

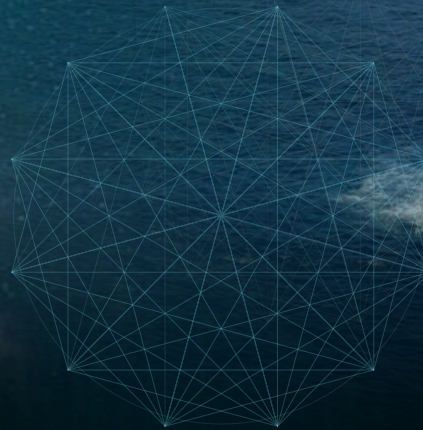


The Internet of Everything: Transforming O&G Industry in the new age

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March 12th , 2015

*Amazing things Happen When You
Connect the Unconnected*



Why Internet of Everything?

Business Outcomes

Process | People | Control



Managed Services



Business Processes



Advanced Process Controls



Apps and App Store

Big Data and Analytics

Raw Data | Knowledge



Cloud



Fog Computing



Data in Motion



Analytics

Connecting Assets

Instruments | xxx | Analytics



Block Valve



Wellhead



Production Platform

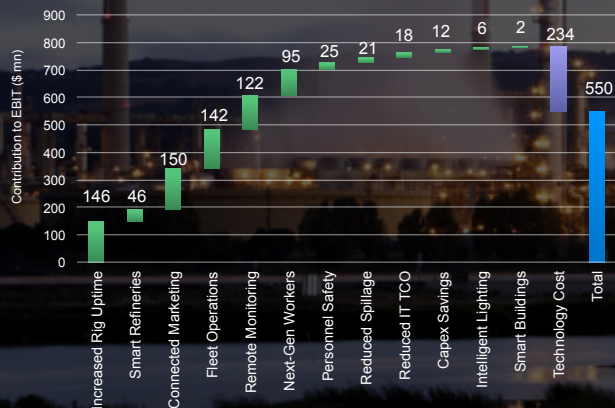


Drilling Rig

O&G IoE Value At Stake

O&G Value Drivers:

IoE Value at Stake 2014–2023



Improve Recover Rate

Reduce Downtime

Increase Assets Utilization

Reduce Operational Costs

Health and Safety

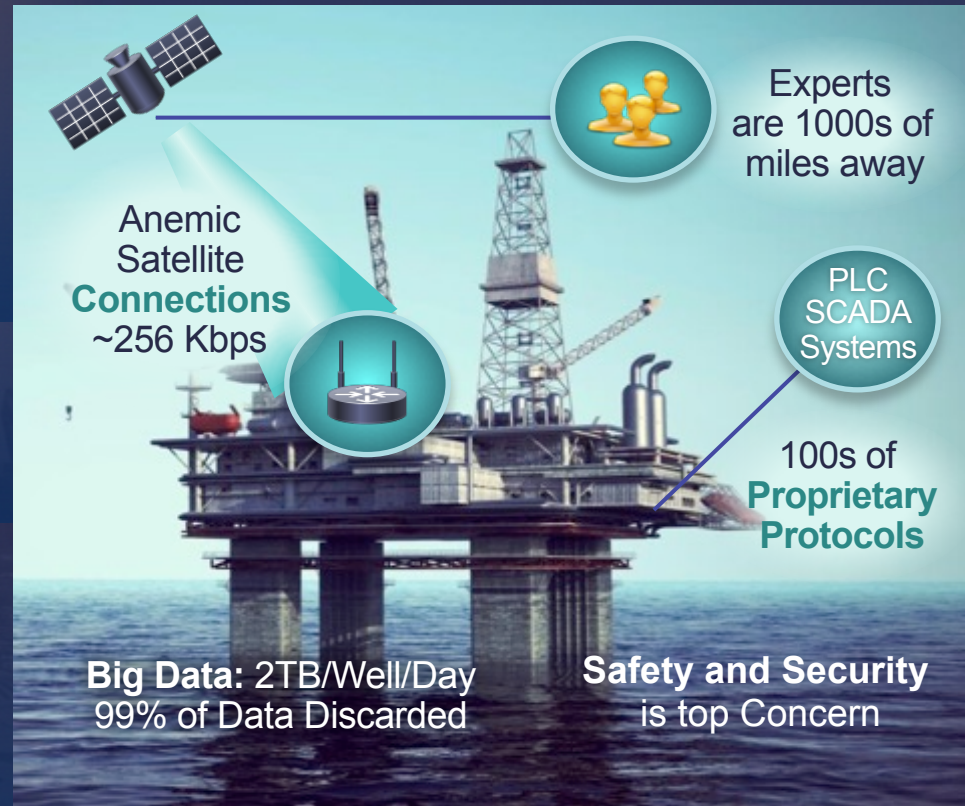
**Over
\$1.1T**

IoE Challenges

- Siloed Applications
- 17 Different Networks
- 30ton of cabling can be eliminated
- 43M³ of deck space in cabling, trays, junction boxes and cabinets can be freed

- Terabytes of data per day
- BW constraints
- Mission Critical Applications
- Security, Security, Security

- Scale (Millions of smart sensors)
- Proprietary Standards (Interop)



IoE Architectural Tenets

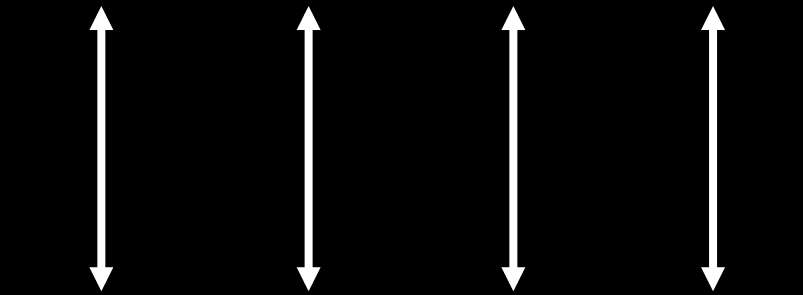


Converged, Managed Network

Information Technology (IT)

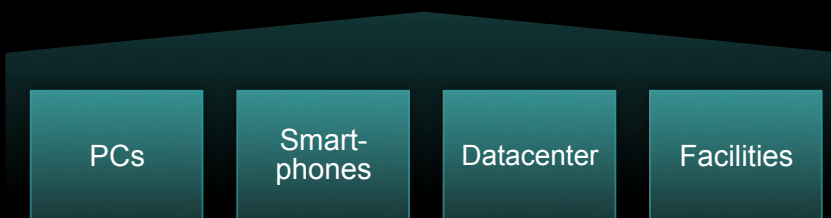


Operational Technology (OT)

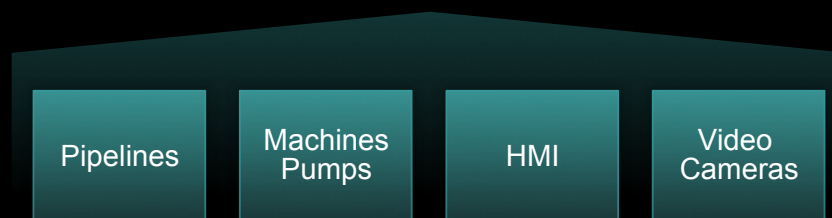


Convergence Delivers Control Over IP

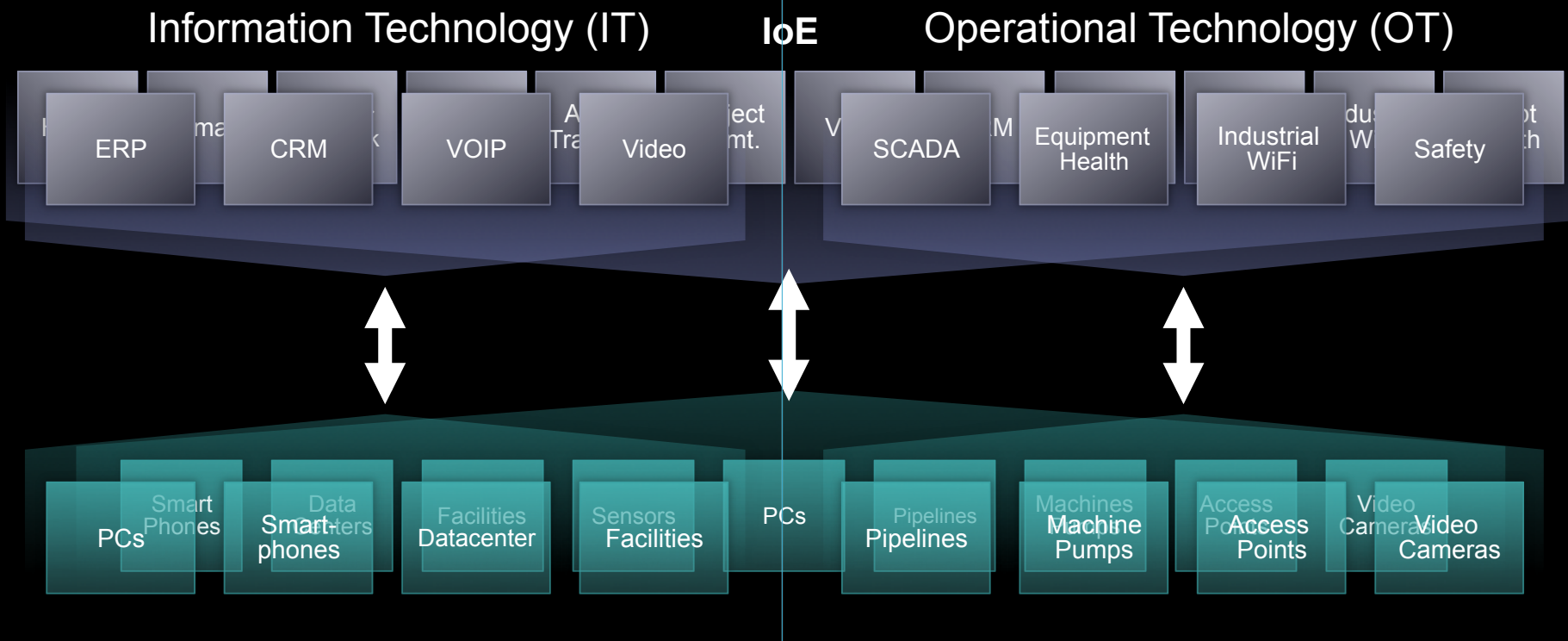
Information Technology (IT)



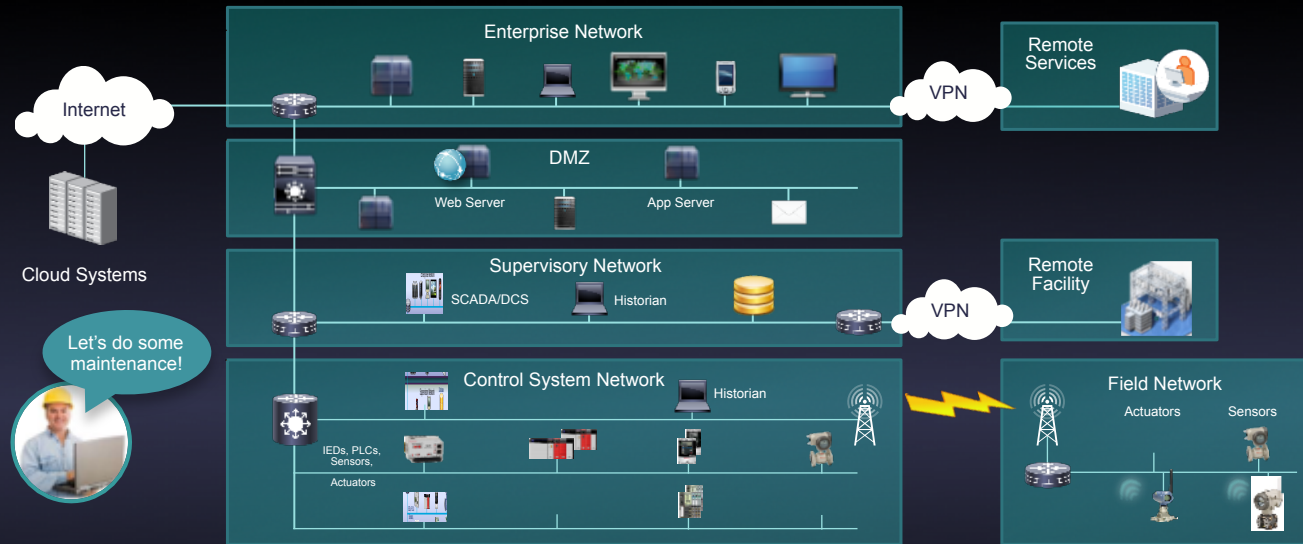
Operational Technology (OT)



Convergence Delivers Control Over IP



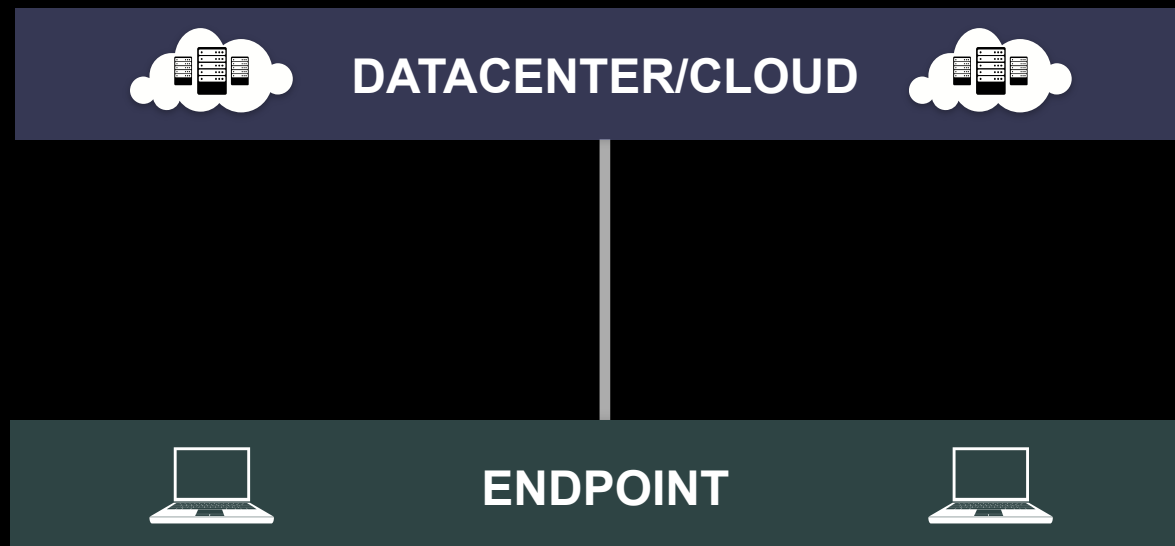
IoE Cyber Security: IT and OT Differences



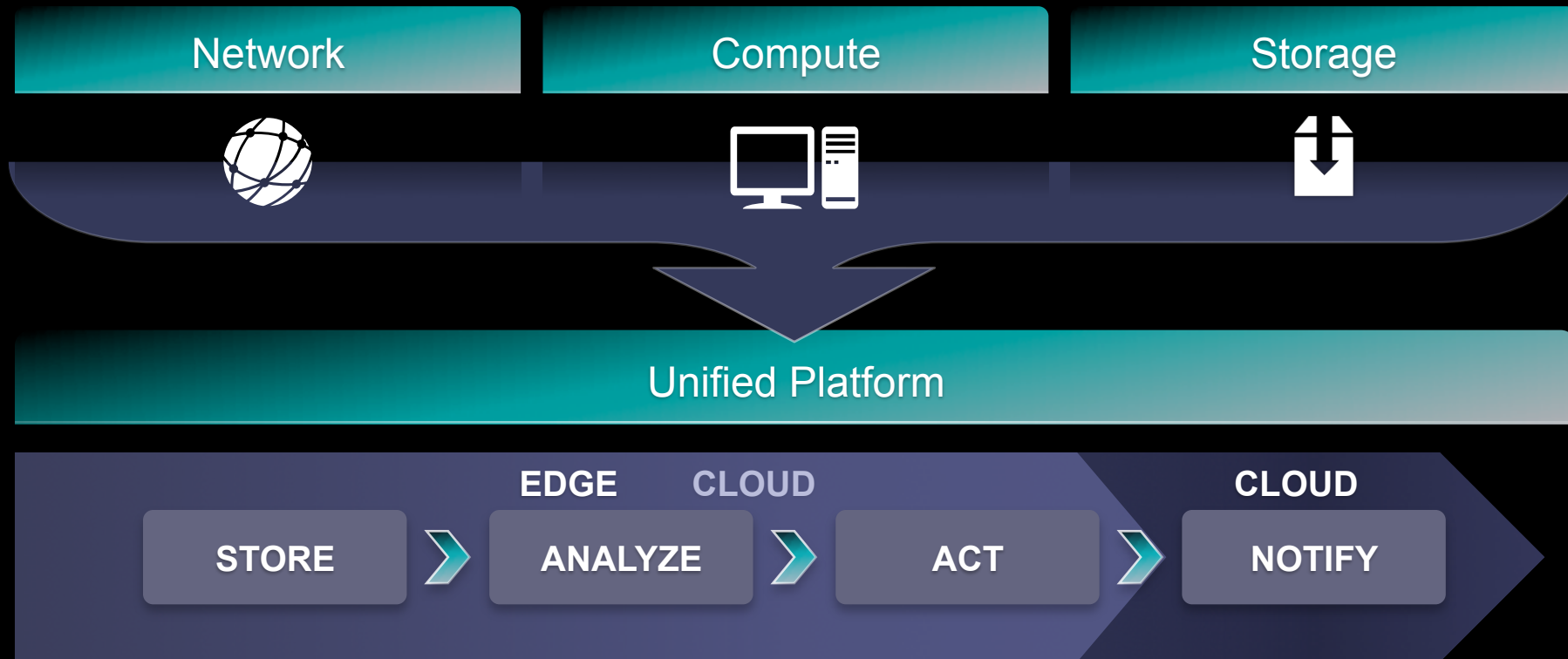
<p>PRIORITY</p> <p>Safety</p> <hr/> <p>Availability</p> <p>Integrity</p> <hr/> <p>Confidentiality</p>	<p>ZONE-BASED</p> <p>Plants</p> <p>Zones</p>	<p>THREAT INFILTRATION</p> <p>Inside and Outside</p>	<p>SIGNATURES</p> <p>IT: Voice/ Data/Video</p> <p>OT: SCADA</p>	<p>NON-STOP OPERATIONS</p> <p>Control Apps Have Priority</p>	<p>LACK OF SECURITY EXPERTISE</p> <p>"Electricians"</p>
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IoE Requires Distributed Computing

Traditional Computing Model
(Terminal-mainframe, Client-server, Web)



Paradigm Shift with Edge Intelligence



Introducing: Fog Computing

IoE Computing Model
(Data Volume, Security, Resiliency, Latency)

