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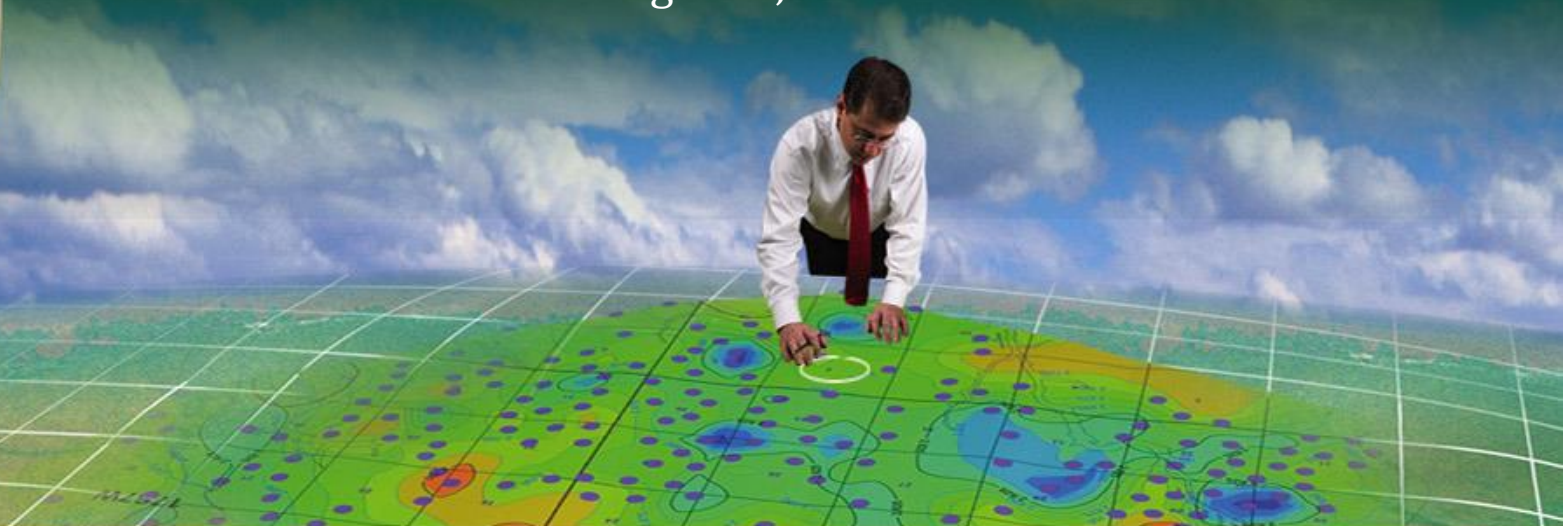


“Talking Shop”

Data Science at Ryder Scott

Adam Cagle

Senior Petroleum Engineer, Data Science Coordinator





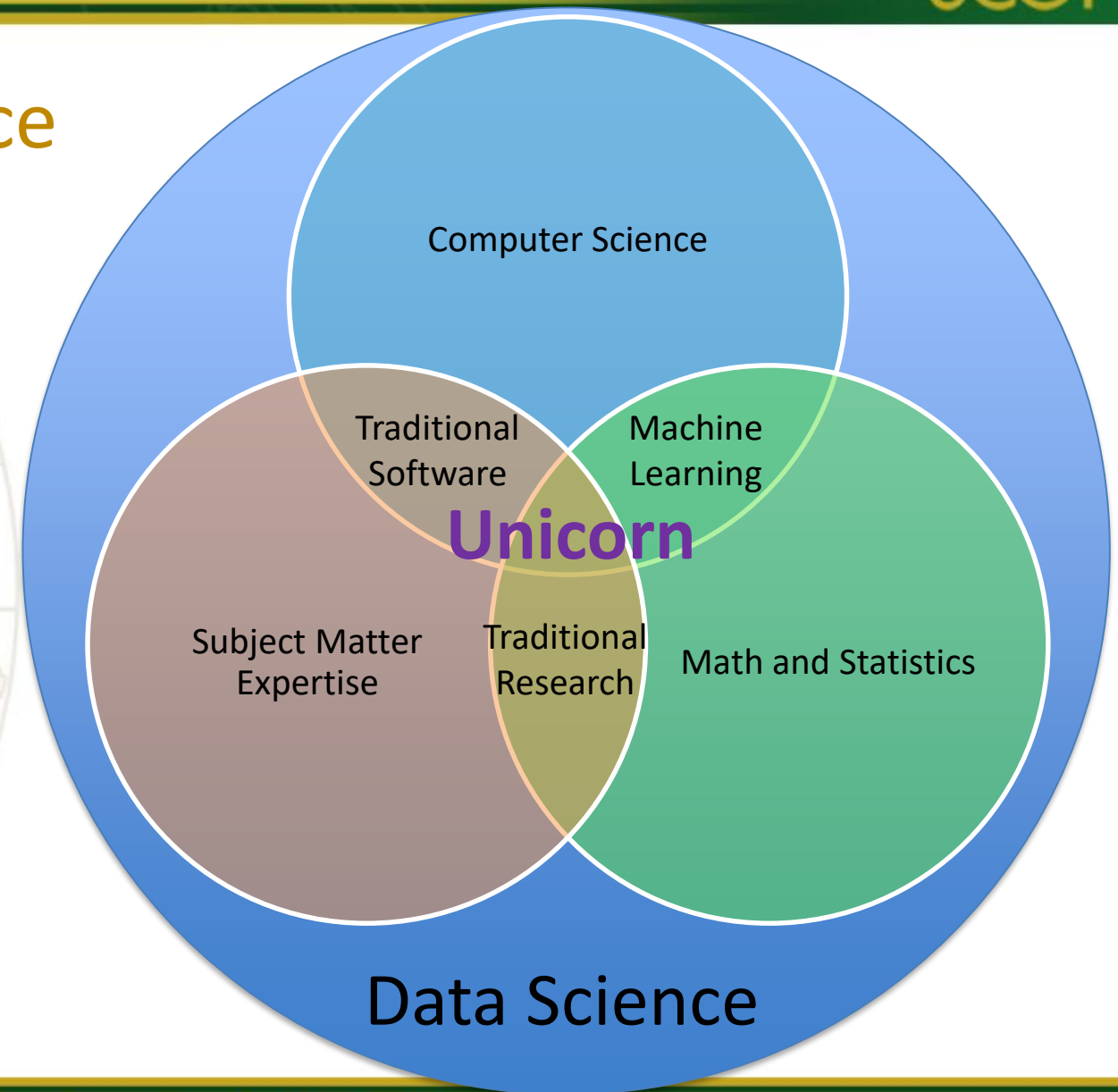


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118,46934	
440	
15,727,8388	
112,162610	-176,0358

1014,070233	1112,162610	1275,418801
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727,8148	440	15400
-145,575075	15,727,8388	1275,418801
-448,928840	112,162610	-176,0358

The Fourth Paradigm of Science

1. Empirical (e.g., DCA)
2. Theoretical (e.g., Material Balance)
3. Computational (e.g., Simulation)
4. Data-driven (e.g., Statistics, ML)



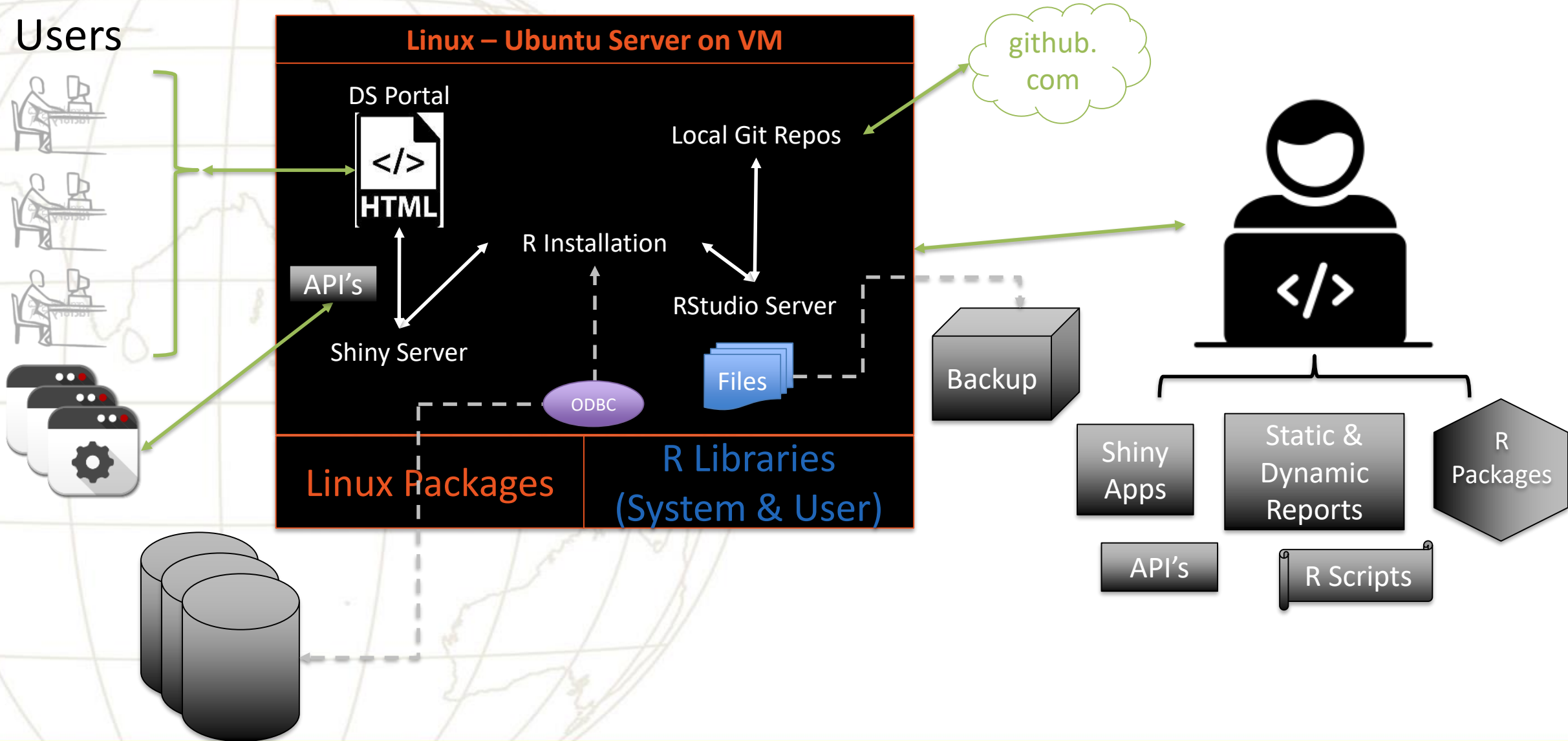
With Great
Power Comes
Great
Responsibility





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Users



- Provide
 - Cutting Edge Tools
 - Training
- In order to
 - Increase Value of Current Services Offered
 - Create New Products
 - Increase Efficiency
 - Increase Employee Job Satisfaction
 - Encourage Innovation

Why Data Wrangling Or Data Munging Blocks Data-Driven Innovation

Teams are overwhelmed with data wrangling projects

It is not uncommon to find analysts and data scientists spending large amounts of time wrangling. In fact, between 50% and 80% of a team's time can be spent munging (NY Times). They expend significant energy integrating, formatting, routing, compiling, and cross-referencing data.

The data work is often manual, time-consuming, and at times, error-prone. The result is an expensive and brittle patchwork of code, files, and folders. If 80% of a week is spent wrangling this leaves no time for analysis for someone who might be making \$200,000 to \$300,000 a year.

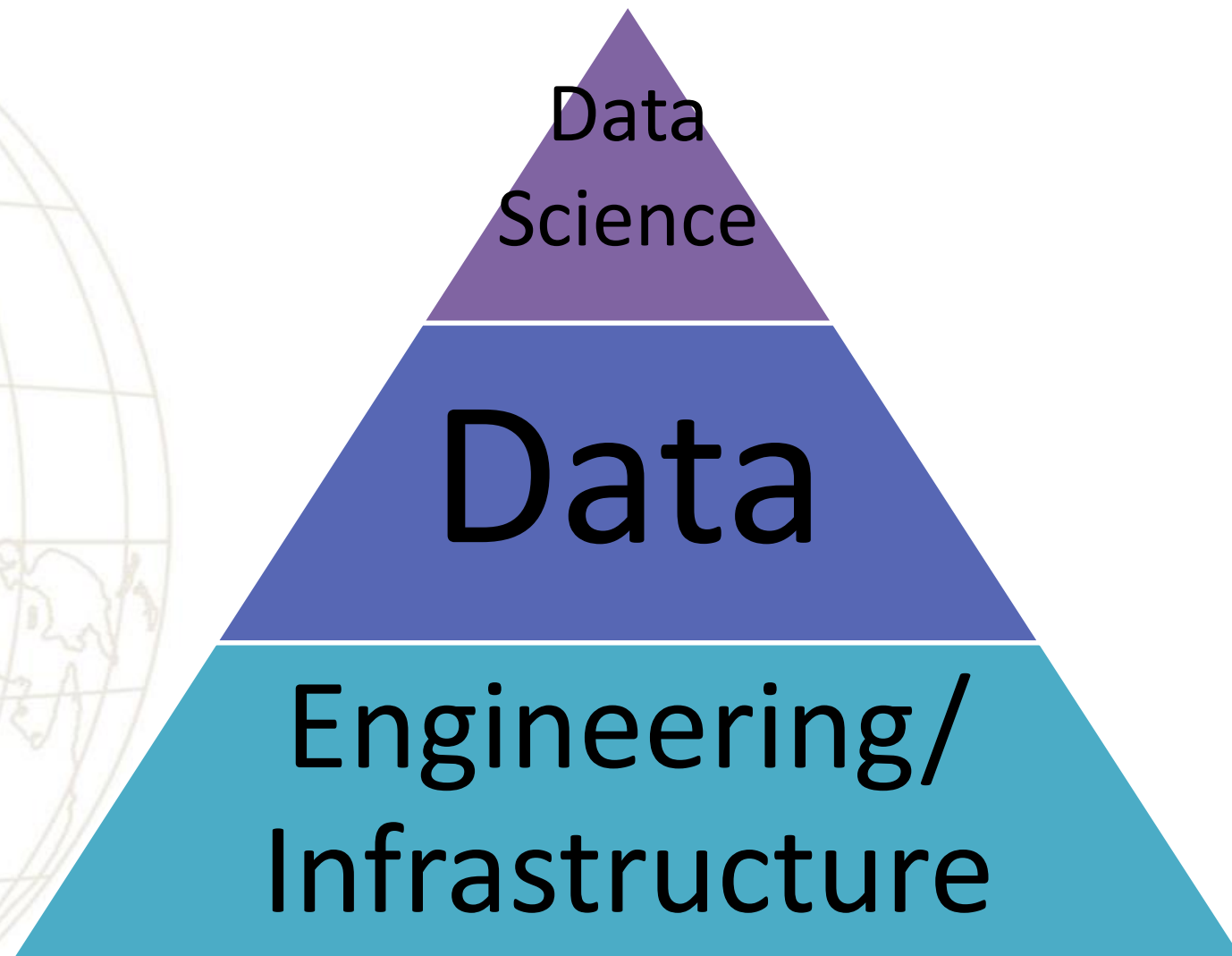
They can quickly become disenchanted and frustrated. Why? Most of their time is spent doing exactly the opposite of what they were hired to do. They deliver what they can with the time remaining.

<https://blog.openbridge.com/why-data-wrangling-or-data-munging-blocks-data-driven-innovation-8d984de4c22a>





TRUST



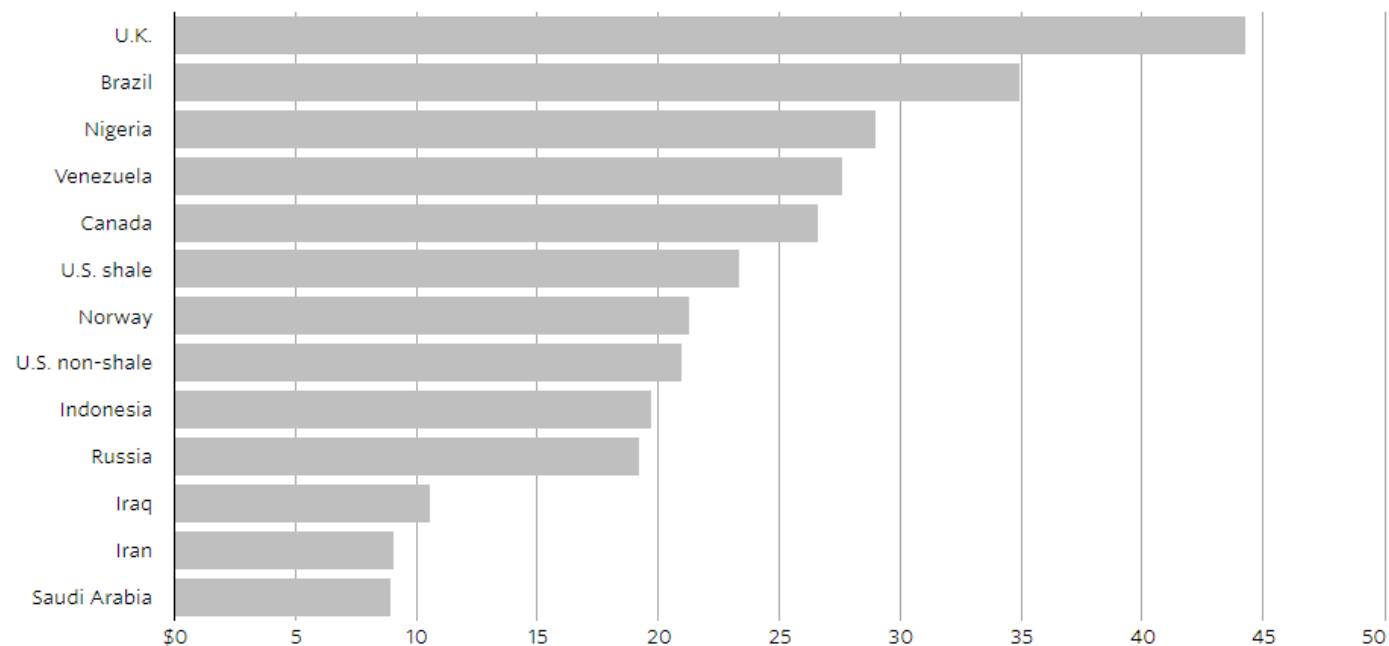
- Timely
- Accurate
- Trustworthy
- Easily accessible





Cost of producing a barrel of oil and gas

Average cash cost to produce a barrel of oil or gas equivalent in 2016, based on data from March 2016.

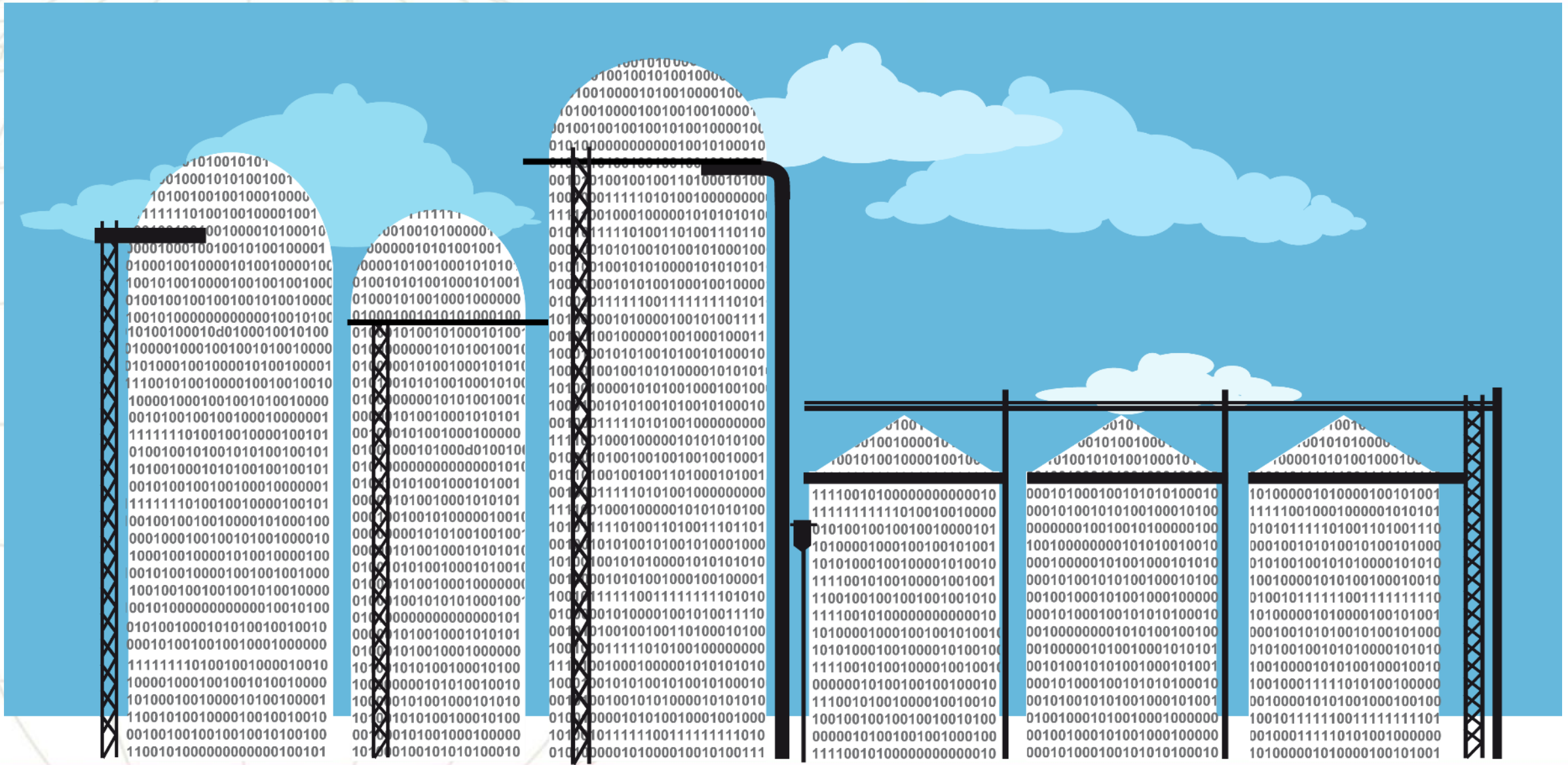


Note: Brent crude price as of Invalid date BST.

Source: Rystad Energy UCube

<http://graphics.wsj.com/oil-barrel-breakdown/>

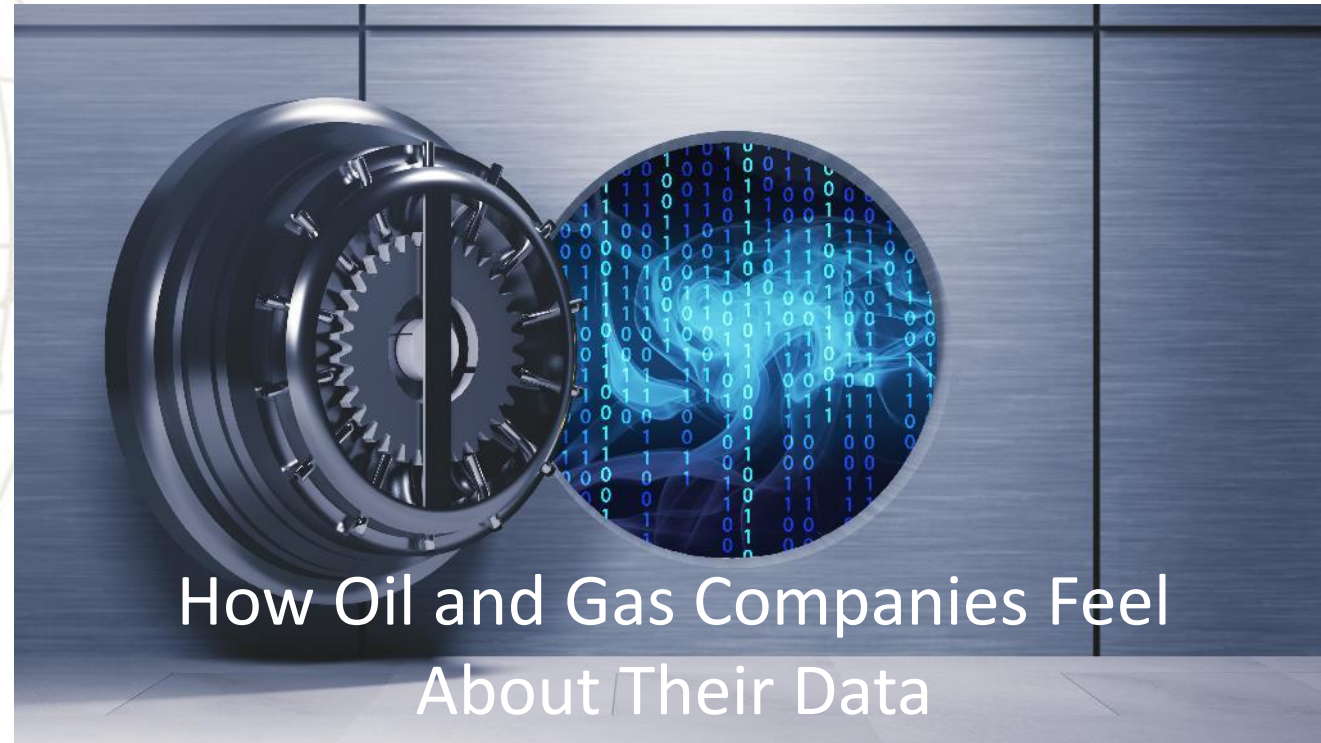
SILOS BY DESIGN



How Facebook Users Feel About
Their Data

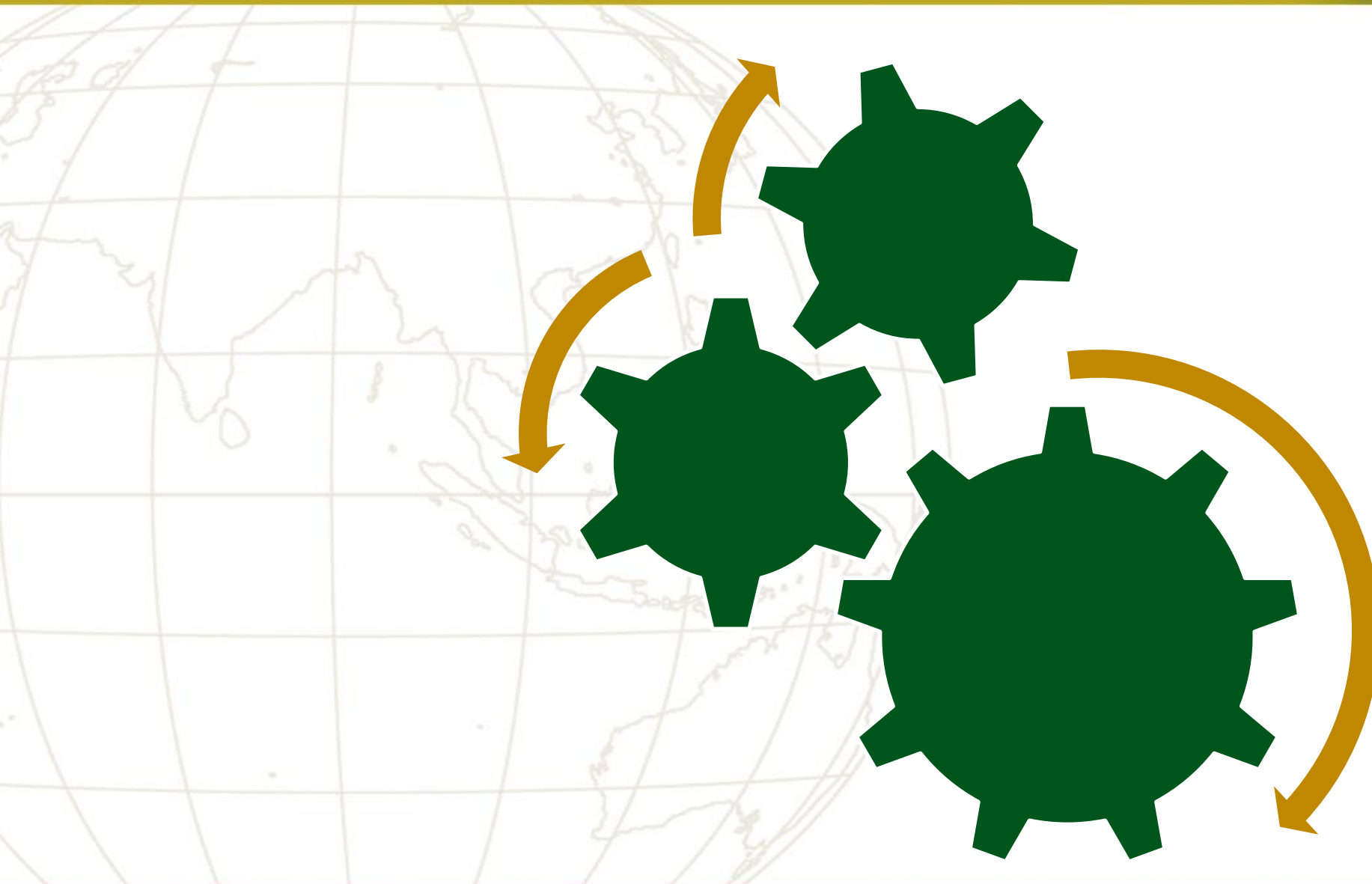


How Oil and Gas Companies Feel
About Their Data



Interchangeable Parts

- Eli Whitney introduced the concept in the U.S.
- Parts were made by hand before, but now they were made by machines conforming to a standard specification
- Broken machines could now be fixed by simply replacing broken parts



IMPOSING STANDARDS: CONSIDERATIONS



SIMPLIFYING THE PROBLEM





- Anomaly detection
- QC Reserves Work
- Test New DCA Models
- Test Auto-Fitting Algorithms
- Standardized Benchmarks
- Experiment with Automation
- Integration Engineering and Geology
- Automated Reports
- New Products and Services

SPECIAL THANKS TO OPEN-SOURCE!



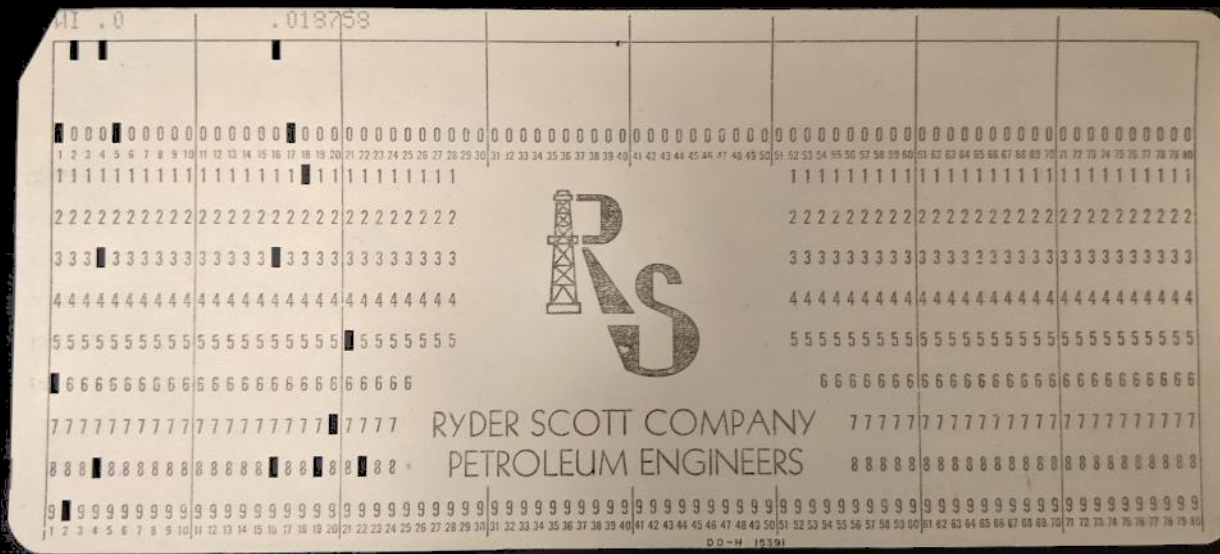
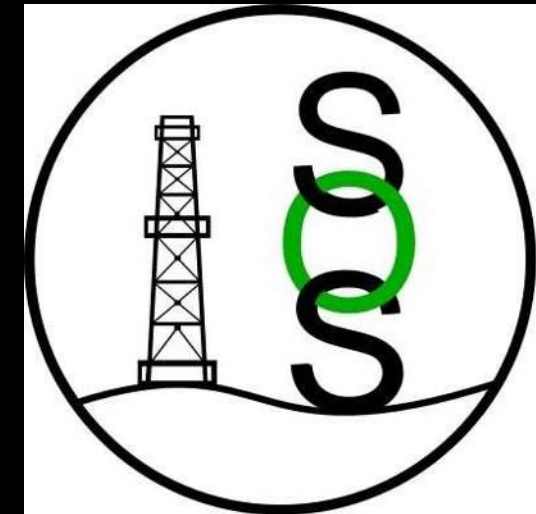
RSC  's Open Source!

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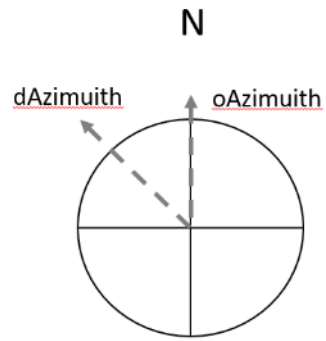


RSC  's Open Source!

Reservoir Solutions



ESTIMATING WELL SPACING: OPEN-SOURCE

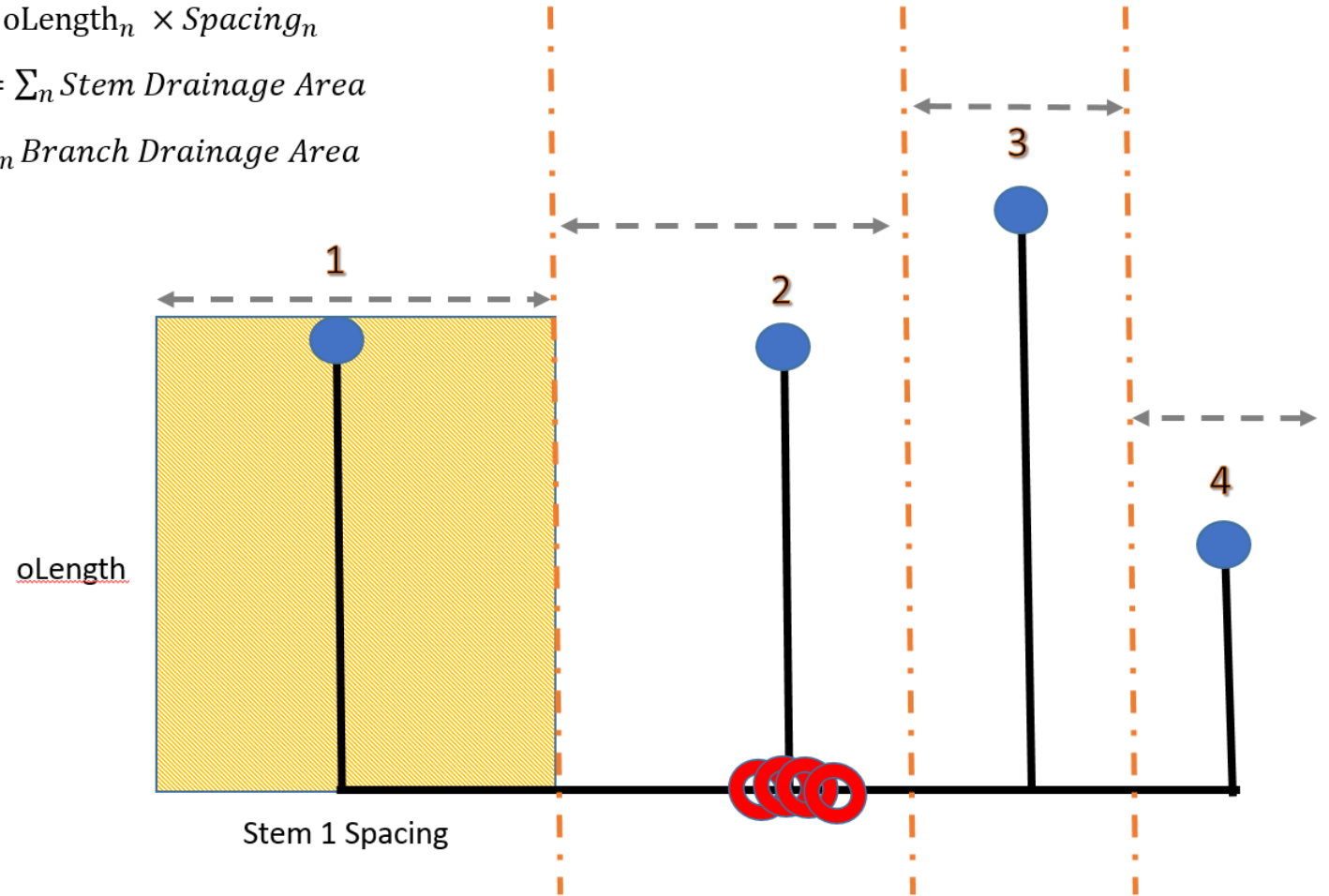
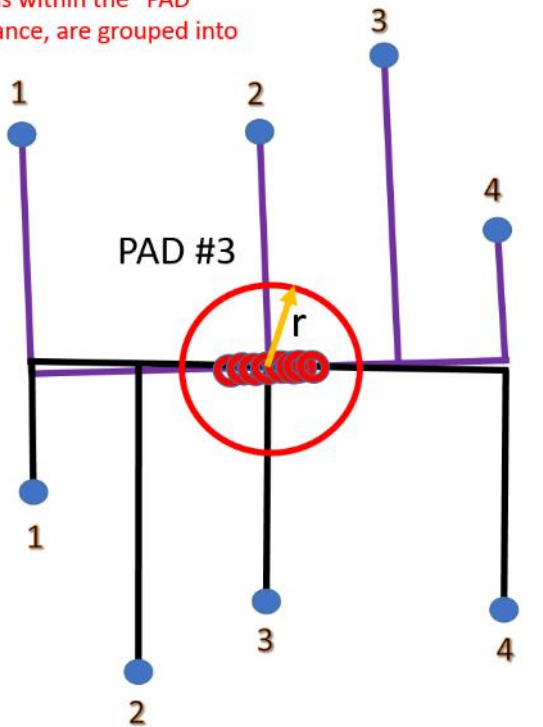


$$Stem_n \text{ Drainage Area} = oLength_n \times Spacing_n$$

$$Branch \text{ Drainage Area} = \sum_n \text{Stem Drainage Area}$$

$$PAD \text{ Drainage Area} = \sum_n \text{Branch Drainage Area}$$

Surface locations within the "PAD Threshold" distance, are grouped into a PAD.



RESERVOIR SOLUTIONS

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Industry is poised to challenge Alberta Securities Commission interpretations of a 2015 regulation that requires a reporting issuer (RI) to cashflow oil and gas production net of abandonment and reclamation costs (ARC). The ASC rule, Item 2.1(3) (b) of NI 51-101F1, includes ARCs for wells, surface facilities and pipelines up to the sales point. RIs have been more selective in their disclosures. One RI said recently, "The cost of abandoning an exploration well, which is unrelated to reserves cash flows, should not be included." ARCs for fewer wells boost undiscounted future net revenues (FNRs).

The Society of Petroleum Evaluation Engineers chapter in Calgary has all but finalized its position on the ARC rule after receiving industry feedback and tweaking its new Canadian Oil & Gas Evaluation Handbook (COGEH). NI 51-101 refers to COGEH as "the standard of practice for evaluation and classification."

Oil and gas companies want "clarity on the inclusion of ARCs," said **Doug Wright**, a past chapter chairman, in December. "The chapter is currently updating COGEH and targeting a late Q1 2018



COGEH
to address
"highly debated"
interpretation



THANKS FOR LISTENING!

