



# 2020

## Russian software industry

**17-th Annual Survey**

**With support from  
APKIT Association**

**RUSOFT Association  
2020**



## Dear Colleagues! Dear friends!

We bring to your attention the results of the traditional research of the software development industry in Russia, which has been carried out by RUSOFT annually since 2004.

In 2020 the study was heavily impacted by the coronavirus pandemic. We were unable to conduct a full-fledged survey in February-March, so we had to conduct an additional round of company surveys in May-June 2020. As a result, we managed to obtain twice less questionnaires than previous years. Therefore, in order to be accurate, in addition to the traditional survey in the midst of the pandemic RUSOFT analysts twice conducted express polls of

industry players on topical issues in the life of companies. The data obtained during this difficult period have also been used in this report. In addition, the results of studying various sources of information were traditionally included into the report as well as expert assessments which had been obtained from top managers of software development companies.

The results of 2019 are important primarily in order to understand how the industry has changed in the challenging 2020. Nevertheless, it should be noted that the previous year was extremely successful for the Russian software development industry. It was marked by a significant increase in sales of the software industry both in the global and in the Russian IT market. An important factor that influenced the growth of the domestic market was the real digital transformation that the Russian economy is going through.

The deepening geopolitical confrontation between Russia and the United States led to a decrease in the share of the US and EU markets in the total volume of software and software development services exports from Russia. But this happened not due to a decrease in sales growth in developed markets, but due to an increase in exports in emerging markets, where Russia was able to provide governments and business communities with alternative security solutions, de facto offering these countries "Digital Sovereignty".

Unfortunately, due to the sale to foreign owners of a number of large Russian companies in 2018-2019, we were forced to exclude their turnover from the calculation of the export volumes of the Russian industry. In this regard, the total indicators of the industry have decreased. As a result, the volume of foreign sales of software and of software development services from Russia amounted to \$8.25 billion (instead of predicted \$11 billion). Thus the total volume of sales in Russia and abroad amounted to \$11.2 trillion (in dollars — \$17.34 billion). The growth of all indicators exceeded 17%.

Russian service companies continued to maintain their positions in the ranking of the 100 leading service companies in the world (according to IAOP). Strengthening of Russian software vendors' positions in the Gartner "magic quadrants" continued, especially it is to notice the success of our companies in the field of information security (7 companies are already included in the rating of the world's best suppliers of information security software).

Taking this opportunity, I would like to express my profound gratitude to our experts who greatly helped to edit the questionnaire and to formulate trends, ensuring that the changes in the global situation in the IT industry have been taken into account:

- Andrew Terekhov (professor of St.-Petersburg State University, President of Lanit-Tercom),
- Alexander Kalinin (CEO of SibEDGE),
- Maxim Semenkin (President of the Association SECON, CEO of CodeInside),
- Alexander Belokrylov (CEO of BellSoft),
- Vyacheslav Ananyev (member of the Board of Directors of the SibAcademSoft Association, CEO of Data East),
- Irina Travina (Chairman of the Board of Directors of the SibAcademSoft Association, CEO of SoftLab-NSK).

And as always, the most sincere words of gratitude to our chief analyst Dmitry Zhelvitsky for the tremendous work in collecting information, preparing the report and rating the leading companies in the industry and leading universities.

We are very grateful to Information & Computer Technologies Industry Association (AP KIT) and to our sponsors for many years of support to the study.

And many thanks to all those who participated in the survey and provided information and their views for the study.

President of RUSOFT Association  
Valentin Makarov

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# CHAPTER 1

Positions of Russian  
software companies in  
the global IT market.



# Reksoft

## Alexander Egorov

CEO



Dear colleagues and partners,

It's been a difficult and eventful year for business. The pandemic has hit every sector of the economy, including the IT market. But we can already say with certainty that overall, software development in Russia has coped well in the face of this challenge. It's helped that software companies have historically been well placed to work remotely by using modern means of communication, and so proved ready to respond to new ways of working. Compared with other sectors, software development has continued to thrive thanks to its flexibility and willingness to digitise working processes. In addition, financial support and other stimulus measures from the state have reduced the impact of the pandemic.

We can expect to see some trends persist even after life returns to normal. First of all, the pandemic has underlined the value of online services. Consumer expectations are higher than ever in terms of the quality and coverage of online connectivity, educational and entertainment content ecosystems for children, information security services that ensure safe, reliable browsing, and cloud solutions and services that make remote working possible. Digital transformation has accelerated even in the more sluggish spheres of life and the economy, which has encouraged our clients to develop and implement as quickly as possible new technologies that will meet the changing needs of end users, whether those are citizens, business or government.

The market has changed, with new models of interaction between consumers and service providers being formed. At many companies, there is increased interest in digital projects, with the aim to transform at pace their products and services to meet new market realities. The difference between today's drive to digitise and that of earlier periods is that the pandemic has made companies view increasing competitiveness through internal optimisation processes as central to their survival, rather than a more speculative interest in a promising area of activity. The speed of transition to digital has increased even in those industries that have traditionally relied on offline channels. Everyone now realises that if they fail to adapt to the new normal, the market will leave them behind.

One of the most important trends in consumer behaviour is versatility. Consumers are increasingly looking to do as much as possible without having to leave the house, instead preferring to make purchases from a safe distance when it suits them. Increasingly, the most successful businesses are ones whose customers can reach them via a range of channels, interacting via a website, social media or in person offline. In addition, consumers expect a personalised company offering, with products and promotions tailored to their own needs.

Governments, too, are changing the way they offer public services. We've seen increased interest from public sector clients in digitisation and artificial intelligence services, including consulting, solution development and implementation, particularly in the implementation of digital transformation and import programmes.

This has been good news for our business. Because Reksoft specialises in the development of complex digital turnkey solutions and helps clients implement digital transformation projects, the pandemic has not affected the quantity or quality of our work. Far from it - we have been able to increase business over the year, and even develop a series of new projects in new areas.

In a world where change is accelerating, the set of processes and technologies we have developed over thirty years has proven a major draw for our clients as they seek to adapt their businesses. Creating digital solutions is different to a bolt-on IT project, because it often involves significant organisational changes on the client's side, right up to tweaking the business model. To make the most of this interconnectedness, we

take an integrated approach. In addition to the design and creation of our solutions, such as consulting on planning the digital transformation process at the enterprise level, we make use of a wide range of tools to prepare the client's information system landscape for work in the new regime so they can hit the ground running.

For our clients, digital transformation is not only about internal changes and incremental improvement. It's also a chance to find their new place in a changing market by creating digital platforms, which then attract other market participants. Almost all of our new projects are related to the creation of platforms of various shapes and sizes. For big business, this means creating ecosystems. For more niche players, it's about understanding how they can transform their business to connect to these platforms and ecosystems and add value.

According to our forecasts, large digital platforms will in the next decade occupy a significant share in many industries, perhaps up to 80% of the volume of a specific market sector. Consulting will focus on the operation of these platforms, providing services for technical support, further development and information security, and consulting on the front end of these platforms for all participants.

Based on our experience in digital transformation over the past year, I can say with confidence that now is one of the best times for the implementation of digital projects. A relatively small investment in digital technologies can significantly improve the competitiveness and efficiency of your business, with a pay-off within two to three years.

### 1.1. Russian ICT market

After the stabilization of the Russian IT market in 2016, when the two-year period of market contraction ended and there were even signs of growth, a quite significant upturn began in 2017. As expected, it continued in 2018. According to IDC, the growth in dollar terms amounted to 9.5% (in terms of rubles — +18.7%). For 2019, the forecast was almost completely justified — instead of the expected growth of 4.8%, there was an increase of 3.9%. The difference of one percentage point in such calculations is quite insignificant.

Thus according to IDC the Russian IT market has reached \$25 billion (₽1.609 trillion, which is 7% more than in 2018).

Most of the segments of this market grew by more than 10% (see section 1.1.4.). The total revenues of the 100 largest companies and of the largest distributors also had at least 10% growth in both rubles and dollars (see section 1.1.2.). Sales of all Russian software companies increased in dollar terms by 12.9% (see section 2.6.). The growth of grocery companies was even higher — 14.4%.

Worse indicators of sales are in the sector of IT equipment ("hardware"). 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 increases. Server deliveries to Russia increased by 7.6% (also IDC data). The supply of printing devices almost also increased — by 7.7% in dollar terms, although in pieces a 1% drop was recorded.

Sagging 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 grown. However, this segment accounts for only about a tenth of the Russian IT market. And its reduction speaks not of some problems, but of market saturation, which became obvious several years ago.

At the same time, sales of computers of local assembly with domestic components are growing rapidly. So far, the share of Russian PCs and servers is not large in order to somehow influence the overall growth rates of the IT market in 2019 but in the near future it will also have to be taken into account.

Sales of IT equipment as a whole increased by 3%, according to IDC. This figure corresponds to the indicators for certain types of devices, but, perhaps, should be closer to 4%. Only software and IT services are completely inconsistent with IDC data. Various sources say their sales are growing in excess of 10%. Moreover the share should be much more than 37% — not less than 45%.

Analysis of various analysts' data, indicators of large distributors and major companies as well as its own calculations of software sales of domestic companies allow RUSSOFT 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. However, IDC's numbers are not wrong. We can talk about different approaches and techniques. In the old days, several analytical companies measured the size of the Russian IT market at once, and their data varied significantly. The reason is not only in the calculation error, but above all in the fact that the attribution of various devices and systems to this market was not the same for all analysts. Therefore, we can assume that IDC does not cover all segments, since some of them are not of interest to the largest IT corporations in the world (which, in fact, are the main clients of IDC).

IDC and other foreign analytical companies measure the Russian market in dollars, although the national currency in Russia is rubles. Using both dollars and rubles can be justified. Much 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 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 importance of ruble measurements increases.

In order not to get confused in various growth indicators (in dollars and in rubles), RUSSOFT suggests focusing on its own bi-currency index. It involves 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 RUSSOFT considers to be 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 — by 9%.

However, taking into account the fact that, according to RUSSOFT, 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 either.

This indicator is also imperfect, since it does not take into account the quite large-scale and rapid transition to cloud technologies and free software (open source), as well as technologies that provide more functionality for less money in comparison with similar solutions that were used before. These processes are difficult and even almost impossible to correctly quantify in terms of changes in the market situation as a whole.

It is important for Russian consumers to get certain useful functionality from the IT market. Even if we imagine that they will receive this functionality for free (that is, with a zero size of the corresponding market), then it will be a blessing for them, although foreign analysts will declare the collapse of the IT market. It is not possible to get IT products or services completely free of charge (even free software, as a rule, requires paid support), but price cuts in IT are common. It leads to a reduction in the market size and to an expansion of opportunities to get more functionality for the same money.

It is important to note that the basic information for calculating the RUSSOFT bi-currency index is the results of a study by the analytical company IDC, which focuses primarily on those segments dominated by large foreign companies, underestimating other rapidly growing segments where these companies do not have a large share.

### RUSSOFT dual currency index

2014	2015	2016	2017	2018	2019 (forecast at the beginning of the year)
-10.6%	-25%	≈0%	+9%	+10%	+5% (+5%)

Source: Calculated based on IDC data

It is important to clarify that RUSSOFT does not conduct its own research of the Russian IT market. The Association's analysts draw conclusions about its state only on the basis of an analysis of data obtained from numerous sources (reports of research companies, published ratings, official indicators of the largest Russian IT companies).

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

RUSSOFT's conclusions on the market situation and those of IDC do not contradict with each other. They differ only because in one case the view of the IT market is made from the side of Russian companies and Russian IT consumers, and in the other case — from the side of foreign vendors. Moreover, it is IDC that remains the source that provides the most complete picture of the situation in the Russian IT market. The calculations and conclusions of RUSSOFT are largely based on the data of this company.

Unfortunately, there is no such relevant internal source of information about the IT market as is IDC in Russia. For state statistics (Rosstat) the IT industry and IT market do not exist at all. The work of statisticians has not yet reorganized into a modern market economy with dynamically developing high-tech companies.

The regulator proposed to create a unified methodology for assessing the indicators of the Russian IT industry, which was reflected in the draft order prepared by the ministry. However 4 years have passed and nothing is known about the consequences of this proposal. Now the ministry has changed its name (it became known as the Ministry of Digital Development, Communications and Mass Media) and the leadership has changed. We also hope for changes in statistics, since the availability of our own objective data is extremely necessary for the preparation of a justification and assessment of the effectiveness of solving state problems (for example, for assessing the impact of state support measures on the import substitution process).

## Russian IT market in 2013-2019

		2013	2014	2015	2016	2017	2018	2019
Foreign companies view	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%)	\$25 billion (+3.9%)
Russian companies view	in rubles (growth / decline per year)	₽1.05 trillion (+3.9%)	₽1.063 trillion rub. (+1.2%)	₽1.08 trillion (+1.6%)	₽1.137 trillion (+5.3%)	₽1.27 trillion (+2%)	₽1.51 trillion (+18.7%)	₽1.61 trillion (+7%)
	change in rubles for inflation	-2.4%	-9.1%	-9%	≈0%	≈0%	+13.8%	+4%

Source: Calculated based on IDC data

According to the estimates of IDC, in 2019 the volume of ICT spending in Russia amounted to \$47.05 billion. As a result, the Russian Federation has become the largest market for information and communication technologies (ICT) in the region of Central and Eastern Europe (CEE).

### 1.1.1. Main indicators of the ICT market in Russia

#### Key indicators characterizing the Russian ICT market in 2019

Index	Absolute value at the end of 2019	Growth (+) at the end of 2019	Source
ICT market	\$47.05 billion	n/a	IDC
Volume of the Russian IT market (with mobile equipment)	\$25 billion (₽1.609 trillion)	+3,9% (+7%)	IDC
Total revenue of the 100 largest IT companies in Russia	₽1.566 trillion (\$24.2 billion)	+21% (+17%)	CNews100 rating
Cumulative turnover of 100 largest IT companies in Russia	₽1.694 trillion (\$26.2 billion)	+14,5% (+117%)	TAdviser100 rating
Russian telecommunications market	₽1.73 trillion (\$26.8 billion)	+2,1% (0%)	"TMT Consulting"
Total revenue of participants in the rating of the largest IT suppliers in the transport industry	₽34.5 billion	+17%	CNews

In August 2020, the All-Russian Public Opinion Research Center (VTsIOM) presented research data on the practice of using computer or laptop by Russians. According to these data, only 22% of surveyed Russians aged 18 and older do not have a home computer (therefore, the majority of Russians — 78% — have a laptop or personal computer at home, versus 8% in 2001); every third person reports the presence of several devices (34%); 37% of Russians use a computer every day at home (+15 pp in 10 years); Russians most often use computer to access the Internet (79%, +16 pp since 2010); the share of those who use computer for games has decreased (13%, -7 pp since 2010).

Experts from the Kontur and Gazprombank Avtoleasing companies determined in May 2020 that electronic document management (EDM), which helps to exchange information safely online when doing business, is used by only 30% of Russian enterprises in their activities. However, among large companies there are 70% of them. Micro-enterprises and SMEs use EDF in 5% and in 12% of cases correspondingly. Such indicators prove that the growth potential of the Russian market of solutions for electronic document management is still quite large.

## Positions of Russian software companies in the global IT market.

According to CNews, Russian law enforcement and supervisory authorities spent ₺130.4 billion on IT and software in 2019, which is 10% more than in 2018.

It can be noted that the total revenue of the hundred largest IT companies (both according to CNews and TAdviser) is about the same size as the entire IT market of Russia - according to IDC. However, these ratings did not include all the largest companies, since they did not provide their data to the compilers of the rating. Of course, there is double counting in this total revenue and export earnings are included. Nevertheless, these data give reason to assume that the size of the Russian IT market is much more than \$25 billion. There are more than 5 thousand IT companies in Russia (more than 10 thousand accredited with the Ministry of Digital Development).

### 1.1.2. Some information characterizing the situation in the Russian IT market

The data provided by individual companies reflects the situation as a whole only partially, since, as a rule, they only present to the public the results of the past year when the year was successful for them. However, the largest companies have market size constraints, and therefore, if a number of such companies have decent growth, then it is safe to assume that the entire market has the same growth.

It is noteworthy that a number of large Western corporations have ceased to disclose the results of their work in the Russian market. This usually happens if there is little growth or there is a decrease in sales. This is another sign that import substitution in the IT sector is difficult, but still underway.

### Results of 2019 for a number of Russian and foreign companies occupying significant shares in their segment of the Russian IT market

Name	pecialization	Growth / decline in turnover in 2019 (absolute value)
MERLION	Distribution of IT and household appliances	+23% (₺331.5 billion)
Jet Infosystems	System integration	+25% (₺31.1 billion)
"My office" (NOT)	Development of office applications	+420% (₺773.5 million)
Group of companies "KORUS Consulting"	of System integration	+28% (₺5.2 billion)
"System software"	Software distribution	+21% (₺6.9 billion)
Rostelecom	Telecommunication operator responsible for the implementation of federal digitalization programs	+5% (₺335 billion)

### Sales of foreign companies in Russia

TP-Link	Telecommunication equipment	+26%
IBM (revenue of the Russian legal entity "IBM Eastern Europe / Asia")	Diversified company	+4.3% (₺10.69 billion)
SAP CIS	ERP, analytics systems and other business solutions	+2% (€ 482.5 million)
Asbis	International holding engaged in the distribution of IT products	-7% (\$1.91 billion)

### 1.1.3. Structure of the Russian IT market

#### Structure of the Russian IT market at the end of 2019

	absolute value	share (a year earlier)	change (absolute value)
IT equipment	\$15.6 billion	62.6% (63%)	+3%
IT services	\$6 billion	24,1% (24%)	+5.5%
Software	\$3.3 billion	13.3% (13%)	+6%
<b>Total:</b>	<b>\$24.9 billion</b>	<b>100%</b>	<b>+3.9%</b>

Source: Calculated based on IDC data

The Russian IT market was considered immature due to the too high share of hardware. In part, it remains so if we apply the appropriate maturity criterion, but after many years of a slow increase in the share of IT services and of software, in 2014-2015 there was a sharp jump of IT services — their share increased from 20% to 25%. In 2016, it remained almost unchanged, and at the end of 2017 the indicator increased by another percentage point — up to 26%. This change was caused primarily by a significant rise in the cost of hardware import which led to a decrease in its sales (because customers preferred not to buy new hardware but to modernize existing one by new services). However, the factor of the ruble devaluation in 2017 could no longer work to increase the share of IT services, since in 2018 there was a significant strengthening of ruble.

In 2018, IDC determined a large 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 to the structure that was before 2014, although the share of IT services still remained higher than it was in 2014 (24%, while it was 20%). A similar thing happened with the rise in the cost of imported hardware in USD due to the devaluation of ruble. In 2019 the market structure did not change significantly, but the share of IT services and of software increased slightly.

If we take into account the underestimation of IT services and of software (see section 1.1.), then there is reason to assume that the total share of IT services and of software in the IT market in Russia may not be 37-40% (as it used to be in the last 2 years) and exceed 45%.

The fact that 78% of the total revenue of the 100 largest companies in the CNews rating comes from the provision of IT services also does not agree with the IDC data, according to which 63% of the Russian IT market is provided by sales of hardware.

J'son & Partners Consulting compared the shares of telecommunications services, hardware and IT services in the country's GDP in the United States and Russia. The largest difference was recorded for IT services — 8.9 times.

#### Shares of the main ICT segments in Russia and the USA

	Share of telecom services in GDP	Share of hardware in GDP	Share of IT services in GDP	Share of IT in GDP
Russia	1.83%	0.50%	0.16%	0.83%
USA	1.72%	1.38%	1.43%	4.01%
USA / Russia ratio, times	0.9	2.7	8.9	4.8

Source: J'son & Partners

### 1.1.4. Data on segments of the Russian IT market

In 2018, almost all segments of the Russian IT market grew. At the same time, growth rates in most cases are double-digit. UPS sales alone declined 1.2% in dollar terms, although there is a barely detectable increase in number of units (+0.3%).

In 2019 the trend generally continued. Only personal computers declined in dollar terms.

Selected segments of the Russian IT market

Index	2019	Decline (-) / Growth (+) at the end of 2019	Source
<b>"Hardware"</b>			
Smartphones	30 million pcs.	+1%	MTS
Smartphones	34 million pcs.	+12%	Omdia
Smartphones	32.9 million pcs. (\$7.9 billion)	+9.6% (+4.5%)	IDC
Smartphones	30 million pcs.(¥495 billion)	+1.5% (+7%)	M Video- El'dorado
Smartphones	30.14 million pcs. (¥495 billion)	+2%	GfK
Transport telematics	¥15 billion	n / a (forecast +10% annually)	Avtonet
Supplies of printing devices	\$696 million (2.56 million pcs.)	+7.7% (-1%)	IDC
Server deliveries	\$1.035 billion	+7.6%	IDC
Storage systems	\$508.09 million	+20.8%	IDC
Desktop PCs	1.91 million pcs.	+0.5%	IDC
Desktop PCs	3.11 million pcs.	+5.8%	ITResearch
Server equipment	\$1.035 billion	+7.6%	IDC
Personal PCs	5.34 million pcs.	-7.8%	IDC
Commercial data centers	44.1 thousand racks	+12.3%	iKS-Consulting
<b>Markets of the future</b>			
Industrial Internet of Things (IIoT)	¥7.92 billion	+4%	iKS-Consulting
Machine-to-machine communications and the Internet of Things	¥64 billion	n / a	J'son & Partners Consulting
WAN IoT / M2M devices	23 million pcs.	+21%	J'son & Partners Consulting
AI technologies	\$172 million	+30% annual growth	IDC
Market size of solutions for smart cities	¥81 billion	n / a	Analytical Center for the Government of the Russian Federation
<b>Software</b>			
Virtual PBX	¥8 billion	+15% (+30% for the number of subscribers)	J'son & Partners Consulting
Virtual PBX	¥11 billion	+39%	TMT Consulting
Virtual PBX (including revenue from hybrid solutions)	¥13.5 billion	+35%	TMT Consulting
Information security systems	¥90.6 billion	+14%	Analytical center TAdviser
Mobile applications	\$1.06 billion (about 1% of the world market)	+40%	App Annie
Mobile apps (number of downloads)	5,125 million apps	+35%	App Annie

Index	2019	Decline (-) / Growth (+) at the end of 2019	Source
<b>Services</b>			
IaaS/PaaS	₽11.9 billion	+29%	J'son & Partners Consulting
Public cloud services	₽73 billion	+30%	TMT Consulting
SaaS	₽46 billion	+26%	TMT Consulting
IaaS	₽23 billion	+38%	TMT Consulting
Chat bots	₽1.5 billion	In the next three years +30%	Accenture

In some areas, there has been a decrease in growth rates. For example, AC & M-Consulting in November 2019 predicted an increase in the IoT market for the entire year by 12.5%, and the number of sold wireless IoT devices in operators' networks — by 15%. In 2015-2018, the growth rates were higher — 20-30%.

Perhaps this is due to the fact that this market is not entirely new in order to maintain rapid growth.

### 1.1.5. Russian software market

According to IDC, the Russian software market reached its maximum value in 2013 and amounted to \$5 billion. Over the next two years it decreased by more than 2 times — to \$2.3 billion. In 2016 such a rapid decline stopped — the software market shrank by another 4% to \$2.2 billion. In 2017 a very decent growth was recorded — up to \$3 billion. However, the IDC reported growth of 19% (if you compare 3 billion and 2.2 billion, it turns out 36%). Apparently, the 2016 data were adjusted upward by IDC analysts (thus, there was still no reduction in the software market).

In 2018 the software market grew by 2.2% to \$3.07 billion. In ruble terms, the situation looks better — an increase of 10.4%. Even taking into account the official inflation rate, the market expanded by almost 6%. In 2019 the software market grew by 6% in dollar terms. The market size is still small - \$3.3bn, when compared with the same indicator in 2013. However, 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, the sales on the domestic sales of Russian software companies traditionally turn out to be much larger than the capacity of Russian market. Growth/decline indicators are also much better in RUSSOFT's reports. At the end of 2019, sales of Russian software companies within the country amounted to \$9.1 billion, with an increase of 12.9% (in rubles, an increase of 15.7%). However, this figure includes revenue from custom software services, which IDC classifies as IT services. Nevertheless, sales of domestic software products within Russia amounted to approximately ₽301 billion (\$4.7 billion), which turns out to be the largest of the entire software market determined by IDC. This indicator has a double count, since when creating a solution on the platform of some vendor, the cost of this vendor's software is counted twice — in the income of the developer of the final solution and in the income of the platform provider. However, this double count is unlikely to exceed \$0.5 billion (most likely much less).

If we assume that foreign software developers are selling in Russia no less than \$1.5-2 billion, it turns out that the entire Russian market has already exceeded \$6 billion and is approaching \$7 billion. Together with software services, which is quite possible combine with software products, since it is often an alternative to replicated solutions, the market size will turn out to be at least \$10 billion.

Such a big difference (between IDC and RUSSOFT indicators) is fully explained by different approaches and methods. The methods, goals and objectives of researching certain markets can be radically different. 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 IT Service or Software? To 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 sells serially a software and hardware complex created on the basis of its standard software, is it 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.

The problem is not that there are very different estimates of the size of the software market. The problem is that there is only one available source of information on the size of this market. IDC may well have its own tasks, following which this analytical company quite correctly calculates indicators for the Russian software market. It can be assumed that only the market viewed by foreign vendors is recognized as such. For other tasks, research is not carried out or nothing is known about them. For example, for import substitution in the field of software, there is no objective information for decision-making at the state level. It can be argued that it is almost non-existent, except for the declared but not confirmed data on the shares of Russian developers for various types of software. Such data was presented in government documents, but did not cite specific studies.

### Main characteristics of the Russian software market in 2015-2019

	2015	2016	2017	2018	2019	Notes
Market size (change per year)	\$2.3 billion (-43.1%)	\$2.2 billion (-4%)	\$3 billion (+19% *)	\$3.07 billion (+2.2%)	\$3.3 billion (+6%)	IDC version
	\$5.5-6.4 billion (-30-32%)	\$6-7 billion (+11-12%)	\$7.3-8.5 billion (+20-22%)	\$8-9.3 billion (+10-11%)	at least \$10 billion (approximately +10%)	version of RUSSOFT (together with custom software, SaaS and implementation services)
Change in rubles, taking into account the official inflation rate	-19%	+16-17%	+3.5%	+5.5%	+7%	version of RUSSOFT

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

Apparently, the software market was influenced by different (the main one is the global digitalization process, which requires more software development). In 2017-2019, software and SaaS vendors revised their tariffs in rubles upward. For example, popular information security solutions from Kaspersky have become more expensive. Since October 18, 2018, the cost of an annual subscription to the Office 365 Personal software package in Russia has increased by 30%. It was planned to adjust prices for other Microsoft office products.

The second factor was revealed by the 1C. According to their estimations, more and more "customers" develop software themselves. Most likely, it is assumed that in large and medium-sized corporations there is a reorientation from standard solutions to custom and internal development. This version is confirmed by the fact that sales of custom development services are growing in Russia faster than sales of ready-made replicated solutions.

According to the CNews SaaS and CNews IaaS ratings, in 2019 the revenue of the 10 largest domestic SaaS providers reached P48 billion, with an increase of 48% compared to 2018. IaaS market turnover is half as much — the revenue of the top 10 participants of the rating amounted to 24 billion rubles, but they also demonstrate similar growth rates — 49%.

#### 1.1.6. Forecasts for the Russian IT market for the coming years

In April 2020, IDC predicted a 30% fall in the Russian IT market for the entire year (in one of the speeches of a company representative, a value of 26.34% was indicated). In June, the forecast was revised to even more negative — a decrease of 35%. IDC analysts focused on the consequences of the worsening economic situation in the country during the crises of 2008-2009 and 2015 and on the dynamics of oil prices. They expect the market to recover to 90% only in 2023.

However, in October 2020 Robert Farish, vice president and regional managing director of IDC for Russia and the CIS, made adjustments to IDC's forecasts. According to him, the company's experts believe that the total volume of the IT market in Russia in dollar terms by the end of 2020 will decrease by 8.2%.

The results of Q1 and Q2 2020 were very good for a number of IT market segments. Even the PC market, which has stagnated in recent years, began to grow rapidly if we compare the sales volume on it with the same period in 2019. Some of these results were summed up after the forecasts made.

For example, at the end of June, the results of the IDC EMEA Quarterly Enterprise Storage Systems Tracker study were presented, according to which, in the 1st quarter of 2020, external storage systems were delivered to the Russian market for a total amount of \$99.64 million, which is 37.9% more than in the first quarter. Dec 2019.

According to IDC EMEA Quarterly Server Tracker research, in the first quarter of 2020, 30,767 servers of all types were delivered to the Russian market for a total of \$231.16 million. Compared to the same period last year, the number of delivered servers increased by 27.6%, while the volume of supplies in monetary terms increased by 34.9%.

According to the Unified Public Procurement Information System, the volume of public procurement in the IT sector in the Russian market in the first half of 2020 reached ₺153.2 billion (approximately \$2.3 billion), with an increase of 70% compared to the same period in 2019. Most of this amount fell on the purchase of software — 2.7 thousand transactions were registered in this sector. In March-April, purchases of computer equipment were more active in order to ensure the transfer of some employees to remote work.

In 2020, according to CNews Analytics, Russian regions intend to spend about ₺212 billion on digitalization and on IT implementation, which is 31% more than last year. The driver of the growth of regional IT budgets remains the implementation of the Unified State Healthcare Information System. However, a change in the economic situation may bring significant changes to these plans.

Sales of laptops in Russia in the first half of 2020 increased by 46% to ₺61.8 billion. In units, the increase is less — it amounted to 38%. A total of 1.5 million devices were purchased in six months. Such data was provided by the Svyaznoy.

According to IDC, in the II quarter 2020 the Russian computer market showed a 30 percent growth compared to the same period last year.

Of course, after such a rise in connection with bulk purchases for remote work, it is logical to expect a significant decline in the III and IV quarters. Analysts at IDC in May 2020 expected that in the global corporate market, PC sales in piece terms would decline in the II quarter by 6.9%, in the III quarter — by 8.8%, in the IV quarter — by 12.1%.

According to GfK's monitoring of retail sales, for the period from January to May 2020 the demand for equipment decreased by 1% in units, but turnover in rubles increased by 9%.

According to a study by IDC Worldwide Quarterly Mobile Phone Tracker, 6.48 million smartphones were shipped to Russia in the second quarter for a total of US \$1.27 billion (retail prices excluding VAT). Despite a number of restrictive measures in retail related to the outbreak of coronavirus in the second quarter, the Russian smartphone market as a whole held out, shrinking by only 11.5% in piece terms compared to the same quarter of 2019.

At the same time, there were significant losses already in the first quarters. According to the Content Review agency, due to the pandemic, mobile operators in Russia lost about ₺30 billion in the period from March to May 2020. According to experts, 40% of losses from this amount fell on the closure of telecom shops. Another 30% is roaming losses after border closures following the coronavirus outbreak. In addition, companies had to spend money on developing networks, transferring employees to a remote mode of work and free access to socially significant data.

There should be a rise of the "Information Security" segment. 57% of Russian companies have made cybersecurity one of their strategic priorities during the pandemic. This is the conclusion reached by experts of the "HR Lab. - Laboratory of HR Innovations" and the platform "Academy of Health", which conducted research for the Analytical Center "AlfaStrakhovanie. Medicine", the results of which were presented in July 2020. Experts interviewed the heads of IT departments of more than 100 Russian companies (with a turnover of \$100 million per year).

48% of respondents said that their company has always paid attention to the security of information processes, however, the transition of employees to a remote format set new challenges for IT departments. 36% noted that electronic document flow in a remote work environment required additional protection measures for users' home computers.

According to a study by DT-Global Business Consulting GmbH, despite the fact that 2020 has become a crisis for business, 51% of companies do not plan to transfer investments in digitalization to a later date, and 37% will increase their investments in the development of digital technologies. Before the crisis, IT was often seen as a complementary tool for streamlining work processes. Many corporations were in no hurry to implement digital solutions in their business models, but chose to wait.

However, according to a survey conducted by DT-Global Business Consulting GmbH in February-March 2020, 90% of respondents said that the volume of e-commerce in their organization will increase this year — 57% expect an increase of more than 10%. And after the government adopted large-scale quarantine measures, digitalization has become a real lifeline for many companies that continue to work in these emergency circumstances. The DT-Global Business Consulting GmbH survey involved over a hundred senior executives from international and local companies operating in Russia in various sectors of the economy.

Growth in online education was expected even before the outbreak of the pandemic. In October 2019 analysts from Yandex.Kassa and Netology presented the results of a user survey regarding online learning. They found that the average check of Russians for courses, trainings and master classes on the Internet increased by more than 20% year to year, and the turnover of the online education market — by more than 60%. At the same time, only 8% of users have experience of learning via the Internet, but already 40% admit that they will study online. It can be assumed that the pandemic will increase this proportion.

IDC announced in the spring that it expects a revival in the segment of the health management system, health monitoring. A new impetus for development will be given to the "safe city", solutions for video surveillance, automation of contact centers and receipt of electronic documents. In turn, this stimulates the development of basic technologies: cloud computing (IaaS, SaaS, PaaS), global networks, network security, data centers, analytical systems, artificial intelligence, big data.

In the current situation with many unknown factors significant for the IT market, accurate forecasts are impossible even in the coming months. The sales outlook for the rest of the year can only be guessed at. However, there are forecasts for some of the fast growing segments for the next few years. They will certainly be revised more than once, but they are still worth mentioning.

According to the results of the new IDC report "Opportunities and Trends of the Internet of Things: An In-Depth Analysis of the Russian Market" presented at the end of 2019, more than 50% of companies have already implemented or plan to complete projects for implementing solutions using IoT technologies within 12 months. IDC predicts that the IoT market will grow at a CAGR of 19.7% from 2018 to the end of 2023.

According to Center 2M, by 2025 the number of IoT / M2M devices in Russia will grow to 40.8 million. At the same time, such segments as transport, housing and communal services and energy will remain the most capacious. Thus, according to analysts' forecasts, it is expected that the domestic market for monitoring and managing a commercial vehicle fleet will more than double in the next 5 years: from 8 million devices in 2019 to 18.5 million in 2025. IoT market potential- devices for housing and communal services and energy is estimated at 7.5 million units, which became possible due to the mandatory introduction of smart metering technology (intelligent electricity metering) and SmartGrid technology ("smart" grids).

J'son & Partners Consulting estimates the volume of the Russian market of M2M communications and the Internet of Things in 2019 at ₹64 billion. The number of IoT / M2M devices connected to the WAN was slightly less than 23 million, (an increase of 21%). According to the forecast of J'son & Partners Consulting, the number of connected devices in 2025 will grow to 56 million, while in monetary (ruble) terms the market will grow to ₹86 billion (CAGR 5%).

In May 2020 Accenture presented the results of the research "Crisis digital technologies: prospects for the chatbot market." According to Accenture, the chatbot market in Russia is expected to grow by 30% annually over the next three years. In the course of the study, 564 respondents were interviewed from 100 companies representing more than 18 sectors of the Russian economy.

Due to the pandemic, the need for personal contact in business processes is reduced. In this regard, according to the research results, the relevance of the use of chat bots using voice or text has significantly increased.

According to Accenture, in 2019 the volume of the chatbot market in Russia amounted to about ₹1.5 billion. In the next three years, the market will grow by 30% annually, that is, by about ₹400-600 million per year.

IDC's October 2019 forecast predicted that the hyperconvergency market will grow at a CAGR of 10.2% between 2019 and 2023.

### 1.1.7. Use of Internet technologies

For the Russian Internet industry in 2014-2015 there was no crisis at all, except for a slight slowdown in growth. At the same time, this slowdown was partly due to the fact that the number of Internet users in 2013 approached the maximum possible and could no longer grow at the same rates.

In 2016-2017 the high growth rates of a number of indicators characterizing the use of Internet technologies in Russia recovered. We can say that at the end of 2018, the growth rates increased. In any case this applies to Internet commerce.

In 2019 the number of Internet users even increased (by about 4%), although the figure is already approaching a possible maximum.

#### Use of Internet technologies in Russia

Index	Time	Absolute value	Change in indicator	Penetration rate	Source
Number of Internet users (over 16 years old)	end of 2019	94.4 million people	3.70%	79.8%	GfK
Runet audience	February 2020	96.7 million people	+4.2% per year	79% of the population	Mediascope
Mobile Runet audience	February 2020	86.2 million people	-	90% of all Internet users	Mediascope

According to RAEC Association, the volume of the e-commerce segment in 2019 amounted to ₹4,172.8 billion, of which: online retail — ₹1,295 billion (+26% versus 2018), online travel — ₹730.3 billion (+9%), online services market — ₹808.7 billion (+19%), electronic payment services market — ₹1,338.8 billion (+19%). The contribution of the RU.net economy to the Russian economy in 2019 amounted to 6.4 trillion rubles. At the same time, the contribution of the main segments amounted to ₹4.7 trillion, showing an increase of 19% compared to 2018. Marketing and advertising provided ₹314 billion; infrastructure — ₹126.8 billion; e-commerce — ₹4,172.8 billion; media and entertainment — ₹85.7 billion. RAEC estimates the direct contribution of the mobile economy at ₹1.7 trillion.

According to Mediascope, in February 2020 the RU.net audience was 96.7 million people or 79% of the country's population (these are those users who use the Internet at least once a month). The growth compared to the same period last year amounted to +4.2%. Moreover, 90% of Internet users go online every day.

The share of socially significant infrastructure facilities with the ability to connect to broadband Internet access in 2019 amounted to 44.3% against 36.1% a year earlier. This is evidenced by the statistics published by Rosstat on the national project "Digital Economy".

### 1.1.8. Telecommunications market

#### The volume of the Russian telecommunications market in 2019

	Absolute value	Growth / decline in 2019	Growth / decline in 2018	Source
Russian telecommunications market	₽1.73 trillion (\$26.8 billion)	+2.1% in RUR (-0.4% in USD)	+3.4% in RUR (-4.2% in USD)	"TMT Consulting"

At the end of 2019, the analytical agency "TMT Consulting" prepared the report "Russian Telecommunications Market 2019-2024". According to preliminary data, the volume of the Russian telecommunications market in 2019 reached ₽1.73 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.

The decline in dynamics is primarily due to the slowdown in growth in the mobile communications market: forming 57% of all telecom revenue, this market primarily determines the dynamics of the communications industry. Other negative factors were a slowdown in the still fast growing Pay TV market, as well as a consistently high rate of decline in revenues in the markets for fixed telephony and inter-operator services. Subscribers continue to abandon home telephones, as well as the optimize the costs of telephone communications in enterprises and organizations. The inter-operator market is shrinking due to market consolidation and a drop in revenue in a number of international destinations.

At the end of 2018, TMT Consulting estimated the Russian telecommunications market at ₽1.77 trillion. That is more than in 2019. Perhaps there has been a recount. Nevertheless, it can be argued that this market has hardly been growing in recent years in ruble terms, and has been steadily declining in dollars. The exception is 2017, when the market grew by 1.3% in rubles and by 16% in dollars. The increase in dollar terms was ensured by the strengthening of the Russian national currency against dollar, and in rubles — the beginning of the revision of tariffs upward (in previous years, tariffs were often reduced).

Another increase in tariffs began at the end of 2019, which will affect the performance of the telecommunications industry at the end of 2020.

According to TMT Consulting, most federal operators in 2019 managed to maintain positive revenue dynamics due to the continuation of the more for more tariff policy — offering more voice and data traffic for a lot of money. As a result, the average market ARPU for the year increased by 2.6% and reached ₽321.

The mobile subscriber base grew by 1.7% and amounted to 260 million. The growth of the subscriber base continued to be influenced by the increase in the number of mobile M2M connections.

Internet broadband penetration has reached 60%. The subscriber base grew by 1.4%, primarily due to the connection of new buildings.

In the Pay TV market, subscriber growth fell to 1.7% from 3.3% a year earlier. The main reason is the outflow of cable TV users. In the context of the stagnation of the satellite TV market, IPTV is the driver of the subscriber base growth, but in this sub-segment as it approaches saturation, the growth rates decrease. At the same time, revenue is growing at a faster pace — 10.2% due to higher tariffs and migration of subscribers from analogue KTV to digital KTV and IPTV, however, there is a slowdown here too.

In 2019, 2.2 million subscribers abandoned fixed-line telephony, and thus service penetration fell by 3 p.p. up to 30%. Fixed-line telephony revenues decreased by 8.9% over the year.

According to a study by the information and analytical agency Content Review for December 2018, Russia took 8<sup>th</sup> place in the ranking of countries with the cheapest mobile Internet. Thus, Russia has maintained its position compared to the ranking published in June this year. From May to December, the cost of 1 GB of mobile Internet traffic in Russia decreased by 15% and amounted to ₽55.5. The global average for the same period decreased from ₽280.5 to ₽269.3.

## Indicators of individual segments of the Russian telecommunications market

Index	Time	Absolute value	The change	Source
Number of mobile subscribers	end of 2019	254 million people	+1.7% per year	TMT Consulting
Average monthly bill per subscriber (ARPU) broadband access	2019	₽359	+2.6% per year	TMT Consulting
Number of Home Wired Broadband Internet Users	2019	33.4 million (60% of all households, and in Moscow — 88%)	+1%	TMT Consulting
Home broadband market	2019	₽143.3 billion	+4.4%	TMT Consulting
Cloud video surveillance market for business	2019	₽1.32 billion	+52%	TelecomDaily
Virtual PBX market (number of client companies)	2019	₽11 billion (328 thousand)	+39% (+23%)	TMT Consulting
Fixed telephony revenue	2019	₽119 billion	-8.9%	TMT Consulting
Russians have smartphones(pcs.)	2018	122.9 million pcs.	-	J'son & Partners Consulting o

## 1.2. Russia and Russian cities in world IT rankings

There have been no serious shifts of Russia in the world rankings in recent years. We can especially note 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 move to a bit lower positions. Apparently, the overall negative information background affects the state of affairs in Russia, and this affects the authors of ratings.

At the same time, any change in Russian positions in world rankings has a weak connection with real changes. Long-term observations allow us to determine the following pattern: the place of Russia in the rating is the higher, the less it takes into account subjective expert assessments. Therefore, a decrease or increase in Russia's rating, 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 ways, the country's position in the ranking is influenced by 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 by analysts of additional important information. There is progress in Russia in various directions, but in almost all cases it is happening evenly and without leaps.

In March 2020, at the request of the Ministry of Digital Development, RUSOFT interviewed its members in order to understand how Russia's position in world rankings affects their business (promoting 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 companies or their products (in particular, reports from Gartner, IDC, Forrester and the rating of the IAOP Association) can matter. There are a lot of companies in the world market, whose affiliation to any country is difficult to determine. Therefore, most often the consumer is guided by the brand. In most cases, the country is not at all interested, unless we are talking about public procurement. In these cases, over the past 5 years (since the events in Ukraine), a geopolitical aspect has arisen.

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

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): One should welcome the advancement of Russia in these ratings, but only due to the real development of the corresponding directions. 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 position in the ratings of countries' competitiveness, innovation and ICT use

№	Rating name	Year / place of Russia in the ratings (↑ or ↓ relative to the previous version)					
		2015	2016	2017	2018	2019	2020
<b>Competitiveness and business environment</b>							
1.	Doing Business	62 (↑)	51	40	35	31	28
2.	The Global Competitiveness Index (global competitiveness index)	53 (↑)	45	43	38	43	-
3.	The IMD World Competitiveness Yearbook (ranking of competitiveness of countries)	45 (↑)	44	46	45	45	50
4.	The best developers (ranked by average score across all HackerRank Challenges)	-	-	2	-	-	-
5.	Human Capital Index	26 (↑)	28	16	-	-	-
6.	Open Data Barometer			26	13	-	-
<b>Innovation and use of ICT</b>							
7.	Bloomberg Innovation Index	14 (↑)	12	26	25	27	26
8.	Global Innovation Index	48 (↑)	43	45	46	46	47
9.	ICT Development Index	45	43	—	45	-	-
10.	E-Government Development Index	—	35 (↓8)	—	32	—	36
11.	UN Global Cybersecurity Index (GCI)			10 (↑2)	-	26 (↓16)	-

#### 1.2.1. Competitiveness and business environment

##### The best developers (ranked by average score across all HackerRank Challenges) — 2<sup>nd</sup> place.

According to a study by HackerRank, which owns the eponymous online platform for programming test tasks, Russia in 2017 ranked second in the world in terms of programmer competences. At the same time, China, which ranks first, had a symbolic lead of 1%. Chinese developers stand out for their mathematical background, training in functional programming and data structure, and Russian developers — in algorithms, although their mathematical training is also at a very high level.

The United States and India, which are considered the leaders in the global software development services market (including custom development), were ranked 28<sup>th</sup> and 31<sup>st</sup>, respectively, but, judging by the rankings prepared by HackerRank, they achieve market leadership largely due to the number of IT professionals (India ) and to business models that other countries cannot follow.

The results of this rating are very important for representing the Russian software industry abroad. Over the past few years, the positions of Russian programmers should not have decreased. On the contrary, the campaign in the United States about the global activities of so-called Russian hackers allows us to maintain and even strengthen the brand of Russian programmers.

### **Doing business — 28<sup>th</sup> place (↑ 3)**

Changes in the Doing business ranking by individual indicators, ranked

№	Indicator name	2015	2016	2017	2018	2019	2020
	<b>Overall rating Doing business</b>	<b>62</b>	<b>51</b>	<b>40</b>	<b>35</b>	<b>31</b>	<b>28</b>
1.	Establishment of enterprises	34	41	26	28	32	40
2.	Obtaining building permits	156	119	115	115	48	26
3.	Connection to the power supply system	143	29	30	10	12	7
4.	Property registration	12	8	9	12	12	12
5.	Getting loans	61	42	44	29	22	25
6.	Protecting minority investors	100	66	53	51	57	72
7.	Taxation	49	47	45	52	53	58
8.	International trade	155	170	140	100	99	99
9.	Enforcement of contracts	14	5	12	18	18	21
10.	Insolvency resolution	65	51	51	54	55	57

Judging by the progress in the Doing business ranking, the business environment in Russia has been steadily improving over the past years. However, it reflects only the situation in Moscow and (in the last 4 years) in St. Petersburg. At the same time, the breakthrough made in the last 7-8 years was made, most likely due to the fact that the compilers of the rating previously imagined the situation much worse than it actually was.

There are still doubts that in the field of international trade everything in Russia is so bad that the country ranks 99<sup>th</sup> in this area. Bureaucracy negatively affects the establishment of international cooperation and the expansion of exports, but these processes are quite active. Most likely, Russia is inferior to 3-4 dozen economically developed countries in this direction, but it is hardly at the end of the first hundred.

The same goes for "Obtaining Building Permits". If you look at the rate of commissioning of new facilities in Russia (business centers, residential buildings), it is obvious that such rates are not available in many countries. Then the question naturally arises: If it is so difficult to obtain a building permit, why is this construction being carried out so actively? Probably, Russia is far from among the leaders in terms of this indicator (although it should be striving for this), but it was hardly beyond the top hundred. Probably, this information reached the compilers of the rating — in the last 2 years Russia has made a rapid leap in the direction of "Obtaining building permits", moving from 115<sup>th</sup> place to 26<sup>th</sup>.

There is a similar rise in the area of "Connection to the power supply system" — with 143<sup>rd</sup> in 2015 and 7<sup>th</sup> in 2020.

It is possible that in the coming years in the areas of "International trade" there will be the same progress as in the area of "Connection to the power supply system". Thus, getting into the top 20 of the Doing Business Rating (this task was set by the President of Russia about 5 years ago) no longer seems an incredible task. This goal should have been achieved in 2020, but, apparently, it was deliberately unattainable in such a short time. The main thing is that the dynamics are positive.

## **The Global Competitiveness — 43<sup>rd</sup> place (↓ 5)**

The Global Competitiveness Index is a global study and the accompanying ranking of countries in the world in terms of economic competitiveness has been conducted annually since 2004 by the World Economic Forum. The study is based on a combination of publicly available statistics and a global survey of corporate executives. The set of variables consists of two-thirds of the results of a global survey of company executives, and one-third of statistics and research results carried out on a regular basis by international organizations.

This rating has not yet been updated at the time this section was prepared.

The attractiveness of countries for the work of IT specialists (Boston Consulting Group and The Network).

Russia ranked 25<sup>th</sup> among 180 countries in terms of attractiveness for IT professionals. More than 40% of Russian IT professionals do not seek to work abroad. At the same time, specialists from Kazakhstan, Belarus and other countries would not mind working in Russia. The study was conducted from March to May 2019. In total, more than 26 thousand people were interviewed, including more than 1.6 thousand specialists from Russia.

## **Country Competitiveness Rating (IMD) — 50<sup>th</sup> place (↓ 5)** **IMD World Digital Competitiveness Ranking**

The IMD World Competitiveness Yearbook is a global study and its accompanying ranking of countries in terms of economic competitiveness according to the Institute of Management Development, which has been conducted since 1996. The Institute understands the country's competitiveness as the ability of the national economy to create and maintain an environment in which competitive business emerges. Each of the 63 countries in the rating is assessed based on an analysis of 333 criteria for four main indicators of key aspects of the country's economic life: "State of the economy", "Government efficiency", "State of the business environment", "State of infrastructure". The calculation uses data from international organizations, surveys of analysts, heads of large corporations and managers. The rating is carried out in compliance with the ratio: two thirds — statistical data and one third — expert assessments.

### **Changes in the rating of The IMD World Competitiveness Yearbook by individual indicators, ranked**

№	Indicator name	2015 (↑ or ↓ relative to the previous year)	2016	2017	2018	2019	2020
	<b>Competitiveness rating of countries</b>	<b>45 (↑7)</b>	<b>44</b>	<b>46</b>	<b>45</b>	<b>45</b>	<b>50</b>
1.	State of the economy	43 (↑2)	49	46	-	-	47
2.	Government efficiency	44 (↓7)	39	46	-	-	48
3.	The state of the business environment	54 (↓1)	52	51	-	-	58
4.	Infrastructure condition	36 (↑1)	36	36	-	-	42

## **Global Competitiveness Report — 38 (↑5)**

In 2018, in the new edition of the competitiveness rating of the World Economic Forum (WEF, World Economic Forum, WEF), Russia climbed 2 positions, taking 43<sup>rd</sup> place out of 140.

### 1.2.2. Innovation and use of ICT

#### E-Government Survey 2018: E-Government Development Index (EGDI) — 36<sup>th</sup> place (↓ 4)

The e-government development rating, for which UN experts are responsible, is updated every 2 years. After rising from 59<sup>th</sup> place in 2010 to 32 positions by 2012, nothing changed for Russia in 2014. She retained a fairly high 27<sup>th</sup> place. In 2016, there was a slight decrease — to 35<sup>th</sup> place, but the level of development is still recognized as high. Then there was a slight rise, and in 2020 it will return to the position of 2016. The worst rating compilers assess the Russian telecommunications infrastructure. Perhaps because of the unique scale of the country and a significant number of settlements, which are hundreds and thousands of kilometers from the nearest megalopolises.

In 2018, there was a return closer to the positions that Russia occupied in 2014. The E-Participation Index (EPI) showed a particularly serious rise — from 32<sup>nd</sup> to 23<sup>rd</sup> place. However, in 2020, Russia again returned 4 positions down.

#### Changes in the rating of the E-Government Development Index by individual indicators, ranked

Indicator name	2012	2014	2016	2018	2020
E-government development index	27	27	35	32	36

#### Bloomberg 2018 Innovation Index — 26<sup>th</sup> place (↑ 1)

The Bloomberg Innovation Index is compiled annually by Bloomberg. In the rating of 50 innovative countries, in the last three years, after a sharp decline from 12<sup>th</sup> to 26<sup>th</sup> place, it has hardly changed its position. It can be noted that the compilers of the ranking saw lower patent activity (in 2018) and lower efficiency of higher education.

#### Changes in the Bloomberg Innovation Index ranking by individual indicators, ranked

№	Indicator name	2015 (↑ or ↓ relative to the previous year)	2016	2017	2018	2019	2020
	<b>Bloomberg Innovation Index</b>	<b>14 (↑4)</b>	<b>12</b>	<b>26</b>	<b>25</b>	<b>27</b>	<b>26</b>
1.	Research and development (percentage of government funds allocated for R&D)	31 (↑2)	31	31	32	33	33
2.	Added value for industry (added value of production in % to GDP)	37 (↑20)	27	48	33	37	37
3.	Productivity (GDP per hour worked)	15 (↑32)	18	42	44	51	43
4.	Density of high technologies (percentage of public high-tech companies in general number of public companies)	15 (↓8)	8	24	22	25	30
5.	Effectiveness of higher education (proportion of graduates)	2 (↑2)	3	3	5	10	25
6.	Concentration of developers (number of researchers per 1 mln.residents)	26 (↓1)	27	27	28	24	23
7.	Patent activity	6 (↑3)	15	16	16	30	25

## Global Innovation Index – 47<sup>th</sup> place (↓ 1)

In addition to Bloomberg, Cornell University in cooperation with the INSEAD business school and the World Intellectual Property Organization compiles a similar Global Innovation Index. In this ranking, in 2014 Russia rose 13 positions and took 49<sup>th</sup> place (despite the fact that in 2012 it dropped from 51<sup>st</sup> to 62<sup>nd</sup> place). Over the past 4 years, Russia's positions in this rating have not changed significantly.

### Changes in the Global Innovation Index ranking by individual indicators, ranked

№	Indicator name	2015 (↑ or ↓ relative to 2014)	2016	2017	2018	2019	2020
	<b>Global Innovation Index</b>	<b>48 (↑1)</b>	<b>43</b>	<b>45</b>	<b>46</b>	<b>46</b>	<b>47</b>
1.	Resources for innovation	52 (↑4)	44	43	43	41	42
2.	Innovation results	49 (↓4)	47	51	56	59	58

The strengths of the Russian innovation system include: human capital and science (30<sup>th</sup> place in the rating); market development level (55); business development level (42); development of technology and knowledge economy (50).

Weaknesses (as seen by the rating compilers) are largely determined by the existing stereotypes about Russia (degree of rule of law, quality of regulation, political environment, logistics efficiency, investments, legal environment, environmental certification according to ISO 14001). There are corresponding problems, but they exist in almost all countries of the modern world. This is especially evident in recent years.

There is a huge difference between 14-27 in Bloomberg and 46-50 in Cornell University. Such a big difference can be explained by the fact that Bloomberg relies mainly on quantitative indicators, and experts at Cornell University (and its partners) — mainly on subjective assessments.

They gave a very low rating to the use of innovations in households and enterprises, despite the fact that the penetration rates of the Internet and computers in the society in Russia are quite high, and almost all enterprises have implemented the main corporate ERP systems.

## Use of electronic government services (study by Boston Consulting Group)

According to a study by the Boston Consulting Group (BCG), the results of which were presented in spring 2019, Russia ranked third in the world in terms of growth in the use of electronic public services and entered the top ten countries with the highest intensity of their use. On average, the growth rates in the world are at the level of 15%, but in Russia they are much higher — about 42%. Russia is also one of the ten countries with the highest intensity of use of electronic public services. About 47% of Russians use them at least once a week. Electronic government services available to the population in Russia are quite diverse — on average, every Russian uses 9.1 different types of such services. According to this indicator, countries such as the Netherlands and Sweden lag behind Russia — where this indicator is 8.2 and 8.8, respectively.

## Using the capabilities of artificial intelligence (AI) in business (Business Leaders in the Age of AI, Microsoft)

According to the Microsoft research "Business Leaders in the Age of AI" (the results were presented in April 2019), 30% of Russian executives are actively implementing artificial intelligence: the global average is 22.3%, and for example, in France — only 10%. According to the authors of the survey, Russian leaders turned out to be more practical in the application of AI in business, compared to their foreign colleagues. Among the main priorities for using AI were: setting the right goals (32%), developing business ideas (26%), identifying new market opportunities (25%) and decision making (23%).

Russian CEOs ranked second in terms of positive attitudes towards AI, with 73% of CEOs believing that technology will have a positive impact on their management activities. They also showed a significantly higher willingness to learn and develop new AI skills. 90% of them expressed a desire to receive professional support in order to work better and more efficiently with this technology; in the world this figure is 67.3%.

### **Countries' readiness index for the emergence and implementation of autonomous driving technologies, KMPG (Autonomous Vehicles Readiness Index)**

In 2020, Russia dropped to 26<sup>th</sup> place, but the number of ranked countries increased from 25 to 30. In 2019, Russia was 22<sup>nd</sup> out of 25 (in 2018 it was 18<sup>th</sup> out of 20).

For the 2020 Index, 30 countries were assessed using 28 variables combined into four components. In 2020, in 9 regions of Russia, the operation of unmanned vehicles is allowed as an experiment. This should have a positive effect on the country's place in the next version of this rating.

### **Best conditions for the development of blockchain projects (Flying University)**

In March 2019, the Flying University published a ranking of countries in which, according to experts, there are the most favorable conditions for the development of business projects related to blockchain and cryptocurrencies. Russia in this rating took 18<sup>th</sup> place out of 23 countries.

The study was conducted on the basis of its own methodology, which includes an assessment of the legal, political and infrastructural conditions in various countries in terms of friendliness to businesses using blockchain and cryptocurrency technologies. The authors of the report primarily focused on the changes that the economies of different countries have undergone under the influence of blockchain and related technologies.

The study says that the market for cryptocurrencies and blockchain projects in Russia is almost unregulated, and the initiatives of the authorities remain draft laws. As soon as they are adopted, and a stable legal practice is created, it will be possible to talk about a completely new period in the attitude of Russian regulators to cryptocurrencies. Among the positive events for the market, experts attributed the creation of the so-called "regulatory sandbox" by the Central Bank — a test platform within which the regulator conducted an experimental ICO.

### **Tariffs for mobile Internet service in 50 countries of the world (Content Review)**

According to a study by the information and analytical agency Content Review for December 2018, Russia took 8<sup>th</sup> place in the fresh ranking of countries in terms of the cost of mobile Internet. From May to December, the cost of 1 GB of mobile Internet traffic in Russia decreased by 15% and amounted to ₺55.5. In 2019, the cost of mobile Internet in Russia has significantly decreased — one 1GB began to cost an average of \$37.3. As a result, Russia got the third place in the list of countries with the cheapest wired Internet.

The total of 206 countries are represented in the ranking. The study includes data from November 28, 2019 to January 8, 2020.

### **Digital Society Index 2019**

In 2019 Russia moved from 10<sup>th</sup> to 23<sup>rd</sup> place in the ranking of countries for the development of a digital society. The drop was caused by the expansion of the list of studied countries from 10 to 24. One of the rating conclusions are as follows: the population access to digital technologies in Russia is quite high, but users do not trust business nor the state in the field of personal data security.

### **The popularity of fintech services (EY research)**

Russia is among the top three countries in terms of the popularity of fintech services. This is evidenced by the results of the EY study, released in November 2019.

Experts estimate the penetration index of fintech services in Russia at 82%. The higher rate is only in China and India (87%).

## Best Ecosystems for Startups (StartupBlink)

At the end of May 2020, it became known that Russia entered the top 20 countries with the best ecosystems for startups according to StartupBlink, which every year conducts a study that evaluates states and cities by productivity, investment, market characteristics, communication level and other criteria.

The USA took the first place in the list. Great Britain and Israel followed, and Russia was given 17<sup>th</sup> place. Compared to 2019, the Russian Federation has lost two positions.

## Supercomputer rating

At the end of 2019, it became known that for the first time in several years the number of Russian supercomputers in the world ranking had grown. The previous summer ranking of the Top 500 was the lowest since 2006. The rise in the rating was provided by the Christofari supercomputer of Sberbank, which immediately took the 29<sup>th</sup> position in the world.

### 1.2.3. City ratings

#### Innovation Cities Global Index 2018

In 2018, 500 cities from all over the world were included in the Innovation Cities Index ranking of the most innovative cities in the world. The rating allows you to determine the potential of participants in the creation, implementation and broadcast of innovative ideas.

#### Change in the position of Russian cities in the Innovation Cities Global Index

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

Cities are evaluated according to 162 special indicators, including the development of market relations, investments in technological progress, business climate, level of development of science, education, health care, culture, as well as the city's sports, financial and information and communication infrastructure. 2015 was the year of the rise of Russian cities, while 2017 was unsuccessful for all cities except Moscow: cities literally collapsed in the ranking, 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 transmission of innovative ideas. The changes that have taken place in Russia in 3 years have influenced innovation both negatively and positively, since the same economic crisis often forced companies and government structures to be more innovative.

### **UN e-government rating**

In this rating compiled in 2018, Russia occupies 32<sup>nd</sup> place (in the previous version in 2016 it was in 35<sup>th</sup> place). It should keep in mind that the authors increased the number of analyzed cities to 40 megalopolises in the world. Each city was ranked according to the Local online service index, just introduced in a pilot project. The result of each metropolis was influenced by the content and capabilities of city portals, the quality of the provision of electronic services. Among all these megalopolises, Moscow was in first place in 2018, but in 2019 the Russian capital moved to 6<sup>th</sup> place.

### **The most intelligent cities in the world according to ICF (Intelligent Community Forum)**

In this ranking, only the 7 most intelligent cities in the world stand out. In 2017 the 15<sup>th</sup> edition of this rating came out, and Moscow was included in it for the first time. In the editions of 2018, 2019 and 2020, Moscow is no longer there. In the 2019 version, the Russian capital can be found among the semi-finalists. In 2020, it is not among the contenders for getting into the top-7.

### **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, Berlin. The overall ranking was generated 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 took 18<sup>th</sup> position out of 76, and in one of the five categories of the rating, "Ecosystem of startups", rose to 10<sup>th</sup> line.

### **Best Ecosystems for Startups (StartupBlink)**

StartupBlink ranks not only countries, but also cities. In its latest ranking, presented in Spring 2020, Moscow took 9<sup>th</sup> place, moving up one position, and St. Petersburg — 147<sup>th</sup> dropping 68 places below.

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

Major Russian software exporters actively participate in various international ratings compiled by world-renowned teams of analysts. However, their representation in these ratings is still insignificant. The main reason is the requirement for disclosure of data on turnover and on profit from the side of the rating compilers. Many Russian companies do not disclose this data for various reasons.

In addition, very often manufacturers of software products do not want to once again indicate their Russian origin, since they position themselves in specific markets as local companies (in order to take advantage of the status of national producers of these countries and avoid the use of anti-Russian sanctions).

Due to the above reasons, as well as due to information secrecy, which is generally characteristic of many middle-aged Russian businessmen (who started their careers during perestroika), the representation of Russian companies in a number of world ratings of software manufacturers is much lower than it should be based on the real state of affairs.

The presence of Russian companies in the world ratings noticeably increases the level of trust in such companies and allows them to conduct more successful foreign economic activities. They can be conventionally divided into ratings for software development service providers and software vendors.

Over the past three years, based on changes in the positions of Russian companies in various world ratings, it is difficult to draw an unambiguous conclusion about deterioration or improvement of their positions. A slight decrease in the representation of Russian software development service providers in world ratings and analysts' reports is largely due to the fact that a number of Russian companies have changed jurisdictions. The reorientation to the Russian market and to markets of developing countries is also important for rating compilers located in Western countries. At the same time, instead of some companies excluded from the world ratings and analysts' reports, new Russian companies appeared there.

#### **The Best of The Global Outsourcing**

The International Association of Outsourcing Professionals (IAOP) has been rating the 100 best outsourcing companies in the world for 14 years in a row. Since 2016 in order to get into this rating companies are being assessed according to five criteria: size and height, customer reviews, awards and certificates, innovation programs, corporate and social responsibility. It should be borne in mind that the IAOP is interested in attracting new members, which may affect the rating of companies that are not IAOP members. Since 2015, no ranking has been compiled as such, but until 2019 each company was assigned the status of a developing company or a leader, depending on the degree of compliance with 5 criteria. In 2019 the name of the rating changed to The Best of The Global Outsourcing 100 (in the former name The Global Outsourcing 100 was an indication of the year of the study). The status of the company is no longer indicated. In 2020 the ranking again has 4 criteria instead of 5.

Russia's representation in the IAOP ranking has changed slightly in recent years after it has gradually increased over the course of a decade. According to experts, good representation in this rating indicates that Russian companies have added good understanding of market requirements and the ability to do business to the highest technical level of Russian engineers. Some companies sometimes drop out of the top hundred, as well as among the leaders in certain nominations. However, they are being replaced by others. Therefore, the total remains almost unchanged.

Four years ago ICL Services became a newcomer to the world rankings. For several years before that, the company was considered as a new Russian contender for getting into the Top-100 of the world's service companies, and it lived up to expectations. In 2013 this company left the Fujitsu group, starting work in Russia under the ICL Services brand. The company is located in Kazan, the capital of Tatarstan, where good conditions have been created for the creation and development of IT companies. In the latest version of The Best of The Global Outsourcing, ICL Services has become the only Russian company classified as a Leader.

MAYKOR, which provides IT services, was first included in such a rating 5 years ago, largely due to its active work in Russia and in the IAOP Association, but in 2020 it failed to remain in the Top 100. In 2019, the representation of Russian companies increased thanks to a newcomer — SimbirSoft from Ulyanovsk. In addition, First Line Software returned to the rating and Artezio was excluded (this company has been in this rating for a long time, but not every year it managed to gain a foothold in the top 100). Artezio returned to the IAOP rankings once again in 2020, while SimbirSoft and First Line Software retained their place.

Luxoft and MERA were not included in the IAOP rating for the first time, as they changed ownership in mid-2019. It is noteworthy that the rating does not include EPAM, which is one of the largest software development service provider in Europe. At the same time, EPAM appeared in the Gartner Magic Quadrants.

**Russian companies in The Best of The Global Outsourcing (The Global Outsourcing 100) in 2015-2020**

№	Russian company name	2015 (status / score — from 1 to 4)	2016 (status / score — from 1 to 5)	2017 (status / score — from 1 to 5)	2018 (status / score — from 1 to 5)	2019 (getting into the rating)	2020 (status / score — from 1 to 4)
1	Artezio	Rising star	—	—	Rising star 2	-	Rising star 3
2	Auriga	Rising star 1	Rising star 4	Rising star 3	Rising star 3	+	Rising star 3
3	Luxoft	Leader 1	Leader 3	Leader 4	Leader 5	+	-
4	MAYKOR	Leader 3	Leader 4	Leader 4	Leader 4	+	-
5	First Line Software	—	—	Rising star 2	—	+	Rising star 2
6	ICL Services	—	Leader 3	Leader 4	Leader 4	+	Leader 4
7	MERA	Leader 0.5	—	Leader 2	Leader 2	+	-
8	SimbirSoft	-	-	-	-	+	Rising star 1

In addition to Russia, Ukraine and Belarus, which are close to it, are represented in the IAOP world ranking (over the years these are EPAM Systems, IBA Group, Intetics, Itransition, Oxagile, TEAM International, Miratech, SaM Softjour, SoftServe). All three countries are close culturally and economically, despite the existing conflict between Ukraine and Russia. Therefore, it is quite reasonable to talk about the so-called "Russian-speaking community" of service IT companies. The strengths of the companies of these three countries are approximately the same. First of all, this is the high quality of education in the field of physical and mathematical sciences, creativity and experience of conducting complex projects.

IAOP also prepared additional lists (sub-lists), defining the best according to 6 criteria (directions). They included the following Russian companies:

- Auriga (Sustained Excellence);
- ICL Services (All Stars);
- Artezio, Auriga, First Line Software, SimbirSoft (Top Customer References);
- Artezio, ICL Services, SimbirSoft (Top Awards & Certifications);
- Artezio, Auriga, First Line Software, ICL Services, SimbirSoft (Top Programs for Innovation);
- Auriga, ICL Services, SimbirSoft (Top Programs for CSR).

## Magic Quadrants of Gartner

Some of the most prestigious ratings for software vendors are the ratings of the analytical agency Gartner Group, which annually compiles the so-called "Gartner Magic Quadrants". They identify software and software vendors that are among the leaders in specific software segments.

### Russian companies in the Gartner magic quadrant

Name of the Gartner Magic Quadrant	Publication year	Company name
Endpoint Protection Platforms	2019	Kaspersky
Enterprise Data Loss Prevention	2017	InfoWatch Zecurion SearchInform
Treat Intelligence	2014	Kaspersky Lab Group IB
Business Intelligence and Analytics Platforms	2013	PROGNOZ
Advanced Analytics Platforms	2016	PROGNOZ
Application Security Testing	2018	Positive Technologies (leader)
Operational Technology Security	2016	Positive Technologies
Data Center Backup and Recovery Software/Solutions	2019	Veeam Acronis
Contact Center Infrastructure, Worldwide	2017	No version
Integrated Revenue and Customer Management for CSPs	2019	Nexign
Sales Force Automation	2019	bpm'online* (Terrasoft)
CRM Lead Management	2020	bpm'online (Terrasoft)
Meeting Solutions	2019	TrueConf

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

Veeam changed owners in early 2020, and therefore can no longer be considered a Russian company. However, its main development center remains in St. Petersburg.

### Some other achievements of Russian software developers in 2019-2020

1. On January 9, 2019 it became known that Kaspersky Lab, whose software was banned from use by American government agencies, helped to catch the thief of classified data from the National Security Agency (NSA).
2. In January 2019, Forrester Research noted the Russian DLP developer Zecurion in its Data Loss Prevention Q1 2019 report.
3. Frost & Sullivan named the Digit Company of the Year in early 2019 for AI-powered machine data monitoring solutions for process industries. Since its foundation in 2017, in just a year, Zifra has entered the international market of Europe, Asia, Africa and Latin America.
4. iSpring, an IT-company from Yoshkar-Ola, announced in February 2019 that its iSpring Suite development was included in the top 20 best tools for creating distance learning courses according to the Training Industry version (one of the most authoritative and largest international corporate training and development portals). Countries participating in the list of the world's best developments for creating courses: USA — 10 companies; Great Britain — 4 companies; Italy — 2 companies; Russia, Canada, Switzerland and Poland — 1 company each.
5. The joint team of the Far Eastern Federal University (FEFU) and the Institute of Marine Technology Problems of the Far Eastern Branch of the Russian Academy of Sciences (IPMT FEB RAS) won the Singapore AUV Challenge-2019, an open Asian Championship in underwater robotics. 35 teams from India, Indonesia, Japan, Sri Lanka, Hong Kong and Macau, Thailand, Taiwan, Malaysia, Kenya, Turkey and Russia competed for the victory.
6. In June 2019, NtechLab announced that the company's algorithm was ranked second in the ActEV-PC international video action recognition competition. The competition was hosted by the US Department of Commerce's National Institute of Standards and Technology (NIST).

7. In December 2019 it became known that the staff of the MIPT Laboratory of Cognitive Dynamic Systems became the winners of the MineRL competition. They proposed an unknown demonstration-based reinforcement learning method that can quickly and efficiently solve hierarchical problems in the Minecraft environment: finding resources and creating tools. It will be possible to use the developed algorithms when creating autonomous mobile robots and robotic manipulators. The competition was held within the framework of the international conference on neural network technologies Neural Information Processing Systems-2019.

8. In September 2019 it became known that the algorithms from Neurodata Lab, according to the results of the research, were included in the global top 3 solutions in terms of completeness, accuracy and correctness of recognizing emotions by face (Emotion AI). This study was conducted by Irish (Dublin City University, Queen's University Belfast), British (University College London) and German (University of Bremen) scientists.

9. In July 2020 it became known that Gartner analysts recognized Rostelecom's IT management model as one of the best in the world.

10. In June 2020 it became known that the algorithm of the company NtechLab, a technology partner of the state corporation Rostec, took the third prize in the international Deepfake Detection Challenge competition for recognizing deepfakes on video. Hosted by Amazon, Facebook and Microsoft, over 2,200 teams from around the world took part in the competition.

11. In September 2019, Fortune published an updated list of the world's fastest growing companies. It includes only one representative from Russia — Yandex. It was placed in 24th place, while five years earlier it was in 65th position.

12. In October 2019, it became known that Diasoft was included in the IDC FinTech Top 100 Ranking 2019.

## CHAPTER 2

Volume and structure  
of sales of Russian  
software companies at  
domestic market and  
abroad

## 2.1. Key indicators of the software industry in Russia

According to RUSSOFT, there are at least 4 thousand stable companies that are professionally engaged in software development in Russia (not counting startups that do not have regular income). The number of software companies grows annually by about 2.5-4%.

The official data on the Multistat website (which are based on data from the Unified State Register of Legal Entities or USRLE), provide information of 32,712 operating organizations as of 07/24/2020, registered under the ICEEA codes 62.0 and 62.01. However, their number has been decreasing in the last two years (in the summer of 2018 it was 36,388; and in the summer of 2019 — 34,346). At the same time, 8,053 new companies with these ICEEA codes were created from 01/23/2020.

If we rely on the data of the Unified State Register of Legal Entities, the number of software development companies is not growing, but decreasing. However, to all appearances, the decrease in the number of registered companies is associated with the struggle of the State with the «fly-by-night».

By «software company» RUSSOFT means a legal entity (or a group of legal entities) which has software development as the main activity, carries out regular sales, is under one management and operates on the market under one brand (with one same name).

Not all legal entities with the specified ICEEA codes can be considered as software companies, since the vast majority of such legal entities do not develop software for sale or do not regularly develop software, while an existing software company (as perceived by RUSSOFT) may have several legal entities united under one management.

Another official source of data on the number of software companies is the List of Accredited IT Companies under the Ministry of Digital Development, Communications and Mass Media of the Russian Federation. Most of organizations in this List are software companies. As of June 13, 2018, there were 8,451 organizations on this List. By June 5, 2019, their number increased to 10,230 companies (+21%), and by July 16, 2020 — to 11,680 (+14%). However, there are legal entities in the register of the ministry, which can only be a part of a certain company (and not in all cases it is a part of a software company).

Official information about the number of companies (both accredited under the ministry and got from the Unified State Register of Legal Entities) is completely useless for economic analysis of the situation in the software industry at the moment. However, it can be important in relation to the provision of tax benefits to software developers.

RUSSOFT's own assessment of the number of Russian software companies is based on the Association's own database of contacts, which is being checked and updated annually, as well as on data on received from regional professional associations and authorities. The RUSSOFT database contains information on about 2 thousand companies. By the complexity of replenishing this database, one can judge how many companies did not get into it. In addition, this database includes information only from regions where full-fledged software clusters have been formed. We could also get information about actually functioning companies from the website of HeadHunter ([www.hh.ru](http://www.hh.ru)) where they post vacancies in the field of software development.

Approximately 2.7-2.9 thousand companies post here such vacancies (the indicator fluctuates), the overwhelming majority of which are software companies. At the same time, there are 13,697 companies in the HeadHunter catalog in the same section, but there is no data on how many of them continue to function. According to the results of RUSSOFT polls, at least 20% of these companies did not hire a single specialist during the past year. At a particular moment, many more software companies do not have open vacancies. Besides, not everyone uses the hh.ru portal.

According to RUSSOFT, at least 2.5 thousand Russian software companies conduct export operations. According to the bank statements that go to the Central Bank of the Russian Federation, about 9 thousand companies received funds for the providing of “computer services” in 2017 from abroad.

However, the difference between 2,500 and 9,000 exporters, as well as difference in the total number of software companies, is explained by the fact that one and the same company, in the understanding of RUSSOFT, can sell its services and solutions through several related legal entities.

In addition, income from "computer services" can be received by companies that cannot be considered as software companies, since software development is not their main business activity.

The USRLE statistics, the data from the Central Bank of the Russian Federation and the list of accredited IT companies can give a general idea of the number of companies registered at different times, although these sources do not provide reliable information either on the number of actually operating companies, or on its dynamics. The data on registration or accreditation of companies in no way reflects the growth in the number of software companies, but depends entirely on other factors. For example, the number of legal entities registered under the codes 62.0 and 62.01 may reflect the struggle of the state with the so-called "fly-by-night" fake companies.

In some years, the number of registrations of new companies increased sharply due to changes in legislation. Thus, getting into the Unified State Register of Legal Entities often reflects not the creation of a new company, but the re-registration of those enterprises that have already operated in a different legal form. The list of accredited IT companies allows you to have some idea of the distribution of IT companies (in particular, software developers) by region, but it also does not provide an adequate picture of the software development industry.

#### Number of Russian software companies

The number of stable Russian software companies	at least 4 thousand.
Number of companies with export earnings	at least 2.5 thousand.

#### The total number of core employees

	thousand people
Software developers working in all industries (including IT services of enterprises in various fields of activity)	>580
Software developers working in the Russian software development industry (total), of which:	>180
- in development centers abroad	>10
- in Russia	≈170
Employees of service companies (including those working for foreign customers)	≈90 (40)
Employees of grocery companies	≈70
Employees of Russian R&D centers of foreign companies	≈8

## 2.2. Sales volume of the Russian software development industry

The total turnover of enterprises in the software industry in Russia amounted to ₱1.136 trillion at the end of 2019, with an increase of 17.8%. Export revenues increased slightly more — by 20.5% in ruble terms (up to ₱533 million) and by 17.5% when measured in dollars (up to \$8.25 billion). The growth rates are very close to the forecasts, which were calculated in May last year based on the expectations of the companies surveyed. Considering that RUSSOFT then proposed to make an amendment to these calculations downward by several percentage points, then the forecast regarding the increase in the total turnover turned out to be 100% correct.

The need for such an adjustment was caused by the fact that the replenishment of the staff of companies planned by all companies could not be carried out due to the lack of a corresponding proposal on the labor market. In the previous several years, it was not possible to achieve such accuracy in forecasts of changes in turnover — the plans of the surveyed companies and their real achievements differed significantly.

Apparently, in 2019 there was a certain stabilization, which makes it possible to correctly assess the prospects (there was still an overestimate, but very small, which should be the case for companies aimed at dynamic development). As the events of 2020 showed, this stabilization was short-lived.

### Change in total sales of software companies

	Forecast based on expectations (made at the end of May 2019)	Actual change in 2019
Inner sales, ₺	+25.6%	+15.7%
Foreign sales \$	+15.0%	+17.5%

Export growth even exceeded forecast, while inner sales increased much less than expected. Nevertheless, the growth of almost 16% is quite decent and significantly exceeds the growth rate of both the global IT market and the growth rate of the Russian economy.

Since the RUSSOFT Association tries to reflect the development of the industry from different angles, the indicators of the total turnover of companies and its changes in various scales are given. In addition, a proprietary bi-currency index was introduced, which is calculated as the average growth of foreign exchange and ruble earnings, taking into account the weight of export earnings and sales on the domestic market. At the end of 2019 this index amounted to 1.165 (corresponds to an increase of +16.5%). In the previous 2 years, it was slightly lower, but, apparently, there was a stabilization at the level of 1.15.

### Key economic indicators characterizing the software industry in Russia in 2013-2018 (growth / decline compared to the same indicator of the previous year)

	units	2013*	2014	2015	2016	2017	2018
Cumulative 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%)
Overseas sales	\$	\$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%
Inner sales	₺	₺178 billion	₺240 billion (+35%)	₺220 billion (-8%)	₺294 billion (+34%)	₺321 billion (+9%)	₺387 billion (+205%)
	\$	\$5.6 billion	\$6 billion (+7%)	\$3.64 billion (-39%)	\$4.4 billion (+21%)	\$5.5 billion (+25%)	\$6.14 billion (+12%)
RUSSOFT dual-currency index		-	1.23	1.1	1.21	1.13	1.14

\* - until 2013 RUSSOFT did not determine the size of the aggregate turnover, therefore there is no data on the growth of turnover compared to 2012.

At the same time, it is important to note that since 2020, to sum up the results of the previous year, the Russian ruble (previously \$) was chosen the basing currency for calculations. If earlier RUSSOFT collected information on the turnover of companies in dollars (the questions in the questionnaire were formulated accordingly) and did all the calculations in dollars, recalculating, if necessary, the indicators in rubles at the average annual exchange rate, then the data for 2019 are based on indicators in ruble terms, which then additionally converted to dollars so that international comparisons can be made.

A direct comparison of total software industry sales in 2019 with 2018 data would be inaccurate. This is due, firstly, to the fact that several large companies at once ceased to be Russian in terms of their ownership after their sale to foreign corporations or after the move of the main business outside Russia. Thus they ceased to meet the RUSOFT criteria defining them as domestic companies. Therefore, instead of the \$11.2 billion of total sales expected in 2019, we received only \$8.25 billion.

Secondly, the analysis of data for several years allowed us to conclude that the volume of sales in the inner market was initially underestimated. The fact is that until 2013 the study was devoted only to the export of software companies. The survey involved only those companies that have sales abroad. Thus, we did not take into account the data on at least 15-20% of companies (in some years this figure reached 30%) that operate only within Russia. Over time, the data we collect on inner sales has become more complete to make the calculations more accurate. Third, the rejection of dollar as the main unit of measurement provided more accurate primary data from the surveyed companies.

**Key economic indicators characterizing the software industry in Russia in 2019 (growth / decline compared to the same indicator of the previous year)**

	unit	2019
Cumulative turnover of Russian software companies	₽	₽1.120 trillion (+17.8%)
	\$	\$17.34 billion (+14.9%)
Overseas sales	\$	\$8.25 billion(+17.5%)
Share of foreign sales in total turnover	%	47.6%
Inner sales	₽	₽587 billion (+15.7%)
	\$	\$9.09 (+12.9%)
Change in the total turnover of Russian software companies in rubles, taking into account inflation	%	+14.4%
RUSOFT dual-currency index	-	1.17

To avoid confusion due to the apparent discrepancy between sales and growth rates in 2018 and 2019, a new table was created for the results of 2019. The changes in indicators refer only to the group of companies that are still considered Russian (such were also in previous years). At the same time, despite the change in the absolute values of turnover associated with the change in the composition of respondents, the comparison of the growth (reduction) rates for all years of the study is quite justified (including in 2018 and 2019).

**Income structure of surveyed companies in the specified specialization (based on the results of 2019)**

Custom development	43.9%
Mobile applications	0.9%
Website development	0.4%
Computer games	—
Embedded software (in equipment, devices)	0.8%
Navigation Systems and Geographic Information Systems (GIS)	1.5%
Replicated enterprise (institution) management systems, workflow automation, design and production process (ERP, CRM, ECM, EDMS, CAD, APCS and others)	24.5%
Information security solutions	—
Development of basic software (DBMS, OS, office applications, programming languages and tools)	1.2%
Scientific research	0.35%
Others	25.45%

For the companies surveyed in 2020, the structure of their total income for the specified specialization was determined. However, this data cannot be extrapolated to the entire industry, since the study does not cover different areas of software companies' activities evenly. It is clear that custom development companies are well represented in the study. At the same time, it can be assumed that developers of mobile applications and computer games are not well represented in the entire array of surveyed companies and their share is underestimated (data from other studies suggest that this share should be much higher). In addition, the estimates of the 2019 results are based on a survey of only 72 companies (so few respondents were due to the pandemic and the associated economic crisis) while for an acceptable margin of error, it is desirable to have at least 120-130 respondents. Nevertheless, based on the resulting distribution of total income, one can determine which areas of activity of software companies were underestimated.

### 2.2.1. Mobile applications

Judging by the survey data, mobile applications account for only 0.94% of the total turnover of software companies. However, the total revenue of only the largest developers of mobile applications for business and government agencies (included in the CNewsMobile 2019 rating) amounted to ₱8.98 billion at the end of 2019, with an increase of 52%. The received ₱8.98 billion is 0.75% of the total income of all software companies in Russia. Consequently, the income of all mobile app developers should be several times higher.

### 2.2.2. Computer games

Companies that specialize in the development of computer games, in extremely rare cases, participate in RUSSOFT polls (in 2020, there was not a single such company among the companies surveyed). At the same time, there are many companies in this area with large income (by Russian standards). Playrix alone is likely to have turnover of more than \$100 million (₱640 million at the 2019 exchange rate). In any case, they announced to be able to spend that amount on acquiring other game development companies. Mail.ru CEO Boris Dobrodeyev at a meeting on the development of information technology with Russian President Vladimir Putin on June 10, 2020 said that in 2020 the export revenue of this industry segment will exceed \$4 billion. How this value is determined and what it reflects remains to be seen. Perhaps this also refers to the income of various Internet companies that offer users to play online. At the same time, the proceeds were received from advertising and offering additional services to Russian and to foreign fans of computer games. Therefore this revenue should be attributed to the income of the Internet companies, not the software companies. Nevertheless, it can be assumed that the field of computer games has not yet been sufficiently studied. Most likely it also contains incomes that are not yet taken into account when calculating the total turnover of software companies and the total volume of foreign sales.

### 2.2.3. Income of Internet companies and of other non-software businesses

The income of Internet companies is not taken into account in the calculations of the aggregate turnover and of volume of foreign sales of enterprises of the software industry. However, the basis for the functioning of these companies is the software developed by them. In many cases, it is the main asset of such companies. In addition, the convergence process becomes obvious every year: typical software developers become, at least partially, Internet companies, and classic Internet companies create their own software products that are offered to corporate clients in Russia and abroad (therefore they become partially software). One of the manifestations of this convergence is the entry into the RUSSOFT Association of Mail.ru Cloud Solutions, created in 2018 as part of the Mail.Ru Group. The business of this company is based on its own cloud platform.

The process of this convergence is evidenced by a number of reports in the media:

1. According to a study by the analytical company App Annie, Mail.ru Group entered the top three earning mobile app developers in Europe in 2019.
2. Mail.ru Group is systematically increasing the share of gaming revenue received abroad: in 2019 it was measured at 69% of the total revenue of the gaming business. By the end of 2022 the company plans to increase this share to 80%.

3. The revenue of the Mail.ru Group's B2B technology direction in 2019 exceeded ₺1 billion. Its share in the group's total income, which amounted to ₺87.6 billion, is still small, but the direction showed high growth rates — 140% year-on-year.
4. In February 2020, it became known that the Sukhoi company will introduce a digital predictive analytics platform developed by Mail.ru Group into its enterprises. Using this platform they will begin to use Vision computer vision technology to monitor all production processes. The systems integration was planned to be completed in the second quarter of 2020.
5. At the end of 2019, the Russian platform Yandex.Cloud became a technological partner of the Atlas biomedical holding company founded by the Russians in launching a new DNA test for analyzing the complete human genome.
6. Yandex in the spring of 2019 became the official supplier of software for multimedia systems of car manufacturers such as Renault, Nissan and Avtovaz. Under the agreement, Yandex will install the Yandex.auto multimedia system on cars.
7. In the spring of 2019, Yandex launched a cloud visualization and user mapping service for its corporate data, thereby entering the cloud business intelligence market, where its competitors are Google Data Studio and Microsoft Power BI. In fact, for Yandex it is the case of selling its own software on the SaaS model. The service is free, but its commercialization is expected later. Over time, companies such as Yandex and Mail.ru will achieve income from the sale of their software or from its provision as a service, which will be comparable to the income of software companies, which will not allow us to ignore their corresponding income in the total sales of the software development industry. If separate companies are created for the developed solutions, then the task of including their turnover in the calculation of the turnover of the entire industry will be quite solvable. They are harder to count when these revenues are not separated from the combined revenues of the Russian Internet giants. It also makes sense to sum up the turnover of software companies and Internet companies in order to find out the total exports of the entire Russian IT-industry. Distributors and system integrators have such exports, but their volumes are still not large. However, it is quite logical that in some foreign markets it will be easier for software companies to promote their solutions together with domestic system integrators.

Currently one can only roughly estimate the export earnings of all enterprises in the IT industry (primarily, software companies and Internet companies). Most likely they already exceed \$10 billion (this is even without the proceeds that remain abroad).

The total revenues of only two such companies (Yandex and Mail.Ru Group) exceeded \$ 4 billion in 2019. At least 10-15% (and possibly up to 30% of these revenues) can be attributed to export. If we sum up the sales of Internet companies in the Russian market and in the markets of the neighboring countries, where they also actively work, then the total share of such sales in the total sales of the industry will be about 70%. At the same time, the far abroad business can neither be excluded as a source of their income. Currently, about half of Russian-speaking Internet users are citizens of several dozen of foreign countries. Yandex and Mail.Ru Group receive the main income from advertising. Even if it is measured in rubles and received in Russia, this does not mean that it cannot be considered as export. For example, a company from Kazakhstan operating in the Kazakhstan market and having ruble accounts in Russian banks can pay for advertising to Internet companies both in rubles and in other currencies. There is no fundamental difference in this. Moreover, about a quarter of the export of "Computer Services" is paid for in rubles. This can be explained by the fact that the ruble is already partly a means of payments in international settlements.

It is more difficult to determine the income of online stores. It is more correct to count not their entire turnover, but only the margin, which is not as great for online trading as for offline trading enterprises.

The contribution of the Runet economy to the Russian economy in 2019 was estimated by the RAEC at ₺6.4 trillion. (almost \$100 billion). There are a lot of methodological difficulties, but still some estimates can be made if more complete information about Internet companies is available. For example, the share of exports can be calculated taking into account the ratio of Russian and foreign audiences.

Based on the available data, it can be assumed that the export of Internet companies that use their own software and, therefore, can be taken into account in the study of the export software development industry, significantly exceeds \$4 billion. Not only IT companies can sell software abroad. For example, it is known that the Rosatom corporation offered its customers software (APCS), which it developed specifically for nuclear power plants.

### 2.3. Prospects for changes in the main indicators of the software industry

In previous years, software development companies' expectations of their overseas sales and revenues tended to be reasonably accurate. Small companies overestimated their indicators (turned out to be too optimistic), while large companies underestimated them (showed caution). At the same time, it turned out that their mistakes compensated each other. This forecast method did not work only twice — as a result of major economic crises: in 2009 (the global economic crisis) and in 2015 (the crisis in Ukraine) which led to the devaluation of ruble (2009 and 2015), as well as to the sanctions problems (2015) and to the decrease in the volume of the Russian market (2009 and 2015). In both cases, significant deviations of the real value of the aggregate turnover from the forecasted value occurred as a result of some major economic shocks that the surveyed companies could not foresee.

In the past few years, companies' expectations have become too high. Real growth rates were 5-10 percentage points lower than forecasted. The exception is 2019, when the forecast for the growth of total turnover turned out to be 100% correct.

In 2020, due to the pandemic, the situation turned out to be such that by the second half of March it became meaningless to make any predictions about the results of the whole year, therefore already with the survey launched at the end of February, some of questions became senseless. When the survey was restarted in mid-May, they had to be abandoned (the questionnaire was shortened by about 20%). First of all, all questions about the plans for 2020 and 2021 were excluded.

Less than half of the surveyed companies still managed to fill out the questionnaire before it was cut. Therefore, you can calculate the average planned turnover at the end of 2020 for 28 enterprises, and the average planned overseas sales — for 26. However, the results obtained should not be indicated, because they do not even reflect expectations at a specific time (some companies sent the completed first version of the questionnaire, when its shortened version was already ready).

As shown by a quick survey conducted on May 12, 2020, company executives had no idea how even the second quarter would end for them, although it was just over a month and a half before its end. The difference between the optimistic and pessimistic scenarios in their responses averaged about 30 percentage points. Despite the fact that by the second half of July the world economy (including the Russian one) began to recover, it makes no sense to make forecasts for the whole of 2020, since very high uncertainty remains.

To predict at least roughly the total turnover and total foreign sales for the year, you need to answer a number of difficult questions:

1. How will the split in the American society develop after the presidential elections in November in the world's largest market? Will the protest movement fade away by the presidential elections or will it expand, turning into an armed confrontation?

2. Will there be a second wave of the pandemic in countries where sales of Russian software companies are traditionally high? Will there be a dangerous new virus?

3. Will the distribution of money to the population and businesses in the United States lead to increased demand in the IT market?

4. Will spy mania and anti-Russian rhetoric bend in the US and the EU or on the contrary will weaken if the American establishment recognizes China as the main enemy?

5. How will the conflicts between the United States and China, as well as the resulting tension in relations between European countries and the United States, affect the global economy as a whole (hence, the global software market and Russian software companies actively working abroad)?

6. How actively will clients of Russian software companies pay off debts? According to the May express survey of RUSSOFT, 82% of the companies surveyed faced a delay in payment for work already completed.

7. How fast will the Russian software market recover? There are not many prerequisites for writing an optimistic scenario. The confrontation between various influential groups in the United States is too tough to reach a compromise, and a clear winner is not foreseen in the near future. The distribution of money has not yet had any obvious effect: the US GDP fell in the II quarter by about a third, and by the end of the year it will decrease by at least 8% (IMF forecast). The pandemic began to decline in the EU, but still economic activity has not fully recovered. Some prohibitions reappear.

The Russian state budget — both at the federal and regional levels — is likely to be sequestered even if it is replenished from the reserve funds. In such a situation, full repayment of the debts accumulated during the pandemic is unlikely. State corporations and oil and gas companies are also experiencing a decline in revenues due to a fall in demand for raw materials and a drop in exchange quotations even to negative values.

According to the rating of IT expenditures of Russian regions, published by CNews Analytics in March 2020, the regions intend to spend P212 billion on digitalization and IT implementation throughout the year, which is 31% more than last year. According to the Federal Electronic Trading Platform TEK-Torg, the volume of state purchases in the field of information technology (computers and peripheral equipment, software and licenses) under Federal Law 44 increased in the first half of 2020 by almost 70% compared to the same period in 2019 and amounted to P153.2 billion. In the first half of 2020, the volume of government purchases in the IT sector grew by almost 70% compared to the same period in 2019 and amounted to P153.2 billion. A significant part of these funds fell on the purchase (about 2.7 thousand tenders) of software and licenses — P48.4 billion (up 85%). However, contracts and announced purchases have not yet become reality. Changes in the economic situation are likely to result in budget revisions and payment delays. Nevertheless, the reduction in purchases with large planned growth is better than much lower budgeted IT costs.

According to the Association ARPP “Patrimonic Soft”, in June 2020 the drop in the average monthly revenue was 30% compared to June 2019, in May 2020 — 45%, in April — 50% correspondingly. This association surveyed its members — software vendors of the own software. Developers of custom software may have a better situation, but RUSOFT express polls (which covered both software vendors and software development service providers), showed that companies were expecting a reduction in revenues for the entire II quarter up to 40%, although they hoped that it would be less in the optimistic scenario (by 12%).

A huge plus for the software industry is state support, which was promised at the highest level. The legislation on the «tax maneuver» (on additional measures of state support for the IT industry) was finally adopted on July 31, 2020, but it will come into effect on January 1, 2021. State funding for digital transformation projects is planned, but the budgets are in any case smaller than they were before the pandemic. In addition, the state is very slow in this regard. Therefore, the promised funding can only have an effect in 2021.

Finally, Gartner and IDC forecast an unprecedented 6-8% decline in the global IT market in 2020, despite an increase in demand in the first half of the year for solutions for remote work and distance learning.

Previously, such cuts were always especially sensitive for Russian software companies. If the growth rates of the world market decreased by several percentage points, then the change in the growth rates of foreign sales of Russian software developers was calculated by 10-15 percentage points. This was the case in 2009, when overseas sales of Russian software products increased by only 5% (instead of about 20% in 2008 (the global crisis emerged only by the end of the year) and not immediately but in 2010 after the situation stabilized).

Given these prerequisites, we can only say with confidence that the previous growth rates — neither the aggregate turnover of software companies, nor the aggregate foreign sales — by the end of 2020 will not be achieved. Even small growth looks unlikely. At the same time, individual companies may well be in the black. This applies to developers of tools for teleworking and distance learning, as well as companies providing information security. However, their share in the total turnover of the software industry is not that large.

The previous long-term trends in the development of the software development industry can be continued, but against the background of new factors, they will become less obvious. It can be assumed that losses in developed markets will continue to be partially offset by growth in sales in Asia and the Middle East (to a lesser extent in Africa and South America). However, this compensation in previous relatively stable years could not be considered complete. Western markets continue to provide Russian developers with up to 80-85% of all foreign sales.

The example of the company "Kaspersky" (formerly "Kaspersky Lab") is illustrative. It has lost more than \$40 million in annual sales in the United States alone in the last couple of years. Due to growth in other markets (the company has offices and partners in 135 countries) it managed to increase its total revenue in 2018. However, the growth was only 4%. It can be assumed that without squeezing Western countries out of the markets, this growth would have been at least 10%.

The desire for import substitution in the IT field (or, more correctly, for “Digital Sovereignty move”) exists not only in Russia, but also in many countries outside the Western world. Moreover, import substitution can take place in the form of replacing imports from one country with imports from another. Taking into account the critical difference in the level of IT development in developed and developing countries of the world, in most third world countries such import substitution is more likely than crowding out American developments by their local solutions. In many developing countries, such a desire for "Digital sovereignty" must be used by the Russian industry. Various government agencies (first of all, the Russian Export Center) have already begun to promote the domestic software developers in relatively new markets for them. However, the pandemic has led to the fact that almost all marketing activities aimed at promoting in new markets for Russian software companies had to be postponed or canceled.

In 2019 RUSSOFT determined the most probable growth limits for the total revenue of Russian software companies. In the absence of shocks in the global economy, one could assume that in dollar terms it would grow in the next 2-3 years by an average of 10-20% per year. Less than 10% increase can be only in case of global cataclysms and ruble devaluation by 40-50%. The same can be said about the growth of the total volume of sales by more than 20%, which is possible with an equally serious depreciation of the dollar against other currencies.

An increase of 10-20% of the total turnover of the industry has existed in all recent years, if we exclude the two-year crisis period 2015-2016 (until 2013 RUSSOFT calculated only the volume of foreign sales). Such growth rates have limitations on both sides.

On the one hand, such constraints were the growing demand for software in the world market (both for software products and for custom development). It provided an annual increase in the total turnover of at least 10%. For Russian companies, fluctuations in aggregate turnover are possible if the domestic market shrinks, but such shrinks occur only for short periods of time. The processes of digital transformation of the economy and import substitution still create powerful pressure to support the sale of software and development services in Russia. The contraction of the inner market in dollar terms at each crisis was associated with a depreciation of the ruble and affected primarily the sales of foreign software companies, the cost of whose products in dollars increased with the depreciation of ruble.

On the other hand, human resources are the limiting factor for the industry growth. At the same time, we are talking not only about those professionals who are directly involved in software development, but also about marketers who know the situation in the foreign market, sales managers and competent managers with leadership qualities. Due to the impossibility of dramatically increasing these resources, the total turnover of the industry does not grow by more than 20% per year. It can be assumed that firstly - there are not enough leaders who can create a new company or take responsibility for the development of some important area of a medium or large company. Marketers and sales professionals are important primarily for grocery companies, which have grown more slowly than custom software developers in recent years. The service model directly depends on the number of developers, but it also needs managers with leadership qualities.

For foreign sales, the constraint on growth in the form of a lack of human resources is even stronger. Therefore, their growth by more than 15% without entering the global market with platform solutions is unlikely. In recent years, growth has reached 16% and 17%, but it has been achieved at the expense of several very large (by Russian standards) companies that have long been established and have become global (they do not always consider themselves Russian). If we exclude these leaders, then the growth in the volume of foreign sales will be no more than 10%. Working in the markets of other countries requires specific skills and knowledge. For example, good command of foreign languages is important, not to mention an understanding of different cultures, global technological and market trends. Among university graduates in IT specialties, the number of students who are fluent in any foreign language is a maximum of 15-20%.

It is much easier to find specialists and managers for the domestic market. Therefore, the growth in sales on it can be more than 20% in dollar terms, even with a stable ruble against the dollar, if a favorable market situation develops for this. Due to limited resources (both human and financial), many companies have to choose between working in the domestic market or working abroad. If sales in Russia provide the maximum growth, then they can either completely (at least temporarily) refuse to promote their solutions abroad, or significantly reduce their efforts to promote them to foreign markets. Another such massive reorientation to the Russian market could be observed by analyzing the results of 2017-2018. It covered at least 10% of Russian software companies. As a rule, those companies whose export share did not exceed 10-15% and which are limited only to neighboring countries, refuse to work outside Russia at all.

The only factor in a significant increase in the volume of foreign sales may be the implementation of projects for the introduction of platform solutions of Russian companies to the global market, primarily in the segments of the new Technological order of the world economy (artificial intelligence, cyber-physical systems, industrial Internet, robotics, virtual and augmented reality). But this growth will largely depend on government support for the Russian IT industry in introducing new regulation and creating a new security infrastructure, which is absolutely necessary for the establishment and growth of markets for the new Technological Order.

In the current situation, it will be possible to return to growth of at least 10% only if the situation in the world market stabilizes. Hopefully this will happen as early as 2021, but first we need to see what happens before the end of 2020.

## 2.4. Overseas sales and export earnings

The aggregate foreign sales of the software industry enterprises in 2019, as expected, did not reach \$10 billion, since a serious adjustment of calculations was planned taking into account the fact that several large companies ceased to be considered Russian (as they have changed ownership from Russian to a foreign). However, the average growth for those companies which still meet RUSOFT criteria of being Russian National companies turned out to be quite good — 17.5%. This is even slightly more than the calculations based on the companies' expectations showed (+ 15%).

### Overseas sales volume 2003-2019 (annual growth)

2003	2006	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019 *
\$0.53 billion	\$1.41 billion	\$3.3 billion	\$4 billion	\$4.6 billion	\$5.4 billion	\$6 billion	\$6.7 billion	\$7.6 billion	\$8.8 billion	\$9.68 billion	\$8.25 billion
+55%	+49%	+20%	+22%	+13%	+17%	+11%	+12%	+13%	+16%	+10%	+17.5% **

\* — in this case, it is incorrect to compare the absolute values of 2018 and 2019, given that some large companies are no longer considered Russian.

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

If in 2019 there were included sales of a number those Russian software companies (Luxoft, Parallels, Transas, Auriga, MERA) which were recently sold to foreign partners, then the total foreign sales of the IT industry in 2019 would have exceeded \$11 billion. There is also a large number of companies that carefully hide their Russian origin. It is usually very difficult to even get information about the number of their personnel, and they usually try not to advertise the very fact that their main development is carried out in Russia. The example of the Nginx company is illustrative. In the spring of 2019 it was sold to F5 Networks from the US for \$670 million. And we had never met data on their sales abroad or in Russia.

The cost of buying a company rarely exceeds its turnover by 3-4 times. Consequently, this company's revenues are likely to well exceed \$100 million. Nginx was founded in 2011 by Igor Sysoev, a former Rambler employee, with the aim of developing and promoting a solution of the same name for high-load sites, which he has been developing since 2002. That is, the origin of the company and its main business activity took place in Russia, but after its establishment, investments of tens of millions of dollars were attracted mainly from abroad.

RUSSOFT does not recognize Nginx as Russian, although it meets all three criteria for belonging to the Russian software development industry (originated in Russia, the founders are Russians, the main development center is most likely located in Russia). The fact is that there is very little reliable information about the company. Such companies try to position themselves as non-Russian, and therefore they keep a lot of things classified in their activities in Russia.

There is too much uncertainty with the collection of information about such companies. We can only assume that if there is more reliable information about their turnover, it would be possible to add at least another \$2 billion to the income received by Russian developers on the international market (in total, it would have turned out to be at least \$13 billion in 2019).

The indicator of sales to foreign investors of companies with Russian roots would be useful in order to try to analyze the reasons for their departure to other jurisdictions. These reasons are generally known, but it is not clear what weight each of these reasons has and how these or other measures of state support to the industry affect them.

There is a net distinction between foreign sales of software companies and their export earnings. Each of these terms has a corresponding quantitative dimension. Therefore, there are three different indicators of the performance of software companies abroad:

- the total volume of foreign sales,
- the volume of export of “computer services”,
- the volume of export earnings.

Their difference from each other may well be quite significant.

The volume of export of computer services is based on statistics collected by the Central Bank of Russia and received from banks according to the corresponding group of the ICEEA classifier. Their volume at the end of 2018 amounted to \$4.488 billion, which is 54% of the volume of foreign sales of software companies. However, such a big difference, which often raises questions and bewilderment, has a logical explanation.

### **Explanation of the Central Bank of Russia**

*Foreign trade statistics for “computer services” are developed on the basis of the international methodology outlined in the “Manual on International Trade in Services Statistics 2010”, UN. Computer services include operations related to the creation and implementation of software: development, creation, delivery and provision of documentation for custom software; purchase of ready-made software delivered by electronic means; the acquisition of software licenses without reproduction and distribution rights.*

*In addition, this category of services includes work related to data processing, creation, restoration, hosting on a server, storing databases and working with them; services for the development, design and placement of web pages on the server; services for the installation, repair and maintenance of computers and software; the provision of consulting services related to software and the operation of computers, as well as training in the framework of consulting. The main sources of information in the compilation of statistics on foreign trade of the Russian Federation in services are the information contained in the reports of credit institutions approved by the Bank of Russia.*

“Foreign sales of software companies” and “export of computer services” are two completely different indicators, and there should not be equality between them. Firstly, software companies receive income not only from computer services, but also from software licenses when selling software and hardware systems, when selling advertisements (in free applications), and various non-computer services from scientific research.

Secondly, companies transfer to Russia earnings from sales of their software abroad not only as payment for «computer services», but also as payments for the use of intellectual property, as money transfers to individuals or as investments. It is known that two large Russian software companies, successfully operating abroad, are not included in the top 10 exporters of computer services, but they are in the top 10 in the section of “Payment for the use of intellectual property”.

Thirdly, a significant part of the earnings received by the legal entities of Russian companies abroad remains outside of Russia. These legal entities are being created in accordance with international practice in order to be closer to the client (in the context of modern geopolitics, this practice becomes especially relevant). This part of earnings can be directed to marketing, to maintain its own foreign development centers and sales offices, as well as remain in the bank accounts of the owners.

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

		2011	2012	2013	2014	2015	2016	2017	2018	2019
Foreign sales of software companies in Russia (data from RUSOFT)	Absolute value, billion \$	4	4.6	5.4	6	6.7	7.6	8.8	9.7	8.25*
	Change over the year	+22%	+13%	+17%	+11%	+12%	+13%	+16%	+10%	+17%
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
	Change over the year	+30.9%	+19.7%	+25.7%	+5.7%	-7.4%	+7.7%	+28.3%	+18.8%	+10.5%
The share of export of "computer services" (data from the Central Bank) in foreign sales of software companies (data from RUSOFT)		42%	43%	46%	44%	37%	35%	39%	42%	54%

\* — in this case, it is incorrect to correlate the absolute values of the total volume of foreign sales in 2018 and 2019, because the indicator for 2019 was calculated according to the changed methodology, taking into account the fact that some companies were no longer considered Russian.

The growth in the share of "computer services" (Central Bank data) in foreign sales of software companies is explained by the fact that the international earnings of companies that have ceased to be considered Russian may not be included any more in the total volume of foreign sales of Russian companies (which is a significant loss as they have a wide foreign network of development centers and marketing offices and left a significant part of their proceeds abroad).

However, the export of computer services is part of the overseas sales of software companies. At the end of 2019, these two indicators differ by \$3.4 billion. How this difference is distributed can only be very roughly represented, because the methods for determining these two indicators are completely different. RUSOFT collects accurate data on the largest companies, and for other companies it extrapolates data from their industry survey based on the model of existing pyramid of distribution of the number of companies depending on their size. The central bank uses a continuous surveillance of the banks' reports on the sources of currency receipts from their clients.

As a result of calculations, export proceeds from foreign sales of Russian software companies to Russia amounted to at least \$6.5 billion at the end of 2019. Consequently, Russian companies have no more than \$1.8 billion left abroad.

Thus, there are three different indicators characterizing the foreign economic activity of Russian software companies in 2019:

1. Total foreign sales of Russian software companies — \$8.25 billion (calculated by RUSOFT);
2. Foreign payments inflow to Russian software companies (volume of software and software development services export) — not less than \$6.5 billion (expert assessment of RUSOFT);
3. Export of computer services — \$4.488 billion (statistics of the Central Bank of Russia).

Possible ways of obtaining export earnings by software companies without being reflected in the statistics of the Central Bank "Export of Computer Services":

**1. Transfers to individuals.** This method is practiced, but the transfer amounts are not very large. And the frequency of using such a channel by a company cannot be large. However, there are no restrictions for receiving an official salary in this way.

**2. Services in the field of research and development.** These services are provided by software companies and can account for a significant share of research revenue across all sectors of science and technology.

**3. Advertising, marketing, public opinion research.** The monetization of a free app is often provided by ads that are placed in that app (displayed with that app).

**4. Payment for the use of intellectual property.** Intellectual property is closely related to software development.

**5. Machinery and equipment.** Many software companies produce equipment (software and hardware systems), the basis of which is the software they have developed. Such equipment can be sold abroad (including neighboring countries) for hundreds of millions of dollars.

**6. Professional services and management consulting services.** It is worth noting that management services brought in \$6.06 billion in 2019 (an increase of 0.5% over the year) At the same time, according to Central Bank statistics, 97% of the export of such services is provided by the “far abroad” for projects in which the corresponding services are provided to customers in Western countries. In some areas, related to the implementation of IT, Russia has relevant competencies.

**7. Direct investments (other than the banking sector) and interholdings transfers** In some years, 80-90% of foreign investment in Russia came from such small states as Luxembourg and Cyprus. This means that most of these investments were of Russian origin. In 2019, 91% falls on the following countries: Cyprus (25.6%), Austria (2.9%), Bermuda (2.9%), Bahamas (3.6%), Ireland (10.1%), Hong Kong (8.5%), United Kingdom (15.2%), Netherlands (18.7%). In many cases, it was more profitable to transfer own funds from foreign accounts to Russia in the form of foreign investments. In recent years, partial refunds to Russia from foreign sales have been carried out in accordance with Russian legislation governing holdings.

#### Statistics of foreign exchange receipts to Russia by types of transfers that can be used by software companies (data from the Central Bank of the Russian Federation at the end of 2019)

Income in favor of individuals located on the territory of the Russian Federation (residents)	\$22.520 billion (+0.3%)
... including receipts of wages and other transfers under employment contracts in favor of residents of the Russian Federation (Cross-border transfers of resident individuals for purposes of transfers and receipts)	\$2.091 billion (+1.3%)
Research and development services	\$0.419 billion (+1.9%)
Advertising, marketing, public opinion research	\$3.705 billion (+1.8%)
Payment for the use of intellectual property	\$0.876 billion (+14%)
Machinery, equipment and vehicles (data of the FCS)	\$27.68 billion (-4.7%)
Professional services and management consulting services	\$6.056 billion (+0.5%)
Incoming direct investments (Equity instruments and units / shares of investment funds)	\$31.975 billion (+264%)
Direct investments of the Russian Federation by instruments of direct investments (by the principle of direction)	

Source: Statistics of the Central Bank of Russia

Although the export of computer services and overseas sales of software companies are different indicators, they are related to each other, and therefore there is some consistency between them. According to the Central Bank of Russia, at the end of 2017 25% of funds received in Russia for computer services from abroad have been provided by the 5 largest companies, and 30 such companies account for 48% of export earnings. This is generally in line with RUSOFT's data, according to which the largest 70 companies provide 74% of foreign sales of all Russian software developers.

Moreover, the acceleration and deceleration of the growth rates of these two indicators, as a rule, occur simultaneously, although the growth rates themselves differ significantly. In 2015, for the only time in the last 7 years, the Central Bank of the Russian Federation did not observe an increase in foreign exchange earnings from the export of computer services, despite the fact that, according to RUSOFT's calculations, the volume of foreign sales of software companies increased by 12%. It should be noted that up to 2013, inclusive, the growth rates of computer services export (data of the Central Bank) were significantly higher than the growth rates of the volume of foreign sales of software industry according to RUSOFT.

Three years, starting from 2014, on the contrary, RUSOFT's estimates were significantly higher. According to the results of 2017-2018, revenue for "computer services" according to the Central Bank of the Russian Federation increased faster than foreign sales (according to RUSOFT). The emerging multidirectionality in 2015, as well as a sharp decline in the growth rate of the export of computer services in 2014 can be explained by the consequences of the geopolitical crisis caused by the events in Ukraine and by the related situation in the country's economy. The depreciation of ruble began in the first months of 2014, and with it came the deterioration of various indicators for the entire economy.

Under these circumstances, it is logical that company leaders began to refuse to transfer money from foreign clients to Russia, leaving more revenue abroad than during the times of geopolitical and relative economic stability.

In addition, anti-Russian sanctions and threats of their use against foreign clients of Russian companies are forcing them to more often transfer their sales centers and technical support centers (and sometimes headquarters) abroad, under the jurisdiction of countries that, in the eyes of their clients, has less risks of falling under anti-Russian sanctions.

This business model is more costly than direct sales to Russia, so any reduction in tensions in the world allows Russian companies to return to direct export sales (to this must be added the exports carried out by new players in the export market, which always appear during a period of decreasing political tensions).

However, the ratio of the indicators "software export" and "foreign software sales" can be influenced by other factors. For example, the weakening or tightening of currency control makes it necessary to change the money transfer schemes in Russia or, more often, to refuse such transfers altogether. Another possible factor could be the increasing popularity of software sales over the Internet. Such sales are most likely not reflected in the statistics of the Central Bank of Russia, and the annual RUSOFT survey suggests that their importance has been growing in recent years for both small and large companies.

The existing trends abroad and in Russia suggest that in the future it will become even more difficult to determine the mass of income of software companies, since the cost of software as an integrated part of hardware is constantly growing and exceeds 50%, which means that manufacturers of hardware are increasingly engaged in software development. They export software via their hardware export. At the same time, such a reorientation is massive, and it is increasingly difficult to separate hardware designers from software companies.

At the end of 2017, the results of a Gemalto study conducted in conjunction with Vanson Bourne became public. The study surveyed 300 IT leaders in the US, UK, France, Germany and Japan. It found that the majority (84%) of device manufacturers changed their behavior. In fact, 37% have already fully transitioned to revenue-generating models focused on software sales, and 94% of respondents have increased their investment in software development in the past five years.

A similar reorientation is visible in Russia as well. Therefore every year it becomes more difficult to distinguish a software company from a hardware manufacturer. However, this phenomenon in Russia is not yet so widespread due to the fact that in Russia there are still much fewer manufacturers of "hardware" than in Western countries, China or Japan.

## 2.5. Comparison of foreign software sales and exports of other goods and services.

The share of foreign software sales in the total volume of exports from the Russian Federation has almost always grown over the past 17 years, although in some years this growth has stopped due to a sharp increase in all Russian exports. In 2002, this share was 0.3%, and in 2016 it reached a record value of 2.3% (for “computer services” for the period 2002-2016 it increased from 0.1% to 0.8%). This indicator decreased only in 2011, when, due to the recover of oil prices, the total export of goods and services of the Russian Federation increased by 30%. It had occurred as well as in 2017-2018, when not only rising prices for raw materials played a role, but also more active work in foreign markets of enterprises of various industries did.

There was no talk of some kind of slowdown in foreign sales of software companies in 2017, since the growth of these sales amounted to 16% in dollar terms (quite an acceptable value in the current conditions), although to a lesser extent than the entire export of services and goods. If we consider the results of 2018, then we have to admit that some signs of a slowdown in software exports were still observed. Whatever were the reasons for the change in the share of software exports, the indisputable fact is that in recent years foreign sales of software have become much more significant in the foreign economic activity of Russia than 10-15 years ago.

### Comparison of the volume of foreign sales of software companies with the total export of goods and services of the Russian Federation, \$ billion

	2011	2012	2013	2014	2015	2016	2017	2018	2019
Export of Russian Federation services	58.04	62.34	70.12	65.74	51.7	50.55	57.8	64.8	62.8
Export of goods of the Russian Federation (FOB)	515.41	527.43	521.84	496.81	341.42	281.85	352.3	443.1	414.3
Export of goods and services Russian Federation	573.45	589.77	591.96	562.55	393.12	332.4	410.1	507.9	477.1
Growth / decline in exports of goods and services over the year	29.8%	2.8%	0.4%	-5.0%	-30.1%	-15.4%	+23.4%	+23.8%	-6.1%
Foreign sales of software companies according to RUSSOFT (change per year)	4 +22%	4.6 +13%	5.4 +17%	6 +11%	6.7 +12%	7.6 +13%	8.8 +16%	9.68 +10%	\$8.25 +17.5%
Share of foreign sales of software companies in total Russian exports	0.7%	0.8%	0.9%	1.1%	1.7%	2.3%	2.1%	1.9%	1.7%*
Exports of computer services (change per year)	1.7 +30.9%	2 +19.7%	2.5 +25.7%	2.7 +5.7%	2.5 -7.4%	2.7 +7.7%	3.4 +28.3%	4.1 +18.8%	4.5 +10.5%
Share of computer services in total Russian exports	0.3%	0.34%	0.42%	0.48%	0.64%	0.81%	0.83%	0.81%	0.94%

Source: Central Bank statistics, RUSSOFT (only data on foreign software sales and calculation of shares)

\* — the decrease in the share is due to the fact that some of the software companies ceased to meet the criteria by which they were considered Russian

Comparison of data on the entire export and foreign sales of software in this case is quite justified. If we focus only on the Central Bank statistics, it will be impossible to explain the significant fluctuations in data on computer services (which is natural, since they reflect only a part of foreign sales of Russian software companies). It should be noted that «computer services» have already reached almost 1% of the total exports of goods and services in all industries. The fact that their share declined slightly in 2018 (with an increase of 19%), only indicates that the average oil price grew even faster (the Brent brand rose in price by 28% in 2018).

### Exports of essential goods in 2016-2019

	Share in total exports of goods and services of the Russian Federation			
	2016	2017	2018	2019
<b>Overseas sales of software companies</b>	<b>2.3%</b>	<b>2.1%</b>	<b>1.9%</b>	<b>1.7%</b>
Food products and agricultural raw materials	5.1%	5.05%	4.9%	5.2%
Grain (cereals)	1.7%	1.8%	2.06%	1.7%
Wood and pulp and paper products	2.9%	2.9%	2.7%	2.7%
Chemical industry products, rubber	6.3%	5.8%	5.4%	5.7%
Machinery, equipment and vehicles	7.3%	6.9%	5.7%	5.8%
Weapons (source: Center for Analysis of the World Arms Trade)	4.5%	3.4-3.7%	≈3.1%	3.0%

The share of foreign sales of software companies in the total export of goods and services of the Russian Federation has been decreasing since 2016, although it has been growing steadily in previous years. The main reason is that exports of other industries also grew during these years (sometimes faster than that of software companies). First of all, commodity revenues increased due to the rising of oil and gas prices in 2017-2018. In 2019, the main reason for the decline in the share of the software industry was due to the fact that several large companies were excluded from the calculations at once, which, in accordance with RUSSOFT's criteria, ceased to be "Russian". With them, foreign sales would exceed \$11 billion. The share of the software industry in total exports of goods and services would be at least 2.3% (that is, it would be at the level of 2016). At the end of 2020, the indicator of foreign software companies itself does not make sense, but one can expect an increase in this indicator, because the losses of the same commodity sector will be greater.

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Over the past 10 years, RUSSOFT has been comparing the volume of foreign sales of software companies with the export of various important goods. This is done in order to assess and show the growing importance of the industry in the economy. It is assumed that this comparison is conditional, since the value of exports, depending on the group of goods or services, can have a completely different impact on the country's economy. The value added indicator is also important, which is very high for the software industry, since the labor costs of software developers are 50-80% (on average, more than 70%). In addition, in the raw materials sector, a significant part of export income comes from imported equipment and natural resource rent. In agriculture, exports are provided not only by the labor of farmers, but also by fertile land, foreign machinery and imported seeds.

## 2.6. Internal sales

Of the total domestic market sales of ₺587 billion, approximately ₺194 billion is accounted for by service companies which receive the main income from custom development. ₺393 billion of internal earnings are received by software vendors. Since it is known what the share of companies that are directly involved in custom development is 83% of total sales of services (software vendors offer 15% of total inner services), it is possible to estimate the total volume of software development services received by all Russian software companies in Russia. It amounts to ₺220 billion.

Similar calculations can be done regarding the domestic software sales in Russia. Service companies are also developing them, but in their total turnover they amounted only to 8.3% in 2019 (6% a year earlier). For software vendors, the main direction is the domestic market (72.5% of internal sales). As a result, the domestic sales of Russian software vendors amount to approximately ₺301 billion.

The total sales of custom software development services and of software in 2019 reached ₺550 billion. The difference between this figure and the total sales of service providers and of software vendors (₺587 billion) is being explained by the fact that one needs to add the sale of software as an integral part of hardware and to also add income from various IT-services, including SaaS and other sources of revenue of software vendors.

The increase in revenue of local companies in the domestic market amounted to 14.4% in dollars (in rubles — 17.3%). Approximately the same indicator should be for the software sold by them (without considering other sources of income). There is no complete and reliable data on the Russian software market. They have been publicly provided only by IDC in recent years. On behalf of this company, the media reported that the entire IT market grew in 2019 by about 4% (in dollar terms) to \$25.1 billion. At the same time, the structure has hardly changed. This means that the software market has grown by about 4% or a little more. Considering the fact that IDC primarily measures the volume of the software market in Russia in terms of sales of foreign companies, the difference in growth rates according to RUSOFT and IDC data suggests that the import substitution process is still quite active, although many large state structures try in every possible way not to change anything and not to substitute foreign software.

At the same time, Russian companies are selling software on the domestic market for \$4.7 billion at a much smaller amount (according to IDC, about \$3.2 billion). At the same time, foreign companies sell software in Russia for at least \$2 billion. Most likely, the volume of the Russian software market should be at least \$6 billion, even if it does not include custom software development services (IDC considers IT services with reference to the corresponding service segment of the IT market). However, IDC data can also be quite accurate if the research company follows a well-established methodology. There may be different opinions about what to refer to the software market and what not to refer to, depending on the tasks.

### Sales volume of Russian software companies in the domestic market in 2013-2019

	2013*	2014	2015	2016	2017	2018	2019**
In ruble terms	₺178	₺240	₺220	₺294	₺321	₺387	₺587
	billion	billion	billion	billion	billion	billion	billion
		(+35%)	(-8%)	(+34%)	(+9%)	(+20.5%)	(+15.7%)

\* — until 2013, RUSOFT did not determine the size of the total turnover and sales within Russia, therefore there is no data on sales growth in comparison with 2012.

\*\* — in this case, it is incorrect to correlate the absolute values of 2018 and 2019, because the indicator for 2019 was actually re-calculated using a slightly changed methodology and based on more complete data.

Although the growth rates of foreign sales turned out to be higher than the growth rates of sales in the domestic market, one cannot speak of the industry's reorientation from the domestic market to foreign markets in 2019. The fact is that the survey in 2020 was not entirely complete (much less questionnaires were collected than in previous years), which, with any division of the indicator (in this case, the total turnover) leads to an increase in the error.

Companies with a turnover of less than ₺1.28 billion (less than \$20 million) showed more significant growth in foreign sales. At the same time, for companies with a turnover of less than ₺320 million (less than \$5 million), sales abroad increased altogether by 25.6%, and in the domestic market — only by 6.7%.

They have had problems with increasing revenue in the domestic market before. It is likely that it is difficult for them to break through in Russia, since state corporations and government authorities prefer to work with larger private businesses or with State corporations. Apparently, small companies have learned to work abroad. Therefore, we are not talking about their reorientation, but about increasing export earnings. In previous years, the growth rate of foreign sales for large companies was generally higher than that of small and medium-sized companies.

In 2018, service companies began to pay more attention to the domestic market. While their cumulative overseas sales increased by 9%, their domestic sales increased by 20.6% (all similar comparisons in dollars). However, this ratio is typical for service companies of all sizes. If 5-10 years ago, some classic custom software developers working in the EU and US markets had no sales at all in Russia (sometimes they were skeptical about the prospects of finding a good customer in Russia), then in the last 2-3 years there were almost all of them working there.

The largest of them necessarily conduct projects in Russia, which provide them with at least 10% of their total revenue (typically up to 50%). Perhaps the growth in demand for custom software development was associated with the preparation of the FIFA World Cup, which was held in Russia in the summer of 2018. Most of the work could have been done in 2017, but payment was made in 2018. However, the influence of the preparation of this championship might not be the main one, because the expansion of the use of artificial intelligence, the introduction of the industrial Internet of things, the creation of state information systems and the development of the "Smart City" - all that required the development of unique solutions. In addition, according to the observations of 1C specialists, there are more enterprises that are trying to develop their own system, even if there are already corresponding ready-made solutions.

At the end of 2019 service companies did not have the same advantage in terms of growth rates in the domestic market. They increased them by 12.7%, and software vendors — by 17.2%. Apparently, a number of large government projects that had required custom software development were completed in 2018, and new similar ones did not appear in the same number.

## 2.7. Sales dynamics for companies of different sizes

Comparing the economic indicators of companies with different turnover, one could safely say that small companies find it more difficult to grow (or often even to maintain the same level of income and survive) than large ones. The larger the company, the better its turnover and overseas sales' figures were. A similar pattern was revealed in almost all years of the study.

Only once (in 2013) small companies made a contribution comparable to large companies to export growth. At the same time, in times of crisis (in 2009 and 2014-2015), small businesses became even more vulnerable in comparison with large companies.

### Dependence of changes in turnover and foreign sales on the size of the surveyed companies in 2015-2018 and in 2019

Categories of companies by turnover		less than \$1 million	from \$1 million to \$5 million	from \$5 million to \$20 million	more than \$20 million
Total revenue	Average annual change 2015-2018	+3.5%	-0.6%	+9.5%	+17.6%
	Change in 2019	+4.9%	+18%	+23.3%	+12.2%
Overseas sales	Average annual change 2015-2018	-1.8%	+9.9%	+9.3%	+18.1%
	Change in 2019	-17.3%	+17.7%	+19.5%	+11.7%

In 2019, which was not a crisis year, the growth rates of the largest companies turned out to be relatively low. They were the largest for companies with turnover of \$1 million to \$20 million (from ₺64 million to ₺1.28 billion). For companies with turnover of less than \$1 million, the total income increased by only 4.9%, while overseas sales fell by 17.3%. However, it should be taken into account that the survey covered poorly young companies that are less than 3 years old. As a rule, fast-growing new enterprises quickly (in 2-3 years) overcome the bar of \$1 million.

As a rule, small companies have a wide range of sales dynamics depending on their age. During all the years of the study, the old-timers of the market grew slowly at the beginning, while young companies developed quite dynamically. Only at the end of 2015 such a pattern was not revealed. Companies with turnover of less than \$5 million, created in the last 10 years, reduced turnover by 29% (in dollars), and their overseas sales increased by 4%. The same companies, which have been working on the market for more than 10 years, recorded a similar decrease in turnover — by 29%, and foreign sales did not change. From the above, we can conclude that the crisis has temporarily leveled the position of small companies of different ages.

In 2019, the following ratio of growth indicators in turnover in favor of younger companies was revealed +12.1% and +22.9%, and in foreign sales — +11.7% and +25.7%, correspondingly.

## 2.8. Head office location

### Dependence of changes in turnover and foreign sales on the location of the headquarters of the surveyed companies in 2015-2018 and 2019

		Moscow	Saint Petersburg	Other cities
Change in total revenue	Average over three years (2015-2018), \$	+13.9%	+12.1%	+20.2%
	2019, ₺	+17.9%	+12.0%	+19.1%
Change in the volume of overseas sales	Average over three years (2015-2018), \$	+17.2%	+16.4%	+13.2%
	2019, ₺	+18.1%	+8.8%	+25.4%

Companies from Moscow and St. Petersburg almost always had higher sales and export figures than regional companies. The main reason is that most of the large and medium-sized software companies in Russia are concentrated in the two Russian capitals. They are growing faster because of their size, although the location of their headquarters also matters. A certain role is played by the popularity of the brands of the two Russian capitals, as well as closer transport links with other countries. First of all, we are talking about air traffic (for St. Petersburg — also rail and road traffic). However, these factors are no longer critical, since almost all major cities in Russia have quite comfortable air links with foreign countries.

In 2016, with the emerging recovery of the Russian economy from the crisis, this advantage of the two capitals slightly decreased, but it still took place. But in 2017 there was a turning point — the surveyed companies located outside Moscow and St. Petersburg grew faster, they increased turnover by 59% and overseas sales by 29%.

In 2018 the turnover growth rates were also higher for companies whose headquarters are located in more than two Russian capitals. But the growth rates of foreign sales did not depend in any way on the location of the companies (the difference was within the margin of error). In 2019, two Russian capitals already have an obvious lag in terms of growth rates (especially St. Petersburg). At the same time, the tendency to transfer the head office from the regions to Moscow has intensified. And some St. Petersburg companies have at least an equivalent office in the capital.

## 2.9. Share of foreign sales in the company's turnover

According to all the previous years of survey (with rare exclusions) the growth in the turnover of the respondents' companies was the higher, the greater their share of exports. At the end of 2018 and 2019, no obvious dependence of the growth rates on the share of foreign sales was revealed. This is despite the fact that sales on the domestic market have grown a little more. This means that companies that are more focused on foreign markets can always respond to the growth of the domestic market. If the situation on foreign markets becomes more favorable than on the domestic one, then companies for which the only key market is Russia will not be able to react as easily to this change.

Random fluctuations in the optimal ratio of export income and sales in the domestic market in the total turnover of a company are quite possible, but analysis of the results of research over several years show that in order to ensure stable growth in turnover, software development companies should have an export share of at least 50% of revenue. This is especially important in the event of economic upheavals within Russia and in the stable situation on the entire world market. Regarding 2020, it is unclear whether the decline will be greater on the domestic market or on the world market. Nevertheless, it can be assumed that companies with a large share of exports will perform at least as well as those who do not work abroad or hardly work abroad.

### Growth of income of companies with different share of foreign sales

Export share	less than 10%	less than 50%	more than 50%	more than 75%
Income growth in 2011	+11%	+17%	+34%	+36%
Income growth in 2012	+28.5%	+22.1%	+20.6%	+24.5%
Income growth in 2013	+5%	+7%	+24%	+25%
Income growth in 2014	+4%	+1%	+25%	+26%
Growth / decline in income in 2015	-34%	-21%	+22%	+25%
Income growth in 2016	+14%	+15.5%	+18%	+18%
Income growth in 2017	+16%	+17%	+21%	+23%
Income growth in 2018	+11%	+9%	+10%	+11%
<b>Average over 8 years (2011-2018)</b>	<b>+6%</b>	<b>+8%</b>	<b>+23.5%</b>	<b>+25%</b>
Income growth in 2019, P	+15%	+15%	+17%	+13%

## 2.10. The nature of the turnover change

Change in annual turnover of respondent companies in dollar terms (excluding 2019, in which revenues were determined in rubles)

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 2018
Did not change	26%	4%	30%	27%	13%	4.2%
Increased	51%	25%	42%	43%	52.5%	69.4%
Shrank	15%	71%	11%	3.5%	15.5%	18.1%
At a loss to answer	7%	14%	17%	26.5%	19%	8.3%

If in 2015 71% of the surveyed companies reduced their turnover in dollar terms, then in 2016 only 11% of those surveyed indicated a radical change in the situation in the industry. In 2017, the share of companies whose revenue decreased at the end of the year dropped to a quite symbolic value — 3.5%. That is, there were almost no companies in the software industry with declining revenues in dollar terms, but this was largely due to an increase in the average annual ruble exchange rate. At the same time, a third of the companies surveyed have high growth rates: they have increased their turnover by more than 10%.

In 2018, the number of companies with reduced turnover in dollar terms increased again. At the same time, the number of growing companies has increased. The growth of more than 10% was observed in 35% of companies.

The turnover indicator at the end of 2019 was measured in rubles, and the Russian national currency depreciated slightly against the dollar over the year. This is partly why there are more growing companies on the market. However, this was not the main factor; 2019 was better than the previous year in all respects. It can be noted that at the end of 2019 about half of the companies surveyed (51.4%) increased their revenue by more than 10%. At the same time, it must be admitted that there were quite a few companies that reduced their turnover.

### 2.11. Distribution of foreign sales depending on the business model

Determining the structure of the industry according to the business model has certain difficulties, as the distinctions between service providers' and software vendors' business models are increasingly blurred. In 2019, 49% of surveyed software vendors indicated the use of custom software development in their activities. Exactly the same figure was a year earlier. In 2020 this figure was only 32%, but much fewer companies participated in the survey, which could affect the result.

At the same time, 43% of service companies surveyed in 2020 indicated that they have income from the sale of their own software products. However, the share of software products in their total revenue is small — about 3%. At the same time, classic outsourcing companies that do not develop their own software products still have modules or blocks that are reused in various projects (that is, they actually have replicable solutions). About a third of the companies surveyed (32%) have income from both custom development and from the sale of their own replicated solutions. Traditionally, the presence of a few percent of the turnover from some business model cannot be indicated as prevailing. As a rule, these are software vendors that, in the spirit of the times, are also engaged in localization, customization of their products or providing services for access to work with these products. In some cases, in service companies the replicated solution was first created under the order of another company, but it became clear that it could be replicated independently.

However, there are examples of the creation of replicated solutions by classic outsourcing companies. For example, Simbirsoft released a replicable mobile solution for insurance companies in the summer of 2019. At the same time there are no examples of a complete transition from a service model to a product one. They are too different to be able to rebuild an already established business or to fully combine the two directions.

Until 2016, a certain trend was observed, suggesting a reduction in the share of foreign sales of software development services in the total foreign sales of Russian software companies (including software development services provided by R&D Centers of foreign companies). Compared to 2008, the share of companies specializing in custom development decreased from 55% to 46%, and the share of R&D centers of foreign vendors — from 15% to 7%. The first place in terms of growth rates was taken by companies with a product business model. At the end of 2016-2018 nevertheless, service companies grew faster.

In 2018, their sales growth rates in the domestic market were especially high, although software vendors even slightly increased their share in the entire turnover. It can reasonably be assumed that the faster growth in foreign sales among companies that receive the main income from custom development was a temporary phenomenon associated with a significant depreciation of ruble against the US dollar after 2014. This assumption is partly confirmed by the results of 2018 (although the average annual ruble exchange rate against dollar dipped by 8%).

The depreciation in the national currency has significantly contributed to the increase of the competitiveness of Russian custom development in the world market. Read more about the prospects for each business model below in the relevant sections.

The factors affecting R&D centers of foreign companies and Russian service companies are partly the same. With the cost of software developers increasing for 10-15 years, not all foreign corporations were ready to expand their Russian divisions. In addition, their work was affected by the deterioration of relations between Russia and the United States (many of the R&D centers that had ceased to exist were owned by American companies). At the same time, the work of R&D centers was also influenced by the presence of global problems in some Western corporations, which forced them to downsize staff around the world, including Russia.

At the end of 2019, the share of software vendors in the total turnover of the industry increased again. However, due to the small number of companies surveyed, this indicator requires clarification. Most likely, this share actually increased, but not so significantly. This can be judged by the growth rates, which were slightly higher for software vendors than for service companies. This applies to both overseas sales and to domestic sales.

The increase in the share of development centers of foreign companies is primarily due to the fact that those companies that have ceased to be Russian (due to a change in their owners) have become such centers. These companies became foreign, so their total turnover can no longer be taken into account in the total volume of foreign sales, but they retained their development in Russia, and their sales and export volumes are taken into account in the results of the development centers of foreign companies.

**Distribution of total foreign sales by companies with different business models at the end of 2016-2019 (absolute value)**

	2008	2016	2017	2018	2019
Service companies	55%	46%	47.5%	47%	40.7% (\$3.36 billion)
Grocery companies	30%	47%	46.5%	47%	49.4% (\$4.08 billion)
Development centers of foreign companies	15%	7%	6%	6%	9.9% (\$0.82 billion)

**Distribution of total sales in the domestic market by companies with different business models at the end of 2016-2019 (absolute value)**

	2016	2017	2018	2019
Service companies	29.5%	30%	32%	33% (¥194 billion)
Grocery companies	70.5%	70%	68%	67% (¥393 billion)

**Distribution of the total turnover by companies with different business models at the end of 2016-2018 (absolute value)**

	2016	2017	2018	2019
Service companies	40%	41%	41.4%	36.4%
Grocery companies	55.5%	55%	55.0%	59.2%
Development centers of foreign companies	4.5%	4%	3.6%	4.4%

## 2.12. Service companies

**Key performance indicators of service companies at the end of 2019**

	in rubles	in dollars	in rubles adjusted for inflation
Turnover	¥411 billion	\$6.36 billion	-
Turnover growth	+16%	+13%	+13%
Volume of overseas sales	-	\$3.36 billion	-
Overseas sales growth	-	+17%	-
Inner sales	¥194 billion	\$3.00 billion	
Growth of inner sales	+13%	+10%	+10%

The main growth in foreign currency earnings from software development services in previous years was invariably provided by large companies. Their growth rates were much higher than those of medium and small companies. Large service companies can receive more profitable orders, and therefore pay their employees a higher salary than small businesses. Because of this, there was a flow of specialists to large companies from small ones.

Large companies have another advantage: having a network of sales offices and development centers around the world. As a result, they can neutralize the problems of anti-Russian propaganda and anti-Russian sanctions, as well as build up their staff by creating remote development centers in various cities of Russia and abroad, or by acquiring foreign and Russian companies.

In 2017 the situation changed dramatically — the increase in foreign sales of companies with a turnover of less than \$5 million averaged 24% (in dollar terms), while for companies with a large turnover it was much less — 8% and 14%. Nevertheless, the growth in turnover in 2017 was still higher for large companies. This suggests that they have begun to pay more attention to the domestic custom software market, which is likely to have grown significantly in 2017.

In 2018 the growth rates of service companies of different sizes caught up. As a result, it is now difficult to say which size of the company provides the most opportunities for increasing revenue. For companies with revenues of less than \$5 million, the total turnover increased slightly more than for larger companies, but the difference turned out to be insignificant for drawing any conclusions on it.

In 2019 the growth in foreign sales of companies with revenues of less than \$5 million turned out to be less (although +10% is a good indicator), but they benefit from an increase in the total turnover.

Small service companies have become more visible and more active in the last 3-4 years. Apparently, they were able to find their foreign customers even with a limited marketing budget and in the face of anti-Russian sanctions. They cannot compete with large companies with thousands of employees when carrying out large-scale projects. At the same time, there are other customers abroad (with small budgets) that the largest outsourcing companies are not interested in. On the other hand, large clients in Europe and the United States are more exposed to the risk of anti-Russian sanctions against them than small companies (for example, start-ups, which are traditional clients for Russian service companies).

A new phenomenon was the entry of not very large regional service companies into the Moscow labor market, although before they were losing the competition for personnel even in their hometown.

**Change in turnover and foreign sales of service companies at the end of 2019 depending on the size of the companies (\$)**

	<b>Change in turnover</b>	<b>Change in the volume of overseas sales</b>
Less than ₴320 billion (less than \$5 billion)	+20%	+10%
More than ₴320 billion (more than \$5 billion)	+17%	+17%

Custom development is still in demand in Russia and abroad. It is changing and is likely to change. More efficient ways of developing software will emerge and the specialization of service companies will deepen. For example, in the summer of 2019, the Lanit group created a new company, Lanit Expertise, which in 3 years intends to occupy about 10% of the Russian outsourcing market in the field of software testing services.

It is not excluded that the demand for custom software development will expand at the expense of Russian product companies. So far, they do not act as massive customers for service companies, but some examples of cooperation already exist. For example, in July 2017 the service company Mera signed an agreement with Kaspersky Lab to provide it with services for the development and testing of software for mobile devices.

It can be assumed that Russian service companies underestimate the markets of developing countries. Of course, the cost of labor there is lower than in Russia, and it will be difficult to enter these markets with the classic model of custom development. But if you use the accumulated expertise and ready-made modules or blocks, if also use work in cooperation with other companies (with platform developers, with system integrators), then the prospects for successful work in these markets become quite realistic.

One of the largest service companies in Russia, working for many years only for Western customers, considered the possibility of working in Iran. It still refused to participate in the tender because they did not know how to work with the state structures of Iran and did not really understand how decisions are being done in this eastern country. However, the estimated cost of the project was fine with it. Another service company (Auriga) won a tender in Dubai and is now mastering a new and very promising market.

In many developing countries, the creation of information systems of a national scale is required. Russian developers can have the corresponding competencies at a competitive price. In 2016-2017, 5-10% of service companies indicated a presence in markets outside of North America and the EU. At the same time, in the countries of the Middle East, such presence had in 2017 12% of companies, and a year earlier the figure was 9%. In 2018 already 25% of service companies were present (at least carrying out individual projects) in the «new markets» and 14% in the Middle East market. The reorientation to «new markets» of service companies is becoming increasingly evident.

It is incorrect to underestimate the service model, although the leaders of software vendors sometimes look down on it — as an intermediary business selling cheap labor to the West. Service companies implement complex digital transformation projects abroad and in Russia, specializing in the high-tech segment of software engineering. The need for these projects is steadily increasing due to the existing technological trends.

There were only doubts about the prospects for its rapid growth. These doubts still remain, because it (unlike the product model) directly depends on the growth of supply in the labor market, and it cannot grow by more than 10% per year. In order to grow faster, service companies must open and expand their network of overseas development centers.

The structure of aggregate foreign sales of service companies has been changing in the last 8 years within the limits of random fluctuations. Moreover, custom software development is often combined with the provision of other IT services. Thus, they can be inseparable from each other. Some large outsourcing companies refuse to separate them altogether.

In the 2018 survey, in the question of the structure of income, two new directions were added to the questionnaire «Sales by SaaS model» and «Sale of equipment (software and hardware systems), advertising in applications and other services that are not IT services». However, this addition did not fundamentally change anything. Income in these two areas went under the item «Other», and they gained from service companies, as a rule, no more than 1%.

It can be noted that outsourcing companies when working with foreign customers are even more focused on software development to order: these services provided 97% of all export revenue in 2017 and 79% — in 2018, 91% — in 2019. Own software products as a rule, are intended for sales within Russia (at the end of 2019 the income from selling their own software provided service companies with 8.3% of earnings in the Russian market and only 0.7% in the foreign markets).

**Structure of total foreign sales of surveyed service companies in 2012-2019**

	2012	2013	2014	2015	2016	2017	2018	2019
Sale, implementation and support of our own software products	1%	1%	-	2%	2%	0.6%	1.3%	0.7%
Custom software development	63%	91%	78%	90%	90%	97.3%	79.3%	91%
Sale of equipment (software and hardware systems), advertising in applications and other services that are not IT services	-	-	-	-	-	-	0.5%	-
Implementation and support	25%	3%	6%	2%	2%	0.7%	5.2%	2.2%
SaaS Sales	-	-	-	-	-	0.2%	0.3%	0.1%
IT outsourcing	10%	5%	3%	5%	6%	1.2%	11.3%	6%
Other	1%	-	12%	1%	1%	-	2.1%	-

**Structure of total sales of surveyed service companies in the domestic market in 2013-2019**

	2013	2014	2015	2016	2017	2018	2019
Sale, implementation and support of our own software products	1%	6%	30%	36%	5.5%	6%	8.3%
Custom software development	63%	58%	52%	44%	78.3%	74.9%	82.6%
Sale of equipment (software and hardware systems), advertising in applications and other services that are not IT services	-	-	-	-	3.2%	1.3%	0.8%
Implementation and support	25%	22%	10%	10%	5.2%	5.1%	3.5%
SaaS Sales	-	-	-	-	0.4%	0.4%	0.4%
IT outsourcing	10%	6%	5%	9%	7%	10.1%	4.3%
Other	1%	8%	3%	1%	0.3%	2.1%	-

**2.13. Software products and turnkey solutions****Grocery companies at the end of 2019**

	In rubles	In dollars	in rubles adjusted for inflation
Turnover	₽656 billion	\$10.16 billion	
Growth / decline in turnover	+18.7%	+15.7%	+15.2%
Overseas sales	-	\$4.08 billion	-
Overseas sales growth	-	+%	-
Inner sales	₽393 billion	\$6.08 billion	-
Growth / decline in sales in the inner market	+17.3%	+14.4%	+13.9%

At the end of 2019 the revenues of software vendors grew slightly more than that of service companies. We can assume a change in the vector of industry development. The fact is that in the previous few years they began to lag behind service companies in terms of growth rates, whose sales volumes are almost proportionally determined by the increase in the number of employees. Product companies are also highly dependent on the number of trained specialists, the lack of which hinders development. However, we are talking not only about technical specialists, but first of all about sales managers, marketing people who understand global market and technological trends, who are competent, ambitious persons with leadership qualities.

There was a slight slowdown in the growth rate of sales of software products, and there were other reasons for that as well. Firstly, no new large exporters appear among Russian software vendors, and the existing ones have exhausted their growth potential in their market segments. For example, several years ago, Kaspersky provided up to 20-30% of the annual growth in the aggregate foreign sales of Russian developers, but now it cannot grow at the same pace, since it already occupies the 4<sup>th</sup> place in the world in its segment. Even with an obviously better solution, it is almost impossible for a Russian company to become a world leader in the current geopolitical situation. Therefore, the 3-4<sup>th</sup> place is the ceiling that the global environment can afford, especially in such an area as information security.

In this segment, not everything is decided by the price and functionality of the created solution. In particular, there are banal bans on the use of Russian software by government agencies, and they have a significant impact on the global IT market. The only way to accelerate sales may be the capture of other segments of the information security market or even the formation of fundamentally new markets associated with the formation of a New technological order.

Other major Russian exporters of software products are in a similar situation. If they have not reached the ceiling, then they are already approaching it, and therefore their sales growth rates are reduced.

If you look at the next echelon (medium-sized companies by Russian standards), then they just fail to make a breakthrough when trying to confidently gain a foothold in foreign markets. There are local successes, but the transition to a new quality with a multiple increase in foreign sales does not work. One of the reasons is the lack of a marketing budget sufficient to actively promote software products. They form their marketing budget from current revenues from software sales in the Russian market, and in 2014-2016 it significantly shrank in dollar terms. Some improvement in 2017 could bear fruit in the future, but not to talk about some significant growth in the marketing budget in dollar terms in 2018-2019.

Perhaps a mistake is the focus on the markets of Western Europe and the United States (for example, the market of German-speaking countries), which are hardly growing anymore. It is very difficult to get users to switch to another solution in these markets, even if the solution is cheaper and better. Therefore, it is necessary to look closely (even actively study) at new and fast-growing geographical markets, where there are no established preferences for vendors and where there is a completely loyal attitude towards Russian companies.

The reorientation to new markets has already begun. Many young companies are successfully entering the markets of Brazil, China, India, Vietnam and other countries that are commonly called developing countries.

However, in recent years, one can note a sharp increase in turnover of Nexign (formally Peter-Service), which views international expansion as a strategic goal. It is already approaching the turnover of the largest software companies in Russia. The growth of the Speech Technology Center is also encouraging. It is still far from the largest, but if the growth rate of 2019 is maintained, it will quickly reach them.

Unfortunately, many promising Russian companies are forced to change jurisdictions and transfer IPRs and profit centers to other countries with more developed markets, more favorable conditions for protecting intellectual property rights and better financing conditions. Examples include well-known foreign software vendors established in Russia and forced to transfer IPR and the headquarters of their businesses abroad. However, some of them change owners.

At the end of 2015, the growth rate of foreign sales of software vendors with a turnover of less than \$5 million and more than \$5 million almost leveled off (7% and 8%, respectively). However, turnover for companies with sales of less than \$5 million decreased by 21% in dollar terms (due to a large depreciation of the national currency against the dollar and due to a large share of sales in the domestic market), and for larger companies, it decreased by 11%.

In 2016, there was again a big difference in the change in the volume of foreign sales: with a turnover of less than \$5 million, there was a decrease by 4%, with a turnover of \$5 million to \$20 million, there was an increase of 3%, with a turnover of more than \$20 million, an increase of 10%. However, at the same time, the total turnover of companies with each turnover of less than \$5 million increased by 38%. Apparently, they have reoriented themselves to a growing domestic market that is quite understandable for them. In the Russian market, all software vendors increased sales by 17% in dollar terms, and in the foreign market — only by 7%, which indicates the gradual transformation of import substitution from a slogan into a reality.

In 2017, the turnover of all developers of replicated solutions increased by 19%. At the same time, sales in the domestic market increased by 24%, and overseas sales — by quite a decent 15% (all in dollar terms). Consequently, the growth rate advantage of sales on the domestic market by 15 percentage points ensured the appreciation of ruble against dollar (in ruble terms, sales within Russia grew by only 8%).

As in previous years, the main sales indicators were better for large software vendors. For relatively small companies it can be noted that their growth in foreign sales was higher than the increase in revenue from operating in the domestic market — 9% and 5%, respectively. However, these companies were not even helped by the strengthening of ruble. In ruble terms, their sales revenues in Russia even declined (by about 9%). One gets the impression that it has become easier for them to work abroad than in Russia. Indeed, active work abroad has become noticeable in a number of still small and not yet very well-known companies.

In 2018, foreign sales of software vendors with a turnover of less than \$5 million again increased more than sales in Russia.

The indicators for companies with a turnover of more than \$20 million turned out to be very low. However, in this case, they were calculated only for the surveyed companies, and there were only 7 of them in the corresponding category, of which only 3 indicated the change in turnover and foreign sales. The sample is so small that no conclusions can be drawn from it.

Since information is collected for all the largest companies not only through a survey, but also from other sources, we have more accurate calculations at our disposal. According to these calculations, the turnover of the largest software vendors increased by 10% in 2018, and overseas sales — by 11%.

However, the leading software vendors did not participate in the polls before. At the same time, companies with a turnover of more than \$20 million grew faster than smaller companies. And 10-11% of the increase is already a small thing compared to similar indicators in previous years. In any case, for software vendors, too, large size has ceased to provide an advantage that allows them to grow faster than their smaller competitors.

In 2019, small companies had a clear advantage in terms of growth in foreign sales. These sales increased for companies with a turnover of less than \$5 million by 51% (for the larger ones only by 11%). However, the high performance among small product companies was provided by three developers of replicated software, which doubled their exports. Since only 13 such companies participated in the survey, it is too early to talk about the trend due to the large possible error. Nevertheless, one can confidently assume higher growth rates for small software vendors (although the difference may not be that big). At the same time, their turnover increased by 11%, while those of larger companies — by 15%. Consequently, it is more difficult for small software vendors to grow in the domestic market than in foreign ones.

#### Change in turnover and foreign sales of software vendors in 2019 depending on the size of the companies

	Change in turnover	Change in the volume of overseas sales
Less than ₺320 billion (less than \$5 billion)	+11%	+51%
More than ₺320 billion (more than \$5 billion)	+15%	+4%

#### Significant news related to the activity of software vendors

1. In December 2019, it became known about the plans of Playrix Holding to buy up a hundred American game developers. This was stated by the co-founders of Playrix, brothers Igor and Dmitry Bukhman. Previously, Playrix has already acquired about a dozen studios, which has increased its turnover to the level of American companies. In 2018, the Bukhman brothers spent more than \$100 million on business acquisitions and plan to more than quadruple their portfolio of gaming projects, which by December 2019 has only four titles. According to the forecasts of Newzoo researchers, the volume of the global mobile games market in 2019 will exceed \$68 billion, so it is increasingly attracting the attention of investors. Playrix games, including Gardenscapes, are expected to reach \$1.5 billion in revenue in 2019, up 30% from the previous year.
2. In 2019, the independent Japanese economic research institute MIC Research Institute, Ltd. Named Russian DeviceLock DLP the best-selling EDPC-class software product in the Japanese market. DeviceLock DLP retains 40% market share for the fifth year in a row.

## 2.14. Software development centers of foreign corporations in Russia

#### Scope of services provided by development centers of foreign corporations

Total volume 2019, \$	Change at the end of 2019, \$	2019 volume, ₺	Change at the end of 2019, ₺
\$0.82 billion	+17%	₺53 billion	+20%

At the end of 2018, the total revenue of R&D centers of foreign corporations amounted to \$0.57 billion. With the 17% growth indicated in the table, by the end of 2019 it should have been much less than \$0.82 billion. The discrepancy is explained by the fact that a number of large Russian companies no longer can be considered Russians, since they have completely moved into the foreign jurisdiction (have been bought by foreign entities). But at the same time they retained development in Russia, therefore, by now we refer their Russian development centers to the development centers of international corporations. Growth of 17% relates to development centers of foreign companies, excluding those Russian divisions of companies that changed jurisdiction in 2019.

It is possible that the resulting total revenue jumped up to more than \$0.82 billion, as this is a very conservative estimate.

The current geopolitical situation and the global problems of some Western corporations (primarily American ones) led to the fact that a number of these corporations reduced their Russian R&D centers or completely closed them. Alcatel-Lucent, Motorola, HP, Google followed this path. They were joined in 2017 by Oracle, which completely closed its development center in St. Petersburg, although it provided a third of the development of the Java programming language. Before the adoption of the anti-Russian sanctions, nothing foreshadowed such a course of events, since the Oracle management expressed satisfaction with the work of St. Petersburg specialists. Apparently, the closure of the development center in St. Petersburg was caused by the political position of the company's management or by the pressure from US government agencies.

On January 17, 2020 Intel informed TAdviser about the opening of the second office of the Research and Development Center in Nizhny Novgorod as part of the strategy of expanding and strengthening their division in the region.

The staff of the Intel Research and Development Center in Nizhny Novgorod in 2019 increased by 370 employees. In addition, the company announced the opening of another Nizhny Novgorod center, which was supposed to employ 300 people.

The information background in Western media often creates a distorted view of the risks of working in Russia. Because of this, top managers of foreign corporations, if they do not decide to reduce investments in Russian divisions, at least do not dare to expand them. At the same time Russia has adopted a number of measures that complicate the work of development centers of foreign corporations. In particular, foreign centers with R&D in Russia reacted negatively to the adoption of the Russian law on the protection of personal data, which obliges them (as all others) to store personal data of Russian citizens in data centers in Russia.

We can talk about a completely massive exodus from Russia of the world's most famous American IT companies. At the same time, it is necessary to point out that their place is taken by large companies from Germany, as well as by young and dynamically developing companies from Asia, many of which were created by immigrants from Russia. Asian companies are traditionally closed in terms of providing information about their activity. Young companies set up abroad by Russians, as a rule, do not want to advertise their ties with Russia, information about which can negatively affect the work in the markets of Western countries.

Although Western companies were closing or downsizing their R&D centers in Russia until 2018, among the 20 largest exporters of IT services from Russia it is easy to determine that Western companies are still dominant among their among the biggest exporters. These are Microsoft RUS (the parent company of Microsoft), Netcracker (NetCracker is a subsidiary of the Japanese corporation NEC), Techcenter of DEUCHE BANK (Deutsche Bank), SAP CIS (SNG "(SAP)," SAP LABS "(SAP), INTEL (Intel), Samsung Research Center (Samsung), Atos Aichi Solutions and Services (Atos is a large French system integrator). However, the American R&D centers, which have often closed and reduced their activity in Russia in recent years, keep only two positions among the leaders - Intel and Microsoft.

It is noteworthy that these companies are the largest official exporters, although they are much better known as importers. With their sales volumes in Russia, they should have sufficient funds to finance R&D centers. However, large corporations have their own financing rules, which, apparently, do not imply mutual financing of different divisions within a country (it is carried out through other departments of the parent company). At the same time, the funding for R&D centers may not take place in the form of payment for IT services. For example, in this regard, we can note the absence of Dell EMC in the list of leaders in the export of IT services (although the company has a large development center in St. Petersburg and numerous cooperation programs with Russian universities).

In September 2019, the Russian representative office of Hyundai announced the creation of the Hyundai Mobility Lab and its placement in the Skolkovo innovation center.

The Chinese giant Huawei is very active in Russia. In 2019, with reference to a representative of a Chinese company, the media reported on the company's plans to increase the number of personnel in research and development (R&D) centers in Russia by almost 4 times in the coming years. At the same time, the company does not officially announce its specific plans regarding the recruitment of Russian specialists, although the heads of Russian software companies fear that they are talking about thousands of new employees.

It should be borne in mind that Huawei will not only hire software developers. The company also needs specialists in Russia for its own production of electronic components at several factories.

Certain information was provided by media reports about plans to create and develop R&D centers for foreign companies in Russia. In recent years, such messages have become much smaller than before. But such a reduction should be associated primarily with the fact that Western companies do not seek to advertise the presence of their developments in Russia for fear of anti-Russian sanctions against them or against their customers.

Many well-known foreign corporations opened or planned to open R&D centers in Russia in 2012-2014 (before the onset of the political crisis) thanks to the Skolkovo Foundation and the innovation city of the same name under construction, whose residents are already receiving tax benefits from the state. The possibility of obtaining privileges (primarily tax) and grants for scientific research, contributed to an increase in the volume of investments in development and research in Russia from foreign corporations. Such powerful corporations as IBM, Cisco Systems, Microsoft and SAP are among the active investors in the development and research in Russia. SAP planned to increase the staff of its research division in Russia to 250 people, and the volume of investments in it — to €45 million. Microsoft at Skolkovo was going to develop software for face and speech recognition in video, as well as software for broadcasting multimedia data.

R&D centers of EMC and Samsung have been operating in St. Petersburg and Moscow for a long time, respectively, but these companies also created the second such centers in Skolkovo in 2012.

T-Systems, a subsidiary of Deutsche Telekom, expanding the number of developers in its St. Petersburg office, entered the Voronezh labor market and, in cooperation with Voronezh State University significantly expanded its office in Voronezh, which was opened in 2012.

The American manufacturer of mobile microelectronics Qualcomm already in 2015 began searching for a team on the basis of which it would be possible to create a Russian development center. The company is interested in specialists with experience in application development and digital signal processing. The Facebook considered the possibility of creating its own R&D center at Skolkovo.

In 2017 and in the first half of 2018, we can only mention two news about the creation of some kind of R&D centers in Russia by foreign corporations. The German company SAP promised to open a large innovation center in Moscow (with an area of thousands of square meters), and the international company Accenture, headquartered in Ireland, opened a similar center (Future Camp for work with innovations) in the capital in March 2018. However, these innovation centers focused on working with Russian clients. They may create new solutions with them, but on existing platforms and for the Russian market. That is, they cannot be considered R&D centers which should export their software or offer software development services.

There were also two relevant news in 2018-2019. In the fall of 2018, Huawei signed a memorandum of cooperation with the Ministry of Informatization and Communications of the Republic of Tatarstan. This agreement provided for the consideration of the possibility of organizing a Huawei research laboratory in the Republic of Tatarstan. The creation of this laboratory, if such took place, might not have been reported in the press.

In the spring of 2019, a joint research laboratory of Siemens and ITMO University was opened in St. Petersburg. The German company made the corresponding decision as part of its strategy for the development of digital technologies in Russia

The data of the Central Bank of the Russian Federation on the volume of cross-border services in the field of research and development were useful for clarifying data on the sales volume of development centers of foreign companies in Russia.

**Export of services in the field of research and development, \$ mln.**

<u>Year</u>	<u>Volume, million \$</u>	<u>Volume change over the year</u>
2010	364	-
2011	418	+15%
2012	399	-5%
2013	383	-4%
2014	454	+19%
2015	320	-30%
2016	395	+23%
2017	430	+9%
2018	411	-4.4%
2019	439	+6.8%

It is difficult to determine the trend for this indicator since 2010. Rather, we can say that it hovers around \$400 million per year. The reasons for the significant reduction in the volume of cross-border services in the field of research and development in 2015 can be attributed to the sharp deterioration of the geopolitical situation caused by the crisis in Ukraine.

Taking into account the fact that the Central Bank statistics take into account not only services in the field of information technology (according to experts from RUSOFT, the share of IT services is at least 20% of the total volume of cross-border R&D services), it is possible to estimate the volume of IT exports-services generated by Russian scientific and educational organizations at the level of \$80 million.

Source: Statistics of the Central Bank of Russia

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

Alcatel-Lucent, Allied Testing, AVicode, Cadence, Design Systems, Chrysler, Cisco Systems, Columbus IT, Dell, Deutsche Bank, Digia, Edisoft, EGAR Technology, EMC, EMS, Ericsson, Hewlett-Packard, Huawei, 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.

**2.15. RUSOFT rating. The largest software companies in Russia**

In 2020 RUSOFT introduced the 6th version of the annually updated rating of software development companies in Russia. By and large, it is a catalog of the largest software companies, divided into categories (divisions) depending on their size and growth rates (taking into account the projected indicators in the next 2 years). There was no other complete rating of Russian software developers before the RUSOFT Rating.

When creating this rating, the main task was not to rank companies by size, but to cover all the largest software companies in Russia and to represent the entire upper part of the industry pyramid. It can be assumed that it was possible to cover not all companies that deserve to be included in the rating, due to the lack of public information about them. However, it can be argued that such missing companies are most likely only a few, and they have a turnover of no more than \$50 million.

Several media outlets and rating agencies have compiled broader ratings for IT companies, ranking software companies separately. However, their ratings were clearly incomplete (they covered at best half of the largest software companies), which also included system integrators, hardware manufacturers, as well as foreign software companies that reported their sales on the Russian market.

The main reason for the incomplete coverage of software companies in the existing ratings is the lack of reliable information on their total revenues, which could be used for ranking. RUSOFT fundamentally refused to rank companies by their turnover, although it collected information on the turnover of all the largest software companies in Russia. The fact is that a significant part of such information was obtained as a result of an annual survey of software developers on the terms of its non-proliferation, and this condition is strictly observed. We also used ratings from other sources, such as CNews, Tadvise100, RIA Rating and Expert RA, but when they were checked.

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

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

However, when compiling the RUSSOFT rating, it was primarily the size of the companies that was taken into account. In order not to disclose confidential information and to avoid strict ranking, all companies were divided into groups and placed there in alphabetical order without specifying data on their turnover. For each group, a fairly wide range of total revenues was determined, and the distribution of companies by these groups took place not only according to the existing turnover, but also taking into account the trend of their development.

**Premier Division (Division A)**

«1C»

Kaspersky

The top division includes companies that already have a capitalization exceeding \$1 billion.

A billion-dollar turnover, most likely, could already have the 1C, if we take into account its income not only from the sale of its own solutions, but also the proceeds received from its distribution activities. However, the economic crisis (first of all, the fall in the ruble exchange rate) had an extremely negative impact on its turnover in dollar terms, since the company receives its main income in Russia.

Kaspersky (formerly called Kaspersky Lab) is firmly among the leaders, but is not growing as rapidly as several years ago. Perhaps new solutions for ensuring the security of the "Internet of things" and more active work outside the US and EU will allow it to accelerate and reach billions in turnover.

**Division B**

ABBYY

Acronis

CBOSS

Center of financial technologies

Cognitive Technologies

DataArt

EPAM Systems (Russia)

GDC Services (ICL-Services)

JetBrains

Luxoft Professional

Nexign (Peter-Service)

SKB Kontur

Voskhod (Research Institute "Voskhod")

Division B also includes quite large companies. Their turnover ranges from \$100 million to \$500 million. This group includes the Russian office of EPAM Systems, which manages development centers in Moscow, St. Petersburg, Saratov and a number of other cities.

In this category, replenishment occurred in 2018 due to DataArt, a company headquartered in the USA, whose main development center is located in St. Petersburg, and another well-known St. Petersburg company JetBrains, headquartered in the Czech Republic.

A newcomer to the 2019 rating version in Division C is Playrix with Vologda roots. It became known after they got into the world AppAnnie rating, being in 32<sup>nd</sup> place. Some experts have estimated its turnover at about \$200 million, and its capitalization at more than \$1 billion. However, there is no reliable information about the company's turnover. Since it has development centers in several cities of Russia and taking into account the fact that it is included in the AppAnnie rating, which takes into account the sales of mobile applications, it can be assumed that the company's turnover is at least \$50 million, although it is quite possible that it has already exceeded \$100 million.

In December 2019, it became known that the founders of Playrix spent more than \$100 million in 2018 on the purchase of other companies alone, and the company's revenue will reach \$1.5 billion at the end of the year. However, this information has no confirmation either.

There are several contenders for the appearance in Division D (turnover from \$20 million to \$50 million). Among them are RC Module, Satellite Innovation and Contek Soft.

**Division C**

BARS Group (BARS Group)

BSS

Diasoft

Dr. Web

Forsite

Infotecs

GDC Services (ICL-Services)

Kronshtadt

Playrix

Positive Technologies

RDTex

RTSoft

Security code

Division D	
AKTIV	Group-IB
Arcadia	Infokompas
Artezio	InfoWatch
ASCON	Integra-S
Ashmanov and Partners	Kodeks
Atom Security	Lanit-Tercom
Auriga	Naumen
B2B-Center ("Center for Economic Development")	Omnicom
Bercut	Paragon
BIA Technologies	PARMA Technologies Group
BIS ("Banking Information Systems")	Parus
BFT (Budget and Financial Technologies)	PROMT
CDC	Redmadrobot
Compass Plus	SCANEX
CryptoPro	Scientific and Engineering Center of St. Petersburg ETU - JSC "Research Center of St. Petersburg ETU"
Devexperts ("Expert-System")	SIGMA
DeviceLock	Soft Expert
Digital Design	SpeechPRO ("Center of Speech Technologies")
Elecard	SPIRIT
EOS ("Electronic Office Systems")	Reksoft
First Line Software	Return on Intelligence
iiko	R-Style Softlab
Galaktika	VIST GROUP
Garant	Zecurion
Geoscan Group	Zyfra (GC "Tsifra")

Perhaps it is worth including Waves Platform and Aitarget in the rating, but there is a question about their recognition as software developers. Waves Platform is the developer of the Vostok blockchain platform, which in the second round of investments is estimated at more than \$1 billion. However, the company is presented as an Internet service provider.

Aitarget was included in the rating of high-tech companies Inc. 5000 Europe 2019 with a turnover of €30.9 million. It has developed a system to automate targeted advertising campaigns on social networks Facebook and Instagram, but earns revenue from the provision of services. Hence, it can be attributed to Internet companies as well.

In 2020, for the first time, 5 companies were excluded from the rating due to non-compliance with RUSSOFT criteria. Once sold to foreign corporations, they can no longer be considered Russians in our report. The sales were carried out during 2018-2020, but since not everyone knows the exact dates of completion of transactions, it was decided to exclude them from the rating. At the same time, these companies are large — Parallels, Luxoft, Veeam, Mera and TRANSAS. As a result, only two Russian companies, 1C and Kaspersky, remained in Division A.

Luxoft retained its place in the ranking, but now as a Russian legal entity called Luxoft Professional, moving to Division B, in which there are two losses (Parallels and TRANSAS) and two additions. It was decided to include the Research Institute "Voskhod" in the rating. Previously, this state-owned enterprise was viewed as a large IT service under the Russian government. However, this research institute develops information systems not only for government agencies, but also for state corporations. It can be expected that it will also have large foreign customers. In addition, the dynamically developing Kazan service company GDC Services (ICL-Services) has moved up to Division B.

MERA was excluded from Division C (after its sale to a foreign investor), but at the same time 4 newcomers appeared in it, of which 3 were previously in Division D — Security code, BARS Group and RDTex. Software Product (GC "Software Product") previously did not get into the rating at all, since it was considered an integrator, not a software developer. However, this company is now positioning itself more precisely as a developer.

In addition to the Voskhod Research Institute, the ranking's newcomers were 7 companies that were in the D division:

1. EOS ("Electronic Office Systems", EOS) is a manufacturer and supplier of office automation and electronic document management systems, personnel records and archiving.
2. AKTIV (Active-soft) — a developer of software and hardware for information security and a major manufacturer of electronic keys and identification tools in Russia.
3. PARMA Technologies Group — custom software development.
4. Redmadrobot — design and development of mobile applications for Android, iOS, iPhone, iPad and Windows Phone.
5. BIA Technologies is a business integrator implementing digital solutions to improve the efficiency of large and medium-sized businesses based on proprietary products.
6. Zifra (Zifra Group of Companies) — develops and implements solutions based on Artificial Intelligence and the Industrial Internet of Things, as well as develops the robotic industrial transport industry.
7. DeviceLock is a developer of technologies for preventing leakage of confidential information (DLP systems).

The Zifra group could have been included in the rating at the end of 2018, but before, only the indicators of individual companies that are included in it were known. Since it presented its total revenue in 2019, which increased by 41% to ₽2.4 billion (export share — 17%), it began to be viewed as a single company.

DeviceLock was not the leader in the Russian market for DLP systems, so it was not considered a large enough company. It does not disclose its turnover. However, it became known that in 2019 in Japan it controls 30-40% of this market in recent years. Given the size of the Japanese market, DeviceLock definitely deserves to be included in the D division, and it is possible that it may already be in the C division.

The cumulative turnover of 78 companies included in the rating of the largest software companies is approximately \$7.5-8 billion (₽400-450 billion). In the previous version, the Rating included 73 companies, but the total revenue exceeded \$8 billion. This indicator decreased due to the exclusion of 5 large Russian companies from the Rating, which changed jurisdiction.

## CHAPTER 3

# Primary Trends in the Russian Software Development Industry

RUSSOFT began to pay attention to the problem of investments at its annual survey in 2011. First of all in the course of surveys, it became possible to find out what part of companies had external financing, and also to clarify plans for attracting investments in the next 2 years. The very fact that the lack of investment is one of the most serious problems in the industry was confirmed by a survey conducted by RUSSOFT at the beginning of 2017 as part of the research "Prospects of Russian IT developments in the global market" initiated by SAP. The study showed that for 52% of software companies the growth of overseas sales was constrained by insufficient marketing budget, and for 33% — by lack of funds to develop solutions that can be competitive in foreign markets.

In-depth interviews with experts conducted within the framework of the same study, led to conclusion that software companies primarily feel lack of “long-term money” — investments for 3-5 years. It is not difficult to attract investments or take out a loan for a project that will provide an almost guaranteed profit in no more than a year. However, in the field of high technologies, it is rarely possible to guarantee profits, and raising loans in Russia requires secure collateral, therefore companies usually need venture capital.

In 2017, changes in the questionnaire made it possible to estimate not only the share of companies with external investment, but also the approximate volume of attracted financing. However, extrapolating the data for the surveyed companies to the entire industry over three years resulted in too large fluctuations, which in reality could hardly have occurred. According to calculations, the volume of external investments in the software industry in Russia in 2016 amounted to \$420 million; by the end of 2017 it decreased to \$120 million. In 2018, the figure increased to \$325 million, and in 2019 it decreased to \$140 million.

It can be assumed that decrease or increase in the volume of external investment took place these years, but there are doubts that the range of fluctuations was so significant. The very extrapolation for the sample (especially for a small one, as in 2020), as well as the unwillingness of some companies to disclose information about attracted investments, makes the calculations of their total volume too inaccurate.

Nevertheless, the survey data give a general idea of the scale of external financing: the industry attracted \$200-400 million annually. Large single investment transactions which its participants do not report to the general public allowed to go beyond these limits.

RUSSOFT's calculations showed that the volume of investments attracted by Russian software companies exceeds the size of the entire Russian venture capital market, the size of which is determined by analysts from PwC and RVC. At the same time, according to their data, the IT sector accounts for 75% of all venture capital deals, and the software industry is only a part of it.

This discrepancy is explained by the fact that RUSSOFT and external analysts use different methods. While the RUSSOFT survey reveals all types of external financing, the “MoneyTree: Russia” survey conducted by PwC and RVC excluded direct investments, and the data analysis took into account only actually received venture capital investments made by business angels, investment companies, private corporate or government venture funds. Venture capital investment means the acquisition of equity capital in new or in growing companies, provided that the acquired share was less than the controlling stake, as well as subsidies for the implementation of projects on a returnable basis.

The data of the annual survey allowed RUSSOFT to determine not only the approximate volume of investments, but also the share of companies that wanted to have external financing, but got unable to attract it.

There were at least 2 times more companies that counted on external financing from 2011 to 2018 (one year almost 2 times) than recipients of investments. For example, if 14% of companies surveyed expected to receive external financing by the end of 2017, then in reality there were 6%. Consequently, the existing 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 the surveys showed that companies began to more realistically assess the prospects for attracting investments. If in terms of their volume they still significantly overestimated the available opportunities, then in the fact of attracting funds from external sources there was no big difference with the forecasts. For example, 11% of companies surveyed in 2017 and 12% of those surveyed at the beginning of 2018 counted on investments in 2018. The share of recipients is fully in line with the forecast — 11%.

**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%

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

The total amount of investments (taking into account the own income and funds provided by their founders) in the software industry amounted to ₺50 billion (\$773 million). This indicator requires clarification, and therefore it can be assumed that it is rather underestimated than overestimated. In this case, the clarification will still be tens of percent, and not several times.

The calculations of the following relative values are more accurate:

- the share of external financing in the total volume of investments,
- the excess of the need for investments over their actual value,
- the expected growth of investments in 2020-2021.

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 total 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 effective investment could be 60% more.

Before the suspension of the survey due to coronavirus, only 33 companies managed to answer about plans for 2020-2021 regarding financial investments. They expected that the volume of investments from various sources in 2020 would decline slightly, and in 2021 will rise sharply. At the same time, the share of external financing will reach 74% in 2021, which will cover the investment needs by 84%.

Consequently, there is a demand for a radical change in the funding structure. It is difficult to say how justified such expectations are in the current situation of high uncertainty (forecasts do not make sense). Most likely, even under the most optimistic scenario, such a strong increase in external financing is unlikely. Nevertheless, an increase in its share is quite possible given the attention that the government began to pay to the development of software development in Russia.

Only 21% of surveyed companies reported on the availability of investments in 2019. However, another 17% did not answer the corresponding question. Among them there may be those who got investments, but for some reason did not disclose information about this. Still, there is a very large proportion (over 62%) of those companies that did not have any sources of funding. In 2020 the number of such companies will not decrease based on the survey results, but in 2021 their number will grow significantly.

At the same time, 75% of companies surveyed did not indicate the desired amount of investments that they could effectively master in 2019. 42% of respondents reported that they had no need for financing, and 33% declined to answer. Thus it can be assumed that most companies do not have a development strategy for which investments are required. It is impossible to determine the reasons for the absence of such a strategy based on the survey results, but perhaps its development is constrained by the lack of real sources of funding.

## Share of companies that invested in development in 2019, by volume of internal and external investments (forecast for 2020-2021)

		Less than \$1 million	From \$1 million to \$5 million	From \$5 million to \$10 million	More than \$10 million	Found it difficult to answer	Attracted (planned)
In 2019 (fact)	Attracted investments	12,50%	5,50%	1,40%	1,40%	17,00%	21%
	Attracted external investments	2,75%	2,75%	0%	0%	26,50%	5%
In 2020 (forecast)	Investments are expected to be attracted	15,20%	12,10%	3,00%	0%	9,10%	30%
	External investments are expected to be attracted	6,10%	6,10%	0%	0%	24,20%	12%
In 2021 (forecast)	Investments are expected to be attracted	12,10%	9,10%	3,00%	6,10%	15,20%	30%
	External investments are expected to be attracted	9,10%	12,10%	3,00%	3,00%	18,20%	27%

Some of companies that did not have investments in 2019 expect to get investment in the future. If the forecast based on the results of the survey turns out to be correct, then in 2020-2021 the number of recipients of investments will expand by almost 1.5 times — from 21% to 30%. At the same time, companies mainly rely on external funding. However, only by the end of 2018 this forecast, made at the beginning of the year, turned out to be correct, primarily due to the fact that companies really assessed their prospects, and not due to an increase in investment activity in the software industry.

### 3.1. Venture Market Data

There are almost no studies that confirm or supplement the results of RUSOFT's calculations of the volume of investments in the software industry. There are various results of the study of the Russian venture capital market, in which there are rarely separate indicators for software development. As a rule, they represent the amount of transactions in the entire venture capital market, highlighting only the entire IT sector.

Experts from PwC and RVC (Russian Venture Company) determined that the growth of the venture capital market began in 2017. This happened for the first time in recent years (the last time they recorded it at the end of 2013). In 2018 the volume of venture transactions amounted to \$433.7 million (78% more than a year earlier). In the first half of 2019, the growth turned out to be even more significant — by 161% to \$248.1 million. The results of the whole 2019 were not yet available on the PwC portal at the time this chapter was prepared.

The average deal size in the first half of 2019 grew to \$3.1 million. A year ago, this figure was \$1.5 million. An almost sevenfold increase in the average deal size at the expansion stage was recorded (from \$2 million to \$13.3 million). The positive dynamics of this indicator is associated with the transformation of the venture model and with the gradual blurring of the boundaries between venture and direct investments.

The IT sector accounts for 88% of the volume of venture capital transactions in 2019 (\$219 million). However, judging by the largest deals, the software industry attracts less than \$100 million (most likely much less).

The largest transactions were the purchase of an 18.7% stake in Ozon.ru by AFK Sistema in March 2019 for \$119.3 million. This transaction was held with the participation of RDIF, Rusnano Sistema Sicar and WayRay startup for a total of \$80 million in September 2018. Another deal was concluded by AFK Sistema and Ozon.ru in December 2018 for \$57 million. Ozon is an Internet company, and WayRay is the manufacturer of the world's first navigation system based on the principle of holographic augmented reality. The production of navigation systems is largely based on software development, but still WayRay cannot be considered a software company. Moreover, although it has Russian roots, it positions itself as a Swiss company headquartered in Zurich.

At the end of the six months of 2019, there were 13 exits of investors from invested companies, which is eight times more than in the first half of 2018. Their total cost was \$53.2 million. The number of exits of investors in 2018 increased by 7% up to 32 deals, and the total cost — by 61% to \$128.9 million.

In the first half of 2019, the State and the state corporations issued 2,357 grants worth \$46.4 million, which, compared to the first half of 2018, is 23% more in monetary terms (\$37.1 million) and 4% more in quantity (2,266 grants issued). The number of grants issued in 2018 decreased to 3,955 units, however, in monetary terms their volume increased to \$99.3 million.

The volume of corporate venture investments was determined by the analytical center TAdviser as part of its own research "Corporate venture in the IT industry in Russia, 2016-2018". It deals with direct investments of large companies in the development of IT start-ups and with their purchase. Consequently, investments in all software companies were not covered by this study, since they could attract external financing not only from corporations and not all of them can be considered startups.

According to TAdviser, in 2016-2018, the total volume of corporate venture capital investments and investments in the purchase of IT startups in Russia exceeded \$570 million (compared with \$180 million in 2016, over \$245 million and just over \$150 million in 2017 and 2018, respectively). Since the results of the study were presented in November 2018, the calculations for this entire year are preliminary.

Systema (17 deals) and Sberbank (10 deals) were ahead of all by the number of announced investment deals. In terms of the volume of transactions, Mail.ru is the leader by a wide margin due to a large number of expensive acquisitions.

TAdviser analysts noted that the government has already begun to support state corporations and private holdings for acceleration and purchase of startups, the next step will be to create incentive tools. At the same time, private groups of companies such as Lanit, 1C and Softline work with start-ups no less, and sometimes more actively than state corporations.

Another study conducted — Startup Barometer 2019 — showed that corporations have become more actively involved in supporting new high-tech companies. Big business has taken a course on the development of corporate accelerators aimed at finding and testing the value of new solutions based on the infrastructure and customer base of corporations.

According to a survey conducted as part of the Startup Barometer 2019 survey, nearly 80% of respondents consider to work with corporations. Entrepreneurs get acquainted with representatives of large companies at industry events (27%) and get contacts through networking (25%). For this purpose 15% of company owners participate in contests and corporate accelerators.

The survey showed that 71% of startups are based on their own funds without attracting investors. Grants allowed 16% of startups to emerge. The source of funding for the launch of 9% of projects was non-core investors (or relatives and friends).

77% of startups have no outside investors. Entrepreneurs manage to develop their business using their own investments and with the help of existing support measures from other players. But based on the answers received, these funds are not enough to refine the product, hire employees, explore new markets and attract any other necessary resources.

It should be noted that, according to RUSSOFT, about 80% of companies in the software industry also do not have external investors.

According to research by Inc.Russia, in 2019 in Russia there were 134 public deals on venture financing of startups in the amount of RUB 11.6 billion. In 2018 there were 275 of them for RUB 26.7 billion. The volume of foreign investments decreased the most. In 2018 Russian startups received €12.6 billion from foreign investors, and a year later — only €1.8 billion.

Startups from the Russian Federation received from corporations and corporate funds ₺2.5 billion in 2019 against ₺8.5 billion a year earlier. Business angel investments decreased from ₺1.8 to ₺1.1 billion. In 2018 accelerators closed 107 transactions worth more than ₺466 million, and in 2019 — only 45 for ₺209 million.

Only funds and companies with state participation showed an increase in investment in 2019 (₺4.3 billion versus ₺1.8 billion in 2018).

Investments of private funds in 2019 remained at the level of 2018 — ₺1.4 billion. The largest deal is the investments of TMT Investments, Yandex, Sistema\_VC, Digital Horizon, Phystech Ventures in the Mel Science educational project in the amount of \$6 million.

The net inflow of foreign direct investment (FDI) to Russia at the end of 2019 increased by 3.5 times — to \$30 billion from \$8.8 billion a year earlier. These figures are indicated in the report "Main trends in the integration development of Russia in 2019", prepared by the Center for Integration Studies of the Eurasian Development Bank.

At the end of 2018, RVC presented a strategy for the development of the Russian venture capital market. The document was prepared by order of the Ministry of Economic development based on surveys of experts and investors.

The Strategy presents the following data: North America is the leader in terms of the volume of transactions — \$84.2 billion (42%), China is in second place — \$65.9 billion (36%). In 2018 Russia had only \$240 million. However, by 2030, the share of the volume of venture deals in GDP should increase from the current 0.02% to 0.3% of GDP due to a sharp increase in the total supply of capital, the number of projects and sales markets.

The authors of the strategy propose to minimize the participation of state institutions in making investment decisions. In their opinion, the state can provide support in other areas: to change regulation (for new technologies it is proposed to introduce “sand boxes” before their certification), to attract universities, to reduce the number of barriers to entering international markets (to create accelerators focused on the global market, search foreign partners, launching an export credit program).

It is also proposed to use tax incentives: from January 1, 2019, investments in securities of technology companies (so far there are 14 such issuers in the special sector of the Moscow Stock Exchange) will not be taxed (if the investor holds them for more than a year). It is also proposed to facilitate the conduct of IPOs on the exchange for technology companies by subsidizing the costs of preparing for listing. In addition, the list of measures includes a capital amnesty on the terms of investments in venture funds, income tax incentives for venture funds and business angels (implementation period — the end of 2024)

Finally, according to the program, the share of NPFs in the capital of venture funds should increase from zero to 10%. It is planned to attract pension' and insurance funds by covering part of the risks from the state, creating specialized “funds of funds”, as well as developing exchange instruments (in particular, issuing bonds). The development of these measures should be completed by mid-2020.

In connection with the data presented in the strategy for the development of the venture capital market, it is worth mentioning that the Russian Direct Investment Fund (RDIF) received \$2 billion from foreign investors. These funds are supposed to be directed to Russian companies engaged in the development of artificial intelligence technologies. So far, they have been received only by the fund and will not necessarily be able to fully reach high-tech companies (experts doubt that the required number of projects can be found for them).

### 3.2. The main events of the venture market

#### 2019

1. In January, the IBS group agreed to sell Luxoft to the American IT company DXC Technology for \$2 billion.
2. In February, it became known that the Digital Valley of Sochi will receive up to ₺250 million of private investment. It is an accelerator that is already selecting the first IT projects for funding. Particular attention is expected to be paid to domestic software developers and ideas related to artificial intelligence and the Internet of Things.

3. In February, EPAM announced the creation of an investment fund Global Opportunity Philly Fund (GO Philly Fund), the money from which will be allocated to technology companies, including developers of blockchain and cryptocurrency solutions.
4. In April, the American fund WCM Investment withdrew from the capital of Yandex. Prior to that, three other American funds, on the contrary, bought up large stakes in Yandex. In February, US investment funds Wellington Management Group and Harding Loevner acquired 4.5% and 4.7% of Yandex shares, respectively.
5. MTS, a Russian telecommunications operator and digital services provider, in April 2019 announced to TAdviser the launch of its own corporate venture capital fund to develop and support promising technology startups. This decision has already been approved by the MTS Board of Directors. The fund will operate on the basis of the corporate accelerator MTS StartUp Hub.
6. In June, VEB Ventures and the Domestic Software Vendors Association entered into a cooperation agreement aimed at developing the infrastructure for commercialization and support of high-tech companies producing Russian software.
7. In June, Huawei became the owner of all the assets of the Russian company Vocord, which since 1999 has been developing and integrating personal identification systems based on face recognition.
8. In June, the management company Fort Ross Ventures and Megafon signed an agreement on strategic partnership and cooperation in the field of innovation, technology exchange and joint search for attractive investment targets. As part of the agreement, Fort Ross Ventures will provide Megafon with its exclusive expertise and information on promising potential investments and its own portfolio companies.
9. In June it became known that the subsidiary of Russian Railways and the structure of Rostec are creating a joint center for the development of wireless network devices LPWAN XNB and technologies in the field of the Internet of things for transport. The next step will be to open a venture fund to support thematic projects with an investment budget of \$100 million.
10. In July, Rostec announced the launch of the Industry 4.0 investment fund, which will provide financial support to startups in the field of industrial technology, robotics, artificial intelligence, digital twins and new materials. By the end of 2019, the total capital of the fund should reach ₺3 billion.
11. At the beginning of September 2019, Russian Railways announced the launch of its startup accelerator. The program will be implemented jointly with the Internet Initiatives Development Fund (IIDF).
12. In September 2019, it became known that Russia needs ₺54 billion to develop virtual and augmented reality technologies. If successful, Russian companies will be able to occupy 15% of the corresponding global market and set industry standards in the world. The corresponding calculations were made as part of the preparation of a roadmap for the development of virtual and augmented reality (VR / AR) technologies. The document was prepared by the Far Eastern Federal University (FEFU) as part of the implementation of the activities of the federal project "Digital Technologies" of the national program "Digital Economy".
13. In December, it became known that RVC had a long process of selecting a managing partnership for a venture fund, which would have to distribute ₺7 billion to support educational startups. Within 3 months after the completion of the competition, its results were not approved due to "serious questions" to the finalists. The selection of applicants began at the end of June 2019, and the competition itself took place in early September.

### 2020

1. In January it became known about the decision of Russia to approximately halve the planned investments in the development of the blockchain, compared with the roadmap prepared by the Rostech state corporation. Experts believe that the excitement around technology is subsiding. Investments in the development of blockchain in Russia until 2024 were planned in the amount of ₺28.4 billion. And previously the cost of implementing this roadmap had been estimated at ₺55-85 billion. Rostech called on the Russian government to spend ₺36.45 billion on the development of distributed ledger technologies. First of all, it was proposed to create a platform based on domestic technologies in this area. On the basis of this platform, solutions would have been created digitalisation of housing and communal services, electronic voting, manufacturing, government procurement, etc.
2. In January, it became known that Rostelecom was investing in the Internet Initiatives Development Fund (IIDF). As a result of the transaction, which was closed on January 13, the subsidiary of the telecommunications state operator — Bashtelecominvest — became the owner of 18.36% of the IIDF invest (the investment structure of the IIDF). According to media reports, the cost of the transaction could have amounted to ₺1 billion.

3. In February it became known that, according to the roadmap for the development of end-to-end digital technology in Russia until 2024, Sberbank will invest ₺150 billion in artificial intelligence and earn ₺448 billion on it. The document was prepared by the bank itself together with the Russian Direct Investment Fund (RDIF).
4. In March, during a meeting with Russian investors, Vladimir Putin discussed issues of improving the investment climate and accelerating the development of IT in Russia. They discussed issues of support for investors from the state, including avoiding the practice of excessive pressure from administrative and law enforcement structures to improve the investment climate and accelerate the development of high technologies in Russia.  
The meeting with the President of Russia was attended by Leonid Boguslavsky, founder of the venture capital company RTP Global, Arkady Volozh, founder and CEO of Yandex, Kirill Androsov, managing partner of Altera Capital, Kirill Dmitriev, CEO of RDIF, Yuri Soloviev, First Deputy President and Chairman of the Management Board of VTB Bank and Alexander Galitsky, Managing Partner of Almaz Capital Partners. The conversation was also attended by Prime Minister Mikhail Mishustin and Presidential adviser Maxim Oreshkin.
5. In March, Dating.com, a dating service founded by Russian entrepreneur Dmitry Volkov, announced the launch of a \$50 million corporate venture fund.
6. In April, Russian Prime Minister Mikhail Mishustin instructed to accelerate the growth of investments by state corporations in venture funds by developing appropriate mechanisms. 11. In April, Goznak launched a corporate accelerator for technology startups. The purpose of the initiative was to search and joint implementation of emerging business opportunities startup, bringing them to a new level, as well as the integration of their technologies into the activities of the enterprise.
7. In June, the Russian Fund for the Development of Information Technologies selected 12 IT projects, for which it is ready to provide grants totaling ₺720 million. Among them is a software platform for robotics control from Innopolis University, a library of Digital Roads subprograms from "Avtodoria" — the developer of the system for photographing violations of traffic rules and the domestic system of digital construction design "TIM Credo".
8. In July, Gazprombank announced that it had reached a preliminary agreement on becoming a shareholder in a joint venture in the field of software development and information technology — in the company “GS-Invest” created by Sergei Matsotsky.
9. In September Russian Prime Minister Mikhail Mishustin announced a program of support for small Russian companies — developers in the field of artificial intelligence, which in the next four years would receive grants worth about ₺12 billion.
10. In September, the AstraLinux announced to be ready to invest approximately ₺3 billion in other developers with whom it is possible to create compatible products for their Operation system. “We intend to invest in small teams that already have serious technological developments in local software niches” was said in the press-release of AstraLinux.

### **Some of the most significant events related to attracting investments**

#### **2019**

1. “The Vostok blockchain platform was valued at more than \$1 billion at the second round of investments”. That was announced announced on May 20, 2019 by representatives of GEM Capital — investment company, which became one of investors in the first round of financing. The first round of investments, completed in December 2018, allowed the platform to raise \$120 million, while evaluating the entire project at \$600 million.
2. In February it became known that Sergey Solonin — the head of Qiwi — invested \$500 thousand in the project of a platform for creating interactive video.
3. In July it became known that the Far Eastern High Technologies Fund is investing ₺100 million in manufacturer of industrial security software Visitech — the Sakhalin based provider of solutions in the field of the industrial Internet of things (IIoT).
4. In July, Softline Venture Partners, Softline's corporate venture capital fund, announced an investment of ₺20 million in Proctoredu. The startup identifies and verifies a person during online certification or exams using biometrics. The startup plans to use the received investments to develop machine learning technologies based on big data and to expand its operations in the CIS countries. Proctoredu plans to launch development in the markets of Latin America, Asia and the United States thanks to the active Softline sales channel and synergy with the fund's current portfolio projects in the field of Ed-tech.

5. In the beginning of the year, GetTransfer.com attracted capital from major investors, including S7 Group and Castel Capital. The invested funds will go to the development of the B2B solutions.
6. In January it became known about the sale of Peter-Service to X Holding (according to SPARK, 99% belongs to Anton Cherepennikov, who also owns Citadel).
7. In the spring, Brandquad, which developed an information management platform for manufacturers and retailers, attracted an investment of ₺187 million from a business angel and the Internet Initiatives Development Fund (IIDF). The investments will go towards increasing the sales department in Russia, for product development and for international expansion.
8. In the beginning of the year the venture fund Gagarin Capital and a group of investors invested \$1 million in the domestic startup iFarm. The project produces special vertical farms with artificial intelligence for the automated growing of vegetables and fruits right in the city.
9. In the Spring, Bestdoctor closed the second investment round for \$3 million. Target Global, an international venture fund, was the lead investor. The company plans to use the raised funds to develop a technology platform and to scale sales. Bestdoctor is dedicated to technology-based health insurance products. The company was the first in Russia to offer corporate medical services based on the self-funding model, in which the employer pays only for services that were actually provided to employees.
10. At the beginning of the year, the Russian Venture Company (RVC) announced an investment of ₺305 million in Personal Medication & Health Management (PM&HM, Research and Production Innovation Center LLC). The money will be donated through the National Technology Initiative (NTI) Project Support Fund.  
In exchange for investments, the fund received 12.67% share in the capital of PM&HM.
11. At the beginning of July, it became known about the Uniphore financing round in the amount of \$38 million. The investment deal was headed by the Californian fund March Capital Partners.
12. In the spring it became known that the founder of the Bars Group, co-owned by the state corporation Rostech, has invested \$1 million in a new company, Trivium. It was created by people from the "Forecast" and will develop solutions of the class Enterprise Performance Management (EPM).
13. In August it became known that the NTI Support Fund will provide Stanislav Ashmanov and Natalya Kasperskaya to Nanosemantics over ₺300 million. The funds will be used to launch the SOVA platform designed to develop virtual assistants.
14. In August it became known that the Skolkovo-Industrial I venture fund investing in Industry 4.0 projects and managed by Skolkovo Ventures, will invest up to ₺200 million in the BFG Group, a pioneer in the Russian market in the field of software for optimizing industrial processes.
15. In the Spring, Sberbank, Gazprombank and Digital Horizon announced the signing of a deal in which Sberbank acquired from Gazprombank a 51% stake in the STC Group. Also, the venture capital company Digital Horizon entered the capital of RTC. Gazprombank remains a strategic shareholder of RTC and will continue to actively participate in the further development of the company.
16. In April, SPIRIT announced that having spent \$5 million to create a new version of the video conferencing server VideoMost 7.0, it added the ability to use it on laptops with Wi-Fi and mobile phones with LTE. WebRTC technology makes it possible to connect to video conferencing on a laptop from a browser without installing a plug-in.
17. At the beginning it became known that Veeam, founded by Russian entrepreneurs, received \$500 million in investment. Veeam's revenue is about \$1 billion, and usually at this stage startups start to think about an IPO, but now the company can take your time.
18. In September Acronis held an investment round in which it raised \$147 million. Goldman Sachs was the main investor. Acronis will use the funds received to develop business, open new representative offices and take over software companies.
19. In September, Equio, a developer of a cloud-based mobile platform for training, management and motivation of personnel for medium and large businesses, announced the attraction of \$1 million in financing from the OKS Group investment company. The investments will be aimed at marketing and increasing Equio's share in the Russian market of digital solutions in management, training and motivation of employees.
20. From December 2019 to March 2020, Foresight increased its authorized capital from ₺20 million to ₺1.14 billion and received additional capitalization from a single participant.
21. The company Briskly, founded in 2018, attracted investments of \$370 thousand during 2019. It is a Russian food tech startup that develops sales automation technologies in stores, cafes, food courts and etc. With the help of the company's platform, the buyer can pay for purchases without a cashier, and establishments can operate without staff. As a result, Briskly's value was estimated at \$20 million.

### 2020

1. In March, Yandex announced that it plans to build a platform for full-fledged distance learning. At the first stage, investments in the creation of this platform will exceed ₺200 million.
2. In July, it became known that a startup with Russian-Ukrainian roots Signum.ai raised \$500,000 from Starta Ventures, Next Ventures and an angel investor who wished to remain anonymous. The team uses the investments to develop sales in the US market. The company develops AI-powered solutions that collect and analyze over a billion data points in real time.
3. In August, Inspector Cloud announced that it had raised \$500,000 in investments from the OKS Group fund, founded by Oleg Polyakov and Kirill Matveev. The Russian developer of a system for recognizing goods on store shelves will spend the funds received on business development in Europe and Latin America.
4. In early March, it became known about the plans of the Spider Group to launch a platform with step-by-step instructions based on augmented reality for household and industrial applications. For the development of this solution, called Fastep, the company received a grant of ₺20 million from the Innovation Promotion Fund within the framework of the Digital Economy national program.
5. In July, it became known that K-Sky, a resident of the Skolkovo Foundation's Biomedical Technologies Cluster, attracted more than ₺130 million of private investment to develop the Webiomed predictive analytics system for healthcare and to enter international markets.
6. In July, Sberbank announced the acquisition of 8.06% of Malivar in exchange for an investment of ₺10 million. The company Malivar, which develops digital avatars, became one of the winners of the joint Sberbank Accelerator and 500 Startups in December 2019, as well as is a member of the international Nvidia Inception Program for AI startups.
7. In February, startup Intelligence Retail raised \$1.5 million from venture funds Finsight Ventures and ExpoCapital. A Russian company with AI-based applied photo recognition technologies closed Round A. The buyers of the innovative solution were FMCG manufacturers and retailers. With its help, you can solve the problems of controlling the assortment of shelves in an offline store — to digitize the functionality of merchandisers and exclude the collection of information manually. The product is based on computer vision.
8. In June it became known that the Russian Direct Investment Fund (RDIF), together with RTP Global and private equity funds Elbrus Capital and Baring Vostok, plans to invest ₺1.5 billion in SKB Kontur. According to Dmitry Mramorov, chairman of the board of directors of SKB Kontur, the pandemic has spurred the demand for electronic document management systems. The funds invested in the company are going to be spent on developing new products and attracting customers.
9. In September, Sumsb announced it had raised \$6 million in investment. Most of all, the developer of software for trading on the financial market MetaQuotes has invested in the AI service for verifying business with Russian roots. Telegram Vice President Ilya Perekopsky also took part in the funding round.
10. In March, it became known that UVL Robotics had attracted investments in the amount of \$500,000. The Russian drone developer was invested by the People & People venture fund Igor Rudziy, the founder of TaxovichkoF, GruzovichkoF and Dostaevisky services, together with partners.
11. In July, Positive Technologies announced its plans to conduct its debut bond issue on the Moscow Stock Exchange with a ₺500 million bond issue.
12. In July it became known that the Qiwi payment system is preparing a secondary public offering. During it, the founders of the company, Sergey Solonin and Boris Kim, together with Otkritie Bank, plan to sell 10.6% of the company's shares. The market price of this package is \$130 million.
13. In April, it became known that Miro had attracted about \$50 million in investments from the American fund ICONIQ Capital, which manages the capital of Facebook founder Mark Zuckerberg and some other leaders of technology companies. Miro develops disruptive technologies for remote teams.
14. In March, it became known that Skolkovo Ventures, a platform for managing venture funds and attracting financing to technology companies, will invest ₺200 million in the first Russian online platform for managing a used car warehouse for professionals CM.Expert. The attracted investments will be used to accelerate product development and enter new markets.
15. In August, Sensorium, which develops a VR entertainment platform with game mechanics, announced a \$100 million total investment since its inception.
16. In February, Copper received a \$8 million investment in its Series A financing round. The company plans to use the raised funds to expand the market. Copper crypto company was founded in 2018 by Dmitry Tokarev in London. It creates products that enable large organizations to acquire, store and resell digital assets.

Most of the news in 2019-2020 reflects the investment activity of state corporations (10). Another 9 events are directly related to state structures (government bodies, state investment funds, grants). At the same time, large private companies are also active (9 news items). As a rule, they are related to the field of ICT. Western investors were featured in 6 news items, but it is possible that some of them do not want to advertise their work in Russia. Asian companies are historically even more closed to information (only one Chinese company was in the news collection).

If we consider technological directions, then Artificial Intelligence is in the first place in terms of mention in the news (10), which corresponds to global trends.

This is followed by IoT, VR / AR, blockchain, robotics (3 each). Biometrics, video conferencing, and BI have one mention each. By areas of application, the top positions are Internet companies and solutions for trade (3 mentions each), and one news item is devoted to developments for training, telecommuting, healthcare, automation of production processes, electronic document management.

According to a study by EY, in connection with the COVID-19 pandemic, 10% of projects involving foreign direct investment (FDI) in Europe have been canceled, another 25% are frozen. Half of investors are going to slightly cut the volume of investments planned for 2020, 15% expect significant cuts. Against this background, Russia looks very good: 34% of FDI projects in the country announced in 2019 are already at the completion stage, 65% of projects are confirmed in 2020, and only 1% of projects are still in question.

Judging by the publications in the media in Russia in the IT sector, we can confidently say that the pandemic did not lead to a decrease in investment activity in 2020 compared to the previous year.

### 3.3. Investments of Russian companies and funds abroad

The activity of Russian investors abroad has been declining in recent years if we analyze public transactions and purchases. It is quite possible that given the investments that are not advertised by market players, there may not be such a decline. Due to the deterioration of relations between Russia and the United States, western countries have become wary of Russian investors which were even accused of technological espionage. Therefore, publicity in this area has become undesirable for Russians.

In 2020, such public activity became almost zero at all. At the same time, in the last 2 years the geographic vector has changed — Russian investors are paying more and more attention to Asian high-tech companies.

A number of investment funds, which started their activities in Russia, reoriented to foreign venture capital markets, since only the Russian one does not provide them with the necessary flow of “inputs” and “outputs”. It is especially difficult in Russia to ensure capital exits. Some of these funds, for example, Almaz Capital, have almost completely scaled down their activities in the Russian market in recent years. Such foundations in Russia do not report their work abroad. And it is difficult to call their investments Russian investments.

In the second quarter of 2018, China surpassed North America in venture capital for the first time, driven by a record \$14 billion in fundraising by financial technology firm Ant Financial Services Group.

#### Examples of investments by Russian investors in foreign high-tech companies in the last 2 years

##### 2019

1. In July, the Sberbank venture fund managed by Fort Ross Ventures invested in the American robotics startup Fetch Robotics, becoming the lead investor in the \$46 million round. The funds will be used for international expansion and further development. In total, the company has raised \$94 million so far from investors such as Softbank Capital, Shasta Ventures, Sway Ventures and others — all of them also participated in the new round.

2. In August, ABBYY became the owner of TimelinePI, a company that develops solutions for complex analysis of business processes. ABBYY plans to leverage TimelinePI's insights to empower its own business intelligence products. The founders of the company will move to ABBYY.

3. In December, Yuri Milner's DST Global fund announced an investment in Baibu, a Chinese cloud-based textile warehouse management platform. The startup has completed another round of funding, the total amount of which was \$300 million.

4. In December it became known that \$147 million raised in September 2019 from Goldman Sachs and other investors allowed Acronis to make its fifth acquisition in the last seven years: the company acquired 5nine Software, an American developer of solutions for cloud management and security of virtualized systems on Microsoft Hyper-V and Azure.

#### **2020**

1. In early May, it became known that Classplus had attracted about \$9 million. The venture fund of billionaire Leonid Boguslavsky RTP Global, which acted as the main investor in this round of financing, also invested in it. Classplus itself announced the investment on May 4, 2020. Galina Chifina, partner of RTP Global, confirmed the information and clarified that the fund invested about \$4 million in the startup in exchange for an approximately 10 percent stake in the Indian company.

## CHAPTER 4

# Geographical Coverage and Vertical Markets of Russian Software Development Companies

## 4.1. Russian market and global presence

After a slight reorientation of the software development industry to the domestic market revealed in 2018 (sales then grew by 12% in dollars, and income from abroad increased by 10%), foreign sales grew at an outstripping pace in 2019. Judging by the growth in revenue, the large activity of industry enterprises in foreign markets is obvious: the volume of foreign sales of software and services for its development grew by 20.5% in ruble terms (by 17.5% in dollars), and sales in the domestic market — by 15.7% (12.9% in dollars).

However, it should be borne in mind that, firstly, not very many companies participated in the 2020 survey (72 questionnaires) and secondly there is a large percentage of them (61%, which is much more than 20-30% in the previous years) were compiled by members of the RUSSOFT Association, which has historically been an association of software exporters.

If we adjust for this factor, then the difference between sales growth rates (abroad and within Russia) will be slightly smaller. The changed composition of the respondents can also explain the extremely low share of the companies surveyed that do not have export revenues. Among all Russian software companies there are probably fewer of such in 2019 than a year earlier, but still not 14%. According to expert estimates, at least 20% of software development companies in Russia are in principle not ready to enter foreign markets.

Since in 2018-2019 there was no big difference in the growth of sales in the domestic market and abroad, the domestic market provided about the same growth in sales volume as the international one. Nevertheless, the respondents, whose share of sales abroad exceeded 50% of turnover, grew in 2019 slightly faster than companies that earn mainly within Russia. The ability to operate in different markets provides special advantages during crises and when the Russian software market is shrinking. It provides business stability in times of economic turmoil.

It is impossible to predict how the growth rate will depend on the share of foreign sales in turnover at the end of 2020, because the crisis is very particular. It was caused not only by the shutdown of a number of enterprises due to quarantine, but also by a sharp restriction of the work of international transport. Thus it was almost impossible to conclude new contracts without business trips to other countries. This, first of all, concerns large projects that require trusting relationships and constant monitoring of software development by the customer. However, it can be assumed that companies that have managed to gain a foothold in foreign markets will have indicators no worse than companies that did not work outside of Russia and neighboring countries. It is much easier to reorient to the internal market from external ones than vice versa. In addition, the fantastic volumes of economic aid to the population and business in the United States and the EU associated with the pandemic will inevitably fall into the budgets of IT companies one way or another and will help stabilize their position. And for some IT segments, the coronavirus pandemic will create new markets, leading to fantastic growth.

Surveys of the latter showed that in 2017 respondents were present on average in 3.12 geographic markets, and in 2018 — in 2.98. For 2019, it is difficult to calculate exactly the same indicator, since the division of the world market has changed in the questionnaire. If you focus on the previous division with a certain tolerance, then it will be equal to 4.47. In this case, there is also growth, most likely, but in reality (across the entire industry) it is not as large as the 2020 survey showed, with a very different structure of the array of surveyed companies. Most likely, the geography of business has expanded in recent years, although in some years the opposite process may take place due to the sharply increased demand in the Russian market.

Separately, it is worth considering the attitude of companies with an export share of less than 25% to foreign markets. Such a share suggests that the main income is provided by work in Russia and in the near abroad. This category previously included at least 60% of all surveyed companies (according to the 2019 survey — 64%). In 2020, the share of such companies turned out to be smaller (52%), but also due to the fact that companies that successfully operate abroad participated in the survey more actively.

According to the results of the study "Assessment of the state of the competitive environment in Russia 2020", prepared by the Analytical Center for the Government of the Russian Federation through a survey of 1,522 respondents from various industries, 35% have no plans to enter new markets in the next three years.

However, in the "field of IT technologies" there are much fewer of them — only 14% (in 2019 — 27%). Among those IT companies that are looking for business expansion opportunities, 19% (15% a year earlier) intend to enter new geographic markets, 29% (22%) — to new software markets, and 52% (63%) — as new software and new geographic markets.

Thus, the desire to expand in foreign markets covers a wide range of software companies in Russia, but having limited resources they have to choose between real opportunities to increase sales through work in the domestic market and hypothetical prospects for entering new and often obscure foreign markets. The choice is often made in favor of working in the Russian market. The resources for entering new markets of the far abroad, not at the expense of working in the domestic market, are still available for a not very wide range of companies. Moreover, in recent years this circle has been narrowing.

### 4.1.1. Comparison of trends in work in Russia and abroad for software vendors and service providers

At the end of 2018 software developers increased their sales abroad a little more than in the domestic market (by 11% and 8.4%, respectively, in dollar terms) but it was they who were much more active in refusing export activity. If in 2017 21.1% of them did not have such income, then in 2018 — 45.2%.

For service companies, almost the opposite is true. They increased their domestic sales by 20.6% in dollar terms, and overseas sales by only 9%. At the same time, the share of companies that do not have export income remained almost unchanged (increased from 27.2% to 27.6%).

This is due to the fact that the greater growth in sales of software industry in foreign markets was provided by several very large companies, as well as not very large, but fast-growing ones. Service companies almost did not refuse to work abroad, but they increased sales in Russia much more actively, which is easily explained by the objectively ongoing process of digital transformation, primarily of the private sector of the economy. However, this reorientation applies to companies developing custom software of all sizes.

In 2019, foreign sales of software industry grew slightly more than sales within Russia — in ruble terms by 21.1% and 17.3%, respectively. For service companies, the difference is greater — overseas sales increased by 20% and sales within Russia by 12.8%. However, the specifics of the 2020 survey do not allow making unambiguous conclusions based on these data. Most likely, the growth rates of foreign sales in fact turn out to be higher, but not as much as the calculations show.

### 4.1.2. Importance of the inner market

If we look at the change in the share of sales in the domestic market in the total turnover of software companies in Russia since 2013 (until 2013 RUSOFT calculated only total exports), then since 2016 it has been steadily growing by 1-2 percentage points. However, until 2016, there was a sharp decline in the share of the inner market from 50% to 35%. Therefore, it can be assumed that in the last 3 years the former ratio has been recovering (most likely, the process continued in 2019).

The failure in 2015 was caused, first of all, by a sharp drop in the average annual exchange rate of ruble against dollar. At the same time, the domestic software market did not grow even in ruble terms. As a result, the sales volume of Russian software companies in Russia decreased by 8% in rubles, and by 39% in dollars. On the other hand, the weakening of the national currency favored work for export (primarily the development of custom software).

Since 2016, currency fluctuations and changes in the situation on the Russian software market cease to be the main factors affecting the share of sales in the inner market in the total turnover of software companies. This indicator is steadily growing both with a further weakening of the national currency and in the absence of an obvious growth in the domestic software market. Even in 2017, it cannot be said that the strengthening of ruble and the expansion of the Russian market significantly influenced the increase in the share of sales in Russia of the total turnover. Growth of only one percentage point is too small to consider the significant impact of the appreciation of ruble against dollar (by about 15%) as the main factor.

After 2016, geopolitics began to exert the greatest influence on the ratio of sales in the domestic and foreign markets. Because of it, it became more difficult to increase exports to the EU countries and the USA, and the process of import substitution on the Russian software market accelerated.

#### The share of sales in the domestic market in the total turnover and the average annual dollar exchange rate in 2013-2019

	2013	2014	2015	2016	2017	2018	2019
Share of sales	51%	50%	35%	37%	38%	39%	52.4%
Dollar rate, ₪	30,9	38	60,7	67	58,3	63	64.6

The sharp increase in the share of the domestic market at the end of 2019 is due only to the fact that the main indicators of the industry were calculated anew using a slightly modified methodology with an insufficiently large sample (the number of questionnaires received). But, first of all, the sharp increase in this indicator is due to the fact that several large companies successfully operating abroad were excluded from the Russian list (due to the change in their owners). Therefore, the comparison with 2018 is not correct.

If you look only at Russian software development companies, then their share of sales in the domestic market is likely to have decreased (foreign sales growth rates are higher).

## 4.2. Distribution of sales by macro-regions of the world market

At the end of 2015, for the first time RUSSOFT provided data on sales of Russian software companies in various macro regions of the world. In previous years, the importance of individual regions of the global market was assessed only by the number of surveyed companies that indicated their presence in a particular macro-region.

Sales by global macro-regions are calculated based on the importance of regional markets to respondents. For large companies that did not participate in the survey, as a rule one can assume from open data how active they are in a particular market. Some of them disclose information on the structure of their sales with their distribution by country or macro-region uniting several states.

This method has a large error. However, there is no other (better) methodology, and it still makes sense to determine at least an approximate distribution of sales by geography.

The available data on these sales for the last 5 years (2015-2019) allows to judge the dynamics of sales in each market only with great caution and in the presence of supporting information from other sources. The fluctuations are too large and do not always look logical. However, multi-year metrics provide a framework for each market. For some markets, the spread was not very large, and the change (growth or contraction) is fully confirmed by other sources.

One of these sources is the Central Bank of Russia, which has statistics on export earnings from Computer Services. Although these services account for less than half of the foreign sales of Russian software companies, the discrepancy in 2017 and 2018 was either insignificant or explainable (the corresponding data for 2019 on the website of the Central Bank of the Russian Federation at the time of preparation of the report was not available).

It should be noted that in the statistics of the Central Bank, fluctuations in sales figures in certain countries fluctuate even more than in the calculations of RUSSOFT, which is associated with the companies' policy on revenue posting. Software developers can directly receive income from the country in which they worked or through an offshore zone, or from regional hubs (for example, Cyprus, Luxembourg, Hong Kong, Singapore).

The much higher indicator of Ukraine in the calculations of RUSSOFT just indicates that it is difficult for Russian companies to work directly on the market of this country. They sell software there under the guise of European developers. Because of this, there is a difference in sales throughout the neighboring countries, but other factors may also affect. It can be assumed that the respondents have branches (including development centers) with which the head office makes settlements not as for "computer services" but for other services. In addition, customers from neighboring countries often have offices in Russia and can pay for the supplied software from the account of a Russian legal entity.

In any case, the share of the “near abroad” countries, according to RUSOFT's calculations, equal to 12.1% looks much more realistic than 5.6% of the Central Bank of the Russian Federation. If we consider the market of Russia and the near abroad (for all types of goods and services), then the share of the near abroad will be approximately 30%. For software, it is less (according to RUSOFT's calculations, 7%), which can be explained by the fact that the Russian IT market is much more developed than in neighboring countries.

### Comparison of foreign sales of software companies (RUSOFT calculations) with the export of computer services (information from the Central Bank of Russia) in a number of countries (macro-regions) at the end of 2018

	Foreign sales of software companies (RUSOFT)	Export of computer services (CBR)
Belarus	1.8%	2.3%
Ukraine	2.9%	0.5%
Other countries of the former USSR (except Belarus and Ukraine)	7.4%	Uzbekistan — 0.5% Kazakhstan — 0.3%
Near Abroad	12.1%	5.6%
USA and Canada	29.0%	11.0%
Germany and German-speaking countries	18.1%	11.5% (Switzerland — 2.9% Germany — 7.9% Austria — 0.7%)
Other Western European countries	14.3%	Cyprus — 7.4% Netherlands — 3% Great Britain — 7%
South and East Asia	8.1%	China — 1.3% India — 0.3% Singapore — 0.9% Hong Kong — 1.4%

Source: RUSOFT, Statistical collection of the Central Bank of the Russian Federation "Foreign trade of the Russian Federation in services 2018"

There is a significant difference in US sales data (with Canada). At the end of 2017, there was no such difference (both RUSOFT and the Central Bank announced about 30%). Apparently, in 2018 it became difficult for Russian companies to work directly in the American market (as before in Ukraine). The share of the United States is steadily decreasing, but it is unlikely that it has decreased threefold in one year.

The share of sales in South and East Asia will rise to 8%, if we collect data for all countries in the region. In it, a significant portion of the sales go through Singapore and Hong Kong.

Thus, RUSOFT's calculations, despite the expected large error, allow us to see a quite realistic distribution of foreign sales in various geographic markets. The statistics of the Central Bank of the Russian Federation gives grounds to correct some data. Moreover, the results of calculations in different years make it possible to determine random deviations. Accuracy also increases in the process of aggregating indicators — for example, when all the markets of Western countries, of post-Soviet countries and of all new markets for Russian companies are combined. As for RUSOFT and the Central Bank of the Russian Federation, it turns out that the markets traditional for Russian software companies (EU, USA, neighboring countries) still provide at least 80-85% of foreign sales.

RUSOFT 2019 data is difficult to directly compare with similar data of the previous several years. Firstly, because the division of the Global Market into macro-regions has changed. Secondly, due to the fact that the calculations were carried out for a different range of companies (in 2019, the income of several large companies that ceased to be Russians according to the RUSOFT classification, were not taken into account). In addition, a slightly modified methodology for calculating total turnover and total foreign sales was used.

**Distribution of sales in 2016-2018 of Russian software companies by macro-regions of the Global market,% of total turnover (calculation by assessing the importance of specific markets)**

	2016	2017	2018
Russia	37%	49.5%	55.3%
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%
USA and Canada	17.7%	17.1%	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%
South and East Asia	5.5%	4.0%	4.0%
South and Central America	1.8%	1.5%	1.6%
Africa	1.1%	0.5%	0.6%
Australia	1.6%	0.9%	0.9%
Middle East Countries	1.2%	1.3%	1.4%

Therefore, the distribution at the end of 2019 is presented in a separate table. Since there were so many fewer companies in the survey, further dividing sales by country did not make sense.

**Distribution of sales in 2019 of Russian software companies by macro-regions of the Global market,% of total turnover (calculation by assessing the importance of specific markets)**

Russia	52.4%
Near Abroad	4.7%
USA and Canada	16.3%
Europe (excluding Russia and neighboring countries)	13.6%
South and East Asia	3.8%
South and Central America	2.6%
Africa	2.1%
Australia	2.4%
Middle East Countries	2.1%

According to the calculations, it is impossible to speak about any cardinal and unambiguous changes in 2019. In general, the distribution of sales by market is not very different from the results obtained at the end of 2018.

Historically traditional for Russian developers are the markets of Europe and North America, as well as the market of Russia and the countries of the post-Soviet space. The penetration into the markets of economically developed countries took place thanks to former compatriots who massively moved during the years of perestroika to countries with a higher standard of living.

A particularly large-scale migration to these countries from the post-Soviet space took place in the 90s of the last century.

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The countries of the post-Soviet space (the former republics of the USSR) are often considered by Russian developers as an internal market, since they were well aware of it, and clients and customers speak Russian well.

Thus, traditional markets are the "Western World" and "post-Soviet space". The "Western world" is presented in a general table with the distribution of sales by macro-region as follows: "USA or Canada", "Germany and German-speaking countries", "Scandinavia and Finland", "Other Western European countries", "Australia" and "Countries Central and Eastern Europe", which are now nevertheless getting closer to the Western world (especially since they are all members of the EU).

In the "post-Soviet space", apart from Russia, Belarus, Ukraine, Kazakhstan and Uzbekistan are singled out.

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

Grouping markets can improve the accuracy of calculations. Consequently, the growth of the share of "Russia and other countries of the former USSR" and "New Markets" with a decrease in the share of the "Western world" in recent years can be said quite confidently. The growth of the Western World market indicator in 2017 can be considered an episode associated with 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**

	2015	2016	2017	2018	2019
Russia and neighboring countries	59.4%	61.1%	54.8% (5.2%)	60.6% (5.3%)	57.1% (4.7%)
Western world	34.7%	32.0%	37.9%	31.8%	32.3%
New Markets	5.9%	6.9%	7.3%	7.6%	10.6%

**4.3. Presence of Russian software companies in foreign markets**

Interest in various markets can also be assessed by the share of companies' presence in these markets, as well as by the importance of each market assessed by the respondents (whether it is key or only individual projects are being implemented on it).

At the end of 2019, the most significant markets for all enterprises in the software industry (they are considered key by at least 10% of the surveyed companies) are Russia (can be merged with the near abroad), the USA / Canada, Europe in general (in particular, the UK and Germany with German-speaking countries). The Asian region is not yet one of them, but about a quarter of the surveyed companies are already present in the markets of South and East Asia. In the future, there should be no less of them than in the United States.

There are many markets in which there is a fairly large share of the surveyed companies, but only a small fraction of these companies recognized them as key markets. Therefore, these markets can be viewed as potentially promising.

**The presence of software companies in the domestic and foreign markets in 2019 with an assessment of their importance,% of companies surveyed**

	The market is key	Only individual projects are being implemented in this market	Presence
Russia	73.6%	16.7%	90.3%
Near Abroad	9.7%	34.7%	44.4%
Belarus	2.8%	29.2%	31.9%
Ukraine	1.4%	26.4%	27.8%
Kazakhstan	6.9%	29.2%	36.1%
Uzbekistan	1.4%	22.2%	23.6%
USA / Canada	34.7%	23.6%	58.3%
Europe (excluding Russia and neighboring countries)	23.6%	27.8%	51.4%
Great Britain	11.1%	16.7%	27.8%
France	5.6%	13.9%	19.4%
Italy	4.2%	16.7%	20.8%
Germany and German-speaking countries	12.5%	20.8%	33.3%
Northern Europe (Scandinavia and Finland)	5.6%	16.7%	22.2%
Central and Eastern Europe	2.8%	20.8%	23.6%
South and East Asia	5.6%	20.8%	26.4%
China	1.4%	22.2%	23.6%
Japan	1.4%	8.3%	9.7%
India	1.4%	13.9%	15.3%

	The market is key	Only individual projects are being implemented in this market	Presence
Africa	1.4%	15.3%	16.7%
South and Central America	5.6%	11.1%	16.7%
Brazil	1.4%	8.3%	9.7%
Mexico	1.4%	8.3%	9.7%
Argentina	0.0%	6.9%	6.9%
Near East	4.2%	16.7%	20.8%
Australia / New Zealand	4.2%	11.1%	15.3%
<b>Market grouping</b>			
Russia and neighboring countries			93.1%
Near Abroad			55.6%
Overseas Markets			84.7%
Far abroad			73.6%
Western Markets			70.8%
New Markets			38.9%

By the end of 2019, each market (except for the Russian one) increased the share of Russian companies present on it. However, this is due only to the unique composition of the surveyed companies — a more significant (in comparison with previous years) prevalence of developers, for whom the priority is the export direction. Consequently, this growth does not indicate any trend. At the same time, the distribution by market itself is of interest. Moreover, some countries that were not previously considered separately have been added to the list of countries where Russian companies do business.

Some trends can be seen from survey data from previous years, suggesting that they have generally remained the same.

#### Presence of Russian companies in the domestic and foreign markets in 2007-2019, % of surveyed companies

	2007	2013	2014	2015	2016	2017	2018	2019
Russia	55	93	94	92	87	93	94	90.3
Near Abroad	—	—	—	—	—	—	—	44.4
Kazakhstan	—	—	—	—	—	—	—	36.1
Belarus	32	33	27	33	28	29	26	31.9
Ukraine	17	39	30	32	25	23	20	27.8
Uzbekistan	—	—	—	—	—	—	—	23.6
Other countries of the former USSR	39	31	45	40	42	40	45	—
USA and Canada	55	41	48	36	37	42	39	58.3
Europe (excluding Russia and neighboring countries)	—	—	—	—	—	—	—	51.4
Great Britain	—	—	—	—	—	—	—	27.8
Germany (German-speaking countries)	25	22	24	27	19	31	29	33.3
France	—	—	—	—	—	—	—	19.4
Italy	—	—	—	—	—	—	—	20.8
Scandinavia (with Finland)	28	17	17	18	16	20	21	22.2
Central and Eastern European countries	—	—	—	—	16	20	21	23.6
Other Western European countries	35	34	37	32	30	35	31	—
South and East Asia	19	8	12	15	13	16	17	26.4
China	—	—	—	—	—	—	—	23.6
Japan	—	—	—	—	—	—	—	9.7
India	—	—	—	—	—	—	—	15.3

## Geographical Coverage and vertical markets of Russian software companies

	2007	2013	2014	2015	2016	2017	2018	2019
Australia, Africa, South America	25	14	12	—	—	—	—	—
South and Central America	—	—	—	8	8	14	10	16.7
Brasil								9.7
Mexico								9.7
Argentina								6.9
Africa	—	—	—	9	7	10	8	16.7
Australia	—	—	—	8	10	16	12	15.3
Near East	—	8	6	9	11	16	19	20.8

Since 2007, the share of surveyed companies operating in the American market began to decline. This was mainly due to small companies (although large companies also somewhat reduced their activity in the United States). In 2014, there was a recovery of interest in the American market, but in 2015, due to geopolitical risks, this interest decreased again. In the past 2 years, approximately 40% of respondents reported their presence in the American market, but sales on it are still declining.

### Share of software companies that marked certain markets as key (based on the results of 2007-2018), % of companies surveyed

	2007	2010	2011	2012	2013	2014	2015	2016	2017	2018
Russia	42	86	79	24	69	62	78	80	78	81
USA and Canada	43	15	30	14	10	18	21	25	26	24
Other Western European countries	12	12	17	13	15	14	11	13	18	12
Ukraine	6	10	9	22	8	5	7	9	15	2
Other countries of the former USSR	12	6	11	24	7	8	10	18	26	8
Belarus	24	12	8	20	6	6	9	11	18	5
Germany and German-speaking countries	11	12	14	18	8	7	6	8	16	10
Central and Eastern European countries	—	—	—	—	—	—	—	6	7	5
Scandinavia and Finland	13	6	8	8	8	7	4	5	5	5
South and East Asia	6	3	7	6	1	4	3	6	7	5
Australia, Africa, South America	9	1	4	3	3	6	—	—	—	0
South and Central America	—	—	—	—	—	—	1	1	5	1
Africa	—	—	—	—	—	—	0	2	1	1
Australia	—	—	—	—	—	—	0	3	4	4
Near East	—	—	—	3	1	3	0	3	7	3

Software developers who have already established themselves in the US market try not to leave it. It is becoming increasingly difficult for new companies to enter it. Nevertheless, the share of companies that are planning their debut in the American market this year and the next (relative to the year of the survey) from 2016 to 2019 grew steadily, increasing over 4 years from 8% to 13%. The high interest in the American market among those companies that have not yet entered it is explained by the fact that it is 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.

The growth in the number of those wishing to debut outside Russia concerns all foreign markets. Even Ukraine had a fairly high indicator according to the results of the 2019 survey — 7% versus 2% in 2016.

At the same time, these plans were almost never confirmed by actions: with all their intentions to enter foreign markets more actively, Russian developers increased sales in the domestic market at an outstripping pace (up to 2018 inclusive) and the shares of macro-regions in the geographic distribution of foreign sales were mainly decreasing or hardly changed.

In 2020 the survey had to be suspended due to the pandemic, and the restart took place with an abbreviated questionnaire, in which all questions regarding plans until the end of the year and for 2021 were removed. Nevertheless, 35 out of 72 surveyed companies still completed the first version of the questionnaire. They did this for several months. Therefore, they announced their plans with very different possibilities to predict the future.

According to their answers, it can only be noted that, as a rule, in 2020 the share of companies planning to be present in foreign markets decreased, and in 2021 it grew again. Consequently, some companies did not see the prospects for working in certain markets in 2020, but hoped that such prospects would appear next year.

#### Demonstration of intentions to be present in the domestic and foreign markets in 2020-2021 in comparison with 2019, % of surveyed companies that are already present or plan to be present in certain markets

	2019 (fact)	2020 (fact and forecast)	2021 (forecast)
Russia	90.3%	75.8%	72.7%
Near Abroad	44.4%	30.3%	30.3%
Belarus	32.0%	18.2%	24.2%
Ukraine	27.8%	18.2%	15.2%
Kazakhstan	36.1%	33.4%	36.4%
Uzbekistan	23.6%	12.1%	15.1%
USA / Canada	58.3%	42.5%	45.5%
Europe (excluding Russia and neighboring countries)	51.4%	39.4%	42.4%
Great Britain	27.8%	21.3%	24.3%
France	19.5%	18.2%	30.3%
Italy	20.9%	12.1%	18.2%
Germany and German-speaking countries	33.3%	24.3%	27.3%
Northern Europe (Scandinavia and Finland)	22.3%	15.1%	21.3%
Central and Eastern Europe	23.6%	18.2%	18.2%
South and East Asia	26.4%	18.2%	24.3%
China	23.6%	9.1%	18.2%
Japan	9.7%	15.2%	15.1%
India	15.3%	15.1%	12.1%
Africa	16.7%	12.1%	15.1%
South and Central America	16.7%	12.1%	15.1%
Brazil	9.7%	9.1%	12.1%
Mexico	9.7%	6.1%	9.1%
Argentina	6.9%	3.0%	3.0%
Near East	20.9%	21.2%	21.2%
Australia / New Zealand	15.3%	9.1%	9.1%

#### 4.4. The emergence of "problem markets" due to heightened political tensions

In terms of sales, the US market confidently remains in second place (after Russia) for all the years of RUSOFT's research. With the income received in the American market, only the income from operations in the entire European market is comparable.

It is known that for the largest Russian exporters, the share of sales in the United States in total revenues is often measured in tens of percent, and sometimes reaches 50% and even 80%. Service companies are leaders in the developed markets (USA and EU), almost twice ahead of software vendors in terms of the share of companies in their segment operating in these markets.

Nevertheless, for the leading software vendors, the US market provides very significant volumes of export earnings. For example, Kaspersky, a leading Russian developer of solutions in the field of information security, annually earned up to \$200 million in the US market. In recent years, this figure has decreased (according to reports in the American media in 2017, to about \$150 million). The decline in U.S. sales likely has increased further over the past two years

Over the past 4 years, certain political risks have arisen in the markets traditional 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 structures are generally not allowed to acquire Russian software in any form. Commercial companies are not advised to purchase Russian software or engage Russian companies to develop software if it is used in the interests of the Ministry of Defense.

The trend of increasingly crowding out Russian companies from the markets of Western countries (primarily the United States) is already negatively affecting their sales in these markets. At the same time, there is no reason to expect a turning point and change in attitudes towards Russia and Russian software companies.

On September 10, 2019, a permanent rule came into force prohibiting government agencies from using any Kaspersky products. The ban now applies not only to the institutions themselves, but also to contractors and IT service providers for government agencies.

In early March 2020, it became known that Group IB, which also works in the field of information security, was probably among the Russian companies undesirable for work in the United States. However, the charges were not brought against the company itself, but only against its head of the network security department, Nikita Kislitsin. He is suspected by the American intelligence services in an attempt to sell the data of users of the social network Formspring in 2012. Even if the sanctions do not affect the entire Group IB, it will be more difficult for it to work in the American market after such accusations from one of its top managers.

Squeezing Russian custom software developers out of the US market can also be challenging given the need to maintain budget and improve software quality. At the end of June 2019 it became known that the software for the crashed Boeing 737 Max planes was created by Indian programmers, who were used by an American company to develop software. This was reported by Bloomberg, an authoritative publication in Western countries.

Consequently, not only the Russian side, but also the American side suffers from the political aggravation. Interdependence in the field of IT was quite high. It is unlikely that attempts to oust Russian companies from the markets of Western countries will stop because of this, but they may be less active in certain periods and in certain segments of economy.

### 4.5. "New Markets"

If we consider the geographical distribution of foreign sales, then in 2018 traditional markets accounted for 83% of sales of companies from Russia, and New Markets (South and East Asia, Africa, South and Central America and the Middle East) — about 17%. At the end of 2019, the share of New Markets increased to 25%.

This ratio does not correspond to the geographical structure of the world market. Based on data from Gartner and IDC, the US and EU account for approximately 60% of global IT spending (including communications). Hidden in this mismatch is the huge potential for increasing sales in emerging markets.

The difference between 25% and 30-40% is not as big as a few years ago, but Russian developers have a great potential for sales growth in these markets. In the long term, if the process of replacing American IT solutions around the world continues, "New Markets" may even account for more than 40% of global IT sales, since these are fast growing markets where you can get higher growth rates than in the stable markets of Western countries.

The emergence of problems in traditional markets for several years has pushed Russian developers to actively seek sales opportunities in SouthEast Asia, Latin America, the Middle East and even Africa. Judging by media reports, a number of companies open representative offices and implement projects in countries to which Russian software developers showed almost no interest 5-10 years ago (see the selection of messages below). Russian software developers were interested in the markets of Latin America, Vietnam, Mongolia, the Philippines, Zimbabwe, Indonesia, Nigeria, South Africa, India, China, Nepal, UAE, Iran and many other countries.

The growth of 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 these countries to search for alternative suppliers.

Separately, it is worth noting the US open sanctions war against the leading IT companies in China. Since May 20, 2019, following the calls of congressmen, Google ceased cooperation with Huawei, which means it would be disconnected from support for the Android operating system, but continued to support current Huawei smartphones until August 19, 2019. In the summer of 2020, it was announced that it was impossible to supply processors to TSMC from Taiwan for Huawei mobile devices. This means that the use of any American technical solution can cause serious problems for any country at any time due to some political differences with the United States. To the attacks on Huawei, one can add President Trump's demands for the sale of American divisions of large Chinese companies to American companies.

#### 4.6. Geographic preferences of service and product companies

Service companies are better represented (in comparison with grocery ones) in developed countries with a high level of income and with their own software products. Product companies have an advantage in the neighboring countries and in the "New Markets". This was also the case in previous years.

**Presence of Russian software vendors and service companies in the domestic and foreign markets in 2019, % of companies surveyed**

	Grocery	Service
Russia	93%	90%
Near Abroad	62%	33%
Belarus	59%	14%
Ukraine	41%	19%
Kazakhstan	59%	21%
Uzbekistan	48%	7%
USA / Canada	45%	67%
Europe (excluding Russia and neighboring countries)	41%	57%
Great Britain	21%	31%
France	21%	17%
Italy	21%	19%
Germany and German-speaking countries	24%	38%
Northern Europe (Scandinavia and Finland)	17%	24%
Central and Eastern Europe	24%	21%
South and East Asia	34%	19%
China	31%	19%
Japan	14%	5%
India	31%	5%
Africa	28%	7%
South and Central America	24%	10%
Brazil	17%	2%
Mexico	21%	2%
Argentina	14%	2%
Near East	28%	14%
Australia / New Zealand	14%	14%

**Attitude of Russian software vendors and service companies to work abroad (share of surveyed companies)**

	Service	Grocery
Are operating or planning to operate in 2019-2020 in all markets	5.9%	17.1%
Do not work and do not plan to work abroad	25.9%	38.6%
Operated in new markets in 2018	24.7%	28.6%
Interesting "New Markets"(already operating or planning to enter them in 2019-2020)	40.0%	42.9%
do not plan to work abroad in 2019-2020	17.6%	27.1%
did not work abroad in 2018	32.9%	60.0%
Interesting markets of Western countries (already operating or planning to enter them in 2019-2020)	74.1%	48.6%

At the same time, software vendors more often indicate their presence in New Markets. At first, service companies were generally focused exclusively on the developed markets of the USA and Europe, since there was no solvent customer in Russia and in neighboring countries. They also did not see any prospects in the New Markets, where the average salaries of software developers are lower than in Russian cities.

However, the situation gradually changed. Having gained serious experience of working for foreign customers, custom software developers 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 announced plans to enter African markets, and in 2019 this figure was already 7%.

#### 4.7. Geographic distribution of software development centers

Remote development centers are created by Russian companies to solve two problems: either to be closer to the customer and to work with them 24/24 and 7/7, or (which happens more often) to gain access to the local human resource on the labor market.

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

In 2019, 49% of companies surveyed had remote development centers in other cities of Russia, but in this case it was the special composition of companies surveyed with a greater prevalence of large companies in Moscow and St. Petersburg than in other years. And the number of respondents turned out to be insufficient. The results of the 2020 survey only in rare cases can reveal any trends in the distribution of remote software development centers in Russia.

**Availability of software development centers and plans to open them in the next 2 years, the share of companies surveyed**

	2016	2017	2018	2019	2020
Have at least one remote development center in Russia or abroad	40	43	31	32	44
They plan to open in Russia or abroad in the next 2 years	32	25	31	31	36
Have abroad	22	22	16	14	28
Planned to open abroad in the next 2 years	22	11	11	17	21
Have in the far abroad	11	14	11	10	24
They plan to open in the far abroad in the next 2 years	15	9	10	14	18

Compared to the 2018 survey, it is worth noting that in 2019 the percentage of companies that intended to open at least one development center abroad increased (from 11% to 17%) and, in particular, in the far abroad countries – would increase in the next 2 years. (from 10% to 14%). In practice, such plans only characterize the desire for geographic expansion, increasing turnover and exports. It will be explained in other sections of this chapter and in other chapters that these plans reflect a frequently over-optimistic attitude among respondents.

In 2020, an insufficient number of respondents reported their plans to open development centers abroad in the current and next year to draw any conclusions from the corresponding answers.

**The presence of remote development centers (percentage of respondents who indicated a country or region)**

	2011	2012	2013	2014	2015	2016	2017	2018	2019
in Russia	28	24	34	32	36	33	25	29	44
in Belarus	7	8	11	7	6	5	2	4	4
in Ukraine	7	10	14	9	12	4	3	2	3
in other neighboring countries	3	6	12	4	7	5	5	4	7
In other countries of Western Europe	5	5	10	7	7	4	6	4	7
In Germany and German-speaking countries	—	—	—	—	—	1	3	4	4
Scandinavia and Finland	—	—	—	—	—	0	2	1	3
in Central and Eastern Europe	3	1	2	3	5	3	5	4	6
in the USA and Canada	3	4	14	9	8	3	4	4	14
in South and East Asia (SEA)	5	1	3	3	4	1	1	2	3
In Africa	0	0	2	1	1	0	0	0	0
In South and Central America	0	0	0	2	2	1	1	1	3
In the middle east	0	1	1	0	1	0	1	0	1
In Australia	—	—	—	—	1	0	3	1	3

Changes in the questionnaire in the 2020 survey made it possible to obtain data on which cities in Russia are most interesting for creating remote development centers and how many employees are in these centers.

In total, the surveyed companies indicated 40 cities. Most often they indicated Moscow and St. Petersburg. However, in the capital's development centers, which have been opened by companies headquartered outside of Moscow, most often there is a small number of developers who are required to constantly contact customers.

**Top 10 Russian cities by the number of remote development centers of the surveyed companies operating in them**

1	Moscow	12
2	St. Petersburg	12
3	Nizhny Novgorod	6
4	Rostov-on-Don	6
5	Novosibirsk	5
6	Saratov	5
7	Voronezh	3
8	Kaliningrad	3
9	Krasnodar	3
10	Samara	3

In total, the surveyed companies employ 22,834 specialized technical staff. Of these, 8,855 people (39%) work in remote development centers (not in the city where the head office is located).

Vladivostok, Volgograd, Dubna, Izhevsk, Innopolis, Kazan, Obninsk, Penza, Perm, Taganrog have two references.

One time respondents named Belgorod, Bryansk, Veliky Novgorod, Yekaterinburg, Ivanovo, Kostroma, Novokuznetsk, Omsk, Orenburg, Prokopyevsk (Kemerovo region), Ryazan, Sevastopol, Sergiev Posad, Simferopol, Syktyvkar, Tver, Tolyatti, Tomsk, Chelyabinsk Yaroslavl.

The excessively high concentration of employees of development centers from other cities in St. Petersburg is explained by the insufficient sampling of survey respondents in 2020, although it partially reflects the high level of training of IT specialists in this city.

If we consider that in 5 cities (Novocherkassk, Vladimir, Yekaterinburg, Zelenograd, Yoshkar-Ola) there are head offices of the surveyed companies, but these cities were not indicated as locations of remote development centers, then according to the 2020 survey the software development business is underway in 45 cities of Russia. In previous years, their number usually exceeded 50.

**Top 15 Russian cities by the number of employees in remote development centers of nonresident companies located in these cities, people**

1	St. Petersburg	3,487	6	Omsk	480	11	Novosibirsk	180
2	Voronezh	749	7	Ryazan	480	12	Tver	140
3	Saratov	728	8	Izhevsk	297	13	Taganrog	85
4	Nizhny Novgorod	546	9	Samara	297	14	Tolyatti	80
5	Moscow	497	10	Kostroma	286	15	Rostov-on-Don	79

**News regarding remote development centers**

1. In July 2020, Neoflex opened a branch and a development center in Penza. The primary task of the new development center will be to create a team of experts that will develop and build up Neoflex's expertise in the following areas: development of microservice applications and applications for streaming data processing; development of complex software using Fast Data technologies; building reporting systems based on Big Data technologies; DevOps; front office solutions; integration solutions and service-oriented architecture. It is planned that by the end of 2020 the number of employees of the Penza development center Neoflex should reach more than 50 people.
2. In October 2019, Accenture announced that it plans to open a second regional technology center in Rostov-on-Don in 2020. It will focus on systems integration and on software development, business process and application outsourcing. The company rented an area of 800 m<sup>2</sup> and by the end of 2020 intends to form a team of 100 people.
3. In the fall of 2019, Bars Group opened an office in Nizhny Novgorod.
4. In August 2019, Raiffeisenbank announced the opening of its IT hub in Omsk, which is expected to employ about 100 IT specialists.

**4.8. Facts related to the geographic expansion of Russian companies in 2019-2020**

The number of news publications that reflect 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 attracted, first of all, by those markets that are not yet traditional for Russian software companies. Apparently, this growth will stop in 2020 due to the fact that for almost half a year any foreign activity was at best difficult, and, as a rule, impossible. Nevertheless, there will most likely be more relevant news for the entire year than in 2018.

**2019**

1. In February, Trueconf announced that it has deployed a video banking system based on its own Trueconf Server solution at the Commercial Bank of Kuwait. The solution united 43 branches with a central office, and also provided the bank's call center with the ability to remotely serve clients throughout the country.
2. In February, the Ministry of Digital Development, Communications and Mass Media of the Russian Federation announced that it will act as the coordinator for the creation of an innovation hub in Vietnam, which, among other things, will support Russian IT companies in entering the Vietnamese market.
3. In February, Devicelock reported a 25% increase in sales of the Russian Data Leak Prevention Devicelock DLP in the United Arab Emirates, Saudi Arabia, Bahrain and other countries of the Arabian Peninsula in 2018 by 25% compared to 2017. New implementations were carried out in state institutions, banks and large companies, and the Sultanate of Oman became the leader in the total number of implementations.
4. In February, RTITS, the operator of the Russian automatic toll collection system on highways, Platon, announced that it would start implementing a similar system in India. Now in India, tolls are charged at the barriers manually, resulting in traffic jams and loss of money. If the Russian system proves its effectiveness in one area, it will be deployed throughout the country.
5. In February, heads of the constituent entities of the Russian Federation and leading domestic technology companies took part in a business mission to Japan. Russian experts presented in Tokyo the investment potential of Russian regions, and also introduced the Japanese partners to the activities of Russian technology companies.

6. In March, Naumen announced its entry into the German market by completing the implementation of the Naumen Contact Center platform at VersOffice GmbH.
7. In March, DataArt announced the opening of an office in Yerevan, where for the first time in the company's history it will combine the functions of an R&D center and a sales office. DataArt in Armenia will focus on promoting Quality Assurance (QA) — software testing and quality control, software development and support, business development.
8. In March, the Eurasian Development Bank (EDB), Rusprom and Transcom signed a trilateral memorandum of cooperation. Its purpose is to establish partnerships and develop cooperation for the joint implementation of a project for the creation and development of integrated public administration in Kyrgyzstan for state and municipal bodies.
9. In March, Russia and India announced plans to establish a joint center for the development of navigation receivers. Russia will invest €2.5 billion in this project, and it plans to attract the same amount of funds from private investors.
10. In March, a delegation of Russian IT companies headed by the Minister of Digital Development, Communications and Mass Media paid an official visit to Cairo. As a result of the negotiations and consultations, agreements were reached on the supply of a number of Russian IT products and complex solutions to Egypt and on a return visit of representatives of Egyptian companies to Russia.
11. In April, Data MATRIX, a resident of the Skolkovo Foundation's biomedical technologies cluster, signed a cooperation agreement with one of the leading contract research organizations in South Korea, Seoul CRO. The document launched the implementation of advanced IT solutions for the Korean pharmaceutical industry. As part of the agreement, Data MATRIX, a Russian software developer and provider of data processing and clinical trials automation, transfers exclusive rights to use its solutions to Seoul CRO. In parallel, the company will be engaged in the implementation of IT products and cloud services on the local market.
12. In April, the Russian startup Bitronics Lab opened a neurotechnology class for schoolchildren in Spain. Thanks to educational kits produced by a Russian startup, schoolchildren will be able to learn the basics of human physiology, robotics and programming. Classes are held at the Russian educational center "Glagol" in the city of San Pedro de Alcantara.
13. In April, MONT announced the opening of a legal entity and a separate branch in Uzbekistan (Tashkent). The new MONT branch will continue to work with companies that previously interacted with the MONT sales representative in Uzbekistan, and will also expand and develop a partner network in the region.
14. In May, the Russian manufacturer of service robots Promobot announced the conclusion of a contract for the supply of products to Saudi Arabia. It is the 34<sup>th</sup> country in the company's export geography. The total amount of the contract is \$400 thousand.
15. In May, Kaspersky opened an office in Rwanda to develop its business on the African continent. As a result, the Russian company has a total of 37 offices in 32 countries.
16. In May, NtechLab, a technology partner of the State Corporation Rostech and one of the world leaders in the field of biometric technologies, presented a face recognition solution targeted at the countries of Asia, the Middle East and Latin America.
17. In May, according to the Ministry of Digital Development, Communications and Mass Media, Russia and Vietnam entered into a bilateral agreement on the supply of specialized IT solutions in the field of information security. The prime ministers of both countries, signed the relevant documents in Moscow.
18. In June, the Ministry of Digital Development, Communications and Mass Media announced the launch of the Russian Center for Digital Innovation and ICT in Dubai. It was opened with the assistance of the Russian Export Center in the so-called "Silicon Valley" of the UAE — Dubai Internet City.
19. In June, Auriga opened a new laboratory for testing medical softwaremedical devices of one of the company's regular customers in Vilnius (Lithuania).
20. In June, 1C announced that its basic ERP-system by the autumn of the same year will be translated into English, so that it would be more convenient for foreigners to create their own versions on its basis. In addition, in the international version ("1C: ERP") options related to the need to comply with specific Russian legislation will disappear, and the functionality will also expand. "1C: ERP" is in good demand in the CIS countries (for example, in Kazakhstan and Belarus), in many countries of Eastern and individual countries of Western Europe (in particular, in Germany and Italy), as well as in territories very remote from Moscow, such as Vietnam.

21. In July, the Tomsk company Neuromech, which develops mechatronic devices and neurocontrolled software, announced the opening of offices in Spain and Hong Kong, through which it intends to promote its solutions in the European and Asian markets.
22. In July, ABBYY announced that as part of expanding its presence in the Asia-Pacific region, it opened a new office in Hong Kong. This is ABBYY's third regional office in Asia after Taiwan and Japan.
23. In July, Nexign announced a partnership with Giza Systems in the Middle East and Africa region. The goal of the cooperation is to expand the capabilities of both companies to provide flexible product solutions to telecom operators in the MEA region (Middle East and Africa).
24. In August, the Episcopa analytical platform, created by the Russian development team Waveaccess, was integrated into the farm management system of the Danish company SKOV A / S.
25. In August, ICL Services announced that, with the assistance of the Agency for Investment Promotion and Export Support (ANO API), it was entering the IT market of the Far East. In autumn, the company intended to open a working office in Vladivostok to work with the markets of Japan, Singapore and Southeast Asia.
26. In August, Kaspersky opened its first Transparency Center in the Asia-Pacific region. It is located in Cyberjaya — the "Silicon Valley" of Malaysia and the satellite city of Kuala Lumpur.
27. In September, PERCo, a St. Petersburg manufacturer of security systems and equipment, announced the opening of its first overseas office in Dubai, which will meet the growing demand for PERCo access control equipment and strengthen its presence in the Middle East.
28. In October, it was announced that New Cloud Technologies would supply office software to the Government of Burundi. The company has negotiated at the state level to work in a number of other African countries, including Algeria, Burundi, Gabon, Ghana, Democratic Republic of Congo, Madagascar, Morocco, Nigeria, Senegal, Togo and Uganda.
29. In October, the Avtomatika concern of the State Corporation Rostech and the Angolan mobile operator Movitel S.A. signed a contract for the provision of services to improve the operator's information security level.
30. In October, the Russian manufacturer of robotic constructors Robbo announced its entry into the Japanese market by signing the first contracts worth €500,000 and entering into an agreement with a Japanese distributor.
31. In November Finland became the fourteenth country where you can order a taxi through the Yandex service. In Finland, the Yandex.Taxi service was launched under the Yango brand (short for Yandex Go).

### 2020

1. In March, Infowatch Group and Rosinfokominvest signed a cooperation agreement. According to the agreements reached, the fund will assist in the analysis of foreign markets priority for the group of companies and their export potential, in the growth of sales of the above information security solutions in Southeast Asia and Africa.
2. In March, it became known that Hot-WiFi entered the UAE market. The company opened a representative office in Dubai and began developing the Hotspot guest marketing WiFi network in the region and measuring the effectiveness of outdoor advertising.
3. In March, it became known that the Ecuadorian carrier Reina del Quinche had installed Galileosky devices on buses in the capital of Quito. The devices of the Russian company made it possible to solve the problem of a lack of funds due to the fault of drivers and controllers.
4. In March, Deputy Minister of Digital Development of Russia Alexei Volin held a meeting with the Ambassador of Iran to the Russian Federation Kazem Jalali. The parties discussed Russian-Iranian cooperation in the field of communications, information technology and mass communications.
5. On April 12, Singapore launched a smart floating farm and implemented Kaspersky software to protect it.
6. In April, the Russian retailer Svetofor opened its third discounter in Germany under the Mere brand. The new store was launched in the city of Halle — unlike other outlets, the front-office processes in it are automated with a Russian-made technological system.
7. In April, it became known about the upcoming introduction of Cognitive Pilot technologies in trams in Shanghai. The Russian company began cooperation with the Chinese supplier of railway signaling systems FITSCO (Shanghai Fuxin Intelligent Transportation Solutions Co).

8. In June, Nexign announced that it would open a new office in Santo Domingo, Dominican Republic, which will be central to the Latin America region. In doing so, Nexign will expand its international presence and strengthen its position in emerging markets by offering digital transformation solutions to telecom operators in Latin America.

9. In June, Softline launched its own platform for VAS provision in Sri Lanka.

10. In June, the Russian company SPIRIT announced that its technologies were used in Comera video messenger, launched by the Arab company Comera Tech. It is noteworthy that due to the tough position of the authorities in the UAE, WhatsApp, FaceTime, Telegram and Skype are blocked. At the same time, Comera Tech received permission from the local regulator and developed an application for group video calls, available to users both domestically and for calls abroad.

11. In June SKB Kontur received the status of an operator of electronic document management in Uzbekistan. In March, GLONASS announced the signing of a protocol on intergovernmental activities between the Russian Federation and the Republic of Serbia in the field of information and navigation services.

12. In June it became known that Televend, the European smart vending solution from INTIS, was integrated with the payment equipment of Terminal Technologies Group. Vendotek Lite Russian terminals have become part of the telemetry system of smart vending machines, used in more than 190 thousand points of sale.

13. In July, it became known that the Uzbek People's Bank had chosen Finastra to transform its risk management. The project partners are the local fintech company Finekstra and Neoflex, a developer of IT solutions for digital business transformation.

The number of news about activity abroad, measured since 2017, got to be such high that it became possible to have statistics for analysis and identification of trends. It is natural that in 4 incomplete years the most news were in the field of information security. Moreover, in this area, the conclusion of some contracts is not advertised more often than in others.

**Statistics on news about activity abroad in the IT field in 2017-2020, divided by areas of developer activity**

	2017	2018	2019	2020 (7 months)	Total news for 4 years
Information Security	6	4 (-1)*	6	2	17
AI, robotics	1	1	3		5
Custom software development and IT services	1	1	3		5
Enterprise management systems	4		1		5
Biometrics and identification systems	2	1	1		4
Storage, backup and data storage	2	2			4
Systems for public administration			2	2	4
Data Analysis Solutions	2		1		3
Development of cloud management systems	1	1			2
Bank solutions		1		1	2
Internet projects	1		1		2
Navigation systems			1	1	2
Video conferencing			1	1	2
Solutions for telecom operators	1			1	2
Office software			1		1
Learning solutions			1		1
Biomedicine solutions			1		1
Contact Center Solutions			1		1
IoT				1	1
Platform for VAS				1	1
Electronic document management				1	1
Online trading solutions				1	1
Total directions covered	10	7	14	10	

\* - one news about leaving the market, and therefore with a minus.

## Geographical Coverage and vertical markets of Russian software companies

At the same time, there is some activity in a wide range of areas for the development of high-tech solutions. At the same time, you can see an increase in the number of these areas, and in 2020, "Information security" is reflected in only two news items (the same number of "Systems for public administration" have). However, this year is too special to draw any definite conclusions from its statistics. There are no prerequisites for a decrease in interest in Russian solutions in the field of information security.

Judging by the news, the greatest activity of Russian IT companies is observed in South and East Asia. Europe (excluding Russia and neighboring countries) and the Middle East are in second and third place. Taking into account the fact that Russian software companies began to work actively in the Middle East relatively recently (in Europe they began to work 20 years earlier), it can be assumed that the European market will soon be less interesting to start foreign expansion than the Middle East.

### Statistics on news about activity abroad in the IT sector in 2017-2020, divided by macro-regions

	2017	2018	2019	2020 (7 months)	Total news for 4 years
South and East Asia	7	4	13	4	28
Europe (excluding Russia and neighboring countries)	6	3 (-1)*	6	3	17
Near East	5	2	7	3	17
Near Abroad	5	2	5	2	14
Africa	1	2	5	1	9
Latin America	4	1	1	2	8
USA	1	2			3
Australia	1				1
total for the year	22	16	31	14	

\* - one news about leaving the market, and therefore with a minus.

## 4.9. Vertical Markets

### Frequency of mentioning vertical markets in 2007-2020 (% of all respondents)

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

\* - until 2011 — Banking sector and financial services (Banking & Financial Services)

Over the entire period of RUSOFT's research, no regularities have been revealed in the change in the importance of vertical markets for Russian software development companies. Fluctuations in this indicator are random or temporary. In general, we can conclude that the sectorial priorities of Russian exporting companies have not fundamentally changed over the past decade.

## Chapter 4.

The only clearly identified pattern associated with vertical markets was associated with a sharp decline in the number of their mentions per company in times of crisis. In 2009-2010, software developers were forced to focus their efforts on those areas in which they are most competitive, or which turned out to be less susceptible to the global crisis. A similar decrease in this indicator was revealed in the 2015-2016 survey.

In 2018, there was no corresponding question in the questionnaire. It reappeared in 2019 and allowed us to see a sharp increase in the average number of these vertical markets — it reached 6.8, and in 2016-2017 this figure was 4.6. All vertical markets with the exception of Information Technology were mentioned by a large number of companies surveyed.

In 2020, the growth of this indicator continued (increase to 8.2), but this is due, first of all, to the special composition of the companies surveyed (the share of small companies is much lower than in previous years).

# CHAPTER 5

## Human resources



# Huawei

## **Dr. Vladimir Rubanov**

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In the modern world, the quantity and quality of IT specialists that the particular country has in aggregate is becoming a key factor of success, competitiveness and welfare of the state. Russia is traditionally strong in terms of its engineering education level. This is also the reason why the pedestals of the top international natural science and IT Olympiads are often taken by Russians. However, the education system itself if isolated, is not able to provide a full cycle of training for the great variety of specialists that are necessary to overcome the challenges of large-scale digitalization of all sectors of the economy and the development of advanced technological solutions in the required areas.

And here we cannot act without cooperation and mutual assistance between IT companies and the education system. Of course, the model of such cooperation itself is not new. For example, since the middle of the last century the "Phystech (MIPT) system" has been demonstrating outstanding success in training top engineering specialists, mostly due to the constant participation of leading industrial and scientific organizations of the country. Meanwhile, the challenges of the current time require the expansion and scaling of this model throughout the industry to involve all leading companies in the training process of IT specialists in close connection with universities and even schools. And here "the industry social responsibility" is necessary, because investment in the cultivation of a particular student does not guarantee that this student will work for your company or will not leave it soon. However, at the macro level, this is not important, because only maximizing the number and quality of specialists in total matters, while internal rotation within the borders is an inevitable natural process that does not affect the overall human resources potential.

Fortunately, many IT companies do not need to be explained the meaning of industry responsibility, and more and more market players are paying attention and investing in training future IT specialists, developing their own educational modules, supporting Russian universities and research organizations. An important aspect is also the creation of a sufficient number of high-quality jobs that combine interesting world-class tasks and decent working conditions - it is the availability and level of such jobs in the country that determines the "IT attractiveness rating" for migration of the best specialists. And we are talking not only about preventing the "brain drain" abroad, but also about returning those who have previously left. For example, we at Huawei R&D Russia launched a targeted program to return IT specialists to Russia. The opportunity to work in an international scientific and technical environment, to participate in the full cycle from fundamental research to the development of basic technologies and, finally, mass products of world importance, while not leaving the borders of Russia - creates an opportunity for the development and retention of Russian personnel from young students to top world class professionals.

Among other "best practices" for the development of Russian IT human resources potential, it is important to mention the complex programs of

interaction between IT companies and universities (for example, in Huawei R&D Russia it is called the Joint Talent Cultivation Program), which include the development of additional educational courses in cooperation with Russian universities, additional scholarship program for IT students, creative competitions for young people, support for graduate and post-graduate students engaged in advanced research with the participation of the company's technical mentors, including combining the scientific part of the work with real testing in production. At the same time, due to the close links between education, science, research and development, it is important to invest not only directly in educational institutions, but in the scientific and technological ecosystem of Russia as a whole. We do this with the help of grants to Russian scientists for general and fundamental research, thereby developing the skills of not only local IT employees, but also a wider range of leading Russian specialists. It is also very useful to organize free scientific and practical conferences for the exchange of knowledge in the Russian IT community.

I hope more and more companies in Russia will join this movement to develop and strengthen the country's IT human resources potential. Ultimately, it is beneficial for all participants in the best traditions of win-win strategies.

## 5.1. Assessment of the general situation with personnel in the software industry

At the end of 2019 there were at least 580 thousand IT professionals in Russia who were directly involved in the software development process. The growth for the year was at least 7% (this indicator has been stable at 6-8% for several years) that means that over the year the industry has added at least 40 thousand software developers. Most of the growth was provided by universities.

This is a conservative estimate. It is also necessary to take into account a serious error in the available data for calculations. The fact is that the calculations are based on a survey of software companies which constitutes only a part in the developers' community. For software developers who are employed in other industries, as well as in the public sector, it was assumed that they account for about  $\frac{3}{4}$  of all specialists and this share does not change significantly from year to year.

The error was especially large in 2020, since the pandemic led to a sharp decrease in the number of companies surveyed. Nevertheless, the survey data provide a general idea of how enterprises, organizations and departments of Russia have increased their staff of developers.

According to APKIT data (this association unites a wider range of IT companies, including system integrators, distributors and IT importers), 650 thousand people are engaged in software development in Russia. This is quite comparable to 580 thousand from RUSSOFT's calculation, if we take into account the error and the fact that there may be slightly different understanding of who is a software developer.

The Institute for Statistical Studies and Economics of Knowledge of the National Research University Higher School of Economics determined in 2019 that there are more specialists working as software developers (analysts) in Russia — about 655 thousand people. Existing data on the number of developers in some members of federation gave a similar value when extrapolated to the whole country. Thus, various sources say that at the end of 2019 there were at least 600 thousand software developers in Russia.

If we restrict ourselves to only Russian software companies, then they employ at least 180 thousand specialized technical employees. At the same time, at least 10 thousand developers out of 180 thousand are outside the country, working in remote development centers. Consequently, about 170 thousand work directly in Russia in software companies, which is 10% more than at the end of 2018.

Calculations show an increase in the number of core employees by 14% throughout the industry in 2019 and by 10% for the companies surveyed. Since the margin of error is large, it is best to rely on conservative estimates.

### REFERENCE

*The data on the number of specialized employees obtained as a result of the survey of companies, as well as the data of large companies that did not participate in the survey, but posted information about the staff of their specialists in the public space (on their website or in the media), allowed RUSSOFT to calculate in 2007 the total number of software developers in the industry, and then to adjust this value annually. The calculation is based on the weight of companies in the Russian software industry for which information is available. The weight is determined by the share of these companies in the total number of Russian software companies for each category, which are formed depending on the size of the enterprise and the business model (service or product). At the same time, RUSSOFT has information on almost all the largest companies with a turnover of more than \$50 million. For this category of companies, the data on the number are simply summed up. For other categories, the total number of companies and the share of the category for which information on the number of employees is available is taken into account.*

*At the same time, RUSSOFT assumes that there are at least 4,000 software companies in Russia (there are much more of them, taking into account those in which only a few people work and there are no regular sales).*

Over the past few years, both large and small software companies have been steadily increasing their staff by 8% or more (for the companies surveyed, the growth in 2017 and 2018 was generally 12%). Until 2017 large companies grew faster and largely at the expense of small ones.

**The total number of core employees**

	<b>End of 2016</b>	<b>End of 2017</b>	<b>End of 2018</b>	<b>End of 2019</b>
Software developers working in Russia in all industries (including IT services), thousand people	470-480	>500	>540	>580
In the software industry in Russia (excluding employees in foreign centers), thousand people	132-137	>140	>155	>170

**Distribution of employees depending on the business model**

in service companies (including work for foreign customers)	56-57% (≈22%)	≈58% (≈22%)	≈59% (≈22%)	≈54% (≈23%)*
in grocery companies	≈40%	≈38%	≈37%	≈41%*
in Russian R&D centers of foreign companies	≈3-3,5%	≈4%*	≈4%	≈5%*

\* — the change in the indicator reflects not growth, but the adjustment made upon receipt of additional information (in 2019, a significant adjustment was due to the sale of a number of large companies that were considered non-Russian, as well as the use of an updated calculation methodology)

The increase in the growth rate of the total headcount can be explained by the fact that, thanks to the activity of the APKIT Association, since 2014, many new budgetary places for IT specialties have appeared in universities. It is unlikely that their number increased by 70% in three years, as announced in the media, but their number increased by 20-30%. It was mainly regional universities that increased the admission of students in IT specialties.

The second significant factor in the increase in the growth rate of the total headcount of the software industry enterprises is the transition of developers to the development industry from other sectors of economy. Most likely, large corporations did not reduce the recruitment of their IT services (insourcing companies), let alone cut them. Recruiting companies noted that state corporations have even increased their activity in the labor market in recent years. The IT services of medium and small business (SMB) could also lose personnel (due to the growing popularity of cloud services) which would go the software industry. The retraining of personnel could also have an effect — training in programming for those who had no education in the field of IT.

Survey data over the past few years make it possible to determine that the share of developers in the total number of personnel is 70-85% for service companies, and 55-70% for software vendors. If we exclude rare deviations, then the range can be narrowed down to 80-83% and 55-63%, respectively. The average for all companies will be around 73%. Consequently, with 180 thousand specialized technical staff (including those who work in foreign development centers), the total number of personnel of software companies will be approximately 250 thousand people.

The share of companies that planned to increase the number of employees in 2019 turned out to be lower than the forecast based on the expectations of companies surveyed in early 2019. However, it increased by 5 percentage points compared to the same indicator in 2018. The share of fast-growing companies (those whose staff growth exceeded 10%) also increased.

**Change in the number of employees, share of surveyed companies**

	<b>2016</b>	<b>2017</b>	<b>2018</b>	<b>2019 (forecast based on expectations at the beginning of the year)</b>
Magnification	49%	44%	54%	59% (68%)
Increase over 10%	23%	25%	28%	35% (39%)
Reduction	13%	9%	9%	15% (9%)
Without changes	31%	35%	31%	25% (20%)
Found it difficult to answer	7%	12%	6%	1% (11%)

### 5.1.1. Headcount across the entire ICT industry

The Institute for Statistical Studies and Economics of Knowledge of the Higher School of Economics has calculated that 8 million Russians were employed at work in 2018, where they need to intensively apply their skills in the field of information and communication technologies (11% of all employed citizens in the country). Of these, 1.8 million people are professionals working in the ICT industry. Approximately 655 thousand work as software developers (analysts, architects), and another 464 thousand are employed as electrical engineers. 250 thousand Russians work as specialists in databases and networks, 149 thousand people are engaged in the installation and repair of electronic and telecommunications equipment.

Another 127 thousand people work as specialists in ICT maintenance and user support. Approximately 69,000 are technicians in telecommunications and broadcasting. Finally, 66 thousand people manage services and departments in the field of ICT.

In January 2020, APKIT provided the following data: in total, the number of specialists employed in the ICT sector in Russia was 845 thousand people, of which 194 thousand people in the IT services segment, 54 thousand people in hardware, in Internet of Things — 22 thousand people, in the export of IT services — 150 thousand people, in software development for the domestic market — 75 thousand people, in the Telecom segment — 350 thousand people. If we exclude telecommunications companies, it turns out that 495 thousand people work in the IT industry.

APKIT also estimated the annual need, which implies not only compensation for departing employees, but also the maximum possible growth. In particular, 37 thousand people are required in IT services (19% of the existing number of all staff), in IT export of services — 21.5 thousand people (14%), in software development for the domestic market — 8.5 thousand people (11%), in the Internet of Things — 1.7 thousand people (8%). For the entire IT industry, the need is 70.6 thousand people (14%).

Another 950 thousand people work as IT specialists in government agencies and various enterprises (organizations) that do not belong to the ICT industry. Consequently, in total the ICT industry employs 1.8 million people, which is 2.4% of the economically active population of the country. A similar indicator on average in Europe is 3.9%, in Finland — 7%, in the UK — 5%, in Norway — 4.5%, in the Czech Republic, France, Germany — 4%, in Poland — 3%.

### 5.1.2. Rotation of personnel

The employee 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 leap — up to 12.5%. Given that not many companies participated in the survey in 2020, it is necessary to check whether such significant growth has occurred. However, such a check is unlikely to be possible when summing up the results of 2020, since this year is special due to the impact of the pandemic on the industry and the entire economy. Nevertheless, the version about the growth of staff turnover looks quite probable, because most of companies that participated in the 2020 survey are attractive in terms of poaching their staff. If this indicator is high for them, then for the rest of the companies it is at least not lower.

#### Annual turnover rate by company size

year	2012	2013	2014	2015	2016	2017	2018	2019
For all surveyed companies	6.00	6.00	7.70	5.70	9.50	9.50	9.30	12.50
more than \$100 million *	4.60	7.70	5.00	6.00	11.00	9.00	2.00	12.60
from \$20 million to \$100 million	8.30	7.40	6.50	6.10	6.70	8.80	13.80	9.90
from \$5 million to \$20 million	9.00	7.80	7.40	8.10	10.90	16	10.80	17.50
from \$1 million to \$5 million **	8.40	8.20	6.60	6.10	6.20	5.40	9.70	12.30
less than \$1 million ***	4.80	13.10	7.70	6.20	6.50	6.60	6.70	8.50

\* — 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."

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At least half of the companies surveyed face annual layoffs (in 2016 — 59%, in 2017 — 50%, in 2018 — 58%, in 2019 — 67%).

It is already impossible to say about the low rate of staff turnover in Russia. In the current environment, when the staff is renewed annually by an average of about 10%, companies have to learn to start projects with one team composition, and finish with a completely different one.

The rotation of personnel varied depending on the type of company. At the same time, there was a certain stability in these differences. For example, staff turnover was generally lower for smaller companies. These same companies had to hire more university graduates, while large enterprises where exports provided more than 50% of revenue, preferred employees with experience.

In recent years, these dependencies have begun to break. Since 2016 not the smallest companies have suffered more from the staff turnover, but enterprises with turnover of \$5 million to \$20 million, and in 2018 they were joined by companies with turnover of \$20 million to \$100 million.

Since 2018, companies that receive most of their income from exports have become more active in relation to university graduates, compared to enterprises operating primarily in Russia.

Product companies tend to have a more stable development team than service companies. In 2019 the employee turnover rate for software developers was slightly higher, but actually at the same level as for service companies.

Rotation was consistently higher for companies that have been on the market for no more than 10 years, compared to those that have already celebrated their tenth anniversary. At the end of 2019, relatively young companies were recruiting graduates much more actively, but at the same time losing employees a little less.

### Rotation indicators for companies of different categories at the end of 2019

	Staff turnover	The share of university graduates from the average number of staff
For all surveyed companies	12.5	5.1
<b>Company size</b>		
Turnover less than \$5 million	12.0	7.0
Turnover over \$5 million	12.5	5.0
<b>Business model</b>		
Service	12.2	6.3
Grocery	13.6	3.3
<b>Share of foreign sales in turnover</b>		
Less than 50%	17.1	3.6
More than 50%	11.1	6.0
<b>Age of companies</b>		
Under 10 years old	10.5	7.4
Over 10 years old	12.7	4.9

In almost all years of the study, the highest labor market activity was invariably recorded in St. Petersburg. This city has traditionally had a higher staff turnover rate and the highest percentage of university graduates in the staff. At the end of 2016 and 2017 St. Petersburg ceased to be the clear leader in these two indicators, but it still had the largest number of companies from which specialized employees left. In 2018, the northern capital had the lowest employee turnover.

In terms of the share of companies with staff turnover, St. Petersburg in 2019 again has the highest indicator. However, if we exclude companies that found it difficult to answer the relevant question, then both in Moscow and St. Petersburg 100% of companies lost employees in 2019.

In the regions, 19% of companies indicated that they did not have a single employee who left in 2019.

The admission of graduates is sharply reduced during the crisis period. So, the share of recent students in the state in 2014 decreased to 0.8% (a year earlier it was 8.4%). In 2015, the indicator increased to 8.4% (apparently, due to deferred demand) and in 2016-2017 it stabilized at 6%. By the end of 2018 it reached a record value of 10.4%, but in 2019 it dropped to 5%. It is easy to assume that in 2020 the share of university graduates will decline even more.

**Labor market activity of surveyed companies depending on their location**

		<b>Moscow</b>	<b>Saint Petersburg</b>	<b>Regions</b>
by the end of 2017	Accepted university graduates	6.00%	4.10%	10.00%
	Share of companies with turnover	27%	72%	54%
	Employee turnover rate	9.40%	9.40%	8.70%
by the end of 2018	Accepted university graduates	7.20%	7.30%	17.60%
	Share of companies with turnover	86%	85%	84%
	Employee turnover rate	11.60%	6.60%	11.00%
by the end of 2019	Accepted university graduates	7.50%	4.60%	3.00%
	Share of companies with turnover	62.50%	80.00%	60.70%
	Employee turnover rate	14.10%	12.50%	6.90%

**5.1.3. Replenishment of staff**

There are three main sources to replenish the staff of software companies: universities, visiting foreign developers (primarily from neighboring countries) and enterprises of other industries. By and large, until 2019 for several years only one source of recruitment mattered — universities. If before 2016 in some years the migration of software developers from Kazakhstan, Ukraine and Belarus provided up to 20% of the growth in the total staff of Russian software companies (excluding employees of their foreign development centers) then in 2017-2018 this figure did not exceed 5%.

At the end of 2018 university graduates and foreign specialists provided 99.5% of the increase in the total staff of the surveyed companies (labor migration from non-CIS countries gave only about 4%). Cross-sectoral movements of employees did not produce any significant influx of personnel. Most likely, about the same number of employees move from other industries to software companies as they change jobs in the opposite direction.

At the end of 2019, migration provided about a fifth of the increase (19%), and university graduates — 57%. Other sources gave 24%. Most likely, the share of migrants and graduates in the increase in staff is slightly higher. Nevertheless, 2019 turned out to be unique in terms of the share of staff inflow from other sources. These can be, first of all, specialists who have switched to software companies from other industries (including as a result of retraining if they did not have the appropriate higher education).

If we compare the growth rate of the number of employees with the growth rate of turnover, then all the years of the RUSSOFT study, revenue measured in dollars or the volume of foreign sales increased faster than the staff. It is significant that at the end of 2018, 35% of the companies surveyed, whose number of employees did not change or even decreased, increased their turnover (in dollar terms). At the same time, 24% had a revenue growth of more than 10%. The aggregate turnover of companies that were unable to increase their staff increased by 2.3%.

The results of 2019 in this study were summed up with calculations in rubles. Nevertheless, it can be seen that the share of companies that could not increase their staff, but showed growth, turned out to be even greater and amounted to 59%. The aggregate turnover of companies that retained or reduced their number of employees increased by 9%. At the same time, the best indicator of the change in revenue turned out to be in those enterprises that went to reduce staff. At the same time, the dependence of the growth rate of turnover on the recruitment of the staff of companies still exists. Companies that increased their headcount grew by far more than 9%.

**5.1.4. Productivity growth**

In 2017 the total headcount of Russian software companies grew by 7%, and the total turnover in dollars — by 19%. In 2018, the difference turned out to be less — 7.8% and 10.6%, respectively. The convergence occurred due to the depreciation of ruble against dollar.

There is a clear increase in labor productivity, measured in dollars. The productivity of software developers is growing mainly due to the rise in the cost of services for software developers and the scaling of the business of software vendors.

At the end of 2018, one developer accounted for \$75 thousand in revenue (together with foreign development centers), and at the end of 2019 — \$96 thousand. It should be taken into account that the composition of respondents surveyed in 2019 and 2020 is very different, which makes it difficult to make correct comparisons.

### 5.1.5. Job attractiveness factors

A HeadHunter survey of 225 respondents in April 2016 showed that high salaries are not the main factor in job attractiveness for IT professionals. Much more often they mentioned an interesting job (86%) and a promising and dynamically developing software segment (58%). Only 39% of respondents mentioned salary as the main factor. 23% appreciate flexible working schedule, and 23% appreciate the fact that IT professionals are in demand and protected from layoffs.

According to Rekadro's research “Motivating Factors for IT Professionals,” the results of which were published at the end of 2018, IT professionals are less interested in working at a large enterprise than Russians in general.

Similarly, significantly fewer IT specialists want to work in companies with state participation (14% versus 32% among Russians as a whole) and are more interested in their own business (16% versus 11% among Russians as a whole). IT specialists will prefer to work in an international company, which fully coincides with the position of Russians in general.

## 5.2. The current need for IT professionals

Quantifying the overall shortage of software developers is largely pointless. If we say that the programmers deficit is 500 thousand people, 1 million people or 2 million people, then any of these figures will be correct. In any case, it was true before the pandemic, which temporarily overshadowed the problem of lack of developers.

However, if the situation stabilizes, any possible inflow of programmers in the Russian labor market can theoretically be used in software companies and in IT-departments of enterprises of various industries. Taking into account the global staff shortage and a small share of Russia in the global software market (including custom development services), the domestic software industry can grow 2-3 times and even more due to a sharp increase in exports.

In 2019 the industry-wide shortage of personnel was 25-35 thousand people. In fact, the companies hired about 2 times less in 2019 — about 15 thousand people. Consequently, the shortage in the short term is 10-20 thousand people in the software industry alone. Almost 4 times as many programmers work in the entire economy. However, this does not mean that the personnel shortage for the entire software industry is 4 times greater. Most likely, the large state-owned banks can afford to hire almost as many specialists as they need, and sometimes more. It can be assumed that the total annual unmet need for software developers is 25-40 thousand people. Such a number of developers had to be attracted additionally from somewhere. The pandemic and the global economic crisis caused hereby will force us to revise these estimates, but this requires at least a general understanding of what will happen before the end of 2020, in 2021 and in the coming years.

### 5.2.1. The ratio of the number of resumes and vacancies

How the ratio of resumes and vacancies is changing can be tracked by the HeadHunter Index, which reflects the change in the number of resumes per vacancy in various professional fields. “IT, Internet, Telecom” fits the software industry. Although the corresponding index reflects the situation in the entire ICT sector with a wider range of specialists and managers, its dynamics is almost completely correlated with the results of the RUSSOFT survey, in which respondents assess “Staffing, education and training system”.

Long-term observations indicate that satisfaction in the workforce is the higher, the less difficult the situation on the labor market becomes. There is always a shortage of personnel, but in some years it becomes a little less. It is noteworthy that two completely different indicators (the average score, which was obtained according to the results of the survey on the degree of satisfaction of the need for personnel, and the ratio of the number of vacancies and resumes according to the statistical array) in some years almost coincide.

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This is due to the fact that it is considered optimal when there are 4-5 resumes per vacancy, which allows not to have unemployment and makes it possible to select the best. The surveyed companies assess the situation with personnel on a 5-point scale. If the hh.index for the software industry was about "5.0", then, most likely, the average staffing score would also be greater than "4".

Until September 2018 the hh-index remained at the level of 2.5-2.6, with a decrease in some months to 2.2 and to 1.8. At the end of 2018 and in the last quarter of 2019 the level was 2.7-2.8, in some months dropping to 2.5 (for the entire economy, this index fluctuates between 5-7). Thus, the supply of IT specialists in the labor market in 2018 slightly increased relative to demand.

In 2019, nothing radically changed — the hh-index for the first 9 months had slight fluctuations in the range of 2.5-2.8, but more often it was 2.7, and in the last three months of the year it increased to 2.9. The sharp rise in the index began in March 2020 (from 2.7 to 3.1) and continued until May. Following the trend, the index reached in May a record value over the past 5 years — 4.5. Consequently the problem of the shortage of specialists disappeared at all. However, this is connected, of course, not with an increase in supply, but with a temporary sharp decline in demand in the II quarter. According to preliminary estimates, in 2020 the revenue of software companies decreased by 30-40%. With such a drop, no one thought about expanding the company's staff in the vast majority of cases. Businesses in other industries have also suspended hiring. According to the hh.ru, in June and July 2020 the hh.ru index was 3.5 and 3.3 respectively so the recruitment began again in IT.

The dynamics of the average score in assessing the situation with personnel, calculated on the basis of the annual RUSSOFT survey, is similar.

The 2018 poll showed a decrease in the average score to 2.67 (2.68 for software vendors and 2.64 for service providers). In 2019 a slight increase was recorded to 2.73 (the hh.index also increased slightly). Software vendors rated the staffing situation at 2.79, and service providers — at 2.68. The overall assessment of software companies still dropped to 2.62, with the hh.index almost unchanged (it even increased slightly). Apparently, this was a reaction to a too long uncertainty of the market situation.

In addition, software executives could see opportunities to increase growth in 2019 if there was a greater supply of software engineers in the labor market. This supply grew, but the demand grew even faster.

### 5.2.2. The most demanded specialists

Information about the most sought-after specialists and how the demand changes over time has become less available in recent years. Recruiting companies, even if they do relevant research, have stopped publishing their results on their websites. The most recent of these studies date back to 2014-2015.

Since 2008, the need for employees of various specializations across all surveyed companies in the RUSSOFT study has changed insignificantly (the corresponding question was in the questionnaire of this study up to 2015 inclusive). All these years, only C/C ++, Java and C# developers have consistently been in the top three most in-demand specialisations.

Foreign markets more often required Java and C# developers. To work on the Russian market, the need for PHP/MySQL web programmers is higher.

In subsequent years in Russia, the demand grew not only for programmers, but for specialists with skills in the most relevant IT areas, such as artificial intelligence, Big Data, blockchain, etc.

Among the vacancies, those that have recently been related to the professions of the future have begun to appear, for example, Virtual Reality designer, Deep learning engineer, Data mining engineer, artificial intelligence developer, IoT analyst.

Among the skills that employers will look for in a few years, the most popular will be: self-learning, language skills, transdisciplinarity and cross-functionality, technological literacy, programming skills, creativity, entrepreneurship, social intelligence, collaboration with team members. Thus, in the future, the most successful candidates will be those who are equally proficient in soft skills and hard skills.

## Human resources

### IT Jobs, 2018

Sphere	Number of vacancies
Mobile applications	2981
Information Security	2862
Frontend	2007
Backend	1703
QA	1244
Machine learning	901
Big data	797
VR	287
Artificial Intelligence	209

Source: job portal Adzuna.ru

According to a survey of the labor market from the employment portal Adzuna.ru, published in spring 2018, the greatest demand for IT professionals is observed in the development of mobile applications and information security. There remains a steady demand for front-end and back-end developers (approximately 2,000 and 1,700 vacancies, respectively). But to work with artificial intelligence and virtual reality, relatively few specialists are required: only 209 and 287 open vacancies.

According to analysts from the recruiting portal Superjob (their report was published at the end of 2019), software developers for iOS and Android operating systems will be in greatest demand in 2020 due to the rapid development of the mobile application market.

In this segment, there are fewer than two people per job, and the average salary in Moscow is P140-150 thousand, with a maximum of P300 thousand.

### Willingness to accept specialists by surveyed software companies in 2020

	Total need, people	Number of companies that indicated the need for employees of this specialization		Total need, people	Number of companies that indicated the need for employees of this specialization
Developer (without specifying specialization)	462	9	System Administrator	80	1
C ++ / C # developer	104	7	UX/UI Designer	1	1
Developer for DBA	2	1	.Net developer	85	3
JavaScript developer	30	1	PHP Developer	20	1
Front-end developer	81	3	Java developer	124	10
Developer for mobile platforms (iOS, Android)	103	10	Microcontroller programmer	3	1
Software architect	3	1	Designer	20	1
Business analyst	2	1	Tester	209	11
Python developer	43	3	Marketer	2	2
Systems Analyst	62	4	Linux developer	4	2
Account manager	40	1	Project managers	55	4
Technical writer, copywriter	8	3	DevOps engineer	1	1
Local technical support engineers	230	1	Service Desk Specialist	180	1
Hardware (Electronic Engineer, REA Technologist)	4	2	Machine learning developer	10	1

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The next IT specialty in demand is UI / UX (user experience and user interface) designers. Here, an average of 2.5 jobseekers apply for one job, the salary in Moscow is measured at approximately P115–125 thousand, but you can earn up to P250 thousand.

The vacancies for QA specialists also have an average of 2.5 CVs. The average salary in the Russian capital is P90-100 thousand, the maximum salary is P250 thousand.

Superjob also predicts an increase in demand for data analysts, whose services are also in demand in financial institutions and in wholesales traders. The ratio of the number of vacancies and resumes in this segment is 1 to 4.5. Big Data analysts have the highest average income level: average earnings in Moscow are P150-160 thousand, and the maximum salary is P250 thousand.

The results of the 2020 survey showed that the most common developers are massively required, about the same as in 2015. The professions of the future, which were in sharp increase in demand in recent years by recruiting companies, were named by rare representatives of software companies in 2020.

### 5.3. Labor migration

Since the beginning of 2015 (in connection with the events in Ukraine) an additional migration flow has appeared in Russia from the East of that country. In 2016-2017, the inflow of personnel from Ukraine and from neighboring countries slightly decreased. In any case, the share of respondents who reported hiring new employees who arrived from other countries has decreased. The outflow either did not change significantly or slightly increased. Judging by the fact that the increase in the number of employees of the surveyed companies coincided with the number of hired university graduates, one could conclude that the migration flows have again leveled off. At the same time, there was an influx from countries with a high level of wages, since some Russians go abroad with plans to return after the end of the signed contract.

In 2018, there were no signs of a radical change in the situation. The influx of personnel from abroad and the departure of specialists abroad remained at the same level.

As the 2020 survey showed, in 2019 migration provided 19% of the staffing of the software industry enterprises. Signs of a massive departure of software developers abroad were still not observed, although there were sensitive losses of key specialists.

#### 5.3.1. Traveling abroad

**The problem of the abroad outflow of developers for different categories of companies in 2016-2019, % of companies surveyed**

	2016 survey	2017 survey	2018 survey	2019 survey
All surveyed companies	14%	18%	17%	17%
<b>Company size</b>				
Turnover less than \$5 million	15%	19%	18%	18%
Turnover over \$5 million	12%	14%	14%	13%
<b>Head office location</b>				
Moscow	13%	4%	2%	11%
Saint Petersburg	13%	15%	12%	15%
Regions	16%	28%	25%	20%
<b>Export share</b>				
Less than 50%	14%	16%	12%	13%
More than 50%	14%	22%	29%	28%

## Human resources

Due to the increase in the abroad outflow of personnel in 2015, in the 2016 survey questions were included in the questionnaire that allow us to determine the impact of migration flows on the software industry. As a result, it turned out that the abroad migration of employees was a problem for 14% of the companies surveyed. This indicator did not depend in any way on the share of foreign sales and almost in no way — on the business model (for software vendors it was 13%, and for service companies — 14%).

In 2018 and 2019, the survey data did not allow to draw a conclusion about any significant changes in how companies assess the problem of employee migration abroad. It can only be noted that the difference between companies that are more oriented towards foreign markets and companies for which the domestic market is the main one — has increased. Developers who work in Russia, on average, have a much worse command of foreign languages. This prevents them from even thinking about looking for work in other countries. In addition, the recovery of the domestic market is affecting. Working exclusively on it, it was now possible to grow rapidly again and retain staff through additional income.

### The problem of the abroad outflow of developers for different categories of companies (survey in 2020), % of companies surveyed

	<b>It is quite widespread for our company</b>	<b>We lose specialists in isolated cases, but these specialists are key</b>	<b>There is a problem in some form</b>
All surveyed companies	4.3%	27.1%	31.4%
<b>Company size</b>			
Turnover less than \$5 million	2.40%	21.40%	23.8%
Turnover over \$5 million	7.1%	35.7%	42.8%
<b>Head office location</b>			
Moscow	4.6%	18.2%	22.8%
Saint Petersburg	5.0%	30.0%	35.0%
Regions	3.6%	32.1%	35.7%
<b>Export share</b>			
Less than 50%	0%	22.7%	22.7%
More than 50%	12.5%	37.5%	50.0%

In 2020, the wording of the issue of employee migration abroad has changed. The respondents had the opportunity not only to report its presence (or absence), but also to choose from two options the nature of the outflow of personnel abroad — "The outflow is quite massive for our company" and "We are losing developers in isolated cases, but these developers are key".

Most likely, it resulted the change in the wording of question. The share of companies that admit the existence of the problem of brain-drain abroad increased sharply (from 17% to 31%). However, only 4.3% of the surveyed companies consider such migration to be massive. Among medium and large companies, this figure is higher — 7.1%, but inflow and outflow of employees compensate each other.

It is noteworthy that even the American Russian-speaking community does not have accurate data on the number of IT specialists who have moved to the United States from the post-Soviet space. There is only an assumption that there should be at least 50 thousand of those in Silicon Valley alone.

Since Spring 2020, the problem of abroad migration has temporarily become irrelevant due to the closure of borders as part of the fight against the pandemic, as well as the termination of the issuance of work visas for software developers in the United States. In addition, the economic crisis has forced a number of foreign high-tech companies to massively cut their personnel. However, poaching the best talent from other countries may again be a problem for Russian software companies.

### 5.3.2. The influx of personnel from abroad

Thanks to another new question in the 2019 questionnaire on the proportion of new employees hired in 2018 who arrived from abroad, it became possible to calculate the number of programmers who entered Russia. As a result, the influx of foreign specialists hired by Russian software companies was estimated in 2016-2017 at about 400-500 people.

At the end 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 arriving programmers got a job in other industries, the total inflow is estimated at about 2-2.5 thousand people.

According to the companies surveyed, both at the end of 2017 and of 2018, the cumulative increase in the number of employees almost corresponds to the number of university graduates hired. Consequently, all other flows (from the software development industry to other industries and vice versa, from abroad and abroad) compensate each other. The mismatch is only 3-4 percentage points. This means that other sources (in addition to universities) provided software companies in 2018 with an additional 800-900 specialized employees. So much more employees of the industry were transferred from other industries and from abroad than in the opposite direction.

In 2015, 20% of the surveyed companies hired foreign software developers. In 2016 — 18%, in 2017 — 14%. In 2016-2017 the absolute number of developers who arrived from abroad did not change. In 2018 both the share of companies which hired foreign developers (up to 21%) and the number of these specialists increased. In 2019, these indicators continued to grow. The increase in the number of developers who arrived from abroad was especially great. In software companies, their total headcount is approximately 2,850.

#### How actively different categories of companies accepted employees from neighboring countries

	Average share of new employees who arrived from the near abroad (out of all hired in 2019)	Share of companies that hired new employees in 2019 who arrived from neighboring countries
All surveyed companies	4.4%	22.0%
<b>Company size</b>		
Turnover less than \$5 million	4.4%	13.6%
Turnover over \$5 million	4.4%	35.7%
<b>Head office location</b>		
Moscow	4.3%	20.8%
Saint Petersburg	5.0%	35.0%
Regions	3.0%	14.3%
<b>Export share</b>		
Less than 50%	4.0%	15.6%
More than 50%	4.6%	36.0%

The statistics of the Ministry of Internal Affairs show that in 2018 the number of issued work permits for highly qualified foreign citizens and persons without citizenship increased by 6% (up to 28,183). In 2019 the growth was even more significant — 22% (up to 34,299). This increase is consistent with the RUSSOFT survey data.

In the first half of 2020 the number of issued work permits for highly qualified specialists dropped sharply due to the pandemic — from 16,221 (in the same period a year earlier) to 7,750.

The Boston Consulting Group and The Network, conducting a joint study from March to May 2019, ranked Russia in a fairly high 25<sup>th</sup> place among 180 countries in terms of attractiveness for IT professionals. In total, more than 26 thousand people were interviewed, including more than 1.6 thousand Russians.

Readiness to move to Russia was reported by 38% of respondents from Kazakhstan and 27% from Belarus. Also, the percentage of those wishing to work in Russia was high in Turkey, Angola, Nicaragua, Serbia, Lithuania, Peru, Estonia and Ukraine. Researchers explain the attractiveness of Russia for local and foreign IT professionals by large-scale digitalization, which continues in the country and in the world. Digitalization creates a demand for qualified specialists, for whom business and the public sector are fighting.

At the same time, more than 40% of Russian developers do not seek to work abroad. If on average in the world about 68% of IT professionals are ready to leave to work in another country, then in Russia this figure is 58%.

### 5.3.3. Internal migration

According to the results of the “10<sup>th</sup> labor market research and salary survey in Russia in 2019” by the Antal Russia recruitment agency, the mobility of specialists within the country has been declining in recent years: if in 2016 40% were ready to move to another city, then in 2019 30% of respondents agreed to move across Russia.

In recent years, interregional competition for personnel has become noticeable. The main and most active players in this field are Tatarstan (with its new city — Technopark Innopolis), Kaliningrad Oblast and Far East region (with free economic zones and exceptional business conditions), Moscow (with its own IT business attraction program), Ulyanovsk Oblast (in which the governor personally participates in IT business events). The activity in these cities is manifested in the creation of favorable conditions for relocation, high-tech business and work. This is not always enough for at least some massive movement of specialists.

Taking into account the active promotion of the ideology of the Digital Economy and Digital Transformation, competition between regions for creating better conditions for running an IT business will certainly accelerate the development of the IT industry in the regions and increase the level of the digital economy as a whole.

## 5.4. Salary

### 5.4.1. Average salary in Russia, in the IT sector and in the software industry

During all the years of the RUSOFT study, the average salary in the software industry has been increasing, if measured in rubles. During the crisis periods (2009-2010 and 2014-2015) the growth rate only decreased — from 10-20% to 8-10%. There has always been an increase in income for software developers, but during the crisis it could not cover losses from inflation and from decrease 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 the same indicator for the entire Russian economy. Only in 2017, for the first time, there was no obvious growth advantage for software developers. Most likely, programmers' salaries nevertheless increased slightly more (by 1-2 percentage points) than the national average for all industries, but for the first time the difference was so insignificant.

However, in other sectors, even the nominal incomes of workers in the last 2-3 years either did not grow at all, or decreased, while real incomes definitely decreased. In 2017, there was only partial compensation for these losses, which the software developers did not actually have.

In 2018-2019, the growth in the average salary of software developers and the increase in the nominal accrued wages of workers in the Russian economy as a whole (data from Rosstat) were completely equal. According to RUSOFT calculations, salaries of core 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 at the end of 2019 amounted to ₴47.5 thousand). There are discrepancies, but not significant, taking into account the existing calculation error.

In the case of software developers, the Russian labor market is only part of the global one. Therefore, programmers, not without reason, often focus on measuring the value of their income in dollars.

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If we consider the dynamics of the average salary in dollar terms, then for Russian software developers it increased by about 24% in 2017 (largely due to the strengthening of ruble). However, in 2018, due to the weakening of the national currency, the dollar average wage increased by only 4%. The growth in 2019 in dollar terms was insignificant — by 3.2%. Thus, the average salary of software developers in dollar terms has not yet reached the pre-crisis level of 2013 (it is 15.6 percentage points lower). At the same time, in Western countries programmers' salaries have increased significantly over the years.

### Change in average salary for Russian software companies surveyed by RUSSOFT in 2014-2019

	2014	2015	2016	2017	2018	2019	Total for 6 years (since 2013).
in ruble terms	+11.6%	+8%	+10%	+7.7%	+12.1%	+5.8%	+69%
in dollar terms	-6%	-32.5%	0%	+24%	+4%	+3.2%	-15.6%

The average salary in the software industry in Russia by the beginning of 2017 reached ₺82-84 thousand, by the same part of 2018 it was about ₺90 thousand, by the beginning of 2019, most likely, it exceeded ₺100 thousand during the year. By the beginning of 2020, it grew up to 6% and reached approximately ₺106 thousand.

According to HeadHunter (the report “Labor and Salary Market in Russia in 2019”, the average salary of IT specialists in 2019 amounted to at least ₺91.2 thousand with an increase of 6.5% over the year, which is quite consistent the average salary in software companies in ₺106 thousand with an increase of 5.8%, since in these companies the salary is higher than the average for the entire IT industry.

The career portal "My Circle" found out that the average salary of a specialist in the IT industry in the first half of 2019 is ₺100 thousand in Russia.

### How the salary of the surveyed companies changed in 2017-2019

	2017	2018	2019
increased	53%	58%	70%
increased by more than 10%	25%	24%	33%
hasn't changed	29%	22%	29%
decreased	1%	2%	2%
find it difficult to answer	17%	18%	14%

In 2018, not only the salary growth rate in the software industry was higher than a year earlier, but the share of companies that raised salaries and other employee benefits increased. In 2019, the growth rate of the average salary decreased, but the number of companies that went to revise employee benefits expanded to 70%.

It is possible that by the end of 2020 there will be a slight decrease in the size of wages both in Russia and in other countries.

### 5.4.2. Change in the size of the average salary for different categories of companies

#### Average salary in software development in two capitals and regions in 2019, ₺ thous.

	average salary	Compared to the level of Moscow
Moscow	140.6	100%
Saint Petersburg	124.8	88.8%
Regions	84.8	60.3%

It is worth noting in the last 5 years the growth rates of the average salary was recorded higher in the regions than in Moscow and St. Petersburg, as well as an increase recorded in the growth of salaries in companies that are more focused on the Russian market.

Source: HeadHunter (report "The labor market and wages in Russia in 2019")

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For 4 years (in 2015-2018) the software vendors raised salaries by less than service companies, which sharply increased exports.

In 2019 the wage growth rates were much higher for software vendors.

### Average growth of wages in ruble terms for various categories of surveyed companies.

	by the end of 2015	by the end of 2016	by the end of 2017	by the end of 2018	by the end of 2019
All surveyed companies	8%	10%	7.7%	12.1%	5.8%
<b>Head office location</b>					
Moscow	7%	7%	7.9%	8.9%	5.0%
Saint Petersburg	8%	8%	4.2%	10.1%	5.0%
Other cities of Russia	10%	14%	10.3%	13.7%	9.6%
<b>Company size</b>					
turnover less than \$5 million	9%	9%	9.4%	10.3%	11.7%
turnover over \$5 million	8%	10%	7.5%	13.4%	5.4%
<b>Export share</b>					
less than 50%	7%	10%	10.4%	13.5%	7.5%
more than 50%	10%	9%	7.2%	10.7%	5.5%
<b>Business model</b>					
developers of replicated solutions	4%	7%	6.6%	8.6%	11.1%
custom software developers	9%	11%	7.8%	13.2%	4.8%
<b>Age of companies</b>					
companies over 10 years old	10%	10%	7.3%	12.2%	4.8%
companies under 10 years old	8%	9%	14.0%	11.8%	16.6%

### 5.4.3. Salary level for selected popular specialties

#### Average salary for a number of popular specialties in Russia in August 2020, P thous.

Php programmer	140
Web designer	90
1C programmer	150
Information Security Specialist	100
Java Programmer	180
Systems Analyst	135
Oracle Developer	150
Technical support specialist	60

The career portal "My Circle" determined that in the first half of 2019, the highest salaries have been attributed to developers in such languages as: Scala, Objective-C and Golang — P150 thousand. The salary in general in the field of software development is P100 thousand (in Moscow — P140 thousand, in St. Petersburg — P120 thousand, in other regions — P80 thousand).

There has been an increase in salaries in almost all programming languages. Objective-C (P150 thousand + 25%), Swift (P130 thousand + 24%) and Java (P120 thousand + 20%) showed particularly strong growth. A slight decrease in salaries for C ++ developers (P97 thousand) and Delphi (P78 thousand).

According to Hays, Russia remains in high demand for developers for iOS and Android mobile platforms. Depending on the industry, Android developers at the end of 2019 could qualify for salaries in the range of P190–250 thousand before personal income tax.

Of the professional specializations in IT companies, DevOps (a set of practices to improve the efficiency of development processes) is most actively developing. In this regard, specialists in DevOps, as well as in big data and cloud solutions are becoming more and more in demand. DevOps architects, depending on their experience and competencies, can apply for a salary ranging from P250 thousand to P450 thousand, DevOps engineers — from P180 thousand to P350 thousand per month.

## Average salaries of IT specialists in Moscow and Moscow region in 2019

Job vacancy	Average salary (Pthousand before personal income tax)		
	Developer / system integrator / vendor	Internet / e-commerce	Banking
C++ developer	210	190	190
Devops-architect	210	300	300
Devops engineer	230	230	230
Go Developer	230	230	230
Node JS Developer	205	205	220
UI / UX designer	160	160	150
Database administrator	150	160	170
BI Analyst	180	180	180
Data Warehouse Analyst	150	155	165
SAP Architect	270	-	270
Solution Architect	250	270	250
1C developer	115	140	140
Android developer	175	220	195
IOS developer	170	195	195
C# developer	190	190	190
Java developer	250	250	250
Javascript developer	160	165	160
PHP Developer	200	200	200
Python developer	160	235	170
Autotest developer	170	170	170
Network engineer	115	120	120
System Administrator	170	160	150
Systems Analyst	120	140	135
Information security specialist	130	120	132.5
Big Data Specialist	220	220	220

Source: Hays

## 5.5. Personnel 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 global market, appear.

With all the other sources of workforce available, universities will be their primary supplier to software enterprises for the foreseeable future. Therefore, the task is to increase the number of students studying in IT specialties, and to develop cooperation in training personnel between companies and leading departments of universities.

### 5.5.1. Number of IT graduates

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

In March 2020, the cost of the federal project "Personnel for the Digital Economy" (which is part of the national program "Digital Economy") increased about threefold — from P51 billion to P139 billion. However, it is known that this entire program will be corrected.

### 5.5.2. Assessment of the quality of work of universities

With all 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 an appropriate specialization, but the quality of their training. One can speak of a sufficient or insufficient number of graduates only if they have certain knowledge and skills that make recent students in demand from Russian companies (especially Russian software exporters).

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

### 5.5.3. Rating of Russian universities for graduating 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.

This deficiency is partly mitigated by the fact that the results of surveys over several years are combined. This is how the rating was based on the 2016-2019 polls. The respondents indicated those universities whose graduates, in their opinion, are in the greatest demand in the industry. Since the RUSSOFT study annually covered more than 150 companies (in 2018 — 161, and in 2019 — 175), and each year the composition of respondents changes by 70-80%, the final rating for 4 years reflects the opinion of more than 400 employers representing software industry of Russia.

#### Ranking of universities according to employers (managers of software companies) based on surveys 2016-2019

1	Bauman Moscow State Technical University	76
2	Saint Petersburg National Research University of Information Technologies, Mechanics and Optics	75
3	Moscow State University	66
4	Saint Petersburg State University	65
5	Saint Petersburg State Polytechnic University	63
6	Moscow Institute of Physics and Technology	43
7	Novosibirsk State University	41
8	Tomsk State University of Control Systems and Radioelectronics	40
9-10	Saint Petersburg State Electrotechnical University	38
9-10	Tomsk Polytechnic University	38
11	Novosibirsk State Technical University	37
12	Tomsk State University	34
13	Moscow Engineering Physics Institute	33
14	South Federal University	26
15	Saint Petersburg State University of Aerospace Instrumentation	20
16	Penza State University	16
17	High School of Economics	14
18-20	Don State Technical University	11
18-20	St. Petersburg State University of Telecommunications prof. M.A. Bonch-Bruевич	11
18-20	Kazan National Research Technical University. A.N. Tupolev (KAI)	11
21-22	Nizhny Novgorod State Technical University (NSTU)	10
21-22	South Ural State University	10
23-25	Izhevsk State Technical University	8
23-25	Kazan (Volga Region) Federal University	8
23-25	Chelyabinsk State University	8
26-29	Voronezh State University	7
26-29	Nizhny Novgorod State University N.I. Lobachevsky (UNN)	7
26-29	Moscow Technological University (MIREA, MGUPI, MITHT)	7

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26-29	Oryol State University named after I.S. Turgenev	7
30-31	Omsk State University F.M. Dostoevsky (OmSU)	6
30-31	Siberian State University of Telecommunications and Informatics	6
32-34	Samara State Aerospace University	5
32-34	Moscow Aviation Institute	5
32-34	Perm State National Research University	5
35-43	Belgorod State University	4
35-43	Ulyanovsk State Technical University	4
35-43	Belgorod State Technological University named after V.G. Shukhov	4
35-43	Ryazan State Radio Engineering University	4
35-43	Altai State Technical University named after I. I. Polzunova	4
35-43	Ulyanovsk State University	4
35-43	Saratov State University named after N.G. Chernyshevsky	4
35-43	Yuri Gagarin Saratov State Technical University	4
35-43	Volga region State Technological University (Yoshkar-Ola)	4

Source: RUSSOFT Annual Survey

In total, the respondents have mentioned more than 140 universities in their responses in recent years. In addition, 3 educational institutions of the secondary specialized education system (technical schools, colleges) are mentioned.

In the latest version of 2019 (the results of surveys in 2016-2019), the List of Top-43 was determined (those universities that had at least 4 mentions in 4 years).

Until 2019, two leaders of ITMO University and the Bauman Moscow State Technical University stood out among all the country's universities. In recent years, they have taken the first place in turn. Moreover, the difference between them is very small.

They are followed by three more universities with almost the same indicators: Moscow State University, St. Petersburg State University and St. Petersburg State Polytechnic University. As a result, there are three St. Petersburg universities and two Moscow universities in the top five. Further, there is a group of 8 universities, the grades of which have very slight differences between themselves. Among them there is one university in St. Petersburg, two in Moscow, Novosibirsk and three in Tomsk.

In 2020, RUSSOFT decided to reduce the dependence of a university's place in the Ranking on the number of respondents from a particular city and introduced a 3-point rating system.

### Top 17 universities in terms of total points (RUSSOFT rating)

1	Saint Petersburg State University	54
2	Saint Petersburg National Research University of Information Technologies, Mechanics and Optics (ITMO)	48
3	Peter the Great St. Petersburg Polytechnic University	39
4	St. Petersburg State Electrotechnical University "LETI" named after V.I. Ulyanov (Lenin)	31
5	South Federal University	24
6	Bauman Moscow State Technical University	23
7-8	Moscow State University	21
7-8	Moscow Engineering Physics Institute	21
9	Saint Petersburg State University of Aerospace Instrumentation	18
10	High School of Economics	16
11-12	Moscow Institute of Physics and Technology	15
11-12	Novosibirsk State University	15
13-14	Kazan (Volga region) Federal University	13
13-14	St. Petersburg State University of Telecommunications prof. M.A. Bonch-Bruевич	13
15-17	Voronezh State University	11
15-17	Saratov State University	11
15-17	Saratov Technical University	11

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The results of university assessments by the surveyed companies provide an opportunity to present new and interesting information. The peculiarity of the 2020 survey was that 10 companies rated universities not only in those cities in which their headquarters are located (before, with a larger number of respondents, there were no more than 3-4 of them). A total of 75 educational institutions received marks (one of them is a college, and the rest are universities). Many respondents mentioned 5 or more universities.

When ranking according to the sum of the points scored, not a single Moscow university was in the top five. It presents 4 St. Petersburg and one Rostov University. This is an unexpected result, because St. Petersburg had no advantage in terms of the number of survey participants (Moscow was represented by 24 respondents, and St. Petersburg — by 20).

At the same time, when ranking according to the average score, the first four places were in three Moscow universities and one in Novosibirsk. However, they only have 5-8 ratings. It is not known what their average score would be with 10-15 marks. A few more universities also have the maximum average grade (3), but they have less than 5 marks. At least 20 universities have only one grade — 3 points. Much depends on the minimum number of grades a university must have to be included in the Rating. If we take into account only those Universities that have less than 10 grades, then St. Petersburg State University will be in first place (as in the ranking by the sum of points).

Three St. Petersburg universities, which are ranked 12-14 in the ranking by the sum of points, have a very low average score. This means that they train many specialists, but employers do not rate their level of training highly.

In general, it can be pointed out that some universities clearly do not correspond to their places in the top 14 and in the top 17. We can only assume that some universities in Tomsk, Nizhny Novgorod and other cities could be assessed at the same level, if their companies were more actively involved in the survey.

### Top 14 universities in terms of GPA

		Average score	Number of ratings
1	Moscow State University	3	7
2-3	Moscow Institute of Physics and Technology	3	5
2-3	Novosibirsk State University	3	5
4	Bauman Moscow State Technical University	2.88	8
5	Saint Petersburg State University	2.84	19
6	Saint Petersburg National Research University of Information Technologies, Mechanics and Optics	2.82	17
7	Peter the Great St. Petersburg Polytechnic University	2.79	14
8	South Federal University	2.67	6
9	High School of Economics	2.67	9
10	Moscow Engineering Physics Institute	2.63	8
11	Kazan (Volga region) Federal University	2.60	5
12	St. Petersburg State Electrotechnical University "LETI" named after V.I. Ulyanov (Lenin)	2.21	14
13	Saint Petersburg State University of Aerospace Instrumentation	2.00	9
14	St. Petersburg State University of Telecommunications prof. M.A. Bonch-Bruевич	1.86	7

### 5.5.4. Business participation in the training process

Software companies (both Russian and foreign) make a great contribution to the training of future personnel. Largely thanks to them, the proportion of graduates who immediately or after a short additional training at a training center of an IT-company find work according to their specialty is at least 50%. Without business assistance and self-training, this percentage would be close to zero.

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Since teaching work is still not well-paid and prestigious, there are many teachers in universities who do not know the industry for which they are preparing specialists. This problem is partially solved due to the fact that business representatives (including even company owners) themselves go to universities and give lectures to students or conduct practical classes, as well as form topics for internships and theses. This is how students are introduced to the industry.

Many large and even some medium-sized companies have their own training centers, which train specialists for themselves and for the entire industry. The largest companies create departments or laboratories in leading universities, where they purposefully train their employees. Some industry representatives believe that developers for the IT industry can be trained by private universities, which should be created by large businesses.

According to a RUSSOFT study, 2018 saw a clear and significant expansion of companies' cooperation with universities. Of 100% of the companies surveyed, 73% had some form of such cooperation. Consequently, many small companies have also joined this work. In the 2019 survey, for the first time, respondents were asked to indicate the existence of their own training center. As a result, it turned out that 16% of the surveyed companies have such centers.

The 2020 survey data did not reveal any significant changes. Taking into account the fact that only 54 respondents answered the corresponding question (therefore, the influence of random factors is greater than with 150-160 answers), the activity in all areas of cooperation with universities has not changed in any way.

### The main forms of cooperation between companies and universities in 2008-2020

Year of the survey	2009	2015	2018	2019	2020
Student internship	42%	38%	50%	54%	57%
Employment of graduates	34%	24%	36%	48%	46%
Employee Courses	24%	12%	28%	24%	22%
Own training center	n / a	n / a	n / a	16%	13%
Others	1%	37%	14%	16%	19%
Do not cooperate	42%	53%	39%	27%	33%

Almost all of the surveyed large companies (with a turnover of more than \$20 million) in all years of the survey indicated that they cooperate with universities. 80-85% of smaller enterprises with a turnover of \$1 million to \$20 million have also established such cooperation. And even half of the smallest companies cannot do without it. However, they are limited only to "Internships for students" or "Employment of graduates", which does not require large costs.

### 5.5.5 Key findings regarding training for the IT industry

1. Financing of Russian universities has improved over the past 10-15 years, which allowed them to stop the degradation of the times of perestroika and to start developing.
2. In a number of universities there is a rejuvenation of the teaching staff, but this is not enough, as long as it only slows down the aging process. There are many teachers in the higher education system who are far from practical activity.
3. The still low level of remuneration of teachers does not allow raising a new generation of promising and motivated teachers in universities, as well as attracting IT specialists from the business environment to teaching
4. With a lack of money in the entire education system, some of the universities have such low efficiency that the question may arise about the justification of their funding from the state.
5. Representatives of universities complain about the increased requirements for the preparation of various reports the very recent years, which takes a lot of time from teachers.
6. With all the criticism of the unified examination process, its introduction contributed to the admission of many talented young people from the regions to leading IT-universities.
7. Distance education (which was previously viewed with skepticism by many) and the connection of all Russian schools to broadband Internet access made it possible for young people to self-train in regions where there are no strong universities and physics and mathematics schools.

8. The task of training a mass of programmers could be handled by technical schools and colleges. However, they (with very rare exceptions) are not at all a source of personnel for software enterprises in Russia.
9. The list of IT specialties for which training takes place in Russian universities has remained almost unchanged for 20 years already. Educational programs are also being updated very slowly, although the IT sector is undergoing rapid changes.
10. Among the universities there are many those with a large number of graduates, whom employers from the software industry do not want to hire.
11. The data of testing knowledge on programming by HackerRank show that Russian programmers are among the best in the world. If in the overall rating Russian programmers share 1st and 2nd places with Chinese, then in solving problems related to algorithms, they occupy absolute leading positions in the world. It is these tasks that are most consistent with the world's leading technology trends, which are identified by analysts from Gartner and from other reputable research companies in the world.
12. Commercial IT companies make a big contribution to adjusting skills of university graduates to market requirements, but they solve the state problem at the expense of their profits, without receiving preferences from the state. At the same time, officials are trying to control educational centers in which companies train personnel for themselves.
13. Significant potential for increasing the number of IT specialists — both for retraining university graduates who are threatened with dismissal due to digital transformation, and for mastering IT skills by employees of other industries — is associated with the involvement of training centers of IT companies in state training programs and in retraining of IT specialists.
14. Russian universities, as a rule, improve their positions in international rankings, and in a number of specialized rankings they occupy leading positions in the world.
15. Various information that became available in 2019-2020 suggests that, firstly, the increase in the number of budget-funded places in IT specialties, which began several years ago, is bearing fruit. In addition, there are signs of a more effective work of a number of regional universities (they are moving up in the world and Russian university rankings).

## 5.6. Foreign language skills

The share of employees of Russian software development companies who are fluent in English has always consistently stood at about 70%. Apparently, after the consistent growth of this indicator, stabilization took place. The share of German-speaking developers in the surveyed exporting companies is kept at the level of 8-10%. The share of employees speaking other foreign languages is about the same.

Since the indicators for the year change slightly, the question about the number of employees who speak foreign languages was not asked to the respondents in 2017-2020.

### Share of employees with good command of foreign languages (of the total headcount of surveyed companies)

	2008	2009	2010	2011	2012	2013	2014	2015
English	65%	65%	68%	68%	72%	67%	75%	74%
German	10%	11%	5%	8%	8.5%	9%	8%	11.5%
Others	3%	11%	4%	8%	9.5%	11%	10%	13.5%

However, if you do not take into account the employees of foreign development centers of Russian companies, then there will be much fewer employees who speak English in the companies. According to the 2016 survey, such employees represented approximately 55-57%. The same applies to German and other languages.

As a rule, developers have enough knowledge of English (and of other) languages to communicate with colleagues abroad, and local partners can be used to localize and promote solutions.

Among the “other” languages (besides English), the respondents mentioned German 9 times, Spanish 6 times, Dutch, Italian, Korean, Latvian, Lithuanian, Finnish, French, Czech — 1 time each.

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The languages of the neighboring countries and of national republics of Russia were also mentioned, but they are unlikely to help in promoting their services and solutions abroad. Naturally, in foreign development centers, almost all employees are fluent in the state language in the countries where these centers operate. However, as a rule, these countries are primarily interesting as a labor market and not as a sales market.

Despite the obvious progress in the acquisition of foreign languages by employees of software companies, many problems remain unsolved. English-speaking employees are in short supply in small and regional companies. The growth in the total number of such employees was provided by the largest companies located in Moscow and St. Petersburg.

This is partly because they pay for the training of their employees in foreign languages. However, this growth is largely due to the fact that companies from the two capitals have the opportunity to attract the best developers from regions and from small companies.

The number of English-speaking employees in IT companies is not resulting from the improvements in the Russian state education system. Foreign languages are mostly learned at the own expense of developers or at the expense of an employer who pays for training in language courses or hires teachers to let his (her) staff study in a company.

### Proportion of employees with good command of foreign languages, depending on the location of the companies

	English	German	Others
Moscow	76%	14%	17%
Saint Petersburg	76%	3%	2%
Siberia	72%	7%	6%
Ural	93%	0%	6%
Other cities	54%	4.5%	0.2%
Outside Moscow and St. Petersburg	62%	4%	1.7%

In Russia, qualified English teachers usually do not go to work to schools and universities due to low salaries. This problem should be solved by the government. Otherwise, the high-tech sector of the economy in its international competitiveness will never match the training potential of technical specialists that Russia has. Russia is not the worst in the world rankings in terms of English proficiency, but it is still in them in the second half.

According to the portal superjob.ru, 84% of programmers who are looking for a job indicate their knowledge of English in their resume. However, in fact, there are much fewer programmers who are fluent in this language (apparently less than 70% of them, since about the same number of English-speaking employees work in companies that mainly work for export).

### Foreign language proficiency depending on the company's turnover

	less than \$5 million	more than \$5 million
English	50%	77%
German	4%	12%
Others	1.8%	15%

A more in-depth analysis of resumes, conducted by the Superjob Research Center, shows that only 15% of software developers report "fluent" or "conversational" level of English proficiency in their resume, 50% state language proficiency at the level of "reading technical documentation", 28 % admit that they have basic knowledge, and 7% do not indicate the level of English proficiency.

According to the agency "ANCOR High Technologies", the situation with the knowledge of English is much better — 64% of all developers (available in the database of this recruiting agency) speak English at the "good" and "fluent" level.

The significant differences in the data of the two companies can be explained by the different audience reach. ANCOR is more focused on recruiting personnel for international companies and Russian exporters, which accordingly implies higher requirements for knowledge of foreign languages, while SuperJob focuses on a wider audience.

Having studied in the first half of 2019 the salary offers of employers and salary expectations of job seekers for professions where knowledge of the English language is often required, Superjob revealed the difference between the income of specialists who speak and do not speak foreign languages. The market salary corridor for engineers without requiring English proficiency is ₺55-80 thousand. The average income of engineering and technical personnel in companies assuming knowledge of English at a conversational or fluent level rises to ₺60-90 thousand.

## Human resources

According to Superjob, more than a third of job seekers (36%) who are fluent in one or more foreign languages have faced tests of foreign language proficiency in employment. A quarter of the respondents (25%) constantly use a foreign language at work, another 17% — quite often, 4 out of 10 — from time to time. Interestingly, among Russians who defined their level of knowledge of a foreign language as “fluent”, only 42% believe that their language skills are sufficient to work in a company where this foreign language is a working language. According to a survey of the Superjob resume database, among Russians who speak foreign languages at a conversational or fluent level, the majority speaks English. The second most popular is German, the third is French. They are followed by Spanish, Italian and Chinese.

Service Rabota.ru, GC Efko and ANO “Russia — Land of Opportunities” presented the results of a study in June 2020, the purpose of which was to find out how well students of Russian universities know English and how this knowledge will help them in their future careers. The study involved 2,135 students and graduates from about 140 Russian universities from all regions of the country. Only a small part of Russian students (15%) are fluent in English and can confidently apply it in their work (Upper Intermediate and Advanced). At the same time, more than 90% of students study English. Among the masters, 22% of students know English at an advanced level, but among bachelors — only 14%. Almost every fifth respondent (23%) speaks English at an intermediate level (Intermediate), 16% of students and graduates know it at the Pre-Intermediate level, about 20% know English at an elementary level.

Learning foreign languages is still a problem, though not as acute as it was 15 years ago. However, it is necessary to improve in this direction. Especially considering the plans for the declared international expansion of Russian software companies.

# CHAPTER 6

# Technologies



# Getmobit

## Maria Rukavishnikova

Founder and CEO

### GETMOBIT

#### Efficient vs widely available technologies: main criteria for Russian developers

When choosing a business solution, a B2B customer focuses, first and foremost, on the technology stack used by the developer of digital products and compatibility with existing developments.

Digital products in B2B markets often gravitate towards becoming "end-to-end" (or "all-in-one") solutions. To ensure sufficient quality and high levels of interoperability, all members of the value chain must interact with each other. The transfer of expertise and knowledge, cooperation between technology companies is becoming a prerequisite for interoperability. To put it differently, the market participants for software development and hardware solutions must inform each other about development plans, support each other in terms of improvement.

What criteria do companies employ and what factors they pay most attention to when choosing technologies for "end-to-end" development? Using Getmobit's experience, we will check whether our decisions coincide with the results of the annual RUSSOFT research on the popularity among Russian developers of certain operating systems (OS), database management systems (DBMS) and programming languages.

**Operating systems (OS).** Many companies continue to use the Windows operating system. However, many software and hardware developers also choose Linux. This is according to the RUSSOFT poll, in which Linux became the most popular OS in lieu of Windows).

New Russian operating systems, as forked from Linux, already have sufficient functionality and in the next 5-7 years can replace Windows in desktop space. This is prompted not only by the requirements of regulators (FSTEC, FSB, Moscow Region) and the policy of protectionism within the framework of import substitution, but also by a large selection of high-quality solutions from Russian developers.

From the start and up until now, Getmobit has been working with the Linux family, because the company has always understood the potential of this OS and has ever growing confidence in it. At the decision-making stage, several criteria were significant for us: openness and availability (Linux is an open source OS, most distributions are free), flexibility and performance (you can make your own OS build of the minimum size, flexible OS configuration is available for platform features), security and availability (available are many utilities, programs and components in source codes, which allows you to quickly build up and combine functionality, since much has already been written and can be reused or adapted).

Thus, based on the experience of Getmobit, we can confirm that if companies plan to design a system and application layer of software (firmware) for specific product needs, hardware platform features and / or customer requirements, then Linux is an excellent choice.

**Database management systems (DBMS).** The list of the most demanded DBMS in Russian IT companies practically does not change. It is more interesting that PostgreSQL was included in the top-3 by the RUSSOFT poll, displacing Oracle, and joining MySQL and MS SQL.

When choosing a database management system, the main characteristics depends of the tasks for which a DBMS is selected:

- Priority and balance of database operations (proportions and requirements for data writing and reading);
- Planned and peak load (the amount of information to be stored in the database, the number of simultaneous requests from consumers / services / users the database must process);
- Fault tolerance (any requirements for the service in terms of reliability and fault tolerance);
- Transactions (the relevance of the traditional transaction mechanism and understanding of the levels of their isolation required for functioning);

- Models and data structures (the presence of a fixed data storage structure, change frequency);

- Openness and accessibility (support for libraries and programming languages, openness of the solution and availability of source codes).

Based on the factors above, we chose a NoSQL database to work at Getmobit that meets all the requirements for it as part of our product. Note that this DBMS, with good indicators for our tasks, turned out to be not indicated in the list of the most popular systems among other Russian companies in the course of the RUSSOFT survey.

**Programming languages.** The choice of language also depends on the direction and type of tasks that the company plans to solve. By the RUSSOFT poll, Java / J2EE is now among the leaders among developers.

As a rule, the criteria for choosing a programming language are: versatility (standard libraries, solving different problems), availability and regularity of updates, ease of learning for specialists, developers community (the more popular the language, the more specialists and the easier it is to find an answer to any question, the market for personnel is wider).

With all these criteria in mind, Getmobit uses Python for system and application development, as well as for back-end development. An important factor for our company was the ability to prototype and create hypotheses in Python. The firmware of our devices is also written in Python and C++. Mobile applications are developed according to the following standards: Java for Android, Objective-C and Swift for iOS.

Summing up, it is important to note that the most adaptable, universal technologies capable of rapid integration and scalability are in demand. Getmobit is constantly working on expanding the "compatibility list" - now in the active phase of compatibility with more than 20 technology companies, among them is an increasing number of Russian companies - Basealt SPO (OS Alt 8 SP), JSC Infotecs (ViPNet), LLC CRYPTO-PRO (CIPF CryptoPro CSP), Security Code LLC (APMDZ Sobol), JSC Baikal Electronics, JSC SPC Elvis.

As part of the annual RUSSOFT research in 2020, the question regarding the popularity of OS, DBMS and programming languages among developers has been changed. Rather than simply mentioning a system software or programming tool, respondents were asked to rate what proportion (in terms of time spent for developing appropriate solutions and applications) exists for each technology used. Knowing the number of staff in the company, it became possible to have a more objective picture, since previously both a small company with 5 developers and a large one, which employs thousands of developers, had one vote each.

This change, however, does not negate the value of measuring the variability in popularity of OS, DBMS and programming languages, which were tracked in the survey in previous years.

## 6.1. Operating systems

Regarding the popularity of operating systems, with all the random fluctuations over the past 5-10 years, there are several clear trends. First, the frequency of mentioning MS Windows decreased (from 94-97% to 84-88%). But even with a steady decrease in its share, it remains in first place with a decent margin from the GNU Linux family (this OS family that is nevertheless approaching the leader, albeit gradually). The rise of the Android OS turned out to be especially powerful — from 6% in 2010 to 58% in 2019.

The share of companies that developed applications for at least one of the Linux operating systems (GNU Linux family, Android and Tizen) was 73%. If we add related UNIX-like operating systems, then the share of companies that mentioned at least one system from this group in 2019 will be 78%. MS Windows still had more users, but the gap from the UNIX and Linux family put together was no longer very large. If the existing trends continue, then it will be leveled in the next 2-3 years.

In 2020, the OS from the Linux family took the lead, slightly ahead of Windows. The growth in the number of mentions of the Linux family is quite consistent with the trend that was identified in previous years. The sharp drop in popularity of Windows is questionable. Therefore, it is premature to rush to announce the obvious leadership of the Linux family. The survey in 2020 turned out to be incomplete due to the insufficient number of companies participating in it.

### Top-10 used operating systems

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

According to NetMarketShare statistics, at the end of January 2020 Linux's share in the global desktop OS market was within 1.47%, taking into account the whole variety of distributives, but at the end of winter it approached 2%. Windows held 88.14% of the market, being the absolute leader. NetMarketShare determines the popularity of an OS among users (in this case, desktop users). At the same time, the company is suspected that it overestimates the performance of Microsoft solutions (not only the OS, but also browsers). Nevertheless, it notes the explosive growth in the number of Linux users, still assuming that nothing threatens Windows leadership.

Due to the fact that under pressure from the US authorities Google has made its Android operating system an instrument of political pressure (new smartphones of the Chinese Huawei may not have updates to this OS, as well as related services from Google), doubts arise about the further growth of Android's 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.

At the same time, this transition is unlikely to affect the confrontation of the Linux family with MS Windows, since a possible abandonment of Android will be in favor of other operating systems developed on the basis of Linux.

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

The new approach of RUSSOFT in determining the popularity of the OS among developers showed that by the end of 2019 the Linux Family still lags far behind Windows, and that Android is not close to the second place, but rather far from it.

**Share of operating systems by time spent on developing relevant solutions and applications at the end of 2019 (data from the 2020 survey)**

MS Windows	42,52%
Linux Family	29,99%
Android	7,75%
iOS	6,76%
Mac OS	8,86%
Open/Free/NetBSD	3,89%
MS Windows Mobile	0,02%
MS Windows Phone	0,02%
Oracle Solaris	0,02%
Tizen	0,16%

MS Windows Mobile, MS Windows Phone and Oracle Solaris showed very low indicators. Perhaps next year they should no longer be included in the top 10. However, there are no full-fledged candidates for their replacement yet.

Among other operating systems (not included in the top 10), in recent years respondents mentioned mainly real-time operating systems — for example, QNX, VxWorks, ThreadX, MQX, Contiki, LynxOS, RTOS. Moreover, as a rule, they mention each only once. Until 2016, the number of references to real-time operating systems grew from year to year, which was consistent with global trends. According to a survey of the last 4 years, such growth has not been observed, however, 3-5% of companies consistently indicate their use of such operating systems.

In 2019, MSVS (Mobile System of the Armed Forces) and Elbrus OS also appeared, but they were also mentioned once. In 2020, Elbrus OS was also mentioned once, and OS Aurora appeared for the first time. Additionally, webOS (an embedded open operating system based on the Linux kernel for smart TVs) has two mentions. Two companies indicated that they are developing cross-platform web applications for it.

Some operating systems which were popular in the past were not mentioned any more by developers. They are RIM Blackberry and Symbian OS, both are for mobile communication systems. The use of them has declined due to problems with the companies that develop these systems — RIM and Nokia, respectively. As their popularity metrics neared zero, they were removed from the major operating systems table in 2016.

At the same time, this table has not undergone fundamental changes. Seven out of ten operating systems were rightfully in it in 2008. For more than 10 years, the only thing that changed in its composition was that instead of Blackberry and Symbian, Tizen OS appeared.

It is worth remembering about the bygone operating systems due to the fact that others can repeat their history. For example, there are prerequisites that MS Windows Mobile will follow the Symbian path. In January 2019 Microsoft announced the end of support for Windows 10 Mobile, the last mobile operating system of that American corporation. Despite the end of support for the operating system, phones based on it will continue to function, and application developers will be able to continue to release updates for their software. Devices will still be able to install apps from the Microsoft Store. MS Windows Mobile has not lost its popularity among Russian developers — about the last 10 years the frequency of its mentions has stably fluctuated within 15-20%. However, the same thing happened with Symbian — for a long time (after Nokia stopped supporting it) they developed applications for it, but in the end its indicators reached zero level.

Back in the fall of 2017, Microsoft's vice president promised that Windows 10 Mobile will no longer receive any updates, except for security features, since the number of platform users is small, and developers are indifferent to it. At the same time, it was decided to stop further development of Windows Phone. According to Gartner, in Q4 2016, 99.6% of new devices had pre-installed Android or iOS.

Instead of Blackberry and Symbian, a relatively new OS Tizen appeared in the OS segment for mobile systems, the first version of which was released in 2012. This system has a version adapted for Russia for devices that can be used in government agencies and companies seeking to exclude unauthorized access to the transmitted confidential information. In the summer of 2016, the first implementation of the free Tizen operating system for a domestic processor — 1892BM14Я — was presented in Russia. The main feature of the Russian Tizen distributive is the implementation of a built-in security profile, which allows achieving a higher level of trust in accordance with the requirements of Russian regulators (1892BM14Я is a new generation multi-core signal microprocessor for communication, navigation, multimedia, embedded and mobile systems, for example: tablets, smart video cameras, phones).

In 2017, one could expect a significant increase in the popularity of the Tizen OS. Such an increase was quite possible, but the results of the 2018 survey did not allow to unambiguously confirm this version, since the number of mentions even decreased (within the limits of possible random fluctuations). The 2019 poll showed the highest popularity of Tizen, which indicated a possible more active use of this OS by Russian developers. In 2020, there was a slight decrease in the rate of mentions, and the share of this OS in terms of time spent on development is still close to zero.

It can be noted that Tizen was not included in the Register of Domestic Software by the decision of the Minister of Communications and Mass Media. At the same time, another OS appeared in the Register — Sailfish — which was actively promoted by the Ministry of Telecom and Mass Communications (in particular, the Sailfish OS was purchased from the Russian Post, which is the subordinate to the Ministry). Judging by the fact that over the past 2-3 years, none of the surveyed developer companies mentioned Sailfish (the respondents had the opportunity to name other OSs that were not the main ones), its promotion has not yet strongly affected market participants.

In the spring of 2018, the state corporation Rostelecom proposed to the Russian government to oblige officials to use smartphones based on the Sailfish OS. Experts doubted that in this way it is possible to achieve massive use of the Sailfish OS, since devices with this system will have limited functionality. In addition, civil servants typically use their own smartphones to install the applications they need to work.

At the beginning of 2019, Sailfish received the Russian-language name "Aurora". Apparently, the promotion under the new name will be more active. This promotion has already begun: in June 2019 the Minister of Digital Development and Communications suggested Huawei to abandon Android in favor of Russian Aurora OS.

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. One (the first in the history of the survey) mention of this operating system by the respondents does not yet allow making an unambiguous conclusion about the successful launch of this OS on the market.

In November 2019 it became known that Russian Railways were ready to introduce Aurora OS among their employees. The corresponding agreement was signed between Russian Railways, the Open Mobile Platform company and the branch 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.

Several Russian versions of Linux-based OS have been developed for personal computers, including ALT Linux OS and Astra Linux OS. Although there are messages about the transition to these operating systems of large Russian machine-building enterprises, the developers have not yet mentioned them separately in the rating — apparently, the respondents attribute them to the GNU Linux family.

Going forward, the list of the most popular operating systems may have to include the national operating system for the Internet of Things. The plans to develop an OS for the IoT became known in the fall of 2017 from a document prepared by a Sberbank' led working group 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 resiliency, 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. In March 2019, Kaspersky announced that it was creating its own operating system for IoT with an advanced security. This OS appeared at the end of 2019 in two versions — for the corporate segment (including government agencies) and for ordinary users.

Determining the popularity of OS in various categories of companies in 2020 does not make big sense due to the insufficient number of respondents of that year. Nevertheless, it is quite possible to be guided by the results of the survey conducted in the previous year. There are no big changes during the year.

Companies that generate more than 50% of their income from exports are usually large, and therefore have several lines of business and many different customers. Consequently, they use a wider range of programming tools and operating systems than companies that are more focused on the Russian market. The difference in the use of the OS between these two groups of companies in the 2016-2018 polls was not revealed at all only by the popularity of MS Windows. In 2019, the difference showed itself (the popularity of Windows among developers, focused more on the Russian market, decreased), but according to only one survey, it is too early to draw definite conclusions.

**Main operating systems used by companies with different share of exports in total revenues**

	<b>export less than 50%</b>	<b>export over 50%</b>
MS Windows	86%	93%
Mac OS	39%	75%
GNU Linux family	66%	90%
Open/Free/NetBSD	18%	35%
Oracle Solaris	9%	23%
iOS	42%	73%
Android	52%	78%
MS Windows Mobile	13%	30%
MS Windows Phone	10%	20%
Tizen	6%	13%

Compared to other cities, St. Petersburg almost always has a significantly higher percentage of companies that use operating systems for mobile devices. In 2018 the leadership of St. Petersburg companies was not obvious only for iOS, which was most popular in the regions. In 2019, no more active use of OS for mobile devices by St. Petersburg companies was revealed. As before, their leadership is still consistent in the GNU Linux family: at least 70% of the surveyed St. Petersburg companies over the past 4 years have consistently noted the GNU Linux family among the operating systems they use.

The most frequent mention of a number of operating systems is available from regional companies. However, they are represented by different cities with different indicators. This leadership can be associated with the increased activity of software companies located outside the two Russian capitals.

**The main operating systems used by companies with different headquarters locations**

	<b>Moscow</b>	<b>Saint Petersburg</b>	<b>Other cities</b>
1 MS Windows	75%	91%	91%
2 GNU Linux family	72%	79%	69%
3 Android	50%	47%	66%
4 Mac OS	33%	44%	56%
5 iOS	36%	41%	58%
6 MS Windows Mobile	22%	21%	14%
7 MS Windows Phone	17%	12%	11%
8 Oracle (Sun) Solaris	22%	15%	8%
9 Open/Free/NetBSD	28%	21%	20%
10 Tizen	6%	3%	10%

## 6.2. DBMS

The frequency of mentioning almost all the main DBMSs, included in the table, has not been changing significantly from year to year (as well as their ranking by this indicator). The random fluctuations in this indicator for each DBMS were not very large, but they still took place. Exceptional was only the steady growth in the share of PostgreSQL, the free object-relational database management system. As a result, the composition of the top three most popular DBMSs has changed for the first time. For many years it consisted of MS SQL, MySQL and Oracle.

In 2018, PostgreSQL got into the ranking, pushing Oracle to the 4<sup>th</sup> place. Among companies with a turnover of less than \$5 million, PostgreSQL took a solid third place already in 2017. In 2019 it was already in second place among all surveyed companies. In addition, the latest poll showed that MySQL came out on top, displacing long-term leader MS SQL (an open source e-commerce database for online transaction processing, acquired some years ago and maintained now by Oracle Corporation). The 2020 poll showed that the rise of PostgreSQL has continued, and the database is already leading in the number of mentions by representatives of the companies surveyed.

**Main DBMS used, % of all surveyed companies**

	year of the survey / DBMS	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
1	MySQL	47	40	59	56	56	54	42	53	61	72	54
2	PostgreSQL	17	15	26	30	28	28	33	36	51	66	79
3	MS SQL	63	74	70	66	70	67	59	61	67	62	58
4	Oracle	49	55	51	47	45	39	36	37	40	41	40
5	SQLite	9	5	12	10	19	12	10	19	25	35	29
6	MS Access	19	9	19	17	18	19	17	18	16	23	8
7	Firebird	11	9	10	13	16	15	11	11	14	13	13
8	MongoDB	-	-	-	-	-	-	-	-	6	10	35
9	IBM DB2	13	14	9	10	12	12	8	8	7	9	8
10-11	MSDE	7	5	5	5	7	2	2	4	6	7	0
10-11	Sybase ASE	6	3	3	6	8	6	2	3	5	7	4
12-14	IBM Informix	7	5	7	7	6	4	1	3	6	6	4
12-14	Sybase ASA	6	6	5	6	6	3	2	2	4	6	4
12-14	Linter	-	-	-	-	-	-	-	3	4	6	4
15-16	SAP DB	6	5	7	5	5	3	5	2	6	5	6
15-16	InterBase	9	7	7	10	6	6	3	3	7	5	4
17	Paradox	4	3	3	2	4	3	1	2	5	4	2
	Others	13	8	7	8	10	9	5	9	14	13	8

The changes of the wording of the corresponding question in the questionnaire in 2020 made it possible to determine not only the number of companies using the DBMS, but also to find out how intensively each company was developing applications for the most famous DBMS. In the second indicator of popularity, PostgreSQL is still in the lead. The result of the new formulation showed that only 6 DBMS in the rating have indicators that can be considered non-zero.

**The share of DBMSs by the intensity of applications developed for them (survey data in 2020)**

1	PostgreSQL	35.77%	10	Linter	0.16%
2	MS SQL	32.42%	11	SAP DB	0.16%
3	Oracle	9.58%	12	MS Access	0.13%
4	MySQL	8.71%	13	InterBase	0.07%
5	MongoDB	7.53%	14	IBM Informix	0.06%
6	SQLite	3.05%	15	Sybase ASA	0.03%
7	Firebird	1.28%	16	Paradox	0.01%
8	IBM DB2	0.56%	17	MSDE	0.00%
9	Sybase ASE	0.47%			

PostgreSQL (its various versions) is being actively implemented in Russia. Companies that receive more than half of their income from sales abroad still use it more often in comparison with developers focused more on the Russian market. However, the popularity of PostgreSQL is growing faster precisely among companies for which the main IT market is Russian.

In December 2019, Denis Tereshchenko, Deputy Head of the Federal Customs Service of Russia (FCS), said in an interview that the information systems of the Federal Customs Service are very demanding on fault tolerance, and therefore it is important that the DBMS can work in a cluster configuration. Its essence is that two DBMS databases work as a single whole, and if one of the databases fails, then all processing is transferred to the other, for users it is absolutely imperceptible. According to Tereshchenko, such technical solution has not been implemented yet in Russian DBMSs. Nevertheless, PostgresPro vendors have assured that in the next release all FCS requirements will be implemented.

SQLite, a compact embedded database management system, has been growing in popularity 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 30%.

In 2016 Mail.ru Group announced plans to break into the database management systems market with its open source Tarantool DBMS. It is being tested on domestic products, but subsequently it will be distributed (primarily as a replacement for Oracle) both in Russia and abroad. This system has not yet been mentioned by the respondents in their answers.

In November 2019 Nokia announced that it has created a software solution for automating developments in the field of the Industrial Internet of Things (IIoT), which is based on the Tarantool DBMS.

In September 2020 Mail.ru Group announced plans to invest P300 million in the development of the Tarantool DBMS and its popularization all over the world. The money will go towards improving the security of the system, launching English-language support and strengthening the international development team.

**The latest data on the popularity of DBMS among different categories of companies refers only to 2019 (due to a not quite complete survey in 2020).**

DBMS	Company size		Overseas sales	
	year of the survey / turnover less than \$5 million	turnover over \$5 million	less than 50% of turnover	more than 50% of turnover
MS SQL	59%	71%	58%	73%
MySQL	70%	76%	66%	90%
Oracle	33%	68%	37%	55%
PostgreSQL	63%	71%	60%	83%
SQLite	35%	34%	31%	48%
MS Access	19%	37%	18%	38%
Firebird	9%	26%	13%	13%
IBM DB2	2%	32%	4%	25%
Sybase ASE	2%	24%	3%	18%
MSDE	3%	18%	4%	15%
InterBase	2%	16%	4%	8%
Sybase ASA	2%	16%	4%	10%
IBM Informix	2%	18%	3%	15%
SAP DB	2%	16%	3%	13%
Paradox	2%	11%	3%	8%
Lintar	3%	13%	6%	5%
Others	17%	5%	10%	23%

The larger the company, the larger the set of DBMSs it uses. Therefore, among companies with a turnover of more than \$5 million, all DBMS are mentioned more often than among smaller companies. The only exception in 2017 was the domestic Linter system, which is used only by companies with a turnover of less than \$5 million. Moreover, it was more often of interest to companies that receive most of their income from foreign sales. The version of Linter distributed in Japan is recognized there as one of the best DBMS for the Internet of Things. In 2018, it was revealed that Linter also became interesting for companies with a turnover of more than \$5 million, and even more often than for smaller companies. In 2019, the advantage in the frequency of use of Linter against large companies has grown even more.

The lower a DBMS is in the ranking, the greater the difference in its popularity among companies of different sizes and with different share of exports. The larger the company and the more export-oriented, the better is the indicator for almost all DBMS. Only SQLite has almost the same frequency of mention (among companies with a turnover of less than \$5 million it is 35%, among companies with a turnover of over \$5 million — 34%).

For two years in a row (2018 and 2019), about 10 systems mentioned by the respondents were not included in the DBMS rating (in 2017 there were 6 such systems). Among them, MongoDB was most often named — 10 times in 2018 (6% of all surveyed companies) and 16 times in 2019 (10%). As a result, this DBMS was among the main ones and was immediately placed in 8<sup>th</sup> place, and according to the results of the 2020 survey, it confidently takes 5<sup>th</sup> place.

Of the others listed as "Others" only Cassandra and Redis were mentioned twice in 2018. One each — Realm, Raven DB, Raima, NoSQL, Intersystems Cache, OrientDB, BigQuery, Ignite, and Zircon, developed on the basis of PostgreSQL. In 2019, Redis has already been mentioned 3 times, and the rest are mentioned one by one (these are Berkeley DB, ClickHouse, DynamoDB, Firebase, ClickHouse, Oracle TimesTen In-Memory Database, Hbase). In 2020 — twice Cassandra and Realm, once Redis and a proprietary DBMS for their own tasks. According to the JetBrains survey, which was completed in the Summer of 2020, the top 3 DBMS's in use in the world in the last year are: MySQL (66%), PostgreSQL (36%), MongoDB (35%). In Russia, PostgreSQL (61%) is leading with a confident lead, MySQL accounts for 42%, MongoDB and Redis each have 30%. Russians are also 10 times more likely to use ClickHouse, a DBMS with Russian roots.

### 6.3. Programming languages and tools

For many years, four programming languages (C #, C, C / C ++, Java / J2EE) have been the leaders in popularity among Russian software companies, changing their positions only to each other. The drop of the C out of the four in the 2016 survey seemed temporary and caused by random factors. However, the 2018 survey showed that the C is still losing ground — it again not only dropped out of the Top 4, but even ended up in 7<sup>th</sup> place. It stayed in about the same place in 2019, and the Java / J2EE first made its way to the leaders.

**Top-7 programming languages that were used as the main ones, % of surveyed companies**

Survey year / programming language	2014 survey	2015 survey	2016 survey	2017 survey	2018 survey	2019 survey
1 Java/J2EE	17%	22%	17%	15%	14%	24%
2 C/C++	17%	26%	26%	18%	19%	17%
3-4 C#	17%	16%	20%	19%	15%	13%
3-4 PHP	9%	6%	5%	5%	12%	13%
5 .NET	9%	6%	8%	2%	8%	4%
6 C	17%	12%	8%	15%	4%	4%
7 Delphi	8%	7%	11%	4%	6%	3%

Among the major programming languages that did not make the list of 7 most used, but have been mentioned, are Python (6 times mentioned, 4% of respondents) and JavaScript (4 times and 3%) which had the most mentions in 2019. Traditionally, one or two times the main companies surveyed called also "1C" (in 2019 — 3 times). In addition, Ruby and VBA received 2 votes each, one each for Scala, Centura, the Unity PC game development environment, and the Oracle APEX platform.

A year earlier, in 2018, only HTML5, Python and Swift were mentioned twice, and RUBY, JavaScript, 1C, FoxPro, PL / SQL, Objective-C and Kotlin were mentioned one by one.

It is noteworthy that the Kotlin language of the Russian company JetBrains was first listed as the main language. In 2017, Kotlin was featured by Google as one of the two (along with Java) recommended programming languages for mobile systems. Therefore, his appearance in the rating was quite expected.

#### Use of programming languages that are not mainstream, but are used by companies in a number of projects, % of companies surveyed

		2014 survey	2015 survey	2016 survey	2017 survey	2018 survey	2019 survey
1	HTML5	-	-	29%	34%	46%	50%
2	Java	39%	44%	40%	46%	49%	47%
3	PHP	23%	18%	26%	29%	37%	47%
4	C++	30%	25%	34%	41%	40%	44%
5	C#	25%	21%	26%	32%	36%	42%
6	.Net	14%	24%	24%	22%	33%	35%
7	C	10%	16%	19%	23%	26%	30%
8	Javascript	5%	7%	4%	7%	11%	22%
9	Delphi	7%	4%	10%	14%	17%	21%
10	Python	3%	8%	5%	7%	6%	15%
11	Kotlin	-	-	-	-	4%	7%
12-13	Swift	-	-	-	3%	6%	4%
12-13	Golang (Go)	-	-	-	-	3%	4%
14-16	Ruby	4%	4%	3%	1%	4%	3%
14-16	Objective C	5%	5%	2%	2%	3%	3%
14-16	SQL	3%	4%	4%	1%	2%	3%
17	Scala	-	-	-	-	2%	2%
18-21	Perl	4%	4%	3%	3%	2%	1%
18-21	CSS3	-	-	-	-	2%	1%
18-21	Erlang	-	-	-	-	2%	1%
18-21	Assembler	-	-	-	-	1%	1%

About 30 programming languages were indicated by the respondents as not the main ones, but used. HTML5 climbed to second place after Java in the 2018 survey, and moved to first in 2019.

Thanks to 4% of the companies surveyed, Kotlin was immediately in 11<sup>th</sup> 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	Other	-	-	-	-	-	-	15	24	20	16	15	21
	Do not use	-	-	-	-	-	-	-	24	16	9	11	10

In the rating of development tools over the past 10 years, clear leadership has remained with MS Visual Studio. For the second place, the struggle is no longer between the IntelliJ IDEA of the St. Petersburg company JetBrains and the free Eclipse with the participation of Xcode. According to the results of the 2019 poll, Eclipse broke away from all the others, approaching the leader. IntelliJ IDEA also confidently took the third place.

Among the most popular programming tools which are not included in the table, the most frequently mentioned in 2018 were Android Studio and SubLime (3 times each), as well as PyCharm, RubyMine, and PHPStorm (2 times). In 2019, 4 times — Android Studio and PyCharm, and 3 times — PHP Storm, Qt Creator and Vim.

In 2020, the wording of the question regarding programming languages has changed dramatically. They were no longer divided into main and others. At the same time, the share of the company's developers who use the programming languages which were suggested in the list was estimated. Therefore, popularity 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. However, the leadership of Java, as it used to be in 2019, remains in 2020.

The question about programming tools is completely excluded from the questionnaire, according to the recommendations of experts who helped prepare it. They felt that the information about the popularity of these tools was not very interesting.

#### Most Popular Programming Languages in Russian Software Companies (2020 Survey Data)

	Share of employees using this programming language	Share of companies surveyed using this programming language
1 Java	22,5%	63,6%
2 C#	21,7%	51,5%
3 JavaScript	16,6%	74,2%
4 C++	13,4%	62,1%
5 Python	7,95%	56,06%
6 C	7,6%	31,8%
7 PHP	5,6%	53,0%
8 Visual Basic .NET	4,6%	19,7%

Among the programming languages that were not included in the main list, Kotlin and Swift received the most mentions (7 mentions by the leaders of the companies surveyed). Kotlin employs 5%-40% of these companies' employees, while Swift employs 5%-20%. 7 mentions represent 11% of all surveyed companies that answered the corresponding question. Therefore, with such a result, Kotlin and Swift can be included in the main list next year.

C# also has a good indicator (in 5 companies 1%-20% of employees use it). Ruby has three references, 2 each — Perl, Assembler, Delphi and Erlang, one each — Golang, Shell, Dart, Clojure, Lisp and 1C.

The RUSSOFT survey data can be compared with the results of other studies. In the summer of 2020, JetBrains completed its fourth annual software 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 has bypassed Java in the list of languages used 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 frequently used languages in the world, while in Russia PHP is still in fourth place.

Top 5 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%).

A similar picture is in the answers regarding the study of additional languages: Russian developers are more attracted to new languages. They are more likely to learn Go and Kotlin, but less likely to learn Python, Java, TypeScript, and PHP. Top 5 languages that respondents started or continued to learn in the last 12 months: worldwide — 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 comes first.

# Main conclusions

### Economic indicators

The aggregate turnover of enterprises in the software industry in Russia amounted to \$17.3 billion at the end of 2019 with an increase of 14.9%. Revenues from foreign sales increased by 17.5% to \$8.25 billion. Sales growth in Russia is slightly lower — 13% with total sales of \$9.1 billion.

In 2019, which was a pre-crisis year, the growth rates of the largest companies turned out to be relatively low. The highest growth was for companies with turnover of \$1 million to \$20 million (from ₪64 million to ₪1.28 billion).

At the end of 2019, the share of software vendors in the export sales and in the total sales increased compared to service providers. However, due to the small number of companies surveyed, this indicator requires clarification. Most likely, the decline of service companies' growth was due to the loss of a number of large service providers the status of a Russian company. As a result, the share of software vendors actually increased, but not so significantly.

### Domestic market

IDC's forecast, according to which in 2019 the Russian IT market would increase by 4.8% (in dollar terms), was almost completely justified — the actual growth was 3.9%. The difference of one percentage point in such calculations is quite insignificant. Thus, according to IDC, the IT market of Russia has reached \$25 billion or ₪1.609 trillion in 2019 (7% more than in 2018).

Analysis of various resources, data provided by large distributors and major companies, as well as our 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 was at least \$29 billion. At the same time, it is necessary to be aware that the methodologies of RUSOFT and IDC' analysis are seriously different, so their results can not be directly compared.

Russian companies in 2019 sold their software on the domestic market for \$4.7 billion (according to IDC – for about \$3.2 billion). At the same time, foreign companies sold software products in Russia for at least \$2 billion. Most likely, the volume of the Russian software market should be at least \$6 billion, even if it does not include custom software development services (IDC considers software development services as a part of the corresponding segment of the IT market).

### Investments

At the end of 2019 the foreign investments into the software industry accounted for only 18% of the total investment. The main source of investment in the software industry is the income of companies and investments from their owners. At the same time, software developers believe that the volume of effective investment should be 60% more. So external investments are most welcome.

The companies surveyed expected that due to the pandemic, the volume of investments from various sources by the end of 2020 will slightly decrease, and in 2021 will grow sharply. At the same time, the share of external financing will reach 74% in 2021, which will cover the investment needs by 84%. Interviews with market participants and the data provided by survey confirm that there is a strong industry demand for a radical change in the structure of business financing.

### Business geography

In recent years, there has been a steady growth in the market share of "Russia and other countries of the former USSR", as well as a growth of the "New Markets", while the share of the "Western World" in the total sales of the industry has decreased. At the end of 2019, there is no unequivocal confirmation of this trend due to the fact that the circumstances affecting the estimated shares of New Markets and Western World have changed significantly.

## Main Conclusion

The share of foreign sales of software companies in Russia's total revenues from the export of services and goods decreased in 2019 to 1.7% (a year earlier it was 1.9%), but only due to the fact that several large companies changed owners and ceased to be considered Russian. For those companies that are still considered Russian, the growth of foreign sales in dollar terms amounted to 17.5%, while the total exports of all Russian enterprises decreased by 6%.

The share of exports of computer services (determined by the Central Bank of Russia) in the total volume of exports from Russia increased from 0.81% to 0.94%.

After a slight reorientation of the software development industry to the domestic market revealed in 2018 (sales then grew by 12% in dollar terms, and the income from abroad increased by 10%) foreign sales grew at an outstripping pace in 2019. Judging by the growth in revenue, the large activity of software companies in foreign markets is obvious: the volume of foreign sales of software and services increased by 20.5% in ruble terms (by 17.5% in dollars), and sales in the domestic market — grew by 15.7% (12.9% in dollars).

In the total volume of sales of Russian software companies, 57.1% falls on Russia and on the former Soviet Union, 32.3% — on the Western World, 10.6% — on New Markets.

Russian software companies most often consider the markets of France, Japan and Brazil to be the most promising for a debut in 2021. It is in these markets that more software developers plan to sell their solutions and services next year than they did in 2019.

Last year, 19.5% of the surveyed companies were present on the French market, and 30.3% reported plans to work on it next year. In Brazil, this indicator in the same years increased from 9.7% to 12.1%, and in Japan — from 9.7% to 15.1%. There is also a slightly better indicator in 2021 than in 2019 for the markets of Kazakhstan (36.1% and 36.4%, respectively) and the Middle East (20.9% and 21.2%).

## Business environment

There have been no major shifts of Russia in the World innovations' and IT ratings in recent years. The Doing Business rating continued to rise in 2020. It can be considered the most important of all. However, in most cases there was a slight move to a bit lower positions. Apparently, the general negative information background affects the state of affairs in Russia, and this also affects the authors of ratings.

According to the estimates of companies surveyed by RUSOFT, the conditions for doing business in Russia in 2017-2020 did not improve or worsen. The average score, based on RUSOFT estimations, was 2.86 for the past 4 years after it increased from 2.82 in 2017.

The chronological list of the State bodies decisions related to the IT-industry, 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 inclusively, this list had 1, 2 or 3 items for each year, then in 2016 and 2017 there were already 7 items, in 2018 — 14, in 2019 — 16. The sharpest growth was observed in 2020. In the first 9 months 51 relevant decisions or events are worthy of mention. At the same time, the significance of the news has also increased. Only the so-called “tax maneuver” involving the reduction in the rate of the income tax and of the social tax (with an unlimited prolongation of the social tax benefit, which is especially important) can outweigh the significance of all decisions of State bodies of the previous 2019.

## Human resources

At the end of 2019 Russian software companies employed at least 180,000 specialized engineering staff. At the same time, at least 10 thousand developers out of 180 thousand are located outside the country, working in remote development centers. Consequently, about 170 thousand people work in software companies directly in Russia, which is 10% more than at the end of 2018. An increase in the growth rate of the staff of all software companies in Russia is observed for the second year in a row, which is probably due to decisions to increase the number of the budget paid students in universities in IT specialties (these decisions have been done for several years, starting in 2014).

## Main Conclusion

It can be assumed that a number of regional universities have begun to work more efficiently. This is reflected in their rise in various university rankings (both Russian and international).

The personnel turnover indicator until 2015 inclusively 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 leap — up to 12.5%.

In 2020, the share of surveyed companies that admit the existence of the problem of the brain drain to abroad increased (from 17% to 31%). However, this is due to the change in the wording of the question in the questionnaire. The respondents had the opportunity not only to report the existence (or absence) of a problem, but also to choose from two options of the nature of the outflow of personnel to abroad — “It is quite widespread for our company” and “We are losing developers in isolated cases, but these developers are key”. Only 4.3% of the surveyed companies acknowledged the problem of the mass departure of personnel to abroad. Among medium and large companies, this indicator is higher — 7.1%, but their employees departure is much more often massive. 27.1% of the respondents noted that they lose developers in isolated cases, but these developers are key professionals.

The salaries of developers in the software industry in Russia increased in 2019. According to RUSSOFT estimations, the average monthly salary grew by 3% to \$1.64 thousand (staff in Russia receive salaries minus 13% of the income tax).

# Participants of the Survey



Arcadia is a software engineering company focused on providing software development services to clients worldwide. We are a team of 600 professionals with diverse technology skills and domain expertise.

With over 27 years in IT, we have a broad range of expertise in software engineering, UX/UI design, quality assurance, DevOps, and innovative fields such as big data, machine learning, and data engineering. We have developed custom software for businesses in many different industries, including healthcare, education, media, travel, entertainment, and more.

We have also established a set of management and technology practices that allow us to finish projects on time and within budget. We have accomplished this through iterative development techniques, Agile practices, and the use of modern approaches to infrastructure management.

We pay a lot of attention to the quality of our work. Our developers follow behaviour-driven development (BDD) and test-driven development (TDD) approaches. Approximately 25% of our technical staff are QA engineers who are responsible for the quality assurance of our deliveries.

At Arcadia, we strive to build long-term software development partnerships with our clients. We are genuinely proud of the fact that most of our clients have been with us for years.

**Development centres:** St. Peterburg, Rostov-on-Don, Taganrog, Minsk.

**Representative offices:** London, Philadelphia (PA).

**Markets:** USA, UK, the Nordics, the DACH region, and the Benelux countries.

**Certifications:** ISO 27001, EcoVadis CSR, and a Microsoft Gold Certified Partner.

**Core industries:** Education, pharmaceuticals, healthcare, media, travel, and entertainment.

**Services:** Custom software development, team augmentation, technology consulting, business analysis, UX/UI design, legacy systems modernisation, engineering big data solutions, building DevOps pipelines, cloud optimisation, accessibility audits, support, and maintenance.

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## **Technology profile**

### **Distributed systems**

We build distributed systems with strict requirements for security, scalability, and availability using microservices, event-driven architecture, asynchronous messaging, stateless components, CQRS, and event sourcing.

Technologies: .NET Core, NodeJS, Java, NATS, Kafka, RabbitMQ, Azure, AWS, GCP, Service Fabric, and Kubernetes.

### **Web development**

We design and build applications with intuitive user interfaces. We build Single Page Applications (SPA), corporate portals, and e-commerce sites based on different CMS platforms.

Technologies: .NET Core, NodeJS, Java, Spring, PHP, Laravel, Python, Django, Angular, React, Vue, Svelte, Sitecore, EpiServer, Umbraco, and SharePoint.

### **Mobile development**

We build native mobile apps for iOS and Android as well as cross-platform apps with React Native and Adobe Cordoba.

We have implemented bidirectional data synchronisation, low-latency video streaming, H.264 hardware encoding, advanced camera work, location-based apps using beacons, low-energy Bluetooth, geofencing, GPS/Wi-Fi, augmented and virtual reality, mobile OCR, and learning games.

Technologies: Swift, Objective-C, Kotlin, Java, JavaScript, Unity, and Ionic.

### **Data engineering**

We configure and maintain data pipelines; clean and anonymise data; and extract data from any SQL and NoSQL data sources to transform, unify, and visualise them. We also configure search engines and distributed computing systems.

Technologies: SSIS, SSAS, Informatica, Talend, Power BI, Tableau, Qlik, SAS, Elastic Search, Solr, Hadoop, and Spark.

### **Data science**

We design and develop machine learning algorithms for classifications, predictions, computer vision, and natural language processing. We prepare and process data, build and train neural network models, and evaluate and optimise models.

Technologies: Python, R, Keras, TensorFlow, PyTorch, and the Microsoft Cognitive Toolkit.



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**Engineering Locations**

7 development centers in Russia (two in Moscow, N. Novgorod, Rostov-on-Don, St. Petersburg, Novosibirsk), + one in EU (Vilnius, Lithuania).

**Services**

- Software Product Engineering and ADM
- Custom Software Development
- Product Maintenance
- Re-engineering and Porting
- Customization and Integration
- Testing and Test Automation
- Technology Research and Consulting
- Analytics

**Domain Verticals**

High-tech vendors and service providers, Silicone manufacturers, ISVs, Telecom, Mobile, Medical Devices manufacturers, Education, Government, Automotive, Media & Entertainment, Robotics, Transportation and Logistics, Energy and Industry, E-Commerce and more.

**Technologies & Platforms**

- Embedded, system-level, and real-time systems, digital twins
- Mobile and connectivity, cross-platform development, multimedia streaming, hybrid and native apps
- Enterprise applications: Workflow, document, knowledge and content management, CRM systems
- Web services, high loaded distributed applications
- Data science: Big Data, cloud storage, DevOps, machine learning, prediction analytics
- Internet of Things, wearables, sensors, AR/VR apps
- M2M solutions, apps and services for smart enterprise, industrial automation, e-health, connected cars and other scenarios

## **Awards**

- In Global Outsourcing 100 (rating by IAOP) since 2008. Auriga constantly receives top marks for Customer References.
- In Global Services 100 (by Global Services Media and neIT) since 2006. The company is ranked among the "Top 10 Service Providers: Eastern Europe".
- In the Black Book of Outsourcing (by Datamonitor) c 2006. In 2011 Auriga is ranked the No. 1 Engineering Services Outsourcing (ESO) provider worldwide. In 2010 Auriga was named #15 in the prestigious "Global Top 50 Vendors" list.
- Auriga is included in overall Top 20 of software R&D service providers and in Top 10 among the companies serving Software industry, in a 2009 ranking of service providers in India, China, Russia, Ukraine & CEE by Zinnov Management Consulting.
- Microsoft Silver Partner in Software Application Development since 2010.

## **Certification**

ISO 13485

## **Partnerships**

Parasoft, OR.NET e.V., Intel IoT Solutions Alliance

## **About Auriga**

Established in 1990, Auriga ([www.auriga.com](http://www.auriga.com)) is recognized as one of the Top-100 leading outsourcing software R&D providers worldwide. Headquartered in Boston, MA with 500+ 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).



**ICL Group of Companies (ICL GC)** is a large systems integrator ranking among the top IT-companies of Russia that provides a comprehensive range of IT services, solutions and products.

ICL GC service business activity is presented by **ICL Services company**. Since 2006, the company has been providing a full range of IT services for 80 major customers out of 30 countries of the world in Russian, English, French and German with a 24/7 operation mode.

**Company customers include:** Ozon, Innopolis Special Economic Zone, Renaissance Capital, ASNA, Kelly Services, Spring Mobile Solutions, Rehab Family, etc. The company is a key business partner of Fujitsu and annually ranks among TOP-100 rating of The Global Outsourcing 100 as estimated by the International Organisation of Outsourcing Professionals (IAOP).

**ICL Services ensures:**

- comprehensive maintenance of all components of the IT infrastructure, from data centers and user workstations to complex critical business applications, with the use of modern methodologies and flexible service models;
- guaranteed availability of IT infrastructure and applications, as well as full compliance with the Service Level Agreement (SLA);
- risks minimization and sharing in managing the IT infrastructure of the customer's company;
- transformation and modernization of IT infrastructure with the use of effective technologies;
- growth of business performance indicators due to reliable and stable IT services.

**Key activities:**

**SERVICES:** Service Desk; Field support in the territory of Russia and CIS countries; Maintenance, transformation and integration of IT infrastructure and systems; Development, implementation and maintenance of applications; IT and business consulting; Digital solutions (Machine learning, AI, IoT); System integration.

**SOLUTIONS** in the field of finance, power engineering, mechanical engineering, manufacturing industry, logistics, pharmacy, retail, etc., making it possible to manage the client's business processes more effectively and gain economic benefits from cutting the time needed for development and entering new business areas.

**Industry advances:**

- TOP-100 in the rating of The Global Outsourcing 100, as estimated by the International Organisation of Outsourcing Professionals (IAOP);
- Winner of the Innovation Time Award in the Product of the Year nomination in the category "IT and Digital Technologies" (2018);
- TOP-3 of SDI (Service Desk Institute) contest in "The Best Large Enterprise Managed Service Provider" nomination;

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- TOP-7 in the IT Europe contest in the category “Data, information management or Analytics solution of the year”;
- The winner in the nomination “Arrangement and Development of Jobs in Non-Production Organizations” of the contest “Russian Organization with High Social Efficiency”.



**ICL Soft** business area has been established in ICL GC in order to develop and implement business application solutions. The company is among TOP-10 of the Russian largest IT companies involved in SW development, information security, IT outsourcing and ERP services. For over 20 years ICL Soft has been carrying out the projects on creation, implementation and support of solutions based on “1C:Enterprise”.

**The company customers include:** Gazprom and Novatek subsidiaries, Pension Fund of the Russian Federation, Polyot Enterprise, Commercial Port of Vladivostok, Logikam, Betar, etc.

**Key activities:**

**1C-based SOLUTIONS:** consulting and introduction of 1C; business process automation; equipment maintenance and repair.

**In-house SOLUTIONS:** in the field of safety and health care, housing and public utilities, power engineering, finance, etc.

**Company's business competencies include:**

- Finance Management (FRP, PM)
- Regulatory Accounting (RAS and IFRS)
- Production Management (APS, SFC, TPS, FCRP, RCCP, MRP, MPS, SOP)
- Sales Management (SCM)
- Supply Management (SCM, SRS, DRP)
- Material Management (ITS, WMS)
- Record Management and Document Flow
- Personnel Management (HCM, HRM)
- Master Data Management (MDM)
- Customer Relationship Management (CRM)
- Service Maintenance Management (ITSM)
- Operational Business Process Management (BPM)
- Monitoring and Analysis of Business Performance Indicators (PM, KPI)

**Partnership statuses:**

- 1C:Franchising (since 1999)
- 1C: Candidate for ERP Solution Competency Centre of 1C Company
- The 1C: Candidate for CORP Competency Centre
- 1C:Consulting Project Participant: with the statuses “Partner 1C:Consulting (MAN)” and “Partner 1C:Consulting (ACC)”, 1C:CTC.

## Participants of the Survey

company	head office location	web	e-mail	phone	expertise in areas corresponding to global technological trends
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Arax Group	Moscow	www.araxgroup.ru/	info@araxgroup.ru	495-504-82-63	
Arcadia	St.-Petersburg	https://softwarecountry.com	info@softwarecountry.com	812-610-59-55	Artificial Intelligence, Big Data & BI, IoT
Artezio	Moscow	www.artezio.com/	sales@artezio.com	495-981-05-31	Artificial Intelligence, Big Data & BI, Blockchain Technology
Auriga	Moscow	www.auriga.com	pr@auriga.com	495-713-99-00	AR&VR Development, Artificial Intelligence, Big Data & BI, IoT
Basealt	Moscow	www.basealt.ru	org@basealt.ru	495-123-47-99	IoT
BPM Environment	Innopolis	https://mpicloud.com/	sdc@mpicloud.com	800-600-41-07	
Budget and Finance Technologies	Moscow	https://bftcom.com/	info@bftcom.com	495-784-70-00	
CodeInside	Penza	https://codeinside.ru	office@codeinside.ru	841-263-67-36	Artificial Intelligence, Big Data & BI, Smart City
Company ASB	Omsk	https://companyasb.ru/	client@companyasb.ru	381-240-40-33	IoT
Dalesoft	St.-Petersburg	www.dalesoft.ru	office@dalesoft.ru	-	
Digital Design	St.-Petersburg	www.digdes.ru	info@digdes.com	812-346-58-33	Artificial Intelligence, Big Data & BI
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EPAM Systems	Moscow	www.epam-group.ru	ask_ru@epam.com	495-730-63-62	AR&VR Development, Artificial Intelligence, Big Data & BI, Blockchain Technology, IoT, Smart City
Erlyvideo	Moscow	https://erlyvideo.ru/	max@erlyvideo.org	906-711-11-14	Smart City, Artificial Intelligence
ErmineSoft	Novosibirsk	www.erminesoft.ru	denis@ermineoft.ru	913-926-26-97	AR&VR Development, Artificial Intelligence

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Exactpro	Moscow	<a href="https://exactpro.com">https://exactpro.com</a>	<a href="mailto:info@exactpro.com">info@exactpro.com</a>	495-640-24-60	Artificial Intelligence, Big Data & BI, Blockchain Technology
First Line Software	St.-Petersburg	<a href="http://www.firstlinesoftware.ru">www.firstlinesoftware.ru</a>	<a href="mailto:irina.ribchenko@firstlinesoftware.com">irina.ribchenko@firstlinesoftware.com</a>	906-279-00-25	Artificial Intelligence, Big Data & BI, Blockchain Technology, IoT, Smart City
Garanin Apps	Moscow	<a href="http://www.GaraninApps.com">www.GaraninApps.com</a>	<a href="mailto:Michael@GaraninApps.com">Michael@GaraninApps.com</a>	916-821-35-53	
GDC Services	Kazan	<a href="https://iclservices.com/">https://iclservices.com/</a>	<a href="mailto:pr@iclservices.com">pr@iclservices.com</a>	800-333-98-70	AR&VR Development, Artificial Intelligence, Big Data & BI, IoT
Gemalto	Moscow	<a href="https://thales-sentinel.ru">https://thales-sentinel.ru</a>	<a href="mailto:mikhail.chukhlin@thalesgroup.com">mikhail.chukhlin@thalesgroup.com</a>	926-996-42-25	Artificial Intelligence, Big Data & BI, IoT
Geoscan Group	St.-Petersburg	<a href="http://www.geoscan.aero">www.geoscan.aero</a>	<a href="mailto:info@geoscan.aero">info@geoscan.aero</a>	812-363-33-87	AR&VR Development, Artificial Intelligence, Smart City
GPA	Moscow	<a href="http://www.gpr.ru">www.gpr.ru</a>	<a href="mailto:107@gpr.ru">107@gpr.ru</a>	985-994-27-12	
HTC (High Tech Center)	Izhevsk	<a href="http://www.htc-cs.ru">www.htc-cs.ru</a>	<a href="mailto:dpletnev@htcmail.ru">dpletnev@htcmail.ru</a>	906-818-76-68	AR&VR Development, Blockchain Technology
Inostudio Solutions	Taganrog	<a href="http://www.inostudio.com/">www.inostudio.com/</a>	<a href="mailto:russoft@inostudio.com">russoft@inostudio.com</a>	863-432-03-18	AR&VR Development
Inreco LAN LLC	Vladimir	<a href="http://www.inrecolan.ru">www.inrecolan.ru</a>	<a href="mailto:marketing@inrecolan.com">marketing@inrecolan.com</a>	492-244-40-90	Big Data & BI
Internet-Frigate	Novocherkassk	<a href="http://www.ifrigate.ru">www.ifrigate.ru</a>	<a href="mailto:main@ifrigate.ru">main@ifrigate.ru</a>	863-522-41-10	Big Data & BI, IoT, Smart City
iSpring	Yoshkar-Ola	<a href="http://www.ispring.ru">www.ispring.ru</a> , <a href="http://www.ispring.com">www.ispring.com</a>	<a href="mailto:press@ispring.ru">press@ispring.ru</a>	800-333-78-73	
IT Brick	Kazan	<a href="http://itbricksoft.com">itbricksoft.com</a>	<a href="mailto:info@itbrick.ru">info@itbrick.ru</a>	843-253-63-89	
KS2 Engineering	St.-Petersburg	<a href="http://www.ks2corp.com">www.ks2corp.com</a>	<a href="mailto:tatiana.y@ks2corp.com">tatiana.y@ks2corp.com</a>	911-730-11-58	IoT, Smart City

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Media technology	St.-Petersburg	<a href="https://sigmasms.ru/">https://sigmasms.ru/</a>	<a href="mailto:info@sigmasms.ru">info@sigmasms.ru</a>	904-615-46-08	Artificial Intelligence
Mentalstack	Taganrog	<a href="https://mentalstack.com/">https://mentalstack.com/</a>	<a href="mailto:hello@mentaltack.com">hello@mentaltack.com</a>	989-615-88-94	AR&VR Development, Artificial Intelligence, Big Data & BI
MIRCOD	Kazan	<a href="http://www.mircod.com">www.mircod.com</a>	<a href="mailto:michael@mircod.com">michael@mircod.com</a>	962-560-25-00	AR&VR Development, Artificial Intelligence, Big Data & BI, IoT, Smart City
Nautsilus	Moscow	<a href="http://www.nautsilus.ru">www.nautsilus.ru</a>	<a href="mailto:info@nautsilus.ru">info@nautsilus.ru</a>	495-939-58-72	Big Data & BI
Netrika	St.-Petersburg	<a href="http://www.netrika.ru">www.netrika.ru</a>	<a href="mailto:info@netrika.ru">info@netrika.ru</a>	812-640-80-70	Artificial Intelligence, Big Data & BI, Smart City
OKTET Labs	St.-Petersburg	<a href="http://oktetlabs.ru">http://oktetlabs.ru</a>	Konstantin.Usakov@oktetlabs.ru	921-332-08-05	IoT
PiterSoft	St.-Petersburg	<a href="https://piter-soft.ru/">https://piter-soft.ru/</a>	<a href="mailto:info@piter-soft.ru">info@piter-soft.ru</a>	812-333-08-60	
PROMT	St.-Petersburg	<a href="http://www.promt.ru">www.promt.ru</a>	<a href="mailto:julia.epiphants@promt.ru">julia.epiphants@promt.ru</a>	812-655-03-50	Artificial Intelligence, Big Data & BI
RAIDIX	St.-Petersburg	<a href="http://www.raidix.ru">www.raidix.ru</a>	<a href="mailto:request@raidix.com">request@raidix.com</a>	812-622-16-80	Big Data & BI, Smart City
Reksoft	St.-Petersburg	<a href="http://www.reksoft.ru">www.reksoft.ru</a> , <a href="http://www.reksoft.com">www.reksoft.com</a>	<a href="mailto:rfi@reksoft.ru">rfi@reksoft.ru</a>	495-926-17-71	AR&VR Development, Artificial Intelligence, Big Data & BI, IoT, Smart City
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RTSoft, Software Development Center	Moscow	<a href="http://www.rtsoft.ru">www.rtsoft.ru</a> , <a href="http://www.rtsoft.de">www.rtsoft.de</a>	<a href="mailto:rtsoft@rtsoft.ru">rtsoft@rtsoft.ru</a>	495-967-15-05	AR&VR Development, Artificial Intelligence, IoT, Smart City
RusBITech-Astra	Moscow	<a href="https://astralinux.ru">https://astralinux.ru</a>	<a href="mailto:info@astralinux.ru">info@astralinux.ru</a>	495-369-48-16	
SKB Kontur	Ekaterinburg	<a href="http://www.kontur.ru">www.kontur.ru</a>	<a href="mailto:info@skbkontur.ru">info@skbkontur.ru</a>	343-228-14-40	Big Data & BI

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SoftLab-NSK	Novosibirsk	<a href="http://www.softlab-nsk.com">www.softlab-nsk.com</a>	<a href="mailto:administration@softlab-nsk.com">administration@softlab-nsk.com</a>	383-363-04-62	AR&VR Development, Smart City
Solvo	St.-Petersburg	<a href="http://www.solvo.ru">www.solvo.ru</a>	<a href="mailto:sales@solvo.ru">sales@solvo.ru</a>	812-606-05-55	Big Data & BI
SPB TV	St.-Petersburg	<a href="http://www.spbtvsolution.ru">www.spbtvsolution.ru</a>	<a href="mailto:partners@spbtv.com">partners@spbtv.com</a>	812-318-31-11	Artificial Intelligence, Big Data & BI, IoT
Speech Technology Center	St.-Petersburg	<a href="http://www.speechpro.ru">www.speechpro.ru</a>	<a href="mailto:stc-spb@speechpro.com">stc-spb@speechpro.com</a>	812-325-88-48	Artificial Intelligence, Big Data & BI, Smart City
SWTECNN	Nizhny Novgorod	<a href="http://www.swtecnn.com">www.swtecnn.com</a>	<a href="mailto:info@swtecnn.com">info@swtecnn.com</a>	831-216-19-06	IoT, Smart City
TatMobailInform CDC	Innopolis	<a href="http://tatmobile.solutions">http://tatmobile.solutions</a>	<a href="mailto:welcome@tatmobile.solutions">welcome@tatmobile.solutions</a>	905-038-91-53	Big Data & BI
TrueConf	Moscow	<a href="https://trueconf.ru/">https://trueconf.ru/</a>	<a href="mailto:info@trueconf.ru">info@trueconf.ru</a>	495-698-60-66	Artificial Intelligence
Webpraktik	Rostov-on-Don	<a href="http://www.webpraktik.ru">www.webpraktik.ru</a>	<a href="mailto:info@webpraktik.ru">info@webpraktik.ru</a>	903-438-15-52	Artificial Intelligence, Big Data & BI

# Application A

The global ICT market  
and opportunities to  
increase sales of Russian  
suppliers

## Application A.

Experience shows that even small fluctuations in the global IT market are reflected in the sales of Russian software developers (their foreign sales). This was the case during the crash of the dot-coms (companies whose business model is entirely based on the Internet) in 2000 and also happened during the 2009 global economic crisis.

Judging by the results of research by well-known analytical companies, in 2017, a turning point came in the IT market: in connection with the beginning of the digital transformation process, in most countries there was a quite steady increase in the demand for IT. In some areas, this growth is double-digit (by tens of percent). This trend will continue in 2020.

According to Gartner, global spending on IT grew 3.8% in 2017 to \$3.521 trillion.

In 2018, analysts at Gartner expected an increase of 4.3%, but the growth was slightly lower — by 3.9%. According to IDC, the global IT market in 2018 reached \$4 trillion, an increase of 4.2%. That is, about the same growth as estimated by Gartner.

Gartner has determined that the global information and communication technology (ICT) market in 2019 reached \$3.76 trillion, an increase of 1%. Of all the segments, the largest growth in corporate software — by 8.5% to \$456 billion (primarily due to SaaS solutions).

IDC has estimated the growth of global IT spending in 2019 at 5%. At the same time, software sales increased by 10%.

IT services, which analysts refer to custom development, also had good growth rates. IDC identified an increase of 4.7%, and Gartner identified a 3.6% increase (most likely, custom development had a larger increase).

The quite decent growth of the global software market has created favorable conditions for increasing foreign sales of Russian software developers. At the end of 2019, they added 17.5% (in dollar terms).

Analysts assumed that 2020 would be no worse, but in the spring they radically changed their forecasts. Instead of growth by the end of the year, they began to predict a significant reduction. According to the April forecast of IDC, the entire global IT market will contract by 5.1% (the software market — by 1.9%, and the IT services market — by 2.6%).

Gartner in May presented a prediction of an even larger decline: the entire IT market, according to its version, will shrink by 8%, and global sales of enterprise software and IT services — by 6.9% and 7.7%, respectively. It is possible that in May and IDC would have received similar indicators (the negative impact of the pandemic on the global economy every week became more significant).

### World ICT market in 2017-2019 (forecast for 2020)

	\$Billion in sales			2020 (forecast made in May)
	2017	2018	2019	
Data center systems	181 (+6.3%)	201 (+11.3%)	211.63 (+0.7%)	-9.7%
Corporate software	352 (+8.8%)	397 (+9.3%)	458.13 (+8.8%)	-6.9%
Devices	663 (+5.1)	669 (+0.5%)	698.09 (-2.2%)	-15.5%
IT services	933 (+4.4%)	983 (+5.6%)	1,031.58 (+3.8%)	-7.7%
Telecommunication services	1,392 (+1.3%)	1,400 (+1.9%)	1,357.43 (-1.6%)	-4.5%
Total	3,521 (+3.8%)	3,650 (+3.9%)	3,756.86 (+1.0%)	-8.0%

Source: Gartner

In such a situation in the entire global IT market, with a not very good attitude towards Russian companies in Western countries, it will not be easy for domestic software developers to maintain foreign sales at the level of 2019.

**Change in global IT spending in 2019 (forecast for 2020)**

	<b>Growth in 2019</b>	<b>Forecast for 2020 in April</b>
Devices	+0.9%	-12.4%
Infrastructure	+8.8%	+3.8%
Software	+10.0%	-1.9%
IT services	+4.7%	-2.6%
All global expenses	+5.0%	-5.1%

Source: IDC

The only segment of the IT market globally that will see growth is Public Cloud Services. It is predicted by Gartner to grow by 19%. For cloud video conferencing and cloud telephony, the company predicts growth of 24.3% and 8.9%, respectively. Due to the fact that the segment "Public cloud services" is not yet large in volume, its influence on the indicators of the entire IT market will be insignificant.

**1. IT services**

According to experts from Gartner, spending on IT services in 2019 exceeded \$1 trillion for the first time in history and amounted to \$1.03 trillion. (+3.8%). According to a Gartner survey, 46% of organizations say IT services and vendor consolidation are among the top three best cost optimization practices.

Gartner predicts that CIOs will tend to spend money on subscription-based products and cloud services to minimize upfront costs.

It is expected that the IaaS market in 2020 will grow by 13.4% to \$50.4 billion and in 2021 by 27.6% to \$64.3 billion.

According to IDC analysts, the volume of the global market for IT services and business services (business consulting and outsourcing of core business processes) increased by 5% in 2019.

According to the research results of the consulting company Information Services Group (ISG), the total value of contracts signed in the world in 2019 amounted to \$13.2 billion. By 2020, the global IT and business operations outsourcing sector declined by 5% in value terms after a drop in the number of traditional outsourcing contracts signed. In the III quarter. 2020 ISG forecasted the growth of the IT outsourcing market by 3% compared to the II quarter.

**2. Enterprise (institution) management systems and other corporate software**

The volume of the global market for enterprise software in 2019, according to IDC, reached \$224.6 billion, an increase of 7.5%. Public cloud services account for 40.3% of software sales, and in 2024 their share may grow to 56.8%.

**3. Information Security**

The volume of the global market of solutions for information security (IS) and cyber risk management, according to Gartner, reached \$120.93 billion in 2019. More than half of the market is accounted for by information security services, global expenses for which in 2019 amounted to \$61.98 billion. The second largest segment of the information security market is technologies for protecting infrastructure: their annual sales were equal to \$16.52 billion. Approximately \$13.39 billion was spent on equipment designed to ensure cyber protection of networks. Sales of consumer information security software in 2019 reached \$6.25 billion, and solutions for management of accounts and access (Identity and Access Management, IAM) — \$9.84 billion.

According to Gartner, spending on information security and risk management systems in 2020 will reach \$131 billion, and in 2022 — will increase to \$174 billion, of which approximately \$50 billion will be directed to protecting client systems. Sales of cloud platforms and security applications will grow from \$636 million in 2020 to \$1.63 billion in 2023, and sales of application security systems over the same period — from \$3.4 billion to \$4.5 billion. And the market for information security services, in 2019 it increased from \$62 billion to \$66.9 billion.

## Application A.

However, money alone cannot solve all issues. Most information security specialists are overwhelmed by analyzing logs, preventing hacking attempts, investigating possible cases of fraud, etc. The labor shortage is large, so the information security industry is looking with more hope at solutions in the field of artificial intelligence. According to MarketsandMarkets, in 2019-2026 the growth of the market for AI tools for ensuring cybersecurity will grow by an average of 23.3% per year, from \$8.8 billion to \$38.2 billion.

According to the National Venture Capital Association (NVCA), in 2019 the volume of investments in startups engaged in information security amounted to \$5 billion, while in 2018 the figure was equal to \$6.5 billion. We are talking about investments in companies that deal only with cybersecurity and do not develop other technologies.

The global market for software and services for preventing DDoS attacks in 2019 exceeded \$9.3 billion (data from the research company ResearchAndMarkets). The experts did not specify the dynamics and only noted that the costs of such solutions are increasing and will continue to grow in the future.

### 4. Augmented and virtual reality (AR / VR)

The global market for virtual and augmented reality technologies will show an annual growth of 60.5% and will reach \$40 billion by 2022.

Source: BCC Research

### 5. Internet of Things (IoT)

According to ReportCrux Market Research, the global demand for artificial intelligence in the IoT market was estimated at about \$2.64 billion in 2019, and sales of related solutions are expected to be about \$15.72 billion by 2027, giving an average growth (CAGR) at 25.0% from 2020 to 2027.

Global sales of equipment for the Internet of Things in 2019 reached, according to research company Transforma Insights, \$465 billion, and the number of such devices in operation increased to 7.6 billion pieces.

Global shipments of cellular IoT modules in 2019, according to Berg Insight, increased by 22%, reaching a new record level of 265 million units. Annual revenues grew at a slower pace and increased by only 7% due to a decrease in the average price and an increase in the share of inexpensive LPWA modules in the range.

The number of active IoT devices will more than triple by 2030 and will amount to 24.1 billion against 7.6 billion registered at the end of 2019. Such data was announced by Transforma Insights analysts. In their opinion, such a sharp increase will affect the total volume of the market for IoT devices, which will be \$1.5 trillion with an approximate compound annual growth rate (CAGR) of 11%. North America, China and Europe will dominate the market, with an estimated market share of 26%, 24% and 23%, respectively.

The volume of the world market of chips for equipment of the Internet of Things (IoT) in 2019 reached \$370.9 billion (data of the analytical company ResearchAndMarkets). According to experts' expectations, global spending on semiconductor components for IoT devices will rise by 6% annually and will amount to \$525.4 billion by 2025.

### 6. Artificial Intelligence (AI), Robotics

The volume of the global market for technologies for robotic process automation in 2019 reached \$1.55 billion (data from ResearchAndMarkets research company). Experts call the introduction of artificial intelligence and cloud computing in the segment of small and medium-sized businesses, whose representatives are looking for new technologies to improve their efficiency, as one of the main drivers of growth.

In the context of the COVID-19 pandemic and an uncertain economic future, the search for solutions that ensure high business productivity, effective support for remote work of employees and the prompt response of business processes to any difficult situations becomes relevant for every organization. These are the solutions that Intelligent Automation technologies can provide, and therefore their demand, which is already very high, will inevitably grow in the near future.

The global market for service robots in 2019 exceeded \$17 billion.

According to CB Insights' annual analysis of global AI investment trends, tech-savvy startups raised a record \$26.6 billion in 2019, closing over 2,200 deals worldwide. For comparison, in 2018 about 1900 agreements were concluded for a total of \$22.1 billion, and in 2017 — about 1700 units for \$16.8 billion.

### 7. Blockchain

The volume of the global market for blockchain technologies provided as a service (BaaS) in 2019 amounted to \$420.5 billion (data from research company ResearchAndMarket).

Investments in developers of enterprise blockchain solutions skyrocketed by 62%.

The volume of investments in enterprise-level blockchain technology developers in 2019 reached \$434 million, which is 62% more than a year earlier (data from CB Insights, an analytical company specializing in the study of the venture capital market).

In early May 2020, research company IDC released a forecast that spending on enterprise blockchain projects in Europe in 2020 will grow by 60% to \$1.33 billion, despite the COVID-19 coronavirus pandemic.

### 8. Smart city

Smart city spending hits \$104.3 billion — IDC.

In 2019, global spending on smart city projects reached approximately \$104.3 billion (data from analyst firm IDC), and in 2020, global spending on initiatives to develop smart urban environments will increase by 18.9% to \$124 billion.

### 9. Cloud technologies

In early March 2020, research firm Allied Market presented the results of a new report on the dynamics of the cloud backup and recovery software market. According to analysts' conclusions, this segment is growing very rapidly — on average by 24.2% per year. So, if in 2017 the sales volume barely exceeded \$6 billion, then in 2019 it reached \$9.3 billion, and by the end of 2023 it is expected to be \$22.22 billion.

Gartner expects the infrastructure as a service (IaaS) sector to grow 13.4% in 2020 to \$50.4 billion, and 27.6% to \$64.3 billion in 2021.

The global SaaS market in 2019 amounted to \$101 billion, more than doubling in three years (data from analytical company Synergy Research).

In 2019, the volume of the global market for software-defined networks and data centers (SDN, SD-WAN and SDDC technologies) reached \$51.7 billion (data from the analytical company MarketsandMarkets). Sales spending on software-defined solutions is expected to increase globally by 25.5% annually, reaching \$160.8 billion by 2024.

Analytical company Gartner estimated the volume of the global market for public cloud services at \$242.7 billion at the end of 2019.

In 2019, global spending on services used to deploy cloud infrastructure reached a record \$107.1 billion, up 37.6% year-over-year (data from Canalys).

### 10. Big Data, BI, data storage

The market for servers and storage systems with open specifications in 2019 was estimated by IDC analysts at \$15.7 billion. It is assumed that in 2020 the market growth will slow down. The average annual growth rate of revenue over a 5-year period — from 2020 to 2024 — is forecast by analysts to be 16.6%. At the same time, the main driver of growth will remain the demand for servers, which will continue to form about 83% of all revenue in the OCP—solutions market.

### 11. Computer and telecommunication equipment

The volume of the global laptop market in 2019 reached 160.9 million units, an increase of 0.4%, and the volume of the global server market in 2019 was 12.1 million units or +2.4% (data from ResearchAndMarkets).

According to preliminary data from IDC, II quarter 2020 was a successful year for the traditional PC market of desktops, laptops and workstations, and global shipments grew 11.2% year over year to 72.3 million units. With the tightening of restrictions around the world in the first few weeks of the quarter, demand for laptops continued to grow as a way to ensure business continuity and student learning.

The volume of the global market for cellular infrastructure in 2019 reached \$39.87 billion, an increase of 6.2% (data from analytical company Gartner).

Research and Markets has determined that the volume of the global solid-state drives (SSD) market in 2019 reached \$20.7 billion (by 2025 it should surpass the indicator of \$47.8 billion).

In 2019, manufacturers worldwide shipped a total of 93.8 million desktops (desktops; laptops not included), down 3.2% from a year ago (ResearchAndMarkets).

At the end of May, IDC adjusted its February forecast for the global PC market: shipments of personal x86 systems in pieces by the end of 2020 will decrease, in accordance with the updated estimate, by 12.4%.

The volume of the global market for cellular infrastructure in 2019 reached \$39.87 billion, an increase of 6.2% (data from Gartner).

In 2019, the volume of the global smartphone market decreased by 2% and amounted to 1.52 billion pieces. This is the first decline since 2008 (data from Gartner).

In the first three months of 2020, according to Canalys, 272 million smartphones were shipped worldwide, down 13% from the same quarter a year earlier. In 2019, global smartphone shipments will decline 3.1% to 1.35 billion units.

The global chip market volume in 2019 amounted to \$412.1 billion, down 12.1%. The decline was the strongest since 2001, when chip sales plunged 32% in the so-called dot-com crisis, according to the Semiconductor Industry Association, SIA.

At the end of 2019, the global computer market recorded 4.8% growth. This happened for the first time since 2011, when growth was at the level of 1.7% — from 2012 to 2018, inclusively, the market annually showed a drop in sales (IDC data).

The global market for wearable electronics in 2019 reached a record 336.5 million units, an increase of 89% (IDC data).

The volume of the global server market in 2019 amounted to 12.1 million units, an increase of 2.4% (data from the analytical company ResearchAndMarkets). Among the factors still driving the growth of the server market, analysts attributed the IT equipment upgrade cycle in companies, strong demand from cloud service providers, the growing use of servers as the main building blocks for deploying software-defined infrastructure. In addition, experts point to widespread interest in new Intel processors and the increasing proliferation of next generation workloads.

## 12. Telecommunication services

The volume of the global market for solutions for unified communications (UC) and collaboration (Unified Communication and Collaboration, UC&C) in 2019 reached \$38.8 billion, an increase of 17.7% (data from IDC).

## 13. Other segments of the global IT market

Global mobile Internet traffic in 2019 grew by 58% (Tefficient data).

Sales of software and equipment for traffic management amounted to \$30.6 billion in 2019, and by 2024 this figure will grow to \$57.9 billion (data from ResearchAndMarkets).

The volume of the global market for interior design software in 2019 reached \$3.83 billion (data from ResearchAndMarkets)

According to PitchBook Data analysts, in 2019, venture capitalists have invested a total of \$30.42 billion in startups offering software and services for companies and government agencies, almost double the figure a year ago. Consumer developers raised \$23.26 billion, a quarter less than a year earlier.

In the 1<sup>st</sup> quarter in 2020, the market for smart home devices grew, according to IDC, by 3.8% compared to the same quarter last year. More than 22 million units were delivered during the quarter smart devices. It is expected that in 2024 the market for smart home devices in Europe will reach 200 million units. Volume of supplies, and the average annual growth rate (compound percentage, CAGR) in the period 2020—2024 will amount to 16.15%.

## 14. The situation in the markets of the largest countries and in certain macroregions

In 2019, African startups attracted record high investments. Overall, African companies received \$1.34 billion in venture capital, and fintech developers \$678.73 million (WeeTracker data). More than 75% of deals were made in Nigeria, Kenya and South Africa, and fintech continues to be the most attractive financing sector. The annual growth in venture capital in this area was 138.5%.

Research firm IDC estimates that ICT spending in Russia was \$47.05 billion in 2019, making the Russian Federation the largest information and communication technology (ICT) market in Central and Eastern Europe (CEE). Poland (\$20.44 billion) ranks second in CEE in terms of ICT spending, followed by the Czech Republic (\$10.86 billion), Hungary (\$6.71 billion) and Romania (\$6.66 billion).

The volume of the European IT market in the II quarter. 2020 increased by 7.3%. In June, the growth was even stronger — by 14%. Moreover, the largest countries in the region showed an impressive rise in spending: Germany (+17%), Italy (+38%), France (+15%), Spain (+19%). This is evidenced by the data of the analytical company Context.

In mid-February 2020, it became known that in 2019, American companies installed fewer robots than a year earlier. This is the first time that such a decline has been recorded since 2015, due to a decline in production amid trade wars and lower demand.

Shipments of manufacturing robots in the United States fell more than 16%, according to the Development Assistance Association. In 2019, shipments also fell in Mexico, down 25%, while shipments in Canada remained largely unchanged.

At the end of 2019, it became known that China would transfer all government agencies to Chinese computers and programs. Lenovo is named as the main supplier of "import-substituting" technology, but the final decision has not yet been made. The new strategy of the PRC is designed for three years, and "under the gun" will be Dell and HP computers, as well as Microsoft software.

Indian tech companies in 2019 attracted a record \$14.5 billion in investments, a year earlier it was \$10.6 billion (data from venture capital firm InnoVen Capital).

## Application A.

According to IDC, the service market in North and South America in 2019 decreased by 5.2% to \$485.6 billion. At the same time, the US government and business in Q1 2020 began to slow down new projects to postpone discretionary decisions due to market uncertainty in connection with the COVID-19 coronavirus pandemic. Spending on technology and business services in Latin America increased 7.2% in 2019. In 2020, the situation in this region began to worsen due to quarantines in many countries, depreciation of currencies and weak Chinese demand for locally produced products.

In early January 2020, it became known that the United States was introducing new restrictions on the export of artificial intelligence software. It is assumed that in this way the government is trying to limit the transfer of critical technologies to rival powers, for example, to China.

North America, China and Europe will dominate the active IoT device market, according to Transforma Insights, in the next decade (until 2030), with an estimated market share of 26%, 24% and 23%, respectively.

Sales of unified communications and collaboration solutions in North America, according to IDC, climbed 12.1% in value terms. The countries of Europe, the Middle East and Africa (EMEA) recorded a 15 percent rise, in the Asia-Pacific region — 17.9 percent.



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