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### **Physics-Driven Innovation In the Oil and Gas Industry**

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In terms of sheer scale and financial investment and geographical footprint, nothing is bigger than the oil and gas industry. This “mature industry” employs a bewildering mix of technologies dating from the 19<sup>th</sup> century to the 21<sup>st</sup>. Oil well construction represents one of the largest volume markets for steel tubulars, Portland cement, and high-quality sand. On the other hand, advanced 3D seismic data processing, shaped-charge perforating, and nuclear well logging have consistently driven forward the state of the art in their respective areas of applied science, as much or more so than defense or other industries. Moreover, a surprising number of physicists have made their careers in the oil industry. To succeed at introducing new technology requires understanding which problems most need to be solved. The most esoteric technology can take off in this industry if it honestly offers the best solution to a key problem that is costing millions of dollars in risk or inefficiency. When the right breakthrough solution emerges, the resources to implement it can be almost limitless. However, the prevailing culture is conservative and brutally cost-driven: any cheaper or simpler solution that performs as well will prevail, no matter how inelegant!