



# DIGITALIZATION AS A SUCCESS-DRIVING FACTOR

## GeoSplit Experience

WITH EVERY PASSING YEAR THE CONCEPT OF ECONOMIC ACTIVITY BASED ON DIGITAL TECHNOLOGIES BECOMES MORE AND MORE WIDESPREAD. IT BECAME ESPECIALLY POPULAR IN INDUSTRIAL BRANCHES. THE TECHNICAL DIRECTOR OF GEOSPLIT LLC EVGENII MALIAVKO TOLD US ABOUT THE WAYS IT HELPED THE OIL AND GAS INDUSTRY DURING THE PANDEMICS AND WHAT THE HIGH-TECHNOLOGY OILFIELD SERVICE COMPANY OFFERS ITS CUSTOMERS

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**Evgeny Malyavko,**  
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**- Evgeny, in your opinion, has digitalization helped cope with the challenges of 2020 in the industry? And what is the situation with this in your company?**

- Of course, 2020 entailed significant changes both in our everyday life and in the professional environment. Nevertheless, the oil and gas industry, despite its inherent conservatism, to my mind, has managed to flexibly respond to external challenges. This happened, among other things, by virtue of the previously set industry practices of digital transformation. Almost all oil and gas producing companies in Russia — LUKOIL, Gazprom Neft, Rosneft, NOVATEK, Tatneft, Zarubezhneft and others — indiscriminately have their own digital strategies, but in many ways 2020 has become a turning point and helped understand whether digitalization will

remain only a fashion trend or will really bring new technological value to our industry.

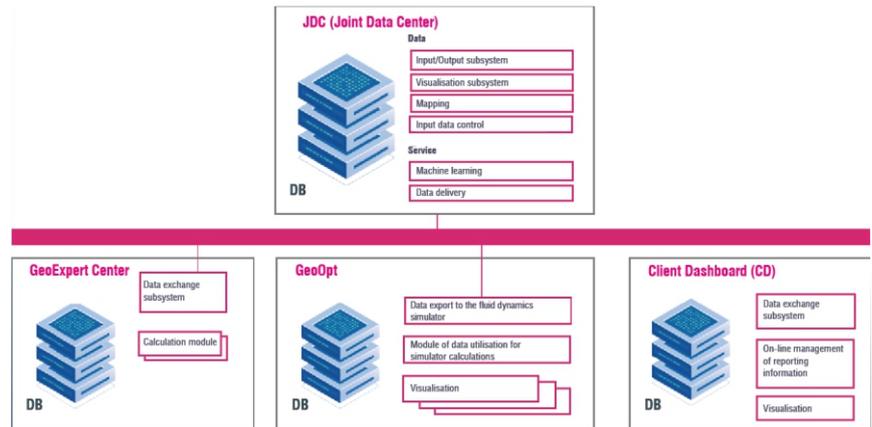
Like many players in the oilfield services market, we have also redesigned some of our business processes by transitioning them to the online environment. And, indeed, once again we realized that we had chosen the right way to develop digital solutions increasing the value of our traditional products. If we talk about the results of 2020 for GEOSPLIT, despite the period of turbulence and uncertainty in the oil and gas industry, we managed to maintain the trend for sustainable business development and further strengthened our technology-oriented leadership. We have entered a new business cycle of the company development, introduced process solutions for the research of deep-sea production facilities, underground gas



storage, and main pipeline transport in the market, continued international expansion, opened a laboratory and representative offices in China and the Middle East, and launched a number of social and charitable initiatives. But perhaps the most important thing is that none of our projects was suspended, i.e., all our customers and partners received the marker diagnostics data in a timely and complete manner.

**- What is the value of GeoSplit's technology and what role does digitalization play in it?**

- Our technology is often considered as an alternative to traditional methods of studies related to oil and gas facilities. For example, in the field of horizontal well research, the methods of field



Geosplit Unified Digital Platform

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geophysics are deployed. As practice shows, companies dealing with subsoil use cannot study horizontal wells with the methods implying field geophysical tests (FGT) within the entire well stock, since it is expensive, there are risks of tool jamming and sticking in the horizontal wellbore, which requires well shutdown and impacts the production. At the same time, it cannot be argued that this is a bad tool, it is rather a tool for solving specific targeted problems. We strive to create a versatile, widely used and reliable data acquisition tool. Thus, the dynamic marker monitoring of horizontal wells allows abandoning downhole operations, improving the study information value and moving to complete trouble-free operation. Having once performed the horizontal well marking operation during the lower completion assembly immersion or having injected the marked proppant at multistage, after the well is put into operation, we take wellhead samples of reservoir fluid, then analyze them in our own laboratory and obtain data on the profile distribution and the inflow composition along the horizontal well. But the most valuable thing is that this approach allows to qualitatively increase the amount of information received. This may be considered as a great potential, since we are dealing

with the creation of a full-fledged monitoring system for the oil and gas facility under study and obtaining of a stream of data on its condition in the long term. Nowadays, when the speed of decision-making is increasing, one of the key needs is the data, by virtue of which the quality of decisions made by our customers will be improved. This is what we see as our mission. But is it possible to process Big Data without advanced digital approaches? This is the answer to the question raised in relation to the necessity of digitalization concept.

**- Well, then, what practical tasks are solved by digital approaches?**

- Let's start with the fact that the value of the marker diagnostics tool is that it can be applied for a diverse subset of tasks in several sectors of oil and gas production. I'll give you a couple of examples. In the Midstream segment, these are tasks related to the marking of oil and petroleum products in the main transport system to identify batches of off-spec product, reveal the cases of theft, illegal tie-ins in pipelines, etc. In the Upstream segment, these are tasks related to marking horizontal wells, monitoring water and gas breakthroughs along the

wellbore, and evaluating the effectiveness of stimulation operations, primarily multi-stage hydraulic fracturing and acid stimulations. Special tasks include diagnostics of the tightness of packer equipment, evaluation of the nature of the inflow along the hydraulic fracture itself. For example, in the conditions of the Bazhenov Suite hard-to-recover reserves (HRR), our technology is used as a way of additional study of this complex geological object in dynamics. But perhaps the most interesting and ambitious task for us is the quality improvement of field development design and management. We are already implementing several projects in Western Siberia, where we mark a group of wells rather than a single well. We are talking about carpeting or one hundred percent coverage of the field site with marker diagnostics, as a result of data processing, we get the opportunity to localize the remaining reserves, manage the inflow profile, control the flooding system, and it means the possibility of setting and solving optimization problems.

The tasks in the segment of designing the development systems related to finding answers to the following questions is not less interesting: How to optimally position horizontal wellbores relative to stress, how to select the optimal lengths of horizontal wellbores, how to place frac sleeves - evenly every 50 m, every 100 m, or, quite the opposite, to have a specific individual approach to each well. Universal and fully justified solutions have not yet been invented. By the way, this is a completely new class of tasks, since the industry has not had such an extensive practice of monitoring horizontal wells until now.

Particularly in this segment, the digitalization is a key element for us in transforming the data quantity into the quality of adopted decisions.

**- What is the method of field development management based on GeoSplit data?**

- It is obvious that in the conditions of geological uncertainty and the multi-variant development scenarios, it is impossible to manage the field without creating its model or digital 'alter ego'. In order to avoid turning this digital 'alter ego' into a 'cousin' or, in other words, a hardly resembling copy of the real object, the creation of models should be based on high-quality data. We provide this data. Now we distinguish two conceptually independent approaches in the area of field development management based on dynamic marker monitoring of wells, which can complement each other. The first approach is related to adapting permanent hydrodynamic models. Strictly speaking, geological and hydrodynamic modeling is today a fundamental approach to the design of development systems, the search and justification of the optimal development scenario. The first pilot project, which we have already implemented under this concept, allowed us building a coherent methodology for administering projects of this kind, starting from clarifying the geological structure of the reservoir section, analyzing the current state of the development system, identifying key problems in the particular field area, ending with developing and justifying practical recommendations based on marker diagnostics, a method for what needs to be done to optimize the development system, increase oil recovery or reduce the cost of RPM (reservoir pressure maintenance) system.

The second approach relies on non-geological modeling tools based on machine learning algorithms, artificial intelligence, a simplified physical reservoir model, and digital processing of field data arrays. We assume the material balance model as a physical model. As a machine learning model, we use algorithms adapted to training based on the tasks of classification, processing and forecasting the statistical material collected at different time points about the parameters of the 'well-reservoir' system. This approach allows solving a range of problems for evaluation of the connection of injection wells with the inflow profile along horizontal wellbores, search for other functional dependencies, and optimization of the operation of the production and injection well stock. The

advantage of this approach is a lesser resource intensity, as well as fast running of thousands of multivariate scenarios aimed at finding a class comprising the optimal ones. Or, in other words, a prompt decision-making of the required quality. At the same time, the marker diagnostics allows creating a large number of dynamic data sets, on the basis of which machine learning and the compilation of a predictive model using neural networks runs faster than it would have run without it. Relatively speaking, creation of a reliable machine learning model, usually requires 5 years of development history, and by virtue of marker diagnostics, this period can be reduced down to 1 year. This may sound quite ambitious, but we believe in the ultimate success of what we do.

**- What is the Geosplit unified digital platform mentioned in your publications?**

- Once we came up with the idea of facilitating the way of communication with our customers by creating a data showcase, where all available information about each marked well: routine reports, operation program, field supervision reports, etc. is uploaded. We called it the Customer's Personal Account, which was the first

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digital bridge for us. Today, this new idea has been reborn as a concept of a complete transition to a unified digital platform, which does not implement the functions of loading and storing data only, but also applies algorithms for processing, analyzing, visualizing and interactive generation of reporting documentation. In fact, the platform software allows structuring, predicting and testing hypotheses based on data received from marker diagnostics, mining and development history, as well as geological and technical activities. So, the software package can be designated as a class of decision-making recommender systems. Users of this platform are both in-house employees and our customers as external users. Naturally, each customer has personal authorized

access to its well study projects only. Information security and data protection are of the utmost importance to us.

**- Finally, I would like to know how your company builds cooperation with corporate research and design institutes, which all major oil and gas companies have. After all, as a rule, such institutions develop digital approaches for the company.**

— If we work with an oil and gas company, then the specialized institute is the same customer to us. At first, we may be treated as a contender, but we are not competing, but partnering in this aspect. For example, we are currently cooperating with one of these institutes, elaborating hypotheses together, and the institute itself sets goals and tasks for us when conducting the research. It is very important to build a format of the working process within multidisciplinary teams — management administration, field services and the oil and gas production division, experts of the corporate institute and the oilfield service company. We have learned from our own experience that the most tangible effect in using the results of our research is achieved in this way — with the maximum involvement of all

participants engaged in the expert review and decision-making.

**About GeoSplit**

GeoSplit is an international digital oilfield service company acting in the area of dynamic marker monitoring of oil and gas facilities. Established in 2013 as a resident of the Skolkovo Foundation. Currently, the Company has implemented over 300 well study projects with more than 30 customers in 5 countries. The GEOSPLIT technology platform deploys the markers based on quantum dots, which are high-precision indicators of oil, water and gas inflow. The company's proprietary software, which also underpins its know-how, enables highly accurate and high-performance fluid sample analysis and interpretation of the field data.