

TECHNOLOGIES

In 2018, we launched a program¹ to further enhance the Company's automation processes. The main purpose of the program is to boost the efficiency of decision making at all levels: from wellsite operations to integrated planning at the PJSC LUKOIL level. By applying information technology, we can ascertain and prevent a wide range of risks early on, including investment mistakes and the ineffective execution of investment projects, the loss and corruption of data, big data analysis, and poor integration of management processes.

Investment projects have been developed that are currently at different stages of implementation. Most of them are at the pilot stage in Russian entities, and a decision will be made on whether to roll them out in other areas. The Company works on developing end-to-end technologies across all business segments, including in the following areas:

- Digital information management and cybersecurity
- Operational data analytics
- The robotic automation of routine operations

- Predictive equipment maintenance and repairs
- Health controls and the automation of mobile personnel functions
- Intelligent video analysis systems
- Digital social interaction and a knowledge-sharing support platform
- Mobile services

In 2020, we continued to implement and roll out projects across key business segments.

Sample projects in the Exploration and Production business segment

- Integrated simulation (implementation). The models created determine the optimal risk-adjusted production potential. During 2020, we built 61 field models.
- Drilling emergency forecast (pilot stage). These projects optimize drilling times, reduce the number of complications from operations, and mitigate the severity of consequences from unavoidable complications.
- Management of mature field development using neural networks (pilot stage). The project is designed to optimize the operation of reservoir pressure maintenance systems, which positively affects the energy output ratio.
- Completion of the pilot project of the power equipment maintenance system, based on a predictive condition analysis in LUKOIL-West Siberia. In 2021, we plan to roll out the project for all regional subdivisions of LUKOIL-West Siberia, LUKOIL-Komi, and LUKOIL-Perm.

¹ In 2019, the Board of Directors decided call this program the LUKOIL Group's Functional Development Program for Information and Technology Support.

Sample projects in the Refining, Marketing and Distribution business segment

The following projects have been put into commercial operation:

- Predictive analytics of the technological and dynamic equipment state (duplication stage). The project will boost the availability of process equipment by cutting down on unscheduled repairs and detecting early signs of equipment wear. Predictive analytics systems have been implemented at the Perm Oil Refinery (70 equipment items are being monitored) and at the Volgograd Oil Refinery (10 items of equipment). A task force made up of predictive analytics engineers has been set up to consolidate their experience for the subsequent roll out of solutions. In 2021, the Volgograd Oil Refinery plans to continue this project, involving the monitoring of an additional 50 units of equipment.
- The APC+ enhanced management systems make it possible to optimize the operation of process units using artificial intelligence methods and the analogs of virtual analyzers and to use artificial intelligence to predict the future conditions of units. The project is at the final stage of implementation at the Nizhny Novgorod Oil Refinery and the Oil Refinery in Bulgaria.
- An intelligent video surveillance and video analysis system has been installed at the Volgograd Oil Refinery to enhance operational safety: 25 cameras are able to detect fire and smoke and record violations of personal protective equipment rules.

The following projects are at the final stage of implementation: Unified Digital Platform and Mobile Personnel (Perm Oil Refinery), and implementation of enhanced management systems.

Sample projects in the Corporate and Other business segment

- A working prototype of the new Intranet Portal has been developed to display information and provide services, depending on the user profile and employee category. The system will go into pilot operation in 2021.
- As part of the Data-Driven and Visual Analytics Employee Performance Management project prototype services for goal-based management, employee performance analysis, and decision support were developed.

Improving cybersecurity

- Design of the information security system for significant facilities of critical information infrastructure has been completed.
- Solutions to protect resources and services of the Shared Information System against modern cyberthreats have been implemented, and the quality of access controls improved.
- Transition to a new secure Internet access solution is in progress, to bolster anti-malware and cyber-fraud protection.
- A Zero-Day Exploit defense solution has been implemented, which provides additional scanning of corporate email messages for threats.