



## **Deloitte Construction — The Foundation of a Successful Project** Construction Project Management

Deloitte Forensic  
Mining

# About Deloitte Construction Group

Deloitte is a team of highly skilled professionals with significant experience in construction management.

Working in cooperation with experienced financial advisors and legal practitioners, over twenty engineers have a track record of successfully delivered projects both in Russia and abroad.

In this brochure, we have highlighted key risks and issues our clients are facing when implementing their investment construction projects in mining industry.

## Key services

1. Managing pre-project and project works
2. Working out and operating the project schedule
3. Supervising project logistics and procurement
4. Maintaining control over the project budget
5. Reporting on a monthly basis



# 1. Managing pre-project and project works

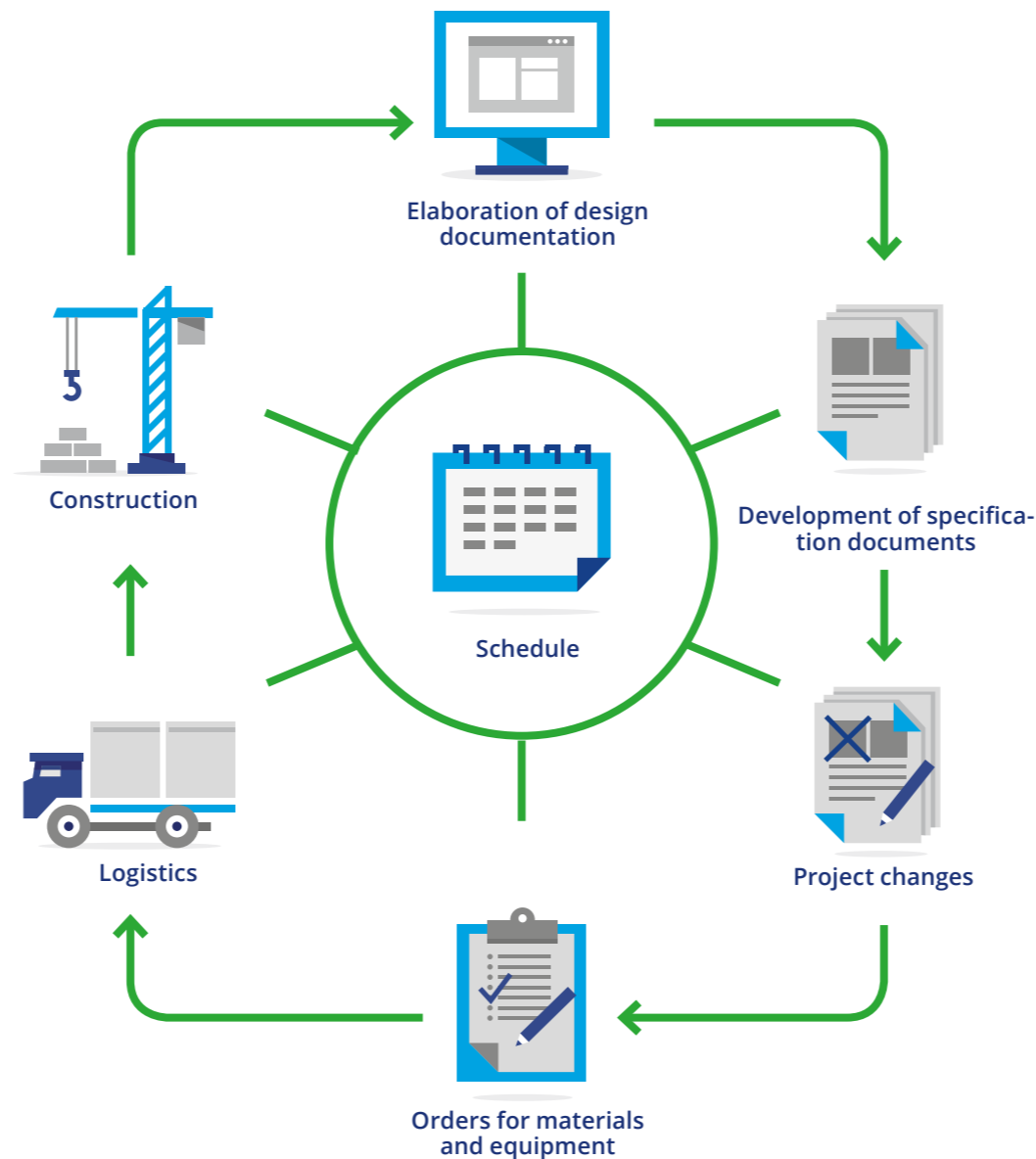
# 2. Working out and operating the project schedule

→ In Russian practice, to ensure the project is completed in the shortest possible time, all too often design works and construction are performed simultaneously. In its turn, it raises the bar for design documentation since its quality directly affects the construction period, its price and quality.

→ The schedule is a prime tool to control project completion timeline. Obviously, applicability and usability of the schedule depend directly on the quality of its elaboration, content and adaptability in the course of construction.

- Pre-design stage**
- Pre-project management should include:
- analysis of the primary documentation, its compliance with standards, review of geological map generation, verification of the approach feasibility and reserves calculation (resource evaluation), verification of the adequacy of technical studies (engineering investigations);
  - control work, if necessary;
  - development of technical requirements and examination of the project engineering;
  - analysis of strategic risks;
  - conclusion on data adequacy and recommendations on strategic risk mitigation for successful project implementation.

- Design stage**
- Project management should include:
- **Responsive change management:** design documentation and specification documents are constantly changing and require co-operation. To manage this process efficiently, there should in place an established procedure for introducing changes and ensuring timely communication to the related departments. Sometimes, the ultimate solution is to establish a project bureau on the construction site.
  - **Innovative approach:** project design visualization using state-of-the-art CAD-tools (3D-design), i.e. teamwork empowered by 3D. Such automation enables every team member responsible for their own structure elements to exchange 3D models. Thanks to this instrument, the quality of design documents increases manifold.



Depending on the project elaboration and its stage, the following project schedules may be necessary:

- A **project milestones chart** is prepared where there is a shortage of information and it is hard to predict timeline and resources for certain works.
- **The main project schedule** is developed progressively as design and specification documents are elaborated.
- A **comprehensive project schedule** comprises several interconnected sections: design documentation and specification document scheduling, delivery schedules for materials and equipment, construction and installation works schedule, and commissioning schedule.

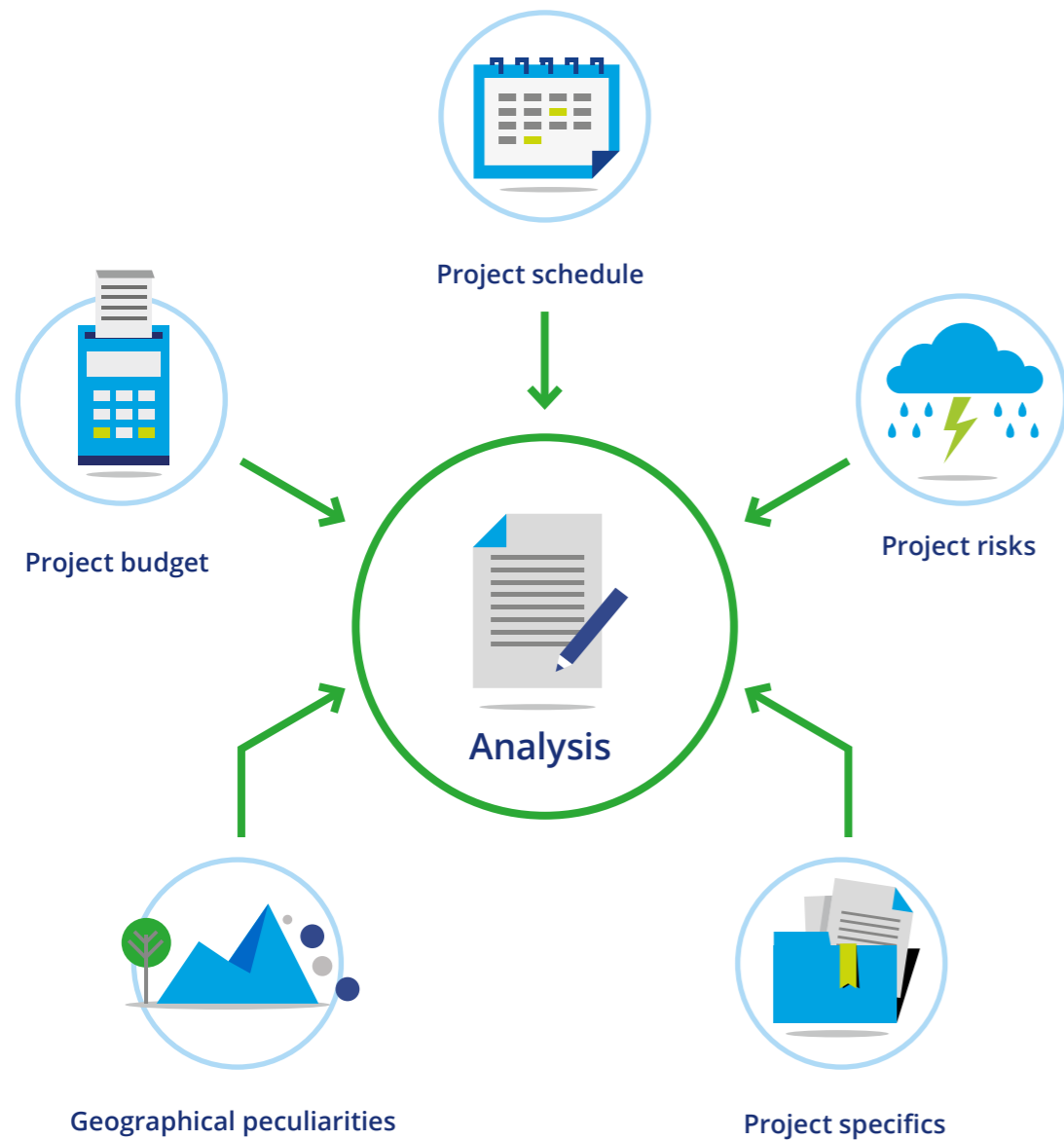
Elaboration of a high-quality schedule requires it to be filled with data on labour effort (man-hours of working men), level of non-labour (construction machinery and equipment) and financial resources (expenditures).

Design chart support effected in the course of construction includes:

- **updating project information** — actual start and completion dates as well as progress
- **entering adjustments** associated with changes in design documents, delivery dates, and quality and level of resources.

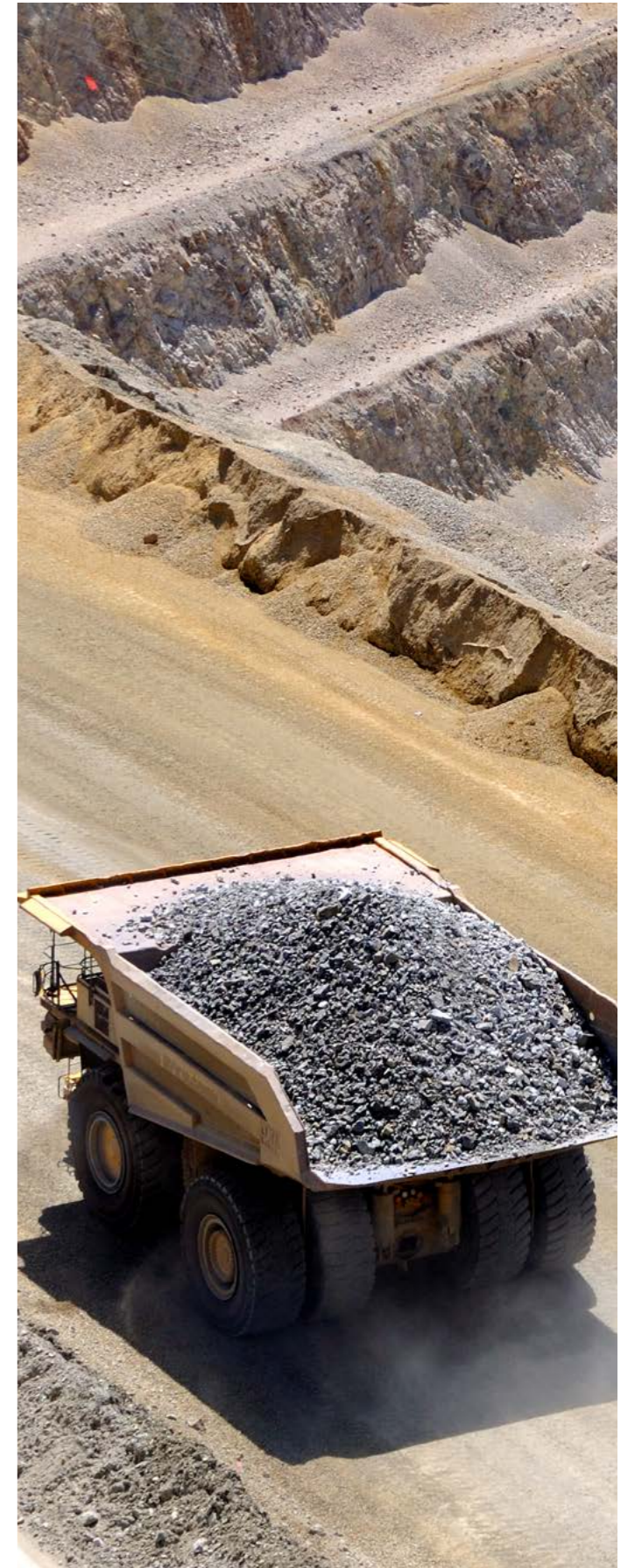
### 3. Supervising project logistics and procurement

→ Projects logistics and procurement control is an essential element for mining facilities, construction of which is usually carried out in conditions of complex transport accessibility.



**Such analysis serves as a basis for the regulations governing control over the project procurement and includes:**

- persons responsible for procurement and delivery of inventory items by project sections;
- persons responsible for quality control at all stages of the supply chain (visual examination, documentary control);
- types, sorts and number of vehicles involved in the logistics chain;
- a schedule for prioritization of consignments under the comprehensive project schedule;
- shipment dates, deliveries to the construction sites, container numbers etc.;
- creation of a consolidated request registry;
- supplier name, contract date, contractual delivery date;
- status (not ordered, ordered, not paid, paid, shipped, in delivery).



## 4. Maintaining control over the project budget



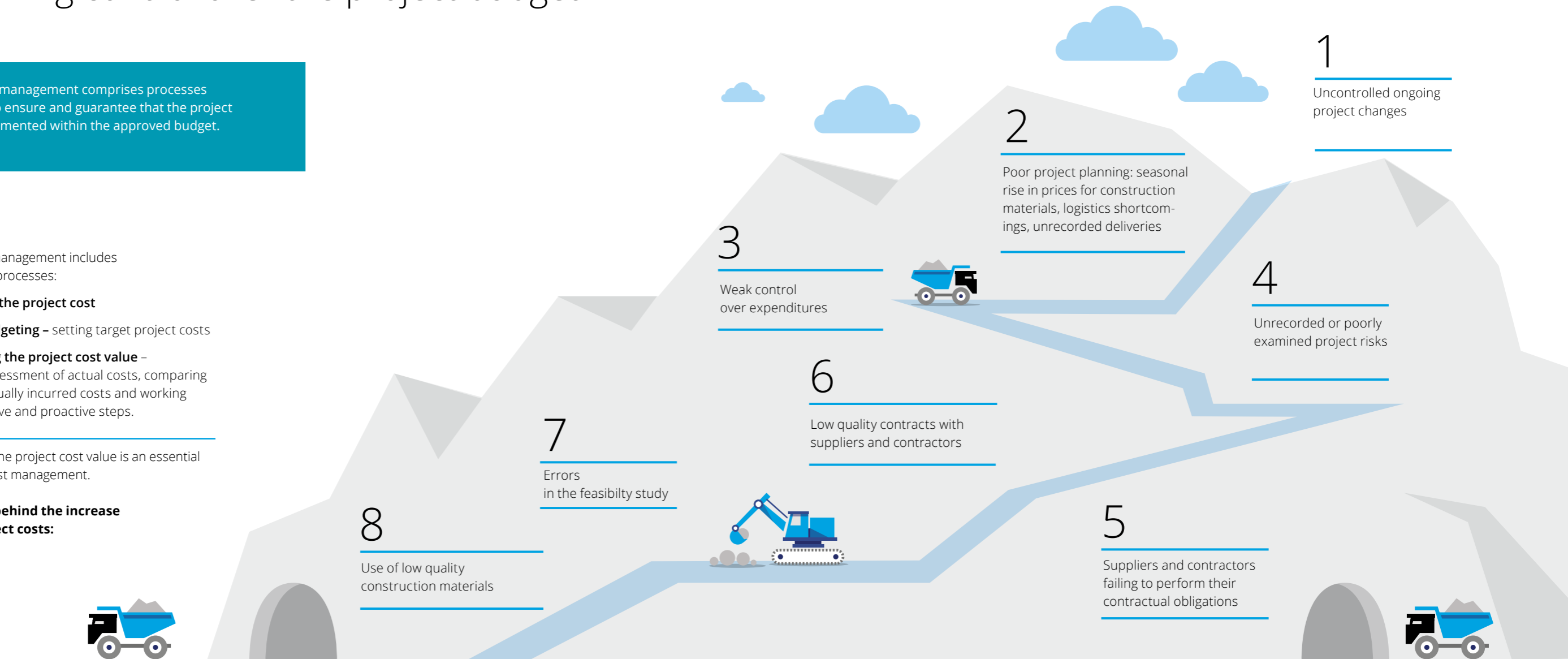
Project cost management comprises processes necessary to ensure and guarantee that the project will be implemented within the approved budget.

Project cost management includes the following processes:

- **estimating the project cost**
- **project budgeting** – setting target project costs
- **supervising the project cost value** – ongoing assessment of actual costs, comparing them to actually incurred costs and working out corrective and proactive steps.

Control over the project cost value is an essential element of cost management.

**Key drivers behind the increase in total project costs:**



- **Develop a unified project change request** form and maintain a change register to document all changes and extra work.
- **Find optimization opportunities within the existing budget:** create a register of expenditures that contributed to lowered construction cost which will help to decrease the cost of future extra work.
- When entering into contract relations with contractors, **set an identification list for construction materials and technologies** to prevent them being replaced with those of lower quality.
- **Establish conditions for using cheaper construction materials** that do not materially affect construction quality.

- **Hold an open bid** among suppliers for the projects.
- **Set a priority for contracting other suppliers** if those selected following the bid fail to perform their contractual obligations.
- When entering into contractual relations with suppliers and contractors, **set a System of appropriate penalty provisions** for non-performance of contractual obligations.
- **Perform high quality design supervision.**
- **Monitor performance of contractual obligations:** a well prepared contract gives assurance of successful project implementation. Ongoing monitoring of fulfillment of fundamental conditions and control over amendments introduced to contracts.

## 5. Reporting on a monthly basis



To ensure efficient monitoring, the management and key specialists have to elaborate the structure of project reports to document planned and actual metrics by work stages, timelines, costs and utilization of labour resources.

For this purpose, depending on the project stage and needs, a report is generated on a:

- **monthly basis;**
- **weekly basis;**
- **daily basis.**

It enables a prompt response to emerging issues, mitigates risks of extra costs and makes it possible to:

- **identify the reasons behind the differences between actual and planned metrics;**
- **monitor deviations from the key metrics on an ongoing basis.**



Below you can find a few examples of key metric monitoring our team uses in monthly reporting:

- actual design completion rate (percent), by project sections;
- actual material availability rate (percent) of construction objects;
- actual performance of the logistics plan on delivering the necessary materials and equipment to the construction site;
- actual number of personnel on the construction site compared to the plan of construction organization;
- completion rate for key work types (reinforced concrete, steelwork, technologies, electricity supply, measuring equipment, automatic devices, start-up and commissioning)
- aligning open advances to actual works performed
- general matters requiring project management's attention
- project risks
- expected project completion date and estimated cost.

## Description of a delivered project



## Detailed description of a delivered project



In June 2014, a private management company requested our advice on organizing construction of a mining and processing plant in the Far Eastern Federal District. The total construction delay exceeded 8 months, engineering works were scattered and only 15% of the planned workforce was present on the construction site.

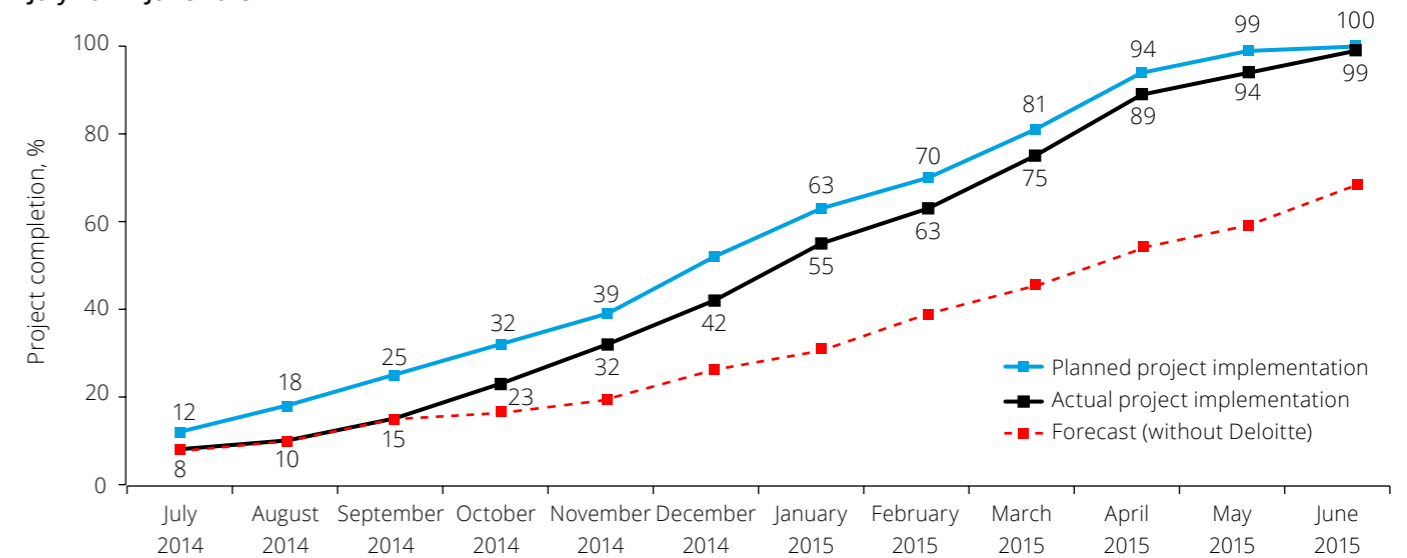
After nine months of our work, the following issues were solved:

- streamlined design flow, elaborated a 3D model of the plant;
- developed a detailed schedule of work (3rd level);
- rearranged supply system;
- the number of contractors increased from 3 to 8 resulting in the increase in the number of working men up to 98% of the planned workforce
- streamlined management team resulting in improved efficiency of decisions made and reduced Investor expenses



## S-curve of the project

July 2014 - June 2015

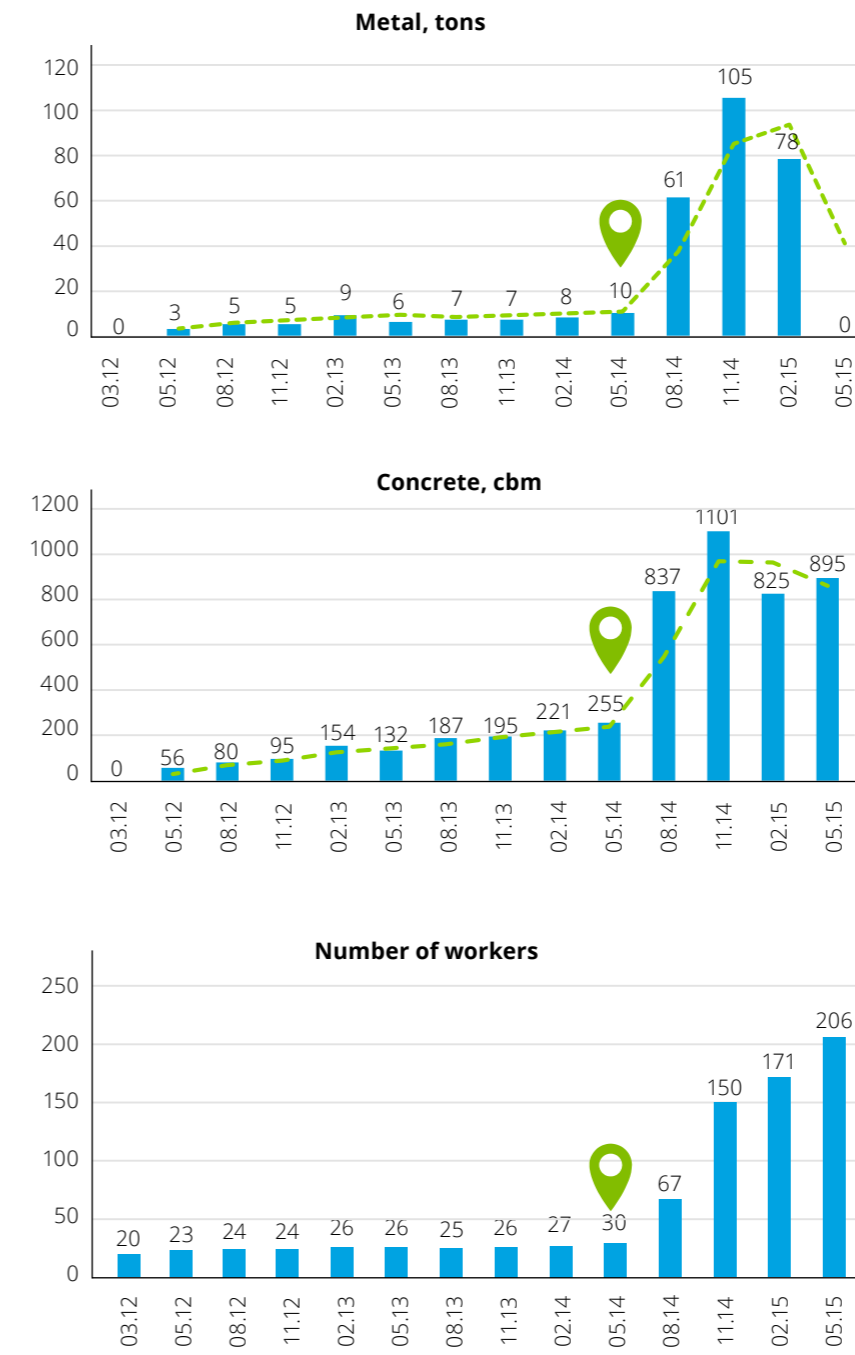


# Our experience

<b>Construction management</b>	When Deloitte was contacted by the client, the construction of a mining and refining plant was in the second year, and during this period only 24% of the total scope of work had been performed. Our team established procedures for managing construction in an extreme climate and without adequate transportation. As a result, the plant was completed on time schedule. The S-curve (p. 13), which reflects the work pace, suggests that the completion the project would have been delayed by at least 6 months had we not been engaged.	6 months USD 42 million*
<b>Design phase</b>	During the construction period, our specialists developed a 3D-model of the future plant that helped us adjust the design documentation for all construction phases of the project. The 3D-model helped identify a large number of mistakes made in the design documentation and make timely adjustments to the working documents.	2 months USD 14 million*
<b>Analysis of water-supply solutions</b>	We identified critical mistakes in the design documentation while analyzing technical solutions for the water supply. Our team developed practical solutions and prepared working documentation for their realization; this allowed for the timely supply of water to the plant and prevented any disruption of the start-up and commissioning schedule. Despite the logistical complexity and time needed for the redesign, we still managed to avoid construction being prolonged by three more month.	3 months USD 21 million*
<b>Supply and logistics</b>	During the construction period, our specialists developed comprehensive procedures and regulations to control the supply and delivery of the necessary materials and equipment to the construction site. We also devised an urgent delivery of materials by Mi-26T helicopter. As a result, uninterrupted supply was set up, which in turn expedited the construction by at least two months.	2 months USD 14 million*
<b>Checking of estimates</b>	Throughout all the entire construction period, our specialists scrutinized the estimates for the construction and installation work. These estimates and contracts contained doubling, unjustifiably applied rates and other manipulations. The total amount of savings was around RUB 150 million.	USD 2.5 million*

\* The cost saving is based on the monthly cost of the factory's deferred start-up. Taking into account the cost of construction site maintenance (including fixed mortgage payments) and opportunity cost associated with lost revenue.

# Dynamics of the project's major KPIs



The moment when Deloitte team began to take part in the project



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