We will present several case studies of large-scale CCS demonstration projects in Europe and Asia and discuss what is needed to take CCS to the next level of implementation.

Biography:

Prof. Lau worked for Shell's upstream business for 35 years where he had held positions in R&D, field development planning, technical assurance, training, project management and technical leadership. From 2016-2021, he was a professor of practice at the National University of Singaspore (NUS) and senior scientific advisor at Singapore's Agency of Science, Technology and Research (A*STAR). At NUS, he taught and conducted research on unconventional and renewable energy resources. In 2021, Prof. Lau founded Low Carbon Energies, a consulting firm focusing on the energy transition. He holds BSc and PhD in chemical engineering from Caltech and Princeton, respectively, and is a registered professional engineer in Texas. He is also an adjunct professor at the Chemical and Biomolecular Engineering Department at Rice University.

Successful Formula for Accelerating Change

Marise Mikulis
EnergyInnova, Inc

Abstract:

Managing change and responding to disruption have always been challenging aspects of energy professionals' work, but lately they have accelerated and become more pressing and complex than ever. Technology advances, operational process changes, organizational shifts, the global energy transition, diversity and inclusion programs, the pandemic response, and working from home have underscored the need for successful change practices, but only 70-75% of change pursuits actually succeed well.

What practices can we learn and apply from the 25-30% of these initiatives that do succeed? What is the current research in change management that can make a difference in our engineering endeavors? What professional competencies can shift our odds?

This presentation discusses the core change variables of execution approach, resistance, and persistence. Fresh perspectives are offered on success levers ranging from neuroscience, to execution methods, the delivery team, performance metrics, and ultimately to establishing new norms. Woven throughout are practical, industry-relevant examples, such as new technology introduction and the global energy transition.

Come get (re-)acquainted with our sister discipline, Change, in the context of the work engineers and geoscientists do. Take away best practices for addressing our sector's challenges and shift your odds of success for reliably delivering project ROI, improving talent acquisition and retention, and advancing our ability to meet the world's evolving energy demands.

One idea you would like the members to take away from this lecture:
Understand what change management competency is, the rigorous science underpinning it, core considerations for execution, and best practices that improve our odds of success in meeting today's challenges as professionals in the rapidly changing energy industry.

Biography:

Ms. Mikulis is a broadly accomplished Upstream leader working with business Operations to lead and successfully implement change to produce measurable business improvement. She has extensive experience navigating the change dimensions of upstream technology introduction and management; business and organization integration; digital transformation; Diversity, Equality & Inclusion; and professional coaching. Marise's work affiliations span oilfield service, operators, high tech, and her consulting company. An active SPE member, she is a prominent voice in this change arena for the organization (SPELive, D&I). She holds a B.Sc. in Geology and Mathematics from Tufts University, and change certification (CCMP) aligned with ACMP's standard.

Effective Pipe Centralization is Critical to Total Depth and Well Integrity

Mike Moffitt
Ace Oil Tools AS

Abstract:

Effective centralization in well construction both achieves total depth and delivers the best possible cement sheath to optimize zonal isolation. Achieving planned shoe depth reduces risk to best deliver the anticipated return on investment. The best possible cement sheath delivers a long-term barrier to prevent fluid migration to surface beyond the useful life of the well, satisfying local regulatory and environmental constraints. Unfortunately, centralization strategies to best achieve these two objectives may be diametrically opposed. Choosing the right casing hardware along with a well-planned centralization program helps resolve this conflict.

This presentation discusses the rationale behind centralizer choice and placement to enhance reaching total depth and to deliver cement integrity over the life of the well. It also breaks common centralization myths, presents case histories where good centralization has helped reach planned shoe depths and includes a case where poor centralization led to compromised well integrity.

ONE IDEA: A well-planned and executed centralization program helps achieve total depth and provides an effective barrier both during and beyond the productive life of the well to satisfy local regulatory and environmental constraints.

Biography:

Mike Moffitt currently manages the Western Hemisphere for Ace Oil Tools. He has over 20 years' service company experience in the drilling industry. He began his well construction career in liner systems and his expertise includes conventional liners, casing hardware and Casing & Liner Drilling Systems.
Mr. Moffitt has written numerous papers and trade magazine articles and is listed as inventor or co-inventor on fifteen patents relating to liner drilling and cementing technologies. He received his Bachelor of Science in Mechanical Engineering from Texas A&M University.

The Digital Twin for Production Optimization – with Emphasis on Compositional Modeling

Kristian Mogensen
ADNOC HQ

Abstract:

A digital twin is essentially a digital representation of a physical system such as a well, pump, compressor, or a series of connected items. Sometimes, machine-learning algorithms can assist in analyzing large amounts of data within domains such as preventive maintenance.

The value proposition of a digital twin is to have a complete overview of all fluid streams in the production and injection network to enable automation of production capacity planning subject to current and future constraints. The digital solution must be versatile, maintainable, accurate, and with a quick turnaround time to address dynamic changes in market demand as well as the supply side down to the individual wells.

Integrated asset models (IAM) have been around for the past two decades or so. These models have become more sophisticated but also require more effort to maintain. The Digital Oil Field (DOF) orchestrates data exchange between different IT systems to feed a calibrated IAM model. An IAM-DOF system provides an up-to-date overview of all fluid streams to maximize value creation subject to a number of constraints. The digital solution must be versatile, maintainable, accurate, and with a quick turnaround time to address dynamic changes in market demand as well as the supply side.

So far, digital twins have mainly focused on mimicking small, well-defined systems, whereas IAM models tend to address the bigger picture. Can we take the best from both worlds? Do you need to? And how would you go about developing such a technical solution?

These are some of the aspects which we will discuss in this presentation. When you blend different fluid systems together, you need a robust fluid description at well level. Complicating factors may arise, such as compositional variation at reservoir level, gas coning as well as breakthrough of injection gas. Many such technical details must be factored in, without losing sight of the overall goal: to create more value.

Biography:

Kristian Mogensen works as a Senior Specialist at ADNOC Upstream in Abu Dhabi and is the receiver of the 2020 SPE Regional Award on Reservoir Description and Dynamics.

Kristian has published more than 35 SPE papers and holds 20 patents. His main technical interests include enhanced oil recovery, pore-scale physics, matrix-acid stimulation, and fluid phase behavior. He serves as technical editor for SPE Reservoir Evaluation & Engineering and as Associate Editor for Journal of Petroleum Science and Engineering. Kristian earned MSc and PhD degrees in chemical engineering from the Technical University of Denmark.

What is the one idea you would like the members to take away from this lecture?
The future of digital twins looks promising and is in the hands of people who are tech-savvy, collaborative, and with a wish to understand the bigger picture.

Waterflood Optimization by Data Analytics on Mature Fields Accelerate the Field Developing Process from Months to Weeks

Babak Moradi
Three60 Energy

Abstract:

Currently, 70 percent of global oil is being produced from mature fields. The waterflood process is widely used to improve the oil recovery of mature fields. Unlocking the potential of existing mature assets and the optimization of waterflooding can be challenging using traditional dynamic modelling workflows due to high well count, years of historical production data (extensive data set), complex stratigraphy, etc.; however, these challenges create opportunities for applying data-driven techniques. In addition, increased attention towards reducing carbon emissions makes data-driven techniques more attractive as they are computationally-light techniques.

First, this work reviews classical analytics for studying the waterflood process; after that, machine learning techniques are used to optimize rates of water injector wells for maximizing the production efficiency. Next, an innovative hybrid physics-guided data-driven method is presented to accelerate field development and locate the remaining oil (LTRO) process from months to weeks. The results of this new workflow are validated against outputs of the numerical simulation and 4D seismic info. Furthermore, the comparison of post drilling results and predictions of the new physics-guided data-driven workflow is presented for a field located in the Middle East.

This presentation demonstrates that it is now possible to deliver digital LTRO projects, capturing the full uncertainty ranges, including complex multi-vintage spatial 4D datasets, and providing reliable non-simulation physics-compliant data-driven production forecasts within weeks. This presentation addresses the challenge of reducing mature fields study resource intensity and therefore, time and costs whilst maintaining a high degree of fidelity.

Biography:

Babak Moradi has over 13 years of experience in reservoir engineering. He has been involved in studies of more than 20 mature fields located in the Middle East, South East Asia, Australia, North Sea, and Africa. Babak is an expert in machine learning and programming; he has developed several software packages relating to petroleum engineering. He is the author of 30 scientific publications in areas of enhanced oil recovery, CO2 sequestration, fluid properties modelling, and has published a textbook on fluid flow in the wellbore. His strong background in mathematics and programming helps him to turn data into knowledge.

Optimizing Field Development and Predicting EUR Utilizing Geochemistry

George Norton
Red Bluff Resources LLC

Abstract:

Field development strategies have been variable in many basins due to the unpredictability of well performance, spacing implications, and parent/child well interactions. Oil in place, reservoir thickness and porosity have been used for mapping efforts to increase the likelihood of drilling in the most desirable locations for years with limited success. Using a data analytics approach in conjunction with a state-of-the-art geochemical drainage analysis, a new strategy for appraisal and development can be formulated and key areas identified with limited amounts of new drilling activity. Combining the geochemistry data which identifies the specific regions that are contributing with basic vertical logs from historical wells and applying multi-variant analysis techniques to those specific drained regions, it is possible to identify which variables lead to correlations to EUR (expected ultimate recovery). Once EUR can be predicted in a stand-alone well, it is then possible to further evaluate spacing implications (vertically or horizontally), and accurately measure the percentage of degradation and communication. Combining this information is possible utilizing a RQI (reservoir quality index) and generating a contour map of the RQI allows the user to predict with ~75%+ accuracy the EUR of potential wells. This significantly aids in land evaluation, development planning, well spacing, and economic prediction. SPE members should take away a new approach for utilizing geochemistry data in conjunction with conventional log data and data analytics not for purely just a drainage analysis, but a field development and EUR predicting method that is able to be mapped with accuracy previously unavailable.

Biography:

George Norton is a Senior Completions Engineer with Red Bluff Resources and holds a BS in Mechanical Engineering. George is a recipient of the Exemplary Volunteer Award and Outstanding Study Group Award via SPE along with 4 awards from his time at Occidental Petroleum related to innovation, and 1 award at Schlumberger for operational performance. George has worked with multidisciplinary teams focused on new technologies and innovation to understand well performance. George has chaired sessions for URTeC, currently serves as the Oklahoma City Education Chair/ 2022 Section Chair Elect, has organized SPE workshops, and presented multiple times at various conferences.

Reservoir Insights Unlocked by Multidisciplinary Integration

Shauna Oppert
Chevron

Abstract:

Integrated engineering and geoscience technologies provide insights into complex saturation, pressure, and geomechanical changes from reservoir production. Pressure Transient Analysis, 4D seismic interpretation, and Mechanical Earth Modeling each estimate dynamic property changes that can be complimentarily used to calibrate and cross-validate the other technologies. Three case studies are discussed to highlight the multidisciplinary approaches that have uncovered alternative scenarios and new understandings about the subsurface production effects. The value of integration is realized through improved forecasts driving better reservoir management decisions for EOR fields.

Future innovations in multi-disciplinary approaches will require increasing the complexity of production and subsurface effects associated with monitoring and modeling. Complex Water Alternating Gas injection modeling shows promise for integrated analyses. Production and injection involving complex subsurface features, such as fracture corridors, pose significant challenges for identifying production effects on surveillance data as well as accurately capturing and forecasting these effects in simulations. Coupled modeling, machine learning, and model inversion using surveillance data are key to drive new advances between engineering and geoscience integrated applications.

Biography:

Shauna Oppert leads Chevron's technical integration between geophysics and geomechanics. She has 20 years of experience between Chevron and ExxonMobil and has published over 25 technical papers in her field. She earned a MSc. in Geophysics from the University of Calgary in 2002 and a BSc. in Geology & Geophysics from Missouri Science & Technology in 2000. She has been a keynote speaker for the 2021 EAGE PRM workshop, a panel speaker for the 2018 SPE IOR conference, and has served as the SEAM Life of Field Technical Committee Chair in the SEG for five years.

Fracture Height Growth Modeling in Layered Formations – Comparison of Modeled and Observed Data

Vibhas J. Pandey
ConocoPhillips Company

Abstract:

Accurate prediction of fracture height growth from hydraulic fracturing treatments, especially in highly layered or laminated formations, is crucial not only from well performance perspective but also from planning and treatment design viewpoint. Understanding of critical parameters that govern the fracture height growth in heterogenous formations is essential to developing suitable well completion strategies that are specific to the reservoir.

This presentation reviews the typical fracture heights observed during the treatments, and then describes the construciton of a semi-analytical fracture height prediction model and its application to several real-world cases covering a variety of reservoirs ranging from traditional low permeability sandstones to coalbed methane and shale reservoirs worldwide. The treatment types include conventional fracturing treatments, foamed fractures and slickwater fracturing treatments.

The model-predicted fracture heights agree reasonably with those determined from field measurements such as tracer and microseismic survey in vertical and horizontal well completions. With the introduction of fluid flow induced pressure distributions in the fracture, along with the velocity-based fracture toughness calculations, the traditional uncertainties in input data are mostly eliminated, and accurate predictions can be made. The analysis also reveals typical fracture growth patterns that are dependent on injection rate and corroborated with interesting observations in the field.

Key Takeaway: The critical parameter of fracture height can be predicted with reasonable accuracy even in highly layered formations and the designed fracture heights can be achieved in the field with implementation of formation-specific hydraulic fracturing treatment designs.

Biography:

Vibhas Pandey has over 30 years of experience in oil and gas industry and currently works as an Engineering Fellow with ConocoPhillips in their Global Completions Engineering group in Houston. He is a well-stimulation expert primarily foccused on hydrualic/acid fracturing modeling, treatment design, field support and optimization, and has authored several technical papers including 2 chapters in recently published SPE Monograph. Mr. Pandey holds Bachelor's and Masters' degree in Mechanical Engineering (India), Master's degree in Petroleum Engineering (Univerity of Oklahoma), and is currently pursuing PhD in Petroleum Engineering from Unversity of North Dakota where he also serves as Adjunct Faculty.

Drill Rig Control Systems:
Detecting Auto Driller Dysfunction and Improving Behavior

Paul E. Pastusek
ExxonMobil UIS

Abstract:

Drill rig control systems are often not as well tuned nor as well behaved as expected. There can be substantial interaction between systems that is not recognized and is attributed to 'difficult drilling'. This may only become obvious when supervisory control automation systems are added on top of the existing controllers.

This lecture shares some of the key findings on detecting, modeling, and correcting these issues, with particular attention on integrating drill string models with auto drillers, top drives, and active torsional damping systems. An unstable auto driller controller may induce stick-slip and lead to inefficient drilling and bottom hole assembly damage.

The torque limits set in the auto driller, top drive, and automation systems can also interact in ways that confound attempts to eliminate control instability. In general this interaction between controllers is not well understood by the industry and may not be recognized as a separate excitation mechanism for stick slip. Current best practices are shared to minimize the interaction of these three systems, but this is still an active area of discovery.

Simulation and rig trials have shown that this dysfunctional behavior can be mitigated by appropriate adjustments to the control system. Multiple systems have been designed that make these adjustments automatically and are now being deployed. In general, all control systems, not just drill rigs, can and should be modeled, monitored, and tuned to get the best performance of the system with unconditionally stable performance.

Biography:

Paul Pastusek is a Drilling Mechanics Advisor at ExxonMobil. His expertise is in: automation, drill string dynamics, steerable systems, borehole quality, bit applications, cutting mechanics, rig instrumentation and control systems, and failure analysis. He received the 2020 SPE International Drilling Engineering Award and the 2017 GCS Regional Drilling Engineering Award. Paul has a BSME from Texas A&M University and a MBA from the University of Houston. He has 43 years' experience continuously improving drilling processes and tools. He is a Registered Professional Engineer, holds 42 US patents, and has delivered 55 papers and presentations on drilling technology.

Methane Emissions:
Our Obligation and Our Opportunity in the Energy Transition

Drew Pomerantz
Schlumberger

Abstract:

The world has entered an energy transition where the future role of energy sources will depend partially on their greenhouse gas footprint. While that transition is expected to take a generation, some changes will occur quickly. One of the fastest ways to combat climate change is to reduce emissions of methane, not carbon dioxide. Methane is the main component of natural gas and a more potent greenhouse gas than carbon dioxide. The oil and gas industry handles a large quantity of methane, and a small amount of that methane leaks to the atmosphere. Because methane is such a potent greenhouse gas, those emissions are small in volume but large in environmental impact: methane is the dominant source of our industry's direct greenhouse gas emissions, above other sources like flaring. This lecture describes the main sources of methane emissions, the market and political drivers to reduce methane emissions, and the new technologies being developed to find and fix methane leaks.

Biography:

Andrew (Drew) E. Pomerantz is an Energy Transition Technology Advisor at Schlumberger, based in Boston, Massachusetts. He focuses on new technologies that reduce direct greenhouse gas emissions from the upstream and midstream oil and gas industry, particularly novel methods to detect fugitive methane emissions. Drew graduated from Stanford University with a PhD in chemistry in 2005 and has co-authored 100 peer-reviewed publications and 25 granted US patents. He founded the Boston chapter of the Society of Petrophysicists and Well Log Analysts (SPWLA).

Practical Petrophysics in Unconventional Reservoirs: Chasing the Sweetest!

Jesús M. Salazar
Marathon Oil

Abstract:

Take away: Sound petrophysics help find sweet spots and the richest hydrocarbon-yield drilling target to optimize wells staking and spacing.
Liquid-rich resource plays warrants revisiting “bypassed” hydrocarbon in organic-rich source rocks and tight sands, which were deemed uneconomic when first drilled. Petrophysics is one of the tools used to target the richest hydrocarbon zones to drill horizontal wells in this factory-like field development. This presentation will review various petrophysical methods to assess hydrocarbon resources in unconventional reservoirs with cutting-edge technology typically acquired in data-rich pilot holes. Subsequently, I will elaborate on a practical workflow that uses laboratory measurements made on core to upscale a petrophysical model based on basic triple combo logging suites. Reliable prediction of petrophysical properties, to anticipate the richest high-hydrocarbon-yield window, demonstrates the robustness of the model despite being based on a limited data. I will discuss examples of this modeling in unconventional reservoirs in North and South America.This practical approach is run by geoscientist as a rapid automated workflow to generate fairway maps, locate sweet spots, and to identify the best benches for landing lateral and wells' spacing in various resource plays.

Biography:

Jesús M. Salazar joined Marathon Oil in Houston (2018) as their lead SME in petrophysics after long stints with ConocoPhillips, Oxy, and PDVSA in three continents. Jesús is former SPWLA President and VP Technology and Executive Editor for the journal SPERE&E. He is Associate Editor for SPEJ since 2019 and a recipient of SPE's Peer Apart recognition. Salazar has published numerous papers for journals and conferences and won the best paper award published in Petrophysics in 2006. He received Ph.D. and M.S. degrees in Petroleum Engineering from The University of Texas at Austin and B.S. in Physics (honors) from Universidad Central de Venezuela.

Physics Embedded Machine Learning for Modeling and Optimization of Mature Fields

Pallav Sarma
Tachyus

Abstract:

In traditional reservoir management, various types of predictive models have been applied over the years for either qualitative or quantitative optimization of various reservoir management decisions. Such models range from the very simple analytical models (type-curves, etc.) to the very complex reservoir simulation models. While analytical models are too simplistic for quantitative optimization, many issues such as the significant time and effort required to build and calibrate simulation models etc. generally prohibit their practical use for closed-loop quantitative optimization. Additionally, there have also been many attempts at the application of traditional machine learning approaches for predictive modeling of production performance. While such models can be built very efficiently and are very fast to evaluate, however, due to spatial sparsity of data, combined with poor measurement quality, and the absence of the underlying physics in such models, such purely data-driven approaches have only had limited success. This talk describes a unique modeling approach termed Data Physics. Data Physics combines state-of-the-art in machine learning approaches and reservoir physics into unified models. These models can be created as efficiently as machine learning models, integrate all kinds of data, and can be evaluated orders of magnitude faster than full scale simulation models, and since they honor physics, they have good long term predictive capacity and can therefore be used for robust large scale optimization. We present applications of Data Physics models to real waterflood injection and infill drilling optimizations. A significant increase in actual incremental oil production and reduction in operational cost is demonstrated.

Biography:

Pallav Sarma is Co-Founder and Chief Scientist at Tachyus responsible for the modeling and optimization technologies underlying the Tachyus platform. He is a renowned expert in closed-loop reservoir management, with multiple patents and papers on various topics including simulation, optimization, data assimilation and machine learning. He has many years of research experience working for Chevron and Schlumberger prior to Tachyus. He has received many awards including the Dantzig Dissertation award from INFORMS, Miller and Ramey Fellowships at Stanford University, Chevron's Excellence in Reservoir Management award, and a SIAM award for excellence in research. He holds a Ph.D. in Petroleum Engg. and a Ph.D. Minor in Operations Research from Stanford University. He currently serves in the committees of the SPE Reservoir Simulation Conference, the EAGE European Conference on the Mathematics of Oil Recovery and the JPT editorial committee.

Fracture Challenge: What can we resolve while drilling?

Chandramani Shrivastava
Schlumberger

Abstract:

Fractures remain one of the most important events in the subsurface to impact the reservoirs, from drilling till characterization, development and abandonment. Natural or induced (while drilling or stimulation), they need to be detected early to understand their propagation behaviour and impact under different conditions. Industry has been grappling with this challenge, as often their impact is understood very late.

Many indirect methods have helped understand fractures for decades; however, new technologies and applications can help detect, identify and characterize the fractures while drilling itself. This is achieved by analysing

1. Basic measurements-while-drilling (MWD) data
2. Surface logging data for cuttings and mud-gas
3. Logging-while-drilling (LWD) basic to advanced measurements

Recent advances in technology have made possible to perform and transmit downhole interpretation while drilling commences, in addition to sending multiple measurements uphole at limited bandwidth for real-time interpretation. Machine learning methods are being used to automate the fracture detection workflows removing subjectivity in interpretation. Several case studies from across the globe will be shared to show what all can be resolved while drilling to address the fracture challenge and provide actionable intelligence.

Biography:

Chandramani Shrivastava heads the geology domain for Schlumberger's Well Construction division and is based out of its headquarters in Sugar Land, US. He holds M.Tech in Applied Geology from IIT-Rookee (India) and MS in Petroleum Engineering from Heriot Watt University (UK). He has worked in India, Middle East, South East Asia, West Africa and US in various technical profiles. He has more than 80 presentations and publications to his credit at various symposia and conferences in ~20 years of service. He specializes in interpretation of well-logs and integration of data across disciplines, and is considered an industry expert in borehole images.

‘Well integrity in the Operate phase of the well lifecycle – our roll as crime scene detectives’

Simon J. Sparke
International Well Integrity Ltd.

Abstract:

My takeaway ONE idea - "Having a well Well integrity problem is not a sin, but doing nothing about it is!".

Globally, there are over two millions wells, and it is well documented that at least 40% have mechanical problems that require risk assesment and mitigation. Many of these wells are old and close to de-commisioning but day to day management remains a key issue.

This dynamic presentation shows and documents how over time, key industry events have impacted the well construction and management proces of our well stock. Changes are partly driven by regulations in one part of the world and utilised by other regions as best practices. Technical advances in engineering and sciences also create change by providing greater access to well data and well operational status. Finally, software such as Well Integrity Management Systems (WIMS) has brought about an awareness of the wells status and how it can be better managed particularly as part of the ageing process.

Well integrity is an exciting discipline that embraces a wide range of subjects and skills. Like crime scene investigation, the evidence is provided - it’s a case of reviewing and understanding the data, that ultimately leads you and the team to making a decision on the best way to manage your well(s)

Biography:

Simon began his career in 1978 working for Schlumberger in the Middle East. Over the next 25 years he worked globally for a variety of service providers and Operators in various field and office based roles both onsore and offshore as an Operations Engineer.

Gaining a masters degree in 2005 he moved into Operations Management for a major independent operator and built his first well integrity management system, publishing SPE MS-142449, 'Seven Pillars of Well Integrity' which identified, which established the key seven system ingredients for well integrity,

Considerable experience and knowledge was gained as a co-author of ISO Well Integrity Standard 16530-1. Now, as an independent contractor, he authors key operations related documents for a wide range of clients, building well integrity management systems and providing training schools in many countries and languages for all types of wells.

Simon is an active member of the SPE, and is working on various committees to promote well integrity awareness on a global basis.

A Survival Guide for Digital Transformation

Martin Storey
Well Data QA

Abstract:

When organizations everywhere are racing to embrace Digital Transformation, it is easy to get excited about the claimed possibilities and to overlook the fundamentals. It is also unclear what this will mean for most of us, our organizations and employment prospects. Hence it is reasonable to ponder and assess our readiness for these changes and the opportunities they may bring.

Digital Transformation arguably began a long time ago. It was in the late 1980s that just about everyone in the oil and gas industry started using computers. These were first introduced as "productivity tools" in support of conventional work. With the benefit of experience and technological progress, organizations have evolved new workflows. Today, Information Technology projects are increasingly seen as corporate gamechangers.

In this lecture, an experienced geoscientist offers his take on what Digital Transformation may mean, and suggests how to prepare to ride the wave and succeed. Specific topics will include the need for a reliable data inventory, pre-requisites for the integration of multiple data sets and for the rigorous quantification of uncertainty. All these can be implemented without disruption, at low incremental cost and great potential value to all parties.

The main takeaway point is that regardless of what Digital Transformation turns out to be, some actions should be taken now rather than later to ready the organization. These actions all revolve around the systematic consolidation of specific data fundamentals. In the process, the people involved will also become better prepared and more valuable to their organization.

Biography:

Martin Storey is an independent practising Petrophysicist with over three decades of international experience combining field operations and the acquisition, integrated exploitation and management of well data. He consults and delivers training programs in these areas. He is a long-active member of the SPE and other associations including the Society of Petrophysicists and Well Log Analysts (SPWLA). He was an SPWLA Distinguished Lecturer in 2019 and 2020, and received that society's Distinguished Service Award in 2020. He has a BSc in Mathematics and Computer Science from Stanford University, and an MSc in Electrical Engineering from the California Institute of Technology.

An Examination of the Effects of Surface Data Acquisition Methods on Well Performance Evaluations and Completion Optimization

Darryl Tompkins
Revo Testing Technologies

Abstract:

It is a common practice in the development of wells to change completions designs in an effort to determine which design works best in each area. Quite often a Rate Transient Analysis ("RTA") of the flowback / early production data is used to evaluate how well performance is affected by changes in the completion design. Many analysts faced with performing RTA struggle to have confidence in the analysis results due to poor quality production data. This presentation shows how different surface data acquisition methods effect the evaluation of well performance using common RTA techniques. Additionally, this presentation will recommend preferred methods of data acquisition and demonstrate how these methods produce less ambiguous results. Superior data quality should be a top priority if a well's performance and/or completion design needs to be evaluated quickly and accurately with RTA of the early production period. Iterative completion optimization can be a waste of time and money if the difference in a well's performance due to changes in the completion design cannot be evaluated quickly and accurately due to poor surface data acquisition methods.

Biography:

Darryl has spent his career working in reservoir, completions, and operations engineering in mature fields, gas storage, and unconventionals. He is currently the Chief Technology Officer of Revo Testing Technologies based in Houston TX where he works on developing technologies for unconventional well performance evaluations and production optimization. He is a registered Professional Engineer in the Province of Ontario and he holds a B.Sc. in Mechanical Engineering from the University of Windsor, Canada.

Reservoir-on-a-Chip Micromodels: Tiny Tools for A Big Industry

Wei Wang
Aramco Research Center-Boston, Aramco Americas

Abstract:

Applications of nanomaterials and nanotechnology in the oil and gas industry have been on the rise over the past decade. As a major step forward in realizing the vision of a much in-demand “Reservoir-on-a-Chip” technology, microfluidic devices have been applied as micromodels for oil reservoirs, which opened a new window into high throughput advancement of reservoir and oilfield chemistry. In this review, recent progress and perspectives on applications of microfluidics technology in the oil and gas industry are discussed. Microfluidics consist of microfabricated structures that have small volume capacity and features for liquid handling, with cross sections that range from nanometer to micrometer. The dimensions, geometries and surface properties of microfluidic chips are precisely tailored through nanofabrication and post chemical modification, so that the nano/micro-scale porosity and wettability of the microchannels can be tuned to faithfully resemble natural reservoir rocks. Miniaturized microfluidic device provides an ideal tool for studying the transport processes of fluids at high temporal and spatial resolution. With the advantage of excellent optical transparency, microfluidic micromodels allow us to directly visualize and quantify the multiphase flows and geochemical fluid−rock interactions by advanced spectroscopic and microscopic imaging techniques, elucidating the complex fluid behavior in oil recovery processes. As an example, a specifically designed micromodel system enables water−oil displacement experiments to be performed rapidly in very small-volume samples for dramatically accelerated screening of candidate chemicals or nano-agent additive formulations for enhanced oil recovery (EOR) operations, significantly reducing time and cost compared to conventional coreflooding experiments.

Biography:

Wei Wang is a Research Science Consultant who joined Aramco Research Center-Boston as a founding member in 2012. His current research focus is on the application of advanced materials and nanotechnology for reservoir engineering. Wei was a Staff R&D Scientist at Oak Ridge National Laboratory (ORNL) from 2001-2012, where he received the Stanley I. Auerbach Award in 2009. Wei obtained his Ph.D. degree in Physical Chemistry from the Chinese Academy of Sciences (CAS) in 1993 with the honor of the CAS Presidential Award. He has authored 160 research papers, 4 book chapters and 15 US patents. Wei is also an Industrial & Engineering Chemistry (I&EC) Division Fellow of the American Chemical Society (ACS) and serves as a Program Committee Member for SPE-ATCE and ACS National Meetings.