



**Gulf Coast Section  
Data Analytics Study Group**

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**DELIVERING  
BUSINESS  
VALUE THROUGH  
DATA ANALYTICS**

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**NORRIS CONFERENCE  
CENTER CITY CENTRE  
HOUSTON  
April 18-19, 2022**



**Event PolIEV**

**DATA SCIENCE  
CONVENTION  
2022**



# DATA SCIENCE CONVENTION 2022

DELIVERING BUSINESS VALUE THROUGH  
DATA ANALYTICS

Keynotes, Panel, Technical Talks, Workshops, Posters, Exhibits, Networking & More  
April 19, 2022 at the Norris Conference Center, CityCenter, Houston, TX

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SparkCognition's award-winning AI solutions allow organizations to predict future outcomes, optimize processes, and prevent cyberattacks. We partner with the world's industry leaders to analyze, optimize, and learn from data, augment human intelligence, drive profitable growth, and achieve operational excellence.

Our patented AI, machine learning, and natural language technologies lead the industry in innovation and accelerate digital transformation. Our solutions allow organizations to solve critical challenges—prevent unexpected downtime, maximize asset performance, optimize prices, and ensure worker safety, all while avoiding zero-day cyber-attacks on essential IT and OT infrastructure. SparkCognition's product portfolio enables organizations to quickly capitalize on their data, providing actionable insights based on real-time analysis, amplifying their return on investment, and redefining best practices. Since our inception, we have worked toward perfecting AI to accelerate market adoption and enhance, advance, and safeguard organizations, fostering a smarter, safer, and more sustainable future.



### MARKETS

- Manufacturing
- Renewable Energy
- Oil & Gas
- Power & Utilities
- Cybersecurity
- Financial Services
- Transportation
- Government
- Retail

### SOLUTIONS

- Predictive Maintenance
- Prescriptive Insights
- Asset Performance
- Process Optimization
- Endpoint Protection
- Forecasting
- Logistics
- Health & Safety
- Algorithmic Trading

### TECHNOLOGIES

- Artificial Intelligence
- Machine Learning
- Deep Learning
- Reinforcement Learning
- Natural Language Processing
- Computer Vision
- Knowledge Representation
- Cybersecurity
- Cognitive Automation



**AUSTIN, TX**  
 Headquarters (founded 2013)  
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300+ EMPLOYEES



140+ PATENTS

### AFFILIATES



### CUSTOMERS AND PARTNERS (SELECT)



### AWARDS



### TESTIMONIALS

*"SparkCognition is at the forefront of a technological shift in machine learning and artificial intelligence which will revolutionize every aspect of industry."*  
 — Greg Hyslop, CTO & SVP, Boeing

*"Cutting edge technologies, like AI-based predictive analytics, are key enablers to improving the efficiency of our operations and meeting our ambition to become a net-zero company by 2050."*  
 — Fereidoun Abbassian, VP of Transformation, Upstream Technology, BP

*"The SparkCognition financial product has offered us insights into our data that have improved our ability to serve our client base better. This product has positioned us to compete in an ever-evolving data-driven marketplace and ensures the capturing of efficiencies that allow our business to scale more rapidly."*  
 — Nomura Global Markets

Contact SparkCognition today at [info@sparkcognition.com](mailto:info@sparkcognition.com)

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# Welcome

Welcome to the Data Science Convention (DSC) 2022, organized by the SPE Gulf Coast Section Data Analytics Study Group. We are excited for another impactful event this year after two years of volatility and swings within the energy markets! DSC is a one-day summit that provides professionals a unique opportunity to learn, share, and discuss with industry and academic leaders on ways digital innovation has been transforming the energy industry.

As the downturn of the oil and gas industry was dominated by data-related buzzwords and their cost-reduction potential, the recent upturn is eagerly looking to materialize the financial impact of these digital technologies. For this reason, this year's event is themed by data analytics and business value. The convention kicks-off with a keynote by Sushma Bhan, an industry leader who has been at the forefront of data and digital strategy in E&P and SPE.

During our technical session, experts from operator, service, tech, start-up companies and academia, representing various sub-sectors of Energy and AI, share lessons and best practices during the technical and poster sessions. The afternoon keynote by Shan Jegatheeswaran provides interesting insights from a manager's perspective on the incremental adoption of digital, focusing on capturing value in every step and iterating. A panel of industry leaders with diverse expertise and backgrounds will engage with the audience on the challenges and current strategies for successfully scaling digital solutions.

Humans rely on cooperation to thrive. We hope to provide a networking and knowledge-sharing platform to realize the vision of the study group. This is not possible without volunteer efforts from study group members, judges, and presenters, support from sponsors, and most importantly, participation from the attendees!

Happy learning! Happy networking!

**Babak Akbari**

Baker Hughes

Data Analytics Study Group Chair

**Karin Gonzalez**

Chevron

Data Analytics Programs Chair

# AGENDA

7:00 AM	7:45 AM	<b>Registration</b>	
7:45 AM	8:00 AM	<b>Introduction</b>	
8:00 AM	8:30 AM	<b>Keynote</b>	<b>Sushma Bhan</b> , Director, IKON Science
8:30 AM	9:00 AM	Value with Physics and AI	<b>Pallav Sarma</b> , Co-Founder and Chief Scientist, Tachyus <i>Various Approaches to Combine Physics and Machine Learning and their Applications to Oil and Gas Operations</i>
9:00 AM	9:30 AM	Value with Physics and AI	<b>Hector Klie</b> , Co-Founder and CEO, Deepcast.ai <i>Creating Value with Physics Informed AI Models: Benchmarks and Applications</i>
9:30 AM	10:00 AM	<b>Coffee Break/Exhibition/ Poster Showcase</b>	
10:00 AM	10:30 AM	Next Generation in Technologies for Adding Value	<b>Pavel Dimitrov</b> , Senior Solutions Architect, NVIDIA <i>How Learning Physical Laws Can Help the Energy Industry</i>
10:30 AM	11:00 AM	Next Generation in Technologies for Adding Value	<b>Siddhartha Gupta</b> , Co-Founder and CEO, Nesh <i>Teaching Language Machines - Applications of NLP in the Energy Sector</i>
11:00 AM	11:30 AM	<b>Poster Competition Pitch</b>	
11:30 AM	12:30 PM	<b>Lunch Break/Exhibition/Poster Showcase</b>	

# AGENDA

12:30 PM	1:00 PM	<b>Keynote</b>	<b>Shan G. Jegatheeswaran</b> , Senior Vice President, Baker Hughes
1:00 PM	2:30 PM	<b>Panel</b>  <b>Moderator</b>	<b>Ben Amaba</b> , VP of Strategic Partnerships, Clarifai <b>Mubarik Choudry</b> , Digital Commercial Manager-Projects & Technology, Shell <b>Philippe Herve</b> , SVP of Energy and Sustainability, SparkCognition <b>Liz Dennet</b> , VP of Data Architecture, Wood Mackenzie <b>Nelia Mazula</b> , Global Account Manager, Siemens  <i>Scaling Digital Solutions in Oil and Gas</i>
2:30 PM	3:00 PM	<b>Coffee Break/Exhibition/Poster Showcase</b>	
3:00 PM	3:25 PM	Case Studies	<b>Shane J. Prochnow</b> , Digital Geology Advisor, Chevron <i>Introducing SPARC and TIBER: A Marriage of Subsurface Machine Learning, Spatial Cluster Delineation, and Nonparametric Statistics for Potentially Improved Type Curve Neighborhood Workflows</i>
3:25 PM	3:50 PM	Case Studies	<b>Supriya Gupta</b> , AI Solutions Manager, Schlumberge <i>IoT and Automation enabling Remote, Unmanned, and Safe Production</i>
3:50 PM	4:15 PM	Case Studies	<b>Edward Wolfram</b> , P.E, Reservoir Engineer, Oxy <i>Modeling Child Well Depletion in the Delaware Basin using Mixed Models</i>
4:15 PM	4:40 PM	Case Studies	<b>George Voneiff</b> , SVP of Unconventional Solutions, Datagravation <i>How to Use a Unified Data Model to Operationalize Data from Multiple Sources for Increased Production Gain</i>
4:40 PM	4:45 PM	<b>Closing/Awards</b>	
4:45 PM	6:00 PM	<b>Happy Hour/Networking</b>	

# KEYNOTE SPEAKER

Keynote Address 8:00 AM - 8:30 AM



Sushma K. Bhan

**Sushma Bhan** is currently Board Advisor- Data Science and Engineering Analytics at Society of Petroleum Engineers and Director at Ikon Science. Prior to this role, Sushma was Chief Data Officer-Subsurface and Wells at Shell Oil Company, where she created business co-owned data strategies and accountability for global data accelerators, standards, and subsurface digital-value funnel. Sushma was a motivating global leader of Shell's data community of over 120 professionals across 21 countries, including a team of Chief Data Officers for Contracting & Procurement, Safety & Environment, Projects & Engineering and Exploration. Over the past decade, her team's collective data improvements have resulted in millions of dollars in costs savings and valued outcomes, specifically in Wells, Reservoir and Facility Management (WRFM).

Sushma's three decades Shell career encompassed various roles - General Manager Technical Data, Manager Data Management & Geomatics, Information Manager of Shell R&D, Discipline Chief of Information Management, Shell Chemicals' Global IT Manager, and E-Commerce Business Manager for Equilon (Shell-ExxonMobil Alliance). Prior to Shell, Sushma started her career at AMR Corporation on the Saber System in real-time applications. Sushma built strong ties to business stakeholders, enjoyed a track record of trust and credibility with her customers, and achieved excellence in both execution and delivery. She has an M.S. from University of Delhi and an Executive-MBA from University of Houston.

Sushma has published technical papers on Technical Data Management, WRFM digital-Wellbooks, Data Security, Release of Technical Information and Knowledge Management. She is a member of Society of Petroleum Engineer's (SPE) Data Science and Engineering Analytics Advisory Committee, Co-Chairperson for SPE's Digital Energy Technical Section (DETS) and serves on Rice University's Professional Science Master's (PSM) Board of Affiliates. She is passionate about maximizing value from data and data sciences, specifically to driving integrated timely decisions and automation across global processes.

Sushma is the recipient of 2020 SPE International award for Management & Information (M&I) for distinguished contributions to the Petroleum industry. Additionally, she received the 2019 SPE Gulf Coast M&I award, 2018 Royal Dutch Shell's CIO and VP awards for Global Data Quality, 2003 Association for Women in Computing Leadership in Technology Award in Houston, and OCA Outstanding AP Employee Award in 2008. She served as President of Shell's Women's and Asian Pacific employee networks, where she led diversity and inclusion efforts in the US. Sushma is active in mentoring young professionals and is the founder of Youth Leadership Development Program of Houston ([www.yldpHouston.org](http://www.yldpHouston.org)), a non-profit organization to develop Indo-American youth leaders. Sushma enjoys jogging, traveling, biking, and hiking. She is married to a scientist and is the proud mother of two adult sons.

# KEYNOTE SPEAKER

Keynote Address 12:30 PM - 1:00 PM

**Shan** leads the software and digital operations team for the Oilfield Services business unit at Baker Hughes Company. He is responsible for leading software and technology programs that support ~\$13BN in annual revenues and ~30,000 employees engaged in field services, service shops, and manufacturing processes. He currently leads the business's efforts on Remote Operations digitization and journey into application of AI / ML technology for upstream operations.

Previously, Shan spent seven years leading global functions in sales operations and indirect channel sales. Highlights include leading the commercial integration of the largest merger in the oil & gas industry between GE Oil & Gas and Baker Hughes, delivering a global commercial transformation including the re-design of the enterprise CRM, underwriting, pipeline, incentives, training, and sales performance processes.

Shan started his career as an Account Manager with GE Capital, subsequently joined GE Company's Corporate Audit Staff (CAS) leadership program, and then joined GE Oil & Gas (now Baker Hughes Company). He has worked across several continents and in many of GE Company's business units.

While he is a proud Canadian – he also pledges allegiance to the German soccer team (he was born in Berlin) and favors Middle Eastern cuisine (lived in Syria for 8 years as a child). He has a BA (Honors) in Applied Economics from Queen's University, Canada and a Master of Business Administration in Finance from McMaster University, Canada.



**Shan G. Jegalheeswaran**  
Chief Digital Officer  
Oilfield Services  
Baker Hughes Company  
Houston, Texas



# SPEAKERS

## “Various Approaches to Combine Physics and Machine Learning and their Applications to Oil and Gas Operations”

8:30 AM - 9:00 AM

**Abstract:** Almost all aspects of oil and gas operations are privy to applications of various types of predictive models for understanding complex phenomenon and decision making. Such models range from the very simple analytical models (type-curves, etc.) to the very complex reservoir and facilities simulation models. Simulation models attempt to model detailed behavior of system physics and integrate all kinds of measured data, and can therefore be used for robust long term prediction and quantitative optimization. However, many issues such as the significant time and effort required to build and calibrate these models, computational complexity, etc. generally prohibit their practical use for real time decision making and operational optimization. Additionally, there have also been many attempts at the application of traditional machine learning approaches for predictive modeling in the oil and gas industry. 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.



**Pallav Sarma**  
Co-Founder and Chief  
Scientist, Tachyus

This talk describes approaches for bridging the gap between these two traditionally different approaches to derive modeling approaches that benefit from the strengths of both. Three approaches to combine physics and machine learning will be discussed. The first is the simplest, where a machine learning model is combined in sequence with a pipe network model and a data assimilation algorithm, wherein the machine learning model is used to detect in real-time occurrence of leaks, which triggers the evaluation of the network model to determine the location and size of the leak. The second is a coupled machine learning model together with a physics based model of hydraulically fractured wells, where the uncertain parameters of the two models are jointly inverted to fit historical data. This model can then relate design variables to the physical model that are not part of it, and the coupled model can be used to create physically realistic production forecasts and optimize fracture design. The final approach is the most complex, which directly embeds the physical equations of fluid flow into machine learning 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 include similar underlying physics as simulators, they have good long term predictive capacity. Applications to waterfloods will be presented.

**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 in the oil and gas industry working for Chevron and Schlumberger prior to Tachyus. He has received many awards including the INFORMS Prize, 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., a Ph.D. Minor in Operations Research from Stanford University and a B.Tech from Indian School of Mines. He is a SPE Distinguished Lecturer and currently serves on the committees of the SPE Reservoir Simulation Conference, the EAGE European Conference on the Mathematics of Oil Recovery and the JPT editorial committee.

# SPEAKERS

## “Creating Value with Physics Informed AI Models: Benchmarks and Applications”

9:00 AM - 9:30 AM

**Abstract:** Machine learning (ML) models are starting to play a key role in advancing scientific and engineering discovery in several E&P domains traditionally dominated by mechanistic models. The use of ML models is particularly promising in processes that are not completely understood, or where it is computationally infeasible to run mechanistic models at desired resolutions in space and time.

However, the adoption of state-of-the-art black box ML models has often been challenged by their large data requirements, inability to produce physically consistent results, and their lack of generalizability to out-of-sample scenarios. On the other hand, well established first order assumptions fail sometimes to describe the observed reality, exhibiting noticeable differences between the physics-based model predictions and the performed measurements. Given that neither an ML-only nor a traditional mechanistic-only approach can be considered sufficient for creating business value in many applications, there is a striving need to explore the synergistic integration of data-driven and physics-based models.

In this presentation, we will explore use cases where mechanistic models, ML models, and a few emerging hybrid models are used in the industry. We will highlight the strengths and weaknesses of each methodology and the opportunities that novel modeling approaches will bring to the industry in terms of accuracy, speed, and interpretability.



**Hector Klie**  
DeepCast.ai

**Dr. Hector Klie** is an experienced computational and data scientist focused on developing physics-informed AI solutions for multiple engineering and geoscientific applications in Oil & Gas. Dr. Klie is co-founder and Chief Executive Officer of DeepCast.ai since June 2017. He is currently appointed as an Adjunct Professor of the Dept. of Computational and Applied Mathematics at Rice University. Prior to his role at DeepCast.ai, he was Director of Enterprise Data Solutions and Data Science Technical Lead at Sanchez Oil & Gas Corporation (2016-2017), Staff Reservoir Engineer and Lead Data Scientist at ConocoPhillips (2008-2016) and Associate Director and Senior Research Associate at the Center for Subsurface Modeling in The University of Texas at Austin (2003-2008) and, Research Scientist at PDVSA-Intevep (1989-2003). He has published over 80 papers in the areas of sparse linear solvers, production forecasting, field optimization, uncertainty quantification, high-performance computing, reduced-order modeling, and machine learning. Dr. Klie has patented 5 inventions in the areas of data analytics for automated drilling and parallel physics-based solvers. He has chaired and co-organized several technical events at the SPE, SIAM, SEG, and IEEE. He is currently an Associate Editor of the Computational Geosciences Journal. Dr. Klie completed his Ph.D. in Computational Science and Engineering at the Dept. of Computational and Applied Mathematics at Rice University, 1997, and a Master's Degree in Computer Science at Simon Bolivar University, Venezuela, 1991.

# SPEAKERS

## “How learning physical laws can help the energy industry”

10:00 AM - 10:30 AM

**Abstract:** The last ten years have been transformational for ML—there have been many breakthroughs in computer vision, natural language processing and many other traditional data science problems. But, for me, the most exciting development comes from recent advances in making neural networks compatible with physical laws. I will touch on three topics. First, I will briefly outline why ANNs are capable of representing physical laws and justify recent efforts to build increasingly large models. Then, I will discuss how physical laws may be used to train ANNs, possibly without any meshing or simulation data, to be just as accurate as numerical simulations while being significantly faster to run. And last, I will speculate that, owing to their transfer learning capabilities, ANNs provide an opportunity for the Energy Industry to collaborate in a new way.



**Pavel Dimitrov**  
Senior Solutions  
Architect,  
NVIDIA

**Pavel Dimitrov** is a Senior Solutions Architect at NVIDIA. He helps energy partners and customers discover what is possible with accelerated computing in areas like electric power generation, transmission and distribution. More broadly, he likes to learn math and to apply it to other fields of knowledge. Prior to NVIDIA, Pavel spent over 12 years in oil and gas collaborating with scientists and engineers on research and development projects resulting in 16 granted patents. He holds a Ph.D. in Computer Science from Yale University.

## “Teaching Language Machines - Applications of NLP in the Energy Sector”

10:30 AM - 11:00 AM

**Abstract:** The Knowledge Worker Shortage today is the greatest it has ever been since 2008 and 75% Companies believe that creating and preserving knowledge across an evolving workforce is key to their long-term success. However only 9% companies say that they are ready to address this trend. Knowledge has been and will continue to be a driving force in organizational performance and if a company thoughtfully manages its knowledge portfolio, it will achieve a distinct competitive advantage. We'll look at how AI and NLP technology can help address this fundamental Human-Capital problem that is facing the Energy Sector.



**Siddhartha Gupta**  
Nesh

A Petroleum Engineer by background, Sidd is the Co-founder and CEO of Nesh. Nesh builds Subject Matter Avatars for Complex Industries. Sidd is a Schlumberger and Shell alumni. He is also a self-described data nerd and a design enthusiast. Sidd has a Bachelor's Degree from Indian Institute of Technology and a Masters Degree from UT Austin.

## “Scaling Digital Solutions in Oil and Gas”

1:00 PM - 2:30 PM

Market volatility and pressures to reduce emission are driving major digital innovations in oil and gas. Both start-ups and large vendors have entered the market with new solutions for data analytics. In addition some companies are changing their roles and increasingly becoming software developers. This panel explores the current environment to determine what key questions customers should understand as they evaluate, develop and purchase new innovations in data analytics. How do customers build frameworks to evaluate and purchase digital solutions in this market? Attendees will hear from experts at owner operators, oil field services, start-ups and large software vendors on this topic.

Dr. **Ben Amaba** is the Vice President of Strategic Partnerships at Clarifai, an AI leader in image, video, audio, and text unstructured data. With over 30 years of industry experience, Ben is recognized for his work in AI, IoT, Data, and Automation. Ben received his Ph.D. in Industrial Engineering from the University of Miami. Dr. Amaba is a registered and licensed Professional Engineer with International Registry; certified in Production, Operations, and Inventory Management by APICS ®; LEED® Accredited Professional (Leadership in Energy & Environmental Design); and certified in Corporate Strategy by Massachusetts Institute of Technology. Ben holds a copyright and several patents. Dr. Amaba is a Fellow with the Institute of Industrial and Systems Engineering. Ben earned his BS in Electrical Engineering as well as his Master's in Engineering/Industrial Management.

Dr. Amaba holds positions as Board Member to the Oakland University Artificial Intelligence Research Center (OUAIRC), Founding member to the Institute of Advanced Systems Engineering, Founding member to the Center of Advanced Supply Chain Management, Industry Council Advisor for the Project Production Institute, Board Member to the Council on Industrial and Systems Engineering (CISE), Executive Board Member of Applied Human Factors and Ergonomics (AHFE) and Editorial Board Member to IEEE (Institute of Electrical and Electronics Engineers) IT Professionals, and Editorial Board of The Open Cybernetics and Systemics Journal.



**Ben Amaba**  
VP of Strategic Partnerships,  
Clarifai

**Mubarik Hussna Choudry** has been with Shell for over 20 years, having worked in various global leadership roles with the last 10 years focused on Innovation and Digitalization. Ms. Choudry is currently working as a Digital Commercial Manager in Shell's Projects & Technology organization, part of the Computational Science & Digital Innovation team. Some of her most recent roles include Digital Product Management for Assets and Projects across the downstream and upstream businesses and Innovation Advisor for Operational Excellence. In that capacity she was instrumental in development and implementation of Shell's digital strategy for assets and helped identify and drive incremental & disruptive innovation opportunities in Emerging Technologies such as AI, Robotics, and Digital Realities. She holds a BA and MS in Management Information Systems and MBA from Rice University.



**Mubarik Choudry**  
Digital Commercial Manager-Projects & Technology, Shell

## “Scaling Digital Solutions in Oil and Gas”

1:00 PM - 2:30 PM

**Philippe Herve** is SparkCognition as the SVP of Energy and Sustainability. Herve is an executive with US and international success in operations, P&L, technology, business development, marketing, sales, and client relations.

Herve's comprehensive experience in oil and gas spans large-scale project leadership, IT, engineering, manufacturing, and operation.

Herve holds multiple patents in the field of ultrasonic and has authored many technical papers. He is a member of numerous professional organizations including the Society of Petroleum Engineers. Over the years, Mr. Herve has frequently been published in Bloomberg, Oil & Gas Journal, Journal of Petroleum Technology, World Oil, The Houston Chronicle, Drilling Contractor, and is a frequent speaker on diverse management and engineering subjects.

Herve was a late comer to the AI revolution. He only started working on Artificial Intelligence in 1985. Artificial Intelligence had already been defined 30 years earlier.



**Philippe Herve**  
SVP of Energy and  
Sustainability,  
SparkCognition

**Liz Dennett**, PhD is a passionate technologist with over a decade of experience using data-driven approaches to solve pressing energy challenges. She has demonstrated success pioneering novel data types, architectures, and analytics solutions through the energy value chain.

Liz is currently a VP of Data Architecture at Wood Mackenzie where she is helping slay data silos to fuel sustainable innovation, and hosts the Horizon Podcast, a candid take on the Energy Transition. Prior to joining Wood Mackenzie, Liz was the Lead Solutions Architect for Energy Data Platforms at Amazon Web Services (AWS), and held various roles of increasing scope and complexity within AWS, Biota Technology, Hess Corporation, and the NASA Astrobiology Institute. A technology evangelist, Liz has given over 100 invited presentations, received over a dozen awards, and written more than 10 academic and industry publications.

Liz holds a MS and PhD in Geoscience from the University of Wisconsin-Madison and has completed executive education at the Haas School of Business. Liz's passions include building things, board games, and stubbornly refusing to believe things are "hard".



**Liz Dennett**  
VP of Data  
Architecture,  
Wood Mackenzie

### Session Moderator

**Nelia Mazula** is a Global Account Manager for Siemens. She has 20 years of experience in the energy process industries focused on digital transformation strategies. She was a founder of one start-up and an early employee for 2 software start-ups purchased by Siemens and has held numerous management and leadership positions. She has numerous software certificates and several published technical papers on digital strategies. Nelia speaks 4 languages and has 5 engineering software patents. She has been featured in numerous media outlets as a community and innovation leader including KPRC News, Univision and The Houston Chronicle. As a result of her work, she was featured in the National Inventors Museum. Nelia is a certified professional project manager, holds a bachelors in chemical engineering from Arizona State University and an international MBA focused in international business and digital strategy from INSEAD university.



**Nelia Mazula**  
Global Account  
Manager,  
SIEMENS

# SPEAKERS

## “Introducing SPARC and TIBER: A Marriage of Subsurface Machine Learning, Spatial Cluster Delineation, and Nonparametric Statistics for Potentially Improved Type Curve Neighborhood Workflows”

3:00 PM - 3:25 PM

**Abstract:** We introduce the Spatial Partitioning Algorithm for Reducing Complexity (SARC), and the Type-Curve Interrogation Based Evaluation Routine (TIBER), both patent-pending and innovative approaches that aim to improve type-curve area delineation. Production forecast of unconventional basins are often assessed by type production curves (type curves) from representative wells that are regarded to characterize a distinct geographic region of a hydrocarbon producing region. These geographic regions are most often constructed subjectively as a field matures with ongoing drilling campaigns. Additionally, there can be a high level of uncertainty regarding the geographic boundary connections to subsurface reservoir transitions that influence hydrocarbon production. SPARC removes the subjectivity from traditional type curve analysis by utilizing machine learned, continuous ALICE forecasts to delineate type curve area polygon regions using spatial clustering approaches that are aware of spatial proximity and predictor attribute similarity. Additionally, the spatial clustering approach can discover clusters that are arbitrarily shaped from samples that are unevenly dense across the prediction space. Good examples of these spatial clustering methods are a modified Calinski-Harabasz pseudo-F Statistic approach (Calinski and Harabasz, 1974) and spatial hierarchical clustering. SPARC can cluster and delineate regions from both continuous and sample point (well) data. The continuous data in this application is a digital representation of the forecasted hydrocarbon potential of a hydrocarbon producing basin and the clusters represent an optimal discretization of this formally continuous data into regions that are the most distinct from each other in terms of forecasted mean potential but maintain minimal internal variation of hydrocarbon potential within their geographic boundaries. TIBER adds a validation component to the overall workflow, testing realizations of type curve neighborhoods for their population distinctiveness using nonparametric statistical approaches, namely the Tukey-Kramer test of significance. The concept of TIBER is that type curve regions should aspire to maximize F-score in terms of maximizing the mean difference versus internal variation between type curve area region populations given their sampling (well counts). Global clustering approaches will allow for greater simplicity of type curve regions while maximizing the production forecast value of each area. We present real examples of the hypothetical optimization possible with SPARC for both the Permian Basin (Delaware Basin Wolfcamp A) and Duvernay Basin (CBU).



**Shane J. Prochnow**  
Digital Geology  
Advisor, Chevron

**Shane J. Prochnow** is Digital Geology Advisor at Chevron Technology Center- Sub-Surface Innovation Lab. He has over 15 years industry experience at ExxonMobil and Chevron. He holds a Post-Doctorate (3 yrs), Ph.D, MS, BS in Geology at Baylor University. He is an Army National Guard Officer (retired) and his research interests include unconventional, reservoir characterization, geostatistics, machine learning, integrating complex systems. Shane has previously worked as Permian Basin First Principles Champion, Reservoir Characterization Advisor for Mid Continent Business Unit Asset Development, and Geologist on the ARMT Completions Optimization Group.

# SPEAKERS

## “IoT and Automation enabling Remote, Unmanned, and Safe Production”

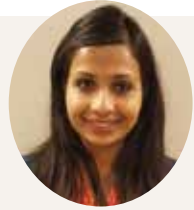
3:25 PM - 3:50 PM

**Abstract:** Our clients face 2 major challenges: to get the most barrels out of the ground at the lowest possible cost, and to do it in a sustainable manner that is most beneficial to society. The solutions that we build in the production operations space help them in both these dimensions.

We have a large portfolio of AI driven solutions which help our clients maximize productivity, reduce costs and operate in a safe and environmentally responsible manner. Our edge intelligence workflows on Agora combine data, physics, machine learning, insights and close loop control to help our clients address their biggest operational challenges through application of AI.

The talk will focus on presenting various AI case studies with operators focused on improving production, optimizing field and pump operations, raising smart alarms for equipment health and detecting flow assurance issues. We will also demonstrate how we deploy, operationalize, scale and continuously improve AI models on the edge platform by using the latest advance in MLOps technology. Overall, the talk will focus on edge AI intelligence use cases and technology for upstream production operations.

**Shane J. Prochnow** is Digital Geology Advisor at Chevron Technology Center- Sub-Surface Innovation Lab. He has over 15 years industry experience at ExxonMobil and Chevron. He holds a Post-Doctorate (3 yrs), Ph.D, MS, BS in Geology at Baylor University. He is an Army National Guard Officer (retired) and his research interests include unconventional, reservoir characterization, geostatistics, machine learning, integrating complex systems. Shane has previously worked as Permian Basin First Principles Champion, Reservoir Characterization Advisor for Mid Continent Business Unit Asset Development, and Geologist on the ARMT Completions Optimization Group.



**Supriya Gupta**  
Schlumberger

## “Modeling Child Well Depletion in the Delaware Basin using Mixed Models”

3:50 PM - 4:15 PM

**Abstract:** Child well depletion is a topic of noted concern for unconventional resource operators. The development of the Delaware Basin has involved drilling standalone wells in many sections to preserve leases and capture acreage. Today, most every unit must account for the degradation caused by complex, non-linear physical interactions with the parent wells. To predict parent child physical behavior, a range of numerical simulation and machine learning techniques have been applied by operators with varying success. By themselves, machine learning models are limited by the available data, while numerical simulations require time intensive and costly modeling to history match and capture specific scenarios. This presentation proposes a novel, hybrid approach to leverage both the available analogue data and numerical simulations to provide a more robust, well-distributed parent-child dataset. The resulting dataset consists of ~55 parent-child manually-selected parent-child interactions combined with ~135 physical simulation results presented in URTeC: 5264. A stacked generalization model consisting of a multivariate linear model and neural network model then combines this data into a more robustly extrapolatable and predictive model. The simple multivariate linear



**Edward Wolfram**  
P.E, Reservoir  
Engineer, Oxy



**James Cassanelli**  
Geoscientist, Oxy

(cont. on next page)

# SPEAKERS

(Cont. from previous page)

model captures linear trends and provides enhanced extrapolation power, while the neural network model captures nonlinearity between predictors and the response variable and helps bridge the gap between actual and simulated data. The final model has subsequently been successfully implemented in various case studies to optimize child and infill placement and produced incremental improvements in parent child performance predictions and development NPV.

**Edward Wolfram, P.E.**, is a data analytics minded reservoir engineer, currently working for Occidental Petroleum on the Delaware Basin Well Analysis and Design team. After graduating Suma Cum Laude from the Colorado School of Mines with a BS in Petroleum Engineering and the McBride Honors Minor, Edward worked for Anadarko and now OXY in various petroleum engineering and data science roles of increasing responsibility; focused on leveraging algorithmic approaches to create solutions for field wide optimized economic development in unconventional resource plays such as the Delaware, Permian, and Greater Natural Buttes Basins. A recent study area of his work has been the application of machine learning workflows to enable decision making to account for the developmental impact of parent child relationships on infill well performance. Edward is a fan of leveraging python and statistics to save time and create novel engineering solutions, insights, and workflows.

**James Cassanelli, Ph.D.**, is an analytics-focused geoscientist currently working for Occidental Petroleum on the Texas Delaware Subsurface Characterization team. Previously James worked for Anadarko Petroleum in the Texas Delaware Basin Operations group. Before beginning his professional career, James earned a Doctorate degree from Brown University in the field of Planetary Science. James' work involves the application of various data-related disciplines to better understand and optimize the development of unconventional oil and gas assets. James has delivered multiple oral presentations at a number of national and international science conferences and previously taught a data analytics bootcamp course at Rice University.



# SPEAKERS

## “How to Use a Unified Data Model to Operationalize Data from Multiple Sources for Increased Production Gain”

4:15 PM - 4:40 PM

**Abstract:** The objective of the presentation is to showcase how to use a unified data model to integrate data from the reservoir to surface facilities and provide an automated solution to the operational, engineering, and management team. Likewise, provide a functional and applicable solution to oil and gas fields by bringing together disparate data sources to perform required inquiries and provide key performance indicators with an automatic and reusable way for daily operations to enhance operational intelligence.

The Unified Data Model extracts data from historical databases and systems across all disciplines and integrates it into an open architecture. Using the aggregated data, the model automatically performs cross-functional analysis and captures the logic of subject matter experts while assisting the team in final decision making. The visualization of critical performance data in sophisticated dashboards is designed for each group: production, reservoir, and operations. Dashboards are used to communicate reservoir and equipment performance events across teams. Because of the prompt processing and display of data, management is able to make crucial operational choices and optimize production more quickly.

The results can be visualized in any other preferred business intelligence tool. Dynamic dashboards are prepared to prove how the connections can be linked and used by various departments. The solution establishes a ranking system of the candidates that are analyzed based on their potential and historical performance, and it can be extended whenever new data sources are integrated. The results across different assets have proved the effectiveness by: reducing costs to operate fields, -reducing maintenance costs, -avoiding loss of profit from unscheduled downtime/reliability events, -optimization of reservoir energy while increasing efficiency, -identification of flow assurance problems (wax/asphaltene) and others. Overall, it improves reservoir, well and equipment performance with a reduced risk of failure while gaining revenues.

Professor Voneiff has thirty-nine years of oil and gas experience, primarily in unconventional reservoirs. He founded, built, and sold several E&P companies in the US and Canada, teaches graduate-level classes part-time in the Petroleum Engineering Department at Texas A&M University, and is SVP Unconventional Solutions at Datagration Solutions Inc. He has extensive experience in risk management, uncertainty analysis, completion & development optimization in tight rock and A&D evaluations, with expertise in data analytics and economics. Honors include induction into the Texas A&M Petroleum Engineering Academy of Distinguished Graduates in 2013, recipient of the Sproule Lifetime Achievement Award from the Canadian Society for Unconventional Gas in 2005, recipient of the #1 Company in the Aggie 100 presented by the Texas A&M Mays Business School in 2005, and Finalist/runner-up in the Ernst & Young Canadian Entrepreneur of the Year in 2004



**George Voneiff**  
SVP of  
Unconventional  
Solutions,  
Datagration

# DSC 2022 Poster Competition

Title	Presenter	Affiliation
Model-free Detection of Interwell Connectivity in CO2 WAG Projects using Statistical Recurrent Units	Deepthi Sen, Hongquan Chen, Prithvi Singh Chauhan	Texas A&M University
A Novel Application of Machine Learning for Estimation of Capillary Pressure	Ahmed Kasha; Ahmad Sakhaee-Pour	University of Houston
Using Machine Learning Methods to Estimate True Bottomhole Temperature in Eaglebine and Duvernay Basins	Nabeel Muhammedy	University of Houston
Application of Machine learning to predict and diagnose Failures in electrical submersible pumps	Shaikha Alballam	University of Oklahoma

#### Poster Judges:

**Raquel Gordillo**, Manager, Unconventional Reservoir Simulation ,Oxy

**Kainan Wang**, Machine Learning Scientist , Chevron

**Diego Molinari,Sr.** Reservoir Engineer , RockCliff Energy

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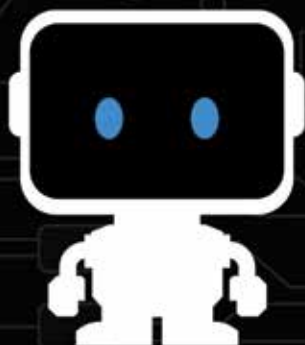


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Admissions Information

## Other Partners



## “Machine Learning Workflows in Oil and Gas”

April 18, 2022

Hands-on workshop covering the various aspects of building a Machine Learning Model and then packaging and deploying that model into an End-to-End Upstream E & P Workflow Solution that an end user (Geoscientist, Production Engineer, Drilling Engineer etc) can use.

The workshop covers the following:

- Identify use case and pain points
- Identify and collect the relevant data
- Pre-process data to make it analytics Ready
- Build/Train and test the Machine Learning Model using Python
- Validation of the model results by Domain Experts
- Build solution and operationalize
- Demo of working end-to-end Machine Learning solution(s)
- Open discussion

**Sunil Garg** is the founder and CEO of dataVediK, a Houston based AI/ML startup focused on sustainable living and using Domain, Data Science and Software Engineering expertise to build a Hyper-Converged Data and Analytics Platform for Energy industry. Prior to this, he spent 20+ years establishing and growing Data Management, Big Data and Analytics businesses for Schlumberger. Sunil has deep understanding of Oil and Gas data, Data Science & ML and uses the combination to build end user centric solutions. He is a member of several industry organizations and forums like SPE, AAPG, PPDM, SPDM, OSDU and Rice Alliance. Sunil is a sought-after speaker at various industry conferences and conducts Big Data, Machine Learning and Blockchain trainings for the Industry, the Government, and the Academia. He is also an active angel investor and a Board member of TiE Houston, an organization whose mission is to foster entrepreneurship through mentoring, networking, funding, and incubation. As a member of the National Small Business Association Technology Leadership Council, he advocates on behalf of all small technology and R&D firms on a wide range of issues, including intellectual property protections, data rights, regulatory reform, cyber-security compliance and government contracting.



**Sunil Garg**  
Founder and CEO,  
dataVediK



**Yuxing Ben**  
Senior Reservoir  
Engineer, Oxy

**Dr. Yuxing Ben** is a reservoir engineer at Occidental, where she develops hybrid physics and data-driven solutions in the subsurface engineering technology group. She was the principal developer of machine learning technology for Anadarko's real-time drilling and hydraulic fracturing platforms. She won the best paper award from URTEC 2019 and was selected as a SPE distinguished lecturer for 2021. Prior to Anadarko, Dr. Ben served as the technical expert for Baker Hughes' hydraulic fracturing software—Mfrac. She has developed complex fracture model for Halliburton and was a postdoc at MIT. She has authored more than 30 papers and holds three US patents. She earned a BS in theoretical mechanics at Peking University, and a PhD in chemical engineering from the University of Notre Dame.

**Dr. Ibrahim Mohamed** earned his Doctorate (Ph.D.) in PE from Colorado School of Mines in 2020. Currently he is a Subsurface Data Scientists at Chevron US. He is also an adjunct professor at UH, where he teaches Petroleum Data Analytics for graduate students. Dr. Mohamed's Ph.D. research focused on numerical modeling of diagnostic fracture injection tests in unconventional fractured formations. His research also proposed a novel method to investigate and optimize hydraulic fractured stage properties in near-real-time as well as applications of data science and machine learning in predicting DFIT parameters.



**Ibrahim Mohamed**  
Data Scientist,  
Chevron

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## Exhibition



We thank our sponsors, exhibitors, speakers, poster presenters and poster judges for supporting and participating in our convention.

All proceeds go towards scholarship funds for students. We look forward to meeting you at our exciting events in 2022!



Gulf Coast Section  
Data Analytics Study Group

## Data Science Convention

Norris Conference Center, CityCenter Houston

April 18-19, 2022