Kick-off Meeting for
DIRECT: DIgital REservoir Characterization Technology

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We are excited to announce the kick-off meeting for the Direct: Digital Reservoir Characterization Technology consortium to be held on **June 13th, 2019, commencing 9:00 am** at:

Anadarko Conference Center (Hackett Tower 3rd Floor)
1201 Lake Robbins Dr.
The Woodlands, TX 77380

Appreciation to Anadarko for hosting the event.

Agenda

Time	Speaker	Topic
9:00	Michael Pyrcz	Welcome, Introduction Geostatistics and Data Analytics
9:30	John Foster	Introduction Numerical Modeling
10:00	Carlos Torres-Verdin	Introduction Geophysical Data Integration
10:30		**Break**
10:45	Eric van Oort	Introduction Geomechanical Data Integration
11:15	Michael Pyrcz	Initial Proposed Plans / Steering
11:45		**Additional Discussion and Feedback**
12:00		**Lunch Provided**

We are happy to discuss,

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Prof. John Foster
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Prof. Carlos Torres-Verdin
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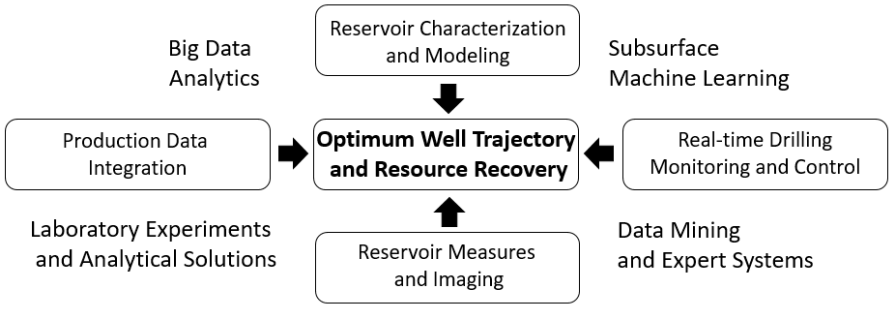
Austin, TX 78712-1585

More Information about the DIRECT Consortium

Opportunity

There is an opportunity to combine best-practice and cutting-edge technology in reservoir spatiotemporal characterization and modeling, production data integration, reservoir geophysics and real-time drilling control with big data analytics and machine learning to optimize well trajectory and resource recovery.



Optimum well trajectory and resource recovery through integration of engineering, data analytics, and machine learning.

The hydrocarbon industry requires high-resolution, integrated physics-and geology-based and data-driven, real-time updateable models that are cost-effective, interpretable, efficient, and reliable for production-oriented optimum decision-making, for both conventional and unconventional resources.

This **DIRECT** industrial affiliates program, based in the Hildebrand Department of Petroleum and Geosystems Engineering, at the University of Texas at Austin, will work to develop these integrated modeling and decision support systems to solve the following outstanding problems:

- **Integration**: Maximizing the integration of deterministic engineering physics, geological description, target-oriented drilling, geophysical measurements, borehole formation evaluation, production history and core data to construct high-resolution reservoir models for improved production forecast accuracy.
- **Characterization:** Improving the spatial resolution of reservoir description and modeling based on enhanced data integration for improved development decision-making.
- **Grey Box Modeling**: Development of big data analytics and machine learning methods that fully account for geospatial and engineering knowledge, for black box (data-drive) plus white box (physics-based).
- **Robust Decision Making:** Automated, expert systems with feedback to support consistent evaluation and decision making with subsurface and production data.
- **System Interpretability:** Advanced, real-time system summarization, feedback and spatial visualization for model interrogation and learning from models for credible decision support.
- **Optimum Drilling:** Development of production-oriented drilling strategies by designing trajectories for optimum well placement to maximize reserves intersection and recovery factors by primary or secondary production means.
- **In-fill Drilling**: Development of efficient, and cost-effective strategies to evaluate in-fill drilling, primary or secondary production, and intelligent feedback control systems for reactive production under variable geological, fluid and financial constraints.
- **Uncertainty Quantification**: Development of modern methods to ascertain the value of measurements and the uncertainty of descriptions and quantifications, and real-time feedback on impact on the development decisions.
- **Modern Software Solutions for Reservoir Characterization**: Development of modern computer and software solutions for rapid and efficient 3D collocated multi-physics description, visualization, modeling, well geosteering, and production forecasting.

Short-term Goals (1-2 years)

The consortium will develop new methods and workflows in spatial, big data analytics and machine learning for petrophysical, geophysical, reservoir engineering and geomechanical integration into subsurface models for optimum well trajectories and reservoir recovery, including:

- Novel big data analytics methods and workflows for data debiasing, imputation of missing data, feature and anomaly detection.

- Novel reservoir-oriented methods for geophysical data processing and interpretation for high-resolution reservoir description and updating.
- Novel data analytics and machine learning methods and workflows for early deployment to consortium members.
- Well-documented examples, best practice workflows and case studies, training and mentoring for development of member company operational capability.

Mid-term Goals (3-4 years)
The consortium will develop novel machine learning-based geomodeling and forecasting methods and workflows.

- Novel machine learning methods and workflows for spatiotemporal, multivariate modeling that account for data bias, spatial correlation and trends, multivariate physics-based constraints that are robust in the presence of sparse to big data for deployment to consortium members.
- Well-documented examples, best practice workflows and case studies, training and mentoring for development of member company operational capability.

Long-term Goals (5-6)
The consortium will develop real-time updateable expert systems for optimum field development.

- Novel integrated systems for optimum production-oriented well geo-steering and completion.
- Port algorithms and key findings into a modern computer and software architecture and protocols for user-friendly interactions, diagnostics, learning and decision support.
- Well-documented examples, best practice workflows and case studies, training and mentoring for development of member company operational capability.

Consortium Leadership
The faculty leading this IAP are uniquely capable to address these challenges, given our strong knowledge concerning geology, geophysics, geomechanics, drilling and completions, reservoir engineering, formation evaluation, geostatistics, reservoir modeling, data analytics and machine learning.

Membership
Consortium start-up requires three supporting partner companies at $60k/year. At this level of support, the consortium will be able to support 3-4 PhD students to conduct the planned research supervised by leading faculty and while integrating input from the consortium participants. Interested companies are welcome to join now. We will host a formal kick-off session in The Woodlands, TX on June 13th, 2019 at the Anadarko office.

Additional Information
See the exploratory prototypes summary at https://github.com/GeostatsGuy/DIRECT.

We are happy to discuss,

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