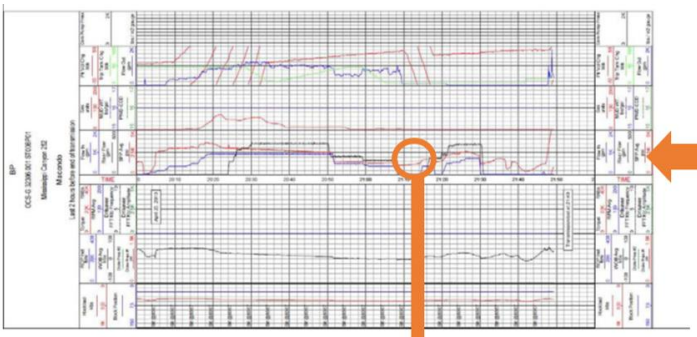
The Data Fit Organization and the lessons of Macondo

The concept of a Data Fit Organization has been developed by a Steering Committee based in Perth, Western Australia, with input from the CORE Innovation Hub (Australia's first co-working collaboration space focused on resources technology), resource sector operators (petroleum and mining), academia, government agencies, and technology service providers. A Data Fit Organization (DFO) is one where data culture is a ubiquitous part of work, like safety is today, where all employees have data competencies and capabilities, and demonstrate behaviors that deliver strategic value from data, and where data roles and responsibilities are measured and incentivized. The Steering Committee is delivering a thought leadership framework to help map, assess and improve data capabilities and behaviors across roles to improve effective upskilling.

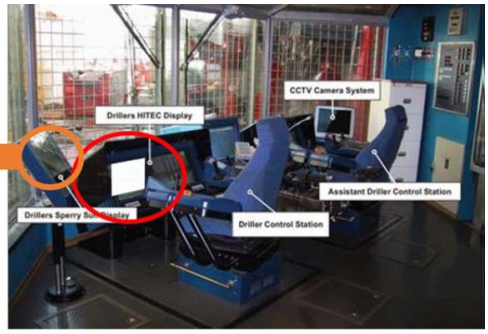
A Data Fit Organization, is in short, one where data ***is*** the organization, and where a shared industry approach is used to consistently and effectively drive value through data, mapping, assessing and improving data capability and maturity using a simple, repeatable and accessible framework. This framework is informed by a 'Fitness-To-Operate' safety competency framework developed for the offshore oil & gas industry. Three measurable "capitals" contribute to data fitness to operate; Human, Social, and Organizational. These same capitals support the safety-focused framework developed for the Australian offshore petroleum industry by the University of Oxford and the National Offshore Petroleum Safety and Environmental Management Agency (NOPSEMA, Australia's independent regulator for safety and environmental management in Commonwealth waters). That 2013 initiative by the International Regulators Forum for the oil and gas industry was developed to reduce the risk of an accident in Australian waters similar to the Macondo incident in the Gulf of Mexico, and continues to focus the work of the Steering Committee on the role of data in determining fitness to operate.

The 2010 explosion and fire on the Deepwater Horizon platform, drilling for BP, was in part attributable to a data management and delivery failure, and led to the loss of the rig, 11 deaths, 17 injuries, an oil slick that could be seen from space, and penalties and losses of over $60 billion dollars. What became one of the largest environmental disasters in the United States, with an impact on six state coastlines, helped to focus the resources industry on "Fitness To Operate" and ESG priorities in corporate policy and communications.

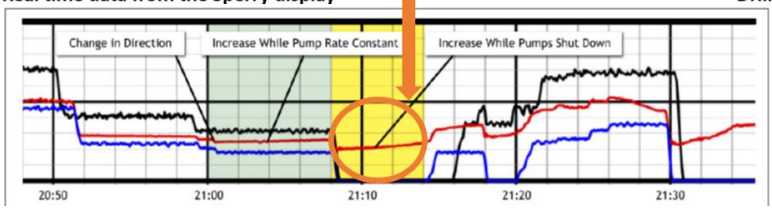
An analysis of the data available on the rig by the SAS Institute in 2015, using data artifacts from the Deepwater Horizon and materials from the Accident Investigation Report, the U.S. Coast Guard, and the U.S. National Commission Chief Counsel's Report, as well as an IEEE causal chain of events "fish bone" analysis, found that the first clear data indicator of fluid flow imbalance appeared 43 minutes before the blowout. ***The rig operators had the data they required to prevent the accident*** (see below).



Real time data from the Sperry display



Driller's view from the Deepwater Horizon



Diagnostic drill pipe pressure data anomaly

The data management failure was that the information was displayed in a hard to read location and format, not highlighted at a time when multiple simultaneous operations were occurring on the rig floor, and the driller would have had to notice a small inflection on one of at least 19 parameters being displayed on a small auxiliary console to one side of his workstation. The Rig Manager had in fact earlier admitted to "having a little trouble" interpreting data, but concluded at the time, "It's no big deal".

While only one vendor's real time data feed survived the explosion, it is possible that the last recorded data from other sensors is still preserved on the rig in 1500 meters of water, and will never be recovered because the area is now a gravesite. Ironically, the Macondo #1 well and the oil from it are now the subject of rich ongoing data sets, with subsea monitoring of the well itself including data from Remotely Operated Vehicles (ROV's) overseen by BP, Transocean (owner of the drilling rig), the United States Coast Guard, Federal On-Scene Coordinators, the U.S. Interior Department's Bureau of Safety and Environmental Enforcement (BSEE) and Bureau of Ocean Energy Management (BOEM), and State On-Scene Coordinators from Louisiana, Mississippi and Florida. Massive available data sets have driven advances in modeling of deepwater hydrocarbon plumes, transport and mixing in the water column, multiscale fluid movements at and near the bottom boundary layer, and oil degradation processes over temporal scales from minutes to years.

In Australia in 2014, a working group published a fitness-to-operate (FTO) conceptual framework for assessing behavioral factors that influence both short and long-term safety outcomes, including how an organization encourages the questioning of operational data. This framework grew into the Data Fit Organization imperative, and has now been piloted and refined using field operations at both oil and gas and mining operators in Australia. The data management capability and maturity aspects have been the subject of several workshops and presentations for peak industry data management organizations, including the Professional Petroleum Data Management (PPDM) Association and the jointly U.K. and Norway based Society for Petroleum Data Managers. Guidance from the workshops in the form of force-ranked priorities can be used to focus data management efforts on foundational, transformational, networking and integration skill sets that allow knowledge workers to optimize the use of data in the current resource industry environment of volatility, uncertainty, complexity and ambiguity (VUCA).

A frame of reference is provided by Embedded Data Workflows, similar to industry standard value stream modeling from business architecture, but which map all key data roles and capabilities to deliver business outcomes through standardized processes that leverage data. Successful data workflows are role-led, with data roles overlapping those identified in industry standard data governance frameworks. In a Data Fit Organization, everyone demonstrates through measurable behaviors an understanding of their embedded data workflow role and their data capabilities, and the workflows are continually improved trough an iterative process of identifying data opportunities and deploying embedded solutions.

Early indications from the targeted workshops agree generally with output from the industry pilots, which utilized standardized interviews with personnel in different data roles across embedded data workflows covering exploration and development in the oil industry and ore processing in mining. One of the workshops established minimum basic data principles that would contribute to data fitness, which could be embedded in a data management lifecycle policy or procedure. The top-ranked principles, while obviously influenced by a selection bias from practicing data managers, were that open standards should be adopted and adapted, data should be owned by the organization and open by default, quality and confidence flags should be visible, searchable and fit-for-purpose, data and metadata should be curated as close to the source as possible, and that business data asset sponsors should be the conduit for funding data management initiatives.

Optimum accepted practices derived from the workshops were derived from the differences in key behaviors when force ranked by importance and when force ranked by level of demonstration in the

participant's organization. They were then framed in a Start-Stop-Continue agile retrospective template for data managers. The top ranked behaviors to start were including in onboarding for all staff training with proof points for understand the full data lifecycle and value of embedded data workflows, regularly communicating measured value of embedded data workflows to the business data asset sponsors, and aligning a data fit strategy with organizational vision at as high a level as possible. The top ranked behavior to continue was designing the data user experience to visualize data for business insights, and the behaviors flagged to stop were chasing the latest technology at the expense of process, and focusing only on collecting and ingesting data rather than enrichment.

For those that are interested, the online survey is available for further input at: *https://www.menti.com/weswnksmgh*

Sources:

Barker, T. (2021) ***"An Imperative for Building a Data Fit Organisation: A whole-of-organisation view of data capability & opportunity",*** *Robotics & Automation In Mining Conference, Joonalup, Western Australia, 13 October 2021* *https://mininginnovationnetwork.swoogo.com/ram21*

Bartlit, F. H. Jr. (2011) ***"Macondo: the Gulf oil disaster"*** *Chief Counsel's report, National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling, Gulf oil disaster, Library of Congress Control Number 2011505289, CCN Permalink https://lccn.loc.gov/2011505289, http://purl.fdlp.gov/GPO/gpo4390*

BP U.S. Press Office (2012) ***"Joint survey again confirms Macondo wells are secure"****, https://www.bp.com/en/global/corporate/news-and-insights/press-releases/joint-survey-again-confirms-macondo-wells-are-secure.html*

Griffin, M., et al. (2014). ***"A conceptual framework and practical guide for assessing fitness-to-operate in the offshore oil and gas industry"*** *Accident Analysis and Prevention, 68, 156-171. https://doi.org/10.1016/j.aap.2013.12.005*

Griffin, M., et al., (2019). ***"MAPNet: Rethinking Work Skills for the Future"****, White Paper for the Future of Work Institute, Curtin University, Perth.*

Kozman, J. (2021) ***"Becoming a New Energy Data Professional – What are your transferable skills?"*** *Society for Petroleum Data Managers Online Conference 2021, https://societypdm.com/spdm-online-2021*

Pun, H. (2015) ***"Was it management-technical failure or safety ignorance? Root cause analysis of the BP Oil Spill in the Gulf of Mexico"*** *2015 International Conference on Industrial Engineering and Operations Management (IEOM), 2015, pp. 1-7, doi: 10.1109/IEOM.2015.7093724, http://dx.doi.org/10.1109/IEOM.2015.7093724*

Prickett, Z., et al., (2019) ***"Data Competency Framework for Industry 4.0",*** *Whitepaper, CORE Innovation Hub, Perth, WA, with; University of Western Australia, Future of Work Institute, Curtin University, and National Energy Resources Australia. https://www.corehub.com.au/data-science*

Walker, S. and Duarte, J. (2013) ***"Drilling for Deepwater Data: A Forensic Analysis of the Gulf of Mexico, Deepwater Horizon Disaster"****, Paper SAS1865-2015, pp.156-171, International Regulators Forum – 2013* *https://support.sas.com/resources/papers/proceedings15/SAS1865-2015.pdf*

NOTE: Current status of Deepwater Horizon maintained at: https://www.marinetraffic.com/en/ais/details/ships/shipid:7664/mmsi:-8764597/imo:8764597/vessel:DEEPWATER_HORIZON,