

Oil & Gas Innovation Council

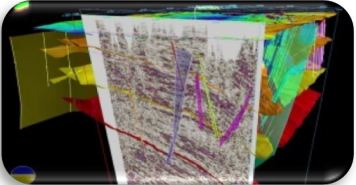



July 23, 2019 – URTeC, Denver

**Ethan Smith Vice President
Frost & Sullivan**

A silhouette of an oil worker wearing a hard hat, positioned in the foreground. The background shows an industrial setting with tall structures, possibly part of an oil rig or refinery, under a light sky. The image is split horizontally, with the top half being white and the bottom half being a dark blue-grey color.

Startups To Address Critical Issues in E&P Industry

Council Mission: Lower Operation Cost + Improve Well Productivity

	Exploration Costs	Total Well Costs		
Stage:	Exploration & Planning	Drilling	Completion	Production & Development
Investment (Time):	Variable Prospects	2 – 4 Weeks	3 – 7 Days	10 – 20+ Years
Avg. Cost (US Dollars):	Variable Land Acquisition fees	1.8 – 2.6 Million	2.9 – 5.6 Million	1 – 3.5 Million
Spotlight innovations, business models, processes, and best practices that have the potential to reduce the complexity and inefficiencies within upstream Oil & Gas.	<ul style="list-style-type: none">• Seismic Surveys• Gravity Surveys• Geological assessments• Develop Drilling & Completion Plans• Land Acquisition• Lease Agreements/Right-of-Ways• Mineral Rights/Royalties• Land/Site Preparation• Move rig, equipment and personnel to site.• Government permitting and reporting	<ul style="list-style-type: none">• 3 stages:<ul style="list-style-type: none">• Surface• Intermediate• Production• Run & cement casing• Well Logging• Well Testing (DST)• Core samples• Directional Surveys• Disposal/recycle drilling fluids• Mud Logging• Establish working interests• Government permitting and reporting	<ul style="list-style-type: none">• Finalize Completion Program• Perforate• Acidizing• Hydraulic Fracturing• Well Testing & Flowback• Disposal/recycle Frac Flowback• Install production equipment• Government permitting and reporting	<ul style="list-style-type: none">• Well, Lease, Field• Install infrastructure to maintain & monitor production<ul style="list-style-type: none">• Storage tanks• Pipelines• Transportation/Logistics• Well Control & Intervention• Re-stimulation/Re-frac/EOR• Royalty payments• Disposal/recycle of produced water• Government reporting
				

Source: EIA

Critical Issues: Participating Companies

IOC



NOC



Independents



Equipment Suppliers



Service Companies



Critical Issues 2019



Industry Trends and Technology Tracker

Updates on new technology, trends or start-ups applicable to the industry. Deep dive into how trends and technologies in other industries can be translated to the oil and gas industry.



Benchmarking

Best in Class digital platforms, technology implementation, completion designs, subsurface modeling, etc.



Coexistence of Renewables and Oil & Gas

Solar and Wind Power are creating a ceiling for natural gas power generation demand. Will renewables do the same for diesel in the oilfield?



Electrification of the Oilfield

Trends towards electric motors displacing diesel generators and gas turbines



Impact of Digital Technologies in Oil and Gas

Leveraging AI, ML, High Performance Computing, Blockchain, Additive Manufacturing, Drones, IOT, etc. to increase production, reduce costs and become more efficient.

Oil & Gas Innovation Council Calendar (2019)

JANUARY Startup Tracker Study: Future of Drilling (2018) Breakfast: Completion Designs (Houston) Jan 16 7:30-11:00AM CST	FEBRUARY Startup Tracker	MARCH Startup Tracker Study: Oilfield Water Management	APRIL Startup Tracker Study: Completion Designs Web Briefing: Best Practices in Oilfield Water Management April 2, 10:00AM CDT
MAY Startup Tracker Study: Refracturing Innovations Web Briefing: Refracturing Innovations May 30, 10:00AM CDT Council Meeting and Innovation Lab Tour (Denver) May 22	JUNE Startup Tracker Web Briefing: Innovative Startups June 12 10:00AM CDT Breakfast: Supply Chain Innovation Embassy Suites - Energy Corridor (Houston)-June 19, 8:00-10:00AM CDT	JULY Startup Tracker Web Briefing: Digital Transformation July 11, 10:00AM CDT	AUGUST Startup Tracker Study: Oilfield Supply Chain
SEPTEMBER Startup Tracker Study: Digital Transformation Platforms in Oil & Gas Growth, Innovation, Leadership Summit (Austin) September 15-17 Council Meeting and Innovation Lab Tour – (Austin) Sept 18	OCTOBER Startup Tracker Study: Aerospace Innovations in Oil & Gas Web Briefing: Aerospace Innovations Date TBD 10:00AM CDT	NOVEMBER Startup Tracker Study: Best Practices in Well Planning	DECEMBER Startup Tracker Study: Artificial Lift Monitoring and Optimization Web Briefing: Well Planning Date TBD 10:00AM CST

May Council Meeting: Colorado School of Mines



Emerging Leading Innovators: Oilfield Supply Chain

Why What Who

AI & Advanced Analytics



Advanced Computing



Communication Systems



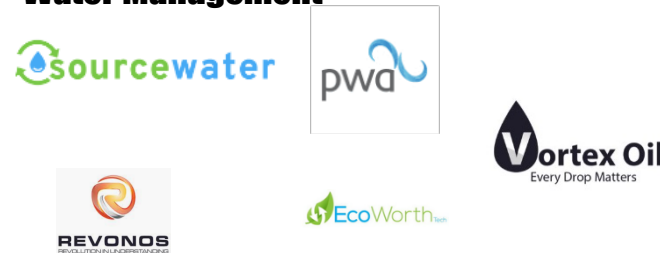
Digital Upstream Oilfield Supply Chain Ecosystem



AR/VR



Water Management



Internet of Things



Blockchain, predictive ordering, drones and logistics management



Emerging Leading Innovators: Completions Designs

Operators



Service Providers

HALLIBURTON



Weatherford®



Startups and Technology Providers



ROCKETFRAC



Fracture ID

seismoS

CARBO
CERAMICS

Welltec



Packers Plus®
DO IT ONCE. DO IT RIGHT.



WDVG

W.D. Von Gonten & Co.
Petroleum Engineering



Emerging Leading Innovators: Future of Drilling

Operators

ExxonMobil
Energy lives here™

EQT
Where energy meets innovation.



Apache
EXPLORING WHAT'S POSSIBLE



Service Providers

HALLIBURTON

Schlumberger

**BAKER
HUGHES**

MOTIVE
DRILLING TECHNOLOGIES



ENSIGN

NABORS

Transocean

Startups and Technology Providers

ai driller

Akselos

**DATA
GUMBO**

**BEYOND
LIMITS**

**DRILLING
SYSTEMS**

GRAVITY JACK

moblize

**Infrastructure
Networks**

BUILDING SMARTER NETWORKS



opentext™

QUANTICO
Energy Solutions

NVIDIA

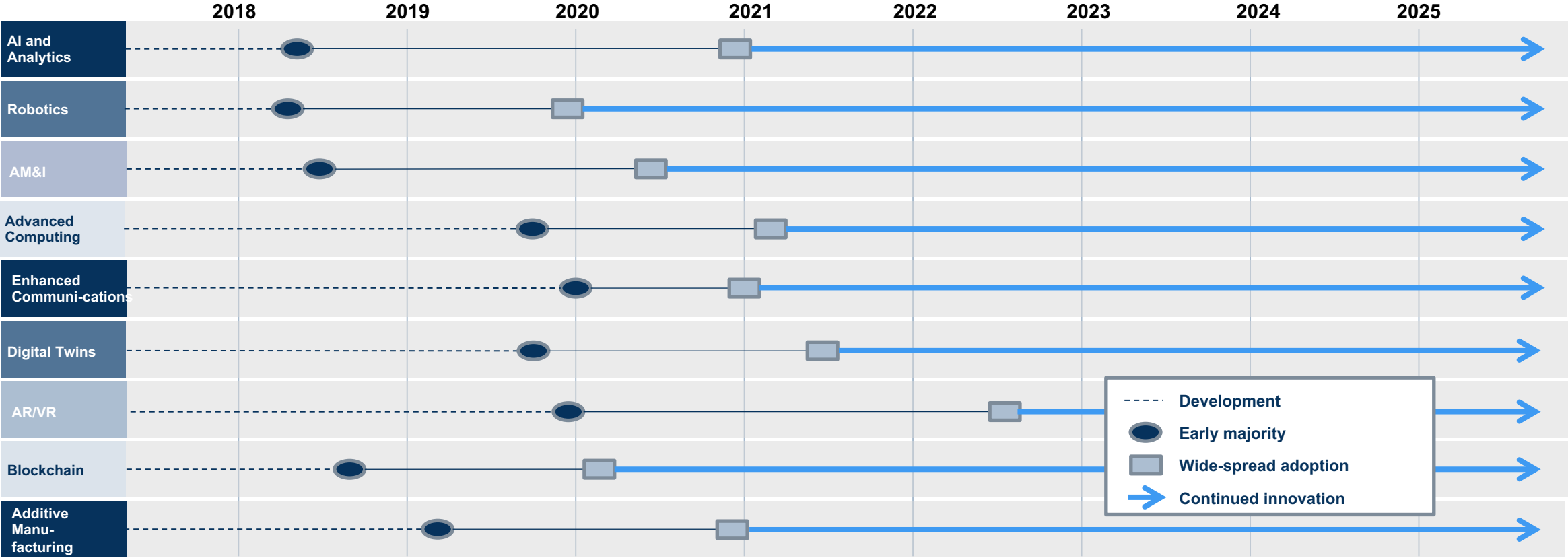
Emerging Leading Innovators: Oilfield Water Management

Operators	        
Midstream Partners	           
Equipment and Service Suppliers	               

Source: Frost & Sullivan

Timeline for Advanced Applications of Technology

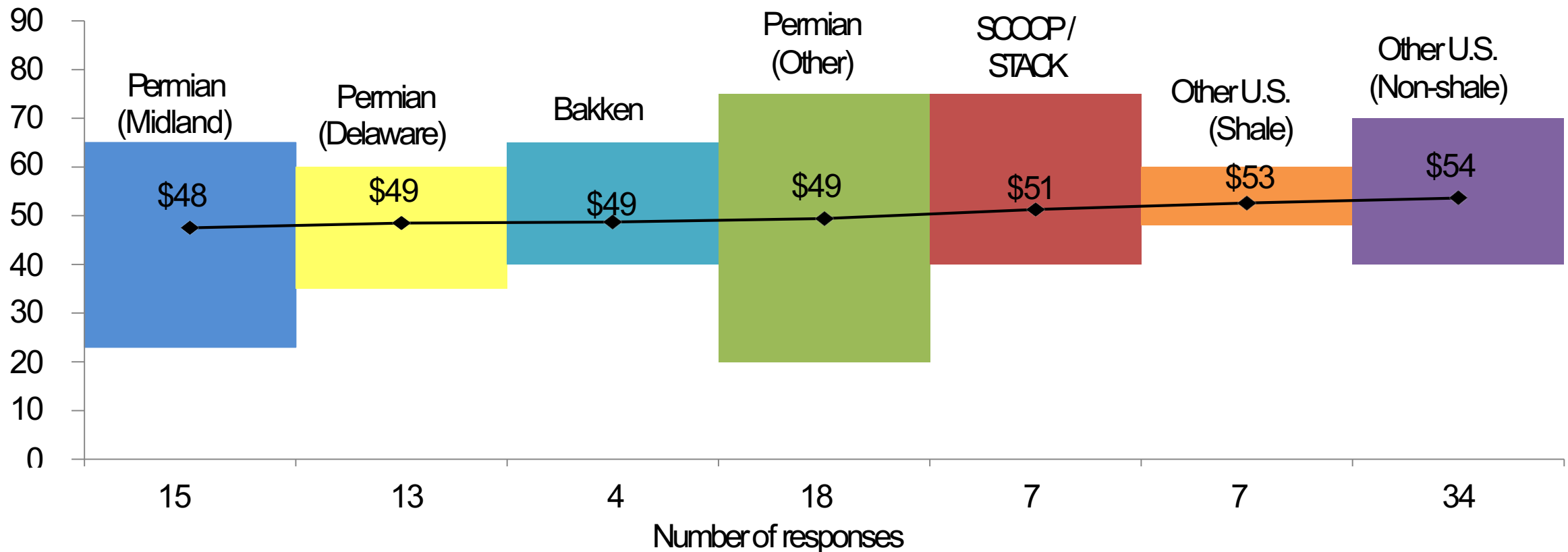
The Future of Drilling Systems: Key Technologies by Development Stage, 2018–2025



Breakeven Prices for New Wells

Dallas Fed Energy Survey—What WTI oil price does your firm need to profitably drill a new well?

Dollars per barrel



Federal Reserve Bank of Dallas

Critical Issues 2020



Innovation Target

***Companies to have in your
“scope”***

Profiled Companies

[Fieldbit](#): Field service digitization

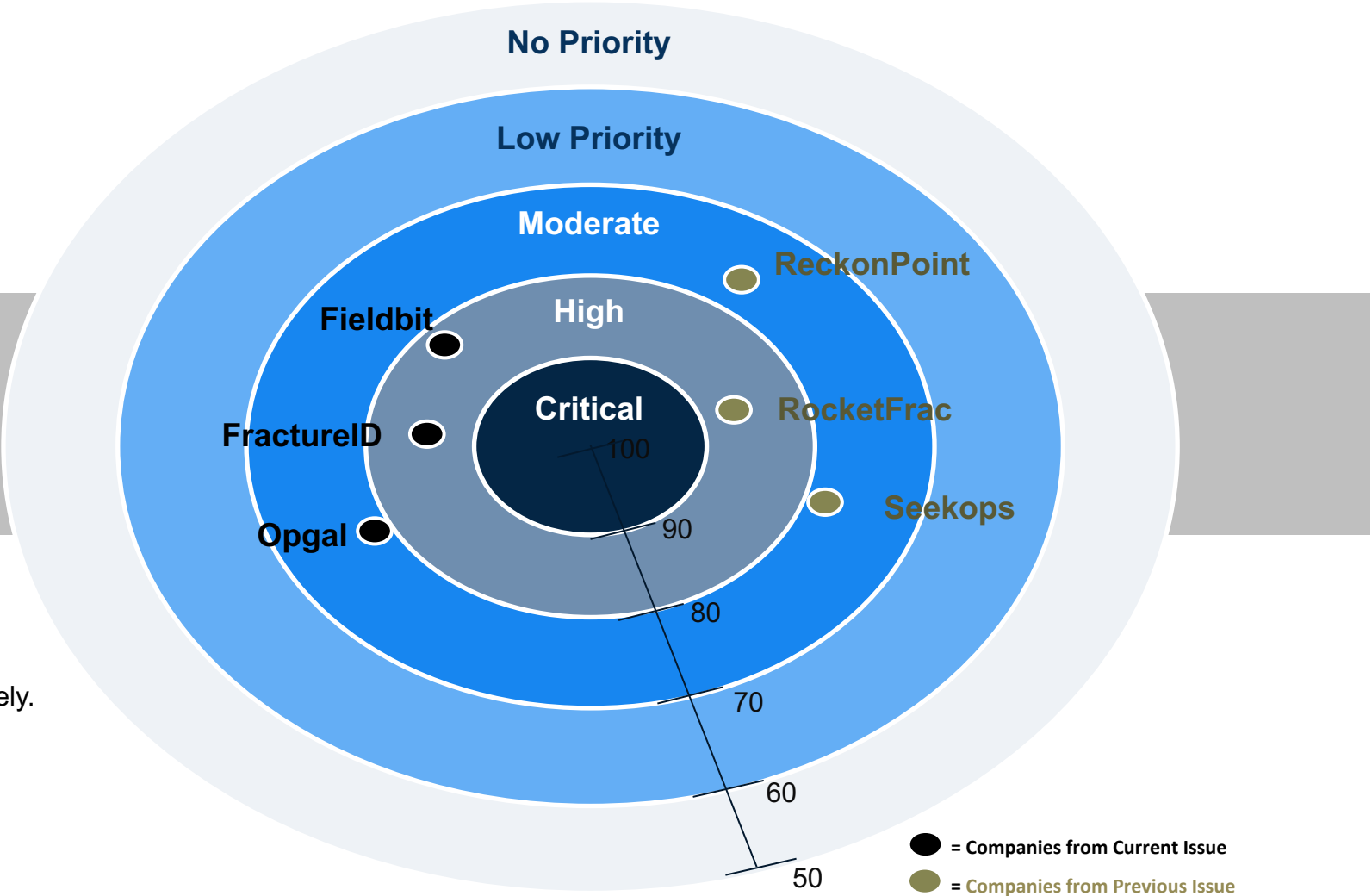
[FractureID](#): Drilling and hydraulic fracturing optimization

[Opgal](#): Gas emission and leak detection camera

Click on company name for direct link to profile.

The target is based on a rating scale from 1-100 (analyst score). A score of less than 50 will plot off the target entirely. The closer the company/technology is to the center the more critical it is to have them in your “scope.”

[Click Here to learn more about the scoring methodology.](#)



Source: Frost & Sullivan

Score
87

Data Gumbo

www.datagumbo.com/

The Solution:

Data Gumbo provides blockchain as a service for automating contract execution. The company applies their solution to a few different contract types: standard contracts, incentive based contracts and resource sharing contracts. Data Gumbo's original focus was to provide a third-party source of truth, reconciling data distrust between operators and drilling contractors around performance KPIs. The company has since expanded to other areas of the upstream oil and gas supply chain (e.g., completions, frac jobs, etc). Its blockchain technology uses a series of "if this, then what?" statements to electronically capture performance transactions, which are displayed to users in a combination of private and public blockchains, ensuring a high degree of security. Data Gumbo is ultimately providing the tools and platform to help change business models. Operators are able to make better decision on which rig, company and even crew is best for a specific job. Contractors and service providers have more actionable data to utilize for their own internal improvements.

Value Proposition:

- "Provide Blockchain as a service and remove the need for trust."
- "Achieve tremendous operational efficiency."
- "Allow people to align incentive across value chain."

Company Size: 12 Employees (US and Europe)

Revenue: Currently generating revenue but not yet profitable.

Funding: \$600k total funding (convertible note). Actively raising up to \$1.35M on that convertible note with plans for an equity raise in the summer of 2018 for around \$10M.

Investors – 1 angel Investment Company and 5 individuals.

Current Clients & Partnerships:

- Clients – 2 current clients, 7 active pilot projects - onshore and offshore operators.
- Partners –

Current Applications: Oil and Gas service contracts.

Current Upstream Applications:

Performance based contracts, resource sharing, automated contracts, document origin tracking, single window system for shipping and logistics.

Upstream Penetration:

DataGumbo is on the brink of transitioning from Early Adoption to Gaining Traction. The company recently transitioned two pilot customers over to full-time clients and has 7 additional pilot projects.

Competitors: IBM, Petrobloq, Ethereum, Apla, NEM

Business History and Strategy:

Data Gumbo was founded by Andrew Bruce and William Fox in 2016 but didn't begin the blockchain journey until late 2017. Mr. Bruce and Mr. Fox have a wealth of experience in the oil and gas industry. Before founding Data Gumbo, they both worked for NOV where they were responsible for delivering the NOVOS rig control system. DataGumbo's primary focus is providing blockchain as a service to automate service contracts however the company is currently expanding into other types of contracts (incentive based, resource sharing, etc.).

Hypergiant: Digitization of the Oil & Gas Sector



Current Trends and Unmet Needs

Exploration and discovery of oil fields is a time consuming, labor and cost intensive process which also requires sophisticated infrastructure. Therefore, it is necessary to utilize innovative solutions which integrate digitization in order to reduce the efforts required in discovering new oil and gas fields.



Technology Attributes

- Hypergiant specializes in creating innovative infrastructure capabilities through vertically integrated geospatial intelligence. This is done through small satellites sent into the orbital space and utilizes machine learning to gather data from the earth and the gathered intelligence can be used in the field of oil and gas. The company integrates software based intelligent systems, machine learning and human perception to achieve business goals.
- The orbital infrastructure and the intelligence aids in expediting the discovery and exploration of oil & gas fields. The artificial intelligence powered insights integrated with orbital data gathered from the satellites and terrestrial sources enhance the real-time monitoring of oil & gas pipelines and also aids in predicting and early identification of a potential pipeline failure.
- The company also applies its artificial intelligence models with the satellite data and the internal terrestrial information from the oil & gas company to run pilot tests so as to check the performance efficiency of the services provided. This helps in conducting trial and error tests which will eliminate the flaws in the system and make the system function with less errors.



Technology Profile

Hypergiant specializes in analyzing vast amounts of data through machine learning to generate technology solutions which are smarter than the human workforce and is also an efficient addition to the oil & gas industry as it aids in accelerating the discovery of oil fields and also enhances real time monitoring of the fields with actionable recommendations.

Technology Readiness



TRL-9

The proprietary technology solution is successful and is already commercialized.

Funding

The company has received a funding of \$5 million from investors including Clearblade, Cerebri and Pilosa.

Collaborations

The company has collaborated with Satellite & Extraterrestrial Operations & Procedures (SEOPs) LLC in order to launch small satellites to extract orbital intelligence which can be used in a wide range of applications.

Future Plans

The company plans to generate smart satellites which use artificial intelligence in space in order to collect smart data which can be used to discover and maintain oil fields.

Score
82

PhDsoft

www.PhDsoft.com

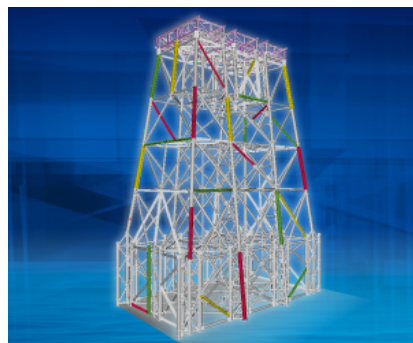
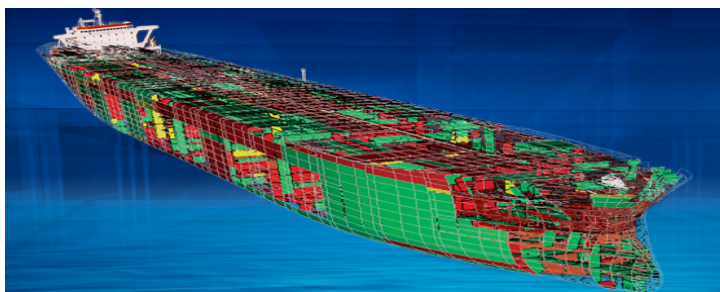
The Solution:

C4D® is a comprehensive software system that incorporates digital twin technology, 4D-space-time integration, industry best practices and predictive analytics to model and efficiently manage physical assets. C4D® is delivered in one platform that can be implemented with minor customization for the end-user. The software is industry 4.0 ready, capable of handling big data and synchronizing with Remotely Operated Vehicles (ROVs), robots, sensors, AI and IoT. C4D® utilizes actionable data to more efficiently manage assets while simultaneously balancing operational needs and budget.

Value Proposition:

Accurately assess the condition of assets and calculate the timing and cost of repairs to reduce maintenance costs while increasing the safety, reliability and life of assets.

- Forecast condition of physical assets at any point in time
- Estimate the cost of the repair and maintenance
- Prioritize inspection and repair to areas with the highest risk
- Eliminate unnecessary inspections



Company Size: 8 Employees (Houston + Brazil)

Revenue: Currently revenue generating *

Investors: Confidential

Current Clients & Partnerships:

- Clients – Shell, Petrobras, Transpetro, Modec, Senai and Subsea7
- Partners – Lloyd's Register, Microsoft, IBM, Houston Technology Center and others.

Current Applications: Oil and Gas, Aviation, Civil Engineering, Marine, Industrial Facilities and Nuclear Facilities.

Current upstream application: Asset Management, Predictive Digital Twin

- Performance validated by global clients in actual commercial use
- Over 110 assets modeled and monitored
- Millions of dollars saved – documented client case studies and testimonials
 - Reduced inaccurate estimates for steel replacement by 80%
 - Reduced engineering time by 90%
 - Reduced inspection planning by 50%

Upstream Penetration:

The company is relatively new to the US market but is looking to make a big impact within onshore upstream operations. C4D® was initially designed for large assets in the offshore Oil & Gas industry but their technology can easily be translated onshore. Onshore oil and gas assets are actually quite similar to offshore assets – 1) The equipment and physical structures are subject to wear and tear from harsh environments and general usage and 2) The equipment and physical structures are routinely inspected.

Competitors: Predix, AspenTech, TabWare – AssetPoint, Akseles

Business History and Strategy:

PhDsoft is a very distinguished company and have won multiple awards, most recently the Best Business Plan & Strategy Award at the 2017 INNO-CHINA Entrepreneurship Competition. The company has proven track record with over 20 years of successful performance in the oil and gas industry. PhDsoft has primarily operated in Brazil but incorporated in the U.S. during 2015 and moved headquarters to Houston, TX. They are expected to close their first US contract in 2018. Their immediate goals for 2018 are to continue developing research projects with existing clients while strengthening their competitiveness and enhancing their technology's value.

Images source: PhDsoft. Source: PhDsoft

Oil & Gas Innovation Council Advisory Committee



Annual Council Meeting Sept 2019 Lost Pines Resort

