

Export of Russian Software Development Industry

18-th Annual Survey

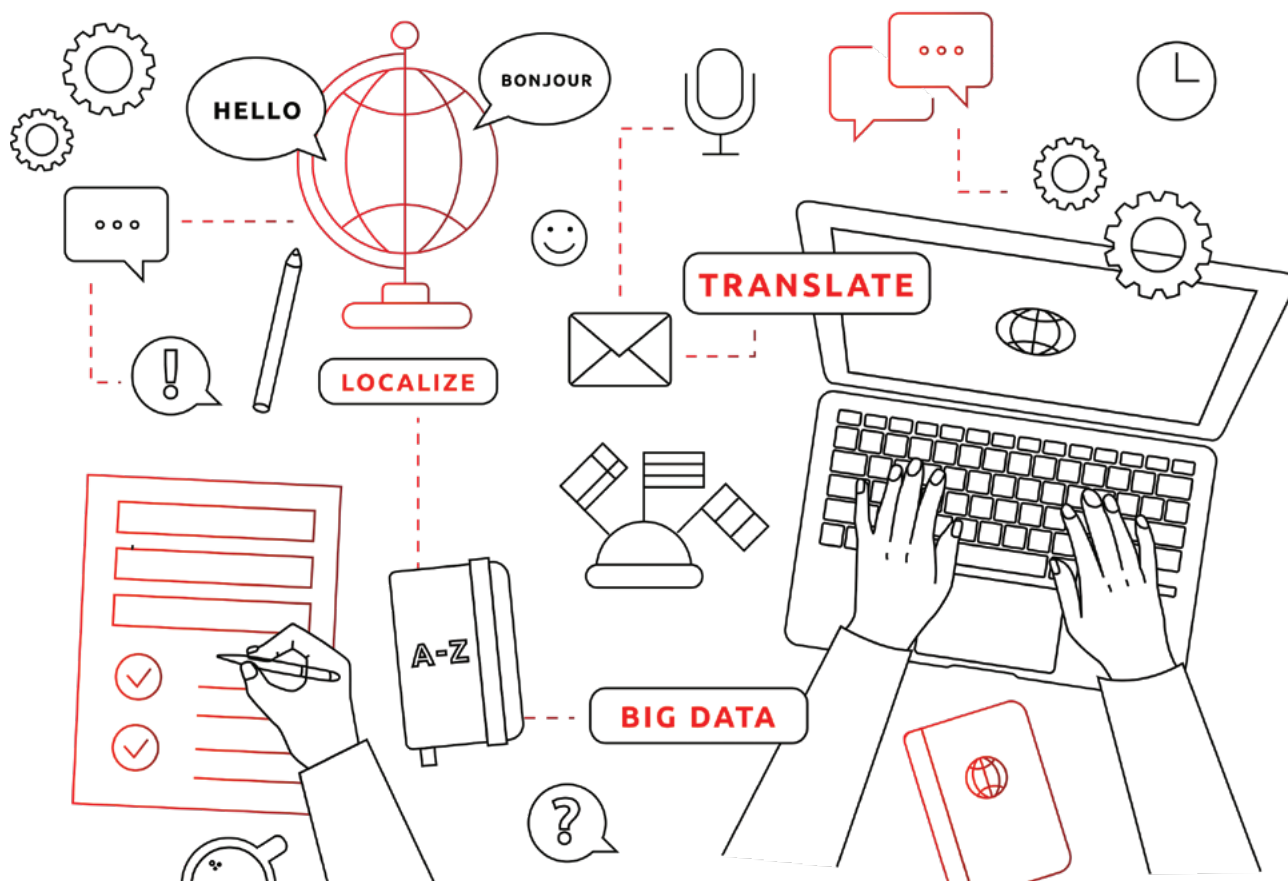
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DEAR COLLEAGUES AND FRIENDS

It is my pleasure to introduce to you the results Russian software industry survey that has been annually organized by RUSSOFT Association for 18 years now.

In 2021 in spite of continuous pandemic of coronavirus we managed to gather information from ever biggest number of respondents engaged in the software industry, having received altogether 232 duly filled questionnaires. Such a number of respondents provided the survey's results with a solid and adequate basis. Besides, we have also traditionally explored diversified official sources of information and used insights from top managers of software companies.

Results of the previous survey in 2020 proved to be not quite accurate and adequate because of uncertain situation (much less respondents took part in the survey that time). Pandemic brought serious changes to the software development industry structure and its practices in 2020 - both in Russia and in the global market.

The results of survey carried out in 2021 have strongly confirmed our predictions that the previous year was rather successful for the Russian software industry in spite of geopolitical and economic turbulences in the world. Instead of predicted drop of the Russian IT market (which was estimated by IDC experts from 30 % to 8 % during the year), the Russian IT market grew up to 2 % and reached \$25.35 billion. It was marked by a significant growth of sales in the software industry (by 16% in RUR) both in Russia and abroad. Digital transformation of the Russian economy proved to be the key factor for such a growth.

The deepening of geopolitical tensions between USA and Russia led to a certain decrease of the US and of EU market shares in the Russian software export in software development services. One must notice that diminishing of the developed markets share in the Russian export did not mean the cut of export — not at all! The thing is that the export to other (developing) countries has been growing more significantly, because Russia proved to be able to become an alternative global provider of IT-solutions, particularly in the field of electronic government, financial services and (particularly) cybersecurity, de-facto offering “Digital Sovereignty”.

The total volume of Russian software companies' sales reached \$8.6 billion (while the total volume of sales in Russia and abroad reached 1.35 trillion RUR). The growth in RUR in both cases exceeded 17 %.

Russian software development service providers have kept their positions in the rating of the top 100 global service providers (according to the IAOP). Russian software vendors have also continued strengthening their positions in the “Gartner Magic Quadrants”, where one needs to stress the success of cybersecurity solutions' vendors. As many as 7 Russian companies are included into the list of the best cybersecurity providers in the world.

Respondents of our survey in 2021 have also positively considered the growth prospects in the current year and expected to increase their sales 16+ % in dollars and their export by at least 10 % in 2021.

I would like to take this opportunity to express my profound gratitude to our experts who helped us to seriously adjust the questionnaire according to the changing situation in the global market: Andrey Terekhov (professor of St. Petersburg State University and president of Lanit-Tercom), Alexander Kalinin (CEO of SibEDGE), Maxim Semenko (president of SECON Association and CEO of CodeInside), Alexander Belokrylov (CEO of BellSoft), Viacheslav Ananiev (member of the Board of directors, SibAcademSoft Association), CEO of Data East), Ms. Irina Travina (Chairman of the Board of SibAcademSoft Association, CEO of SoftLab-NSK).

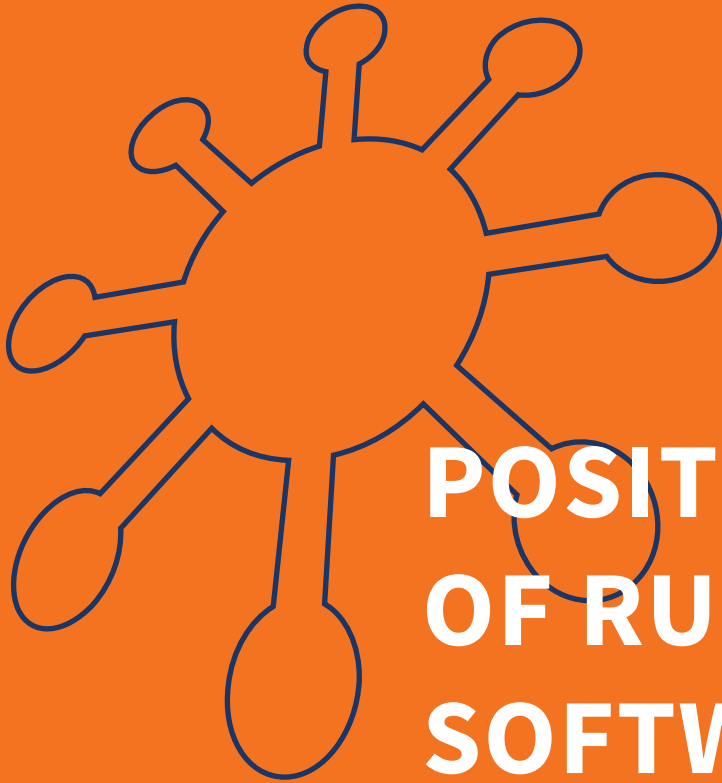
As ever — my most sincere words of gratitude to Dmitry Zhelvitsky, the RUSSOFT Chief analyst for his fantastic work of searching and gathering initial information, analysing received data, preparing the final report and carrying out the ranking (both of the leading companies in the IT sphere and universities).

We are also very grateful to the Information & Computer Technologies Industry Association (APKIT) for their continuous support of our survey for many-many years.

And finally our great thanks to those who participated in the survey, provided RUSSOFT with information about their companies and thus contributed to the success of the survey.

Best regards,

President of RUSSOFT
Valentin Makarov



POSITIONS OF RUSSIAN SOFTWARE COMPANIES IN THE GLOBAL IT MARKET





THE OUTSOURCING CYCLE

Alexander Egorov
Reksoft CEO,
Russoft board member



Today, the Russian market for digital solutions development is characterised by large companies' move to in-house development and acute staff shortages. Looking back, the IT world is no stranger to this situation: the shift from in-house to outsourcing is cyclical. The first wave of development outsourcing began in the late 1980s and was fueled by dramatic falls in the costs of communication and the rise of the Internet. It became cheaper and easier to reach all corners of the world, which led to a boom in business process outsourcing (BPO), and later, external software development for international corporations. Most of the outsourcing went to India, but Russia was also involved in the latter stages of this trend, including Reksoft, which was created in 1991. It was then that Ascom, Mitel, Saxo Bank and other large companies became our clients. During this period, external developers were viewed exclusively as a production resource. Everything that could be outsourced was outsourced, including entire IT departments.

In the 2000s, companies realised that, along with development, they had let go of some important business functions, and the reverse process of pulling IT specialists back on staff began. The balancing act between external and

internal development proved hard to sustain. Many companies were in a frenzy, with people recruited and laid off a couple of years later, leaving these workers to rue their salary expectations when they could find themselves barred from the labour market.

Now Russia is experiencing another leap in interest in internal development. The idea of optimising costs has receded, with business becoming digital, and large companies are recruiting IT specialists in the belief that they will be able to home-grow software production that rivals the external market. This misconception is well documented in Frederick Brooks' *The Mythical Man-Month*, whose main point is that increasing IT development team does not automatically increase production. Instead, after a short while, the reverse happens. We are already witnessing the way more enlightened businesses are again turning to service companies to build a professional project office and set up supplier management processes.

Obviously, the digitalisation of business leads to a sharp increase in competition in all industries through the organisation of digital channels of communication with the customer. You can survive on the market only through original solutions

that allow you to communicate with the customer faster, better and in a more compelling way than your competitors. This is why 90% of customers come to Reksoft.

Today, developing a modern, high-load solution is a complex production process. Having a large number of developers on staff does not mean that they are well managed. Managers must have a proven track record of successful implementation of large digital projects, and be able to work with complex project management and corporate architecture in all key domains including business, data, applications and infrastructure. This is exactly what Reksoft has been offering to its international and Russian clients, including public sector ones, for over 30 years. It is only by combining developed tools for organising digitalisation infrastructure and the team's competencies in the implementation of large projects that you can guarantee to connect the client's strategic business objectives with technology – and give them the potential to thrive in the new digital reality.

1.1. Russian ICT market

RUSOFT does not conduct its own research of the Russian IT market. Analysts of the Association draw conclusions about its state only on the basis of the analysis of data obtained from numerous open sources (reports of research companies, published ratings, official indicators of the largest Russian IT companies).

RUSOFT, based on information from its own research, can only assess the correctness of measuring the software segment of the IT market, since it has information about the sales of Russian software developers in the domestic market.

The volume of the Russian IT market, according to IDC, reached \$25 billion in 2019 (RUB 1.609 trillion, which is 7 % more than in 2018). Most of the segments grew by more than 10 %. The indicators for sales of IT equipment (“hardware”) turned out to be worse. However, the smartphone market grew in dollar terms, according to IDC, by 4.5 %. Other companies determining the size of the hardware market have similar increase. Server deliveries to Russia increased by 7.6 % (IDC data). The supply of printing devices increased almost as much – by 7.7 % in dollar terms, although in pieces a 1 % drop was recorded.

Decline was noted only in the “Personal computers” segment. In pieces, their number decreased by 7.8 %. At the same time, the average dollar price is unlikely to have increased. Sales of IT equipment as a whole increased by 3 %.

Various analytical data, indicators of large distributors and largest companies, as well as their own calculations of software sales of domestic companies allow RUSOFT to assume that the entire IT market of Russia has grown not by 3.9 %, but by 7–8 %, and its volume is at least \$29 billion.

Russian IT market in 2013-2020 according to IDC

		2013	2014	2015	2016	2017	2018	2019	2020
View of foreign companies	in dollars (growth/decline per year)	\$33 billion (-1%)	\$28 billion (-16%)	\$17,8 billion (-39%)	≈\$17 billion (-3-4%)	\$21,8 billion (+17%)	≈\$24 billion (+9.5%)	\$24,86 billion (+3.9%)	\$25,35 billion (+2.0%)
View of Russian companies	in Rubles (growth/decline per year)	RUB 1.05 trillion (+3.9 %)	RUB 1.063 trillion (+1.2 %)	RUB 1.08 trillion (+1.6 %)	RUB 1.137 trillion (+5.3 %)	RUB 1.27 trillion (+2 %)	RUB 1.51 trillion (+18.7 %)	RUB 1.61 trillion (+7 %)	RUB 1.83 trillion (+14.0 %)
	Change in Rubles adjusted for inflation	-2.4 %	-9.1 %	-9 %	≈0 %	≈0 %	+13.8 %	+4 %	+8.7 %

The question of what the Russian IT market has become in 2020 is even more confusing. We can say with confidence that it grew in Ruble terms by at least 14 %, and in dollars – by at least 2 %. However, there is reason to believe that the growth turned out to be at least a few percentage points higher.

An increase of 14 % in Rubles and 2 % in dollars was reported in April 2021 by IDC when summing up the preliminary results for the year. With such an increase, the Russian IT market in 2020

reached RUB 1.83 trillion (for the first time, IDC presented this indicator in Ruble terms) or \$25.35 billion. However, in these preliminary data, the growth of all mentioned segments turned out to be more than 14 % (in Ruble terms). At the same time, for each segment, it looks quite realistic. Apparently, IDC company did not mention those segments that had a slight increase or even a fall when presenting the preliminary results.

By September 2021, the final data for the entire market was never provided.

There was only a clarification on the growth of the IT services segment and the volume of sales of corporate software was presented. IDC appears to be cutting back on public disclosure of its own research.

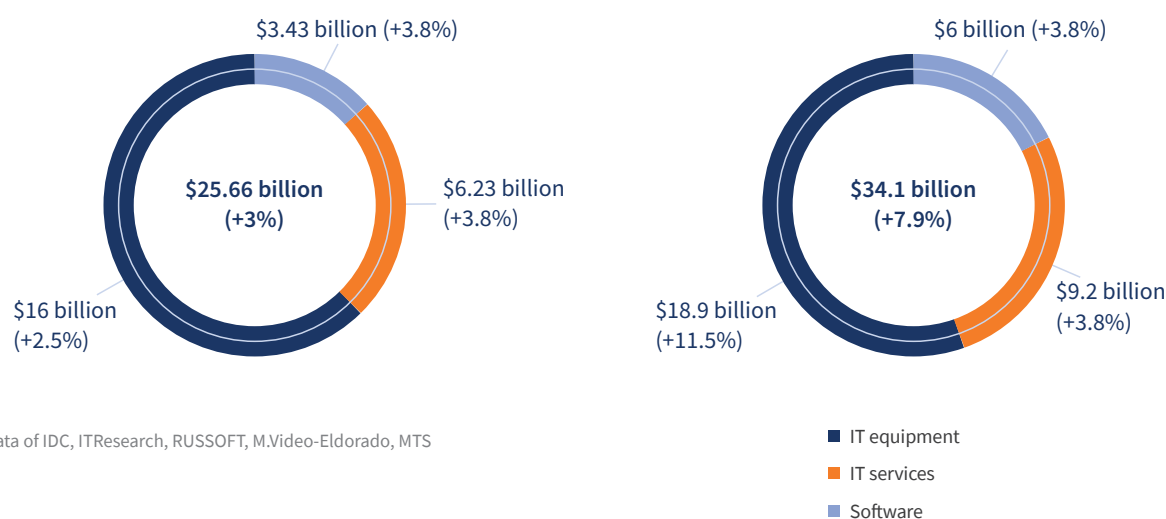
Therefore, a general idea of the entire market and its largest segments (first of all, the “Software Market”) has to be obtained on the basis of the analysis of various data. In addition to the partially disclosed information from IDC, there are the results of studying certain

segments of other research companies, official Russian statistics, reports on the year results of the largest companies (first of all, the turnover of distributors and system integrators is of interest). In addition, RUSSOFT has its own data on sales of Russian software companies in the domestic market.

Analysis of information obtained from various sources allowed us to form a certain range of both the size of the Russian IT market and its growth (with division by segments, as was the case with IDC in previous years). If we focus on the minimum indicators, then the market size at the end of 2020 amounted to \$25.66 billion with an increase of 3 % (in

Rubles – by 15 %). That is, it is something very similar to the preliminary results presented by IDC. If you focus on the maximum indicators, it turns out that the size of the IT market reached \$34.1 billion with an increase of 7.9 % over the year (in Rubles – RUB 2.46 trillion with an increase of 20.6 %).

RUSSOFT's assessment of the Russian IT market and its individual segments at the end of 2020



There is reason to believe that the minimum indicators reflect the existing underestimation both in absolute terms and in terms of growth, while the real state of affairs is fully consistent with the maximum market size with the corresponding growth. This conclusion is based on some important indicators that characterize to some extent the situation in the Russian IT market.

In particular, this indicator is the total revenue of the 100 largest Russian IT companies in the CNews rating. It exceeded RUB 2 trillion (almost

\$28 billion), having increased over the year by 28.6 % (in dollars – by 15.1 %).

The version of the underestimation is also confirmed by the data on the IT costs of organizations in the Rosstat reference book "Russia in Figures 2021": they exceeded RUB 1.6 trillion at the end of 2019 (\$25 billion). Most likely, these are the costs of only large and medium-sized enterprises, which are required to report to the statistical office. The received RUB 1.6 trillion definitely does not include purchases of computers, smartphones, printing devices and software by

individuals. Taking into account the growth in 2020 and taking into account the costs of small businesses and households, total IT spending in Russia may well amount to at least \$34 billion.

The underestimation of the Russian software market by IDC is especially evident. Its volume of this market amounted to about \$3.5 billion, but according to RUSSOFT, sales of software products of Russian software companies exceeded \$4 billion, and imports, according to the Central Bank of the Russian Federation, amounted to

\$4.5 billion.

However, the IDC figures cannot be considered wrong. We can talk about different approaches and techniques.

RUSOFT bi-currency index

IDC and other foreign analytical companies usually measure the Russian market in dollars, although the national currency in Russia is rubles. Using both dollars and rubles can be justified. A lot depends on which market segments are being studied and what research objectives are set. If you focus on the interests of foreign corporations, which measure their income in dollars or euros, then naturally the use of the American or European currency will be justified. The dollar, being the world currency, has an

advantage over the euro. If we focus on Russian IT developers and consumers, the significance of ruble measurements increases.

In order not to get confused in various growth indicators (in dollars and in rubles), RUSOFT suggests focusing on its own bi-currency index. It implies measuring the sales of those solutions that are made in Russia in rubles, and imported devices and systems in dollars (taking into account their weight in the total volume of the IT market in Russia).

According to the bi-currency index, the Russian market grew by 5 % in 2019. At the same time, the calculations are based only on IDC data, which RUSOFT considers somewhat underestimated. If we focus on the bi-currency index, then in 2019 there was a slowdown in

growth rates, since in 2018 this index corresponded to an increase of 10 %, and in 2017 – of 9 %. However, taking into account the fact that, according to RUSOFT, the growth rates of the IT services and software markets should be higher than that of IDC, it can be argued that over the past three years the development of the IT market has been the same. The growth rates were quite decent, but not very high.

At the end of 2020, the bi-currency index amounted to 1.134, which corresponds to an increase of 13.4 %. The growth of this indicator provided a high demand for computer equipment, which arose largely due to the pandemic and the associated transition to a remote mode of work, education, trade and entertainment.

1.1.1. Structure of the Russian IT market

Structure of the Russian IT market at the end of 2019

	share (a year earlier)	change (of the absolute value)
IT equipment	62.6 % (63 %)	+3 %
IT services	24.1 % (24 %)	+5.5 %
Software	13.3 % (13 %)	+6 %
Total:	100 %	+3.9 %

Source: Calculated by RUSOFT based on IDC data

Structure of the Russian IT market at the end of 2020

	share	change (of the absolute value)
IT equipment	55.4 %	+11.5 %
IT services	27.0 %	+3.8 %
Software	17.6 %	+3.8 %
Total:	100 %	+3.9 %

Source: Assessment of RUSOFT

The Russian IT market was considered immature due to the too high share of equipment sold on it. In part, it remains so if the specified maturity criterion is applied, but after many years of a slow increase in the share of IT services and software, in 2014–2015 there was a sharp jump in IT services: their share increased from 20 % to 25 %. In 2016, the share of services remained almost unchanged, and by the end of 2017 it increased by another percentage point – up to 26 %. Such a change in 2014–2015 was caused primarily by a significant increase in the cost of imported equipment as a result of the ruble devaluation due to the crisis in Ukraine with a very small number of Russian analogues, which led to a

decrease in its sales. However, the factor of the ruble devaluation in 2017 could no longer work to increase the share of IT services, since this year there was a significant strengthening of the ruble.

In 2018, IDC determined a significant increase in sales of IT equipment in Russia (in dollar terms – by 15 %), but IT services and software remained almost unchanged. Consequently, there was some retreat and return to the structure that was before 2014, although the share of IT services (24 %) still remained higher than it was in 2014 (20 %). In 2019, the market structure did not change significantly, but the share of IT services and software slightly increased.

At the end of 2020, RUSSOFT made its own assessment of the Russian IT market, according to which the share of IT services and software turned out to be higher than in IDC's calculations. At the same time, over the year, the share of IT equipment, according to RUSSOFT, slightly increased, and that of IDC, perhaps even slightly decreased, since, according to preliminary data presented in April 2021, the growth of the software market turned out to be slightly higher than the growth of the entire IT market, the growth of the IT services market (there are final results for it) remained at about the same level.

1.1.2. Russian software market

At the end of 2020, IDC switched to providing data on the Russian IT market in rubles. According to the preliminary results announced in April 2021, the Russian software market grew by 16 % (the final results of the year at the time of this report were not published yet): from RUB 213.5 billion to RUB 247.6 billion. When converted into dollars at the IDC exchange rate (RUB 64.69 for 2019 and RUB 72.32 for 2020), we get an increase from \$3.3 billion to \$3.42 billion (by 3.8 %).

If the growth rate looks quite realistic (sales of Russian software companies on the domestic market also grew by about 16 % in ruble terms), then the absolute value seems to be underestimated. It can be assumed that the IDC methodology does not cover all types of software sold in Russia.

According to the methodology used by RUSSOFT, sales on the domestic market of Russian software companies

traditionally turn out to be much larger than the capacity of the entire market. At the end of 2020, sales of Russian software companies within the country amounted to \$9.5 billion, with an increase of 4.5 % (in rubles, an increase of 16.5 %). However, this figure includes revenue from custom software, which IDC classifies as IT services.

Nevertheless, sales of domestic software products within Russia amounted to approximately \$4.5 billion, with an increase of 1 %, which turns out to be the largest of the entire software market determined by IDC. This phenomenon is explained by the fact that RUSSOFT has a double count in this indicator, since when creating a solution on the platform of some vendor, the cost of its software is taken into account twice: in the income of the developer of the final solution and in the income of the platform supplier. However, this double count is unlikely to exceed \$0.5 billion (most likely it is much less).

If we assume that foreign developers of software products sell in Russia for at least \$2 billion, then it turns out that the entire Russian market of software products alone has reached \$6 billion in 2020.

Foreign software may account for much more than \$2 billion, because, according to the Central Bank of the Russian Federation, imports of computer services amounted to \$4.5 billion in 2020, with an increase of 25 % compared to 2019, according to the results of which it was estimated at \$3.59 billion. This import also includes custom software (some foreign vendors develop custom-made systems based on their platforms, and some Russian companies order software development abroad), but the supply of relevant services from foreign companies is not large-scale (hardly they exceed \$1 billion).

Such a big difference (between indicators of IDC and RUSSOFT) is fully explained

by different approaches and methods. The methods, goals and objectives of researching certain markets can vary dramatically. Indeed, there can be many options for how to measure the software market. Because of this, there are serious discrepancies in research results. Should custom software be included in the software market or not? Should SaaS be classified as IT services or software? Should we take into account the income of software companies from the implementation and support of software or not? If a company does custom development for a specific customer, but on its own replicated platform, is this a service or a typical solution? If a software

company serially sells a software and hardware complex created on the basis of its standard software, are these the sales of hardware or software? There are many such questions. In most cases, methodological difficulties are associated with whether to classify a particular segment as the IT services market or the software market.

Rosstat in its reference book "Russia in Figures 2021" indicated that the costs of organizations for the purchase of software in 2019 (this figure is calculated with a delay of more than a year) were RUB 488 billion (\$7.5 billion). Perhaps, this indicator is even underestimated,

since it can be obtained on the basis of statistical reporting. It also includes custom software, but minus this software, the entire corporate software market should be about RUB 260 billion (\$4 billion). According to the most conservative estimates, in 2020 this figure exceeded RUB 290 billion (in dollars it turns out not about \$4 billion, but over \$4 billion).

Since in previous years the Russian software market was measured in dollars, to reflect the dynamics for 2020 it is also presented in the US currency, but with duplication in rubles.

Main characteristics of the Russian software market in 2015-2019

		2016	2017	2018	2019	2020	Notes
Market size (change per year)	\$	\$2.2 billion (-4 %)	\$3 billion (+19 %*)	\$3.07 billion (+2.2 %)	\$3.3 billion (+6 %)	\$3.42 billion (+3.8 %)	IDC version
	RUB	—	—	—	RUB 213 billion (+8.7 %)	RUB 247 billion (+16 %)	
	\$	\$6-7 billion (+11-12 %)	\$7.3-8.5 billion (+20-22 %)	\$8-9.3 billion (+10-11 %)	at least \$10 billion (≈+10 %)	at least \$10.4 billion (+3.8 %)	version of RUSSOFT (together with custom software, SaaS and implementation services), \$
	RUB	—	—	—	RUB 646 billion (+12.5-13 %)	RUB 750 billion (+16 %)	
Change in Rubles taking into account the official inflation rate		+16-17 %	+3.5 %	+5.5 %	+7 %	+10.6 %	

* – the growth indicated by IDC is most likely obtained after adjusting the data for 2016.

1.1.3. Use of internet technologies

According to the Russian Association for Electronic Communications (RAEC), in 2020 the Runet economy continued to grow despite the coronavirus pandemic. The contribution of the Internet segment to the Russian economy reached RUB 6.7 trillion, while the volume of the e-commerce segment amounted to RUB 6.07 trillion (+22 %). The audience of the Runet reached 97.4 million people, the audience of the mobile Internet – 89.5 million people.

In general, the Runet economy grew by 22 % over the year, while the contribution of the marketing and advertising segment amounted to RUB 349.8 billion, e-commerce segment RUB 6.07 trillion, infrastructure segment RUB 152.3 billion, digital content segment RUB 123.4 billion.

Runet audience reached 97.4 million people, or 79.5 % of the country's population over 12 years old, while 92 % of Internet users log on to the network daily.

The audience of the mobile Internet in Russia has reached 89.5 million people (73.1 % of the population).

The number of users of the Portal of Government Services increased in 2020 by 24 million and amounted to 126 million people.

The volume of the e-commerce segment in 2020 amounted to 6.07 trillion Rubles, an increase of 22 % compared to 2019.

Online retail grew over the year to RUB 1968.4 billion (+52 %), the Internet services market – up to RUB 986.5 billion (+22 %), the electronic payment services market – to RUB 1,794 billion (+34 %), while online travel fell to RUB 335.5 billion (-54 %).

The volume of the infrastructure segment in 2020 reached RUB 152.3 billion (+20 %). SaaS market reached RUB 17.3 billion (+14 %); infrastructure market (cloud hosting, IaaS, PaaS, etc.) reached RUB 123 billion (+23 %).

In mobile applications, Russian users spent \$1.33 billion (+25 %) over the year. The number of active users of social media in Russia in 2020 reached 64 million (+30 %).

According to the Federal State Statistics Service (Rosstat), in 2020 online sales accounted for 3.9 % of the retail trade turnover in the Russian Federation against 2 % in 2019. Thus, the share of e-commerce almost doubled over the year, which was largely facilitated by the COVID-19 coronavirus pandemic: because of it, people began to spend more time at home and order goods online.

The largest share of the online sales channel is registered in Moscow – 9.3 % at the end of 2020. Novosibirsk is in the second place (8 %), in the third place is Sevastopol (7.8 %). In St. Petersburg, annual Internet sales reached 7.3 % of total retail sales.

According to Ngenix, a Russian provider of cloud services, the number of accesses to government web services in Russia at the end of 2020 approximately doubled (depending on the month, the growth was in the range of 1.8–2.35 times) compared to 2019.

1.1.4. Telecommunications market

The volume of the telecommunications market in Russia in 2020

	Absolute value	Growth/decline in 2020	Growth/decline in 2019	Source
Russian telecommunications market	RUB 1.73 trillion (\$23.98 billion)	-0.7 % (-10.5 %)	+2.1 % (-0.4 %)	TMT Consulting
	RUB 1.79 trillion (\$24.81 billion)	+2 % (-8.7 %)	n/a	ACRA
Income from communication services	RUB 1.9 trillion (\$26.33 billion)	+1.7 % (-9.0 %)	n/a	the Ministry of Digital Development, Communications and Mass Media

According to TMT Consulting research company, the volume of the Russian telecommunications market in 2019 reached RUB 1.74 trillion (the final results of the year are not publicly available).

The income growth rate was 2.1 %, which is lower than in the previous two years. At the end of 2020, the size of the telecommunications market remained almost unchanged if measured in rubles (it decreased by 0.7 %), but in dollars, the decline was significant – by 10.5 %.

The deterioration in dynamics is primarily due to the slowdown in growth in the mobile communications market (at the end of 2020, the growth was only 0.3 %): forming 57 % of all telecom revenues, it is this market that primarily determines the dynamics of the communications industry. Other negative factors were a slowdown in the still fast growing Pay TV market (+1.5 % in 2020), as well as a consistently high rate of decline in revenues in the fixed-line telephony markets (-11.6 %) and inter-operator services (-5.8 %). Subscribers continue to abandon home telephones (in 2020, 2.3 million subscribers abandoned fixed telephony, service penetration fell by 3 p.p. to 27 %), and they also optimize the costs of telephony at enterprises and organizations. The inter-operator market is shrinking due to market consolidation and a drop in revenues in a number of international destinations. Internet access services grew by 1.1 %.

The next increase in tariffs began at the end of 2019, which was supposed to affect the performance of the telecommunications industry at the end of 2020. Most likely, there was an impact: without an increase in tariffs, the drop could have been more significant.

In the summer of 2021, Russian providers announced plans to increase tariffs for wired Internet. The price increase will be at least 4 %, and in some cases

subscribers will have to pay 15 % more. However, this increase cannot have a serious impact on the entire telecommunications market.

According to the Ministry of Digital Development, Communications and Mass Media, revenues from communication services in 2020 increased by 1.7 % compared to 2019 and reached RUB 1.9 trillion. The difference from the calculations of TMT Consulting company, apparently, lies in the fact that the Ministry of Digital Development, Communications and Mass Media classifies income from postal services as these services.

In 2021, data on the telecommunications market appeared from another source: its indicators were presented by the Analytical Credit Rating Agency (ACRA). According to it, the volume of the Russian telecommunications industry in 2020 reached RUB 1.79 trillion, which is 2 % more than a year earlier. Not only the absolute value of the ACRE turned out to be slightly larger than that of TMT Consulting, but also instead of falling, a slight increase was revealed.

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1.2. Russia and Russian cities in the world IT ratings

There have been no serious shifts of Russia in the world ratings in recent years. It is especially worth noting the continued rise in the Doing Business rating in 2020, which can be considered the most important among all world ratings. However, in most cases, there was a slight slide to lower positions in 2020, and in 2021, a slight increase could be seen more often. Apparently, the general negative informational background concerning the state of affairs in Russia affects, and this affects the creators of the ratings.

At the same time, any change in Russian positions in world ratings has a weak connection with real changes. Long-term observations allow us to determine the following pattern: the less the rating takes into account subjective expert assessments, the higher is the place of Russia in it. Therefore, the decrease or increase in the rating of Russia, first of all, reflects how it is treated abroad. This is also important, but it is not worth judging the real situation in a particular field of activity in the country by the positions in the ratings.

In many respects, the position of the country in the rating is influenced by the information received from Russia.

Purposeful work with rating compilers (sometimes inviting them to get acquainted with the situation on the ground) often gives a positive result. However, even in this case, the sharp increase in the rating does not so much reflect a serious improvement in the real situation, but rather the receipt of additional important information by analysts. There is progress in Russia in various directions, but in almost all cases it happens evenly and without leaps.

In March 2020, at the request of the Ministry of Digital Development, RUSSOFT interviewed its members in order to understand how Russia's position in world ratings affects their business (promotion of software products and custom software development services abroad). No examples have been identified that such an influence exists. Most often, the respondents answered categorically: they had never come across the fact that Russia's position in the ratings positively or negatively influenced the conclusion of contracts.

For companies, only the ratings and reports of analysts dedicated to specific enterprises or their products (in particular, reports from Gartner, as well as IDC, Forrester and the rating of the

Association of Outsourcing Professionals) can matter. There are a lot of companies on the world market whose affiliation to any country is difficult to determine. Therefore, most often the consumer focuses on the brand. In most cases, clients are not interested in the country at all, except in the case of public procurement. In these cases, over the past seven years (since the events in Ukraine), the geopolitical aspect has been influencing.

When asked how the desire to change Russia's position in world ratings could affect the digitalization process and the development of ICT infrastructure within the country, the respondents were not ready to give a definite answer.

According to the answers of the respondents, it was possible to draw the following conclusion (it is available in the answer of one of the respondents): "It is necessary to welcome the advancement of Russia in these ratings, but only due to the real development of the corresponding areas. It is necessary to monitor these ratings, but at the same time take into account their conventionality, without dwelling on them."

Changes in Russia's positions in the ratings of countries' competitiveness, innovation and ICT use

No.	Rating name	Year/place of Russia in the ratings (↑ or ↓ relative to the previous version)						
		2015	2016	2017	2018	2019	2020	2021
Competitiveness and business environment								
1.	Doing Business	62 (↑)	51	40	35	31	28	—
2.	The IMD World Competitiveness Yearbook	45 (↑)	44	46	45	45	50	45

No.	Rating name	Year/place of Russia in the ratings (↑ or ↓ relative to the previous version)						
		2015	2016	2017	2018	2019	2020	2021
3.	The best developers (ranked by average score across all HackerRank Challenges) (the rating of developers)	—	—	2	—	—	—	—
Innovation and use of ICT								
4.	Bloomberg Innovation Index	14 (↑)	12	26	25	27	26	24
5.	Global Innovation Index	48 (↑)	43	45	46	46	47	—
6.	E-Government Development Index	—	35 (↓8)	—	32	—	36	—
7.	UN Global Cybersecurity Index (GCI)	—	—	10	—	26	—	5

1.2.1. City ratings

Changes in the position of Russian cities in the Innovation Cities Global Index, ranked position

City name	2015 (↑ or ↓ relative to the previous version)	2016–2017	2018	2019	2021
Barnaul	-	446	467	476	469
Vladivostok	367 (↑14)	415	439	447	428
Volgo-grad	365 (↑13)	432	436	444	401
Ekaterinburg	220 (↓7)	358	402	416	385
Izhevsk	400 (↓6)	454	466	482	455
Kazan	223 (↓1)	339	375	393	366
Kaliningrad	303 (↑11)	397	426	437	404
Krasnoyarsk	280 (↑23)	412	443	438	437
Moscow	45 (↑18)	43	48	38	34
Nizhny Novgorod	273 (↑9)	388	421	421	423
Novosibirsk	244 (↑9)	394	416	405	406
Omsk	362 (↑9)	421	441	449	439
Orenburg	406 (↑1)	448	473	473	454
Perm	340 (↑14)	419	440	441	450
Rostov-on-Don	289 (↑28)	392	425	419	425
Samara	282 (↓16)	434	427	440	421
St. Petersburg	48 (↑33)	75	93	109	121
Saratov	341 (↑14)	437	456	463	448
Togliatti	407 (↑1)	455	474	475	465
Tomsk	339 (↑4)	444	462	460	452
Total cities in the rating	442	500	500	500	500

Innovation Cities Global Index 2018

In 2018, 500 cities from different countries were included in the list of the most innovative cities in the world, the Innovation Cities Index. The rating allows you to determine the potential of participants in the field of creating, implementing and broadcasting innovative ideas. Cities are assessed according to 162 special indicators, including the development of market relations, investments in technological progress, the business climate, the level of development of science, education, health care, culture, as well as the sports, financial and information and communication infrastructure of the city. The year of the rise of Russian cities was 2015, while 2017 was unsuccessful for all cities, except Moscow: cities literally collapsed in the rating, losing from 27 to 152 positions. In 2018, the decline affected all Russian cities, including the capital. In 2019, only a few Russian cities improved their positions (including Moscow).

There seems to be no reason for such a downgrade in the ratings of almost all Russian cities, since economic problems should not greatly affect the creation, implementation and broadcast of innovative ideas. The changes that have taken place in Russia over 3 years have influenced innovation both negatively and positively, since the same economic crisis often forced companies and government structures to be more innovative.

In 2021, out of 20 Russian cities included in the rating, 15 improved their positions, and 5 had a decline (usually very small).

The most promising cities for investment in technology, innovation and startups

According to the Tech Cities of the Future rating, Moscow entered the TOP-20 of the most promising cities in Europe in 2020. The cities were evaluated in terms of attracting capital, availability of qualified employees and infrastructure development. The five leading cities included London, Paris, Dublin, Amsterdam and Berlin. The overall rating was based on the results that cities scored in each of five categories: Economic Potential, Innovation and Attractiveness, Foreign Direct Investment Level, Startup Ecosystem, and Profitability. The capital city took the 18th position out of 76, and in one of the five categories of the rating ("Ecosystem of startups") it rose to the 10th line.

In 2021, Moscow climbed to the 14th place in the overall rating, and in the Startup Ecosystem category – to the 6th.

Best Ecosystems for Startups (StartupBlink)

StartupBlink ranks not only countries, but cities as well. In its last rating, presented in 2021, Moscow retained the 9th place, which it occupied a year earlier, St. Petersburg dropped from the 147th place to the 199th. Novosibirsk (the 400th place, dropped by 34 positions), Kazan (the 428th, 87 positions lost), Chelyabinsk (the 637th place, 11 positions lost) and Yekaterinburg the 680th place (138 positions lost) were also below. Kaliningrad rose by 289 positions to the 610th place, Tomsk – by 272 positions to the 677th.

The World's 100 Best Cities

In October 2020, Resonance Consultancy, a real estate and economic development consulting company, released a revised version of The World's 100 Best Cities rating of the world's best cities for living, business and tourism. Moscow is in the fourth place against the fifth place a year earlier. The authors of the study noted the leadership of Moscow in the "Product" category, once again recognizing it as the best in terms of infrastructure (in particular, the airport network), cultural sites and attractions. In addition, the Russian capital was included in the top three megalopolises in the "Place" category, in which the quality of the urban environment and safety is analyzed. The city also improved its position in the "People" category, moving from the 143rd to the 12th line in a year. Moscow ranked second in the world in terms of the number of residents with higher education.

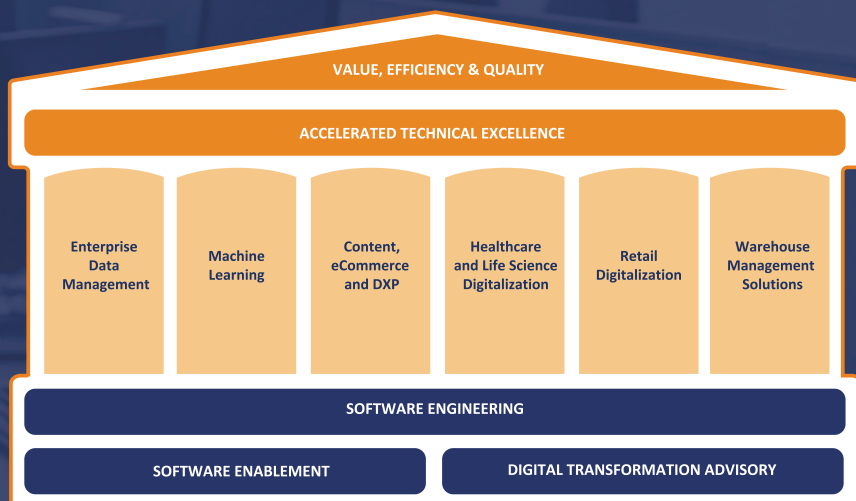
St. Petersburg was also included in the rating, being in the 16th place in 2020 (in the previous list, the Russian city was in 35th place).



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VLADIMIR LITOSHENKO

Senior Vice President of First Line Software,

Chairman of the Export Committee of RUSSOFT

«We have been working in Russia and abroad for more than 10 years. Despite the difficult economic situation in the world caused by the pandemic, we opened an office in Australia, and now we are opening a new office in Poland. Today we are actively expanding the geography of the company's sales. We on the NP RUSSOFT Export Committee help our colleagues to explore new markets. Russian software developers are highly regarded all over the world due to their high level of expertise. Therefore, despite the current situation, most IT companies are actively building new online sales channels and are showing strong growth abroad. Our company is a direct confirmation of this.»

PARTNERS, AWARDS, ACHIEVEMENTS



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1.3. Achievements of individual Russian companies and their inclusion in the world IT ratings

Over the past 4 years, based on the change in the positions of Russian companies in various world ratings, it is difficult to draw an unambiguous conclusion about their deterioration or improvement. A slight reduction in the representation of Russian software developers in world ratings and analysts' reports is largely due to the fact that a number of companies have changed jurisdictions. The reorientation to the

Russian market and the markets of developing countries is also important for rating compilers based in western countries. At the same time, instead of some companies excluded from world ratings and analysts' reports, new Russian companies appeared.

The Global Outsourcing 100

The International Association of Outsourcing Professionals (IAOP) has been rating the 100 best outsourcing companies in the world for 15 years in a row.

Russia's representation in the IAOP rating has changed slightly in recent years after it has gradually increased over the course of a decade.

Russian companies in the rating of The Best of The Global Outsourcing (The Global Outsourcing 100) in 2015–2021

No.	Name of the Russian company	2015	2016	2017	2018	2019 (getting into the rating)	2020	2021
1	Artezio	Rising star	—	—	Rising star	—	Rising star	Rising star
2	Auriga	Rising star	Rising star	Rising star	Rising star	+	Rising star	Rising star
3	Luxoft	Leader	Leader	Leader	Leader	+	—	—
4	MAYKOR	Leader	Leader	Leader	Leader	+	—	—
5	First Line Software	—	—	Rising star	—	+	Rising star	Rising star
6	ICL Services	—	Leader	Leader	Leader	+	Leader	Leader
7	MERA	Leader	—	Leader	Leader	+	—	—
8	SimbirSoft	—	—	—	—	+	Rising star	Leader
9	Reksoft	—	—	—	—	—	—	Leader

Russian companies in the Gartner magic quadrant

Name of the Gartner Magic Quadrant	Publication year	Company name
Endpoint Protection Platforms	2021	Kaspersky
Enterprise Data Loss Prevention	2017	InfoWatch Zecurion SearchInform
Enterprise Backup and Recovery Software Solutions	2021	Veeam Acronis
Treat Intelligence	2014	Kaspersky Lab Group IB
Application Security Testing	2018	Positive Technologies
Operational Technology Security	2016	Positive Technologies
Data Center Backup and Recovery Software/Solutions	2020	Veeam Acronis
Integrated Revenue and Customer Management for CSPs	2019	Nexign
Sales Force Automation	2021	bpm'online* (Terrasoft)
CRM Lead Management	2020	bpm'online (Terrasoft)
CRM Customer Engagement Center	2021	bpm'online (Terrasoft)
Meeting Solutions	2020	TrueConf
Insight Engines	2021	EPAM

* – the company promotes its bpm'online solution in foreign markets under the Creatio brand

Magic Quadrants of Gartner

Some of the most prestigious ratings for product companies (manufacturers of software products) are the ratings of the

analytical agency Gartner Group, which annually compiles the so-called Gartner Magic Quadrants. They identify products and companies that are among the leaders in certain software segments.



Russian IT companies have solidly continued worldwide growth in 2020 and 2021, in spite of the global pandemic. The European Union, US, and Canada market has been sharply increasing, while the markets in Africa, Southeast Asia and the Middle East have kept a steady upward trajectory. The trigger has been the digitalization of many sectors of the economy and increased demand for IT solutions and services. The government's continued support in this endeavor undoubtedly helped this movement and momentum.

Vladimir Litoshenko
Senior Vice President,
First Line Software



1.4. Publications in foreign media about high technologies in Russia

The analysis of the foreign press is carried out on the basis of publications in English. It is they who still influence the sales of Russian software companies in their main markets (North America and Western Europe) most of all, although the situation has changed in recent years: the share of their sales in other regions is steadily growing. Apparently, the increase in the importance of customers outside the US and EU for Russian IT companies will continue in the future. Therefore, it is necessary to study publications in other languages (from Arabic and Spanish to Chinese and Hindi), although such monitoring is much more difficult. In addition, there are still not so many relevant publications to draw conclusions from them. Therefore, it is not yet possible to carry out such a study.

In the last 2 years RUSOFT decided not to carry out laborious monitoring of the English-language media, since it no longer makes sense. One should not expect significant improvements in the representation of Russia and the Russian high-tech sector of the economy in this media. The nature of the publications can only be worse, but most likely insignificantly. More important is the survey data, which indicate which impact the external factor “Negative attitude towards Russia in the Western media” has on the Russian IT business. In 2020, the importance of this factor in respondents’ responses increased, but this year, with a small number of respondents, there was a high proportion of those companies that depend on the attitude towards Russia and Russian companies, which is formed by foreign English-language media. Therefore, it is more correct to focus on the results of a full-fledged survey in 2021. They confirm that companies have begun to suffer more from the “negative attitude towards Russia in the Western media” than until 2019 inclusive, but the degree of this influence is still slightly lower than the 2020 survey showed.

The detailed analysis of articles in English, which was done several years ago, is becoming less interesting for another reason. Such articles are dominated by predictable negativity with a sharp narrowing of topics after 2014. The Russian information technology sphere is now represented mainly in connection with its alleged influence on elections in the United States and a number of other countries, including Ukraine and the Baltic States, as well as in connection with espionage and cyberattacks attributed to “Russian hackers”. If in 2015–2017 they together accounted for 2/3 of the analyzed articles, then in 2017–2019 – already about 3/4 (taking into account the repetition of the same topic in different media – 83 %).

By and large, for a year with a lot of publications, there were not very many reasons for their appearance. Most of the articles are devoted to the fact that Russian companies (primarily Kaspersky) necessarily use their own espionage software sold abroad in the interests of the Russian special services. Of the “evidence”, the “strongest” is the following: “If the headquarters is in Moscow, then the company cannot but cooperate with the special services”. Explanations according to which Kaspersky simply by the nature of its activity must cooperate with the special services – Russian, American, European and Chinese – are not accepted.

In the second place is the multiple repetition of the assertion about the influence of “Russian hackers” on elections in the United States (not only presidential elections, but also elections at the state level) and in other countries. Whether it was just an attempt or something did work out: nobody managed to explain the mechanism of this influence, and why Russia needs it, but for the authors of publications it is not important.

There are also many reports of cyberattacks on critical systems in different countries, which are again attributed to “Russian hackers”. However, it is not always possible to assert that these cyberattacks did take place. If a cyberattack is committed on systems in the United States, then only Russian specialists are to blame. If Russian enterprises and banks in Russia have suffered from cyberattacks, they are still to blame, because they are not able to provide protection.

A few years ago, the main negative was associated with the attacks of the so-called “Russian hackers” on banks with the aim of stealing money from accounts or for the sake of extortion, that is, a banal crime without politics. At the same time, when receiving more detailed information, it turned out that these “Russian hackers”, if they were arrested, were often former citizens of Ukraine or Georgia who had moved abroad. By 2013, journalists nevertheless began to correct themselves, calling them not Russians, but Russian-speaking.

After the aggravation of Russian-American relations in 2014, such messages suddenly almost disappeared. As if all Russian hackers in a year or two switched from banal crime to political activity. According to information security experts, criminal groups, as a rule, are international and have a division by specialization. Some think over the operations, knowing the work of banks, others write malware, and the rest are engaged in its distribution.

Also, reports of software vulnerabilities identified by Russian companies have almost completely disappeared. In addition, journalists completely stopped contacting them if they had a need to get expert comments on various incidents, identified new problems in the field of information security, or when preparing

review material. Until 2014, such comments were constantly addressed, for example, to Kaspersky Lab.

Such a quick, radical and inexplicable switch from one topic to another indicates the launch of anti-Russian

information campaigns. Based on the number of mentions of Kaspersky Lab in the topic of spy mania, it can be assumed that work was purposefully carried out against this company in order to oust it from the American and European markets. Judging by the reports of the

American media, the company's sales in the United States have been steadily decreasing from year to year in the last 5 years, but they are still quite large – \$156 million (a few years ago it was about \$200 million). Consequently, the crowding out is quite successful thanks to the media.

Distribution of publications by topic, % of all publications for the period 01.05.2017 – 30.04.2019

Spy mania, cyber attacks, hackers and sanctions against Russian software companies	Electoral interference	Situation in Russia	Activities of Russian high-tech companies
51%	23%	21%	9%

In the English-language media, in connection with spy mania, first of all, one specific company is mentioned: it is Kaspersky (until recently, the company was called Kaspersky Lab). Nevertheless, the negative attitude of the press affects a large circle of Russian software companies. The annual RUSOFT survey shows that in 2019 45 % of domestic software developers, including those who do not work at all in the far-abroad countries, felt the detrimental effect of the “negative attitude towards Russia in the Western media” in 2019. A year earlier, there were 35 % of them.

A sharp increase in the influence of this factor was recorded in 2020: the average score dropped from -0.63 to -1.20. But it is more correct to focus on the results of a full-fledged survey in 2021, since a year earlier it was not possible to conduct it due to the pandemic. However, a sharp increase in the influence of this factor was also revealed in 2021, but not as large as in 2020 (the average score was -0.96 and -1.20, respectively). Since other factors in 2021 had a slightly smaller impact (the pandemic -0.95, and

Western sanctions -0.71), the information background in the Western media has become the most serious external factor negatively affecting the business of Russian software companies.

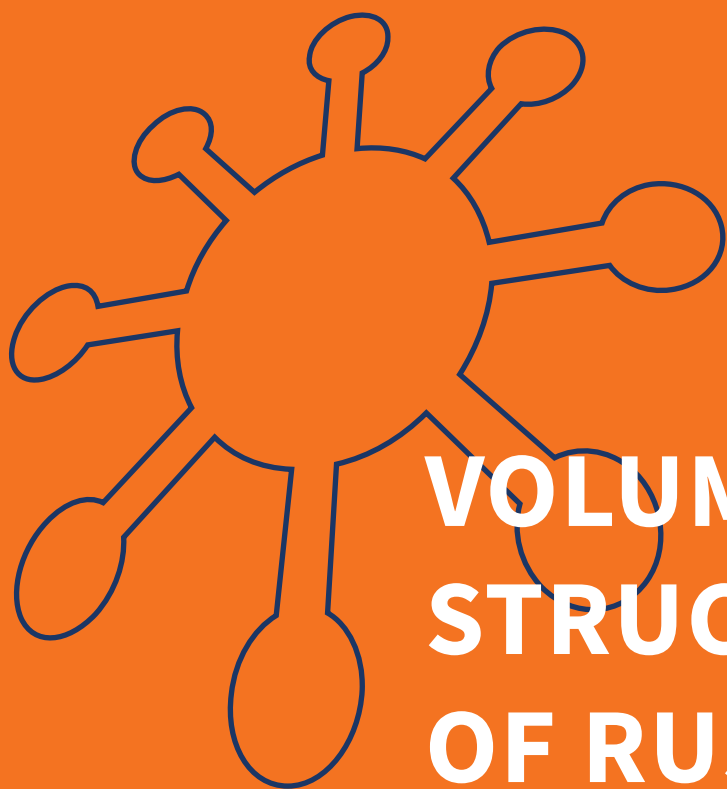
If companies operate in Western markets or plan to enter them in 2021–2022, then this negative impact is felt even more. The average score according to the survey of such companies is -1.20, and if the company operates in the United States or plans to enter the American market, then the average score reaches -1.25.

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Assessment of the influence of the external factor “Negative attitude towards Russia in the Western media”, the share of the companies surveyed

	survey 2017	survey 2018	survey 2019	survey 2020	survey 2021
Very negative (-3 points)	7 %	7 %	2 %	13.3 %	14.1 %
Negative (-2)	12 %	13 %	16 %	33.3 %	18.8 %
Negative, but insignificant impact (-1)	11 %	15 %	28 %	13.3 %	19.4 %
No impact (0)	63 %	55 %	52 %	40.0 %	45.3 %
Positive, but insignificant impact (+1)	1 %	0 %	1 %	0.0 %	1.8 %
Positive (+2)	0 %	0 %	1 %	0.0 %	0.6 %
Very positive (+3)	0 %	0 %	0 %	0.0 %	0.0 %
I find it difficult to assess	6 %	10 %	12 %	9 %	17.5 %
Average point	-0.58	-0.68	-0.63	-1.20	-0.96

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VOLUME AND STRUCTURE OF RUSSIAN SOFTWARE COMPANIES' SALES IN THE DOMESTIC MARKET AND ABROAD



THE COUNTRY WILL ACHIEVE MORE BY BRINGING TO THE MARKET THE WHOLE INDUSTRY THAN INDIVIDUAL BRANDS

Lev Matveev

Chairman of the Board
of Directors of SearchInform

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IT companies are generally doing well, both in Russia and abroad. The pandemic popularized remote work, the rapid transition to digital has opened up additional opportunities for businesses.

However, it is not the same for all IT companies, especially when it comes to exports. Companies that specialize in entertainment products, such as online games, social networks and so on, have strengthened their positions. And companies developing corporate software, in which personal meetings, negotiations are important, on the contrary, have faced a decline in the export.

When whole countries were in lockdown, it became very difficult to open new representative offices, hold events, etc. And frankly speaking, it didn't make much sense. B2B business model implies working through representative offices, partners, offices. Companies that had just started to explore new markets, experienced the negative consequences to the full extent. The vendors, who had firmly established themselves abroad before the crisis, did not notice strong changes. They follow a well-trodden path and do not experience serious difficulties.

When it comes to the export of information security solutions, Russian software is in demand for foreign customers as it was before the pandemic. Traditionally, the United States, Canada and partly Europe are the exceptions. Latin America, Africa, Southeast Asia and so on are positive towards our infosecurity products.

I'd like to add that abroad when it comes to information security, organizations lean to MSSP approach since it is economically profitable. Having noticed the demand for the outsourcing format, we developed SearchInform for MSSP. If you notice such trends and adapt your products to them, then it will be easier to bring software to new markets.

But in fact, from the Russian exports point of view, there is a lot to work on. We need a clearer and more systematic workstyle. We submitted proposals to development institutions, in particular Russian Export Center, on how to support domestic companies in a fundamentally different way. I hope that we will successfully implement them together.

For example, it would be effective to open representative offices of the Russian

IT industry in other countries. Such hubs would be located in foreign capitals with a developed infrastructure, their own call center, well-established relations with local authorities and Russian trade unions. This should be a comprehensive systematic work, including marketing and PR support, interesting events for local companies, and so on.

Russian companies, which are becoming the residents of such representative offices, will be quickly able to enter new markets on a large scale. Russian IT industry will receive a new impetus, raising its own status and prestige. And even for the country it is more profitable to bring to new markets not individual developers, but the whole industry.

I understand that it will not be possible to implement everything quickly. However, in order to firmly establish the brand "Made in Russia" in IT industry in three to five years, the first steps should be taken now.

2.1. Key indicators of the Russian software industry

According to RUSSOFT estimates, there are at least 4.2 thousand sustainable companies in Russia that pursue professional software development, apart from startups generating no regular income. Annually, the number of software companies grows by about 2.5-4%.

According to RUSSOFT, at least 2.5 thousand Russian software companies conduct international business. According to the data of the Central Bank of the Russian Federation, in 2017, about 9 thousand companies received money from abroad for the “computer

services” provided (see explanations on what is meant by computer services below in section 2.3.). The difference between 2.5 thousand and 9 thousand, as well as in the total number of software companies, is explained by the fact that the same company, in the understanding of RUSSOFT, can sell its services and solutions through several legal entities associated therewith. In addition, income from “computer services” can be received by companies that cannot be considered software companies, since software development is not their main activity.

Number of Russian software companies

Number of sustainable Russian software companies	min. 4.2 thousand
Number of companies with export income	min. 2.5 thousand

Total number of core employees, thousand people

Software developers working in all industries (including IT services of enterprises in various areas of activity)	>640
Software developers working in the Russian software development industry (total), of which:	>200
- in development centers abroad	>10
- in Russia	≈190
Employees of service companies (including those working for foreign customers)	≈100 (45)
Employees of product companies	≈80
Employees of Russian R&D centers of foreign companies	≈10



The IT services industry faces major challenges: uncertainty, market acceleration, shortage of specialists, need for agile partnership. The response to the challenges is services productization. The Service-as-a-Product approach combines market wisdom with the company's expertise. It encompasses trust-based partnerships, mature business processes and guarantee commitments. For Russian companies, productized services are a way to move beyond the rentier economy and enter western markets with a competitive offer. Those understanding it will win the market.

Aleksander Kalinin
CEO, Sibedge



2.2. Sales volume of the Russian Software Development Industry

According to the results of 2020, the total turnover of Russian software enterprises amounted to P1,305 trillion, with an increase of 16.5%. Revenues from exports and sales within Russia (in rubles) increased equally — by about the same 16.5%.

If we compare it with the increase in total revenue in previous years, we can see a slight slowdown (in 2019 it amounted to 17.8%, and in 2018 — 19.5%). However, when measured in dollars, the slowdown will look more significant: the growth rate of total

revenue decreased from 14.9% in 2019 to 4.5% in 2020 (to \$18.1 billion).

The increase in total exports in dollar terms in 2020 was 4.3%, and a year earlier — 17.5%. In this case, it was affected by a significant decrease in the average annual ruble exchange rate against the dollar (by about 12%). Sales abroad, therefore, reached \$8.6 billion, and the domestic market provided \$9.5 billion (P684 billion).

The increase in total revenue in dollar terms was below 10% for the entire time

1.305 trillion RUB

The total turnover of Russian software enterprises

of the RUSSOFT annual study only in crisis years (in 2009 and 2015). In the remaining years of the RUSSOFT study, Russian software companies always had at least a 10 percent increase in these indicators.

Average increase in turnover and foreign sales of Russian software companies in 2014-2020 years

	2014	2015	2016	2017	2018	2019	2020
Turnover, P	+25.5	+40	+27	+4	+19.5	+17.8	+16.5
Turnover, \$	+5	-10	+16	+19	+10.6	+14.9	+4.5
Foreign sales, \$	+11	+12	+13	+16	+10	+17.5	+4.3

In June 2020, it was difficult to expect that it would be possible to avoid a reduction in total income and staff by the end of the year: significant delays in payments began, the prospects for concluding new contracts became vague, and IDC and Gartner analysts promised compression of both the Russian and global IT market by several dozen percents.

By September, it became clear that the software industry was recovering quickly, and its growth was quite likely. Moreover, the first quarter was quite successful, since the industry has not yet been affected by the pandemic. Against the background of those concerns in Q2 2020

and situations in the other sectors of the country's economy, the past 2020 can be recognized as more than successful for software developers (see comparison with the indicators of other industries in section 2.7.).

Since the RUSSOFT Association tries to reflect the development of the industry from different perspectives, the indicators of the total turnover of companies and its changes are given in various units of measure. In addition, it introduced its own dual currency index, which is calculated as the average growth in foreign currency and ruble revenues, taking into account the weight of income from foreign sales and domestic market

sales. According to the results of 2020 year, this index amounted to 1.104 (corresponds to growth by 10.4%), according to the results of 2019 year it was slightly higher – 1.165 (16.5%), remaining at the level of the previous two years. This indicator appears to have stabilized around 1.15. Most likely, such an indicator would have been achieved at the end of 2020 if it were not for the pandemic (see more information on its impact in Chapter 4, which analyzes the conditions for business).

It is important to recall that from the 2019 study the base currency for summing up the results of the previous year, has been the Russian ruble (before it was

the US dollar). While earlier RUSOFT collected information on the turnover of companies in dollars (questions in the questionnaire were appropriately formulated) and made all calculations in them, recalculating indicators in rubles at the average annual rate if necessary, the 2019 data is based on indicators in ruble terms, which are then additionally converted into dollars to make comparisons at the international level possible.

Direct comparison of the total sales of the software industry in 2019 with the 2018 data will be incorrect.

This is due, firstly, to the fact that several large industry players at once ceased to meet the criterion of a Russian company after their sale to foreign corporations or

transfer of their main business outside Russia. Therefore, instead of the expected volume of foreign sales of \$11.2 billion in 2019, only \$8.25 billion turned out.

Secondly, the data for several years made it possible to conclude that initially the volume of sales in the domestic market was underestimated. The fact is that until 2013, the study was dedicated only to the export operations of software companies. Only those companies that had sales abroad participated in the survey. Thus, data on at least 15-20% of companies (in some years this figure reached 30%), which operate only inside Russia, was not taken into account. Over time, the collected sales data in the domestic market became more complete and were verified, which made it possible to make more accurate calculations.

Thirdly, rejection of the dollar as the main unit of measure made it possible to obtain more accurate primary data from the surveyed companies.

To avoid misunderstanding caused by apparent discrepancy between sales volumes and growth rates in 2018 and 2019, starting in 2019, a new table was created to sum up the results. The changes in indicators indicated therein relate only to the range of companies that are still considered Russian (they were in previous years). At the same time, despite the change in the absolute values of turnover associated with a change in the composition of respondents, a comparison of the growth rate (reduction) for all the years of the study is quite justified (including in 2018 and 2019).

Main economic indicators characterizing the Russian software industry in 2013-2018 (growth/fall compared to the same indicator of the previous year)

	units of measure	2013*	2014	2015	2016	2017	2018
Total turnover of Russian software companies	₽	363 billion	456 billion (+25.5%)	630 billion (+40%)	802 billion (+27%)	834 billion (+4%)	997 billion (+19.5%)
	\$	more than 11 billion	12 billion (+5%)	10.34 billion (-10%)	12 billion (+16%)	14.3 billion (+19%)	15.82 billion (+10.6%)
Foreign sales volume	\$	5.4 billion (+17%)	6 billion (+11%)	6.7 billion (+12%)	7.6 billion (+13%)	8.8 billion (+16%)	9.68 billion (+10%)
Share of foreign sales in total turnover	%	49%	50%	65%	63%	62%	61%
Domestic sales volume	₽	178 billion	240 billion (+35%)	220 billion (-8%)	294 billion (+34%)	321 billion (+9%)	387 billion (+20.5%)
	\$	5.6 billion	6 billion (+7%)	3.64 billion (-39%)	4.4 billion (+21%)	5.5 billion (+25%)	6.14 billion (+12%)
RUSOFT dual currency index		—	1.23	1.1	1.21	1.13	1.14

* — before 2013 RUSOFT did not determine the total turnover, therefore there is no data on turnover growth compared to 2012.

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Main economic indicators characterizing the Russian software industry in 2019-2020
(growth/fall compared to the same indicator of the previous year)

	unit of measure	2019	2020
Total turnover of Russian software companies	₽	1.120 trillion (+ 17.8%)	1.305 trillion (+16.5%)
	\$	17.34 billion (+14.9%)	18.1 billion (+4.5%)
Foreign sales volume	\$	8.25 billion (+17.5%)	8.6 billion (+4.3%)
Share of foreign sales in total turnover	%	47.6%	47.5%
Domestic sales volume	₽	587 billion (+15.7%)	684 billion (+16.5%)
	\$	9.09 billion (+12.9%)	9.5 billion (+4.5%)
Change in total turnover of Russian software companies in rubles, taking into account inflation	%	+14.4%	+11.1%
RUSOFT dual currency index	—	1.17	1.104

.....

2.3. Prospects for software industry main indicators changing

In the last 4-5 years, company expectations have become too overestimated. Real growth indicators were 5-10 percentage points lower than forecast. The exception is 2019, when the forecast for the growth of total turnover was 100% correct.

In 2020, due to the pandemic, the situation turned out to be such that by the second half of March it became pointless to make any forecasts about the results of the entire year. Therefore, with the survey launched at the end of February, part of the questions regarding the plans for the current and next year had already become unnecessary. By June, you could only count on a slight increase in the year. At the same time, the pessimistic scenario remained still relevant, and it suggested a significant reduction in sales.

In 2021, the situation in the global economy became more predictable in order to make software sales forecasts both in Russia and abroad based on the expectations of the surveyed companies.

According to this forecast, the turnover growth rate in 2021 should increase relative to 2020 — from 16.5% to more than 20%, and the total turnover will exceed ₽1,6 trillion. If the average annual dollar exchange rate is about 75 rubles, which can be counted on, then in dollar terms this figure will exceed \$21 billion.



According to IDC, the volume of the Russian IT market amounted to RUB 1.83 trillion in 2020, which is 14% higher than the previous year. The share of the IT market in relation to the total volume of Russia's GDP is 1.7%.

Despite the pandemic, we expect further market growth in 2021. With the current hybrid work scheme, this year will be especially effective for companies that develop collaboration software for any devices, anywhere in the world. We think that the most popular IT solutions in the coming years will include big data analytics tools, AI technology and cloud solutions.

Dmitry Komissarov
MyOffice CEO



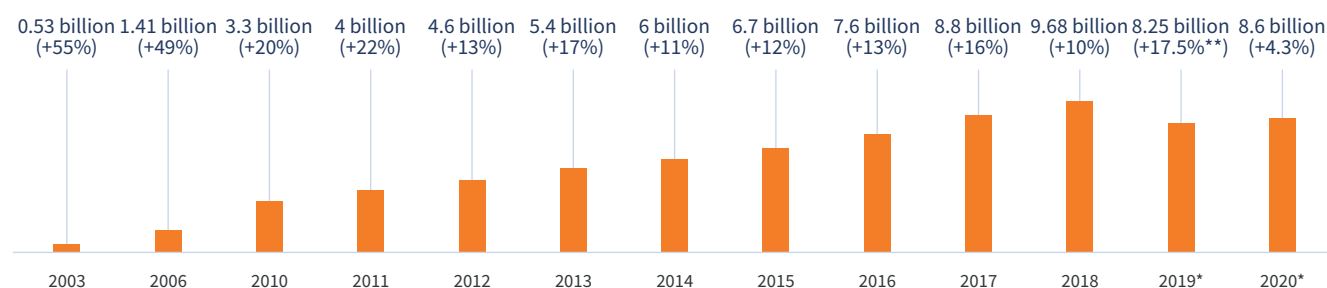
Software companies rely more on the domestic market (on the growth of the entire economy, on the digitalization and import substitution processes). Its sales are much easier to forecast with not so clear prospects for traveling abroad, which are necessary to find new customers and execute new contracts. Regarding the volume of exports in the end of 2021, the surveyed companies were extremely cautious. The vast majority of them expect that it will not change even in ruble terms. Most likely, such an expectation in most cases is similar to the answer “don't know”. Therefore, the foreign sales growth in the forecast based on the surveyed companies' expectations, will increase by 13% only (that is, less than in the end of 2020). In USD, the increase will be about 9% — up to \$9.3 billion.

It is possible that the foreign sales volume will increase more if borders open in the fall and it becomes possible to promote their solutions and services in the markets most significant for Russian software developers. In any case, a significant part of the surveyed companies expect to enter new markets (23% of respondents plan to make a foreign debut in 2021). However, most likely, even with the possibility of active marketing in the second half of 2021, this will fully affect only the export performance of 2022.

2.4. Foreign sales and export earnings

The total foreign sales of software industry companies by the end of 2020, despite the difficulties of concluding new contracts, nevertheless increased. The growth was insignificant — only by 4.3%, but it is still there.

Volume of foreign sales in 2003-2019 (growth for the year), \$



* — it is wrong to correlate the absolute values of 2018 and 2019 in this case, taking into account the fact that some companies are no longer considered Russian

** — growth only for companies that are still Russian (excluding those that have lost this status)

It is not yet possible to reach the level of \$10 billion in foreign sales. Most likely, this will not be possible according to the results of 2021. However, if in 2019 there were no sales of a number of Russian software companies (Luxoft, Parallels, Transas, Auriga, MERA) to foreign partners, then the total volume of IT industry foreign sales in 2019 would exceed \$11 billion.

Foreign sales of software companies should not be confused with their export revenues from the sale of software and its development services. Each of these concepts has a corresponding quantitative dimension. Consequently, there are three different indicators of software companies' business abroad: aggregate volume of foreign sales, volume of exports of "computer services", export earnings. They may differ from each other quite significantly.

The volume of computer services exports is determined by the Central Bank of Russia based on information received from banks according to the corresponding group of the OKVED (Russian National Classifier of Types of

Economic Activity) classifier. According to 2020 results, their volume increased by 13.5% to \$5.094 billion, which is 59% of the total foreign sales of Russian software companies. However, such a big difference, which often raises questions and puzzlement, has a logical explanation.

Explanation of the Central Bank of Russia

Foreign trade statistics on "computer services" are developed on the basis of the international methodology set out in the UN Manual on Statistics of International Trade in Services, 2010. Computer services include operations related to the development and implementation of software: the development, creation, delivery and provision of documentation for custom software; acquisition of ready-made software supplied electronically; acquisition of software licenses excluding right to reproduce and distribute.

In addition, this category of services includes services related to data processing, development, recovery, server hosting, database storage and management; web page development, design and hosting services; installation, repair and maintenance services for computer equipment and software; provision of consulting services related to software and computer operations, as well as training within consulting. The main sources of information in the formation of foreign trade statistics in services in the Russian Federation are the information contained in the statements of credit institutions approved by the Bank of Russia.

"Foreign sales of software companies" and "export of computer services" are two completely different indicators, which should not be equal. Firstly, software companies receive income not only from computer services, but also for software licenses when selling software and hardware systems, when selling

advertising (in free applications), various non-computer services, from scientific research.

Secondly, companies transfer to Russia the proceeds from sales of their software abroad not only under the codifier "provision of computer services", but also as "payments for the use of intellectual property", "transfers to individuals"

or "investments". It is known that two large Russian software companies that successfully operate abroad are not among the top 10 exporters of computer services, but were in the top 10 in the section "Fees for the use of intellectual property".

Thirdly, a significant part of the proceeds received remains outside of Russia. Some

of the money remains in legal entities created by Russian companies in other countries in accordance with world practice, in order to be closer to the client (in the conditions of modern geopolitics, such practice becomes especially relevant). It can be invested in marketing, to maintain its own foreign development centers and sales offices, as well as remain in the owners' bank accounts.

Comparison of computer services exports volume (statistics of the Central Bank of Russia) and volume of foreign sales of software companies (RUSOFT estimation)

		2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Foreign sales of Russian software companies (RUSOFT data)	Absolute value, \$ billion	4	4.6	5.4	6	6.7	7.6	8.8	9.7	8.25*	8.6
	Change per year	+22%	+13%	+17%	+11%	+12%	+13%	+16%	+10%	+17%	+4.3%
Export of computer services (according to the Central Bank of Russia)	Absolute value, \$ billion	1.666	1.995	2.508	2.651	2.455	2.664	3.417	4.06	4.49	5.094
	Change per year	+30.9%	+19.7%	+25.7%	+5.7%	-7.4%	+7.7%	+28.3%	+18.8%	+10.5%	+13.5%
Share of "computer services" exports (Central Bank data) in foreign sales of software companies (RUSOFT data)		42%	43%	46%	44%	37%	35%	39%	42%	54%	59%

* — it is wrong to correlate the absolute values of the total volume of foreign sales in 2018 and 2019 in this case, because the 2019 figure was calculated according to the changed method, taking into account the fact that some companies ceased to be considered Russian.

2.5. Domestic sales

Within the total sales in the domestic market of ₺684 billion, approx. ₺242 billion comes from service companies, which receive the main income from custom development, and ₺442 billion — from software developers. Since the custom software development share of the companies is known (69% for service and 20% for product), it is possible to estimate the volume of software development orders that Russian companies received in Russia. It is ₺255 billion (16% more than a year earlier).

Similar calculations can be made regarding domestic software products sold in Russia. Service companies are also developing them, but in their total turnover they amounted to 6.3% in 2020 (a year earlier, 8.3%, and in 2018 — 6.3%). The main area of product companies yields 70% of sales in the domestic market (a year earlier — 72.5%). As a result, sales of domestic software

products within Russia amount to approximately ₺325 billion (an increase of 8% over the year).

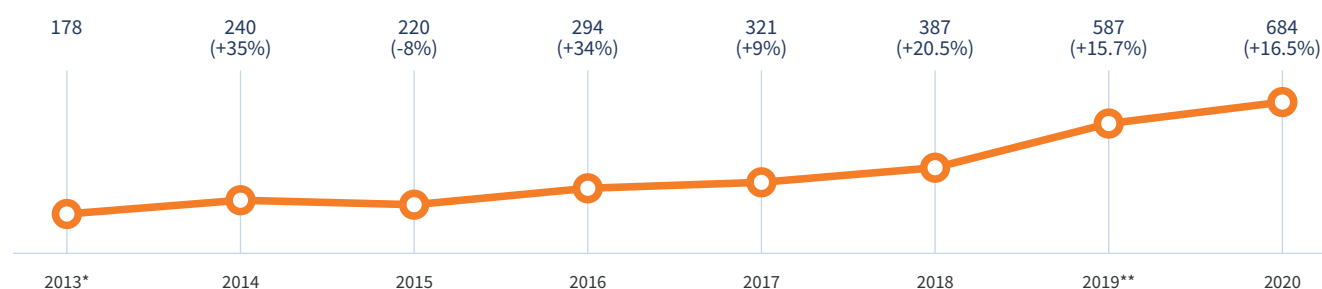
In total, sales of custom software and software products by the end of 2020 reached ₺580 billion. The difference between this indicator and the total sales of service and product companies (₺684 billion) is software sale as part of software and hardware systems, revenues from various IT services, including SaaS, and other sources of revenue.

The increase in revenue of domestic product companies in the domestic market amounted to 0.7% in USD (12.5% in RUB). Approximately the same indicator should be found in the software products sold by them (without other sources of income). At the same time, the Russian software market, according to IDC, increased by 16% (in RUB terms).

325 billion RUB

sales of domestic software products within Russia

Sales volume of Russian software companies in the domestic market in 2013-2020, RUB billion



* — until 2013 RUSOFT did not determine the total turnover and sales within Russia, so there is no data on sales growth compared to 2012.

** — it is wrong to correlate the absolute values of 2018 and 2019 in this case, because the 2019 indicator was calculated actually again using a slightly changed method and based on more complete data.

2.6. Nature of changes in company turnover

Change in annual turnover of respondents' companies in USD terms (with the exception of 2019, when revenue was determined in RUB)

Turnover	at the end of 2014	at the end of 2015	at the end of 2016	at the end of 2017	at the end of 2018	at the end of 2019	at the end of 2020
Remained same	26%	4%	30%	27%	13%	4.2%	5.3%
Increased	51%	25%	42%	43%	52.5%	69.4%	62.6%
Decreased	15%	71%	11%	3.5%	15.5%	18.1%	15.1%
Don't know	7%	14%	17%	26.5%	19%	8.3%	17%

The 2019 turnover indicator is measured in RUB (in previous years — in USD), and the Russian national currency for the year depreciated slightly against the USD. This is partly why there are more growing companies in the market. However, this was not the main factor; the year of 2019 for software developers turned out to be better than the previous one in all respects. It can be noted that at the end of 2019, approximately half of the companies surveyed (51.4%) increased revenue by more than 10%. At the same time, it is true that there were quite a lot of companies that reduced turnover.

In 2020, during the pandemic period, the share of growing companies decreased, which should be the case in the crisis. But the crisis for the software industry as a whole was not as serious as could be assumed, and therefore the reduction in the share of growing companies turned out to be minor. At the same time, 47.1% of the surveyed companies increased turnover by more than 10%, 23.3% — by more than 30%, 9.2% — by more than 50% and 3.9% — by more than 100%.

In 2020, we can see the continued increase in the share of foreign companies' Development Centers. Product companies have increased exports somewhat, and service companies have the advantage of increasing sales in the domestic market. Apparently, the growth of custom development in the Russian market was facilitated by a course towards digital transformation, which requires specific changes in the business model of a particular organization, which in most cases cannot be provided with a fully packaged product.

2.7. Distribution of foreign sales depending on business model

Distribution of total foreign sales among companies with different business models according to the results of 2016-2020 (absolute value)

	2008	2016	2017	2018	2019	2020
Service companies	55%	46%	47.5%	47%	40.7%	39.3% (\$3.4 billion)
Product companies	30%	47%	46.5%	47%	49.4%	49.7% (\$4.3 billion)
Foreign companies' Development Centers	15%	7%	6%	6%	9.9%	11% (\$0.95 billion)

Distribution of total sales in the domestic market by companies with different business models according to the results of 2016-2020 (absolute value)

	2016	2017	2018	2019	2020
Service companies	29.5%	30%	32%	33%	35% (₽242 billion)
Product companies	70.5%	70%	68%	67%	65% (₽442 billion)

Distribution of total turnover by companies with different business models according to the results of 2016-2020 (absolute value)

	2016	2017	2018	2019	2020
Service companies	40%	41%	41.4%	36.4%	37.5%
Product companies	55.5%	55%	55.0%	59.2%	57.3%
Foreign companies' Development Centers	4.5%	4%	3.6%	4.4%	5.2%

2.8. Service companies

Key performance indicators of service companies in 2020

	in RUB	in USD	in RUB, including inflation
Turnover	487 billion	6.8 billion	—
Increase in turnover	+18.5%	+7%	+13%
Foreign sales volume	—	3.4 billion	—
Foreign sales growth	—	+0.5%	—
Domestic sales	242 billion	3.4 billion	—
Domestic sales growth	+25%	+11.5%	+23.8%

2.9. Software products and out-of-the-box solutions

Product companies by the end of 2020

	in RUB	in USD	in RUB, including inflation
Turnover	750 billion	10.4 billion	—
Sales growth/reduction	+13%	+2%	+7.7%
Foreign sales volume	—	4.3 billion	—
Foreign sales growth	—	+5%	—
Domestic sales	442 billion	6.1 billion	—
Domestic sales growth/reduction	+12.5%	+0.7%	+7.2%

2.10. Software development centers of foreign corporations in Russia

Scope of services provided to foreign parent companies

Volume by 2020 in USD	Change in the end of 2020, %	Volume in the end of 2020, P	Change in the end of 2020, P
\$0.95 billion	+16.4%	Р68.9 billion	+30%

Foreign companies with their own research and development centers in Russia:

Accenture, Alcatel-Lucent, Allied Testing, AVIcode, Cadence, Design Systems,

Chrysler, Cisco Systems, Columbus IT, Dell, Deutsche Bank, Digia, Edisoftware, EGAR Technology, EMC, EMS, Ericsson, Harman, Hewlett-Packard, Huawei, Hyundai, IBM, Intel, InterSystems, Jensen Technologies, LG Softlab, Motorola, NEC, NetCracker,

Nival Interactive, Microsoft, Netwrix, Nokia, Nokia Siemens, Quest Software, RD-Software, Samsung Research Center, SAP, Scala CIS, SmartPhoneLabs, Tagrem Studio, Teleca, T-Systems.

2.11. RUSSOFT rating. Russia's largest software companies

In 2021, RUSSOFT Association launched the 7th version of the annually updated rating of Russian software development companies. By and large, it is a catalog of the largest software companies, divided into categories (divisions) depending on their size and growth rate (including, taking into account the predicted indicators in the next 2 years). There was no other complete rating of Russian software developers before the RUSSOFT Rating.

When developing the rating, the main task was not to rank companies by size, but to cover all the largest software companies in Russia and present the entire top part of the industry pyramid. It can be assumed that it was not possible to cover all companies that deserve to be rated, since there is no public information about some of them. However, it can be argued that such companies are most likely only a few, and they have a turnover of less than \$50 million.

Some media and rating agencies compiled wider ratings of IT companies, where they rated separately software development companies. However, their ratings were clearly incomplete (they covered at best half of the largest software companies), which also included system integrators, equipment manufacturers, as well as foreign software companies that reported their sales in the Russian market.

The main reason for the incomplete coverage of software companies in existing ratings is the lack of reliable information about the total revenue of companies that could be rated. RUSSOFT on principle refused to rate companies by their turnover, although it collected information about the turnover of all the largest software companies in Russia. The reason is that a significant part of such information is obtained as a result of the annual survey of software developers on the terms of its non-disclosure, and this

condition is strictly complied with. Data from ratings from other sources, such as CNews, TAdviser100, were also used, but only after verification.

In addition, it is not entirely correct to compare the indicators obtained from the audited reports of a number of companies with the data presented by company employees during the survey, or obtained as a result of expert appraisals.

Strict ranking and comparison of companies with different business models will also not be quite correct.

Nevertheless, when compiling the RUSSOFT rating, first of all, the size of companies was taken into account. In order not to disclose confidential information and to avoid strict ranking, all companies were divided into groups and included there in alphabetical order without indicating their turnover.

For each group, a fairly wide range in total revenue was determined, and the distribution of companies into these groups took place not only according to existing turnover, but also taking into account their development trend.

Companies that already have a capitalization exceeding \$1 billion fell into the top division.

Top Division (Division A)

1C
Cognitive Technologies
Kaspersky
Playrix
4 companies

Most likely, 1C could already have a billion turnover, taking into account its revenues not only from the sale of its own solutions, but also from its distribution activities. However, the economic crises of 2015 and 2020 (first of all, the depreciation of the ruble) extremely negatively affected its turnover in dollar terms, since the company receives the main income in Russia.

Kaspersky (previously called Kaspersky Lab) is firmly among the leaders, but is no longer growing as rapidly as it was a few years ago. Perhaps new solutions to ensure the security of the Internet of Things and more active work outside the United States and the EU will enable its acceleration and achieve USD billion turnover.

In 2020, Cognitive Technologies earned the privilege to be moved to Division A. Although there is no exact data on its turnover at the end of 2020, it can be assumed that it has a fairly high growth rate (if not at the end of 2020, then most likely in 2021).

Playrix (a developer of computer games) also got into the top division. Previously, there was no reliable data on its turnover,

because it was much lower. However, Bloomberg estimated its turnover at the end of 2020 at \$1.75 billion with an increase of 60%. Although, most likely, most of the revenue of this company stays abroad (there it has significant assets in the form of purchased companies), it meets the RUSOFT's criteria of a Russian company.

Group B also included fairly large companies. Their turnover ranges from \$100 million to \$500 million.

Division B

ABBY
Acronis
CBOSS
Center of financial technologies
DataArt
EPAM Systems (Russia)
GDC Services (ICL-Services)
Infotecs
JetBrains
Luxoft Professional
Nexign (Peter-Service)
SKB Kontur
Voskhod (Research Institute Voskhod)
13 companies

The newcomer to this division in 2021 was Infotecs, which works in the field of information security.

Next year, Positive Technologies may get into this division if it maintains its increase of 55% in 2020.

Voskhod (Research Institute Voskhod) has so far been left in the division, because it reduces revenue only in USD terms, and continues to grow in RUB. The company focuses exclusively on the Russian market. In the future, and in this rating in particular, it is necessary to refuse from measurement of revenue in USD.

The MERA company is excluded from division C in 2020 (after its sale to a foreign investor), but at the same

time it had 4 newcomers, 3 of them from Division D — Security code, BARS Group and RDTex. Software Product (Software Product Group of Companies) was previously not included in the rating at all, because it was considered an IT integrator, and not a software developer. However, this company now positions itself more clearly as a software developer.

Division C

BARS Group
BSS
Diasoft
Forsite
Dr. Web
GDC Services (ICL-Services)
Kronshtadt (Kronshtadt group)
Positive Technologies
RDTex
RTSoft
Security code
11 companies

Newcomers to the rating in 2021, who were included into Division D, were Astra Linux (developer of secure operating systems and virtualization platforms) thanks to its 67% year-over-year growth, Neoflex (specializes in custom development and other IT services), which has increased its revenue by more than 50%, iSpring company (developer of professional tools for developing e-courses and organizing remote learning) and Business Automatics (development of web applications and client-server applications).

Directum is getting close to be included into Division D. Perhaps it already deserves to be there, but the exact amount of its revenue is not known.

There are several more applicants to be included in Division D (turnover from \$20 million to \$50 million). They are RC Module, Satellite Innovation and Contek Soft.

Perhaps it is worth including Waves Platform and Aitarget in the rating, but the question is to recognize them as software companies. Waves Platform is the developer of the Vostok blockchain platform, which is valued at more than \$1 billion as part of the second round of investments. However, the company presents itself as an Internet service provider.

Division D

AKTIV
Arcadia
Artezio
ASCON
Ashmanov and Partners
Astra Linux
Atom Security
Auriga
B2B-Center ("Center for Economic Development")
Bercut
BIA Technologies

BIS ("Banking Information Systems")
BFT (Budget and Financial Technologies)
Business Automatics
CDC
Compass Plus
CryptoPro
Devexperts ("Expert-System")
DeviceLock
Digital Design
ElecCard
EOS ("Electronic Office Systems")
First Line Software
iiko
iSpring
GalaktikaGarant
Geoscan Group
Group-IB
Infokompas
InfoWatch
Integra-S
Kodeks
Lanit-Tercom
Naumen

Neoflex
Scientific and Engineering Center
SPb ETU - JSC NIC SPb ETU
Omnicom
Paragon
PARMA Technologies Group
Parus
PROMT
Redmadrobot
SCANEX
SIGMA
Soft Expert
SpeechPRO ("Speech Technology Center")
SPIRIT
Reksoft
Return on Intelligence
R-Style Softlab
VIST GROUP
Zecurion
Zyfra (Zyfra Group of Companies)
54 companies

\$8,5-\$9 billion
(¥600-650 billion)

The total turnover of 82 companies included in the rating of the largest software companies is approximately



MAIN PROCESSES IN THE SOFTWARE DEVELOPMENT INDUSTRY IN RUSSIA

3

3.1. Attraction of investments

RUSSOFT began to pay attention to the problem of investments within the framework of its annual research since 2011. First of all, during the surveys it was possible to find out what part of the companies has external financing, as well as to clarify plans for attracting investments in the next 2 years. The fact that the lack of investment is one of the most serious problems of the industry was confirmed by a survey conducted in early 2017 as part of the study “Prospects of Russian IT developments in the global market” initiated by the SAP corporation. It showed that for 52 % of software companies the growth of foreign sales is constrained by an insufficient marketing budget, and for 33 % – by a lack of funds to develop solutions that can be competitive in foreign markets. Moreover, software companies, first of all, do not have enough “long-term money” – investments for 3–5 years. Attracting loans requires material collateral, which they do not have due to the virtual nature of production, so companies usually need venture capital or access to the stock market. But even there, there are severe restrictions. The results of the annual RUSSOFT research indicate that

no cardinal changes have taken place in 4 years – the investment deficit is still large, and the marketing budget has not increased on average.

In 2017, changes in the questionnaire made it possible to estimate not only the share of companies with external financing, but also the approximate volume of attracted investments. However, when extrapolating the data for the surveyed companies to the entire industry for four years (summing up the results of 2016–2019), too large fluctuations were obtained, which in reality could hardly have taken place. Therefore, this extrapolation was not justified. This was especially true of the results of 2019, since in 2020 only 72 companies participated in the survey due to the pandemic, and in previous years – 150–160.

In 2020, there was another change in the questionnaire: respondents were able to indicate the total volume of investments and their need for them. It was possible to use this addition to calculate the total investment in the entire industry only in 2021, thanks to the participation in a

survey of a record number of software companies (206). Such activity of enterprises allows to make conservative estimates of the volume of investments in the software industry.

Calculations showed that the volume of external financing amounted to approximately RUB 10 billion (\$140 million), and the total investment amounted to RUB 46.5 billion (\$640 million) with a need estimated at RUB 125 billion (\$1.73 billion). Consequently, the available investment is only 37 % of the required amount. At the same time, external financing provides 22 % of all investments made in 2020.

For previous years, you can focus only on relative values: the share of external investments in their total volume, the share of actual investments in the amount required, the expected change in the current and next years.

If we use the same methods of extrapolating the survey data (based on total revenues), then in 2020 there was a significant increase in both the total volume of investments and the volume of external financing.

3.1.1. Investment attraction plans of software companies and their implementation

The data of the annual survey allow RUSSOFT to determine not only the approximate volume of investments, but also the share of companies that would like to have external financing, but cannot attract it.

There were at least 2 times more companies that counted on external financing from 2011 to 2018 (according

to the results of one of the surveys – almost 2 times more) than the recipients of investments. For example, if 14 % of the surveyed companies expected to receive external financing by the end of 2017, then in reality there were 6 %. Consequently, the assumption that the need for external financing is several times higher than the volume of actual investments received additional

confirmation. Other sources also confirmed such a large gap, but, as a rule, they represented the entire high-tech sector of the Russian economy, or at least the entire IT industry (together with Internet companies).

By 2018, the results of surveys showed that companies began to more realistically assess the prospects for

attracting investment. If in terms of the volume of investments they still significantly overestimated the available opportunities, then in the fact of attracting funds from external sources, there was already no big difference with their forecasts. For example, 11 % of the companies surveyed in 2017 and 12 % of those surveyed at the beginning of 2018 counted on investments in 2018. The share of actual recipients is fully in line with the forecast – 11 %.

However, in 2020 the difference turned out to be large again: if 12 % of companies planned to attract external investments, then in fact there were only 7 % of them.

Share of companies that have attracted or are planning to attract external financing

Year of the survey	in the previous year	this year	next year
2011	9%	16%	18%
2012	9%	24%	26%
2013	12%	25%	25%
2014	7%	18%	27%
2015	7%	22%	24%
2016	10%	19%	23%
2017	11%	14%	11%
2018	6%	12%	10%
2019	11%	13%	16%
2020	6%	12%	27%
2021	7%	16%	18%

Share of companies that invested in development in 2020, by volume of internal and external investments (forecast for 2021–2022)

	In 2020 (fact)		In 2021 (forecast)		In 2022 (forecast)	
	Have attracted investments	Have attracted external investments	Expect to attract investments	Expect to attract external investments	Expect to attract investments	Expect to attract external investments
Less than RUB 64 million	25%	7%	27%	12%	25%	13%
From RUB 64 million to RUB 320 million	6%	0%	8%	3%	10%	4%
From RUB 320 million to RUB 640 million	1%	1%	1%	1%	2%	2%
More than RUB 640 million	0%	0%	0%	0%	0%	0%
Found it difficult to answer	5%	5%	5%	4%	6%	5%
Attracted (plan)	31%	7%	36%	16%	36%	18%

It is noteworthy that no surveyed company received more than RUB 640 million in investments in the previous year (2020), and no company plans such a volume of investments in 2021–2022 (although there were such companies a year earlier).

In 2020, there was another change in the questionnaire: respondents were able to indicate the total amount of available investments and their need for them. Although due to the pandemic, it was not possible to conduct a full-fledged survey, however, some preliminary conclusions can be drawn from the new data obtained.

A survey with an updated question on investments showed that at the end of 2019, external financing accounted

for only about a fifth (18 %) of the total volume of investments. The main source of investment in the software industry is the own funds of companies and their owners. At the same time, software developers believe that the volume of investments could be 60 % more.

Available investments in 2020 covered only 37 % of companies' financial investment needs. Software companies could ideally absorb more than 2.5 times more investment funds than they had. This data was obtained based on the assessments of the surveyed companies. In reality, much depends on whether they would be able to expand their staff accordingly due to a shortage of personnel (they can do this mainly only at the expense of each other).

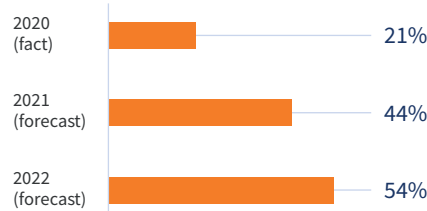
In 2021–2022, the companies surveyed do not expect a reduction in the investment gap. At the same time, they expect to increase the share of external financing in total investment (from 21 % in 2020 to 54 % in 2022).

There is clearly a request for a fundamental change in the funding structure. It is difficult to judge how justified the investment expectations are in the current situation of high uncertainty. Most likely, even under the most optimistic scenario, such a strong increase in external financing is highly improbable. Nevertheless, a gradual increase in its share is quite possible with the attention that the government has begun to pay to the industry.

The share of the total investment in the required investment (calculated according to the RUSOFT survey in 2021)



The share of external financing in the total volume of investments in 2020 and in the next 2 years (calculated according to the RUSOFT survey in 2021)



3.1.2. The main events of the venture market

A selection of news from 2017–2019 showed that the state, through its structures: development institutions and state corporations tried to stimulate investment activity in Russia again, as it was in 2008–2009. At the same time, the number of relevant messages in the media grew. Along with state corporations, large Russian private companies also more often began to demonstrate investment activity in the high-tech sector of the economy. Some news suggests that you can count on foreign funding (for example, Chinese companies and investment funds).

The purchase of domestic software companies by Russian state corporations and large foreign companies is another trend that should be noted in connection with the situation on the venture capital market. At the same time, in 2018–2019, very large enterprises by Russian standards were sold to foreigners: TRANSAS, Parallels and Luxoft. There were no such deals in previous years.

The purchase by corporations of a controlling stake in software companies may well ensure a sharp increase in investment in the development of these companies. However, not all of these investments will be directed to the Russian development centers of the sold companies.

Judging by the media publications about the IT sector in Russia, we can confidently say that the pandemic did not reduce investment activity in 2020 compared to the previous year. Several studies have subsequently confirmed the absence of contraction. Although there are other results, they seem less reliable.

For incomplete 2021 (in fact, for 8 months), there were almost 2 times more reports on attracting investments by Russian companies than for the whole of 2020, as well as for the whole of 2019.

Since there is no reason to associate such growth with the sudden great openness of the venture capital investment market, it can be assumed that an upturn began in 2021 and, perhaps, even something similar to an investment boom occurred, but such estimates require confirmation.

Nevertheless, positive changes can be noted. The question is how significant they are.

According to media reports, certain priorities and dynamics of attracting investments are also traced. If we consider technologies, then most of all investments in two incomplete years (2020 and 8 months of 2021) came to the field of automation of various types of activities (tourism, manufacturing, management, payments). There are 18 messages about this (5 in 2020 and 13 in 2021). Artificial intelligence and robotization are mentioned in 12 messages (5 in 2020 and 7 in 2021), various types of image recognition (objects, faces, emotions, texts) – 6 (2 in 2020 and 4 in 2021), office software – 4 (only in 2021), information security – 4 (2 each in 2020 and 2021).

Information storage technologies, games and entertainment, educational solutions, navigation technologies, analytics, navigation systems, video conferencing, VR and AR were mentioned no more than 2–3 times for a year and 8 months.

According to the sources of investments, the following statistics were obtained. Most often, investors are private funds, investor clubs, individuals – 24 mentions (9 in 2020 and 15 in 2021). These are domestic foundations or the foundations, the affiliation of which to any country was not indicated. At the same time, a number of investors were unambiguously defined as foreign: in 2020 there was only one mention of such

an investor, and in 2021 – 8 at once. At the same time, there are many reports about attracting investments from companies with Russian roots. RUSSOFT has not yet classified them as Russian or foreign companies, according to its own criteria. They can be both, but, as a rule, development is carried out in Russia. Such companies were mentioned 5 times in 2020 and 4 times – in 2021 in relation to attracting investments abroad.

State structures (foundations or development institutions that distribute grants) were mentioned as investors 9 times (3 times in 2020 and 6 in 2021), Russian corporations – 4 times (2 times in 2020 and 2021).

It can be assumed that a new source of replenishment of investment resources, the stock exchange (basically, we are talking about the Moscow Stock Exchange), has started working. There were 6 messages about the placement of shares or bonds (3 each in 2020 and 2021).

3.2. Import substitution

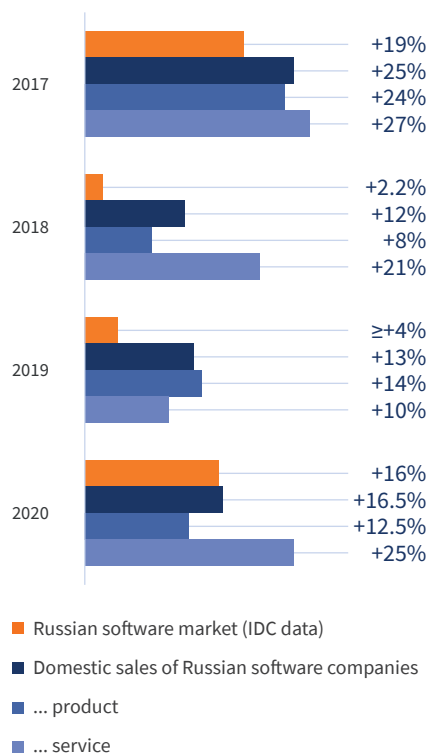
The process of import substitution in the software sector has been going on for the last 15–20 years, but it began to take shape in 2014 in connection with the American sanctions against a number of Russian enterprises (including banks) due to the events in Ukraine.

In recent years, the process of import substitution has either accelerated or slowed down. Another slowdown was recorded at the end of 2017, and in 2018 there was an acceleration. This was evidenced primarily by the growth in sales of Russian software companies in the domestic market and the change in the volume of the Russian software market. In addition, the change in activity for the transition to domestic solutions can be judged by the number of relevant messages in the media (see section 3.4.1.).

If we compare the growth rates of the market and the growth of sales of Russian companies in the domestic market, then in 2016 the difference was huge – 30 percentage points (the sales of domestic companies on it grew so much faster than the market), in 2017 this difference decreased to 5 percentage points, and in 2018 it increased to about 10. It remained at this level in 2019.

In 2020, if we compare data on the growth of the domestic market and sales of domestic companies on it, the process of import substitution has stopped. This (or at least a slowdown) is also indicated by media reports, which reflect how this process is going (below is a list of these messages and their analysis). Apparently, during the pandemic, it was necessary to buy software urgently, without giving priority to domestic companies, since the implementation of domestic software, as a rule, requires more time and more preparation. In addition, there is every reason to believe that the Russian software market is already growing

Comparison of growth indicators of the Russian software market and sales of Russian software companies on this market (in dollar terms)



largely due to the sales of domestic software on it.

Service companies, which are dominated by revenues from custom development, are increasing sales in the domestic market faster than this market is growing (in 2017–2018 and by the end of 2020, the growth in sales within Russia was even more significant than that of product companies).

Companies developing custom software were not previously considered

participants in the import substitution process, because since 2005–2008 their foreign competitors almost did not provide similar services in Russia. In fact, import substitution in the provision of software development services in Russia was successfully carried out by Russian service companies, which did not allow competitors from India and China (other developing countries with lower efficiency and a similar service price), or competitors from developed countries to conquer the Russian market.

It is noteworthy that IDC in its reports began to mention import substitution as a trend that would have a significant impact on the Russian IT market in the near future.

Comparison of the market growth rates and the growth rates of sales of Russian companies on it allows, with some assumptions, to make a supposition about the trend of software import substitution, which is subsequently verified by other indicators and other information. At the same time, the slowdown in the rate of import substitution in 2018–2020 looks quite logical.

The main drivers of the import substitution process were the sanctions imposed on a certain circle of Russian enterprises (a real threat of expanding this circle), and the fall in the ruble against the dollar, which sharply increased the price of foreign solutions in ruble terms. Since the ruble strengthened by about 15 % in 2017, the factor of exchange rate fluctuations began to work against import substitution. At the same time, the impact of the sanctions has not changed dramatically. In 2018–2020, the ruble against the dollar depreciated again, because of this, the price of foreign software increased and Russian customers began to purchase foreign software that had risen in ruble terms less often.

Obtaining quantitative indicators that objectively characterize the entire process of import substitution is not easy, if not impossible. For example, in the case of a transition to free software, which makes it possible not to depend on the loyalty of foreign countries, in general it is not always a question of selling software, but often of providing services for its installation, support and development. And small businesses download such software from free software repositories without even requesting a service for its support and installation.

The number of messages about significant events related to import substitution also serves as an indirect sign of how actively domestic solutions are replacing foreign ones. If in 2017 there were 9 such messages, then in 2018 there were already 19, in 2019 – 37, in 2020 – 46, and for incomplete 2021 – 53 of them. Relevant news is related both to launched projects and plans of state corporations, and government decisions.

The process of import substitution can also be judged by the change in the proceeds from the sales within Russia of key foreign and Russian companies. For example, in 2019, the revenue of the Russian office of Microsoft (Microsoft Rus) decreased by 13 % – from RUB 7.97 billion to RUB 6.93 billion, and in June 2021 it became known that the headcount of Microsoft in Russia for 7 years (since 2014) decreased from 1 thousand up to 300 employees. At the same time, Russian developers of OS (based on Linux) and office applications are experiencing an increase of tens of percent, and in some cases, of several times.

Analysis of media reports, as well as other observations, allows us to conclude that there is some confusion in the government's attempts to influence the import substitution process.

This conclusion is confirmed by the results of the analysis of the spending of Russian government agencies on import substitution of software in 2017–2018, which was presented by the Accounts Chamber in early 2019. Its auditors noted the absence of clear plans for import substitution among government agencies and the presence of violations in the implementation of public procurement. In addition, unified characteristics of the purchased software have not been established for government agencies, which allows them to purchase foreign products with the supposedly necessary redundant functionality. The objects of audit by the Accounts Chamber were 80 federal state bodies and governing bodies of state extra-budgetary funds, state bodies of 85 regions, as well as of 36 urban districts with a population of more than 500 thousand people. During the audit, 33.7 thousand state and municipal purchases were analyzed. The auditors found that in 121 purchases of federal government agencies and state funds for the amount of almost RUB 3.3 billion, there are signs of violations of import substitution standards.

In 2017–2018, more than 96 % of government agencies and state funds in Russia used OS that were not in the Russian Software Registry. About 82 % of government agencies used foreign mail servers. More than 99 % of government agencies used Microsoft or Oracle DBMSs, as well as open source DBMSs of Red Hat, CentOS, Sybase SQL Anywhere, FreeBSD, etc. These DBMSs are not in the Russian Software Registry, some of them have restrictions on the use and technical support in Russia.

As for electronic document management and information security systems, Russian software makes up three quarters of the products used.

In the regions of Russia, server operating systems, directory services and basic services of Microsoft and other foreign vendors are used in about 94 % of cases, foreign DBMSs – in 100 % of cases, foreign mail systems – in 91 % of cases.

Since 2020, the situation has most likely begun to improve, but there are still a lot of manifestations that the process is chaotic. There is still no single plan with control over its implementation in terms of key indicators, except for plans for the share of purchases of domestic software by government agencies.

3.2.1. State policy in the field of import substitution

After long talks about the need for import substitution, after the adoption of the first anti-Russian sanctions applicable to the supply of software to Russia, in 2014 the corresponding decisions at the state level began to be made, although for almost two years they did not have a significant effect. It turned out that first it was necessary to decide what exactly should be stimulated and what should be called import substitution. It was necessary to define a domestic software developer (it took almost a year to formulate this definition and amend the legislation).

When the definitions became clear and a ban was formulated for state structures and enterprises to purchase foreign software, provided that there was a domestic analogue, it turned out that the control mechanism had not been developed, and state purchasers did not have incentives to import substitution, but they acquire serious risks of criminal prosecution for the violation of the law in connection with the violation of the terms of purchases, which they must agree to during import substitution before the expiration of the amortization period of previously purchased imported software.

As a result, according to the respondents, despite the prohibitions, foreign solutions continue to be supplied to government structures (either justifying this fact by the absence of a domestic analogue, or under the trademarks of the Russian companies that use the OEM model for this).

While the state was working out approaches to import substitution of software and trying to form tools for its financial support, Russian IT companies in 2014 began to actively take actions aimed at preparing alternative solutions to replace imported software. In 2014, the creation of consortia of companies was

initiated, which would make it possible to create complex solutions based on the developments of a number of companies or jointly promote their systems on the Russian market (especially in the public sector, including state-owned enterprises). In particular, the following consortia were created: BETA – to form a full stack of domestic software (or free software) and replace basic and application software for the banking sector, and SOYUZ – to replace not only imported basic and application software for the oil and gas sector, but also to replace imported servers with domestic ones based on Elbrus processors. Looking at these actions of domestic companies, one can unequivocally speak of preparations for a change in the market structure (positive from the standpoint of IT users and domestic developers).

In 2015, there was some acceleration in the import substitution process. However, it was caused not so much by the decisions of the Russian government and changes in legislation, as by anti-Russian sanctions and the devaluation of the ruble. A number of enterprises faced with the fact that foreign software vendors have ceased to support previously purchased software, and they had to look for an alternative, even without government incentives for import substitution. Some corporations that risked getting on the sanctions list did not wait for a denial of service from Western vendors. For example, JSC Russian Helicopters launched a program to switch to free basic software (first of all, to the Linux operating system of domestic assembly).

There are doubts about the effectiveness of the Russian Software Registry, which appeared in 2016 under the Ministry of Digital Development, Communications and Mass Media of the Russian Federation. As of early September 2021, 11,320 domestic software products



It is obvious that with the adoption of the course towards import substitution and digitalization, the Russian IT-market has become not only more voluminous, but also of higher quality. An increase in the competitiveness of domestic products together with an effective dialogue among developers stimulates the release of complex sanction-resistant solutions that are so necessary for the implementation of the state tasks. Strengthening the country's IT sovereignty is the main trend that will determine the development of the information technology industry in the coming years.

Rustam Rustamov
deputy general director
at RED SOFT



were registered in the Registry (62 % more than a year earlier) and 3,574 copyright holders. A number of domestic developers consider its creation to be quite useful for ensuring the import substitution process. The presence of such a large number of companies that register their software in the Registry also suggests that there is a need for it, albeit artificially created. However, there are doubts about the effectiveness of the Registry as it exists.

In June 2021, the Ministry of Digital Development, Communications and Mass Media developed a new, more detailed version of the classifier, which would be used as part of the Russian Software Registry. Its current version includes only 26 classes, and the new version is also divided into sections, and the total number of classes has exceeded 95. This classifier has yet to be studied together with experts, but it is unlikely that it will fundamentally change anything if it does

not reflect the need to replace a set of interrelated decisions. In many cases, these must be hardware and software systems. However, until now, in Russian reality, the developers of such complexes have to choose for themselves: to become either software developers or hardware developers in order to take advantage of the tax benefits provided by the state.

The annual survey of RUSOFT shows that, on average, the assessment of the effectiveness of the Domestic Software Registry in terms of its impact on the economic activities of the surveyed companies is low.

In 2019, the average score of such influence of the Registry for all the surveyed companies approached zero: it decreased from 0.16 to 0.09. However, at the same time, companies that do not work in far-abroad countries began to assess this influence better – there was

an increase in the average score from 0.15 to 0.22 (still less than 0.25 obtained in the 2017 survey), and companies operating in the far abroad, it was estimated much worse – a drop from 0.16 to a negative value (-0.01).

In 2020, there were no significant changes in the assessment of the effectiveness of the software import substitution policy, and since there were much fewer respondents than in previous years, the analysis of assessments for individual categories of companies was not carried out (splitting further increases the error).

In 2021, the average score rose to a record value of 0.33 (which is still closer to zero than to 1). This means that companies assess the bans on the use of foreign software in the presence of an analogue in the Domestic Software Registry positively, but believe that their impact is insignificant.

Impact of bans on the use of foreign software in the presence of an analogue in the Domestic Software Registry on companies with different dependence on the situation in the Russian market, the share of the companies surveyed in 2021

	All surveyed companies	Do not work in far-abroad countries	Work in far-abroad countries
Very negative (-3 points)	3.5 %	3.8 %	3.3 %
Negative (-2)	8 %	6 %	10 %
Negative, but insignificant impact (-1)	6 %	5 %	8 %
No impact (0)	45 %	43 %	47 %
Positive, but insignificant impact (+1)	16 %	19 %	13 %
Positive (+2)	12 %	13 %	12 %
Very positive (+3)		10 %	8 %
Average point	0.33	0.46	0.23
Found it difficult to assess	17 %	20 %	14 %

For service companies in general, the importance of the Registry is very low. The average score was only 0.01 in 2019, and in 2021 it became completely negative (-0.04). This figure has almost always fluctuated around zero in recent years. Moreover, more than half of such companies (50–60 %) traditionally do not see any impact of the Registry on the IT market.

Developers of software products are much less likely to show indifference to the Registry. Only 35–40 % of developers of replicated solutions do not see any impact of it, and the average score in 2019 was 0.18, in 2021 it increased to 0.70.

At the same time, 28 % of the companies that receive at least 50 % of their income from exports believe that the existing bans have a negative impact on them. Together with 56 % of the companies that noted its zero impact on the market, the average score was -0.28.

If companies receive their main income in Russia, then the attitude towards the Registry is generally positive – the average score is 0.48, but it is still very low (for 43 % of respondents from this segment, the Registry has no effect).

The biggest benefits from the Registry, according to the survey, are received by product companies, which generate more than 50 % of their revenue from domestic sales. But their average score was 0.78, which is less than the level of positive insignificant influence.

The RUSSOFT survey does not allow us to determine what kind of negative impact the presence of bans on the use of foreign software has in the presence of an analogue in the Domestic Software Registry. One can only assume that it has become more difficult for companies to work in foreign markets. It is required to

study more how foreign software bans affect the software industry as a whole.

We will have to take into account the situation and various processes in the world market. For example, the fact that the World Trade Organization (WTO) in October 2020 expressed concern about the Russian policy of import substitution of software and radio electronic equipment, demanding a report on its compliance with the open market requirements. At the same time, under the slogan of protecting the open market, it will be difficult to ignore the threats that most countries in the world have under the US and EU sanctions policy. It is precisely these threats that prevent the formation of an open market.

Western governments use sanctions to exercise political pressure on various states: from China and Russia to Venezuela and Syria, providing preferences to their own companies. Corporations themselves use or try to use their own monopoly position. There are already many similar examples.

For example, in early 2020, Google left Turkey without its Android operating system and applications on new devices in response to a fine from the Turkish antitrust authority. The Turkish Competition Council drew attention to the fact that users of the Android system on smartphones cannot choose their search engine by default, and obliged Google to amend the license agreement.

In April 2021, the US authorities blacklisted the Chinese company Hytium with alleged links to the Chinese military. Because of this, the Taiwanese company TSMC, the world's largest manufacturer of semiconductor products, was forced to suspend cooperation with it. Hytium develops processors for supercomputers based on the ARM architecture. In a similar pattern,

the United States is putting pressure on Huawei, which it uses as leverage over China in a trade war. In May 2020, they also banned TSMC from producing chips for it.

In September 2021, it became known that the Ministry of Digital Development, Communications and Mass Media plans to conduct a total revision of software from the Russian Software Registry. This need arose because of the new rules for the formation of the Russian Software Registry, as well as because of the avalanche-like increase in the flow of applications to it due to the emergence of benefits from the First package of measures of the state support for the IT industry. The verification process of over 11 thousand programs should be completed by the end of 2021.

3.2.2. Analysis of news that are directly related to import substitution

The analysis of messages concerning directly import substitution leads to the following conclusions. First of all, it is worth noting the intensification of the transition of Russian corporations and authorities to domestic software after a slight slowdown in 2020 caused by the uncertainty of the situation in the first months after the pandemic announcement (in the first 8 months of 2020 there were only 2 relevant messages, and in the last 4 months there were eight of them). In 2021, the process acceleration, which was observed before the pandemic, continued and became obvious (there was, apparently, catching up in the implementation of plans already outlined for 2020–2021).

It should also be noted that in 2021 the number of messages about government decisions (and key companies) stimulating import substitution has increased. At the same time, among these messages appeared those that reflected the activity of key private companies and other non-state structures (primarily industry associations).

Improvement of Russian IT solutions (creation of platform solutions) began to be mentioned more often from September 2020. There were 3 messages for the last 4 months of this year, and only one for the previous 8 months (3 for 8 months of 2021). In this case, it is not the quantity itself that is more important,

but the dynamics. As a rule, work on improving domestic solutions seems to be routine, and there are few reasons to report on the existing constant progress.

There are very few statistical data characterizing the import substitution process. There were problems with this before, but in terms of the reliability of these data. Most likely, such data do not just fail to get into the media, but they do not exist at all. In any case, they are not in the volume that allows us to generally assess the import substitution process.

Distribution of messages in the media in 2018–2021, directly related to import substitution, by topic

	2018	2019	2020	2021 (January–September)	Total for 2018–2021
Transition of Russian corporations and government bodies to domestic software	6	12	10	27	55
Decisions of the government (and key companies) stimulating import substitution	11	11	13	17	52
Sales of companies that receive the most benefits (or losses) from import substitution	—	5	3	5	13
Statistical data characterizing the import substitution process	—	7	2	2	11
Revision of import substitution plans in favor of foreign software	—	2	5	—	7
Improving Russian solutions (creating a set of solutions)	1	2	4	3	10
Messages about sanctions aimed at restricting Russian enterprises to purchase foreign software	2	—	1	2	5

3.3. The need for cooperation

The situation in the global and Russian markets is developing in such a way that domestic companies, in order to successfully promote their solutions and services abroad, need to combine efforts at various levels: from coordinated development to joint marketing.

First, there are no companies in Russia with billions of dollars in annual revenues that can compete on an equal footing in turnover and, consequently, in production costs and marketing budget with world leaders. Even the largest Russian software company Kaspersky, with annual revenue of about \$700 million, understands the need for cooperation, which may even be at the level of information exchange.

The management of Kaspersky believes that the more Russian companies there are in a certain market (especially in the countries that are quite exotic for them), the easier it will be for it to conduct business and develop in this market. By and large, successful Russian IT exporters are ready to help newcomers whenever possible, even for free. Especially if these newcomers can become potential technology partners.

Secondly, according to the Russian Export Center, there is a demand in emerging markets for turnkey complex solutions. Customers, as a rule, refuse to form them on their own and wait for an appropriate offer on the market. Such solutions require not only unification of different software developers, but also cooperation with custom software developers, system integrators, distributors, and equipment manufacturers. There are similar requests for complex solutions in the Russian market.

For RUSSOFT, this topic is especially close, since the Association arose due to the fact that in 1999 several companies decided to merge, realizing how small they are in the American

market. Facilitating cooperation between Russian software companies is one of the strategic objectives of the Association.

Thirdly, the import substitution process is often impossible without offering a comprehensive solution. The fact is that Western hardware and software manufacturers have created a client's dependence on interconnected solutions. In many ways, this dependence was created deliberately and artificially in order to bind corporate clients (as well as private users) to them. Therefore, replacing one component of a telecommunications or IT infrastructure with another is either impossible or very difficult without compromising the reliability of the systems used. Consequently, the substitution must also be complex. For example, a computer should ideally have a Russian processor, a Russian OS (based on open source software) and Russian office applications.

Sometimes the conjugation of only two software products is enough, but more often a single hardware and software complex is required. For a number of years, RUSSOFT has been proposing to promote the creation of such complexes at the state level within the framework of the import substitution policy. The Association's Import Substitution Committee, with the support of IIDF, is developing a concept for creating IT consortia in Russia to develop platform IT solutions for industries.

State incentives for the creation of consortia are also important because in Russia joint actions of companies, as well as combining decisions, are difficult, even if they are beneficial to both parties. There are no established traditions of building appropriate relations yet. In this case, unnecessary ambitions and a lack of trust in each other interfere.

In-depth interviews conducted with experts (heads of successful IT exporters, investors, representatives



Besides software development Astra Linux Group also takes an active part in its implementation. This allows us to receive valuable feedback that helps us to improve our products and ensure consumer's needs.

Roman Mylitsin
Director for Innovations,
Astra Linux Group



of development institutions) in the framework of the research “Prospects of Russian IT developments in the global market” initiated by the SAP Corporation (2017), as well as long-term observations

of RUSSOFT experts on developments in software industry allow us to conclude that Russian business is having difficulty establishing interaction. In the last 2 years (2020–2021), successful examples

of such interaction are associated, first of all, with the need to create complexes of solutions to replace foreign analogues.

Examples of joining efforts of Russian companies

2020

1. In July, it became known that Foresight, a developer of BI solutions, and the Parma Technologies Group entered into a partnership agreement. The goal of cooperation is to expand the number of projects to create data management systems based on Russian software in the public and corporate sectors. The Parma Technologies Group of companies develops application systems using technologies for integrating and processing big amounts of data, artificial intelligence and machine learning, and creates cloud services.

2. In July, the Russian companies Edelweiss (electronics developer), Basalt SPO (developer of the Alt operating system line) and Baikal Electronics (developer of crystal-based systems on MIPS and ARM architectures) announced the start of production of the motherboard based on the domestic Baikal-M processor running Alt OS.

3. In July, Kaspersky increased its stake in the Russian company New Cloud Technologies (NCT, developer of the My Office office package) to 47 % by purchasing 17.5 % of its shares. This made it the largest shareholder in NCT. The deal became a continuation of Kaspersky's strategy to diversify its business and invest in promising IT areas.

4. In July, Medsoft and RED SOFT, as part of a technology partnership, conducted compatibility testing of their products. The developers have confirmed the correct operation of the Quasar software package of the 4th version manufactured by Medsoft with the RED OS operating system manufactured by RED SOFT. The test results are reflected in the bilateral certificate of compatibility. The Quasar software package of the 4th version is an integrated medical information system, fully automated from the registration desk to automatic electronic interaction with federal agencies.

5. In July, it became known that the SKB Kontur group of companies had bought the Kazan developer TaxNet, one of the largest players in the electronic signature and reporting markets of Tatarstan.

6. In February, Mail.ru Group paid RUB 1.6 billion for a controlling stake in the Skillbox educational platform. This project is an online university with employment opportunities for students.

7. In July, two domestic software developers: MyOffice and Instream announced the start of deliveries of a set of import-independent solutions. Customers will be able to purchase the Lotus operating system with the MyOffice Standard package at 20 % below the recommended retail price.

8. In July, Kaspersky and AVL Software and Functions announced the joint development of an automotive electronic control unit based on the KasperskyOS operating system.

9. In December, it became known that ICL Techno and RAIDIX have created the first joint data storage system. Component testing has confirmed the compatibility of the ICL Techno hardware complex and the RAIDIX software. The result was a new joint product called SDS ICL teamRay.

10. In December, Basalt SPO company and the Autonomous non-profit organization for the development of the radio-electronic industry Computing Machinery Consortium signed a memorandum of long-term cooperation. The result of joint activities should be the formation of a domestic software and hardware platform, which is built on the principles of technological independence, develops taking into account modern global trends in the field of IT and computing tools, and meets the requirements of Russian legislation.

2021

1. In January, three residents of Innopolis: My Office, Akronis Infozaschita and ICL presented a turnkey integrated solution that would allow organizations from scratch and quickly deploy a private cloud for joint work with documents, mail, calendar and contacts.

2. In January, VisionLabs and HeadPoint announced a strategic partnership to build IoT and computer vision solutions. They are expected to offer banks, retailers, industrial enterprises, and government agencies

a number of joint solutions based on HeadPoint's InOne IoT platform and VisionLabs' computer vision and machine learning technologies.

3. In March, the Russian software developer Red Soft and the multi-vendor system integrator GK RosIntegratsiya entered into a partnership agreement. The companies will cooperate to jointly develop import-independent software

and hardware systems for public sector customers, as well as develop national technology initiatives.

4. In June, the STC group of companies, which is part of the Sberbank ecosystem, introduced Nestor.BRIEF, a new product based on AI technologies, which is designed to provide record-keeping of workshops and online meetings. It was created jointly with TrueConf. The joint application of the STC solution

with the TrueConf platform will allow companies and organizations to provide their employees with secure video communication with the possibility of open or private record-keeping, which is important for large public and private corporations, federal ministries, services, administrations and other specialized structures where information security requirements are critically important.

3.4. The role of IT in the Russian economy

IT companies, including software developers, make a certain contribution to the development of the entire Russian state. They provide employment (at the same time, that employment, which presupposes highly paid work) and tax revenues to budgets of different levels. IT (primarily software) exporters create an inflow of foreign currency into the country, which contributes to the stability of the national currency rate (reduces its volatility).

In the list of indicators of business importance for the state, an important influence of IT against the background of other industries is employment, since more than 1 million people work in the IT sector, including the IT services of various enterprises and government agencies (there are almost 200 thousand people in the software industry in Russia).

However, the impact of IT on the country's economy and the work of government agencies is so great that it will be beneficial for the state to support

the existence of IT companies in every possible way, even if they do not pay taxes, attract foreign currency to the country and provide employment at all.

The influence of IT companies on the economy and the work of government bodies is reflected in a significant increase in productivity and better manageability of enterprises in various industries, significant savings, acceleration of processes, ensuring transparency in decision-making by officials, in increasing the competitiveness of Russian enterprises (including arms exporters) in the world market through embedded software and the use of the most advanced technologies in complex solutions. In addition, software companies can provide the exchange, processing and analysis of a huge amount of information that accumulates in various government bodies and international organizations, as well as create tools for civilian control over the work of officials.

Outsourcing companies that have participated in the implementation of large projects abroad are capable of transferring expertise in the field of management, organization of work of enterprises and government agencies to Russia. Any successful digital transformation project starts with debugging business processes.

The events of recent years (especially the events of 2020) have even more clearly shown the special importance of information technologies for ensuring the functioning of public institutions and also in terms of protecting the human environment.

The pandemic as a whole has accelerated digital transformation (as evidenced by the results of various studies, some of which are presented below in this section). It has also set or will set new tasks that cannot be solved without the computer analysis of a huge amount of data.

It is possible to quantify the impact of the IT industry on the economy, the work of government agencies, and society, but only partially. Any relevant calculations will rely heavily on assumptions and a plenty of expert judgments with very approximate values. In the commercial sphere, the issue of IT implementation is often not discussed at all, because otherwise the company simply cannot exist in the current environment. In such cases, digital transformation may not lead to an immediate improvement in some financial indicators, but it must be compared with what it would have been without the implementation of some critical IT project.

It is obvious that digital transformation will lead to further global changes in society, in governance at the level of states and companies, in the way of life of billions of people, in solving some social problems and the emergence of new ones. It is difficult to find at least some area of human activity that will not be affected by this process. In such a situation, it is important to somehow track the existing tectonic shifts in the economy and social sphere caused by digital transformation. But,

unfortunately, there is still no complete idea of them in order to see the world at least in the foreseeable future. Nevertheless, the process cannot be stopped anyway.

After the Russian government was headed by Mikhail Mishustin, who achieved a lot as the head of the Federal Tax Service thanks to the introduction of information technologies, there appeared more reasons for officials at different levels to better understand the importance of these technologies for the economy, society and government. Moreover, the new prime minister received a higher education diploma in computer-aided design (CAD) with the qualification of a systems engineer.

It is important to bear in mind that thanks to Mikhail Mishustin, a law on tax maneuver in the IT industry was adopted in 2020: from January 1, 2021, for IT companies, income tax rates and contributions to state extra-budgetary funds will be significantly reduced (for more details, see Chapter 4). First of all, these benefits apply to software companies.

At the same time, digital business transformation will be successful only if all employees are involved in the process, and a digital culture takes root in the company. This conclusion was made thanks to an international study conducted in 2019 by the consulting company Capgemini in Europe and the United States. At the same time, six out of ten respondents named corporate culture as the main obstacle to digital transformation.

It is noteworthy that 40 % of executives believe their companies already have a digital culture, but only 27 % of employees agree with them. 62 % of respondents named corporate culture as the main obstacle to digital transformation. This indicator increased in comparison with the previous study – 55 % of respondents believed the same in 2011. Among other factors hampering the transformation process, the survey participants identified archaic IT systems and applications (48 %), lack of digital skills (43 %) and lack of a clear vision of the management (38 %).

3.4.1. Quantitative estimates of the effect obtained from the practical implementation of information technology

According to the calculations of experts of the analytical company J'son & Partners Consulting, IoT solutions and digitalization in agriculture in Russia will bring a total economic effect of RUB 4.8 trillion per year or 5.6 % of the country's GDP growth. The volume of information technology consumption can grow by 22 %, and moreover due to the digitalization of only one industry – agriculture.

J'son & Partners Consulting considers promising a direct sales model, in which agricultural producers “see” the end consumer, its demand volume and structure, and through the use of predictive analytics, they produce exactly what the consumer needs and when they need it. At the same time, product supply management is carried out on the principles of the automatic exchange of information between participants in

the supply chain and minimal use of the warehouse and logistics infrastructure of wholesale intermediaries.

This can be achieved with the help of IoT technologies and end-to-end automation of production and business processes, as a result of which, according to analysts, it will be possible to reduce the prices of basic food products by half while improving their quality.

In addition, the implementation of such a model of relationships in the value added chain of agricultural products will help to dramatically increase the level of automation of the main production and business processes of agriculture, including small ones, which will increase the consumption of information technologies by agricultural enterprises by RUB 156 billion and data transfer services by RUB 11 billion per year.

Finally, the transition to end-to-end highly automated production and supply chains of agricultural products will make this process transparent for banks and allow them to minimize the risks of lending to agricultural producers. This will create the preconditions for increasing the volume of lending to agricultural producers by RUB 500 billion.

Digital McKinsey (a global expert group that brings together McKinsey experts in digital technologies) has identified the sources of GDP growth by 2025 through digitalization. It indicated the values in 2015 prices.

Optimization of production and logistics operations will provide RUB 1.4–4 trillion.

Improving labor efficiency will provide RUB 2.1–2.9 trillion.

Improving equipment performance will provide RUB 0.4–1.4 trillion.

Increasing the efficiency of R&D and product development will provide RUB 0.2–0.5 trillion.

Reduced costs and production losses will provide less than RUB 0.1 trillion

In total, it will provide RUB 4.1–8.9 trillion, or 19–34 % of the total increase in GDP.

Tripling the digital economy by 2025, according to McKinsey experts, is an ambitious, but achievable goal. The share of the digital economy in the US GDP is 10.9 %, in China – 10.0 %, in the EU – 8.2 %, in Czechoslovakia – 6.3 %, in Brazil – 6.2 %.

In Russia, in 2011 this figure was 2.6 %, and by 2015 it grew to 3.9 %.

According to the McKinsey Global Institute (MGI), in the next 20 years, up to 50 % of the world's work operations can be automated, and this process will be comparable in scale to the industrial revolution of the 18th – 19th centuries. Then in England the share of workers employed in the primary sector of the economy more than halved, although it took eight times longer – from 1710 to 1871.

In May 2020, EY published the results of a survey of the Russian market for unmanned aerial vehicles. The effect of using drones, according to its experts, exceeds \$1 billion in the country, but their implementation is limited due to problems with infrastructure and regulation. The report says that, given the territories and uneven development of infrastructure, the effect of using drones in the Russian Federation may be greater than in many other countries. Russian manufacturers offer world-class products, but faced with numerous restrictions, they are often forced to focus on foreign markets.

According to a study by Accenture, the results of which were presented in early 2021, the digital transformation of companies accelerated against the background of the pandemic and the emergence of new flexible business models would allow economic growth of \$5.4 trillion.

The study surveyed 1,100 largest companies in 11 countries and 13

industries. The economic effect is calculated based on financial data provided by 810 companies.

The study results showed that even in the face of persisting economic uncertainty, 7 % of companies achieved twice the efficiency and three times higher profitability compared to competitors. Accenture calls these companies “future-ready”. They accelerated the use of digital solutions and upgraded operational models, moving from gradual improvements to massive upgrades.



GEOGRAPHY AND VERTICAL MARKETS OF RUSSIAN SOFTWARE COMPANIES





GLOBAL IT TRENDS SHOULD NOT BE OMIT

Dmitry Komissarov
MyOffice CEO



Global spending on information technology will exceed \$4 trillion in 2021 – this forecast was announced by the research company Gartner. According to IDC, Russia's share of IT consumption currently amounts to RUB 1.8 trillion, which is approximately 0.6 % of the global volume. These figures speak volumes to Russian IT companies about the economic prospects of focusing on the global market. Moreover, exporting in-house developments is much more effective for the development of the Russian economy than the "export" and massive brain drain of IT specialists abroad.

Promising Export Destinations

The trend for import-independent solutions supported by the Russian government contributes to the growth of the domestic IT industry. Russian companies are gaining experience and increasing their turnover. At first glance, 140 million residents across Russia may seem like a large IT market. However, in the coming years, many domestic developers will "outgrow" the limits of the national market and take the export route. So, IT companies should not only focus on the needs of Russian consumers, but also keep track of global IT trends. In my opinion, there are several in-demand areas, including information security;

productivity; solutions for big data analysis and processing; collaboration products; services that facilitate interaction between citizens and the government (similar to our government services); and distance learning products.

In terms of the geographical spread of IT solutions exports, Russian developers should pay attention to the emerging markets of Africa, Latin America, and Southeast Asia. Russian software can also be in demand in regions that, due to political circumstances, cannot or do not want to buy software in the West or in the USA, such as certain countries in the Middle East.

MyOffice International Experience

MyOffice began to actively expand in the international market in 2019, with African countries becoming our first customers. We chose this particular region for the following reasons:

- Russia has a solid reputation as a reliable economic and business partner in Africa;
- Our time zones are close, so we can provide technical support from Russia;
- Linguistic accessibility: business communications in African countries are mainly carried out in English and French;

- There is low competition in the software market.

In the short time we have been operating in the African market, we have already established business relations with several countries. We have entered into commercial agreements with the Republic of Burundi worth \$3 million, and have agreed to supply our software to the Republic of Cameroon (1 million licenses), the Republic of Guinea (300,000 licenses) and the Republic of Djibouti (300,000 licenses). We have also reached agreements with the Republic of the Congo regarding the export of Russian office software.

Our export experience suggests that, when buying foreign software, customers pay great attention to data security and preserving the information sovereignty of their country. For our African partners, MyOffice IT solutions turned out to be the most attractive in comparison with other foreign counterparts, because we provide the possibility of deploying private clouds on customers' servers. This means that data can be stored inside the country, in comparison to Google, for example, which operates only through its own clouds, and means that the data processing centers are located outside of Africa.

4.1. Russian market and global presence

In 2018–2019, the sales growth rate of software companies in the domestic market and abroad were different, but the difference was insignificant. In 2018, the revenue received in Russia grew faster, whereas in 2019 – the one received abroad. At the end of 2020, full parity was established: sales growth, both in the domestic market and outside Russia, turned out to be approximately 16 % in ruble terms.

In terms of dollars and by rounding to tenths of a percent, sales in the domestic market have a small advantage in the terms of growth rates. They added 4.5 %, and foreign sales – 4.3 %. Nevertheless, we should not talk about some kind of reorientation of the industry to the domestic market.

Shift of interest in working abroad and in Russia can also be monitored by the share of companies that do not have export income at all. According to the results of 2017, there were 24.8 % of the surveyed companies, and according to the results of 2018, about 1.5 times more – 35.6 %. At the same time, most of the companies that participated in the survey in the last 2 years showed decrease in the share of exports (including up to 0 %). As a rule, these are small companies working abroad which provided no more than 10–15 % of revenue in 2017. Large developers of custom software have also increased sales in Russia.

In 2019, the share of companies without export income decreased to 14.3 % (it became less than in 2017). However, it should be borne in mind that, firstly, not many companies participated in the 2020 survey (72 questionnaires), and secondly: among them a large percentage (61 %, which is much more than 20–30 % in previous years) were the members of the RUSSOFT Association, which historically was the association of software exporters.

Therefore, the increase in the share of respondents who do not have export contracts by the end of 2020 to 29.6 % does not indicate a clearly increased interest in the domestic market. This is due to the fact that it is especially difficult (or even impossible) for small companies that have not yet earned a reputation abroad to find customers in other countries and conclude contracts online. Such companies (with a turnover of less than 320 million rubles) increased export revenue by 6.5 %, and larger ones – by 12.8 %.

According to an expert assessment based on the experience of conducting various studies, at least 20 % of software development companies in Russia are not, in principle, ready to enter foreign markets. Most likely, more than 30 % of companies in the entire industry had no export income in 2020 for various reasons, because the survey traditionally covers mainly exporters.

At the height of the pandemic, in mid-2020, RUSSOFT made the following prediction: “Companies that have managed to gain a foothold in foreign markets will have indicators no worse than those that did not work outside Russia and neighboring countries. Reorienting to the domestic market from outside is much easier than vice versa.” This forecast turned out to be correct and is already the rule. Only in times of the rapid growth of the internal IT market (by tens of percent) could this rule have exceptions in some years.

Separately it is worth considering the attitude of companies with an export share of less than 25 % toward foreign markets. Such a share indicates that the main income is provided by work in Russia and in neighboring countries. This category previously included at least 60 % of all surveyed companies (according to the results of the 2019 survey – 64 %).

In 2020, the share of such companies turned out to be lower (52 %), however also due to the fact that the companies that successfully operate abroad participated in the survey. In 2021, 63 % of the surveyed companies turned out to belong to this category, which is slightly lower the level of 2019.

Thus, the desire to expand in foreign markets covers a wide range of software companies in Russia, but with limited resources they have to choose between real opportunities to increase sales in the domestic market and hypothetical prospects for entering new foreign markets, while against the background of anti-Russian sanctions. The choice is more often made in favor of working in the Russian market. A very large number of companies still have the resources to enter new foreign markets, not to the detriment of work in the domestic market. At the same time, in recent years this circle has been narrowing.

.....

16 %

sales growth in ruble terms,
both in the domestic market
and outside Russia

4.1.1. Comparison of work in Russia and abroad for product and service companies

In the last three years (2018–2020), developers of product software are better able to expand their business at the expense of foreign markets. This new phenomenon is neither affected by fluctuations in the ruble against the dollar, nor by the pandemic. According to the results of 2020, their foreign sales increased by 5 %, and within Russia – by 0.7 % (in dollar terms).

Apparently, the Russian market for product companies is already too cramped. However, import substitution is very active in some of its segments. For example, this applies to basic office software – operating systems and office applications. Companies operating in this segment can grow by tens and even

hundreds of percent per year without going abroad, but their combined turnover relative to all developers of replicated solutions is not yet large.

Product companies are more affected compared to service companies by the policies of several countries that impose bans on Russian developers. Nevertheless, so far foreign markets provide more opportunities to increase the sales of software products than the Russian one.

Service companies are faster to increase sales in the domestic market. Their strong driver is the trend towards digital transformation, which does not have common solution even for enterprises

in certain economy sector, and therefore every time it requires a unique approach to changing the business model and management system. Service companies are also seriously affected by fluctuations in the ruble against the dollar. In previous years, they could sharply increase foreign sales with a serious devaluation of the ruble, which allowed the international market to have an additional competitive advantage at the cost of labor, which is formed in rubles. Over the past three years, there has been no such obvious dependence on currency fluctuations. At the end of 2020, the ruble depreciated significantly – by about 12 %, but in the domestic market, developers of custom software increased sales by 11.5 %, and in external – by 0.5 % (in dollars).

4.2. Distribution of sales by macro-regions of the global market

According to the results of 2015, RUSSOFT for the first time presented data on sales of Russian software companies in various macro-regions of the world. In previous years, the importance of certain regions of the global market was estimated entirely by the number of companies surveyed that indicated their presence in a particular part of the world.

Sales by global macro-regions are calculated by the importance of regional markets for respondents.

It should be noted that software developers can receive income directly from the country which they worked in, or through an offshore zone, or through regional hubs (for example, Cyprus, Luxembourg, Hong Kong, Singapore). A higher indicator of Ukraine in the calculations of RUSSOFT compared to

the data of the Central Bank of Russia indicates that it is difficult for Russian companies to work directly in the market of this country. They sell software there under the guise of European developers.

It can also be assumed that respondents possess branches (including development centers) which the head office makes settlements with under different articles, not under the article “computer services”. In addition, customers from neighboring countries often have offices in Russia, which means they can pay for the supplied software from the account of a Russian legal entity.

Therefore, the share of the “Near Abroad” countries of 7.3 % in 2020, according to RUSSOFT calculations, most likely is seriously underestimated. If we consider the market of Russia and neighboring

countries (for all types of products and services), then the share of neighboring countries will be approximately 30 %. For software, this share is likely to be less. This can be explained by the fact that the Russian IT market is much more developed than in neighboring countries, but still much more than 7.3 %.

Thus, RUSSOFT calculations, despite the assumed large error, make it possible to see a close-to-real distribution of foreign sales in various country markets, if appropriate corrections are made. At the same time, the results of calculations in different years allow to determine random deviations. Accuracy is also improved in the process of aggregating indicators; for example, when combining all markets of Western countries, post-Soviet states and all markets new to Russian companies.

Distribution of sales in 2016–2020 of Russian software companies by macro-regions of the global market, % of total turnover (calculation on the assessment of the significance of specific markets)

	2016	2017	2018	2019	2020
Russia	37 %	49.5 %	55.3 %	52.4 %	52.5 %
Belarus	1.9 %	1.0 %	0.8 %	—	—
Ukraine	2.5 %	1.2 %	1.3 %	—	—
Other countries of the former USSR	5.2 %	2.9 %	3.3 %	—	—
Near Abroad (post-Soviet states)	—	—	—	4.7 %	7.3 %
United States and Canada	17.7 %	17.1 %	13.0 %	16.3 %	13.0 %
Germany and German-speaking countries	9.2 %	8.4 %	8.1 %	—	—
Scandinavia and Finland	3.4 %	1.5 %	1.7 %	—	—
Other Western European countries	8.9 %	8.5 %	6.4 %	—	—
Central and Eastern European countries	3.2 %	1.5 %	1.7 %	—	—
Europe (without Russia and Near Abroad)	—	—	—	13.6 %	12.4 %
Southern and Eastern Asia	5.5 %	4.0 %	4.0 %	3.8 %	6.5 %
South and Central America	1.8 %	1.5 %	1.6 %	2.6 %	2.7 %
Africa	1.1 %	0.5 %	0.6 %	2.1 %	1.4 %
Australia	1.6 %	0.9 %	0.9 %	2.4 %	0.7 %
Middle East countries	1.2 %	1.3 %	1.4 %	2.1 %	3.5 %

It is difficult to make direct comparison of RUSSOFT 2019 data with similar data of the previous few years. First, because the division of the world market has changed. Second, due to the fact that the calculations were carried out in a different selection of companies (in 2019, the revenues of several large companies that ceased to be Russian according to the RUSSOFT classification were

not taken into account). In addition, a slightly changed method of calculating total turnover and total foreign sales was applied.

The distribution of 2020 is calculated according to the data obtained as a result of a full-fledged survey (unlike the distribution of 2019). Therefore, it is more correct to make a comparison

of data for 2020 with data for 2018, but to take into account a slightly changed methodology.

Traditional markets for the Russian IT industry are Western World and Post-Soviet States. “Western World” is presented in the general table with the distribution of sales by macro-regions as follows: “USA or Canada”, “Germany

and German-speaking countries”, “Scandinavia and Finland”, “Other Western European countries”, “Australia” and “Central and Eastern European countries”, which are now becoming closer to the Western world (especially since they are all part of the EU).

Belarus, Ukraine, Kazakhstan and Uzbekistan are separately allocated in the post-Soviet states, except for Russia.

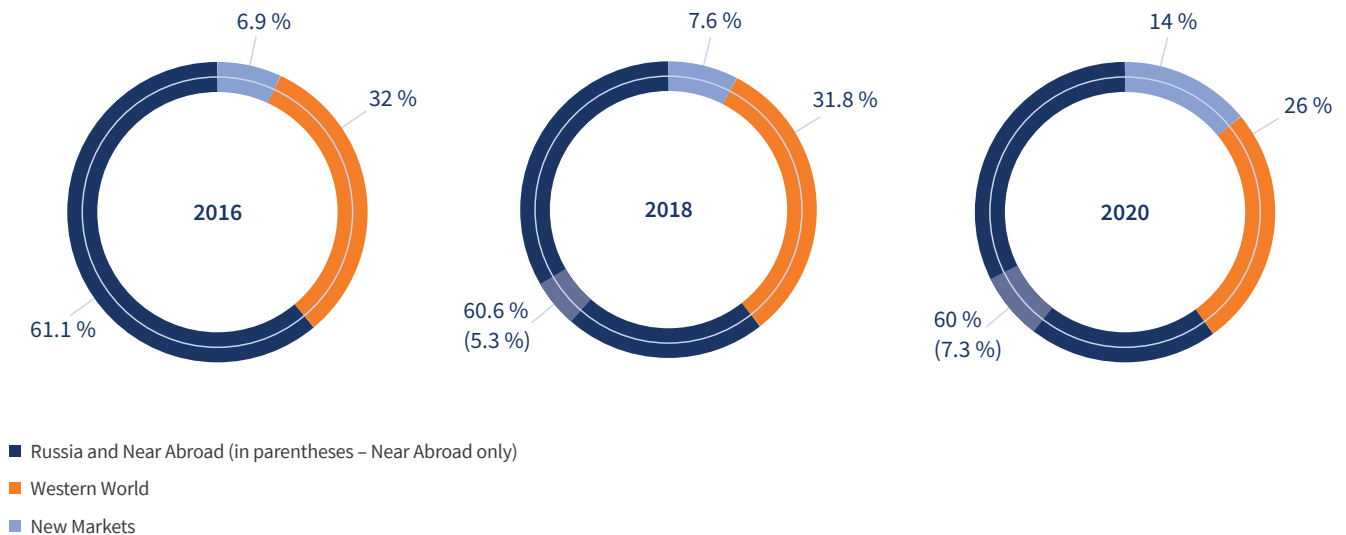
“New Markets” are divided into the following macro-regions: “Southern and Eastern Asia”, “Africa”, “South and Central America” and “Middle East”.

Grouping markets allows to improve the accuracy of calculations. In recent years, we can talk quite confidently about the growth of the share of “Russia and other countries of the former USSR” and “New Markets” while reducing the share

of “Western World”. The growth of the Western World market indicator in 2017 can be considered an episode related to the devaluation effect.

Such changes are confirmed by data on a significant increase in sales in the domestic market and an increase in the number of news about activity in the “New Markets”.

Distribution of sales of Russian software companies by market groups



4.3. Presence of Russian software companies in foreign markets

Interest in different markets can also be estimated by the share of companies in these markets, as well as by assessing the importance of each market (whether it is a key one or only individual projects are implemented in it).

According to the results of 2020, the most interesting markets for all software industry enterprises are Russia (can be combined with Near Abroad), the USA/Canada, Europe as a whole (especially Great Britain and Germany with German-speaking countries). At least 10 % of the companies surveyed consider

these markets as key ones. The Asian region does not yet belong to them, but almost 22 % of the surveyed companies are already present in the markets of Southern and Eastern Asia. In the future, with existing trends, there should be no less of them than in the United States.

Europe still lags behind the United States in terms of the share of companies that consider the corresponding market to be a key one (12.6 % versus 16.0 %), but is already ahead with a noticeable gap in terms of presence (42.2 % versus 31.5 %).

There are many markets where there is a fairly large share of surveyed companies, but only a small part of software developers recognized them as key ones. These markets can be considered as potentially promising.

The presence of software companies in domestic and foreign markets in 2020 with assessment of their importance, % of surveyed companies

	The market is key	Only individual projects are implemented in this market	Presence
Russia	87.4 %	11.6 %	99.0 %
Near Abroad	6.8 %	42.2 %	49.0 %
Belarus	2.9 %	22.8 %	25.7 %
Ukraine	1.0 %	18.4 %	19.4 %
Kazakhstan	5.3 %	30.6 %	35.9 %
Uzbekistan	1.9 %	13.6 %	15.5 %
USA/Canada	16.0 %	15.5 %	31.5 %
Europe (without Russia and Near Abroad)	12.6 %	29.6 %	42.2 %
Great Britain	3.4 %	12.6 %	16.0 %
France	2.9 %	7.8 %	10.7 %
Italy	1.9 %	8.3 %	10.2 %
Germany and German-speaking countries	4.9 %	12.1 %	17.0 %
Northern Europe (Scandinavia and Finland)	2.9 %	9.2 %	12.1 %
Central and Eastern Europe	2.4 %	13.6 %	16.0 %

	The market is key	Only individual projects are implemented in this market	Presence
Southern and Eastern Asia	3.9 %	18.0 %	21.9 %
China	1.0 %	8.7 %	9.7 %
Japan	0.5 %	3.4 %	3.9 %
India	2.4 %	6.3 %	8.7 %
Africa	1.5 %	7.8 %	9.3 %
South and Central America	1.9 %	8.3 %	10.3 %
Brazil	1.0 %	3.9 %	4.9 %
Mexico	0.5 %	4.4 %	4.9 %
Argentina	0.5 %	2.9 %	3.4 %
Middle East	2.4 %	10.2 %	12.6 %
Australia / New Zealand	1.9 %	5.8 %	7.7 %
Grouping of markets			
Developed markets			61.2 %
New Markets			40.3 %

Presence of Russian companies in domestic and foreign markets in 2007–2020, % of surveyed companies

	2007	2013	2014	2015	2016	2017	2018	2019	2020
Russia	55 %	93 %	94 %	92 %	87 %	93 %	94 %	90 %	99 %
Near Abroad	—	—	—	—	—	—	—	44 %	49 %
Kazakhstan	—	—	—	—	—	—	—	36 %	26 %
Belarus	32 %	33 %	27 %	33 %	28 %	29 %	26 %	32 %	19 %
Ukraine	17 %	39 %	30 %	32 %	25 %	23 %	20 %	28 %	36 %

	2007	2013	2014	2015	2016	2017	2018	2019	2020
Uzbekistan	—	—	—	—	—	—	—	24 %	16 %
Other countries of the former USSR	39 %	31 %	45 %	40 %	42 %	40 %	45 %	—	—
United States and Canada	55 %	41 %	48 %	36 %	37 %	42 %	39 %	58 %	32 %
Europe (without Russia and Near Abroad)	—	—	—	—	—	—	—	51 %	42 %
Great Britain	—	—	—	—	—	—	—	28 %	16 %
Germany (German-speaking countries)	25 %	22 %	24 %	27 %	19 %	31 %	29 %	33 %	11 %
France	—	—	—	—	—	—	—	19 %	10 %
Italy	—	—	—	—	—	—	—	21 %	17 %
Scandinavia (with Finland)	28 %	17 %	17 %	18 %	16 %	20 %	21 %	22 %	12 %
Central and Eastern European countries	—	—	—	—	16 %	20 %	21 %	24 %	16 %
Other Western European countries	35 %	34 %	37 %	32 %	30 %	35 %	31 %	—	—
Southern and Eastern Asia	19 %	8 %	12 %	15 %	13 %	16 %	17 %	26 %	22 %
China	—	—	—	—	—	—	—	24 %	10 %
Japan	—	—	—	—	—	—	—	10 %	4 %
India	—	—	—	—	—	—	—	15 %	9 %
Australia	25 %	14 %	12 %	8 %	10 %	16 %	12 %	15 %	8 %
South and Central America				8 %	8 %	14 %	10 %	17 %	9 %
Brazil	—	—	—	—	—	—	—	10 %	10 %
Mexico	—	—	—	—	—	—	—	10 %	5 %
Argentina	—	—	—	—	—	—	—	7 %	5 %
Africa	—	—	—	9 %	7 %	10 %	8 %	17 %	3 %
Middle East	—	8 %	6 %	9 %	11 %	16 %	19 %	21 %	13 %

According to the share of the companies present in various markets, the importance of the Russian market has increased to a record level. Only 1 % of the companies surveyed did not work on it in 2020. In previous years, the share of such respondents did not fall below 6 %.

It is also interesting that 36 % of respondents implemented projects in the Ukrainian market, so it cannot be said that it is impossible to work on it due to political confrontation. At the same time, only 1 % of surveyed companies consider the Ukrainian market to be the key one, and until 2018 there were at least 5 %

of such companies (in some years even 15 % and 22 %). Such a reduction in the priority of the Ukrainian market with the remaining high percentage of companies present on it suggests that Russian companies can work in this country, but the market itself has become much less interesting, primarily due to its rapid reduction.

Software developers who have already gained a foothold in the US market are trying not to leave it. It is becoming increasingly difficult for new companies to enter it. Nevertheless, the share of companies that plan to make their debut

in the American market in the current and next year (relative to the year of the survey) from 2016 to 2019 has steadily grown, increasing over 4 years from 8 % to 13 %. The 2020 survey is not indicative, and in 2021 this indicator remained at a fairly high level – 11.6 %.

The high interest in the American market among companies that have not yet entered it is due to the fact that it is still the largest in the world. At the same time, after consolidating their positions in the United States, it is much easier for companies to enter other foreign markets.

Share of companies interested in different markets

	There is interest *	2021	2022
Near Abroad	63.1 %	9.7 %	4.4 %
Kazakhstan	48.1 %	8.3 %	3.9 %
Belarus	35.9 %	5.3 %	4.9 %
Ukraine	24.8 %	3.9 %	1.5 %
Uzbekistan	26.7 %	6.8 %	4.4 %
United States and Canada	43.2 %	6.8 %	4.9 %
Europe (without Russia and Near Abroad)	56.8 %	7.8 %	6.8 %
Great Britain	19.9 %	2.4 %	1.5 %
Germany (German-speaking countries)	26.2 %	6.3 %	2.9 %
France	14.1 %	1.9 %	1.5 %
Italy	13.6 %	1.5 %	1.9 %
Scandinavia (with Finland)	16.5 %	2.4 %	1.9 %
Central and Eastern European countries	25.2 %	4.9 %	4.4 %

	There is interest *	2021	2022
Southern and Eastern Asia	33.0 %	5.3 %	5.9 %
China	15.5 %	2.9 %	2.9 %
Japan	8.7 %	1.9 %	2.9 %
India	12.1 %	2.4 %	1.0 %
South and Central America	19.4 %	4.9 %	4.4 %
Brazil	11.2 %	2.9 %	3.4 %
Mexico	8.3 %	2.9 %	0.5 %
Argentina	7.3 %	2.4 %	1.5 %
Africa	16.0 %	2.9 %	3.9 %
Middle East	20.9 %	4.4 %	3.9 %
Australia	12.6 %	1.9 %	2.9 %

* – already present in the market or plan to enter it in 2021–2022

For the first time in 2021, 22.8 % of surveyed companies plan to enter a new foreign market, and in 2022 – 21.9 %. Relative to Far Abroad, these figures are 16.5 % in 2021 and 19.4 % in 2022.

Most often they want to make their debut in Near Abroad. From Far Abroad, the greatest interest is in the markets of the USA and Europe.

This was the case in previous years. However, the existing plans have almost never been confirmed by actions: with all intentions to more actively enter foreign markets, Russian developers have increased sales in the domestic market at a faster pace. With greater interest in the large markets of the United States and Europe, their share is still steadily declining, and the share of “New Markets” is growing slightly.

4.4. The emergence of “problematic markets” due to increased political tension

In terms of sales, the US market for Russian companies remains in the second place (after Russia) for all the years of the RUSSOFT study, but the gap from Europe is already very small (13 % for the United States and 12.4 % for Europe). Previously, the difference between them was much bigger.

It is known that among the largest Russian exporters, the share of sales in the United States in total revenue is often measured in tens of percent, and sometimes reaches 50 % and even 80 %. Service companies are the leaders in working in developed markets (the USA and the EU). They are twice as ahead of service ones in terms of the share of companies in these markets.

Nevertheless, the US market provides very significant volumes of export revenue for leading product companies. For example, Kaspersky Company, the leading Russian developer of information security solutions, earned up to \$200 million annually in the US market. In recent years, this figure has decreased (according to US media reports, in 2017 – up to about \$150 million). Over the past three years, sales in the United States

could increase (although according to the company itself, there was still no drop in sales in the US market in 2020).

Over the past 5 years, certain political risks have arisen in traditional markets for Russian developers. This applies to the countries of the European Union, the USA, Canada and Ukraine, where a campaign is being conducted in the media to create a negative image of Russia. Government agencies are not allowed to acquire Russian software in any form at all. Commercial companies are not recommended to purchase Russian software or engage Russian companies to develop software if it is used in the interests of the Ministries of Defense.

The tendency of increasing the displacement of Russian companies from the markets of Western countries (primarily the United States) has already negatively affected their sales there. At the same time, there are no reasons to expect a turning point and a change in the attitude towards Russia and Russian software companies. The number of companies, about the sanctions against which it became known from the media, is expanding.

Nevertheless, the market of the USA and other developed countries inexorably requires the presence of Russian software developers. Even US government agencies cannot quickly abandon solutions of Kaspersky Company. Phasing out Russian custom software developers from the US market can also be a difficult task given the need to maintain a budget and improve the quality of software. At the end of June 2019, it became known that the software for the crashed Boeing 737 Max aircrafts was created by Indian programmers, who were used by American contractors to develop applications. This was reported by Bloomberg, an authoritative media outlet in Western countries.

Consequently, not only the Russian side, but also the American one suffers from political aggravation. Mutual dependence in the field of IT was quite high. Nevertheless, attempts to phase out Russian companies from the markets of Western countries are not only ongoing, but also becoming more active.

4.5. “New Markets”

If we consider the geographical distribution of foreign sales, then traditional markets account for 83 % of sales of companies from Russia in 2018, and “New Markets” (Southern and Eastern Asia, Africa, South and Central America and the Middle East) – about 17 %. At the end of 2019, the share of “New Markets” increased up to 25 %, and at the end of 2020 it reached 30 %. Most likely,

the conclusions about such high sales growth rates are slightly exaggerated, but this indicator has undoubtedly grown in the last 2 years.

This ratio (70 per 30) already almost corresponds to the geographical structure of the world market. But if you focus on data of Gartner and IDC, then the United States and the EU account for

approximately 60 % of global IT spending (including communications services), and other markets – 40 %. Thus, the potential for increasing sales in emerging markets is still great. Moreover, there is an opportunity not to dwell on reaching the share of “New Markets” of 40 %. In the future, if the process of replacing American IT solutions around the world continues, these markets may account

for at least 50 % of foreign sales of Russian software companies, since these are fast-growing markets in which higher growth rates can be obtained than in stable markets in Western countries.

The growing interest in the IT markets of developing countries is also caused by the fact that the sanctions policy of the US authorities undermines confidence in American solutions and platforms in

many countries, which pushes them to find alternative suppliers.

4.6. Geographical preferences of service and product companies

Service companies are better represented (compared to product ones) in developed countries with a high level of income and with the availability of their own software products. Product companies have an advantage in Near Abroad and in “New Markets”. The same was observed in previous years. However, according to the results of the 2021 survey, interest in “New Markets” almost leveled off.

Among product companies, there are much more of those that are already working or planning to work in the next 2 years in absolutely all macro-regions (among service ones, only 1.1 %, and among product ones – 9.7 %).

10–15 years ago, service companies were generally oriented exclusively to the developed markets of the USA and Europe, since in Russia and in neighboring countries there was no solvent customer. They also did not see prospects in the “New Markets”, where the average salaries of software developers are lower than in Russian cities.

However, the situation gradually changed. Having received serious

Attitude of Russian product and service companies to work abroad (the share of surveyed companies)

	Service	Product
Work or plan to work in 2021–2022 in all markets	1.1 %	9.7 %
Did not work abroad in 2020 and do not plan	16.5 %	16.8 %
Worked only in Russia in 2020	23.1 %	27.4 %
Developed markets (presence and plans)	64.8 %	57.5 %
New Markets (presence and plans)	39.6 %	40.7 %

experience working for a foreign customer, developers of custom software began to participate in large projects in the domestic market and in the CIS countries. In 2018–2019, they showed interest in the markets of Africa, the Middle East and Asia. For example, in 2017, only 2 % of service companies reported plans to enter African markets, and in 2019 there were already 7 % of them. According to the 2021 survey, this figure remained at the same level – 6.8 %.

**Presence of Russian product and service companies in domestic and foreign markets in 2020,
% of surveyed companies**

	Product	Service
Russia	100 %	98 %
Near Abroad	64 %	32 %
Belarus	35 %	14 %
Ukraine	27 %	11 %
Kazakhstan	51 %	18 %
Uzbekistan	22 %	8 %
USA/Canada	21 %	43 %
Europe (without Russia and Near Abroad)	32 %	54 %
Great Britain	13 %	20 %
France	12 %	10 %
Italy	12 %	9 %
Germany and German-speaking countries	12 %	24 %
Northern Europe (Scandinavia and Finland)	10 %	14 %
Central and Eastern Europe	18 %	14 %
Southern and Eastern Asia	25 %	18 %
China	12 %	7 %
Japan	5 %	2 %
India	13 %	2 %
Africa	16 %	1 %
South and Central America	16 %	3 %
Brazil	8 %	1 %
Mexico	8 %	1 %
Argentina	5 %	1 %
Middle East	17 %	8 %
Australia / New Zealand	9 %	7 %

4.7. Geographical distribution of software development centers

Remote development centers are created by Russian companies to solve two problems: either for the reason that developers are closer to the customer and can work out with them all the emerging issues 24/24 and 7/7, or (more often) to gain access to local human resources in the labor market.

Most often, Russian companies find the necessary specialists in other cities of Russia.

In 2019, 44 % of the surveyed companies had remote development centers in

other cities of Russia, but in this case the special composition of the surveyed companies with a larger predominance of large companies in Moscow and St. Petersburg affected. And the number of respondents turned out to be insufficient. The results of the 2020 survey can only rarely reveal any trends in the distribution of remote software development centers in Russia.

Data from the 2021 survey provided the results which allow us to identify trends in a better way. So, for example, there is every reason to assume that the share

of the companies planning to open a development center in Russia or abroad will increase in the next 2 years (this also applies to Far Abroad). However, it is not yet clear how these plans will be affected by the practice of using the mode of work of a significant part of employees outside the office. In 2021, the companies surveyed plan that such a mode will account for 58 % of man-hours. In many cases, the office is still needed, but in 2021 and perhaps next year, companies will study the pros and cons of remote operation to make final decisions.

Availability of software development centers and their opening plans in the next 2 years, share of surveyed companies

	Survey 2016	Survey 2017	Survey 2018	Survey 2019	Survey 2020	Survey 2021
Have at least one remote development center in Russia or abroad	40 %	43 %	31 %	32 %	44 %	37 %
They plan to open at least one remote development center in Russia or abroad in the next 2 years	32 %	25 %	31 %	31 %	36 %	38 %
Have at least one remote development center abroad	22 %	22 %	16 %	14 %	28 %	13 %
They plan to open at least one remote development center abroad in the next 2 years	22 %	11 %	11 %	17 %	21 %	20 %
Have at least one remote development center in foreign countries	11 %	14 %	11 %	10 %	24 %	10 %
They plan to open at least one remote development center in Far Abroad in the next 2 years	15 %	9 %	10 %	14 %	18 %	17 %

In practice, plans to open new offices only characterize the desire for geographical expansion, increasing turnover and exports. Other sections of this chapter and other chapters explain that these plans most often reflect the overly optimistic attitude of respondents, and they cannot always be implemented.

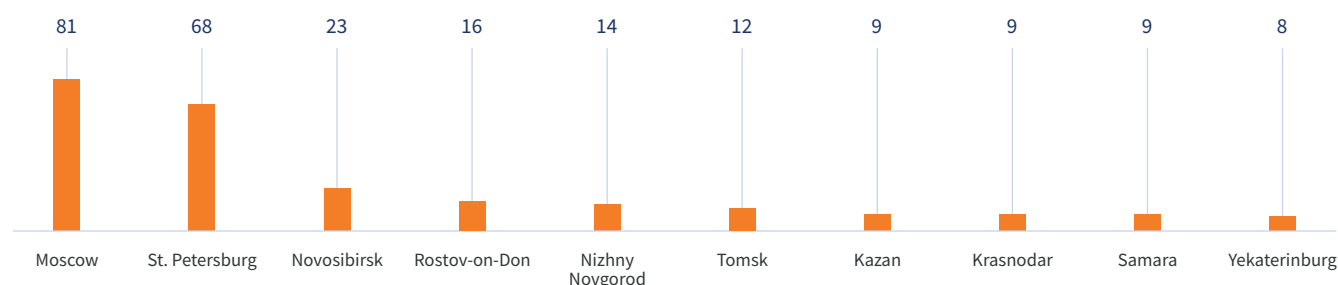
Changes in the questionnaire in 2020 made it possible to get data on which cities of Russia were most interesting for creating remote development centers in them and what the number of employees in these centers was.

In 2021, the survey presented much more cities than a year earlier, because the number of companies surveyed increased from 72 (a year earlier) to 206. As a result, it turned out that the head office or remote development center is in 66 cities of Russia, which represent 50 regions. It can be considered that the survey covered all cities and regions in which at least several dozens of software companies operate. But Vologda and Yakutsk did not get into this list, although the corresponding regions are in the top 20 of the RUSSOFT region rating in terms of software exports, because they have

one large company each, there are no many other software enterprises.

In 2021, almost three times more companies took part in the survey than a year earlier, but not very large companies provided the growth. Therefore, the total number of specialized technical personnel increased over the year not threefold, but only by 20 % – up to 26,664 people. Of these, 11,396 specialists work in remote development centers in other cities of Russia.

Number of mentions of the city as the location of the head office or remote development center (Top 10)



Remote centers of surveyed companies are in 56 Russian cities. This means that in 10 cities there are only head offices.

Although the quality of the survey in 2021 was much better than a year earlier, Petersburg (again with a wide margin from all), Voronezh, Nizhny Novgorod and Saratov also occupy the first 4 positions in the number of employees in remote development centers (only Nizhny Novgorod and Saratov have changed places, but their indicators do not differ much).

St. Petersburg
Voronezh
Nizhny Novgorod
Saratov

the leaders in the number
of employees in remote
development centers

The top 15 Russian cities by the number of employees in the remote development centers of nonresident companies located in them, people

Survey 2020

1	St. Petersburg	3487
2	Voronezh	749
3	Saratov	728
4	Nizhny Novgorod	546
5	Moscow	497
6	Omsk	480
7	Ryazan	480
8	Izhevsk	297
9	Samara	297
10	Kostroma	286
11	Novosibirsk	180
12	Tver	140
13	Taganrog	85
14	Togliatti	80
15	Rostov-on-Don	79

Survey 2021

1	St. Petersburg	4318
2	Voronezh	845
3	Nizhny Novgorod	656
4	Saratov	621
5	Samara	554
6	Ryazan	521
7	Omsk	415
8	Perm	295
9	Moscow	286
10	Izhevsk	278
11	Yaroslavl	275
12	Cheboksary	240
13	Rostov-on-Don	204
14	Belgorod	143
15	Tver	138

4.8. Facts related to the geographical expansion of Russian companies in 2018–2021

The number of news that reflects the activity of Russian software companies in foreign markets is growing every year with the exception of the failure in 2018. This growth has become significant and obvious since about 2013. At the same time, interest was primarily caused by those markets that are not yet traditional for Russian software companies. This growth was expected to stop in 2020. Amidst the pandemic, marketing activity abroad is difficult, but still it did not decline as much as could be expected while maintaining restrictions on movement in the second half of 2021.

According to the results of 2021, the number of news related to expansion abroad is likely to be about the same as it was in 2019. Given that the pandemic will limit the development of international business, achieving the 2019 level is tantamount to growth.

The number of news about activity abroad, starting in 2017, has become so large that it became possible to see statistics for analyzing and identifying trends. Naturally, in 5 incomplete years, the most news was in the field of information security. Note that in this area, the conclusion of some contracts is advertised much less often than in others.

Judging by the number of news, the largest activity of Russian IT companies is observed in Southern and Eastern Asia. The second and third places are taken by Europe (without Russia and neighboring countries) and the Middle East. Given the fact that in the Middle East Russian software companies began to have actively started to work relatively recently (in Europe 20 years earlier), it can be assumed that the European market will soon be less interesting for foreign expansion than the Middle East.

Statistics on news about activity abroad in the IT sector in 2017–2021, divided by macro-regions

	2017	2018	2019	2020	2021 (6 months)	Total news for 5 years
Southern and Eastern Asia	7	4	13	8	1	28
Europe (without Russia and Near Abroad)	6	3 (-1)*	6	6	—	17
Middle East	5	2	7	3	2	17
Near Abroad	5	2	5	6	3	14
Africa	1	2	5	4	3	9
Latin America	4	1	1	2	1	8
USA	1	2	—	1	3	3
Australia	1	—	—	—	1	1
Total within a year**	22	16	31	24	15	—

* – one piece of news about leaving the market, and therefore with a minus.

** – the news may concern more than one macro-region, so it is not the sum of the top lines

**Statistics on news about activity abroad in the IT sector in 2017–2021
with separation by developers' areas of activity**

	2017	2018	2019	2020	2021 (6 months)	Total news for 5 years
Information security	6	4 (-1)*	6	5	2	22
AI, robotics	1	1	3	1	1	7
Custom software development and IT services	1	1	3	—	—	5
Enterprise management systems, billing	5	—	1	3	2	11
Biometrics and identification systems	2	1	1	1	1	6
Data storage system, backup, and data storage	2	2	—	—	1	5
Systems for public administration	—	—	2	2	—	4
Data Analysis Solutions	2	—	1	—	—	3
Cloud Management Development	1	1	—	1	—	3
Solutions for banks	—	1	—	1	—	2
Internet projects	1	—	1	—	—	2
Navigation systems	—	—	1	1	—	2
Video conferencing	—	—	1	3	—	4
Office Software	—	—	1	1	1	3
Solutions for Training	—	—	1	—	1	2
Biomedical Solutions	—	—	1	—	—	1
Solutions for Contact Centers	—	—	1	—	—	1
IoT	—	—	—	1	—	1
Platform for VAS	—	—	—	1	—	1
E-document flow	—	—	—	2	1	3
Solutions for Online Commerce	—	—	—	1	2	3
Total directions covered	9	7	14	14	9	—

* – one piece of news about leaving the market, and therefore with a minus.

4.9. Vertical Markets

Frequency of vertical markets in 2007–2019, % of all respondents

survey year/vertical markets	2007	2009	2011	2013	2015	2016	2017	2019	2020	2021
Information Technology	89 %	69 %	74 %	74 %	68 %	70 %	80 %	78 %	79 %	78 %
Banking*	35 %	36 %	23 %	26 %	34 %	29 %	20 %	38 %	53 %	39 %
Telecommunications	34 %	33 %	26 %	31 %	27 %	27 %	30 %	44 %	46 %	41 %
Industries	31 %	31 %	27 %	38 %	37 %	33 %	28 %	41 %	57 %	51 %
Hospitality, Travel & Transportation	24 %	31 %	28 %	29 %	31 %	27 %	28 %	45 %	61 %	42 %
Government	28 %	25 %	21 %	24 %	28 %	24 %	22 %	37 %	49 %	38 %
Power supply, Gas & Oil	18 %	24 %	17 %	22 %	29 %	21 %	18 %	32 %	43 %	41 %
Healthcare & Pharmaceuticals	23 %	24 %	23 %	28 %	28 %	24 %	26 %	39 %	53 %	43 %
Retail & Distribution	35 %	24 %	26 %	29 %	24 %	26 %	22 %	38 %	50 %	37 %
Education	36 %	23 %	21 %	28 %	24 %	25 %	22 %	31 %	39 %	37 %
Science & Research	—	—	18 %	26 %	20 %	20 %	26 %	31 %	35 %	25 %
Gaming & Entertainment	20 %	11 %	9 %	15 %	17 %	15 %	16 %	22 %	14 %	11 %
Media	—	—	13 %	18 %	18 %	13 %	14 %	18 %	21 %	18 %
Sport & Travel	—	—	10 %	17 %	11 %	15 %	16 %	23 %	29 %	19 %
Insurance	—	—	13 %	15 %	15 %	13 %	11 %	21 %	25 %	24 %
Building & Real estate	—	—	12 %	17 %	28 %	17 %	16 %	33 %	36 %	33 %
Services	—	—	27 %	35 %	26 %	22 %	28 %	42 %	44 %	36 %
Finances	—	—	25 %	26 %	21 %	19 %	19 %	33 %	47 %	33 %
Energy	—	—	17 %	21 %	24 %	22 %	21 %	31 %	42 %	35 %

* – until 2011: Banking & Financial Services

During all the time of the NP RUSOFT research, no regularity was revealed in changing the significance of certain vertical markets for Russian software companies. Fluctuations in this indicator are random or temporary. In general, it can be concluded that the sectoral priorities of Russian exporting companies do not fundamentally change during the decade.

The only clearly identified pattern associated with vertical markets was due to a sharp reduction in the number of their mentions per company in crisis times. In 2009–2010, software developers had to focus on the areas in which they were most competitive or which were less

vulnerable to the global crisis. A similar decrease in this indicator was revealed in a survey of 2015–2016.

In 2018, there was no corresponding question in the questionnaire. It reappeared in 2019 and made it possible to see a sharp increase in the average number of these vertical markets: it reached 6.8, and in 2016–2017 this indicator was 4.6. All vertical markets with the exception of “Information Technology” are mentioned by a large number of surveyed companies.

In 2020, the growth of this indicator continued (an increase to 8.2), but this is primarily due to the special composition

of the companies surveyed (there was a much smaller share of small companies than in previous years). Nevertheless, data from the survey of 2021 allow us to conclude that since 2019 (possibly since 2018, when there was no corresponding question in the questionnaire) there has been an increase in the digitalization process in almost all sectors of the Russian economy, and demand in vertical markets has grown. In the last three years, the mention frequency indicator of each vertical market has also fluctuated, as in previous years, but already at a higher level. The average number of these vertical markets in the survey in 2021 was 6.8, as in 2019.



HUMAN RESOURCES

5



HIRING MARKET 2021: WIND OF CHANGE

Alexey Nikolaev

CCO

Intella IT recruiting
agency

intella

2020 has become a year of fundamental change for both lifestyle and the job market. Many businesses fell apart, and only flexible ones have stayed afloat. We saw some interesting trends that changed our working routine in 2020. They are still relevant in 2021.

Everything we used offline stopped working. The main component of business efficiency turned out to be its digitalization. “If you do not have an online business, you do not have a business.”

Remote work has become a thing. Many foreign companies became more interested in Russian IT specialists. Now we have a good balance between high-quality technical personnel and staff costs.

To the opposite of the usual order, a new trend has formed. Because of the pandemic, Russian IT specialists no longer want to relocate. They prefer to work for a foreign company being at home.

The demand for specialists has grown enormously, but their number has remained the same. Russian employers have started to raise salaries and implement human-focused well-being programs. It is customary for IT

professionals to have a C&B package with LCA, full sick leave coverage, a vacation, sports and educational compensations, and a cafeteria plan with unique benefits. Soon the competition for staff between Russian and foreign companies will increase. Local employers are already taking steps to keep IT professionals. All businesses have to hire not only in the capitals but also in the provinces. Some IT specialists have migrated back to their hometowns because of the pandemic and don't plan to return to big cities.

At the beginning of the pandemic, some employers anticipated specialists to lower their salary expectations, but it turned out the other way around. By October, almost all companies had already indexed salaries. The remote wage is expected to be higher. Compensation for the Internet, calls, utility bills — all of this becomes an integral part of the offers candidates accept.

New intangible benefits became an essential factor for the acceptance of an offer. Today employers need to quickly equip a home workplace and provide personnel with a cafeteria plan, thus making them choose options themselves. Companies that were not flexible enough lost their positions on the market.

In 2021, a new round of competition for candidates is expected — entry into the market of state corporations and opening a vast number of vacancies for the digital transformation of the economy. The trend towards increasing demand for IT specialists continues. Now more than ever, the issue of supplying new personnel, including the modernization of the education system, is acute. The most effective models are opening its training centre inside a company, a system of ambassadors in universities, and retraining internal resources for new needs. Many companies, including intella, have already launched similar projects, while others think about it right now.

5.1. Assessment of the overall HR situation in the software industry

At the end of 2020, there were at least 640,000 employees in Russia who were directly involved in the software development process (such specialists are considered to be specialized in software companies). The increase in their number over the year amounted to about 12 %. In the previous 2 years, it remained at the same level (slightly lower – 10–11 %), and until 2017 inclusive, this indicator was steadily 6–8 % for several years. Consequently, in 2020, at least 60 thousand software developers were added to the industry. Most of the growth (almost 80 %) was provided by universities.

This is a cautious assessment. It is necessary to take into account a serious error in the available calculations, which are carried out on the basis of a survey of software companies. As for the assessment of the number of software

developers who are engaged in other sectors of the economy and social sphere, as well as in the public sector, it is assumed that they account for about $\frac{3}{4}$ of all specialists, and this share does not change significantly from year to year. This assumption needs to be checked annually, but for this it is desirable to conduct additional research on human resources and training in the field of software development, which is much wider than the software industry studied by RUSOFT.

If you consider Russian software companies alone, then at least 200 thousand specialized technical employees worked in them at the end of 2020. Calculations are made according to the data of a survey in which respondents indicate the number of such employees in their companies (indicating the change in the number for the year). At the same

time, at least 10 thousand of them are outside the country, working in the development centers of these companies abroad. Consequently, approximately 190 thousand work directly in Russia in software companies, which is 12 % more than at the end of 2019.

Calculations show that an increase in the number of specialized employees by 12 % occurred both across the entire industry and among the surveyed companies.

Since the error in the calculation results based on the survey data is quite large, it is better to focus on cautious estimates. Nevertheless, taking into account other indirect data, it's safe to say about an increase in the growth rate of the software development industry staff in Russia.

Total number of specialized staff

	the end of 2016	the end of 2017	the end of 2018	the end of 2019	the end of 2020
Software developers working in Russia in all sectors (including IT services), thousand people	470-480	>500	>540	>580	>640
In the software industry of Russia (without employees in foreign centers), thousand people	132-137	>140	>155	>170	>190
Distribution of employees according to business model					
In service companies (including working for foreign customers)	57 % (≈22 %)	≈58 % (≈22 %)	≈59 % (≈22 %)	≈54 % (≈23 %)*	≈55 % (≈23 %)
In product companies	≈40 %	≈38 %	≈37 %	≈41 %*	≈40 %
In Russian R&D centers of foreign companies	≈3-3.5 %	≈4 %*	≈4 %	≈5 %*	≈5 %

* – the change in this indicator does not reflect growth, but an adjustment made upon receipt of additional information (in 2019, a significant adjustment is due to the sale of a number of large companies that were no longer considered Russian, as well as the use of an updated calculation methodology).

In the last 3 years, both large and small software companies have steadily increased the staff by at least 8 % per year (according to the results of 2020, the increase was 11.3 % for companies with a turnover of up to 320 million rubles and 12.1 % for companies with a turnover of more than 320 million rubles). Until 2017, large companies grew faster and largely due to the migration of personnel from small companies.

2020 turned out to be especially difficult for HR departments of software companies. In the first quarter, the situation became slightly more difficult than in the same period a year earlier: there was a more active recruitment of personnel amid an increase in the difficulty of retaining their own employees. In the second quarter, with the outbreak of the pandemic, everything changed dramatically: instead of recruiting, HR departments, together with company executives, began to think about a significant reduction in staff. They had a dilemma: either try to retain the staff as much as possible, assuming that after the

lockdown completion, the cost of finding and selecting personnel will exceed the cost of paying non-working specialists, or still not spend money in vain if the reduction in the global and Russian IT market promised by analysts is prolonged.

However, in the third quarter there was again a 180-degree turn. It turned out that the market is not declining, payments delayed in the second quarter began to be received. For the second half of the year, HR managers of software companies had to compensate for the downtime of their developers in the spring months during the most stringent restrictive measures. A very active recruitment of personnel began and such a shortage arose that was not even in quite prosperous years for the industry. As a result, the total staff of software developers increased over the year by record 12 %.

The increase in the growth rate of the total number of employees can also be explained by the fact that thanks to the activity of the APKIT Association, starting

from 2014, quotas for budget places in IT specialties began to increase in universities. It is unlikely that their number increased in three years by 70 %, as announced in the media, but their number increased by 20–30 %. The admission of students in IT specialties was increased mainly by regional universities (leading universities in Moscow and St. Petersburg did not see the opportunity to accept more students without reducing the average level of training, since a significant increase in the graduation of qualified programmers requires initial investment in teacher training).

The share of companies with a growing number of employees in 2020 turned out to be exactly the same as in 2018 (from 2019 it is difficult to compare due to the unusually small number of companies surveyed), but the percentage of companies, whose staff grew by more than 10 % over the year, increased. In 2020, 11 % of the surveyed companies had more than 30 % staff growth, and 7 % had more than 50 %.

5.1.1. Staff turnover

The turnover rate until 2015, inclusive, fluctuated mainly in the range of 6–7 %, but in 2016 it increased to 9.5 % and in the next two years stabilized at this level. In 2019, there was a new jump – up to 12.5 %. Given that an insufficient number of companies participated in the survey in 2020, there were doubts about the accuracy of the value received. However, data from the 2021 survey showed that such a jump did occur: according to the results of 2020, the turnover rate was 13.3 %. The growth of this indicator is confirmed by other sources as well.

In previous years, at least half of the companies surveyed faced annual layoffs (in 2016 – 59 %, in 2017 – 50 %, in 2018 – 58 %, in 2019 – 67 %). According to the results of 2020, 96 % of the companies that answered the corresponding question had losses. However, at the same time, more than half of the survey participants (54 %) chose the option “Not sure”. It is difficult to assume the reasons for such a mass refusal (a year earlier there were only 28 % who did not want to answer the question about staff turnover). Apparently, this question has

become especially painful for companies or it is already difficult for them to keep track of how many employees quit during the previous year (when there are no layoffs, it is easier to answer the question).

Now we can no longer talk about a low rate of staff turnover in Russia. Under current conditions, when the staff is updated annually by more than 10 %, companies have to learn to start projects with one team composition, and finish with a completely different one.

Annual turnover rate according to size of companies (by turnover)

Year *	For all surveyed companies	More than \$100 million **	From \$20 million to \$100 million	From \$5 million to \$20 million	From \$1 million to \$5 million ***	\$1 million ****
2012	6.0 %	4.6 %	8.3 %	9.0 %	8.4 %	4.8 %
2013	6.0 %	7.7 %	7.4 %	7.8 %	8.2 %	13.1 %
2014	7.7 %	5 %	6.5 %	7.4 %	6.6 %	7.7 %
2015	5.7 %	6 %	6.1 %	8.1 %	6.1 %	6.2 %
2016	9.5 %	11 %	6.7 %	10.9 %	6.2 %	6.5 %
2017	9.5 %	9 %	8.8 %	16 %	5.4 %	6.6 %
2018	9.3 %	2 %	13.8 %	10.8 %	9.7 %	6.7 %
2019	12.5 %	12.6 %	9.9 %	17.5 %	12.3 %	8.5 %
2020	13.3 %	17.4 %	7.1 %	12.9 %	13.3 %	18.6 %

* – in 2019–2020, in connection with the transfer of calculations to rubles, intervals were recalculated at the rate of 64 rubles per dollar.

** – as a rule, several companies, and in 2016 and 2018 only one and two, respectively

*** – up to 2014 inclusive “from \$0.5 million to \$5 million”.

**** – up to 2014 inclusive “less than \$0.5 million”.

5.1.2. Sources of staff additions

To replenish the staff of software companies, there are three main sources: university graduates, foreign specialists (primarily from neighboring countries) and employees with engineering education from enterprises of other industries. By and large, until 2019, only one source of staff addition was important for several years: universities. If until 2016, in some years, the migration of software developers from Kazakhstan, Ukraine and Belarus provided up to 20 % of the increase in the total staff of Russian software companies (without employees of their foreign development centers), then in 2017–2018 this figure did not exceed 5 %.

In 2021, a new question appeared in the questionnaire, which allows us to determine the significance of all the main sources of staff addition of software companies. It allowed us to abandon two old questions: the proportion of specialists who moved to Russia, and the proportion of university graduates among the new employees. As a result, it became possible to get unique and completely new information.

It is not improbable that the share of students combining work and study differs in reality by 5 or even 10 percentage points, but according to the survey results, these students make up

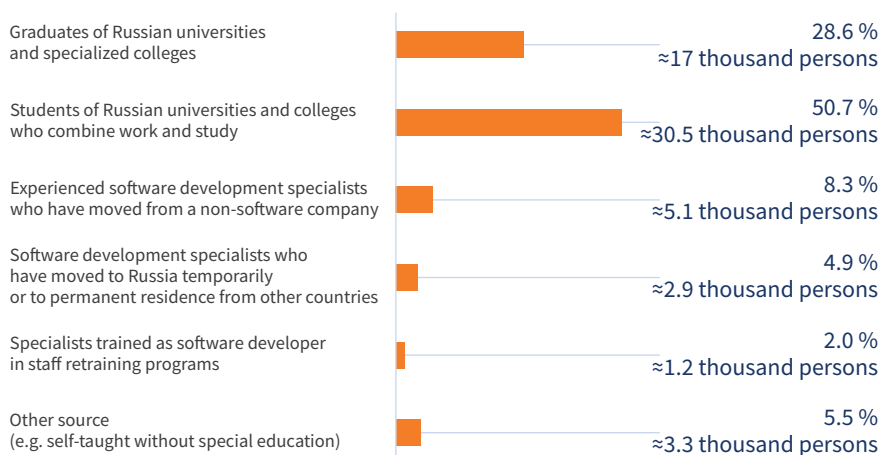
the main share in the additional number of employees that appeared during 2020. The second place was taken by university graduates. Together, they represent one staff source – higher education institutions. In 2020, they provided almost 80 % of the increase in the total staff of Russian software companies.

Despite the pandemic and difficulties when crossing borders, almost 5 % of the increase in IT staff is due to the migration of specialists (primarily from neighboring countries).

A little more than 8 % is accounted for by the specialists who moved to software

companies from IT departments of enterprises of other industries. However, it is difficult to consider this staff source to be full-fledged, since it is not known which stream is moving in the other direction. We can assume that it is at least no less. The same applies to migration, but in 2020 moving to the West was hampered not only because of the pandemic (the United States temporarily refused to attract IT specialists from abroad), but also because of gender policy in the United States and EU countries. Therefore, most likely, the balance of arrival/departure from Russia of software developers turned out to be positive. It is this balance that is desirable to determine by intersectoral transitions and interstate migration of specialists, but it is not yet possible to track where the retired employees go.

Distribution of the growth in the staff of specialized technical staff of software companies received following the results of 2020 by sources of staff addition



5.1.3. Increase of labor efficiency

In 2017, the total number of employees of Russian software companies increased by 7 %, and the total turnover in dollars – by 19 %. In 2018, the difference was less – 7.8 % and 10.6 %, respectively. The rapprochement occurred due to the depreciation of the ruble against the dollar.

Nevertheless, there was a clear increase in labor productivity, if measured in dollars. The productivity of software developers increased mainly due to the higher cost of software developer services and the scaling of the business of replicated solution developers.

At the end of 2018, one specialized employee accounted for \$75 thousand in revenue (together with foreign development centers), and at the end of 2019 – \$96 thousand. It should be

borne in mind that the composition of the companies of respondents surveyed in 2019 and 2020 is very different, which makes correct comparisons difficult.

At the end of 2020, the total number of employees increased more than turnover in dollar terms (by 12 % and 4.5 %, respectively). Consequently, revenue per specialized technical employee decreased to \$91 thousand. Most likely, this indicator will increase in 2021, but much will depend on exchange rates. In ruble terms, output per employee increased, as turnover in ruble terms increased by 16 %, which is more than the headcount growth.

5.2. The existing need for IT specialists

It is largely pointless to quantify the overall shortage of software development specialists. If you declare that the shortage of programmers is 500 thousand people, 1 million people or 2 million people, then any of these values will be true. Taking into account the global staff shortage and Russia's small share in the global software market (including custom development services), the domestic software industry can grow 2–3 times or even more due to a sharp increase in exports. Therefore, it seems more correct to focus on determining how to make the most effective use of all the opportunities for training and attracting personnel: who, how many and whom can train in Russia or attract from abroad. Quantitative benchmarks for the number of software developers will still be required, but for the best allocation of available resources required for training.

In any case, an audit of all available educational resources (both public and commercial) and all human capacity, with an analysis of the possibilities for their more effective use, would be useful. Without it, any planning for the training of specialists will be carried out almost blindly.

If we consider the current need for an additional number of employees required by software companies for one year, then it can be estimated more accurately than the total shortage for 10–15 years. Judging by the plans that companies announce regarding recruitment, on average they need an additional 15–20 % of the already existing staff of specialized professionals annually. That is the number they are ready to hire during the year.

Throughout the industry in 2020, this shortage is 28–38 thousand people. In fact, the companies in 2020 hired much less – about 20 thousand people. Consequently, the shortfall in the short

term is only about 10–20 thousand people in the software industry. Almost 4 times as many programmers work in the entire economy. However, this does not mean that the staff shortage for the entire software industry is 4 times greater. It can be assumed that the total annual unmet need for software developers is 25–40 thousand people. That is, such a number of specialists needed to be attracted additionally to meet the needs of the industry.

Possibilities for solving the personnel problem:

1. Russian universities

The higher education system can significantly increase the number of trained specialists if at least the same level is added to the existing 20–30 leading universities. Even the best universities still need to develop (according to some surveyed employers, not all departments provide equally high quality training).

For more information on the potential of personnel training at universities, see section 5.5. of this chapter.

2. Secondary special education system

Until recently, technical schools and colleges were not considered at all by employers in the software industry as a source of personnel, although the need for qualified middle-level specialists was very high. In secondary special education system, there is quite a mass training in IT specialties, but only system administrators for small enterprises that do not use complex information systems are obtained from them at best.

3. Migration

It is difficult to count on a large influx of personnel from abroad in the current

situation. Nevertheless, the possibilities of attracting foreigners and former compatriots to Russia need to be studied. Of course, if specialists are satisfied with everything abroad, then it will be difficult to convince them to change their place of residence. However, dissatisfaction with work and life in other countries is gradually growing. Perhaps not everyone knows what conditions for life and work are available in Russia. The most important vacancies in the management and organization of foreign sales can be filled with the help of foreigners from economically developed countries. There are already examples of this, although they are rather solitary. For more information, see section 5.3.

4. Training of girls

Software development was previously considered an exclusively male specialty. However, this view has been changing in recent years not only abroad, but also in Russia. With the involvement of girls in the development of software, one can partially neutralize the negative impact of the demographic pit in which Russia is due to the difficult economic situation in the 90s.

5. Staff retraining (postgraduate education)

Retraining of persons with higher education in specialties that do not belong to IT has the huge growth potential of IT personnel. Moreover, it should not necessarily be holders of diplomas in technical specialties who have good basic mathematical training. Biologists, doctors, chemists, linguists and many others are required. Their knowledge is needed in order to create specialized software for various industries and different purposes. What a biologist needs to know is better known by someone who has appropriate experience in this area. It is easier to

teach him/her programming than a programmer to master biology (although they sometimes have to do this). At the same time, heads of software companies are ready to take even specialists aged 50–60 years who have retrained.

6. People with disabilities

According to Gartner forecasts, the development of artificial intelligence, virtual and augmented reality technologies by 2023 will lead to a threefold increase in the number of employed people with disabilities. New technologies remove barriers that previously prevented the involvement of such employees in the workflow. According to experts, by hiring people with disabilities, the business will be able to solve the problem of qualified personnel shortage. On the other hand, in such companies, the retention rate is 89 % higher and staff productivity increases by 72 %, which leads to a 29 % increase in profit.

In Russia, no public messages were found about training programs for people with disabilities for the needs of the IT industry.

7. Automation of programming

There have been talks about replacing programmers with robots in some distant future for many years. However, until recently, it has not been considered as a real threat of job loss for software developers.

According to a survey conducted in the summer of 2020 by the SuperJob portal among representatives of the most common professions, programmers, architects and nurses were the least sure of the need to completely or partially change their jobs in the next 10 years. Nevertheless, 31 % of the respondents on the software development portal still see such a prospect.

In mid-June 2021, Gartner published a new report, according to which by 2024 80 % of technology products and services will be created by non-professionals. This trend is due to the emergence of a new category of buyers who do not belong to traditional IT enterprises, which usually occupy a large share of the entire IT market.

25-40
thousand people

the total annual unmet need
for software developers
(RUSOFT opinion)

.....

5.3. Migration of labor resources

Since the beginning of 2015, in connection with the events in Ukraine, an additional migration flow has appeared in Russia from the east of this country. In 2016–2017, the influx of personnel from Ukraine and from neighboring countries slightly decreased. In any case, the share of respondents reporting the admission of new employees who arrived from other countries decreased. At the same time, the outflow of programmers from Russia either did not change significantly or slightly increased. Judging by the fact that the increase in the number of staff

of the companies surveyed coincided with the number of university graduates hired, migration flows again leveled off: the number of specialists who leave and enter the country is the same. At the same time, there was an influx from countries with a high salary level, since some Russians go abroad with plans to return after the end of the signed contract.

According to the results of 2019, it was not possible to correctly assess migration flows due to the inability to conduct a

full-fledged survey of software companies in the spring of 2020.

In 2021, this survey was successful. It showed that during the previous year about 3 thousand specialists, who received invitations from software companies, entered Russia. The same mass departure abroad (to Western countries) was impossible due to tough restrictive measures. In addition, the United States temporarily suspended the issuance of work visas to IT specialists.

5.3.1. Departure abroad

In connection with the growth of staff outflows abroad in 2015, during the survey of 2016, questions were included in the questionnaire that allow you to determine the impact of migration flows on the software industry. As a result, it turned out that the migration of employees abroad was a problem for 14 % of surveyed companies, and then this share increased to 17–18

%. According to the results of 2019, the values are not indicative due to the features of the survey during the pandemic, and according to the results of 2020, the share was 27 %. However, it cannot be said that there has been such a large increase in the departure of programmers abroad, since the wording of the relevant question has changed. If before respondents simply indicated

the presence of a problem, then during the survey of 2021 they were able to choose its nature (“It is quite massive for our company” or “We lose specialists in individual cases, but these specialists are key ones”). It is presumed that, earlier at least half of the companies indicating the presence of the problem believed that its mention was justified only if the outflow of specialists abroad was quite massive.

5.3.2. Influx of personnel from abroad

Thanks to the question that appeared in the 2019 questionnaire about the share of new employees hired in 2018 and arrived from abroad, it became possible to calculate the number of programmers who entered Russia from abroad. As a result, the influx of foreign specialists hired by Russian software companies was estimated in 2016–2017 at 400–

500 people. It is possible that there were slightly more of them, as some respondents may not have complete information about hired employees in the companies in which they work.

According to the results of 2018, calculations showed that more software developers arrived in Russia from abroad

– about 600–700. Taking into account the fact that some of the specialists who arrived got a job in other sectors, the total influx is estimated at about 2–2.5 thousand people.

In 2015, 20 % of surveyed companies hired foreign software developers, in 2016 – 18 %, in 2017 – 14 %. However,

in 2016–2017, the absolute number of specialists who arrived from abroad did not change. In 2018, both the share of companies hiring foreign specialists (up to 21 %) and the number of these specialists increased. In 2019, the growth of these indicators continued (22 %). In

software companies, their total number was approximately 2,850 people.

It is possible that the accuracy of calculations has improved due to changes in the questionnaire: instead of two questions, one was introduced,

which allows respondents to give more accurate data. According to the results of 2020, the influx of personnel into the industry turned out to be about the same as a year earlier (about 3 thousand), but the share of companies that hired foreigners amounted to 16.2 %.

5.4. Labor compensation

During all the years of the RUSSOFT study, the average salary in the software industry increased if measured in rubles. During the crisis periods (2009–2010 and 2014–2015), the growth rate only decreased: from 10–20 % to 8–10 %. Software developers always had an increase in income, but during the crisis it could not cover the losses from inflation and decline in dollar terms due to the devaluation of the national currency.

At the same time, the average salary in the software industry has always grown relative to a similar indicator for the entire Russian economy. Only in 2017, for the first time, there was no obvious advantage of software developers in terms of growth rates. Most likely, the salary of programmers nevertheless increased slightly more (by 1–2 percentage points) than the national average in all sectors, but for the first time the difference was so insignificant.

However, in other industries, even nominal incomes of workers in the last 2–3 years have either not grown at all or decreased, and real ones have definitely decreased. In 2017, there was only partial

compensation for these losses, which software developers actually did not have.

In 2018–2019, the increase in the average salary of software developers and the increase in the nominal accrued wages of workers as a whole in the economy of the Russian Federation (the Rosstat data) completely equalized. According to RUSSOFT, salaries of specialized employees in the industry increased by 12.1 % in 2018 and by 5.8 % in 2019, and in the entire economy – by 11.6 % and 7.5 %, respectively (the official average salary in Russia in 2019 was 47.5 thousand rubles). There are discrepancies, but they are insignificant given the available calculation error.

According to the results of 2020, the average salary of software developers increased by 11.1 % in ruble terms and slightly decreased in dollar terms (by 0.4 %).

At the same time, the average nominal salary in Russia in all sectors according to the results of 2020 amounted to 51.083 rubles, which is 6 % more than a year

earlier (the Rosstat data). Consequently, developer salaries have risen more again.

In the case of software developers, the Russian labor market is just a part of the world one. Therefore, programmers not without reason often focus on measuring the value of their income in dollars. If we consider the dynamics in average salary in dollar terms, then for Russian software developers it increased in 2017 by about 24 % (largely due to the strengthening of the ruble). However, in 2018, due to the national currency depreciation, the dollar average salary increased by only 4 %. The growth of 2019 in dollar terms turned out to be insignificant – by 3.2 %, and in 2020 there was a slight drop (by 0.4 %). Thus, the average salary of software developers in dollar terms has not yet reached the pre-crisis level of 2013 (it is 15.9 % lower). At the same time, in Western countries, the salaries of programmers over the years have increased significantly.

Change of average salary for Russian software companies surveyed by RUSSOFT in 2014–2019

Years	2014	2015	2016	2017	2018	2019	2020	Total for 7 years (from 2013 to 2020)
In ruble terms, %	+11.6	+8	+10	+7.7	+12.1	+5.8	+11.1	+88
In dollar terms, %	-6	-32.5	0	+24	+4	+3.2	-0.4	-15.9

The average salary in the software industry in Russia by the beginning of 2017 reached 82–84 thousand rubles, by the beginning of 2018 it amounted

to about 90 thousand rubles, by the beginning of 2019, most likely, exceeded 100 thousand rubles. With an increase of 6 % during the year by the beginning of

2020, it amounted to about 106 thousand rubles, and by the beginning of 2021 increased to 119 thousand rubles.

5.5. Staff training. Universities

University education, with all its shortcomings, is the basis for the software industry in Russia. In cities where there are good universities, a large number of software companies successfully operating in the world market appear.

With all other available sources of personnel, universities will be their main supplier to enterprises developing software in the foreseeable future. Therefore, the task is to increase the number of students studying in IT specialties, and to develop cooperation

in personnel training between companies and leading departments of universities.

5.5.1. Major challenges and changes in the education system

In the field of training for the software industry of Russia, changes do not occur, as a rule, since the education system is by definition conservative. It is possible to draw conclusions about changes in it, considering a period of at least 5 years. If we expand it to 10–15 years, we can confidently talk about improvement in the higher education system in terms of

financing. Higher educational institutions (faculties of classical universities), which train specialists for the software industry, over the years have got an opportunity to develop.

With a lack of money in the entire education system, some universities have such low performance that the question

may be whether their budget funding should continue. The low efficiency of such universities is evidenced by the very low percentage of their graduates who found work in their field.

In the field of software development, there is no unemployment problem when looking at the labor market of all

of Russia, and not some individual cities. Therefore, any well-grounded graduate will find a job without problems if desired. Sometimes this requires moving to another city, which is not a serious obstacle for young people. In addition, you can work remotely from any city in Russia.

Some employers believe that among university graduates of their city, no more than 5 % graduates (at best 10–15 %) are ready to work in the company. Up to half of recent students can be recruited if they continue their training, without counting on any return from them in the first months after the formal start of their work. At the same time, 50 % of employees potentially suitable for work are the average for all universities. Since it exceeds 70 % in leading universities, others can have it much lower than 50 %. We can confidently say that in some universities the allocation of budget funds for the education of the vast majority of students has almost zero return.

Unfortunately, there is no mechanism and tool for adequate assessing the quality of work of higher educational institutions in Russia yet, which is recognized even by the heads of leading universities themselves. Most likely, this applies not only to the training of specialists for the software industry, but also to the entire economy of the country. For more information on the problem of assessing the quality of work of universities, see corresponding section 5.5.3.

Basic training in universities is good, since fundamental physical and mathematical education remains at a very high level. The basics of programming are also well studied. However, university students are not taught at all about industrial programming, which involves working

in a team, product managers are not trained, soft-skills are not imparted.

In the labor market of Russia, there is a clear shortage of specialists with business competencies and work experience in international markets: managers, marketers, sellers, entrepreneurs, etc.

The Bologna system, which led to the division of the higher education process into Bachelor's and Master's degrees, has also been criticized. Four years of the Bachelor's degree program may not be enough to train a specialist who meets business requirements.

In the system of higher education (and not only higher education), serious changes are coming, judging by the decisions of the Government of the Russian Federation from the end of 2020.

Russian Prime Minister Mikhail Mishustin launched the implementation of a digital educational environment in Russia. He signed the corresponding decree in December 2020. According to the document, the Ministry of Education had to develop and approve the procedure for selecting Russian regions for conducting the experiment within 10 days from the date of its entry into force, as well as to approve the roadmap for conducting the experiment within one month, in agreement with the Ministry of Digital Industry. It is assumed that the experiment itself on the introduction of a digital educational environment will last two years, starting from December 10, 2020.

In May 2021, Deputy Prime Minister Dmitry Chernyshenko announced the creation of a consortium of educational organizations by the Ministry of Digital Industry of Russia together with the Innopolis University (Tatarstan). The consortium should allow to unify and standardize the main approaches

to training personnel for the digital economy, as well as to form educational modules on digital competencies for teachers and students. Thus, government priorities aimed at supporting and developing the IT industry will be taken into account in the country's educational programs.

In June 2021, the start of competitive selection for participation in the Priority 2030 state support program for Russian universities was announced. The goal of the Priority 2030 program is to form a wide group of universities that will become leaders in creating new scientific knowledge, technologies and developments for introduction into the Russian economy and social sphere.

5.5.2. Number of IT graduates

According to APKIT, in 2019 there were 50 thousand budget places for future IT specialists in Russian universities. During a speech in July 2020 in the State Duma, the Prime Minister of the Russian Federation Mikhail Mishustin said that in 2020 the number of budget places in IT specialties increased by 20 % compared to 2019, and by 2024 it would increase by 2.5 times.

In September 2020, Deputy Prime Minister Dmitry Chernyshenko said that Russia needed 150 thousand IT

specialists additionally, and by 2024 the need for such personnel would increase to 300 thousand people. According to him, three years ago the number of budget places where they studied at institutes in IT specialties was about 40 thousand, today it is already 80 thousand, and by 2024 there will be 120 thousand students.

In Moscow in 2020, the number of freshmen who chose training in IT specialties increased by 8 % compared to the previous year and reached 26

thousand people. The greatest increase in popularity is noted in the specialties of information security, information systems and technologies, software engineering and applied informatics. In total, 100 thousand students are studying in Moscow universities in the field of information and communication technologies this academic year in Bachelor and Specialist programs (data from the Moscow Department of Information Technology obtained during a study of IT/telecom specialists' market).

5.5.3. Assessment of work performance of universities

Despite the shortage of IT personnel (in particular, software developers), the main thing is not so much the number of young people with a higher education diploma with a corresponding specialization, but the quality of their training. We can speak about a sufficient or insufficient number of graduates only if they have certain knowledge and skills that make recent students sought by Russian companies (especially Russian software exporters).

In this regard, the question arises of assessing the performance of universities in terms of training IT specialists (programmers). If we consider Russian software developers as a whole, then there are quite objective indicators of the highest level of their preparation. They are one of the best if not the best ones. This is evidenced by the victories of Russian students at various programming competitions, and the work of hundreds of thousands of Russian university graduates abroad (while they occupy high positions in the largest companies in the world).

To evaluate the work of universities, there are different ratings, but they allow only with certain assumptions to compare universities, which, as a rule, are advanced. The rating of universities compiled by RUSSOFT gives an assessment to the leading universities of Russia according to software companies, which simultaneously assess the number of graduates of the necessary specialization, and the quality of their training. The corresponding ranking allows you to determine quite precisely the top ten universities (although it is possible that some university which takes from the 11th to 15th place also deserves to be in the TOP-10). With less accuracy, universities are ranked from the 15th to 30th place.

5.6. Rating of Russian universities for training of IT specialists according to RUSSOFT

RUSSOFT, being an association of software developers, compiles its rating of universities based on a survey of heads of Russian software companies. It is they who can give the most objective assessments of how effectively educational institutions perform their functions. However, only training of specialists in the field of software development is a case in point.

In addition, one has to make an allowance for the fact that not all cities have appropriate representation among the survey participants, for some of them the sample is too small. Consequently, universities in those regions whose companies are not very actively involved in the study are presumably underestimated. In RUSSOFT, there is information about which cities the software development gives the total revenue calculated in billions of rubles (the Association prepares an annual rating of the regions by the level of development of the software industry in them). If some subordinate entity of the federation is quite high in this rating, and the universities functioning in it do not occupy those places that would correspond to the region position, then this will be an excuse to assume the existing underestimation of these universities.

For example, so far it has not been possible to cover a large number of companies in Yekaterinburg and Nizhny Novgorod with an annual study. Therefore, the universities of these cities received not so many votes, although for all the indicators they should be higher in the RUSSOFT Rating.

There are a lot of development centers for foreign and nonresident companies in Voronezh, and they

almost never participate in surveys. Therefore, Voronezh universities are also undervalued. In Vologda and Yakutsk, there are large software companies that develop computer games. Apparently, they take almost all good specialists from local universities. Therefore, there is only one employer who is able to give an objective assessment both in the Vologda Region and in Yakutia. However, these companies have never participated in the survey. As a result, the universities of Vologda and Yakutsk did not even get into the expanded RUSSOFT rating, in which there are more than 100 universities, although they probably deserve to be among the 50 best (it is possible that even among 40 or 30).

At the same time, with a new methodology for compiling university rankings, which has been applied by RUSSOFT since 2020, the need for adjustment is assumed in only a few cases. Then they relate to those universities that do not fall into the top 15.

Previously, the problem of small representation of some regions among the participants in the study was solved by the fact that the survey results were combined over several years. So the rating was based on surveys of 2016–2019. Respondents indicated those universities whose graduates, in their opinion, are in the greatest demand in the industry.

In 2020, RUSSOFT decided to reduce the dependence of the university place in the Rating on how many companies of a city take part in the survey by introducing a 3-point assessment system. The innovation justified itself, but the 2020 survey itself turned out to be inferior due to the pandemic: only 72 companies took

part in it, which is clearly not enough to evaluate the entire Russian education system in terms of training software developers. It was possible to talk only about an adequate assessment of the universities of two Russian capitals, as well as to some extent of the Rostov region and Novosibirsk.

Nevertheless, the results of the 2020 survey provided new interesting information. The peculiarity of this survey was that 10 companies rated universities not only in those cities in which their head office was located (before, with more respondents, there were no more than 3–4 of them). In total, 75 educational institutions received assessments (one of them is a college, and the rest are universities). Many respondents mentioned 5 or more universities.

In 2021, there were many times more survey participants than in 2020. In total, questionnaires were received from 232 enterprises, including 26 IT companies that have software development, but this direction is not their main one. The data of these 26 companies were not used to calculate the main indicators of the software industry in Russia. Nevertheless, their assessment of universities can well be taken into account when compiling a rating of universities.

Since almost a third of the companies surveyed do not answer the corresponding question (it is difficult for small companies to evaluate the work of universities, since they do not carry out mass recruitment of specialists, and often do not expand the staff at all), in 2021 the rating was based on the estimates of 162 companies. There was no such a large base for compiling the ranking of universities for the entire time of the

annual RUSOFT study. Previously, at best a little more than 100 companies (no more than 120) assessed universities.

24 companies (15 % of all surveyed companies that answered the corresponding question) rated universities in another region in relation to the location of their head office. Most often, these companies have remote development centers, which include the recruitment of graduates of local universities.

In total, 125 educational institutions were mentioned by respondents. Among them, 113 are Russian higher educational institutions. In 2021, 5 secondary

educational institutions: colleges and technical schools were assessed. Another 6 mentioned universities are not Russian, but Belarusian.

In the ranking, universities represent 35 regions of Russia. Most of the universities that train software developers are in Moscow (16), the second and third places are naturally St. Petersburg (12) and Novosibirsk (8). Next is the Rostov region (7), the Samara region with universities in Samara and Togliatti (6), Tatarstan (6). There are 5 universities in Bryansk and Nizhny Novgorod, 4 in Izhevsk (Udmurtia), Tomsk and Yaroslavl, 3 in Penza, Saratov, Ufa (Bashkiria), 2 in Vladivostok, Yekaterinburg, Yoshkar-

Ola (Mari El), Krasnodar, Krasnoyarsk, the Crimea, Omsk, Perm, Ryazan, Tver, Ulyanovsk, Chelyabinsk; and Barnaul (Altai Territory), Vladimir, Voronezh, Irkutsk, Kirov, Kostroma, Kursk, Saransk (Mordovia), Tyumen each have one such university.

In 2020, the survey could not be conducted fully, so the results were different. They should not be mentioned, although the leadership of St. Petersburg State University cannot be considered completely undeserved and accidental.

In comparison with the rating based on surveys in 2016–2019, then there are no huge differences.

Rating of educational institutions that train software development specialists according to the amount of points given by the surveyed software companies

Place in 2021	Place in 2019		
1	1	Moscow State Technical University named after Bauman	90
2	2	St. Petersburg National Research University of Information Technology, Mechanics and Optics	87
3	4	St. Petersburg State University	73
4	6	Moscow Institute of Physics and Technology	68
5-6	3	Moscow State University	66
5-6	5	St. Petersburg State Polytechnic University	66
7	13	Moscow Engineering Physics Institute	52
8-9	7	Novosibirsk State University	42
8-9	11	Novosibirsk State Technical University (NSTU)	42
10	14	Southern Federal University	40
11	9-10	St. Petersburg State Electrotechnical University	39

Place in 2021	Place in 2019		
12	17	Higher School of Economics	31
13	8	Tomsk State University of Control Systems and Radio Electronics	26
14-15	9-10	Tomsk Polytechnic University	22
14-15	15	St. Petersburg State University of Aerospace Instrumentation Engineering	22
16	32-34	Moscow Aviation Institute (MAI)	19
17	26-29	Nizhny Novgorod State University named after N.I. Lobachevsky (NNSU)	18
18-19	12	Tomsk State University	17
18-19	21-22	Nizhny Novgorod State Technical University (NNSTU)	17
20	18-20	St. Petersburg State University of Telecommunications named after Prof. M.A. Bonch-Bruевич	16
21	23-25	Kazan Federal University	15
22	>43	Samara National Research University named after Academician S.P. Korolev	14
23	30-31	Siberian State University of Telecommunications and Informatics	13
24-25	18-20	Don State Technical University	12
24-25	>43	Samara State Technical University	12
26	>43	Bryansk State Technical University	11
27-28	>43	Moscow Technical University of Communications and Informatics	10
27-28	>43	Volga State University of Telecommunications and Informatics (Samara)	10
29	>43	Perm National Research Polytechnic University	9
30-33	26-29	Voronezh State University	8
30-33	26-29	Moscow Technological University (MIREA, MGUPI, MITHT)	8
30-33	>43	Ural Federal University named after the first President of Russia B.N. Yeltsin (UrFU)	8
30-33	>43	South Russian State Polytechnic University named after M.I. Platov (Novocherkassk, NPI)	8
34-37	>43	National Research University of Technology MISiS	7
34-37	>43	Siberian State University of Geosystems and Technologies (Novosibirsk)	7

Place in 2021	Place in 2019		
34-37	>43	Ufa State Aviation Technical University (UGATU)	7
34-37	>43	Udmurt State University UDSU	7
38-45	18-20	Kazan National Research Technical University named after A.N. Tupolev (KAI)	6
38-45	30-31	Omsk State University named after F.M. Dostoevsky (Omsk State University)	6
38-45	35-43	Saratov State University named after N.G. Chernyshevsky	6
38-45	35-43	Saratov State Technical University named after Yu.A. Gagarin	6
38-45	>43	Innopolis University	6
38-45	35-43	Ryazan State Radio Engineering University named after V.F. Utkin	6
38-45	>43	Rostov-on-Don College of Communications and Informatics (RCSI)	6
38-45	>43	Yaroslavl State University named after P.G. Demidov (JarSU)	6
46-50	>43	Kazan National Research Technological University (KNRTU)	5
46-50	>43	Russian Technological University (MIREA), Moscow (merged with MGUPI)	5
46-50	>43	Moscow Power Engineering Institute	5
46-50	>43	Novosibirsk State University of Economics and Management (NSUEU, Narkhoz)	5
46-50	>43	Tver State University	5

In principle, it is possible to build one general rating of educational institutions by the average score, but there are doubts that the ranking will reflect the actual quality of training of specialists. There would be no problem if each university estimated the same number of employers. At the same time, it is desirable that everyone has a single scale for assessment. This is not yet possible. Comparing the average scores of universities that have only 1–3 grades with universities that were rated by more than 20 employers is incorrect.

Even setting one level on the number of grades to be included in a single rating on the average point is not a solution to the problem, because it is impossible to determine a place for this level, so as not to discriminate against some universities. For example, if you set the level at 10 grades, then Novosibirsk State University will be in the first place, and Tomsk State University of Control Systems and Radio Electronics and Southern Federal University will be without a place at all. If you lower the level to 8, then they will take the

2nd and 3rd place. If you raise the level to 20 grades, then Novosibirsk State University will not fall into such a rating.

If you take into account universities without these restrictions, then 38 universities will be in the first place with an average point of “3”. Of these, only 5 will have at least 3 grades (the remaining will have one or two): Novosibirsk State University (14 grades and one mention without assessment), Nizhny Novgorod State University named after N.I. Lobachevsky (6), Kazan (Volga) Federal

University (5), Samara State Technical University (4) and Perm National Research Polytechnic University (3). The undisputed leader is Novosibirsk State University. However, it is completely unclear what its average point would have been if it had been evaluated by

25–36 employers, as in the case of a number of Moscow and St. Petersburg universities. That is, 2 times more.

In such a situation, it is necessary to make not just one ranking, but a minimum 2 of them: with cut-off

according to 8 grades and cut-off according to 20 grades. In fact, it turns out that universities are divided into metropolitan (Moscow and St. Petersburg) and regional.

TOP-10 Russian universities according to the average point obtained from the results of assessments of at least 8 employers

Place in 2021	Name of the university	Average point	Number of mentions
1	Novosibirsk State University	3	15
2	Tomsk State University of Control Systems and Radio Electronics	2.889	10
3	Southern Federal University	2.857	15
4	Higher School of Economics	2.818	11
5	St. Petersburg State University	2.808	26
6	St. Petersburg National Research University of Information Technology, Mechanics and Optics	2.806	31
7	St. Petersburg State Polytechnic University	2.750	24
8	Tomsk Polytechnic University	2.750	9
9	Moscow Engineering Physics Institute	2.737	21
10	Moscow State Technical University named after Bauman	2.727	36

In the TOP-10 based on the average point, with at least 8 grades, the first three positions are occupied by universities in Novosibirsk, Tomsk and Rostov-on-Don. There are reasons to consider them the best universities in terms of the quality of training specialists in the field of software development outside Moscow and St. Petersburg. At the same time, the leadership of NSU is clear and does not cause any doubts.

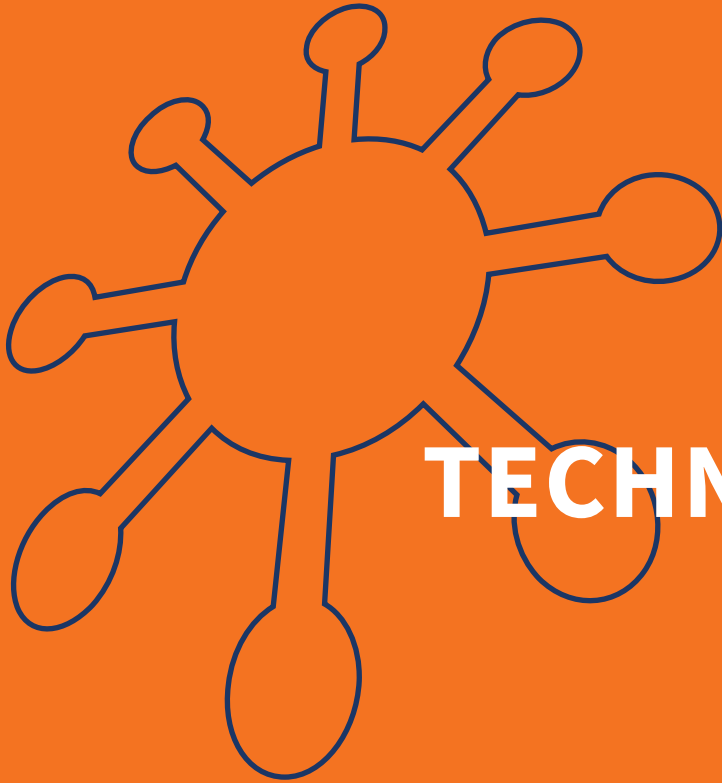
If you set the level of 20 grades, then only 4 Moscow and 3 St. Petersburg universities will remain in the ranking. There is simply no such number of companies surveyed from other subordinate entities of the federation. With the quantitative advantage of Moscow, St. Petersburg universities occupy the first three places. St. Petersburg State University had an equally high average point in 2020.

Therefore, its leadership is not accidental. However, the gap between the first place and the 7th, which Moscow State University occupies, is not so significant as to talk about a completely different level of specialists' training. All the 7 universities that are included in this rating have a very high rating.

TOP-7 Russian universities according to the average point obtained from the results of assessments of at least 20 employers

Place	Name of the university	Average point	Number of mentions
1	St. Petersburg State University	2.808	26
2	St. Petersburg National Research University of Information Technology, Mechanics and Optics	2.806	31
3	St. Petersburg State Polytechnic University	2.750	24
4	Moscow Engineering Physics Institute	2.737	21
5	Moscow State Technical University named after Bauman	2.727	36
6	Moscow Institute of Physics and Technology	2.720	28
7	Moscow State University	2.640	28

Thus, it is more reasonable to refrain from determining one of the best universities in the country in terms of the quality of student training. Among regional universities, this is Novosibirsk State University, and among the universities of two capitals – St. Petersburg State University. It can be assumed that they are at about the same level, and the advantage of one of them cannot be unambiguously determined.



TECHNOLOGIES

6



TOP 5 AI-TRENDS AFFECTING DIGITALIZATION STRATEGY FOR BUSINESS AND GOVERNMENT

Dmitriy Dyrmovski
CEO of Speech
Technology Center



The impact of the pandemic is driving increased investment in digitalization and the use of AI. As a leading company, Speech Technology Center sees a significant increase in demand for Russian-developed AI solutions focused on such areas as computer vision, speech recognition and public safety. Over the past three years, our export revenue have grown fivefold, largely due to increased demand for large-scale projects. With one of the largest R&D teams in the industry and more than 30 years of experience, Speech Technology Center recognized in 2020 as a winner of the CHiME Speech Separation and Recognition Challenge (CHiME-6) proving the leadership of Russian based AI technologies. Based on such experience here are top-5 AI trends for 2022:

- **AI digital independence**

The countries of APAC, LATAM, Middle East and Africa taking a closer look at the possibility of creating their own private AI platforms based on Russian solutions to reduce the risk of anchoring to the foreign cloud solutions and achieve national digital sovereignty.

- **AI-enabled enterprise employee experience**

In the era of social distancing and remote work, digital communication

is reaching a completely new level. This is driving interest in using AI in a form of enterprise assistant for overburdened departments that are struggling to hire people. Combined with communication tools and task planning, AI could help automate routine tasks to free up teams.

- **AI inclusivity**

The availability of digital services to users opens up a demand for the implementation of AI with “inclusiveness”, when the service is convenient for all segments of the population and ages. As an example, we see the creation of AI-based voice assistants/chatbots as a single window of access to the public services that designed previously in traditional forms of mobile applications or web portals.

- **AI voicetech enhancing human behavior and communication**

The trend is in the transition from communication with a speech recognition system (chat bot, voice robot) to solutions that analyze live communication between people, helps to increase efficiency (assistant) and ensure safety not only for the telephone communication channel, but also in real face-to-face interactions.

- **AI development focus and ROI expectations is changing**

Basic AI technologies are becoming “commodities” – available to startups and corporations. The innovative R&D focus is where the threshold of applicability only crossed for solving real business cases: speech recognition for phone calls is a common task, but for live communications in a front office desk is extremely difficult. AI development automation through Automated Machine Learning significantly improve simple cases resolution without involving researchers. AutoML is a major driver for future AI projects rapid growth. At the same time on a business side the focus for innovation shifted from technological breakthroughs to the tangible results of AI implementation. C-level tired of spending budgets on a low probability of success projects and rather focused on the niche use of AI but with the rapid results.

6.1. Technologies used

During the survey as part of the annual RUSOFT study in 2020, the question regarding the popularity of operating systems (OS), DBMSs and programming languages among developers was changed. Instead of simply mentioning technologies, respondents were asked to estimate what proportion (in terms of time spent on developing appropriate solutions and applications) is accounted for by each technology used. As a result, it became possible to have a more objective picture, since before, when assessing the popularity of software, both a small company with 5 developers and a large one, which employs thousands of specialists, had one vote.

At the same time, it must be admitted that the change in the popularity of OS, DBMSs and programming languages could well be tracked in previous years, albeit with less accuracy.

Due to the much larger number of respondents in the survey in 2021 (in 2020, the survey did not turn out to be complete due to the pandemic), it gave more accurate data, both in terms of the number of mentions and the intensity of programming for different OS and DBMSs, as well as the intensity of using programming languages. At the same time, with a significantly larger number of respondents, the share of small software companies participating in the survey

increased, and they indicate, on average, much fewer operating systems, DBMSs and programming languages than large enterprises. Accordingly, the average rate of their mention also decreased. Thus, it cannot be concluded that most operating systems, DBMSs and programming languages have become less popular in 2021 than in 2020. However, taking this into account, various comparisons can be made. For example, one can compare the data obtained as a result of surveys in 2019 and 2018, when there was a more similar structure of the array of surveyed companies.

6.1.1. Operating systems

With regard to the popularity of operating systems among software developers, with all the random fluctuations over the past 14 years, several clear trends can be traced. First, the frequency of mentions of MS Windows has decreased from 94–97 % first to 84–88 %, and in the last 2 years – to 74–79 %. The days when almost all the developers interviewed created solutions for Windows seem to be a thing of the past forever.

In 2020, the GNU Linux family even took the lead, slightly overtaking Windows. The growth in the number of mentions of Linux is quite consistent with the

trend that was identified in previous years. There was some doubt about the sharp drop in the popularity of Windows. The survey in 2020 turned out to be incomplete due to the insufficient number of companies participating in it. Therefore, it was not worth rushing to announce the obvious leadership of GNU Linux.

In 2021, Windows again took the first place in terms of the number of mentions of the operating system, with quite a decent lead over the GNU Linux family. However, if you add related UNIX-like systems (Android and Tizen) to GNU

Linux, then the share of companies that mentioned at least one system from this group will be 82 %. This indicator turned out to be higher than that of Windows, even if we add MS Windows Mobile and MS Windows Phone to it, which no one mentioned separately from Windows. Due to the fact that the 2021 survey was conducted with an increased number of respondents and gave quite reliable results, it can be said more definitely about the superiority of the GNU Linux family over the Windows family in terms of popularity among software developers.

TOP-10 used operating systems, %

	OS name / Year of survey	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
1	MS Windows	97 %	94 %	93 %	96 %	94 %	88 %	92 %	87 %	93 %	84 %	89 %	88 %	74 %	79 %
2	GNU Linux family	64 %	54 %	54 %	59 %	60 %	65 %	51 %	59 %	60 %	57 %	59 %	72 %	76 %	67 %
3	Android	—	—	6 %	4 %	37 %	33 %	43 %	36 %	43 %	39 %	53 %	58 %	60 %	49 %
4	iOS	—	—	—	—	28 %	24 %	34 %	29 %	35 %	36 %	49 %	49 %	50 %	41 %
5	Mac OS	26 %	9 %	15 %	19 %	32 %	31 %	33 %	32 %	33 %	37 %	48 %	48 %	31 %	20 %
6	Open/Free/ NetBSD	25 %	7 %	9 %	9 %	13 %	10 %	14 %	13 %	11 %	11 %	19 %	22 %	8 %	7 %
7	MS Windows Mobile	41 %	17 %	16 %	15 %	23 %	17 %	15 %	23 %	19 %	20 %	14 %	18 %	2 %	1 %
8	Oracle (Sun) Solaris	26 %	16 %	15 %	19 %	19 %	14 %	15 %	11 %	16 %	7 %	13 %	13 %	3 %	3 %
9	MS Windows Phone	—	—	—	—	19 %	19 %	22 %	23 %	21 %	15 %	12 %	13 %	2 %	1 %
10	Tizen	—	—	—	—	—	—	—	—	4 %	7 %	5 %	8 %	6 %	2 %

According to the results of the 2021 survey, the MS Windows operating system also lost its sole leadership in terms of the share of time spent on developing solutions and applications: UNIX-like systems with open source (GNU Linux, Android and Tizen) and

the Windows family (with MS Windows Mobile and MS Windows Phone) have the same indicator of 43 % each. However, some UNIX-like systems fell into the “Others” category (first of all, Aurora together with Sailfish), and the share was not calculated separately for them.

Consequently, the Windows family, at least by a meager amount, is still inferior in terms of the intensity of developing solutions for the OS. In addition, there is also the proprietary UNIX-like system Oracle Solaris with a 0.1 % rate.

Taking a leading position by UNIX-like operating systems was predicted by RUSSOFT analysts in 2022–2023, but this happened a little earlier. It is possible that Windows will regain its leadership for a year (maximum for two), but more likely there will be a further decline in the popularity of this OS. At the same time, there are prerequisites for accelerating this process. The coming years will test whether Windows can hold its ground without having an artificially created monopoly position.

Of course, users are very reluctant to switch to other operating systems instead of the one they are used to. However, the motivation for software developers to remain committed to MS Windows and its MS Office application is getting smaller and smaller every year. Moreover, Microsoft has shown itself to be an unreliable supplier in Russia, having submitted to the US sanctions policy.

OS for mobile devices from Microsoft: MS Windows Mobile and MS Windows Phone already have almost zero indicators. They have failed to gain any popularity in the competitive environment. In 2022, these operating systems will be removed from the core ones, and Aurora will be added instead (along with Sailfish, on the basis of which it was created).

According to the results of the 2021 survey, Aurora OS was mentioned more often than MS Windows Mobile and MS Windows Phone, although it was not included in the list of the main ones in the questionnaire. It was indicated by 2 % of the surveyed companies in the “Other OS” category.

Tizen OS for mobile devices, unlike Sailfish (Aurora), was not included in the Domestic Software Registry (there is only Smart TV Tizen). In the spring of 2018, the state corporation Rostelecom proposed to the Russian government to oblige officials to use smartphones based on the domestic OS Sailfish. Experts

Share of major operating systems by time spent on developing solutions and applications for them

	2019	2020
MS Windows	42.5 %	42.9 %
Linux Family	30.0 %	32.5 %
Android	7.8 %	9.9 %
iOS	6.8 %	7.7 %
Mac OS	8.9 %	4.1 %
Open/Free/NetBSD	3.9 %	1.1 %
MS Windows Mobile	0.0 %	0.1 %
MS Windows Phone	0.0 %	0.0 %
Oracle Solaris	0.0 %	0.1 %
Tizen	0.2 %	0.5 %

doubted that in this way it was possible to achieve the massive use of the Sailfish OS, since devices with this system would have limited functionality. In addition, civil servants tend to use their own smartphones, on which they install the applications they need to work.

At the beginning of 2019, Sailfish received the Russian-language name Aurora. Promotion under the new name has become more active.

Also in June 2019, it became known that the Russian corporate messenger PostLink became the first Russian corporate software with the implementation of voice calls for the Aurora mobile OS. In the same 2019, there was the first mention of this OS in the annual RUSSOFT survey.

In November 2019, it became known that Russian Railways was ready to introduce the Russian mobile OS Aurora

among its employees. The corresponding agreement was signed between Russian Railways, the Open Mobile Platform company and Industry Center for the Development and Implementation of Information Systems, a subsidiary of Russian Railways. It is aimed at implementing pilot projects for the implementation of hardware solutions for specialized mobile devices of Russian Railways employees based on a domestic mobile operating system.

Another contender for exclusion from the main operating systems is Oracle Solaris. It was mentioned by 3 % of the surveyed companies, although only 2 years ago they were 13 %, and in 2008 – 26 %. However, the intensity of development for it is already almost zero. Oracle carried out large-scale dismissal of Solaris developers a few years ago. Although the full cessation of development and support for this OS was not announced, its resurrection is already unlikely.

The data of the RUSSOFT survey can be compared with the world statistics of the OS popularity. According to NetMarketShare data, back in January 2020, Windows held the lead in all devices and until November of the same year was approximately on par with Android. Then it began to lag behind sharply. In July 2021, the gap became quite decent: Android was used by 41.44 % of users, while Windows was used by 30.27 %. At the same time, the indicator was growing for Android in previous months, while for Windows it was decreasing.

If we consider NetMarketShare statistics only for desktop computers, then nothing threatens Windows leadership yet, but the share of this OS nevertheless declined rapidly (from July 2020 to July 2021 from 77.74 % to 72.97 %), while the share of Linux increased (from 1.85 % to 2.38 %). Mac OS X also declined from 17.07 % to 15.4 %.

Due to the fact that Google, under pressure from the US authorities, made its Android operating system an instrument of political pressure (new smartphones of the Chinese company Huawei may not have updates to this OS, as well as related services from Google), in 2020 doubts arose about further growth of Android popularity. There are incentives to more actively create alternative operating systems with full functionality. They have already appeared in China, Russia and other countries, but in Russia the transition to them did not occur very quickly.

In mid-January 2020, it became known that Huawei is starting to pay developers to create applications for the company's operating system, Harmony OS. Thus, the Chinese manufacturer is accelerating the development of its own ecosystem in order to reduce and completely eliminate its dependence on Google services.

The data of the RUSSOFT survey have not yet shown the negative influence of

political games on the growth of Android popularity.

Among other operating systems (not included in the TOP-10), respondents mentioned in recent years mainly real-time operating systems, for example, QNX, VxWorks, ThreadX, MQX, Contiki, LynxOS, RTOS. Moreover, as a rule, they mentioned them only once. Until 2016, the number of mentions of real-time operating systems grew from year to year, which was consistent with global trends. According to the survey results of the last 5 years, such growth has not been observed, however, 3–5 % of the companies consistently indicate their use of such systems.

In 2019, MSVS (Mobile System of the Armed Forces) and Elbrus also appeared, but they were also mentioned only once. In addition, WebOS (an embedded open operating system based on the Linux kernel for smart TV) has two mentions.

In 2021, 9 respondents (4 %) indicated development not for a specific OS, but for browsers, or reported that they have cross-platform solutions. Obviously, more of them have appeared. When it comes to a specific OS, then Aurora (Sailfish) has 4 mentions (2 %), and the rest have no more than one (real-time OS RTOS, QNX, as well as OS for set-top boxes: tvOS, webOS, RokuOS).

The range of operating systems that have both a large number of mentions and only one mention has clearly narrowed in recent years.

In recent years, plans have been reported for the development of new operating systems in Russia. In March 2019, Kaspersky announced that it was creating its own OS with an advanced security system. It appeared at the end of 2019 in two versions: for the corporate segment, including government agencies, and for ordinary users. As reported on the company's website,

KasperskyOS allows you to create cyberimmune solutions that are resistant to most types of cyberattacks. This is especially important for industries and solutions with increased information security requirements. The company invites developers to create solutions for KasperskyOS, but there has not been a single mention of this OS in the annual survey of software companies conducted by RUSSOFT.

The plans to develop a national operating system for the Internet of Things became known in the fall of 2017 from a document prepared by a working group led by Sberbank as part of the cybersecurity action plan for 2017–2024 under the Digital Economy program. It is assumed that it will surpass foreign counterparts in key performance parameters, security and fault tolerance, and it can be used in all types of cyber-physical systems. However, the development of this system should be completed only by the end of 2021.

If we compare the popularity of OS for different categories of companies, then it can be noted that solutions for mobile operating systems are more often developed by the companies that have more than 50 % of their income from exports, as well as the companies whose headquarters are located outside Moscow and St. Petersburg. Development for MS Windows and GNU Linux family is more required by the companies that receive the main income in the domestic market.

The intensity of development of solutions for operating systems by companies with different shares of exports in total revenue and different locations of the headquarters, %

	MS Windows	Mac OS	GNU Linux family	Open/Free/NetBSD	Oracle Solaris	iOS	Android	Tizen
Export share								
export less than 50 %	48.8 %	1.7 %	34.8 %	1.5 %	0.1 %	5.1 %	6.1 %	0.6 %
export over 50 %	36.4 %	7.9 %	27.0 %	0.5 %	0.2 %	11.3 %	15.3 %	0.3 %
Head office location								
Moscow	36.7 %	3.5 %	47.7 %	2.1 %	0.0 %	4.6 %	5.0 %	0.0 %
St. Petersburg	58.4 %	1.4 %	25.9 %	0.9 %	0.1 %	5.9 %	6.9 %	0.4 %
Other regions	40.0 %	5.6 %	25.7 %	0.6 %	0.2 %	10.6 %	14.4 %	1.0 %

6.1.2. DBMS

The frequency of mentioning almost all main database management systems (DBMS) included in the table changed insignificantly from year to year (as well as their ranking by this indicator) until 2020. Random fluctuations of this indicator for each DBMS were not very large, but they still had a place. The only exceptional thing was the steady growth in the share of the free object-relational database management system PostgreSQL.

In 2020, the range of DBMSs mentioned by at least 5 % of respondents sharply reduced. There are only 10 of them left, and in previous years there were about 15. Since not a large number of companies participated in the survey in the pandemic year, verification of the results was required. The 2021 survey confirmed the version according to which the number of popular DBMSs among developers has decreased: 5 % and more

have only 7 systems: PostgreSQL, MySQL, MS SQL, Oracle, SQLite, Firebird and MongoDB. At the same time, all of these most popular DBMS (except PostgreSQL) recorded a significant reduction in the mention rate (% of all surveyed companies). And if you do not take into account the data of the defective survey of 2020, and compare with the results of the survey of 2019, then this indicator increased only for MongoDB and PostgreSQL.

For many years, the three most popular among DBMS developers: MS SQL, MySQL and Oracle have remained unchanged. They only occasionally changed places. In 2018, the composition of the top three changed for the first time: PostgreSQL made its way into it, pushing Oracle to the 4th place. Over the past 2 years, PostgreSQL has confidently ranked first, both in the number of mentions and in

the intensity of solution development for DBMS (more on that below).

It is noteworthy that MS SQL, which has been leading for many years, first gave way to MySQL (an open source database for e-commerce, online transaction processing developed and supported by Oracle Corporation) in 2019. However, in 2020–2021, it still retains the second place.

Apparently, such a large number of DBMSs, which was mentioned earlier, is no longer needed: 5–6 basic ones are enough and some more for specific tasks.

Popularity of SQLite, a compact embedded DBMS, has been growing for a long time. If in 2010–2011 it was mentioned by 5–9 % of respondents, then by 2019 this figure increased to 35 %, but in 2020 it decreased slightly to 29 %, and in 2021 to 12 %.

Main DBMS used, % of all surveyed companies

	survey year/DBMS	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
1	MySQL	47 %	40 %	59 %	56 %	56 %	54 %	42 %	53 %	61 %	72 %	54 %	43 %
2	PostgreSQL	17 %	15 %	26 %	30 %	28 %	28 %	33 %	36 %	51 %	66 %	79 %	78 %
3	MS SQL	63 %	74 %	70 %	66 %	70 %	67 %	59 %	61 %	67 %	62 %	58 %	51 %
4	Oracle	49 %	55 %	51 %	47 %	45 %	39 %	36 %	37 %	40 %	41 %	40 %	31 %
5	SQLite	9 %	5 %	12 %	10 %	19 %	12 %	10 %	19 %	25 %	35 %	29 %	12 %
6	MS Access	19 %	9 %	19 %	17 %	18 %	19 %	17 %	18 %	16 %	23 %	8 %	4 %
7	Firebird	11 %	9 %	10 %	13 %	16 %	15 %	11 %	11 %	14 %	13 %	13 %	5 %
8	MongoDB	—	—	—	—	—	—	—	—	6 %	10 %	35 %	26 %
9	IBM DB2	13 %	14 %	9 %	10 %	12 %	12 %	8 %	8 %	7 %	9 %	8 %	2 %
10-11	MSDE	7 %	5 %	5 %	5 %	7 %	2 %	2 %	4 %	6 %	7 %	0 %	2 %
10-11	Sybase ASE	6 %	3 %	3 %	6 %	8 %	6 %	2 %	3 %	5 %	7 %	4 %	3 %
12-14	IBM Informix	7 %	5 %	7 %	7 %	6 %	4 %	1 %	3 %	6 %	6 %	4 %	1 %
12-14	Sybase ASA	6 %	6 %	5 %	6 %	6 %	3 %	2 %	2 %	4 %	6 %	4 %	2 %
12-14	Lintner	—	—	—	—	—	—	—	3 %	4 %	6 %	4 %	1 %
15-16	SAP DB	6 %	5 %	7 %	5 %	5 %	3 %	5 %	2 %	6 %	5 %	6 %	1 %
15-16	InterBase	9 %	7 %	7 %	10 %	6 %	6 %	3 %	3 %	7 %	5 %	4 %	2 %
17	Paradox	4 %	3 %	3 %	2 %	4 %	3 %	1 %	2 %	5 %	4 %	2 %	1 %
	Other	13 %	8 %	7 %	8 %	10 %	9 %	5 %	9 %	14 %	13 %	8 %	12 %

Changing the wording of the corresponding question in the questionnaire in 2020 made it possible to determine not only the number of companies using DBMSs, but also how intensively each of them was developing for the most famous DBMSs. According to the second indicator of popularity, PostgreSQL is still in the lead. The new formulation showed that in the DBMS

rating there were only 6 database management systems with an indicator that cannot be considered close to zero.

In 2021, the rate of application development for PostgreSQL slightly increased, and decreased for MS SQL and MongoDB. There are no obvious and unambiguous changes for the rest of the DBMSs.

In 2021, the rating included 17 DBMSs. This is exactly the number the respondents were asked to rate in the questionnaire sent to them. At the same time, the surveyed companies had the opportunity to indicate other DBMSs for which they developed. In recent years (with the exception of 2020), up to 10 DBMSs fell into the “Other” category.

One of the systems, MongoDB, later became the main one.

Almost all DBMSs in the “Other” category were mentioned no more than 1–2 times (more often once). At the same time, it was not necessarily every year, but the composition of this category is constantly changing. Only Redis does not fall out of this trend, but the respondents have never mentioned it more than two times. The Cassandra DBMS was also consistently specified 1–2 times, but in 2021 it did not have a single vote, and Redis got 2 votes again.

In 2019, for the first time, but only once, the respondents mentioned the ClickHouse DBMS, a database management system developed by Yandex, which allows you to store and quickly process large amounts of information to create analytical reports. In 2021, it received 7 mentions of respondents at once (4 % of all surveyed companies). Therefore, in 2022, it can be transferred to the number of the main DBMSs after MongoDB.

In 2021, the following DBMSs were also mentioned among “Others”:

- 3i DPP (Big Data Processing Platform),
- NoSQL (designation for a wide class of heterogeneous DBMSs that differ significantly from traditional relational DBMSs),
- Arenadata DB (analytical distributed DBMS built on the MPP system with open source Greenplum),
- Greenplum (massively parallel DBMS for PostgreSQL-based data warehouses),

Share of DBMSs by the intensity of application development for them (survey data from 2020 and 2021), %

		2020	2021			2020	2021
1	PostgreSQL	35.8 %	38.5 %	10	Lintar	0.2 %	0.1 %
2	MS SQL	32.4 %	29.2 %	11	SAP DB	0.2 %	0.1 %
3	Oracle	9.6 %	10.0 %	12	MS Access	0.1 %	0.2 %
4	MySQL	8.7 %	9.3 %	13	InterBase	0.1 %	0.1 %
5	MongoDB	7.5 %	4.3 %	14	IBM Informix	0.1 %	0.1 %
6	SQLite	3.1 %	2.0 %	15	Sybase ASA	0.0 %	0.1 %
7	Firebird	1.3 %	0.6 %	16	Paradox	0.0 %	0.1 %
8	IBM DB2	0.6 %	0.3 %	17	MSDE	0.0 %	0.2 %
9	Sybase ASE	0.5 %	0.8 %				

- ViQube (analytical DBMS),
- HANA (resident relational DBMS of the SAP company),
- Azure Table (cloud-based corporate data warehouse),
- etcd (distributed storage of configuration parameters specified in the form key/value),
- Quant-Hybrid (hybrid object-relational DBMS for collecting and analyzing data from production equipment and technological processes).

Two companies indicated their own DBMS (one of them is Codex Server, and the other is without a name).

According to the JetBrains survey, which was completed in the summer

of 2020, the TOP-3 DBMSs in use in the world for the last year had the following composition: MySQL (66 %), PostgreSQL (36 %), MongoDB (35 %). In Russia, PostgreSQL is the leader (61 %), MySQL accounts for 42 %, MongoDB and Redis each have 30 %. JetBrains noted that Russians use ClickHouse 10 times more often.

Despite the fact that the circle of especially demanded database management systems is narrowing, in recent years new DBMSs have been developed, which are required for fundamentally new tasks that have not existed before. For example, in 2016, Mail.ru Group announced plans to break into the database management systems market with its open source DBMS Tarantool. It was tested on domestic products, but later it would be distributed (primarily as a replacement for Oracle) both in Russia and abroad. Respondents have not mentioned this system in their answers yet.

In November 2019, Nokia announced that it has created a software solution for automating developments in the Industrial Internet of Things (IIoT), which is based on the Tarantool DBMS.

In September 2020, the Mail.ru Group holding announced plans to invest RUB300 million in the development of the Tarantool DBMS and its popularization all over the world. The money will be used to improve the security of the system, launch English-language support and strengthen the international development team.

Up to and including 2021, not a single software developer interviewed by

RUSSOFT mentioned Tarantool as a DBMS for which they create applications.

Popularity of DBMS in different categories of companies

Companies that generate more than half of their revenue from sales abroad were more likely to use PostgreSQL compared to the developers focused more on the Russian market. However, the popularity of PostgreSQL grew faster particularly among the companies for which the Russian IT market is the main one. As a result, this DBMS in 2021 was indicated by 81 % of companies with an export share of less than 50 % and 80 % of companies with an export share of more

than 50 % (that is, the indicators for these categories of companies made equal).

The larger the company, the larger the set of used DBMS it has. Therefore, among companies with a turnover of more than \$5 million, all DBMSs are mentioned more often than among smaller companies. The only exception in 2021 was MySQL.

Development for MS SQL, MySQL and MongoDB DBMS is much more often used by companies with an export share of more than 50 %.

The main DBMS used by companies of different sizes and with different shares of foreign sales, % of all surveyed companies

DBMS	Company size		Foreign sales	
	turnover less than \$5 million	turnover over \$5 million	less than 50 % of turnover	more than 50 % of turnover
MS SQL	48 %	62 %	49 %	68 %
MySQL	45 %	36 %	43 %	56 %
Oracle	25 %	54 %	32 %	32 %
PostgreSQL	76 %	87 %	81 %	80 %
SQLite	9 %	23 %	14 %	16 %
MS Access	4 %	3 %	4 %	4 %
Firebird	4 %	5 %	5 %	0 %
MongoDB	26 %	26 %	24 %	52 %
IBM DB2	1.4 %	5 %	2 %	4 %
Sybase ASE	2 %	5 %	3 %	4 %
MSDE	1 %	3 %	1 %	8 %
InterBase	1 %	3 %	2 %	0 %

DBMS	Company size		Foreign sales	
	turnover less than \$5 million	turnover over \$5 million	less than 50 % of turnover	more than 50 % of turnover
Sybase ASA	2 %	0 %	2 %	0 %
IBM Informix	1 %	0 %	1 %	0 %
SAP DB	1 %	0 %	2 %	0 %
Paradox	1 %	0 %	1 %	0 %
Lintor	1 %	0 %	1 %	0 %
Others	12 %	12 %	10 %	19 %

6.1.3. Programming languages and tools

In 2020, the wording of the question regarding programming languages has changed dramatically. They were no longer divided into main ones and others. At the same time, the share of the company's specialists who use the programming languages suggested in the list was assessed.

Consequently, the popularity of programming languages was determined by other parameters. Therefore, the survey results obtained in 2020 regarding this popularity cannot be correlated with the survey data of previous years.

The question about programming tools was completely excluded from the questionnaire, on the recommendation of the experts helping to prepare it. They decided that the information about the popularity of these tools was not very interesting.

There was only one question about programming tools, and it was formulated as follows: "What proportion (approximately) of your company's employees use the programming

The most popular programming languages in Russian software companies (2021 survey data)

		Share of employees using this programming language	Percentage of surveyed companies using this programming language
1	Java	21.4 %	52.8 %
2	C#	17.9 %	49.5 %
3	JavaScript	16.2 %	65.6 %
4	C++	14.5 %	55.7 %
5	Python	6.3 %	49.0 %
6	C	6.0 %	28.3 %
7	PHP	5.3 %	44.3 %
8	Kotlin	4.1 %	26.8 %
9	Swift	1.8 %	20.1 %
10	Visual Basic .NET	1.7 %	10.4 %

languages listed below?” The results of the surveys before the corresponding changes in the questionnaire in 2020 are presented below (after analyzing the data of the last survey).

The distribution of places in the rating of the most popular programming languages by the share of employees who use them has not changed over the year. Even the indicator for rating turned out to be almost the same for all languages in 2021 as in 2020. However, the rating expanded due to the inclusion of Kotlin and Swift languages (instead of 8 ranked languages, there were 10) into it. As a result of the addition of these two languages, Microsoft's Visual Basic .NET was pushed back from the 8th to the 10th place.

Java took the lead in the main rating in 2019 (even before the questionnaire was changed) and ranks first in both 2020 and 2021 in terms of the share of employees using this programming language. However, in terms of the number of mentions of the companies surveyed in the past two years, JavaScript turned out to be the leader (by a significant margin from the rest).

Some other (except for the main 10) programming languages were mentioned by 29 % of the surveyed companies (they are used by 4.7 % of employees from the entire staff of the surveyed companies). Most often, respondents mentioned Go (3.8 % of the companies surveyed); Delphi (3.3 %); 1C (3.3 %); Golang (2.8 %); Ruby (2.8 %). They also mentioned the programming language of the company Oracle, which provides tools for complex data processing (PL/SQL – 1.9 %); a declarative programming language used to create, modify and manage data in a relational database (SQL – 1.4 %); a language that extends JavaScript, TypeScript (1.4 %). Objective-C, Erlang and Lua, a programming language designed to be embedded in other applications, have 0.9 % each. Programming tools Unity, Scala, Lazarus, Groovy, FORTRAN, Fort, Elixir, Brightscript, ASP.NET Core (a free

cross-platform framework for creating open source web applications), ABAP (a programming language developed by SAP for programming business applications in the SAP environment) are mentioned once each.

The data of the RUSSOFT survey can be compared with the results of other studies. In the summer of 2020, JetBrains completed its fourth annual development ecosystem survey. Based on its results, JetBrains decided to compare how Russian programmers differ from foreign colleagues: 20 thousand programmers from 18 countries were interviewed, among them there were 2.5 thousand respondents from Russia.

This year, according to JetBrains, Python bypassed Java in the list of the most used languages both in Russia and in the world. However, the majority of respondents still choose Java as their main language. TypeScript and C++ have pushed PHP out of the five most used languages in the world, while in Russia PHP is still at the 4th place.

TOP 5 programming languages for the world: JavaScript (70.6 %), Python (56.1 %), Java (55.6 %), TypeScript (28.5 %), C++ (27.6 %); for Russia: JavaScript (62.8 %), Python (46.8 %), Java (36.5 %), PHP (24.5 %), TypeScript (23.1 %).

There is a similar picture in the answers regarding languages in the “Additional” category: Russian developers are more attracted to new languages. They are more likely to learn Go and Kotlin, while they learn Python, Java, TypeScript, and PHP less often.

TOP-5 languages that the respondents started or continued to learn during the last 12 months: in the world – Python (31 %), JavaScript (26 %), Java (22 %), TypeScript (20 %), Go (18 %); in Russia – JavaScript (24 %), Python (23 %), Go (22 %), Kotlin (18 %), Java (15 %).

Go and Kotlin are leading in the global list of languages that the respondents plan to switch to. For Russia, the list is the same, with the only difference that Kotlin is in the first place.

Some programming languages are no longer used at all. Nevertheless, the need for the ability to program in them may arise. In April 2020, it became known that in several US states, searches were unsuccessfully conducted for specialists in the COBOL programming language to update the software used in the employment system: due to the increase in the number of unemployed amid the coronavirus pandemic, it could no longer cope with the load.

At the same time, the Fortran programming language, created in 1957, is experiencing a sharp surge in popularity. In the TIOBE rating, it was in the last 50th place in the summer of 2020, but by April 2021, it was on the 20th line. Despite its venerable age, Fortran continues to evolve and be used in various fields – its most current version was released at the end of 2018.

In the TIOBE rating in April 2021, the C language is in the lead with an indicator of 14.32 %, and Java is in second place almost on a par with Python, which ranks the third (they have 11.23 % and 11.03 %, respectively). C++, C#, Visual Basic, and JavaScript come next. In the year since April 2020, there has been only one change in the ranking in the TOP-7: Java and C have swapped places.

In early December 2020, GitHub, a collaborative IT project development service, published a new rating of the most popular programming languages used by platform users. JavaScript kept the first place in it. Python comes next, followed by Java. TypeScript, which is rapidly gaining popularity, has risen to the fourth place. The fifth line was taken by C#. PHP, C++, C, Shell, and Ruby come next.

At the end of February 2020, an analyst firm IDC released forecasts for DevOps

developers. Analysts focused on the Chinese market, as well as on practical recommendations for 2020 and subsequent years.

By 2024, IDC expects 56 % of companies will not restrict the use of artificial intelligence (AI) and machine learning to application development: they will be used in design, quality management, security and deployment of new technologies. By 2023, 70 % of companies will invest in retraining and training employees, including third-party services, to acquire new skills and get acquainted with new working methods.

By 2023, the number of part-time developers (including business analysts, data workers, and data researchers) in China will double. In particular, the number of part-time developers will increase from 1.8 million in 2019 to 3.6 million.

By 2023, the number of organizations issuing codes for specific applications will increase from 3 % to 30 %.

By 2022, the accelerated modernization of traditional applications and the development of new ones will increase the share of cloud applications to 25 %, driven by the use of microservices, containers and dynamic orchestration.

By 2023, 40 % of DevOps teams will be investing in expanding tools and focusing on key business performance metrics, such as costs and revenues as operations become more important in end-to-end application performance and business impact.

The growing dependence of applications on open source components has ensured the rapid growth of analytic tools. By 2023, software component analysis tools, which by February 2020 are used only by some organizations, will be used by 45 % of firms.

By 2023, 60 % of Chinese companies will have built their own software ecosystems, and 50 % will have access to key reusable code components from public libraries.

By 2024, the share of open source software sourced from their respective libraries will double, that is, to 25 %, and the remaining 75 % will be customized according to the business models or use cases of organizations.

By 2024, applications that fully use DevOps will account for less than 35 %. Enterprises recognize that not all applications can benefit from the complex operations spanning development and manufacturing associated with continuous integration and continuous delivery.

In the rating of development tools, clear leadership has remained with MS Visual Studio over the past 10 years. For the second place, the struggle is no longer between IntelliJ IDEA of the St. Petersburg company JetBrains and the free Eclipse with the participation of Xcode. According to the results of the 2019 survey, Eclipse has pulled away from everyone else, coming close to the leader. IntelliJ IDEA firmly took the third place.

Most popular development tools

	Survey year / development tool	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
1	MS Visual Studio	46 %	64 %	60 %	62 %	45 %	36 %	53 %	49 %	57 %	55 %	57 %	58 %
2	Eclipse	19 %	25 %	19 %	6 %	16 %	15 %	34 %	12 %	25 %	28 %	26 %	43 %
3	IntelliJ IDEA	10 %	5 %	3 %	8 %	9 %	4 %	14 %	9 %	21 %	26 %	26 %	33 %
4	Xcode	—	—	—	—	—	2 %	14 %	6 %	15 %	18 %	27 %	26 %
5	WebStorm	—	—	—	—	—	—	—	2 %	10 %	12 %	21 %	24 %
6	NetBeans	—	—	—	—	—	3 %	8 %	0 %	7 %	10 %	18 %	18 %
7	Another	—	—	—	—	—	—	15 %	24 %	20 %	16 %	15 %	21 %
	Do not use	—	—	—	—	—	—	—	24 %	16 %	9 %	11 %	10 %

6.2. Technological trends

The list of the main technological trends has not undergone significant changes in recent years. In general, it does not differ much among the most famous analytical companies.

Only some additions (in particular, regarding the interconnections of promising technologies) and quantitative estimates are introduced annually. In addition, the trend names have changed in some way and more precise definitions have appeared.

In November 2020, IDC released the Top 10 Global CIO Forecasts for 2021 and beyond. As the pandemic has escalated, CIOs have faced enormous challenges and a road to recovery lies ahead. For many business leaders, this is not just a return to the previous state, but a complete rethinking of what kind of business to do and how to run it.

By 2022, 65 % of CIOs will provide digital technologies and equip actual performers with data, AI and security to improve their productivity, adaptability and efficiency of decision-making in conditions of rapid change.

By 2021, without finding adaptive measures to counter the growing number of cyberattacks, social unrest, trade wars and sudden crises, 30 % of CIOs will not be able to ensure the trust of customers, the basis of their loyalty.

By 2023, the IT deployment “debt” that has accumulated during the pandemic will be a heavy burden on 70 % of CIOs, leading to financial strains, reduced IT responsiveness and “forced” migration to the cloud.

By 2023, in the event of global crises, 75 % of CIOs will become integral participants in business decision-making, as digital infrastructure becomes the “operating system” of the business,

evolving from ensuring its continuity to redefining the business concept.

Striving to provide a secure, distributed work environment, by 2024 50 % of CIOs will accelerate robotization, automation and equipping IT systems with new capabilities, which will pose them a difficult task of managing these transformations.

By 2023, CIO-led groups of counteraction to unfavorable factors will be an integral part of 65 % of organizations, with a focus on digital infrastructure resilience and flexible financing for different scenarios.

By 2025, 80 % of CIOs in collaboration with business unit managers will implement intelligent tools for identifying, studying and predicting changing customer behavior to offer an exclusive customer experience that will increase the loyalty level.

By 2025, 60 % of CIOs will have implemented (low/no-code) development tool management to improve the productivity of IT staff and developers in departments, help them respond to unforeseen needs and accelerate innovation on the intellectual periphery of the network.

By 2025, 65 % of CIOs will have implemented ecosystem, application, and infrastructure management systems that provide interoperability, flexibility, scalability, portability, and operational responsiveness.

By 2024, 75 % of CIOs will assume new responsibilities for managing employee health, social security, and location data to comply with insurance, health, safety, and tax law requirements.



Today large businesses are aiming to reduce time-to-market by team augmentation or with the help of an experienced IT outsourcer. Such a contractor will provide speed and necessary expertise across the entire technology stack, from architecture design to maintenance, including the service approach. Such conditions allow IT companies to expand much faster. In particular, this year we have built up a full team of over 1300 specialists! Now we work on more than 150 projects using both classic corporate technologies and the new ones – for example, Go and Flutter in fintech, retail, and the public sector.

Dmitry Peterson
Chief Operating Officer
SimbirSoft

SimbirSoft

6.2.1. Blockchain

It is assumed that a distributed transaction system allows enterprises to abandon intermediaries in any transactions: whether financial transfers or conclusion of contracts. Blockchain technology eliminates the need for the functions of trusted storage, transmission and validation of information, which are now entrusted to banks, depositories, notaries, document management systems and state registers.

Many developers of blockchain platforms claim that they can be used to control illegal arms trafficking and even draw public attention to environmental issues.

In the long term, this technology is capable of dramatically changing entire industries. The most promising

applications are asset tracking, claims processing automation, internal and joint accounting, and smart city and IoT systems.

At the end of 2019, Gartner predicted that it would be technically possible to scale the blockchain by 2023, and it would be able to support trusted private transactions with the necessary data confidentiality. In one form or another, 60 % of CIOs plan to implement blockchain in the next three years.

On April 20, 2020, the State Development and Reform Committee of the PRC announced its intention to develop blockchain technology, making it one of the components of China's technological infrastructure. This committee, in

particular, plans to fund blockchain-related projects and promote initiatives related to this technology.

In mid-October 2020, PwC presented its analysis, according to which blockchain technologies would ensure the growth of the world economy by \$1.7 trillion by 2030. The analysis is part of a series of PwC studies devoted to scenarios for the use of new technologies and their impact on the economy. PwC believes that "blockchain can help many organizations restore and reorganize their structure" in the new conditions.

6.2.2. Artificial intelligence (AI) and robotization

Even before the pandemic, IDC predicted that European spending on artificial intelligence in 2020 would be \$10 billion, with the average annual growth rate (in compound percentages, CAGR) would be of 33 % until 2023. After the outbreak of COVID-19, IDC revised its forecast, anticipating certain changes in costs in 2020. Many industries, in particular, transportation and consumer services, will be forced to revise their investments in IT downward. On the other hand, AI is a technology that can play a significant role in helping organizations and communities cope with the large-scale challenges posed by quarantine measures and restrictions. In all sectors, the public sector will demonstrate an increase in AI investment. Hospitals will

use AI to accelerate diagnosis of COVID-19 and automate consultations for patients on self-isolation using chatbots. The authorities will also use AI to assess compliance with physical distance requirements.

The spread of the coronavirus COVID-19 would still lead to an explosive growth in spending on artificial intelligence in the world, according to IDC analysts, who announced their forecast on April 9, 2020.

In 2020, the volume of investments in developments based on artificial intelligence technologies grew by 40 %, reaching \$67.9 billion, according to data from the AI Index Report 2021 from researchers at Stanford University.

According to the forecast of Gartner, published in the fall of 2020, in 2021, the revenue of the global market for robotic process automation (RPA) software would reach \$1.89 billion, an increase of 19.5 % over the year. Despite the economic consequences of the COVID-19 pandemic, the RPA market will continue to grow at double-digit rates until 2024.

6.2.3. Internet of things

In early March 2021, the analytical company IoT Analytics presented a forecast for the development of the Internet of Things based on its own data and data from market participants.

Healthcare topped the list of segments with the largest growth in IoT implementation. It is followed by smart grids, connected cars and smart city apps. It is assumed that spending on IoT in the US healthcare sector will grow by almost 39 % and reach \$188.2 billion by 2025, while at the end of 2020 this figure was \$72.5 billion.

According to GSMA forecasts, by 2025 the number of IoT connections will double to almost 25 billion worldwide, and as the popularity of IoT increases, the risk of cyberattacks increases. IoT cybersecurity is a concern of 95 % of respondents to a survey conducted by IoT Analytics, with nearly 40 % “very concerned” about potential IoT vulnerabilities, and 88 % said they support the implementation of IoT security rules and the adoption of industry standards for managing cybersecurity best practices. The IoT security market is expected to grow to \$36.6 billion by 2025, up from \$12.5 billion in 2020.

In 2021, 5G networks will indeed become available to a wide range of consumers. Analysts believe 5G connections will grow to 1.8 billion by 2025, and high speed, increased bandwidth, low latency and high power can significantly accelerate IoT connectivity. Analysts predict 5G will become the main technology for connecting to the IoT.

However, LPWAN and 4G will continue to play a prominent role in connecting to the Internet of Things. The main focus in

this case is on the efficient transmission of small amounts of data using devices that require a wide coverage area and a long battery life.

In April 2021, CRN/USA introduced readers to five new IoT technologies that are redefining the capabilities of IoT devices, opening up new horizons for their use:

1. Battery-free sensors;
2. Container technologies for microcontrollers;
3. A mesh network of sensors (wearable devices of the future will be able not only to measure the heart rate, physical activity and sleep quality, but also to accurately track the movements of the human body);
4. Network segmentation for IoT applications (with the advent of 5G networks around the world, the technology of their segmentation is considered as a way of organizing a network for IoT devices with different requirements for latency, connection reliability, bandwidth, etc.);
5. TinyML (an emerging technology for hardware and software solutions that allows machine learning algorithms to be implemented in low-power miniature chips – microcontrollers).

6.2.4. VR/AR

The segment did not meet the expectations of equipment manufacturers, sales of devices for AR/VR turned out to be significantly lower than planned, and vendors of mass devices lost interest in the topic.

At the same time, the global market for virtual and augmented reality technologies, according to forecasts by BCC Research, will show an annual growth of 60.5 % and will reach \$40 billion by 2022.

6.2.5. Quantum computations

In April 2020, it became known that the US Presidential Administration, when planning the state budget for 2021, decided to increase spending on quantum informatics by 20 % to \$237 million. At the same time, it reduces the cost of scientific activities in 2021 as a whole by 10 %.

6.2.6. Russia and global technological trends

According to the Forrester Consulting survey commissioned by Experian, 63 % of Russian top managers believe investing in data, analytics and artificial intelligence is a prerequisite for business growth. In Russia, companies of various sizes took part in the survey: from medium (500–1,000 employees) to large (up to 5 thousand employees), very large (up to 20 thousand) and global (more than 20 thousand employees), doing their own business in the oil and gas industry, finance and telecom.

The first Russian blockchain platform Jovi was presented at the St. Petersburg International Economic Forum in early June 2019. IT company CROC has become an anchor partner of the developer of the new platform, Noosphere, and will use it when working on blockchain projects for customers. You can test and launch a corporate blockchain on the Jovi platform in just one day.

According to the roadmap for the development of blockchain in Russia within the framework of the Digital Economy program presented at the CIPR-2019 conference, the blockchain is proposed to be used in all state information systems, including voting at the municipal level and control over the spending of budgetary funds. Financial and insurance activities, transportation and storage, public administration, healthcare and manufacturing are among the priority areas for the implementation of distributed ledger technologies. The roadmap authors argue that the effect of the blockchain technology introduction in Russia by 2024 may amount to over RUB 1.5 trillion.

According to the study conducted by the international company Perenio IoT in the first half of 2019, the Russian Internet of Things (IoT) market might exceed RUB 700 billion by 2025. At the same time, the growth rate of the IoT market volume will

most likely remain positive regardless of any development dynamics of the Russian economy and higher in relation to many industries. The fact is that the market is promising not only for solution providers, but also allows you to manage costs, optimize, obtain financial results in the system of city administration, housing and public utilities, transport, agriculture, and personal budget management.

According to Perenio experts, housing and public utilities and development will be the most promising areas of IoT technology application. It is in these segments that a breakthrough and the greatest return from the use of these technologies are expected in the next 5–7 years. The implementation of the Smart City project, one of the directions of the Digital Economy state program, will become a key driver for the development of the Internet of Things.

The volume of the market for dispatching and automation systems of resource consumption recording is estimated at RUB 5 billion. Intelligent accounting, security systems, connection of housing and public utilities devices to LPWAN, optimization of solid waste removal: all these areas are now actively developing in Russia, and the potential volume of the IoT market for housing and public utilities is estimated at 200 million devices.

The Internet of Things, according to PwC's forecast, may become one of the factors for the Russian economy growth. The expansion of such technologies in the next few years can reduce costs by RUB 2.8 trillion. Savings can be even larger if cybersecurity threats are mitigated, regulation emerges and IoT standards are implemented, market participants add.

In particular, the economic effect from the introduction of IoT in the electric

power industry will amount to about RUB 532 billion, in healthcare – RUB 536 billion, in agriculture – RUB 469 billion, in the transport industry – RUB 542 billion. The effect in housing and public utilities by 2025 may reach RUB 3.6 trillion.



MAIN FINDINGS

Economic indicators

According to RUSSOFT, at least 4.2 thousand sustainable companies operate in Russia that pursue professional software development (apart from startups generating no regular income). Annually, the number of software companies grows by about 2.5-4%. Foreign economic activity is conducted by at least 2.5 thousand enterprises.

The birth of new software companies was the most active in 2006-2010. During this period, on average 209 enterprises were created annually. The startup boom in the field of software development lasted until the year 2011, during which approximately 220 companies appeared. Then this indicator began to decrease: in 2012-2016 it averaged 155 companies, and in the last 5 years it decreased even more.

According to the results of 2020, the total turnover of Russian software industry amounted to RUB 1,305 trillion, an increase of 16.5%. Revenues from foreign sales increased almost by 16% as well in ruble equivalent (up to RUB 620 billion) or by 4.3% when measured in dollars (up to \$8.6 billion). Similarly, domestic sales increased by 16.5% up to RUB 684 billion.

According to the results of 2020, the total turnover of service companies in ruble equivalent increased by 18.5% (domestic sales – by 25%, foreign sales – by 12.3%). The total turnover of product companies grew less – by 13% (domestic sales – by 12.5%, foreign sales – by 17.3%). Thus, the share of service companies in the total turnover of all the Russian software companies has slightly increased. It amounted to 37.5% in 2020. 57.3% accrues to the product companies. Another 5.2% is provided by the foreign companies' development centers.

Foreign sales, depending on the business model, were distributed according to the results of 2020 as follows: product companies – 49.7% (49.4% a year earlier), service companies – 39.3% (40.7%), foreign companies' development centers – 11% (9.9%). Changes in this distribution occurred due to some

reorientation of service companies to the domestic market (as a result, the export of product companies grew more than that of service companies), the transition of a number of service Russian companies to foreign jurisdictions, and serious investments in the development of foreign software development centers located in Russia.

In 2020, during the pandemic period, the share of companies with growing turnover decreased, which should be the case in the crisis. But the crisis for the software industry as a whole was not as serious as could be assumed, and therefore the reduction in the share of growing companies turned out to be minor. At the same time, 47.1% of the surveyed companies increased turnover by more than 10%, 23.3% of the companies – by more than 30%, 9.2% – by more than 50%, and 3.9% – by more than 100%.

The share of foreign sales of software companies in all Russian export of goods and services increased over the year by more than a third – from 1.7% to 2.3%, and if we consider only export of services, then it increased from 13.1% to 18.3%. Such a sharp increase in the weight of software development services was due to the fact that it was possible to achieve growth in foreign sales against the background of a serious decrease in the export of services of all other enterprises: it was drastically reduced by 20.5%.

Domestic market

In April 2020, IDC predicted that the reduction in the Russian IT market throughout the year will be 30% in dollar terms. In autumn, the forecast changed and a smaller drop by 8% was predicted. As a result, according to IDC, it was possible not only to avoid a fall but even to get a slight increase: a 2% increase allowed the Russian IT market to reach \$25.35 billion.

Analysis of information obtained from various sources allowed us to form a certain range of both the size of the

Russian IT market and its growth (with division by segments, as was the case with IDC in previous years). If we focus on the maximum indicators that RUSSOFT considers the most realistic, then it turns out that the size of the IT market in Russia reached \$34.1 billion with an increase of 7.9% over the year (in rubles – RUB 2,46 trillion with an increase of 20.6%). The difference in the data provided by IDC and RUSSOFT is due to the fact that the IDC methodology assumes that not all sales of computer equipment, IT services, and software made in Russia belong to the IT market. In addition, in the RUSSOFT calculation, the volume of software sales includes double-counting (when licenses for the sale of the same software are taken into account each time when selling compound software packages).

According to the results of 2020, the growth of the Russian software market, according to IDC, amounted to 16% – from RUB 213.5 billion to RUB 247.6 billion. When converted into dollars, it turns out an increase from \$3.3 billion to \$3.42 billion (by 3.8%).

RUSSOFT data shows that the software market has increased by the same 16% that IDC determined, but it has a much larger volume. Even a very cautious estimate yields RUB 433 billion (\$6 billion). Such estimates are based on the fact that the export of computer services, according to the Central Bank of the Russian Federation, amounted to \$4.5 billion, and, according to RUSSOFT, sales of domestic software products within Russia also amounted to approximately \$4.5 billion. The simple summation of these two values is incorrect, because in the RUSSOFT data there is a small double account, and in the data of the Central Bank of the Russian Federation – services for custom software development, which IDC relates to IT services.

Within the total sales of the Russian software companies in the domestic market of RUB 684 billion, approximately RUB 242 billion comes from service companies, which receive the main income from custom development,

and RUB 442 billion — from software developers. Since the custom development fraction of income is known (69% for service and 20% for product), it is possible to estimate the volume of software development orders in Russia that Russian companies receive. It is RUB 255 billion (16% more than a year earlier). Similar calculations make it possible to determine that the volume of sales of domestic software products within Russia is approximately RUB 325 billion (an increase of 8% over the year).

Investments

The volume of external investments in the software development industry in Russia amounted to approximately RUB 10 billion (\$140 million), and the total amount of attracted financing was RUB 46.5 billion (\$640 million), with a demand estimated at RUB 125 billion (\$1.73 billion). Consequently, the volume of investments received is only 37% of the investment needs of industrial enterprises. At the same time, external investments provide 22% of the total volume of attracted financing in 2020.

In 2021-2022, the companies surveyed do not expect a reduction in the investment gap. At the same time, they expect to increase the share of external financing in total investment (from 21% in 2020 to 54% in 2022).

Business footprint

In recent years, there has been a steady increase in the share of New Markets in total exports, with a decrease in the share of the Western World. The share of the Western World decreased from about 32% based on the results of 2018-2019 to 26% based on the results of 2020. The share of New Markets increased for the same years from 8-11% to 14%. The share of the markets of Russia and Neighboring Countries has been relatively stable in the last 6 years: it fluctuates, but slightly, amounting to approximately 60%.

For the first time in 2021, 22.8% of surveyed companies plan to enter a new

foreign market, and in 2022 – 21.9%. Relative to far abroad, these indicators are equal to 16.5% in 2021 and 19.4% in 2022. Most often, respondents intend to debut near abroad. From far-abroad countries, the greatest interest is in the markets of the USA and Europe. This was the case in previous years. However, existing plans to expand the geography of exports were rarely confirmed by actions.

Import substitution

One indicator of how import substitution is going on is a comparison of the growth indicators of the Russian software market and the sales of the Russian software companies in this market. In recent years, sales of domestic companies have been growing faster than the market itself: in 2017 – by 6 p.p., in 2018 – by 10 p.p., in 2019 – by 9 p.p. This excess suggested that the process of import substitution is quite active. According to the results of 2020, the difference was only 0.5 p.p., which may indicate a slight slowdown. However, other indicators show that the process is as active as in previous years.

The analysis of messages concerning direct import substitution leads to the following conclusions. First of all, it is worth noting the intensification of the transition of Russian corporations and authorities to domestic software after a slight slowdown in 2020 caused by the uncertainty of the situation in the first months after the pandemic announcement (in the first 8 months of this year there were only 2 corresponding reports, and in the last 4 months there were 8 ones). In 2021, the process acceleration of import substitution which was observed before the pandemic continued and became obvious (there was, apparently, catching up in the implementation of plans already outlined for 2020-2021).

It should also be noted that in 2021 the number of messages about government decisions stimulating import substitution has increased. At the same time, among the messages of import substitution appeared those that reflected the activity

of key private companies and other non-state structures (primarily industry associations).

The attitude of various industry sectors representatives to the Register of domestic software is of interest. For service companies in general, the importance of the Register is very low. The average score of its rating was only 0.01 in 2019, and in 2021 it became completely negative (-0.04). Developers of software products are much less likely to show indifference to the Register. Only 35-40% of developers of replicated solutions do not see any impact of it, and the average score of rating in 2021 was up to 0.70, compared to 0.18 in 2019.

At the same time, 28% of companies that receive at least 50% of their income from exports believe that the existing bans have a negative impact on them. Along with 56% of the companies that indicated zero impact of the Register on the market, the average score of its significance was -0.28.

If companies receive their main income in Russia, then the attitude towards the Register is generally positive – the average score of rating is 0.48, but it is still very low (43% of respondents from this segment consider that the Register has no effect thereon).

The biggest benefits from the Register, according to the survey, are received by product companies, which generate more than 50% of their revenue from domestic sales. But their average score was 0.78 (out of 3), which is less than the level of positive insignificant influence.

Business environment

The heads of software companies in general positively assessed the changes in the attitude of the state towards the IT industry over the year. The average score for all parameters characterizing the conditions of doing business increased to 2.91 in 2021, while in the previous 4 years it was 2.86. The rating improvement occurred despite the problem of

personnel deficiency and pandemic, which worsened over the year, which still negatively affected the software business more often than positively.

Achieving an average score of 2.91 indicates that the conditions of doing business are rated by respondents on average as almost satisfactory ("3" scores correspond to a "satisfactory" rating). Progress over 10 years is significant: from 2.58 in 2011 to 2.91 in 2021. At the same time, a decrease in this indicator was noted only in 2016, which was most likely a reaction to the crisis in Ukraine in 2015.

In 2021, respondents got the opportunity to comment in a free form on their assessment of "State support in the field of IT." If we structure all the comments, it turns out that most often respondents mentioned in a positive way "Tax Maneuver" (23.3% of respondents). Another 4.4% believe that in terms of supporting the industry, the government is doing more or less right. It is worth noting that 2.9% of respondents are satisfied with receiving grants. At the same time, the ideal is still far away: 14.1% of surveyed companies believe that "benefits are good, but not available to everyone" or "there is no support for us". Such discontent was not noted at all by large companies (with a turnover of more than RUB 1.28 billion).

The bureaucracy which prevents working was mentioned by 3.9% of respondents, but it makes work difficult, of course, to a much larger circle of companies. In addition, 1.9% of surveyed company executives are unsatisfied with the slip in import substitution.

Russia's position in world rankings

Serious movements of Russia in world ratings, reflecting the business environment conditions and competitiveness of the country, have not occurred in recent years. It can be especially noted the continued rise of Russia in the Doing Business rating in

2020, which can be considered the most important among all world ratings. However, in most cases, there was a slight slide to lower positions in 2020, and in 2021, a slight increase could be seen more often.

Analysis of the nature of publications about the industry in the mass media

An analysis of media reports on decisions of state bodies in chronological order indicates that in recent years the state has begun to pay more attention to the high-tech sector of the Russian economy. If until 2015 inclusive in this list there were 1, 2, or 3 points for each year, then in 2016 and in 2017 it was already 7, and in 2018 – 14, in 2019 – 16. In 2020, there was a sharp increase – up to 65. At the same time, it cannot be said that the significance of the news has decreased, rather, vice versa. Only one factor – "Tax Maneuver" – was able to outweigh the significance of all decisions of state bodies of the previous year 2019. In 2021, the flow of relevant messages turned out to be as large as a year earlier – in the incomplete first 8 months, 40 such publications appeared.

The influence of almost all external factors has become either less negative or more positive. As a result, the integral indicator of the impact of these factors, according to the results of the survey of 2021, was 0.09, which is much better than -0.33 in 2020 and -0.23 in 2019. Even if we exclude the negative factors added in 2021, we will still obtain a slightly better indicator: -0.17. The zero indicator means that there is no influence of the factor, "1" and "-1" – the influence is insignificant (positive and negative, respectively), "2" and "-2" – simply positive or negative, "3" and "-3" – the influence is significant.

The largest impact was the coronavirus pandemic. The own estimates of software developers surveyed as part of the annual RUSSOFT study give the

following picture: only 13.3% of software companies did not feel the impact of the pandemic on business, the pandemic affected 66.1% negatively and 20.6% positively. The average score was -0.95, and the score "-1" corresponds to a negative but insignificant influence.

Human resources

The total staff of specialized employees of Russian enterprises specializing in software development increased by a record 12% in 2020 and reached 200 thousand people (about 10 thousand of them work in foreign offices). The increase in the growth rate of all software companies in Russia is observed for the third year in a row, which is associated with decisions to increase budget places in universities in IT specialties. These decisions have been made for several years, starting with 2014.

At the end of 2020, there were at least 640,000 employees in Russia who are directly involved in the software development process (such specialists are considered specialized in software companies). The indicator increased by at least 60 thousand people, of which 20 thousand people began to work in software companies. Most of the growth (almost 80%) was provided by universities, migration gave 4.9%, retraining of personnel – 2.0%, other sources – 5.5%, transition from other industries – 8.3%.

The migration of employees abroad is a problem for 27% of surveyed companies. Almost all of these companies indicated that "we lose specialists in individual cases, but these specialists are the key ones". There was no mass outflow of personnel in 2020 and it could not be due to the pandemic.

It can be assumed that a number of regional universities began to work more efficiently. This is reflected in the increase in their place in various university rankings (both Russian and international). Software companies interviewed by RUSSOFT

in 2021 began to mention more often educational institutions that do not have a pronounced IT specialization (for example, construction, pedagogical, economic universities). In the full ranking of IT training centers which is published by RUSSOFT in 2021, there were 5 educational institutions of secondary technical education (these are colleges and technical schools). All of them received the lowest score, but a few years ago such educational institutions were not indicated at all as a source of replenishment.

In the ranking of educational institutions that train software development specialists the Bauman Moscow State Technical University and the St. Petersburg National Research University of Information Technology, Mechanics and Optics are leading in the sum of scores given to them by respondents. The third place by a substantial margin is taken by St. Petersburg State University which has the best average score among universities in Moscow and St. Petersburg. Outside the two capitals, Novosibirsk State University is a clear leader.

The retention factor until 2015, inclusive, fluctuated mainly in the range of 6-7%, but in 2016 it increased to 9.5% and in the next two years it stabilized at this level. In 2019, there was a new surge – up to 12.5%, and by the end of 2020, it reached 13.3%, which can be explained by the increase in uncertainty during the whole quarter when companies assumed a reduction in staff more often than its expansion. As a result, the past year was especially difficult for the personnel services of software companies.

The difficult year for personnel services could not but affect the average rating of "Staffing and education system," which was given by software companies interviewed as part of the annual RUSSOFT study. This rating was only 2.65 scores ("3" scores correspond to a "satisfactory" rating).

According to the plans of the surveyed companies, the total number of their

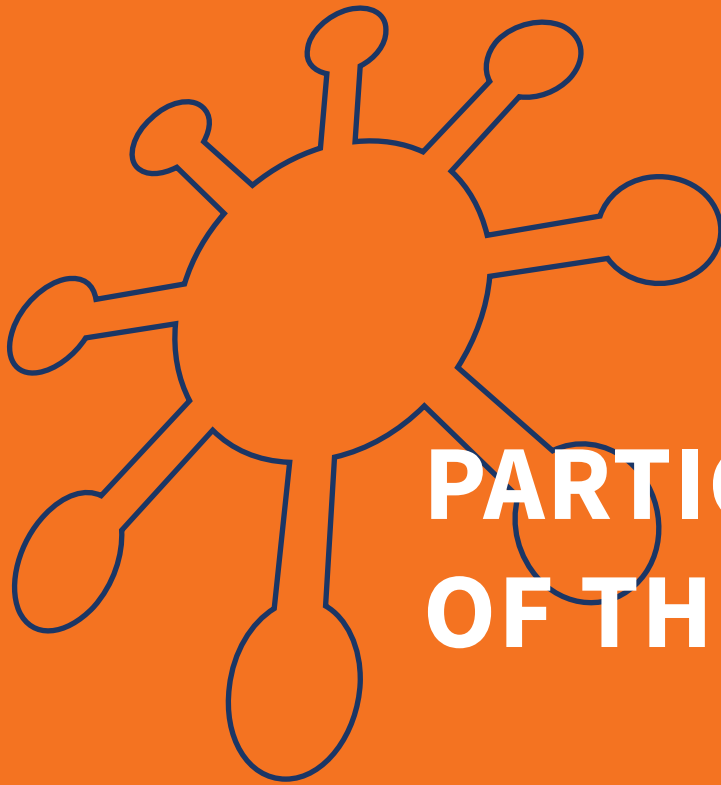
personnel will increase by 17% in 2021. However, it is unlikely that these plans can be fully implemented since there will be no corresponding supply in the labor market.

The monthly salary of specialized technical employees in the Russian software companies increased by an average of 11.1% in 2020, reaching about RUB119 thousand. According to Rosstat, the average nominal salary in Russia in all sectors based on the results of last year increased by a smaller amount – by 6% to RUB 51,1 thousand. As a result, the difference in income between software development specialists and all other employees in Russia has increased again: in 2020, programmers earned 133% more.

Technologies


The survey showed that the rise of PostgreSQL in the ranking of the most popular DBMS among Russian software developers continued. This DBMS gained the lead in two indicators back in 2020, ahead of MS SQL, and in 2021 its leadership strengthened.

Russian software companies began to develop software for UNIX-like operating systems more often than for different variations of the Windows OS.



PARTICIPANTS OF THE SURVEY


Company	Head office location	Web	E-mail	Phone	Specialization	Expertise in areas corresponding to global technological trends
3iTech	Moscow	3itech.ru	info@3itech.ru	(495) 645-4306	Text and media processing products	Artificial Intelligence, Big Data & BI, Smart City
3kex	Krasnoyarsk	3ksigma.ru	info@3ksigma.ru	(902) 945-6719	Basic software development (DBCS, OS, office applications, virtualization tools, programming languages and tools)	Smart City
404studio	Orel	404studio.ru	office@404studio.ru	(4862) 78-2696	Website designing	
4px	Moscow	4px.ru	we@4px.ru	(495) 181-1619	Full Cycle Digital Agency	Artificial Intelligence, Big Data & BI, Blockchain Technology
7 Red Lines	Moscow	7rlines.ru	a.gavrilovich@7rlines.com	(965) 277-9107	Custom software development	AR & VR Development, Big Data & BI
A2B	Ufa	a2b.su	zaripov@a2b.su	(905) 355-9194	Replicated enterprise (institution) management, document flow automation, design and production process systems (ERP, CRM, ECM, EDMS, CAD, APCS and other)	
ABISoft	Saint-Petersburg	abisoft.biz	info@abisoft.spb.ru	(921) 936-1280	Custom software development	
AGNEKO	Moscow region	agneko.com	sales@agneko.com	(495) 660-3590	Custom software development	
AIC	Moscow	en.aic.ru	reception@aic.ru	(499) 350-5674	Intelligent design, plain and simple.	Big Data & BI
ALFASATCOM	Moscow	Alfasatcom.ru	info@alfasatcom.ru	(916) 601-3838	Custom software development	BigData & BI, IoT
Alliance+ (Internet-agency)	Bryansk	alianscompany.ru	sergejkonet@mail.ru	(920) 605-9345	Custom software development	Artificial Intelligence, Big Data & BI
Andsoft	Saint-Petersburg	andsoft.ru	admin@andsoft.ru	(921) 301-2085	Basic software development (DBCS, OS, office applications, virtualization tools, programming languages and tools)	
Aquarius Software	Kostroma	aqua-soft.ru	info@aqua-soft.ru	(910) 660-4618	Basic software development (DBCS, OS, office applications, virtualization tools, programming languages and tools) , Custom software development	

Company	Head office location	Web	E-mail	Phone	Specialization	Expertise in areas corresponding to global technological trends
Aquilon Software Technologies	Kazan	aquilon-st.ru	dir@aquilon-st.ru	(843) 524-7366	Custom software development	Big Data & BI
AraxGroup	Moscow	araxgroup.ru	info@araxgroup.ru	(495) 504-8263	Replicated enterprise (institution) management, document ow automation, design and production process systems (ERP, CRM, ECM, EDMS, CAD, APCS and other)	Artificial Intelligence
Arcadia	Saint-Petersburg	softwarecountry.com	info@softwarecountry.com	(812) 610-5955	Custom software development	AR & VR Development, Artificial Intelligence, Big Data & BI, IoT
A-Real Consulting	Yaroslavl	xserver.a-real.ru	hello@a-real.ru	(800) 555-9297	Information security solutions	
Artezio	Moscow	artezio.com	sales@artezio.com	(495) 981-0531	Custom software development	Artificial Intelligence, Big Data & BI, Blockchain Technology
<div> ARTEZIO</div> <p>Artezio is an international technology company that specializes in professionally solving complex tasks in digital business transformation and custom software development.</p> <p>Artezio is included in the list of the world's best outsourcing service providers (The Global Outsourcing 100) and one of the top developers in several professional categories according to Clutch, the rating and reviews platform. The company's experience and professionalism have been highlighted by a number of international analytical agencies.</p> <p>Among Artezio's clients are customers from Russia, Europe, and the US. We create innovative solutions in various spheres: banking and finance, healthcare and tourism, and build solutions that are used by millions of people around the globe.</p> <p>Artezio's development centers are located in Moscow, Saratov, Nizhny Novgorod, Saint Petersburg, Minsk, Vitebsk, and Mogilev. Additionally, the company has representative offices in the US, Canada, and Poland.</p>						
ASD Technologies	Nizhny Novgorod	asdtech.co	dfeshin@asdco.ru	(963) 672-7526	Developers of personal accounts / self-service portals for fintech, telecom operators and service providers.	Big Data & BI
AssetData	Moscow	assetdata.market	au@assetdata.market	(965) 320-8512	Replicated enterprise (institution) management, document ow automation, design and production process systems (ERP, CRM, ECM, EDMS, CAD, APCS and other)	Artificial Intelligence, Big Data & BI, IoT
ASV	Perm	asv.ru	a.kazymov@asv.ru	(912) 885-3300	Replicated enterprise (institution) management, document ow automation, design and production process systems (ERP, CRM, ECM, EDMS, CAD, APCS and other)	Smart City


Company	Head office location	Web	E-mail	Phone	Specialization	Expertise in areas corresponding to global technological trends
Auriga 	Moscow	auriga.com	pr@auriga.com	(495) 713-9900	Custom software development	AR & VR Development, Artificial Intelligence, Big Data & BI, IoT
<p>Established in 1990, Auriga (www.auriga.com) is recognized as one of the Top-100 leading outsourcing software R&D providers worldwide. Headquartered in Boston, MA with 600+ employees, seven development centers across six time zones, 13+ embedded testing R&D labs and 100+ projects yearly for medical device, automobile and construction tools manufacturers, telecom and power management companies, chip manufacturers, our company offers maximum flexibility in terms of processes, communications, issue resolution while conduct project in strict compliance to quality and risk management standards (ISO 13485).</p>						
Axbit	Samara	axbit.ru	info@axbit.ru	(495) 414-1404	IT Services from site development and mobile applications to comprehensive enterprise automation.	AR & VR Development, Smart City
Axilon Consulting	Moscow	axilon.ru	info@axilon.ru	(916) 815-3499	Information and Analysis Platform (CPM, BI)	Big Data & BI
BACUP IT	Novosibirsk	bacup.ru	a.r.rakhimov@bacup.ru	(383) 325-0771	Custom software development	Artificial Intelligence
BaseALT	Moscow	basealt.ru	org@basealt.ru	(903) 288-1093	Basic software development (DBCS, OS, office applications, virtualization tools, programming languages and tools)	
Bee Pitron	Saint-Petersburg	beepitron.com	all@beepitron.com	(812) 740-1800	Replicated enterprise (institution) management, document flow automation, design and production process systems (ERP, CRM, ECM, EDMS, CAD, APCS and other)	IoT
BellSoft	Saint-Petersburg	bell-sw.com	info@bell-sw.com		Basic software development (DBCS, OS, office applications, virtualization tools, programming languages and tools)	BigData & BI, Blockchain Technology, IoT
BETA	Saint-Petersburg	beta.spb.ru	info@beta.spb.ru	(906) 259-3820	Custom software development	Artificial Intelligence, Big Data & BI, IoT, Smart City
Bitrixoid	Novosibirsk	b-id.ru	info@b-id.ru	(383) 380-5259	Website designing	
Budget and Finance Technologies	Moscow	bftcom.com	info@bftcom.com	(495) 784-7000	Software and consulting solutions for public sector and business	Big Data & BI

Company	Head office location	Web	E-mail	Phone	Specialization	Expertise in areas corresponding to global technological trends
Business Automatics	Moscow	npc.ba	info@pba.su	(495) 221-2965	Build and support complex, intelligent information and analysis systems	Artificial Intelligence, Big Data & BI, Smart City
CEREBRO	Moscow	cerebrohq.com	info@cerebrohq.com	(499) 110-3482	Replicated enterprise (institution) management, document ow automation, design and production process systems (ERP, CRM, ECM, EDMS, CAD, APCS and other)	Big Data & BI
Chilisoft	Moscow	chilisoft.ru	info@chilisoft.ru	(905) 537-2692	Replicated enterprise (institution) management, document ow automation, design and production process systems (ERP, CRM, ECM, EDMS, CAD, APCS and other)	BigData & BI, IoT, Smart City
CodeInside	Penza	codeinside.ru	info@codeinside.ru	(8412) 63-6736	Custom software development	Artificial Intelligence, IoT, Smart City
CommFort software	Novosibirsk	commfort.com	support@commfort.com	(383) 380-4274	Replicated enterprise (institution) management, document ow automation, design and production process systems (ERP, CRM, ECM, EDMS, CAD, APCS and other)	
CrossTech Solutions Group	Moscow	ct-sg.ru	info@ct-sg.ru	(495) 741-8864	Information security solutions	Artificial Intelligence, Big Data & BI, IoT
CVisionLab	Taganrog	cvisionlab.com	info@cvisionlab.com	(905) 454-3313	Custom software development	AR & VR Development, Artificial Intelligence, Big Data & BI, IoT, Smart City
CyberTech	Saint-Petersburg	trikset.com	mikhail@trikset.com	(911) 917-6186	Educational solutions for the study of modern technology and robotics	IoT
Diasoft	Moscow	diasoft.ru	pr@diasoft.ru	(495) 780-7575	Global provider of financial technologies	Artificial Intelligence, Big Data & BI
Digital Mind Development	Krasnoyarsk	dmdevelopment.ru	dmd@dmdevelopment.ru	(3912) 05-0778	Custom software development	Artificial Intelligence
DIP (stp "dip")	Saint-Petersburg	ntp-dip.ru	dip_zenit@mail.ru	(911) 928-8478	Basic software development (DBCS, OS, o ce applications, virtualization tools, programming languages and tools)	
Directum	Izhevsk	directum.ru	office@directum.ru	(3412) 72-1100	Replicated enterprise (institution) management, document ow automation, design and production process systems (ERP, CRM, ECM, EDMS, CAD, APCS and other)	Artificial Intelligence

Company	Head office location	Web	E-mail	Phone	Specialization	Expertise in areas corresponding to global technological trends
DocLab	Ufa	freshdoc.ru	avtushov@freshdoc.ru	(495) 212-1484	Custom software development	Artificial Intelligence
Dom programm	Saint-Petersburg	domprog.com	info@domprog.com	(812) 337-2136	Custom software development	Artificial Intelligence
Ecomash IT	Moscow	ecomash-it.ru	kodeks@ecomash.info	(495) 481-2220	Replicated enterprise (institution) management, document flow automation, design and production process systems (ERP, CRM, ECM, EDMS, CAD, APCS and other)	
Econophysica Ltd	Tomsk	econophysica.com	contactus@econophysica.com	(3822) 90-03-10	Custom software development	Artificial Intelligence, Big Data & BI, Blockchain Technology
eidos	Rostov-on-Don	facebook.com/lubarsky.ru	sergey@lubarsky.ru	(918) 558-3785	Basic software development (DBCS, OS, office applications, virtualization tools, programming languages and tools)	Artificial Intelligence, Big Data & BI
EmDev Limited	Saint-Petersburg	emdev.ru	akakunin@emdev.ru	(812) 385-5778	Custom software development	
EPAM Systems	Moscow	epam.com	ask_ru@epam.com	(495) 730-6362	Custom software development	AR & VR Development, Artificial Intelligence, Big Data & BI, Blockchain Technology, IoT, Smart City
ErmineSoft	Novosibirsk	ermineSoft.com	denis@ermineSoft.ru	(913) 926-2697	Custom software development	AR & VR Development, Artificial Intelligence, IoT, Smart City
EuroMobile	Saint-Petersburg	euromobile.ru	info@euroml.ru	(812) 331-7576	Information security solutions	BigData & BI, IoT, Smart City
eVelopers	Saint-Petersburg	evelopers.com	info@evelopers.com	(812) 032-4321	Custom software development	
EveryTag	Moscow	everytag.ru	hello@everytag.ru	(495) 008-1695	Information security solutions	
Fast Reports	Rostov-on-Don	fastreport.ru	info@fastreport.ru	(863) 227-0740	Basic software development (DBCS, OS, office applications, virtualization tools, programming languages and tools)	
FayGroup	Moscow region	faygroup.ru	info@faygroup.ru	(964) 786-6003	Custom software development	

Company	Head office location	Web	E-mail	Phone	Specialization	Expertise in areas corresponding to global technological trends
ForClasses	Ekaterinburg	moyklass.com	info@moyklass.com	(495) 108-5239	Replicated enterprise (institution) management, document ow automation, design and production process systems (ERP, CRM, ECM, EDMS, CAD, APCS and other)	
Foresight	Moscow	fsight.ru	info@fsight.ru	(495) 137-5498	Replicated enterprise (institution) management, document ow automation, design and production process systems (ERP, CRM, ECM, EDMS, CAD, APCS and other)	Artificial Intelligence, Big Data & BI, IoT, Smart City
GDC Services	Kazan	icl-services.com	pr@icl-services.com	(800) 333-9870	Custom software development	AR & VR Development, Artificial Intelligence, Big Data & BI, IoT
Geoscan Group	Saint-Petersburg	geoscan.aero	info@geoscan.aero	(812) 363-3387	Professional unmanned technologies	AR & VR Development, Artificial Intelligence, IoT
GS Labs	Saint-Petersburg	gs-labs.ru	alexey.goilo@gs-labs.ru	(911) 000-3347	Integrated solutions for the formation of ecosystems for the creation and delivery of digital products based on proprietary technologies	IoT, Smart City
HARMAN Connected Services	Nizhny Novgorod	harman.com	Olga.Sheinfeld@harman.com	(905) 664-1155	Global leader in connected car technology, lifestyle audio innovations, professional audio and lighting solutions, and design and analytics	AR & VR Development, Artificial Intelligence, Big Data & BI, IoT, Smart City
 <p>HARMAN Nizhny Novgorod (founded in 1991, staff – 700 eng.) is following modern trends in Artificial Intelligence, Machine Learning and Natural Language Processing. Our end-to-end software engineering, IoT and data analytics services enable the world's top automotive, mobile and communications, retail and healthcare and software-enabled businesses drive innovation-led growth. HARMAN NN provides cloud technology services, services supporting the Internet of Things and Mobile Applications for Android, iOS, QNX, Java and other mobile platforms. In March 2017, HARMAN became a wholly-owned subsidiary of Samsung Electronics. Customers: Samsung, Jaguar-Land Rover, Mercedes, OnStar/GM, PSA PeugeotCitröen, MSC Cruises, Nielsen, Huawei, Thales, Roche, MainCare, Facebook etc.</p>						
High Technologies Center	Izhevsk	htc-cs.ru	dpletnev@htcmail.ru	(906) 818-7668	Custom software development	Artificial Intelligence, Blockchain Technology
IBIK LLC	Moscow	ibik.ru	director@ibik.ru	(977) 261-1668	Basic software development (DBCS, OS, o ce applications, virtualization tools, programming languages and tools)	
IceRock Development	Novosibirsk	iceroockdev.com	info@iceroockdev.com	(495) 109-7329	Custom software development, Mobile applications	Blockchain Technology, IoT


Company	Head office location	Web	E-mail	Phone	Specialization	Expertise in areas corresponding to global technological trends
Infoapteka	Moscow	infoapteka.com	office@infoapteka.com	(495) 150-3426	Replicated enterprise (institution) management, document ow automation, design and production process systems (ERP, CRM, ECM, EDMS, CAD, APCS and other)	
INFOPRO	Moscow	info-pro.ru	post@info-pro.ru	(800) 600-2401	Information security solutions	BigData & BI, IoT, Smart City
Information Systems and Services	Novosi-birsk	isands.ru	ashovkun@isands.ru	(913) 377-9002	Replicated enterprise (institution) management, document ow automation, design and production process systems (ERP, CRM, ECM, EDMS, CAD, APCS and other)	Smart City
Inostudio Solutions	Taganrog	inostudio.com	russoft@inostudio.com	(8634) 32-0318	Custom software development	AR & VR Development
INOVENTICA Technology	Moscow	inoventica-tech.ru	info@inoventica-tech.ru	(495) 646-7308	Information security solutions	
Inreco LAN	Vladimir	inrecolan.com	sergey.pyatigorskiy@inrecolan.com	(4922) 44-4090	Custom software development	Artificial Intelligence
INTERFACE	Novosi-birsk	interface.nsk.su	interface@interface.nsk.su	(913) 912-2216	System Integration	Big Data & BI
Internet-Frigate	Novocherkassk	ifrigate.ru	main@ifrigate.ru	(86352) 2-4110	Navigation systems & Geographic information systems (GIS)	Artificial Intelligence, Big Data & BI, IoT, Smart City
IQ300	Naberezhnye Chelny	IQ300.ru	info@iq300.ru	(927) 480-6426	Replicated enterprise (institution) management, document ow automation, design and production process systems (ERP, CRM, ECM, EDMS, CAD, APCS and other)	Blockchain Technology, Smart City
iSpring	Yoshkar-Ola	ispring.com	valentina.bulygina@ispring.com	(960) 099-0074	Online Training Software	
ISPSystem	Irkutsk	ispsystem.ru	k.petrulina@ispsystem.com	(914) 001-7106	Embedded software (equipment, devices)	
IT "Design Soft"	Ekaterinburg	d-soft.ru	info@d-soft.ru		Replicated enterprise (institution) management, document ow automation, design and production process systems (ERP, CRM, ECM, EDMS, CAD, APCS and other)	
IT Pro	Moscow	biqube.ru	mail@biqube.ru	(499) 347-8480	Custom software development	Artificial Intelligence, IoT

Company	Head office location	Web	E-mail	Phone	Specialization	Expertise in areas corresponding to global technological trends
IT Universe	Samara	it-universe.ru	info@it-universe.ru	(846) 979-8080	Software development	Artificial Intelligence
Ittransition	Saint-Petersburg	ittransition.com	info@ittransition.com	(495) 640-8937	Custom software development	AR & VR Development, Artificial Intelligence, Big Data & BI, Blockchain Technology, IoT
IVCS Ltd	Innopolis	iva-tech.ru	m.tuktarova@iva-tech.ru	(916) 794-2562	Developers of innovative IT solutions for building a modern digital infostructure	Artificial Intelligence
IW Group	Simferopol	iw-group.pro	alexey@ideas-world.com	(978) 015-6915	Custom software development, Mobile applications	
IZZIO	Moscow	izzz.io	info@izzz.io	(905) 520-3080	Custom software development	Artificial Intelligence, Big Data & BI, Blockchain Technology, IoT
						
		<p>IZZIO, LLC is a software design and development studio for the digital transformation of different-sized businesses and gov agencies, which specialize in web and mobile applications, high-load information systems, developing and embedding CIPF in the software. The company creates projects based on various technologies: blockchain, AI, Big data, IoT, as well as has a number of own developments for different areas. IZZIO, LLC has an indefinite Russian Federal Security Service (FSB) license to develop solutions using CIPF.</p> <p>The flagship product of the company (in the List of Russian software) is the IZZIO blockchain platform with an integrated module based on GOST (Russian National Standard) cryptography: an infrastructure based on the LCPoA consensus algorithm and a set of tools that allow you to easily and cost-effectively create various products based on blockchain technologies.</p>				
JoyCraft Games	Saint-Petersburg	joycraft-games.com	company@joycraft-games.com	(981) 862-7328	Computer games	
KAMIS	Saint-Petersburg	kamis.ru	info@kamis.ru	(812) 274-3522	Replicated enterprise (institution) management, document ow automation, design and production process systems (ERP, CRM, ECM, EDMS, CAD, APCS and other)	Smart City
King Bird Studio	Moscow	kingbird.ru	ask@kingbird.ru	(495) 540-5229	Mobile applications	AR & VR Development, Artificial Intelligence, Big Data & BI, Blockchain Technology, IoT, Smart City
KODEKS	Saint-Petersburg	kodeks.ru	kodeks@kodeks.ru	(812) 740-7887	Replicated enterprise (institution) management, document ow automation, design and production process systems (ERP, CRM, ECM, EDMS, CAD, APCS and other)	AR & VR Development, Artificial Intelligence

Company	Head office location	Web	E-mail	Phone	Specialization	Expertise in areas corresponding to global technological trends
KOMINTEL	Saint-Petersburg	kom-intel.ru	konstvk@kom-intel.ru	(812) 931-1272	Custom software development	Big Data & BI
Kosta	Saint-Petersburg	kostasoft.ru	info@kostasoft.ru	(812) 320-0607	Replicated enterprise (institution) management, document ow automation, design and production process systems (ERP, CRM, ECM, EDMS, CAD, APCS and other)	
LABS	Moscow	advalange.ru	info@advalange.com	(499) 350-2599	Embedded software (equipment, devices)	
LANBilling	Moscow	lanbilling.ru	itdep@lanbilling.ru	(495) 795-0677	Developers in the billing system for telecom operators	
Lanit-Tercom	Saint-Petersburg	lanit-tercom.ru	contact@lanit-tercom.com	(931) 330-9982	Custom software development	AR & VR Development, Artificial Intelligence, Big Data & BI, Blockchain Technology
Lartech	Saint-Petersburg	lar.tech	info@lar.tech	(812) 339-4501	Turnkey solutions for a wide variety of industries where long-distance data transmission is required, high autonomy, ease of installation and quick payback of implementation	IoT, Smart City
League Of Code	Saransk	leagueofcode.ru	welcome@Lcode.pro	(963) 149-1199	Replicated enterprise (institution) management, document ow automation, design and production process systems (ERP, CRM, ECM, EDMS, CAD, APCS and other)	
Leantech	Omsk	leantech.ai	info@leantech.ai	(923) 676-0266	Custom software development	Artificial Intelligence, Big Data & BI, Blockchain Technology
Lexema	Ufa	lexema.ru	market@lexema.ru	(3472) 84-7000	Development in the field of ai and robotization of business processes	Artificial Intelligence
LOGUS	Moscow region	logus.ru	ecology@logus.ru	(903) 664-1923	Custom software development	
Luxoft	Moscow	luxoft.com	VVereschagin@luxoft.com	(495) 967-8030	Custom software development	Artificial Intelligence, Big Data & BI, Blockchain Technology, IoT
Makves Group	Moscow	makves.ru	info@makves.ru	(495) 150-5406	Software for audit and IT Resources monitoring	

Company	Head office location	Web	E-mail	Phone	Specialization	Expertise in areas corresponding to global technological trends
Media technology	Saint-Petersburg	sigmasms.ru	integration@sigmasms.ru	(904) 615-4608	Content provider for A2P text and multimedia messaging	
Media-tel	Moscow	media-tel.ru	info@media-tel.ru	(499) 272-7658	Custom software development	Artificial Intelligence, Big Data & BI, IoT
Megaputer	Moscow	megaputer.ru	info@megaputer.ru	(499) 753-0129	Basic software development (DBCS, OS, office applications, virtualization tools, programming languages and tools)	Artificial Intelligence, Big Data & BI
Monolit-Info	Saint-Petersburg	monolit.com	alex@monolit.com	(921) 937-8542	Replicated enterprise (institution) management, document flow automation, design and production process systems (ERP, CRM, ECM, EDMS, CAD, APCS and other)	
M-Social	Bryansk	msocialproduction.ru	a.trishin@msocialproduction.com	(962) 131-6236	Custom software development	BigData & BI, IoT
Nexign, JSC	Saint-Petersburg	nexign.com	office@nexign.com	(812) 326-1299	Custom software development	Blockchain Technology, IoT
Noviy Disk	Moscow	nd.ru	e-learning@nd.ru	(495) 785-6514	Custom software development	AR & VR Development, Artificial Intelligence, Smart City
Oggetto	Taganrog	oggetto.ru	paul@oggettoweb.com	(989) 612-7000	Custom software development	
OKTET Labs	Saint-Petersburg	oktetlabs.ru	info@oktetlabs.ru	(812) 335-4801	Custom software development	
Overmobile LLC	Novosibirsk	overmobile.ru	finance@overmobile.ru	(913) 798-0533	Computer games	
Paradigma Soft	Saint-Petersburg	paradigma-soft.ru	info@paradigma-soft.ru		Custom software development, Replicated enterprise (institution) management, document flow automation, design and production process systems (ERP, CRM, ECM, EDMS, CAD, APCS and other)	
Pikyug	Novorossiysk	pikyug.ru	py01@py01.ru	(8617) 61-0175	Custom software development	Big Data & BI
PiterSoft	Saint-Petersburg	piter-soft.ru	info@piter-soft.ru	(812) 333-0860	Replicated enterprise (institution) management, document flow automation, design and production process systems (ERP, CRM, ECM, EDMS, CAD, APCS and other)	

Company	Head office location	Web	E-mail	Phone	Specialization	Expertise in areas corresponding to global technological trends
Polymatica	Moscow	polymatica.ru	sales@polymatica.ru	(495) 748-8484	Replicated enterprise (institution) management, document ow automation, design and production process systems (ERP, CRM, ECM, EDMS, CAD, APCS and other)	Artificial Intelligence, Big Data & BI, IoT
Printum	Moscow	http:printum.io	dd@printum.io	(963) 766-2233	Replicated enterprise (institution) management, document ow automation, design and production process systems (ERP, CRM, ECM, EDMS, CAD, APCS and other)	Artificial Intelligence, IoT
PROMT	Saint-Petersburg	prompt.ru	corporate@prompt.ru	(812) 655-0350	Replicated enterprise (institution) management, document ow automation, design and production process systems (ERP, CRM, ECM, EDMS, CAD, APCS and other)	Artificial Intelligence, Big Data & BI
<div></div> <p>PROMT is one of the world’s leading developers of linguistic IT-solutions for enterprise-level clients and private users since 1991. The company is among the few machine translation software vendors from Europe and one of the TOP–10 companies globally.</p> <p>The company has thousands of corporate clients all over the world, such as Amadeus, Nornickel, Russian Railways, PayPal, Gazprom, LUKOIL, SpanishDict, Siemens, Mail.ru, TAdviser.</p> <p>PROMT uses the latest advances in the field of AI to create solutions for all popular platforms — Windows, MacOS, Linux, iOS, Android. PROMT MT software supports more than 50 languages and integrates with Microsoft applications and CAT-systems (SDL Trados, Memsource, Across).</p>						
Qligent	Nizhny Novgorod	qligent.ru	info@qligent.ru		Replicated enterprise (institution) management, document ow automation, design and production process systems (ERP, CRM, ECM, EDMS, CAD, APCS and other)	Big Data & BI
QNIUM LLC	Moscow	qniium.ru	office@qniium.ru	(495) 988-0764	Custom software development	AR & VR Development, Artificial Intelligence, IoT
RAIDIX	Saint-Petersburg	raidix.com	request@raidix.com	(812) 622-1680	Basic software development (DBCS, OS, o ce applications, virtualization tools, programming languages and tools)	Artificial Intelligence, Big Data & BI, IoT, Smart City
Raketa	Vladivostok	raketa.world	hello@raketa.travel	(925) 655-9000	Replicated enterprise (institution) management, document ow automation, design and production process systems (ERP, CRM, ECM, EDMS, CAD, APCS and other)	

Company	Head office location	Web	E-mail	Phone	Specialization	Expertise in areas corresponding to global technological trends
RCO	Moscow	rco.ru	info@rco.ru	(495) 287-9887	Custom software development	Artificial Intelligence
RDTEX	Moscow	rdtex.ru	marketing@rdtex.ru	(495) 995-0999	IT Services	Artificial Intelligence, Big Data & BI, IoT
RED Soft 	Moscow	red-soft.ru	info@red-soft.ru	(495) 285-6268	Basic and application software	<p>RED SOFT — Russian developer and provider of IT solutions and services; Skolkovo resident, member of the "Domestic Software" and RUSSOFT associations. The company implements integrated projects in the field of data storage and management using its own technology stack. RED SOFT is an efficient team with more than 15 years experience in development in the Russian public and commercial sectors. RED SOFT has its own product line: RED OS, Red Database DBMS, Red Platform, Red Virtualization and others. All products are listed in the Unified Register of Russian Software and Databases. Among the company's customers there are more than 20 government bodies, including the Federal Bailiff Service of Russia, the Prosecutor General's Office of the Russian Federation and the Ministry of Defense of the Russian Federation. Projects are being actively implemented in the regions.</p>
Reksoft	Moscow	reksoft.ru	rfi@reksoft.ru	(495) 926-1771	Custom software development	Artificial Intelligence, Big Data & BI, Blockchain Technology, IoT, Smart City
RIT automation	Novosibirsk	rit-it.com	lb@rit-it.com	(913) 700-8372	Embedded software (equipment, devices)	
RNDSOFT	Rostov-on-Don	rnds.pro	es@rnds.pro	(499) 110-9973	Replicated enterprise (institution) management, document ow automation, design and production process systems (ERP, CRM, ECM, EDMS, CAD, APCS and other)	AR & VR Development, Artificial Intelligence, Blockchain Technology, Smart City
Roonyx	Rostov-on-Don	roonyx.tech	vladimir@roonyx.tech	(909) 413-4138	Custom software development	Artificial Intelligence, Blockchain Technology
Rubius	Tomsk	rubius.com	info@rubius.com	(3822) 97-7772	Custom software development	AR & VR Development, Artificial Intelligence, Big Data & BI, Smart City
RunCall	Saint-Petersburg	runcall.ru	info@runcall.ru	(911) 949-4560	Custom software development	Artificial Intelligence
RuNetSoft	Saint-Petersburg	runetsoft.ru	mailbox@runetsoft.ru	(812) 337-2414	Website designing	AR & VR Development, Artificial Intelligence, Smart City

Company	Head office location	Web	E-mail	Phone	Specialization	Expertise in areas corresponding to global technological trends
RusBITech-Astra 	Moscow	astralinux.ru	sfedorov@astralinux.ru	(495) 369-4816	Basic software development (DBCS, OS, office applications, virtualization tools, programming languages and tools)	Smart City
<p>Astra Linux Group is one of the leaders in the Russian information technology market in the area of developing software and information security tools — operating systems of the Astra Linux family and virtualization platforms. The Company has been operating since 2008. Today Astra Linux team consists of more than 300 highly qualified developers and technical support staff.</p> <p>Astra Linux solutions are actively used to ensure security of Critical Information Infrastructure (CII) facilities.</p> <p>The company is a member of ‘Russoft’ and ARPP Software Developers association. Winner of international & local awards.</p>						
SDI SOFT	Moscow	sdisoft.ru	info@sdisoft.ru		Replicated enterprise (institution) management, document flow automation, design and production process systems (ERP, CRM, ECM, EDMS, CAD, APCS and other)	Big Data & BI
Searchinform 	Moscow	searchinform.com	info@searchinform.ru	(495) 721-8406	Complex information protection	
<p>SearchInform is a leading Russian developer of information security solutions. Today, the company’s current list of offered products includes instruments for comprehensive protection against internal threats: SearchInform Risk Monitor, SearchInform DLP, SearchInform SIEM, SearchInform FileAuditor – a DCAP solution, SearchInform Database Monitor — a DAM solution, SearchInform ProfileCenter based on automated profiling, TimeInformer for time-tracking and control of relevance of used websites and applications, as well as offers software as a service.</p> <p>SearchInform products are suitable for companies from all industries, where personal data is stored and processed, as well as commercial, medical, state secret, trade secret and know-how information is kept. The competence of the company is confirmed by a perpetual license from the Center for Licensing, Certification and Protection of State Secrets of the Federal Security Service of the Russian Federation, licenses from the Federal Service for Technical and Export Control of Russia, the products are included in the Unified Register of Russian Programs.</p>						
SFERA	Moscow	sphaera.ru	info@sphaera.ru	(495) 672-7036	Replicated enterprise (institution) management, document flow automation, design and production process systems (ERP, CRM, ECM, EDMS, CAD, APCS and other)	BigData & BI, Smart City
SimbirSoft	Ulyanovsk	simbirsoft.com	info@simbirsoft.com	(800) 2009924	Custom software development	BigData & BI, Blockchain Technology, IoT, Smart City

Company	Head office location	Web	E-mail	Phone	Specialization	Expertise in areas corresponding to global technological trends
Sibedge  sibedge	Tomsk	sibedge.com	contacts@sibedge.com	(3822) 70-1841	A full-cycle global software development company focusing on an approach to business transformation that puts people first Sibedge is a globally distributed software engineering company that puts people first. We combine our innovative technology vision with our clients' business objectives to help them have a smooth journey to digital transformation. For over 15 years, we have successfully implemented over 350 projects across more than 15 countries. We have offices in San Francisco, CA, and Moscow, Saint Petersburg and Tomsk, Russia. In 2019, the company opened a representative office in Australia.	
SIMETRA	Saint-Petersburg	simetrargroup.ru	moscow@simetrargroup.ru		Solution for dispatching, monitoring and modeling transport and logistics flows	Artificial Intelligence, Big Data & BI, Smart City
Smart Design	Saint-Petersburg	smddev.com	info@smddev.com	(921) 932-7150	Custom software development	Artificial Intelligence, Big Data & BI, IoT
Smart Life	Moscow region	smart-life.pro	v.mironov@smart-life.pro	(968) 867-1162	Embedded software (equipment, devices)	BigData & BI, Smart City
SMS-Information technologies	Samara	sms-it.ru	info@sms-it.ru	(927) 263-8621	Proprietary software and creation of solutions for energy and industrial enterprises.	IoT
SoftInform	Tomsk	ssp-soft.com	sales@ssp-soft.com	(906) 950-2550	Custom software development	
SoftLab-NSK	Novosibirsk	softlab-nsk.com	trav@sl.iae.nsk.su	(913) 915-5915	Replicated enterprise (institution) management, document ow automation, design and production process systems (ERP, CRM, ECM, EDMS, CAD, APCS and other)	AR & VR Development
Sonda Pro	Miass	sonda.ru	sonda@sonda.ru	(35135) 3-0677	Custom software development	Artificial Intelligence, IoT, Smart City
Statanly Technologies	Saint-Petersburg	statanly.com	hello@statanly.com	(921) 875-2396	Custom software development	Artificial Intelligence, Big Data & BI, Smart City
Supl.biz	Tomsk	supl.biz	Evg@supl.biz	(913) 823-5866	Replicated enterprise (institution) management, document ow automation, design and production process systems (ERP, CRM, ECM, EDMS, CAD, APCS and other)	Artificial Intelligence, Big Data & BI
SWDC RTSoft	Moscow	rtsoft.ru	rtsoft@rtsoft.ru	(495) 967-1505	Custom software development, Embedded software (equipment, devices)	AR & VR Development, Artificial Intelligence, IoT, Smart City

Company	Head office location	Web	E-mail	Phone	Specialization	Expertise in areas corresponding to global technological trends
SWTECN	Nizhny Novgorod	swtecn.com	valery.kalachev@swtecn.com	(903) 060-7607	Custom software development	
T8	Moscow	t8.ru	info@t8.ru	(499) 271-6161	Telecommunication equipment	Artificial Intelligence, Smart City
						
<p>T8 is Russian developer and manufacturer of the dense wavelength telecommunications equipment (DWDM).</p> <p>Activities:</p> <ul style="list-style-type: none">— developing and manufacturing of DWDM equipment— optical networks design— R&D in the field of laser physics and optical electronics— developing and manufacturing of the radio-photonic component base <p>The DWDM platform includes equipment with 100-600G speed over the channel. The equipment is used for design of metro and backbone networks, connections between data-centers, and it is adapted to the new generation 5G networks. The main clients are telecom operators, IT companies, data centers, system integrators, government and industrial enterprises.</p>						
TAP	Tomsk	tomskasu.ru	info@tomskasu.ru	(999) 620-2759	Custom software development	IoT
Telebreeze	Tomsk	telebreeze.com	andrey.nikitin@telebreeze.com	(906) 948-3848	Solutions for video broadcasting platforms	Artificial Intelligence
Telecontact	Moscow	telecontact.ru	tele@telecontact.ru	(495) 744-5543	Contact Center Software	
Test IT	Moscow	testit.software	artem.kostriukov@testit.software	(950) 863-7003	Replicated enterprise (institution) management, document ow automation, design and production process systems (ERP, CRM, ECM, EDMS, CAD, APCS and other)	Artificial Intelligence
Tezis LLC	Ufa		TezisSoft@mail.ru	(996) 404-4231	Replicated enterprise (institution) management, document ow automation, design and production process systems (ERP, CRM, ECM, EDMS, CAD, APCS and other)	Artificial Intelligence
Thales	Moscow	thales-sentinel.ru	mikhail.chukhlomin@thalesgroup.com	(926) 996-4225	Information security solutions	IoT
Transset	Moscow	transset.ru	info@transset.ru	(499) 649-4668	Own platform - providing access, technical support	Artificial Intelligence, Big Data & BI, IoT
TrueConf	Moscow	trueconf.ru	pr@trueconf.ru	(495) 698-6066	Basic software development (DBCS, OS, o ce applications, virtualization tools, programming languages and tools)	Artificial Intelligence, Smart City

Company	Head office location	Web	E-mail	Phone	Specialization	Expertise in areas corresponding to global technological trends
Tsifrovyye kontrol'nyye tekhnologii	Rostov-on-Don	mt-r.ru	am@mt-r.ru	(800) 222-2061	Replicated enterprise (institution) management, document ow automation, design and production process systems (ERP, CRM, ECM, EDMS, CAD, APCS and other)	AR & VR Development, Artificial Intelligence, Smart City
T-Soft	Saint-Petersburg	t-soft.ru	office@t-soft.ru	(812) 665-5105	Development of computer training systems	AR & VR Development, Artificial Intelligence, Big Data & BI, Smart City
UC Transport	Moscow	podkontrolem.online	info@podkontrolem.online	(499) 677-1703	Replicated enterprise (institution) management, document ow automation, design and production process systems (ERP, CRM, ECM, EDMS, CAD, APCS and other)	Smart City
Umbrella Alliance	Taganrog	umbrellait.com	hello@umbrellait.com	(929) 815-0949	Website designing	AR & VR Development, Artificial Intelligence, Big Data & BI, IoT
UNIVERSE-Soft	Tomsk	universe-soft.ru	manager@universe-soft.ru	(495) 150-2152	Replicated enterprise (institution) management, document ow automation, design and production process systems (ERP, CRM, ECM, EDMS, CAD, APCS and other)	
UserGate	Novosibirsk	usergate.com	kk@usergate.com	(926) 975-6796	Information security solutions	Artificial Intelligence
Usetech	Moscow	usetech.ru	info@usetech.ru	(495) 660-5048	Custom software development	AR & VR Development, Artificial Intelligence, Big Data & BI, Blockchain Technology, IoT, Smart City
Valmaster	Saint-Petersburg	valmaster.ru	info@valmaster.ru	(812) 329-4459	Replicated enterprise (institution) management, document ow automation, design and production process systems (ERP, CRM, ECM, EDMS, CAD, APCS and other)	Smart City
Videomatrix	Ekaterinburg	videomatrix.ru	vmx@videomatrix.ru	(343) 204-7330	Developers in solutions using video analytics, neural networks and artificial intelligence in production	Artificial Intelligence, Smart City
Visiology	Moscow	visiology.su	ivan@visiology.com	(495) 133-6290	Replicated enterprise (institution) management, document ow automation, design and production process systems (ERP, CRM, ECM, EDMS, CAD, APCS and other)	Artificial Intelligence, Big Data & BI

Company	Head office location	Web	E-mail	Phone	Specialization	Expertise in areas corresponding to global technological trends
VR Concept	Moscow	vrconcept.net	cc@vrconcept.net	(495) 212-1147	Replicated enterprise (institution) management, document ow automation, design and production process systems (ERP, CRM, ECM, EDMS, CAD, APCS and other)	AR & VR Development
Web3 Tech	Moscow	web3tech.ru	ikuzmichev@wavesenterprise.com	(910) 450-2686	Custom software development	Blockchain Technology
WebAnt	Rostov-on-Don	webant.ru	v@webant.ru	(960) 466-0100	Mobile applications	AR & VR Development, Artificial Intelligence, Blockchain Technology, IoT, Smart City
Webpraktik	Rostov-on-Don	webpraktik.ru	info@webpraktik.ru	(995) 989-0179	Website designing	Artificial Intelligence, Big Data & BI
WESMA	Moscow	wesma.ru	manager@wesma.ru	(495) 118-2474	Website designing	Smart City
WiFly	Saint-Petersburg	wifly.net	admin@wifly.net		Marketing and monetization solution for Wi-Fi networks	BigData & BI, IoT
YASP	Saint-Petersburg	yasp.ru	welcome@yasp.ru	(812) 974-7403	Replicated enterprise (institution) management, document ow automation, design and production process systems (ERP, CRM, ECM, EDMS, CAD, APCS and other)	Artificial Intelligence, Big Data & BI, IoT, Smart City
YouLK	Novosibirsk	youlk.ru	info@youlk.ru	(383) 209-3430	Replicated enterprise (institution) management, document ow automation, design and production process systems (ERP, CRM, ECM, EDMS, CAD, APCS and other)	Artificial Intelligence, Smart City



WHO WE ARE

Arcadia is a global IT company that creates bespoke solutions for clients worldwide. Our team includes 700 highly-skilled developers, testers, designers and managers. With almost three decades in the business, Arcadia has proved itself as a reliable and trustworthy partner for the world's best brands.

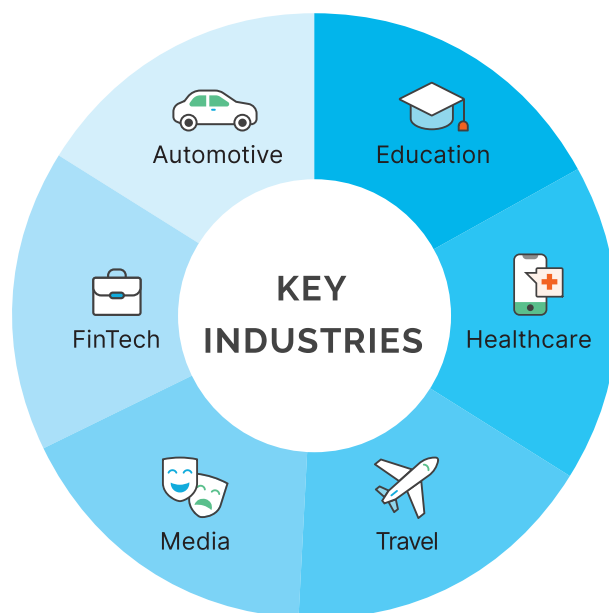
WHAT WE DO

Arcadia provides a full set of IT services that cover every aspect of software engineering. Over the last 28 year, we've obtained solid expertise in custom software, cloud solutions, web and mobile development, design, and testing. Our portfolio includes over 500 successfully completed projects.

WHY CHOOSE ARCADIA

- ✓ Deep industry expertise
- ✓ ISO 27001 certified
- ✓ Long-term relationships with clients
- ✓ Stable teams
- ✓ Access to a pool of 700 IT specialists

TECHNOLOGIES WE USE



WE HAVE OFFICES IN



US



UK



Russia



Belarus

OUR SERVICES



Web Development



Mobile Development



Data Engineering, AI, and ML



DevOps Services



UI/UX design



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