

## **Integrated Operations with AVIST. Current Approaches towards Optimal Oil & Gas Production Planning**

The authors consider one of the effective methods in optimizing oil and gas production activity, i.e. integrated planning and illustrate the difference between these integrated plans and the traditional industrial plans as well the objectives resolved by their use. The paper presents the value and the advantages of this integrated planning and draws the attention of the reader to the items related to personnel selection in conducting this integrated planning. The authors also consider the integrated planning process automation tools and illustrate the results that may be achieved through complex application of 'Integrated Planning' decisions.

**Key words:** Digitizing of companies in oil and gas industry, digital model of production, integrated planning, model of business processes, concept of smart field, AVIST digital platform, AVIST.Planning module.

L.I. Tikhomirov, PhD  
S.V. Volkov, PhD  
I.I. Karandashova  
ITPS Group  
Tel. +7 (495) 660 8181

Digitalization of enterprises in the oil and gas sector is currently a matter of interest of the entire professional community. The companies' CEOs see this trend as a unique opportunity to get new business effects and therefore embark on major technological and organizational transformations. The main idea of digitalization is to get maximum profit from available resources, and this approach really works. According to the recent studies, the use of a digital production model can increase the efficiency of resource use by 10-15% and labor productivity by 20-40% over the next few years. This result can be achieved only with the help of modern tools, one of which is integrated planning - the process of joint planning and decision-making by production departments.

### **DIVERSITY OF PLANS**

Integrated planning can increase efficiency of any production; however, the methodology of integrated planning is currently most in demand at the enterprises of the oil and gas sector, where it fits well into production processes, taking into account industry specifics.

Oil and gas enterprise is a complex mechanism in which all elements must work consistently and efficiently. Naturally, this requires a plan which should be precise, verified and embracing all aspects of production. Its development involves all production departments that have activities, either carried out directly at the operated well stock, or affecting personnel, resources and equipment. First of all, this is the subsurface service, well servicing and workover, chief mechanic, chief power engineer, industrial safety and environmental protection service, and development department.

The traditional approach assumes its own specific planning within each production department. These plans usually interact at regular meetings with a certain frequency. Thus, every production department plans its own operation without complete understanding what other production departments are planning.

The aim of integrated planning is to combine these plans into a single schedule, streamline it, optimize and bring to a unified understanding of what is happening in production.

Why do we view this process through digitalization perspective? Basically, the approaches we use could be based on organizational procedures, and process automation could be supported by MS Excel, but with

current production volumes, this significantly increases the amount of resources used and leads to an increase in costs. A modern integrated plan covers hundreds of facilities, each with numerous activities and resources involved at all planning levels. Therefore, speaking of integrated planning, we mean development of a business process model and implementation of the concept of an intelligent field, where planning is part of integrated operations and is linked to predictive analysis in terms of accounting. This approach allows reliably predicting events, adding them to the plan immediately and minimizing conflicts. In other words, integrated planning has the greatest economic impact as part of an intelligent production model. Let's see what it originates from.

The fundamental difference between integrated planning and traditional planning lies in the unified connection of all production plans at the setup stage and in course of the planning process management by a planner. The work is going on within the framework of an integrated plan, which takes into account all possible conflicts of technology, resources and, of course, timing (Fig. 1). The plan should have no conflicts and be optimized from the point of view of the target production function - oil production, reduction of shortages, downtime, shutdowns, etc.

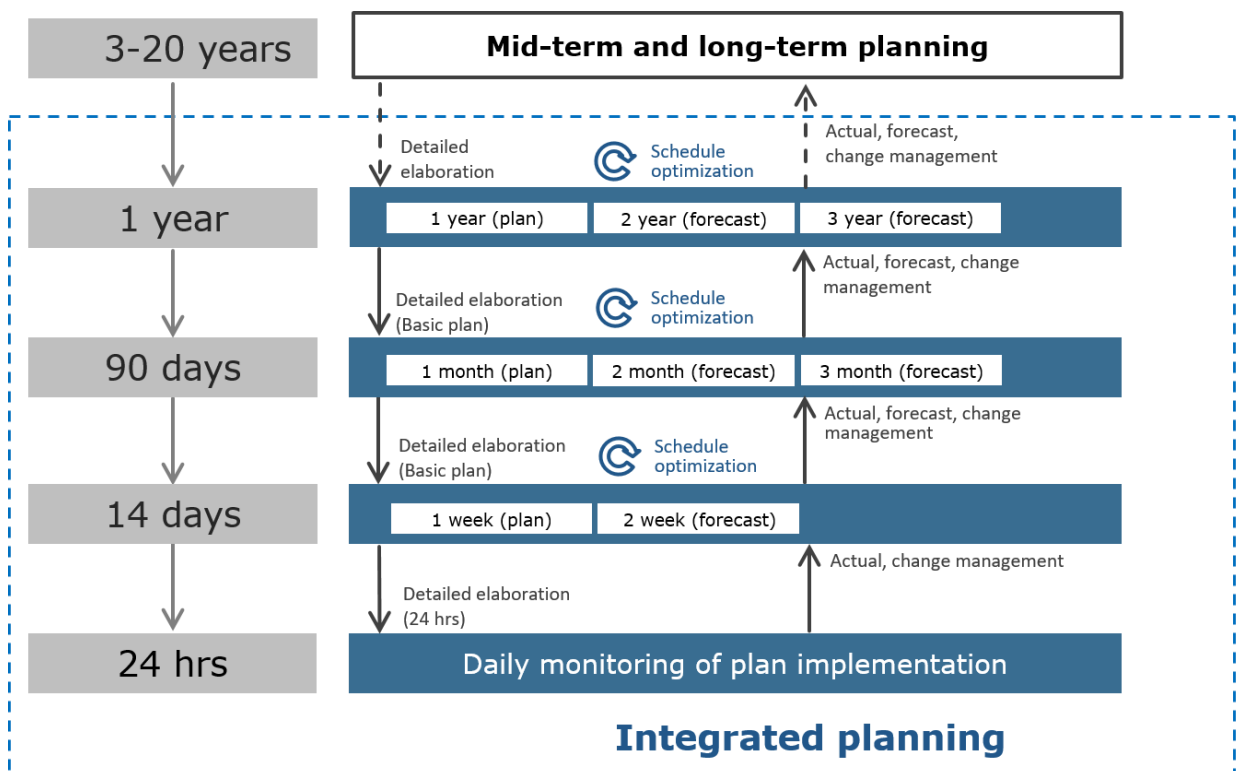


Fig. 1. Diagnostic process flowchart

One of the main tasks of integrated planning is the analysis of conflicts that regularly happen in the approved plans. For example, repair team comes to a facility and it is not ready for handover, or electricians and ground equipment mechanics are the works cannot be started. Integrated planning allows solving all these issues at the execution stage, improve interaction between departments, manage services in accordance with the execution of the current plan.

Therefore, the main effect of integrated planning arises from conflict-free planning and coordination of activities at the execution stage.

### PANNING TIMEFRAMES

Most often, the combination of activities and the reduction of shortfalls i.e. forecasted losses are considered to be the main effects of integrated planning. However, the measurable effects of combining activities in the short-term planning period are very low. It is one percent of production at best. But it's too early to lose hope. When we started to implement vertical integrated planning, it became obvious

that the effect should be sought in reducing those losses that are caused by the inconsistency of production plans. When there are no gaps between plans of different timeframes, this is a completely different level of efficiency.

The main benefit of integrated planning lies in connecting various timeframes. The plan is built from top to bottom in different timeframes, which are embedded in a single change management mechanism. And this is very important. If the mechanism is not implemented in the enterprise, this task can be solved by operational departments. They will even work together without conflict for some time. However, very soon time and resource gaps between the events in different planning timeframes will happen.

The annual plan cannot live its own life either; it consists of monthly plans (and those consist of the weekly and daily plans in their turn) and therefore must be constantly adjusted and synchronized with what is actually happening at the well. For example, we had a serious incident during drilling. We understand that the consequences will affect the implementation of the annual, medium and long-term plans. This might lead to the mothballing of the current drilling hole. It will be necessary to spud a new bore-hole in order to re-enter the development formation that was planned. The restoration work might take weeks, and if the well will have to be re-drilled, the plan might be delayed by months.

The idea behind our methodology is as follows: planning begins from the most long-term horizon, by which we mean the entire life cycle of an asset (field, group of fields). We divide the big cycle into smaller, medium-term ones - from 3 to 5 years. Then we break them down into annual, quarterly, and weekly plans.

Obviously, quality planning in itself cannot fully ensure the implementation of the planned work. It is very important to manage the plan during their implementation. If we have a change management process in place, then any daily changes are automatically translated to all higher planning horizons included in the project scope. All plans are instantly rebuilt to fit the current situation, taking into account resources and budget. Thus, the stable performance of daily operations ensures the achievement of strategic goals for the enterprise. This is the most comprehensive business model in the market to aim for.

## **PLANNING TRANSFORMATION**

So, the owners have realized their business requires digital transformation. What should they do first? Integrated planning is rarely implemented as is. In order to implement the approach, the production itself should be ready for it. Prior to streamlining the processes, they must be set up or defined among the processes carried out in the company. This is where we most often start.

We have a lot of experience at early stage project delivery, requiring the skills of concept development, evaluating existing and designed processes and ensuring their interconnection.

Integrated planning is being implemented in stages. We always distinguish between production and economic planning. It is common knowledge, that production and economic model should be interconnected, but it is necessary to take into account the complexity of the simultaneous implementation of both. Successful projects have been implemented when the production part was introduced (this process can last up to one year) and after that, the current model of economic planning appears. Based on our previous experience, in about one year we can make an economic forecast based on production data.

A planner is a person who formally collects integrated plans, informs about conflicts that arise in the plan, and makes sure these conflicts are eliminated. The requirements for such a specialist are standard. They are: labor discipline, knowledge of procedures and tools. However, there are planners of a higher level who not only understand technologies and equipment but also know the very essence of production plans and activities; can set priorities both according to formal and technological characteristics. There are significantly fewer specialists with this set of competencies on the market.

If the company has such versatile specialists, we recommend giving them the functions of an integrated planning specialist, especially if a person has leadership qualities, which is very important for successful process management. It is necessary to take into account human factor while implementing the process: the person performing production planning has the opportunity to adjust the plans in the interests of their department. Obviously, the first scenario, in which the planner operates strictly based on procedures, is only possible in a company with properly developed processes. If the processes are still at the implementation stage, integrated planning should be carried out by an experienced production worker who knows all technological processes and how the activities influence the final result.

To automate the integrated planning process we use the Russian digital platform AVIST and the AVIST module. Planning (Fig. 2, 3), with which all process participants work, including process owners, planners of integrated and production plans, responsible persons participating in the approval, and regular users who take part in the planned and ongoing activities. The solution offers high compatibility with any elements of infrastructure and security in terms of the risks of sanctions. We have included into the solution characteristics such as: flexible interactive analysis of schedules, allowing to see communication conflicts and effectively manage interaction.

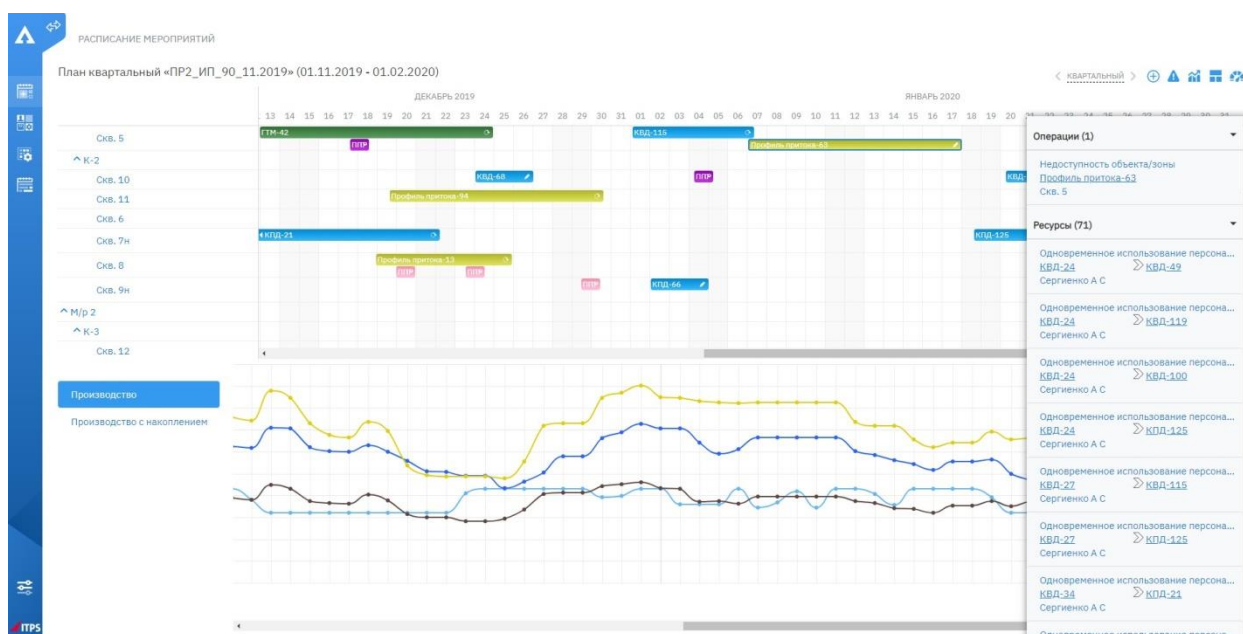


Fig. 3. AVIST.Planning window on the example of an integrated quarterly plan

The cherry on top is the option of automatic optimization of the schedule for a specific target function. For instance, if you need to get a schedule with maximum production, you can select the system settings and target function, specify the necessary restrictions and optimize the plan. What target functions can be used for optimization? The basic ones are production maximization for a certain period (month, quarter, etc.), minimization of shortfalls, reduction of starts and stops.

With the comprehensive implementation of Integrated Planning solution, the following effects can be achieved:

At production:

- minimization of shortfalls by combining activities and optimizing technological modes at the wells and ground facilities by up to 3%;
- reduction of starts and stops at the wells by up to 20%;
- increase of equipment turnaround time;
- reduction of non-productive time of contractors and own personnel;
- reduction of operating costs for maintenance and repair of technological facilities;

At the management level:

- increasing accuracy of production planning;
- reduction of time used for production planning;
- improving consistency of plans of various production departments;
- improving production services coordination in the course of integrated plan implementation.