



Digital Oilfield

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Analytics Leader

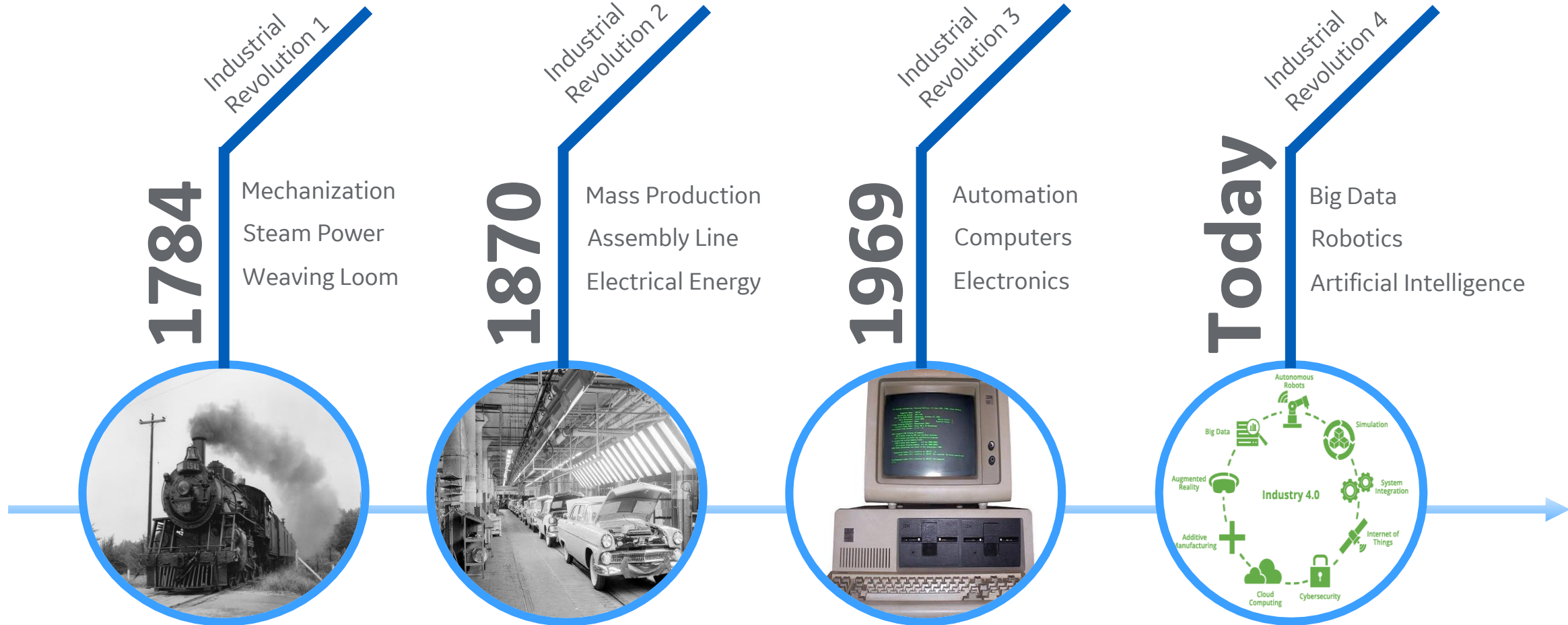
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Content

- Industrial Revolutions
- Digital Buzz Words
- Big Data Characteristics
- Digital Technologies
- Digital Blowout Preventor Example

Industrial Revolutions



Technology Buzzwords

- **Cloud** – “Cloud computing is a style of computing in which scalable and elastic IT-enabled capabilities are delivered as a service using internet technologies. Cloud infrastructure as a service (IaaS) is a type of cloud computing service; it parallels the infrastructure and data center initiatives of IT.” - Gartner
- **Edge** – Edge computing is system which brings computation and data storage closer to the location where it is generated, to improve response times and save bandwidth
- **Digital Twin** - is a mathematical model of a process, equipment or service.
- **Artificial Intelligence** - system which is able to perform tasks that normally require human intelligence, such as visual perception, speech recognition, decision-making, and translation between languages.
- **Machine Learning** - is the learning in which an algorithm can learn by its own without being explicitly programmed.

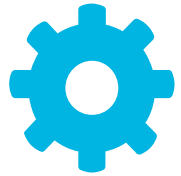
Big Data Characteristics – The 3 V’s (IBM)

Characteristic	Defined as	Example(s)	Challenges
Volume	Quantity of data/information	<ul style="list-style-type: none"> Seismic Data Acquisitions for 2D and 3D images Accelerometers 	<ul style="list-style-type: none"> Storage Bandwidth
Variety	Differences in data formats	<ul style="list-style-type: none"> Text, image, audio, video Transactional vs time series Structured, semi-structured, and unstructured data 	<ul style="list-style-type: none"> Data storage methodologies Data mining Transmission protocol
Velocity	Speed of data collection, transmission and processing	<ul style="list-style-type: none"> Diagnostics/Prognostics Systems Real Time Monitoring Systems 	<ul style="list-style-type: none"> Processors Transmission protocol/medium (acoustic) Connectivity (Satellite, etc)

Value In Data



Maximizing recovery



Optimizing production



Reducing NPT



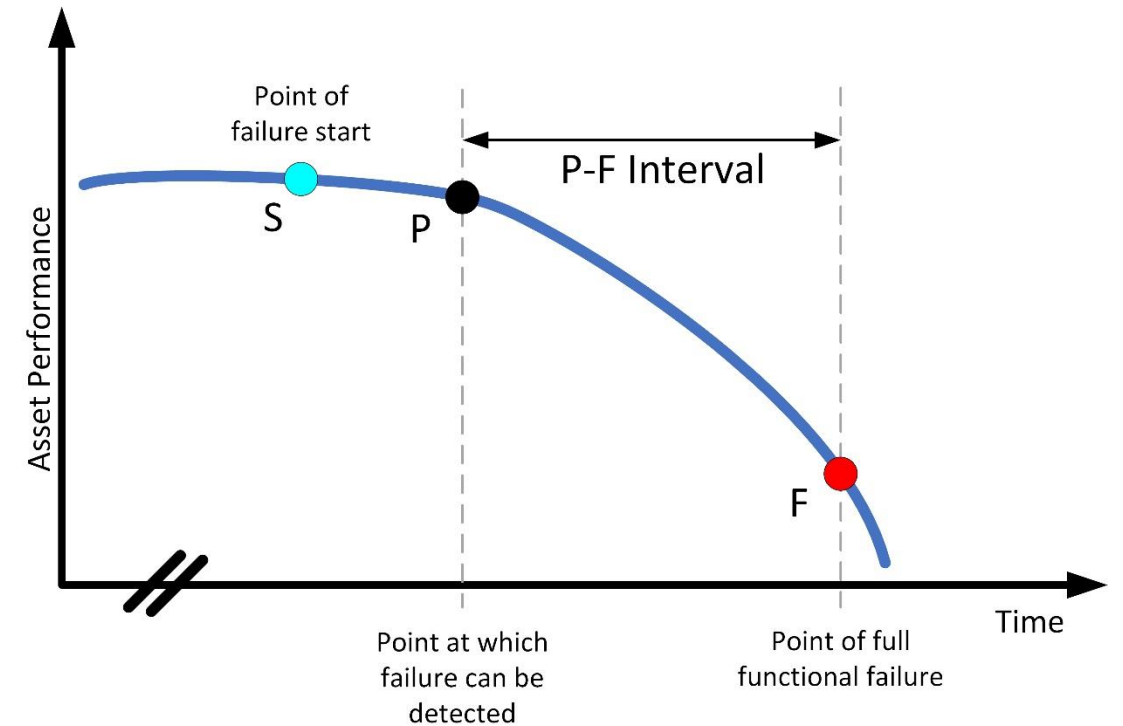
Improving safety



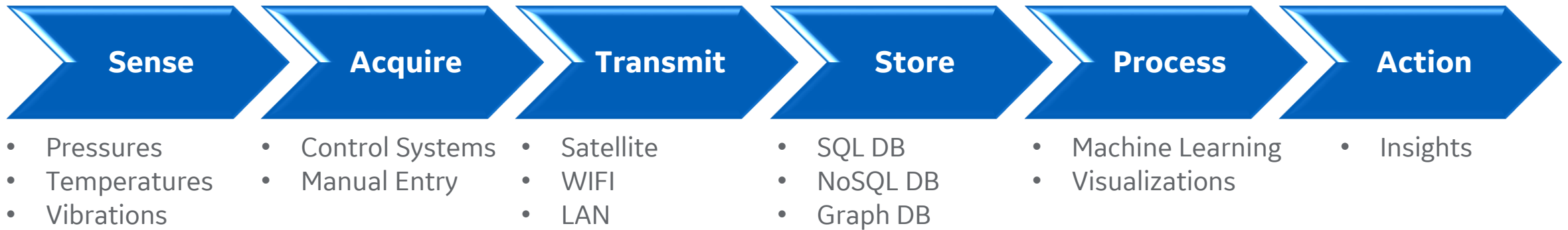
Enabling enterprise-wide digital transformation



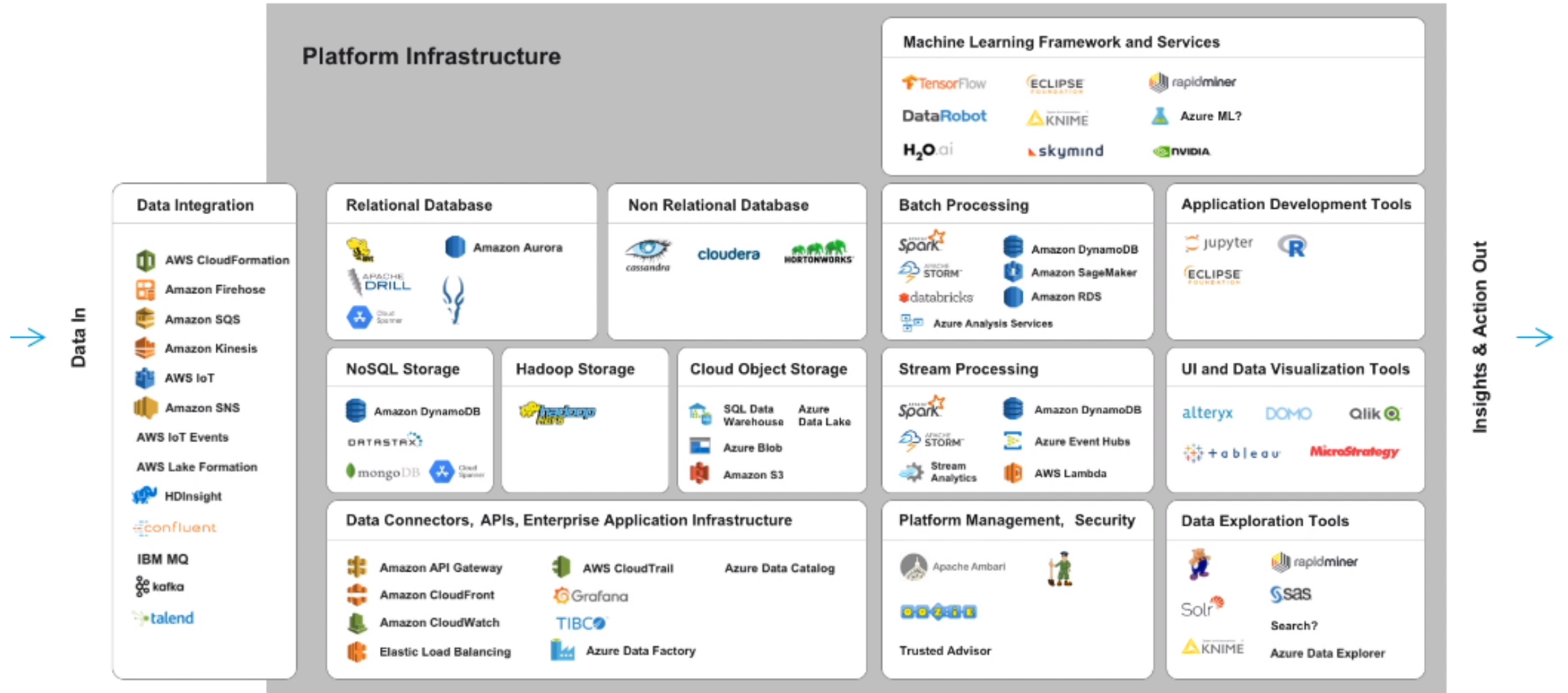
The P-F Curve



Data Stream

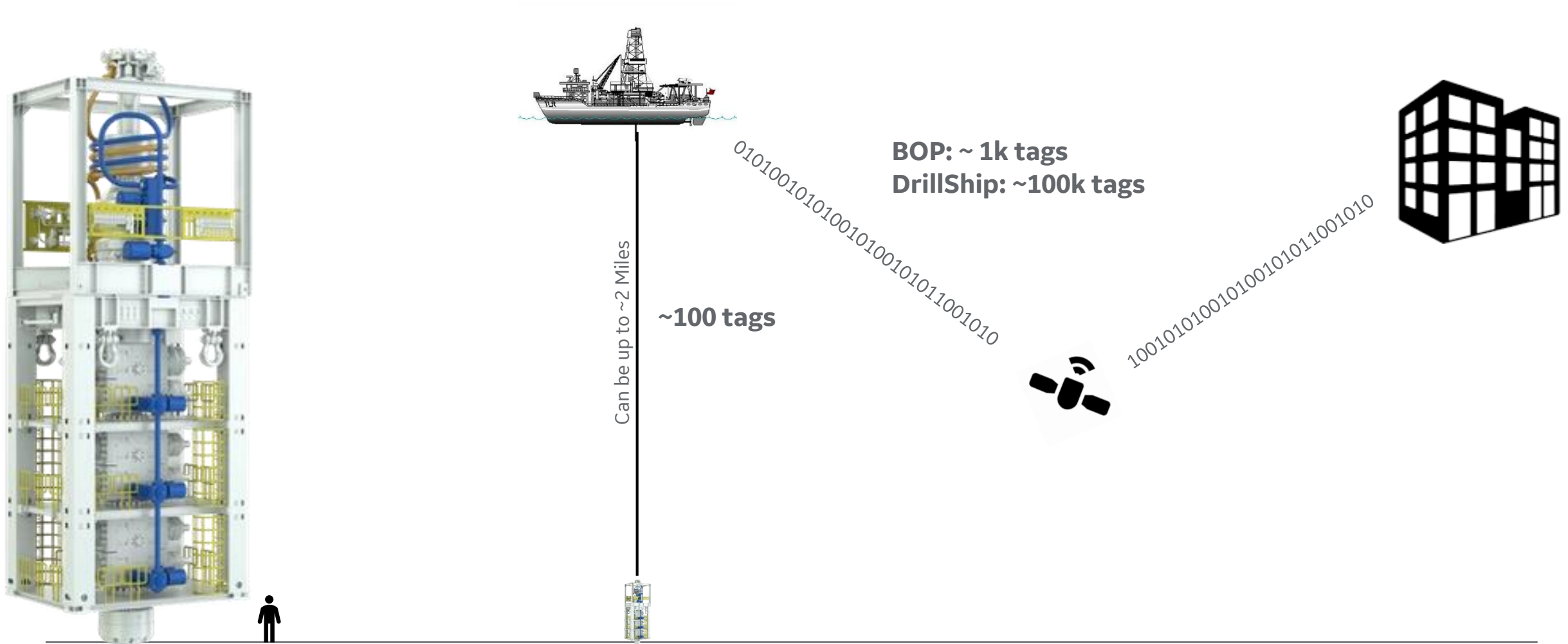


Digital Technologies



Oil & Gas Examples

Blowout Preventer (BOP) – Digital Oilfield Example



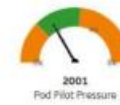


FOUNDATION FOR
**DATA-DRIVEN
DECISION MAKING**
AND **TOTEX SAVINGS**

SeaLytics

Real-time monitoring

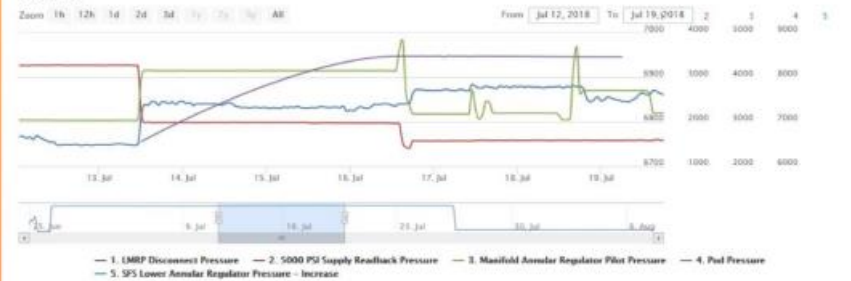
- BSEE RTM compliant (GoM)
- Wurdtech™ Cyber Secure
- BHGE WellLink™ WITSML connected



Solenoids

ID	Name	Cycles	Current In/amp	Over Current	Status
1	Solenoid 01 - Spare	0.00	0	0	
2	Solenoid 02 - Spare	0.00	0	0	
3	AutoClear Control - Reset	48.00	240.00	0.00	OK
4	Manifold Regulator Pressure - Increase	0.00	0.00	0.00	OK
5	Manifold Regulator Pressure - Decrease	0.00	0.00	0.00	OK
6	Upper Annular Regulator Pressure - Increase	0.00	0.00	0.00	OK
7	Upper Annular Regulator Pressure - Decrease	0.00	0.00	0.00	OK
8	Lower Inner Choke - Close	18.00	258.00	0.00	OK
9	Casing Shear Rams (Cavity 2) - High Pressure Close	15.00	0.00	0.00	OK
10	LHRP Disconnect Valve Pressure Switch	0.00	0.00	0.00	OK

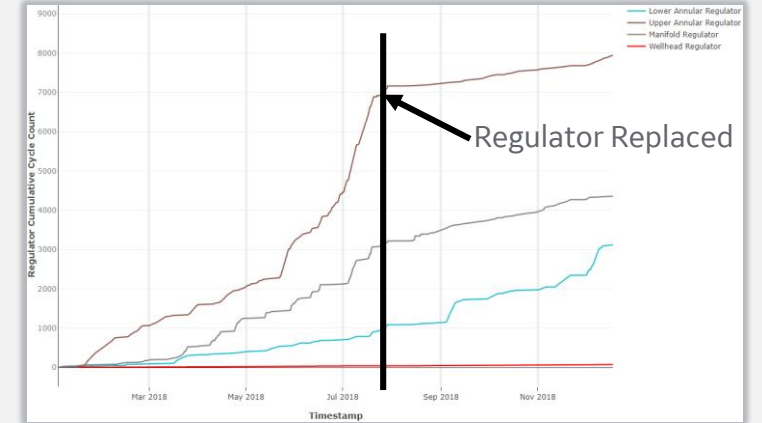
Trends



Regulator Lifting

After upper annular was found to be leaking for an extended time, the regulator lifting metric indicated that it was past its recommended useful life

- A life cycle metric for the regulator was calculated based on the pressure sensor data collected
- Metric indicated that regulator was beyond its recommended life



Decision was made to replace regulator prior to deployment of stack again



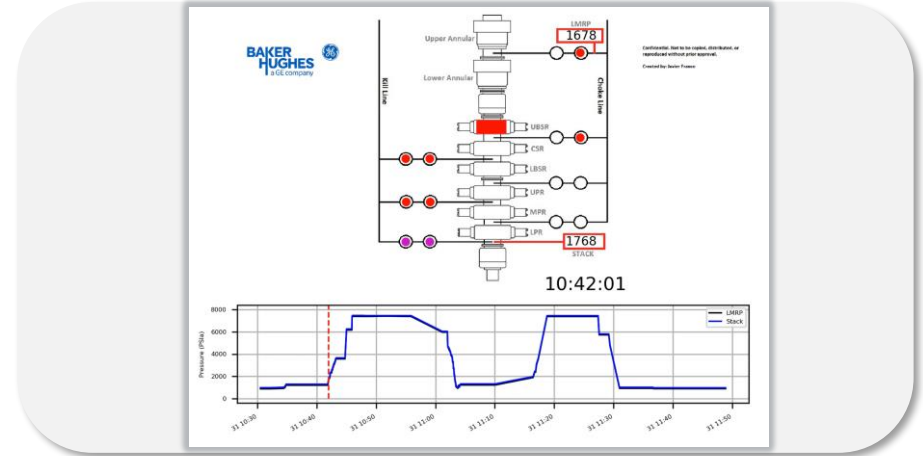
Potentially prevented an unplanned stack pull saving a minimum of **2 days of non productive time**

Blind Shear Rams

- Blind shear rams were unable to pass a pressure test
- Rubber seals parts were found in the flow line

Based on analysis, it was found the sequence of events led to opening rams under differential pressure

Video generated to replay the sequence of events



Recommended operations to change their pressure testing sequence and documentation to prevent issue in the future

- Eliminated extensive engineering RCA
- Allowed operator, contractor, and OEM to quickly agree on root cause **preventing down time of 5-10 days**

Where to learn about Data Science...

1. [Pluralsight.com](https://www.pluralsight.com)
2. [Datacamp.com](https://www.datacamp.com)
3. [Udacity.com](https://www.udacity.com)
4. [Coursera.com](https://www.coursera.com)
5. [edx.org](https://www.edx.org)

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