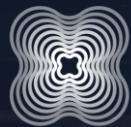


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& Partners



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Digitalizing Russia's Mining & Metals Sector

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Opening remarks

Dear Readers,

We are pleased to present our report on the digitalization of Russia's mining and metals industry. In an in-depth study of industry players' opinions, we have synthesized the benchmarks, expectations, and priorities for digital function development, as well as the problems and challenges currently faced by the sector in the context of the subject area. Rising costs of deploying digital solutions, challenges of innovating in production and technology management, shortage of skills, import substitution of specialized software – this study addresses these and many other aspects. We sought to understand which companies are actively investing their resources in the development of digital processes and tools to maintain their status as industry leaders, and which have shifted their priorities in favor of other sources of competitive advantage

The report is based on findings from a survey, as well as a series of interviews with the industry's top executives. The report looks in detail at successful digital transformation strategies and describes the achievements of companies that prioritized technological and innovative leadership

We hope that this report will become a valuable information resource for companies in the Russian mining and metals industry that are proactively pursuing digitalization opportunities. On behalf of Yakov & Partners and Zyfra Group, we are pleased to share the study insights with a view to strengthening the competitive position of domestic players



Nikita Natrusov

Partner
Yakov & Partners



Ilya Sadardinov

Partner
Yakov & Partners



Sergey Emelchenkov

CEO
Zyfra

Up to x15

is the spread in digitalization impact achieved by Russian companies (as a percentage of EBITDA)



It is not necessary to be a pioneer to generate a significant impact – high-quality implementation of projects is more important



In response to the sanctions, some companies have launched an in-house development of software for mining equipment scheduling, maintenance management, etc.

Only 15%

of company representatives aim to increase the level of ambition vs. the achieved impact of digitalization

70%

of the respondents focus on production, and only a third invest in digital industrial safety and environmental solutions

63%

of the study participants indicated a shortage of digital talent across all occupations, which is on a par with national averages

~75%

of the respondents maintained or increased their digitalization budgets in 2022–2023

Only 10%

of the study participants mentioned projects in such areas as 3D printing, robotics, and AR/VR

>50%

of the respondents expect some sort of technology gap in the medium term



What representatives of leading Russian companies say...

“ The departure of Sandvik and Caterpillar is a big problem that has severely set the market back. Domestic solutions lag significantly behind

Digitalization Director

“ The build quality of components from China leaves a lot to be desired. It causes shutdowns. In the end it all comes down to reliability, and we don't want to compromise on that

IT Director

“ "Low-hanging fruit" has already been picked; projects are becoming more costly and payback periods are growing longer

Deputy CEO for IT

“ There is no Russian underground equipment, and it is not known how long it will take us to make our own equipment

Department Director

“ The flow of ideas has largely run dry – numerous startups with tech know-how have either refused to work with us or left the market... It is unclear where to get new cases in 3 years' time

Digitalization Director

“ Sometimes you can capture some efficiency gains from saving resources and electricity, but it's close to being maxed out, and there is not much left to squeeze out of it. Tons of products still take priority

Automation Director

“ Last year, it was the problem of whether there would be any equipment at all to work with. Now the priority is the availability rate, spare parts pool. Once that is sorted out, we will go back to automation. In fact, it was a step backwards for us

COO

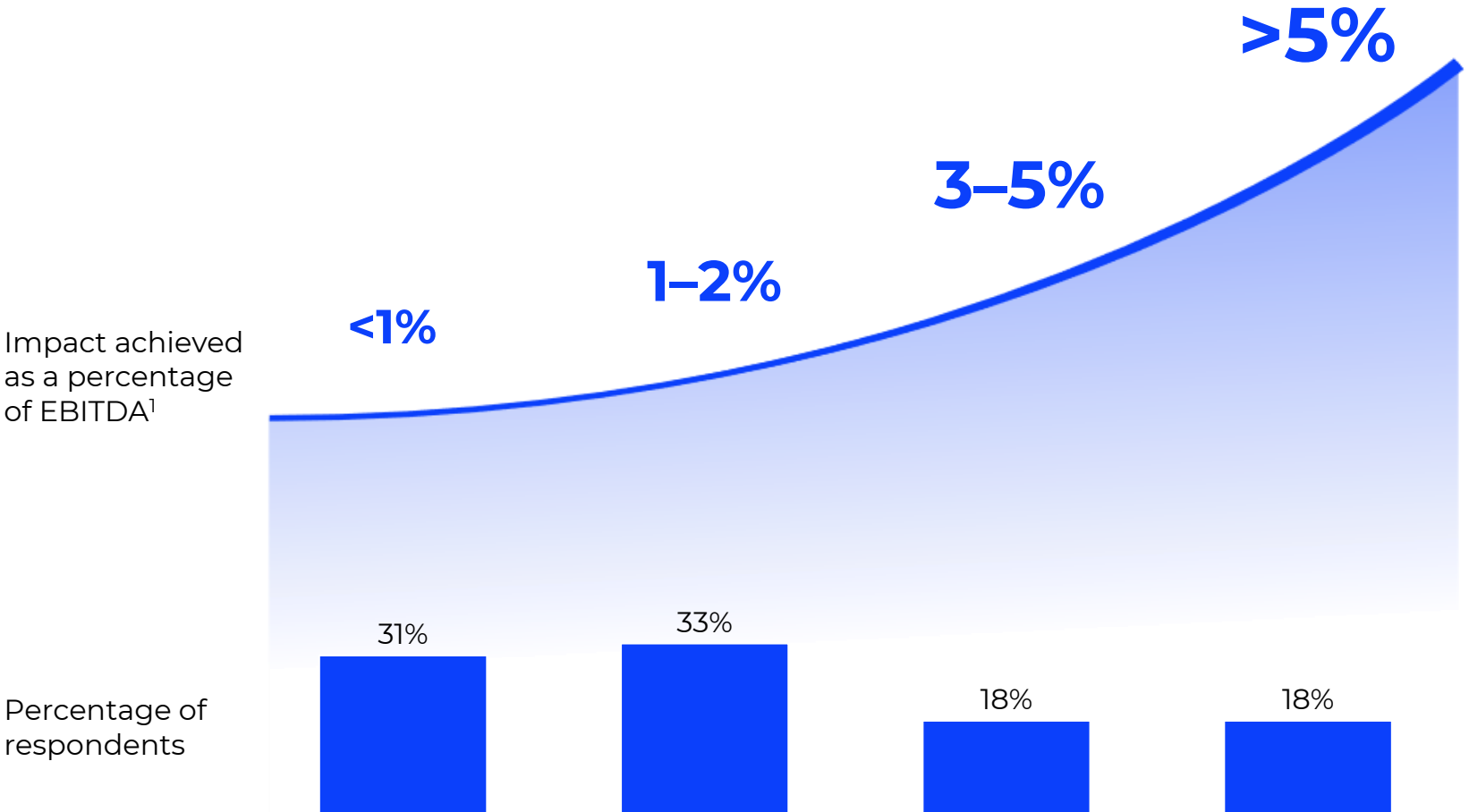
“ Some contractors "up and left," and on top of that they demanded payment for services that they did not actually provide. We ended up having to finish the job ourselves

CEO

“ Universities have become much more flexible and willing to adapt, but it is business that is not ready

Director of a major technology institute

One in three mining and metals companies in the country generates more than 3% of EBITDA from digitalization



Up to 2% of EBITDA

was the impact achieved by 64% of the respondents from Russian companies, which is in line with companies around the world

Top performers achieve **greater impact** (>3% of EBITDA) through:

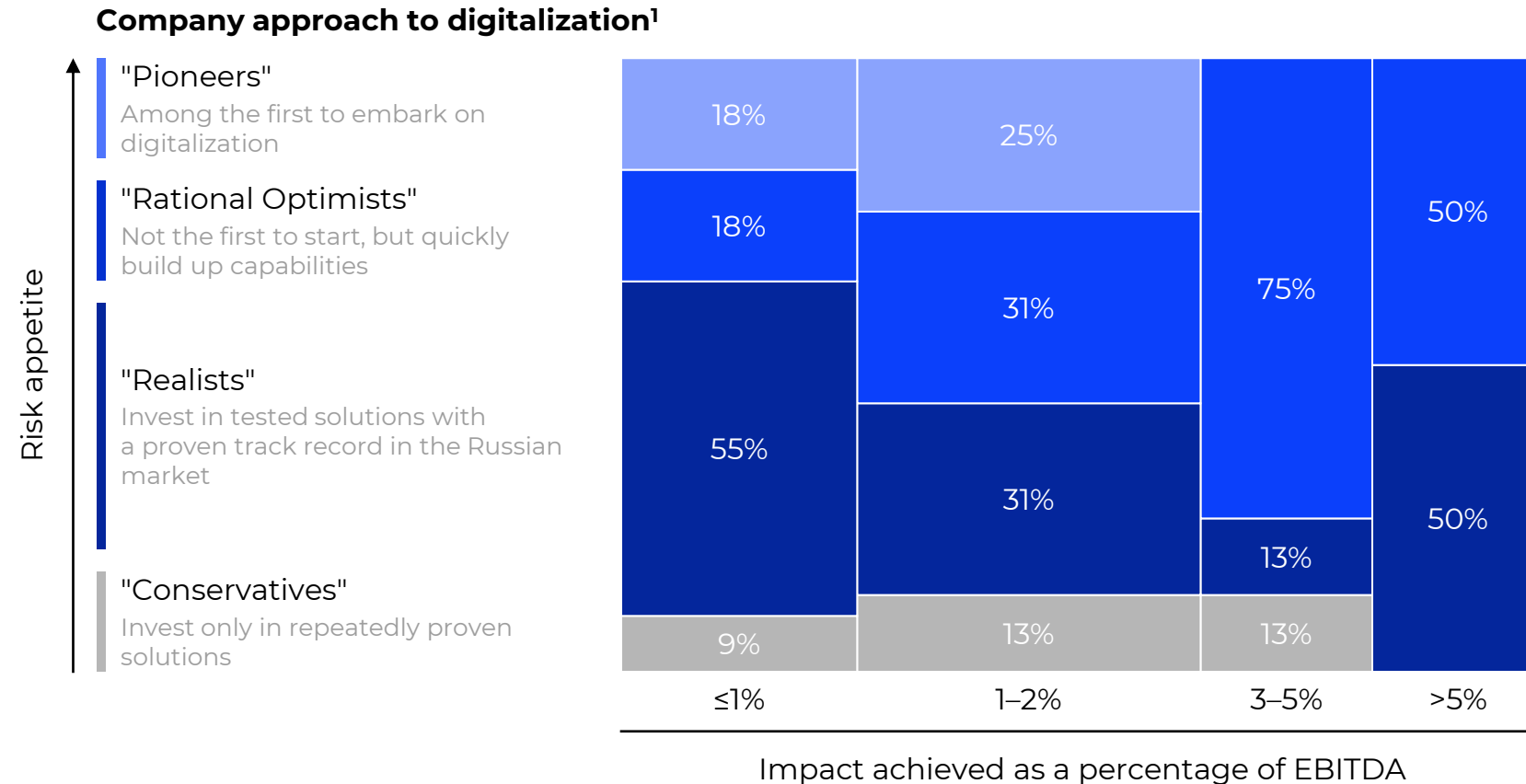
- Focus on 2-3 functions, including production
- Balanced approach to project selection
- Reliance on building internal capabilities

Reaching this level is both an **opportunity** and a **serious challenge** for most market players

1. Achieved impact of digitalization relative to the company's annual EBITDA based on the questions: "What is your company's approximate EBITDA for 2021?" and "Can you assess the impact your company has already achieved from digitalization, where the impact is the incremental annual EBITDA since the launch of digital initiatives?" The survey was conducted by Yakov & Partners in cooperation with Zyfra Group

You do not have to be a pioneer to produce a significant impact — high-quality implementation of projects is more important

Relationship between the digitalization approach and the impact achieved



“ We are extremely careful in our choice of projects, we take a close look at successes and failures of other market players, and we are not susceptible to "hype". At the same time, we develop our own systems where the market cannot meet our needs

COO

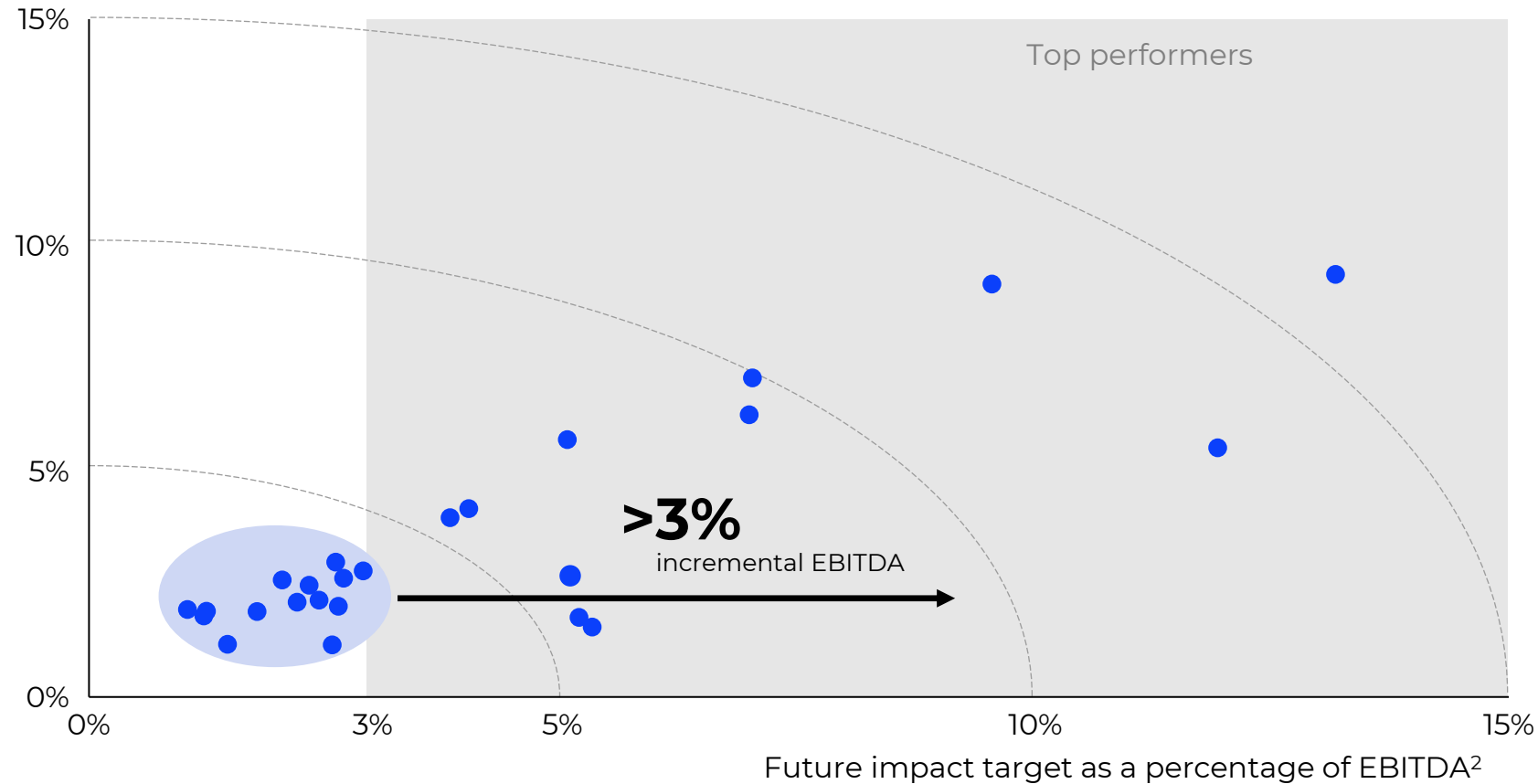
“ I think that we are definitely not in the pole position, but we are still pioneers in some respects – we have products without peers

CEO

1. Question: "How would you articulate your company's approach to digitalization?"
The survey was conducted by Yakov & Partners in cooperation with Zyfra Group

Most company representatives look to sustain the economic benefit of digitalization over the next 3–4 years

Impact achieved as a percentage of EBITDA¹



Only 15%

of company representatives aim to increase the level of ambition vs. the impact already achieved by digitalization

Meanwhile, experience of the world's leading companies shows that ambitious **goals and a willingness to take risks** are fundamental to success

Higher targets will generate a potential incremental EBITDA of:

1–3 RUB bn

for companies with a turnover of RUB 100 bn

6–10 RUB bn

for companies with a turnover of RUB 500 bn

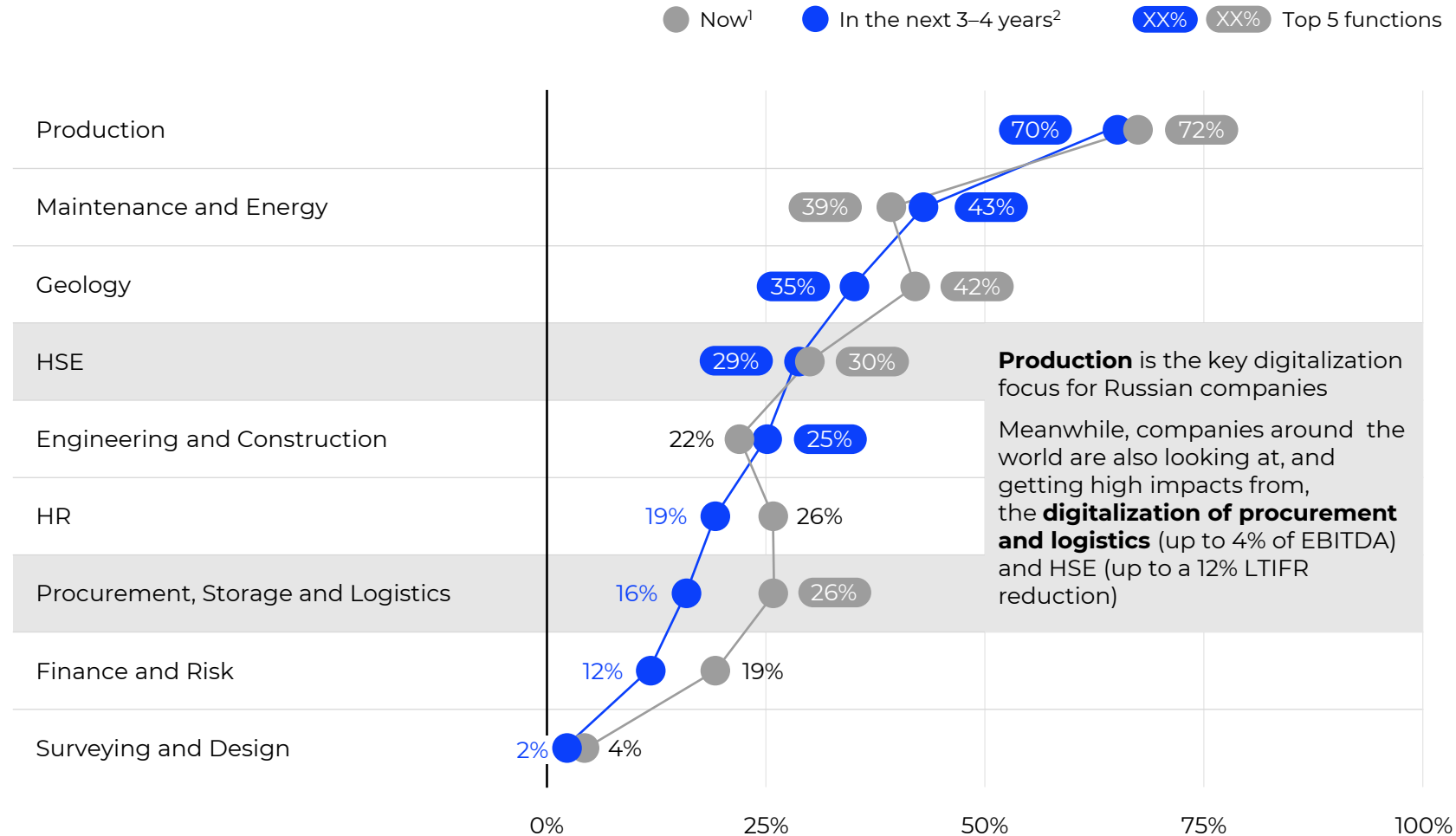
1. Question: "Can you evaluate digitalization impacts already achieved by the company, where the impact is incremental annual EBITDA since the launch of digital initiatives?"

2. Question: "How have digitalization impact targets changed for 2022–2023 (vs. 2021)?"

The survey was conducted by Yakov & Partners in cooperation with Zyfra Group

Now and in the next 3–4 years, production is a key focus area in which to implement digital solutions

Implementation of digitalization solutions by functional vertical



“ We have been digitalizing everything related to the subsoil for a very long time – geology, beneficiation software. There are quick wins here in terms of quality and speed

COO

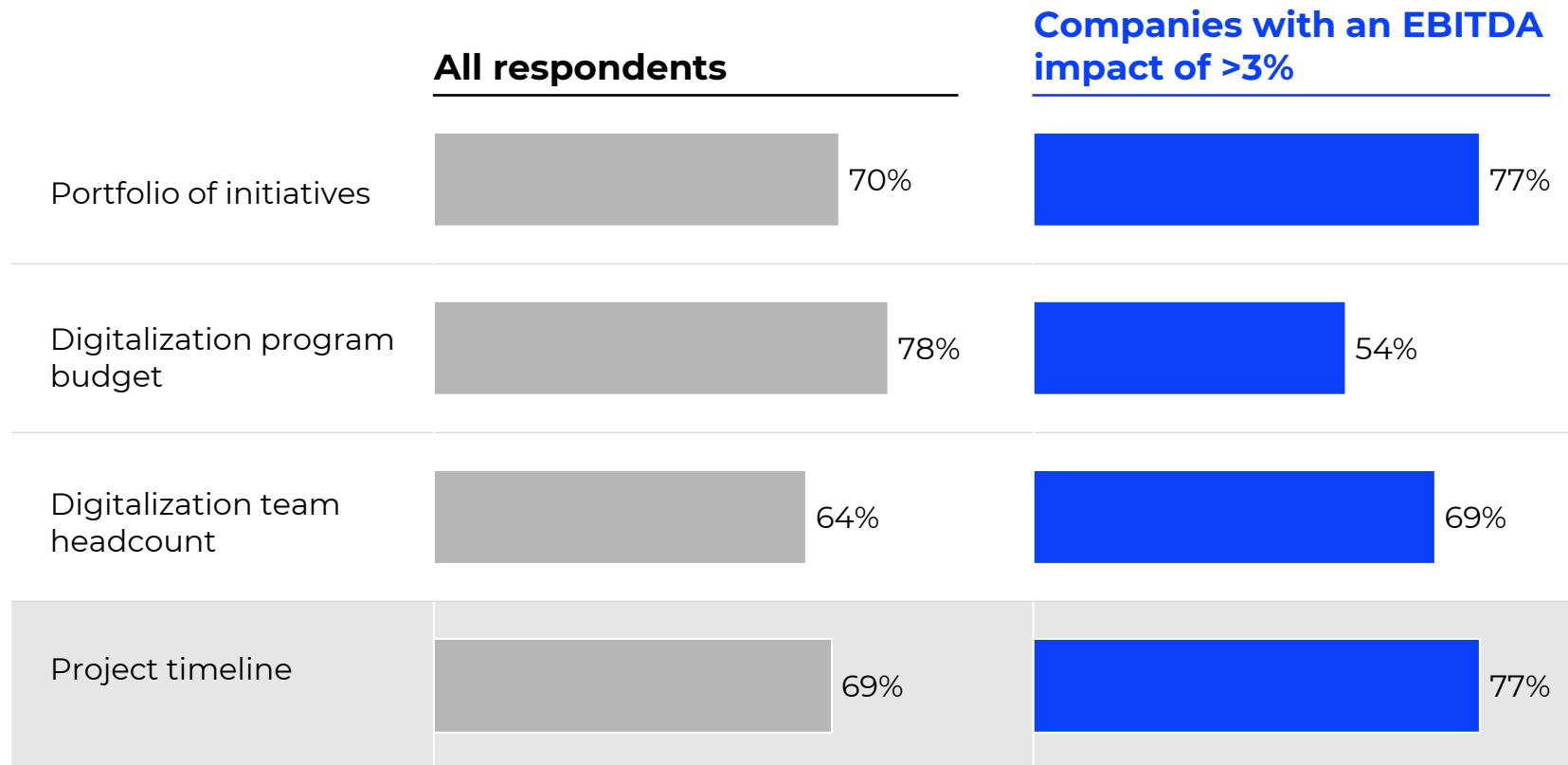
“ Earlier the focus was on productivity, now the focus is on quality: we want to obtain feedstock quality properties as soon as possible

CEO

1. Question: "What are the functional verticals where your company implements digitalization solutions?" (Multiple choice)
 2. Question: "In the next 3–4 years, what are the functional verticals on which you will focus your digitalization efforts?" (Multiple choice)
 The survey was conducted by Yakov & Partners in cooperation with Zyfra Group

Companies are building up their initiative portfolios, budgets, and workforce, but projects are falling behind schedule for reasons beyond control

Percentage of the respondents who indicated that various digitalization program parameters were **maintained or expanded**¹, %



Over the past year, the headcount has not changed, but we have filled vacancies. In the next three years, the headcount is likely to increase through growth of in-house development (there aren't enough contractors in the market)

Digitalization Director

This year, equipment condition monitoring and diagnostics activities have been added to the portfolio [...] The hypothesis is to launch a large diagnostics portfolio. We will definitely get an impact!

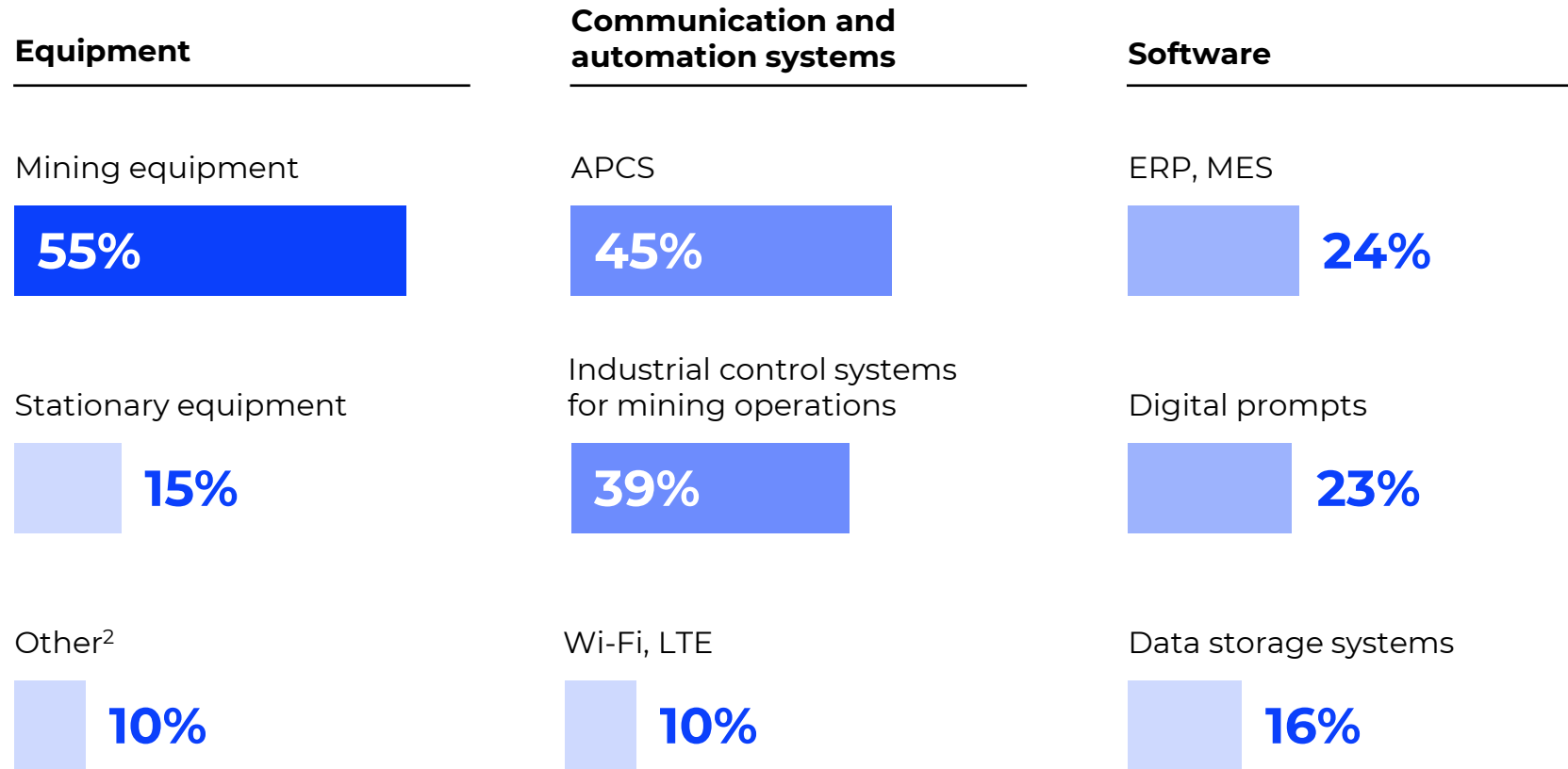
IT Director

1. Question: "Can you assess how the portfolio of initiatives / budget / timeline / number of employees involved in digitalization projects have changed in 2022–2023 (vs. 2021)?"

The survey was conducted by Yakov & Partners in cooperation with Zyfra Group

The most serious challenge is the departure of Western vendors of mining equipment and embedded systems, the rest is being (or can be) replaced

Percentage of the respondents experiencing difficulties in implementing digital tools due to supply constraints ¹, %



1. Question: "In your opinion, restrictions on what type of automation and communications equipment / software systems make it most difficult to implement digital tools?" (multiple choice)

2. Including laboratory and analytical equipment (in-line analyzers, etc.), specialized equipment (drones, etc.), and smart wearable devices (smart glasses, helmets, PPE, etc.)
The survey was conducted by Yakov & Partners in cooperation with Zyfra Group

“ The most serious challenge is the ban on diggers, haulers, and other types of equipment of European brands (CAT, Komatsu, Epiroc...)

Executive Director

“ China has alternatives to any controllers (Schneider, Siemens), and expert systems are being successfully replaced by their Russian counterparts

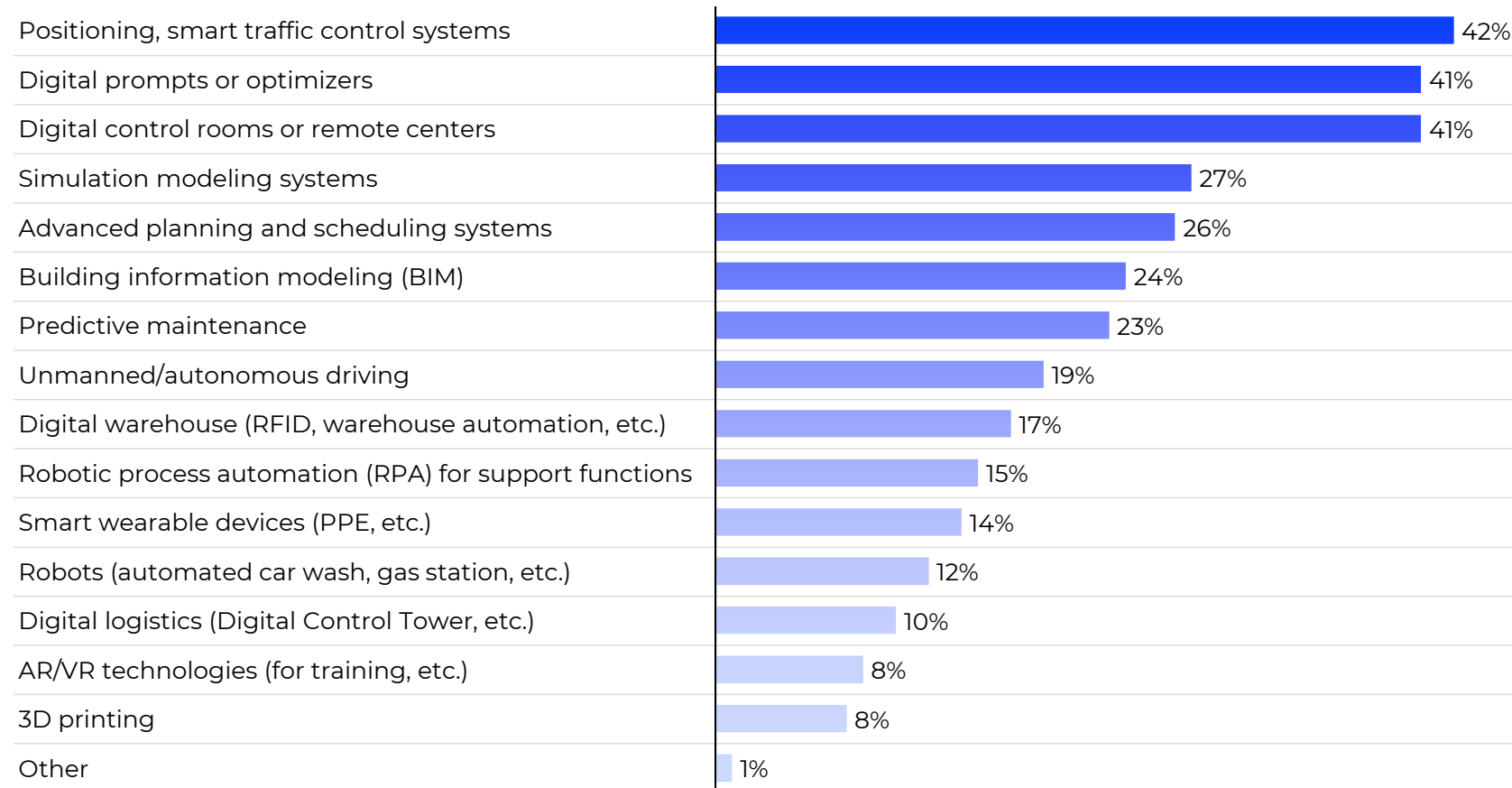
Automation Director

“ Each contractor came with proprietary software. We ended up developing a digital platform for equipment data ourselves

Department Director

Disruptive technologies, including autonomous transportation and 3D printing, are not yet widespread

Popularity of digitalization solutions implemented by Russian companies¹



The three most popular solutions represent **the most mature technologies with proven impact**

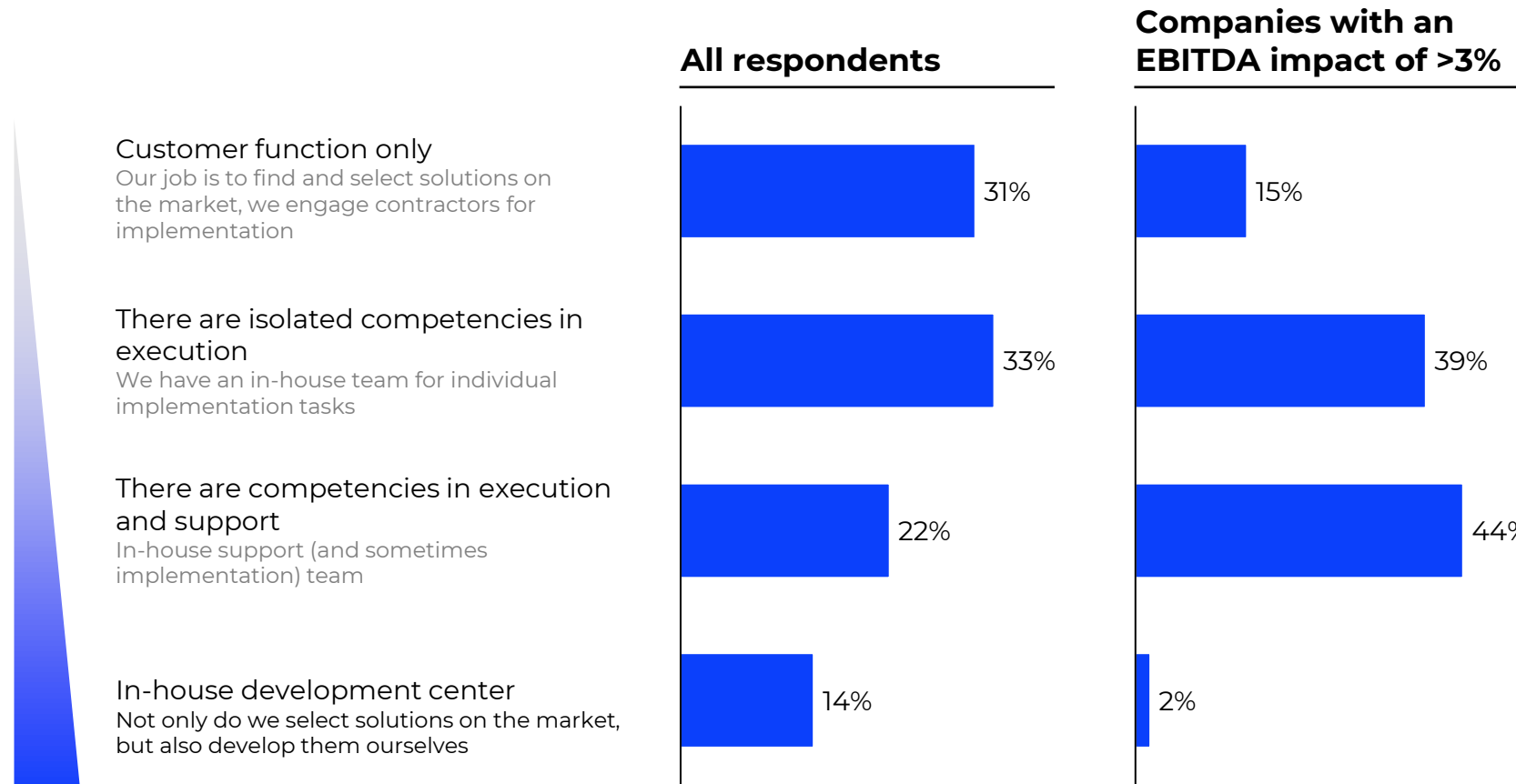
One in five survey participants mentioned the implementation of unmanned transport projects. At the same time, companies **encounter constraints** (low maturity of solutions, expensive infrastructure, economics not always obvious, lack of a legal framework)

Compared to global companies, relatively few Russian survey participants are implementing projects in such areas as predictive maintenance, digital logistics and warehousing, digital HSE solutions, 3D printing, robotics, and AR/VR

1. Question: "What types of digitalization solutions are implemented in your company?" (Multiple choice)
The survey was conducted by Yakov & Partners in cooperation with Zyfra Group

Representatives of leading companies rely on the development of internal capabilities, but without setting up internal development centers

Digitalization operating model¹



46%

of the respondents from companies with a high impact are focusing on the **development of internal capabilities**, although most of them **do not yet have their own development centers**

“ The overall approach to digitalization has not changed – yes, the vendor landscape has gotten worse, but probably like most market players, we want to do it in-house, which is what we are doing

Division Director

1. Question: "Which statement best describes the company's digitalization model?"
The survey was conducted by Yakov & Partners in cooperation with Zyfra Group

Two out of three respondents are short of digital talent in all disciplines

Percentage of the respondents who indicated a **significant or moderate shortage** of digital talent in the following disciplines¹, %



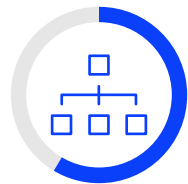
67%

Digitalization project managers



67%

Product owners



58%

IT architects



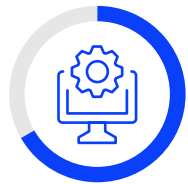
61%

IT developers (including DevOps)



60%

Data scientists



66%

APCS/I&C specialists

Business and universities are interacting more, but it is still a long way to go until proper educational programs are created... There is an isolated model of interaction, but, unfortunately, there is no common forum. And this is a big problem

Director of a major technology institute

There are many specialists left in Russia, but it is difficult to retain them, many of them are going to the East, to new facilities

Digitalization Director

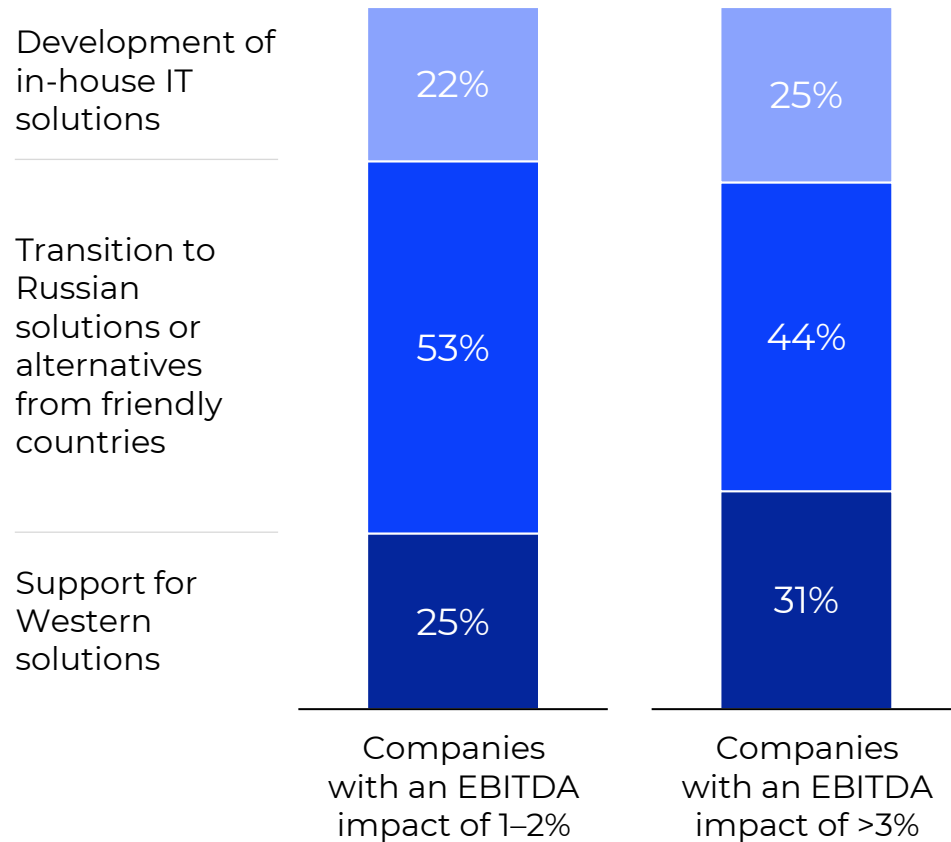
What we truly lack is project managers with good skills and adequate expectations

Department Director

1. Question: "Can you assess the shortage of staff in disciplines involved in digitalization projects?"
The survey was conducted by Yakov & Partners in cooperation with Zyfra Group

Representatives of top performers are more selective when deciding to switch to Russian IT products

Strategy for overcoming restrictions¹



Respondents from companies with a high impact are generally **less likely to believe in import substitution** or alternatives to Western solutions from friendly countries

In the medium term, however, they are more inclined to support Western solutions compared to less ambitious players

“ We support everything in-house, minor malfunctions so far, but nothing untoward has happened. Unfortunately, the Russian market has yet to offer a replacement

IT Director

“ Over the next 2 to 3 years, there are no significant negative constraints. It is important to have in-house development: it gives flexibility, plus modules turn out better and cheaper

Division Director

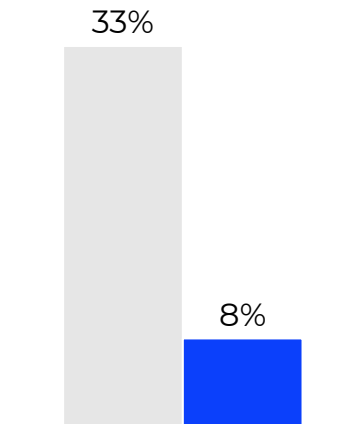
1. Question: "In your opinion, what impact will the departure of the official foreign vendor have in the next 2 to 3 years?" (Multiple choice)
The survey was conducted by Yakov & Partners in cooperation with Zyfra Group

More than 70% of the respondents from leading companies believe that the gap with the world's top companies will narrow or remain unchanged

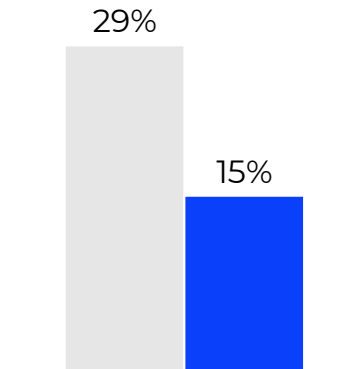
Digitalization outlook for the next 4–5 years¹

■ Companies with an EBITDA impact of 1–2% ■ Companies with an EBITDA impact of >3%

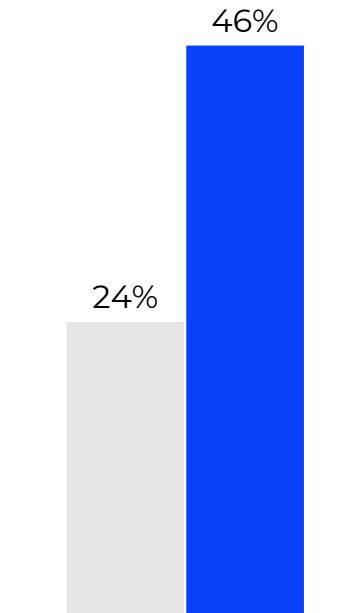
Wide technology gap



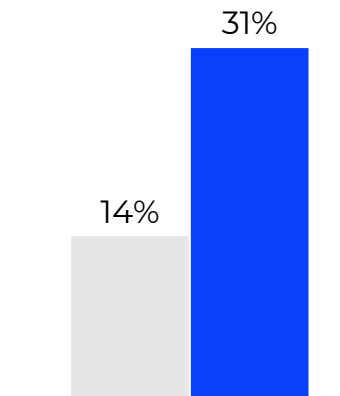
Moderate technology gap



Stabilization at the current level



Becoming a global market leader



>50%

of all respondents expect a technology gap in the medium term

At the same time, high performers are optimistic and **see the potential for Russia's technological leadership**

“ A lot of companies are already helping fund basic research – new beneficiation technologies, recycling of industrial waste, additive technologies. No tech revolution is in sight, but the potential is there!

Director of a major technology institute

¹ Question: "How do you see the company's prospects for digitalization and digital solutions in the next 4 to 5 years?"
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