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Please fill in your abstract title.	An Industrial Internet of Things (IIOT) Platform that Closes the Gap between E&P Operations and Data Science

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Abstract

Objectives/Scope:
This paper proposes the architecture of an IIoT platform that minimizes the overhead and accelerates value creation in the context of the digital oilfield. As an integrated portal for all members working in the same ecosystem, it is the first platform focusing on minimizing the gap between in-house modeling teams and operational teams in an industrial context.

Methods, Procedures, Process:
The proposed IIoT platform is composed of four components: edge, model hub, model deployment software, and end-user applications (see attached figure).
The cloud-based model hub is the core of the system where all computational models are deployed to and managed, and where live data streams through and connected to deployed models. For scalability and security purpose, containerization is implemented. When a model is published to the hub for deployment, the model hub creates a container, a virtual computational environment, and hosts the model as a RESTful API there.

On the asset side, edge devices are equipped with edge agent software that gathers sensor data and sends to the cloud. The edge component sits in the field, connected to the equipment, and securely streams the live, operational data into the model hub.

Model deployment software helps data scientists who create data-driven models to publish their work securely and efficiently. The same desktop client can also be used by data engineers to manage data tags.
At the downstream of the system, various types of applications can be created or connected to the output streams generated by models, including third-party BI tools and customized application user interface rendered automatically during the deployment process.

Results, Observations, Conclusions:
One of our partners, a major pump manufacturer and service provider, connected edge sensors on pumps to this platform. Data scientists built a predictive maintenance model that could effectively predict potential pump failure ahead of time, which reduced the cost of NPT associated with pump replacement on offshore platforms significantly. This integrated platform enables the data science team to re-train and re-deploy models with minimal overhead, and it also enables the operation team to always use the latest models.

Another testing partner, a mid-size unconventional operator, utilizes the platform on their water management project. Connecting the sensors on their fracking water trucks to the platform, their logistics team built a data-driven model to identify anomalous operational records that did not match billed operations and a safety violation monitoring system, which effectively reduced HSE risk as well as contractor fraud.

Novel/Additive Information: The proposed IIoT architecture is the first one focusing on minimizing the gap between in-house modeling teams and operation teams in an industrial context. This work successfully addresses the challenge of operationalizing the digital oilfield, in turn catalyzing smart operations through industrial analytics.