

## LUKOIL: Reinventing Digital Oilfield



**2020**

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PJSC LUKOIL



# Project Goal and Objectives

## GOAL



Improve performance when operating oil-and-gas production equipment (OGPE)

- ☒ Creating an environment for collective situation analysis (CSA)
- ☒ Realigning authority and responsibilities at the management department – Central engineering and technical service (CETS) — Oil and Gas Production Unit (OGPU)
- ☐ Introducing up-to-date tools for integrated production modeling and planning while ensuring the required HSE level

## OBJECTIVES



- Short-term planning
- Operations management and step-by-step operation checking
- Analysis and decision making
- Cost optimization

## PROJECT SCOPE

### Stage 1. Solution development

- ☒ LUKOIL – Perm LLC
- ☒ LUKOIL – West Siberia LLC
- ☒ LUKOIL – Nizhnevolzhskneft LLC

### Stage 2. Solution deployment

- ☐ LUKOIL – PERM LLC
- ☐ LUKOIL – West Siberia LLC
- ☐ RITEK LLC
- ☐ LUKOIL – Komi LLC
- ☐ LUKOIL – Nizhnevolzhskneft LLC
- ☐ LUKOIL – Kaliningradmorneft LLC

## Digital Oilfield Project



### Main components

- Creating Center for Integrated Operations (CIO)
- Integrated planning
- Scheduling production processes
- Integrated production modeling
- Constraints model management
- Applying an assessment method for economic evaluation of well intervention activities (WIA)
- Industrial safety and environment monitoring
- Engineering simulators and training simulator complexes

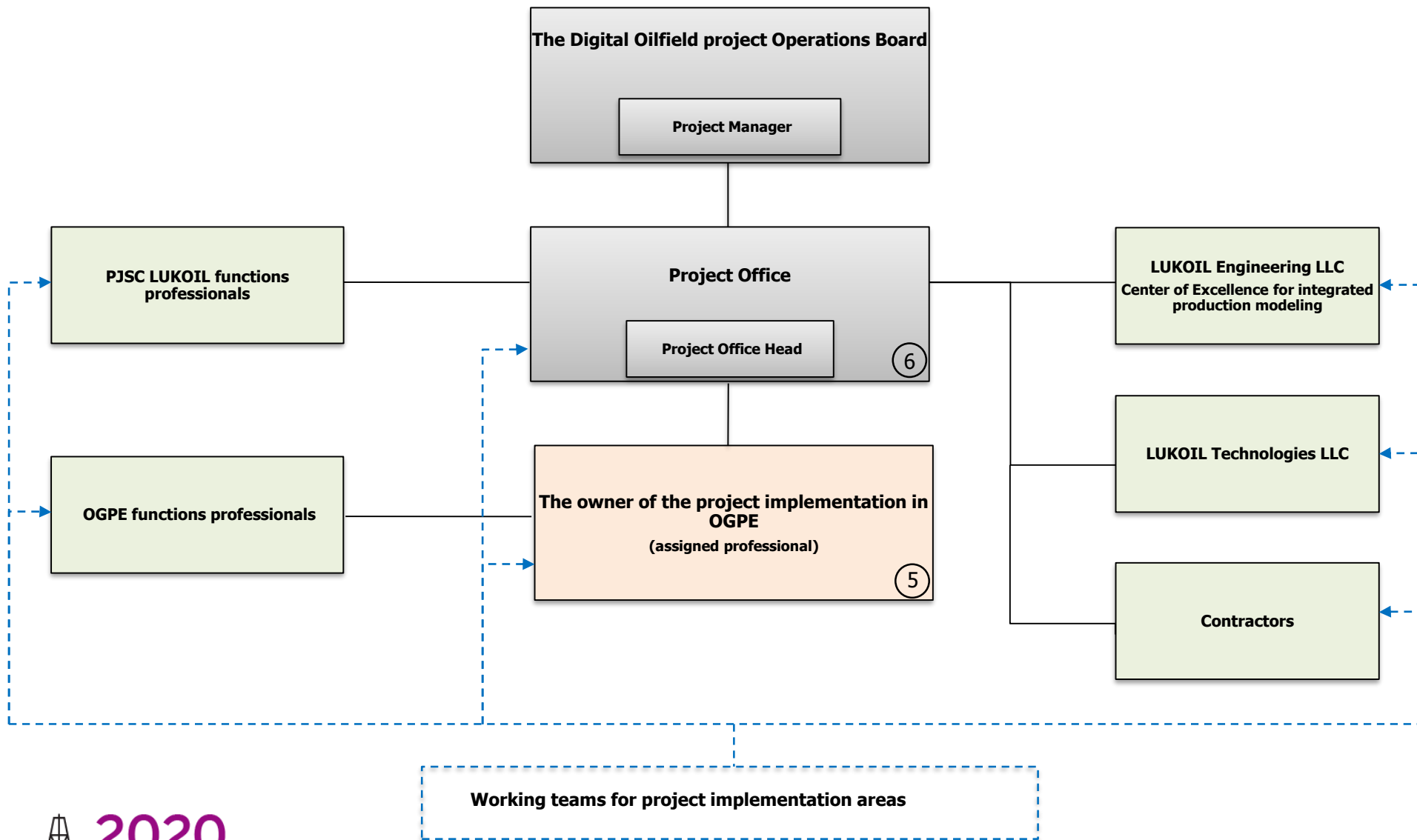


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# Project Management Structure



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# Center for Integrated Operations



## Center for Integrated Operations:

A multidisciplinary team whose key function is improving the operations performance by using up-to-date tools.

## Key Business Processes

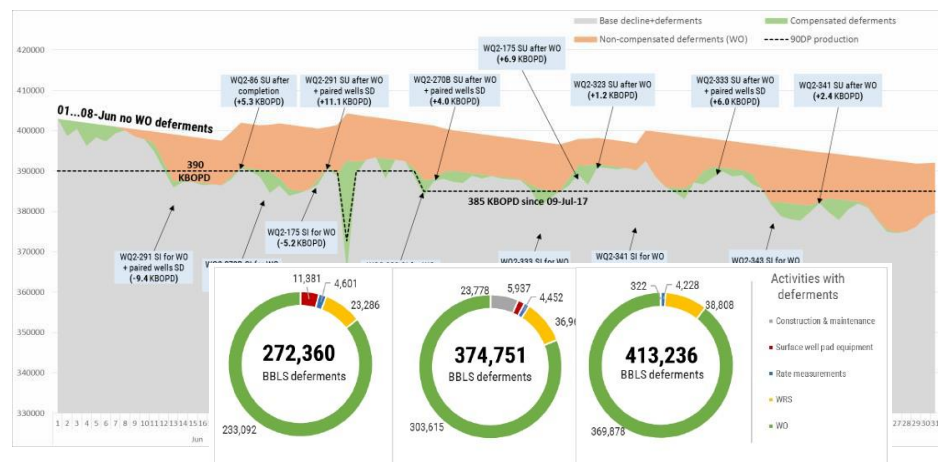
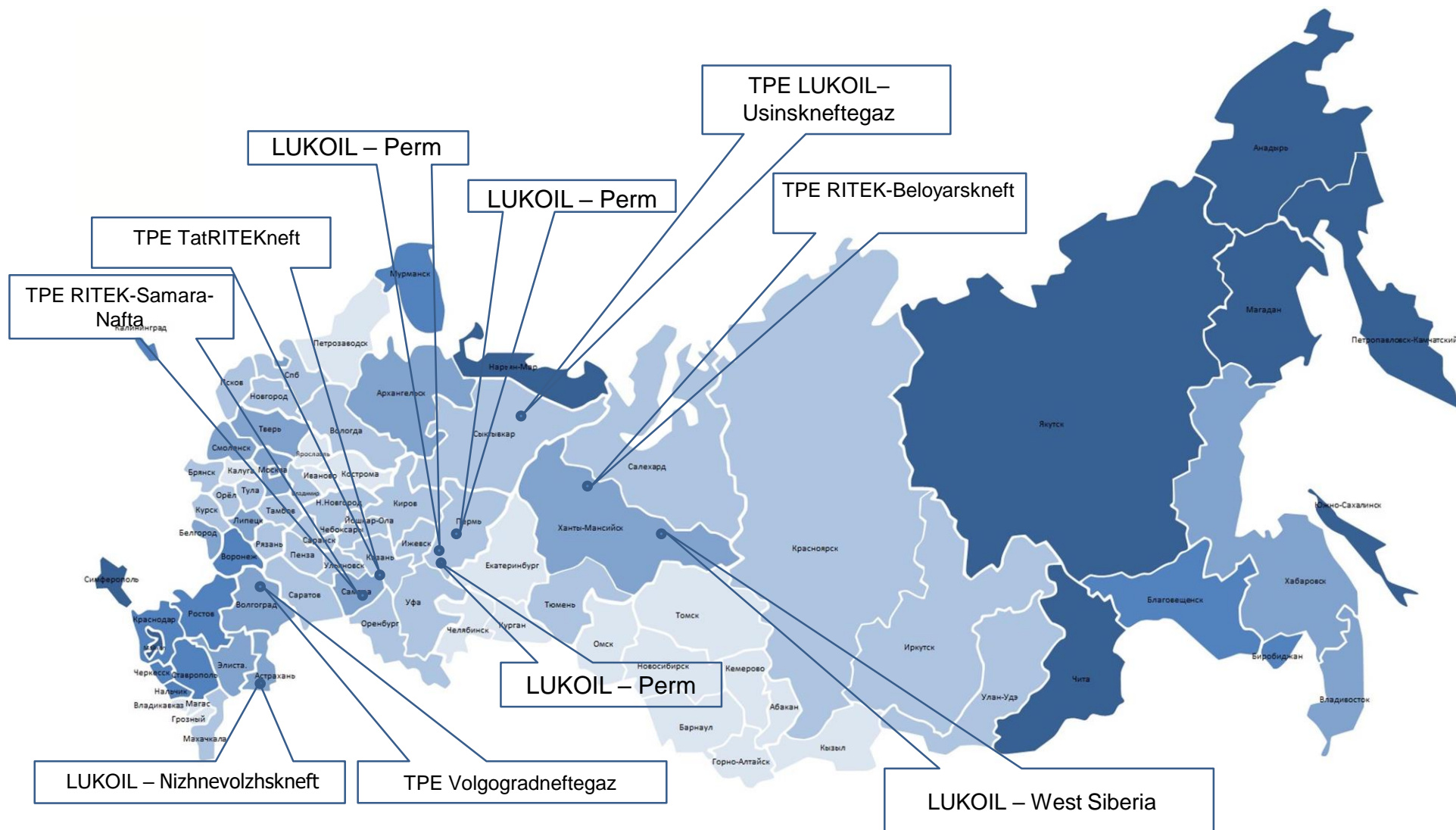


Figure 29. Deferments for June - August 2017



# Introducing Centers for Integrated Operations

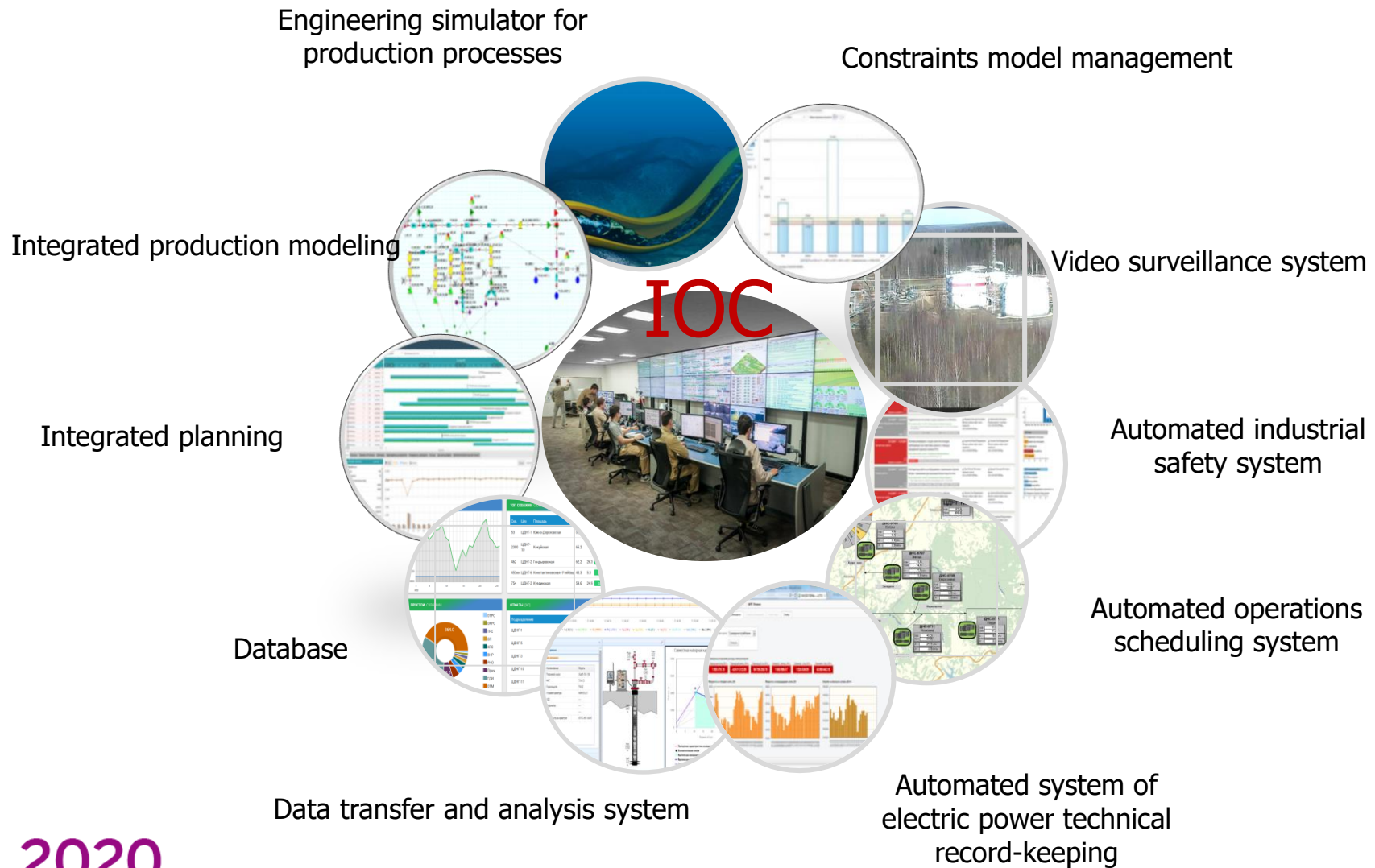


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# Decision Making Support System



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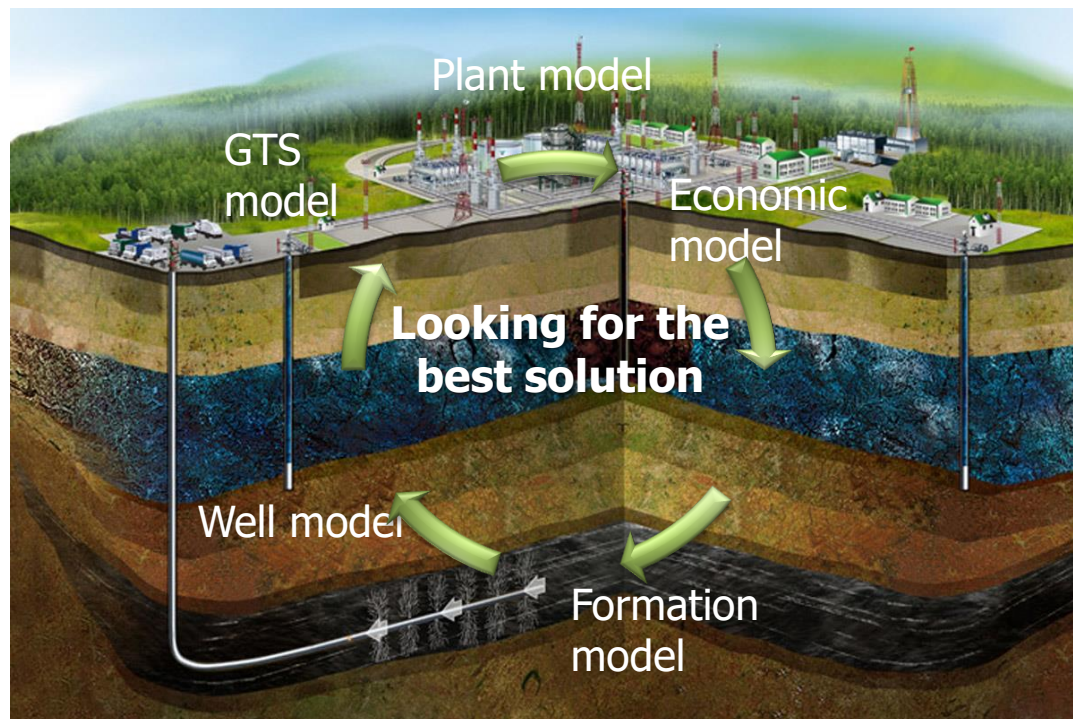
# Integrated Production Modeling

## Integrated Model:

A tool used to calculate the potential outcome and constraints, optimize production and plan performance figures based on the interaction between the integrated model components.

## Benefits:

- ☐ Identify the actual production potential.
- ☐ Plan exploitation rates based on the optimization scenarios for reaching the potential outcome.
- ☐ Ensure the accurate planning and forecasting of performance figures for production.
- ☐ Monitor and assess the risks associated with hydrocarbon production.



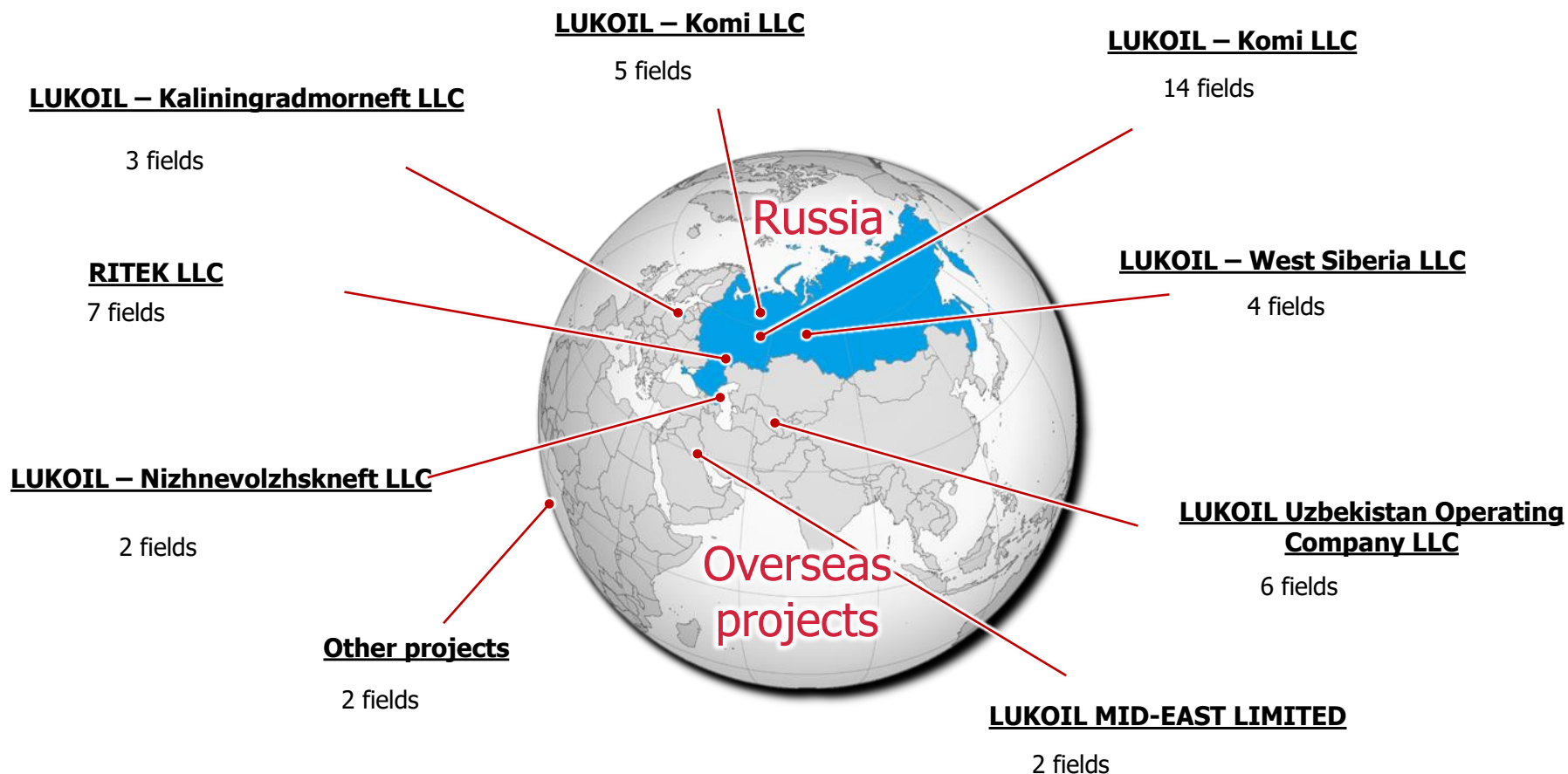
**To create and implement an integrated model, a wide range of input data for all the segments of the production chain has to be used**

\* GTS = Gathering and Transport System



# Introduction of Integrated Production Modeling

- Total number of Integrated Model fields – 45
- Current production share – ~30%
- by 2025 – 125 fields
- Target production share of Integrated Model fields – 80%





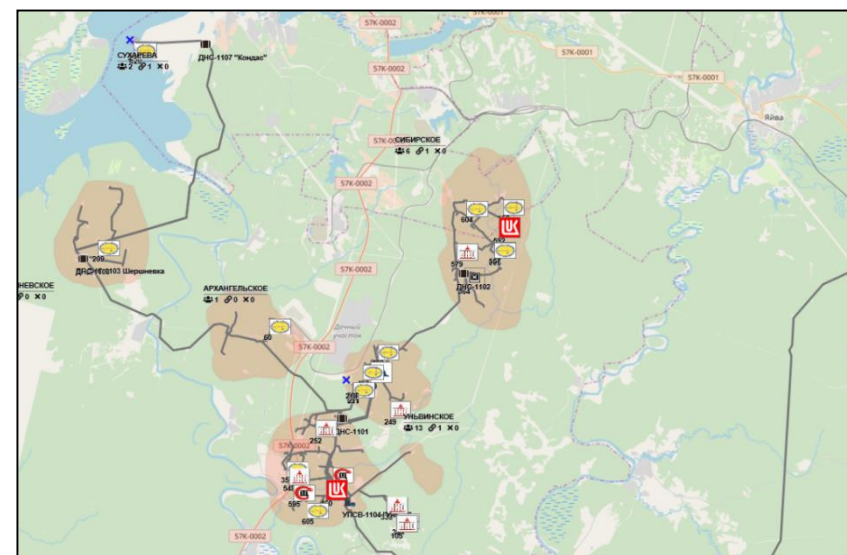
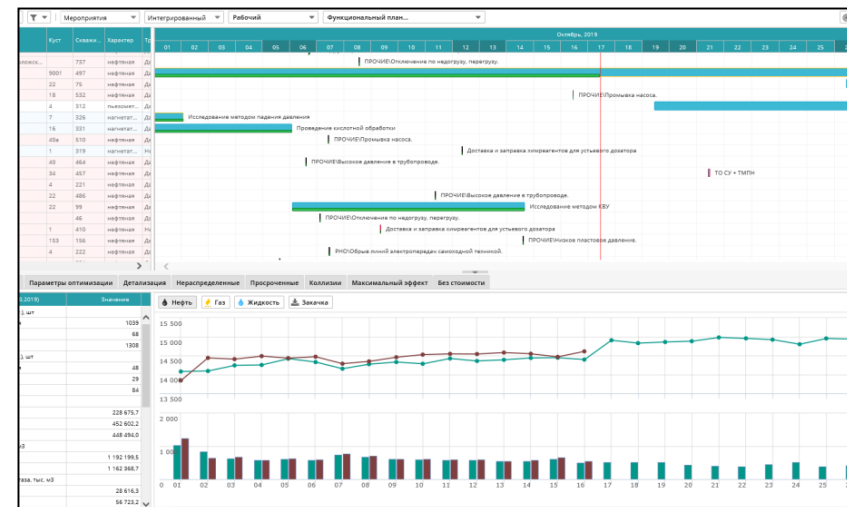
## Integrated Planning

## Integrated Plan:

A comprehensive activities plan designed to reach the target figures and ensuring coordination between different services and functional areas.

## Benefits:

- ❑ Automatically generate a single consolidated plan of activities to be performed by the production facility
- ❑ Optimize the activities plan to fit different purposes (production increase, production shortage reduction, work performer downtime minimization)
- ❑ Create the best sequence of work schedule for well servicing and workover (WSW) teams with the predetermined set of constraints taken into account
- ❑ Monitor plan implementation, signal deviations





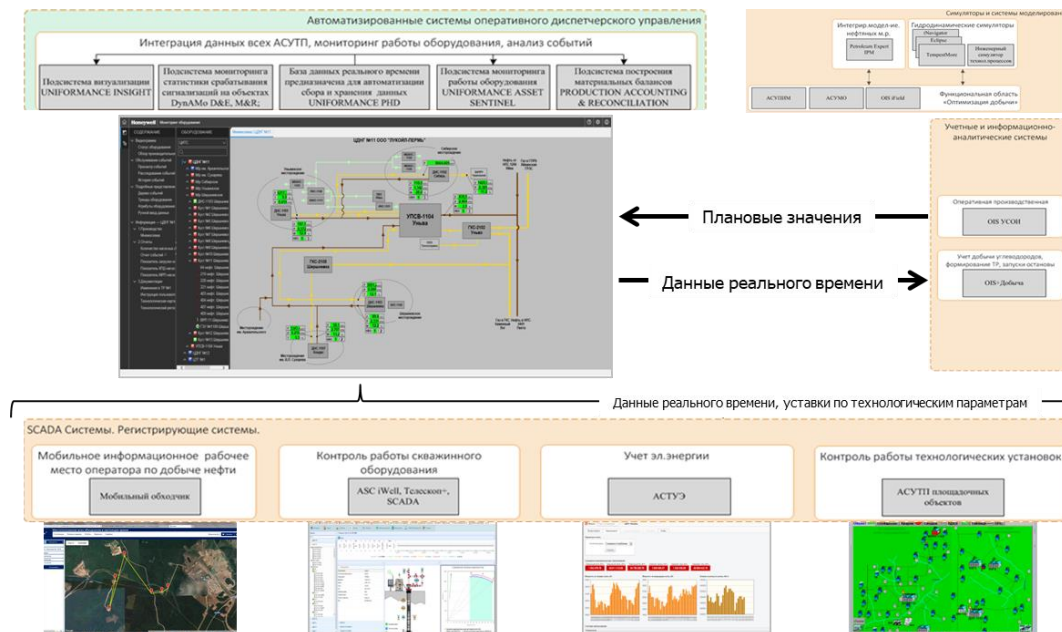
# Collecting and Analyzing Field Data

## Data Transfer and Analysis System:

A set of software used to ensure online well monitoring, analysis and management

## Objectives to meet:

- ❑ Monitor the execution of operating practices
- ❑ Identify and signal out-of-plan deviations in a timely manner
- ❑ Adjust equipment operating modes remotely
- ❑ Generate analytical reports and carry out comprehensive analysis



**When using comprehensive analytical tools,  
the quality of input data is of utmost  
importance**



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## Challenges

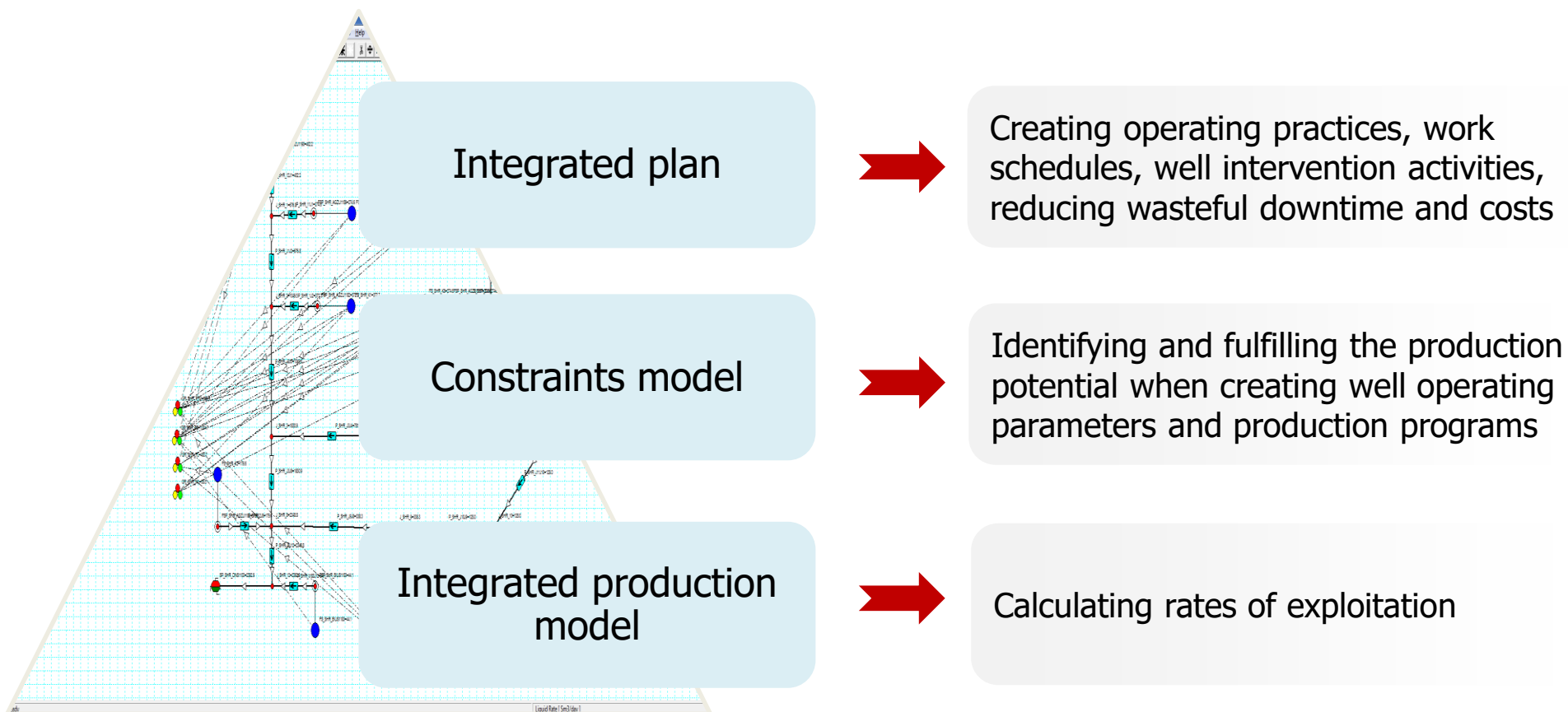
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**The main task is to build the Digital Oilfield project tools into the company's existing business processes and IT architecture**

- Change/optimize business processes
- Update regulatory and procedural guidelines and local regulations
- Integrate software products
- Build tools into the existing IT architecture
- Automate processes



# Continuous Process of Operations Performance Management

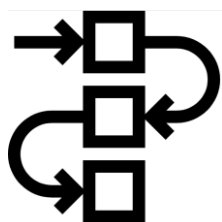
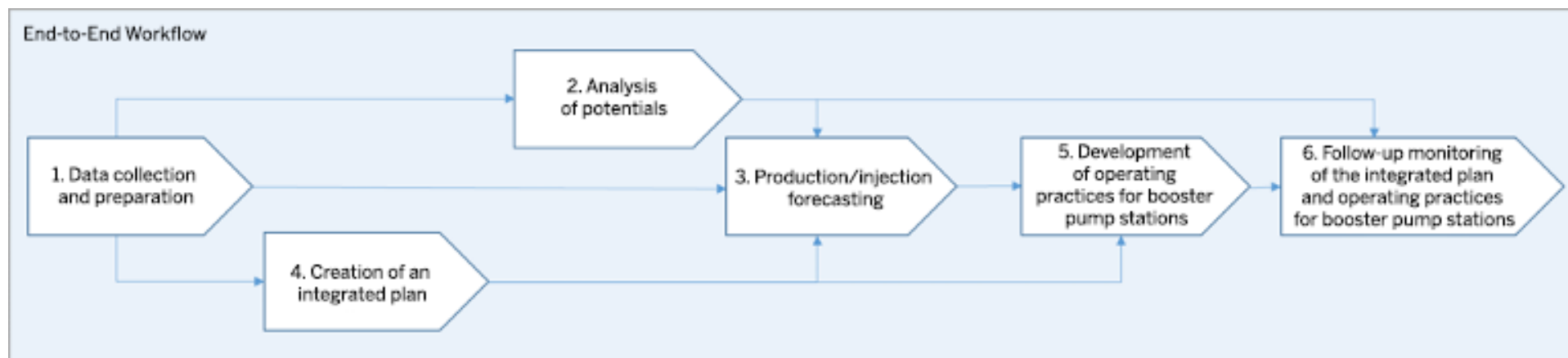


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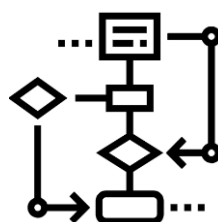
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# End-to-end Workflow



6  
workflows



42  
functions



80%  
automated



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# Creating the System to Improve Operations Performance



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**Всегда в движении!**