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2017

Export of Russian Software Development Industry

14-th Annual Survey

Dear colleagues!

Dear friends!

Here you will find the results of the annual (and 14th!) survey of the software export industry in Russia, which has traditionally been carried out by the Noncommercial Partnership for Software Developers RUSSOFT (NP RUSSOFT). In February-April 2017 we surveyed over 150 companies on the market (this was a record for the entire period of surveying!) Additionally, we studied various sources of information, and received expert assessments from dozens of directors of software developer companies.

Last year was marked by the Russian economy moving from stagnation to growth, which was reflected in the increase of sales of Russian software companies not only abroad, but also on the domestic market. Another important factor was the election of Donald Trump as the US president, which led to a deepening in the geopolitical conflict between Russia and the USA, creating preconditions for strengthening the position of our industry in Europe and in countries of the developing world. At last, the mechanism of state support of hi-tech export was launched, in the form of the Russian export center. The first results were shown by our activity in third-world countries, where Russia proved capable of providing alternative solutions in the security sphere, de facto offering these countries "Digital sovereignty".

The volume of foreign sales of software and developer services of Russian companies grew by 12% and reached $7.5 billion. At the same time, it must be admitted that for geopolitical reasons, it is becoming more difficult for our companies to sell software and developer services from Russia, and so the gap has increased between the total volume of foreign sales by Russian companies and the volume of sales by their Russian offices (which came to $4.8 billion).

Both service and product companies have strengthened their positions in world ratings. Eight service companies were included on the list of the 100 top service companies in the world (according to IAOP). Russian software manufacturers continued to strengthen their position in "Gartner magic quadrants", and the success of our companies in the information security sphere should be particularly noted.

Unfortunately, further prospects for growth of export to the USA will not depend on companies themselves in many ways, but on the development of the geopolitical situation. But it is evident that there are prospects for growth in European countries, in Southeast Asia, in Latin America and the Arab world.

I would like to take this opportunity to thank the company ToyOpinion for their efficient support of the study in gathering initial information, and the company PROMT for the excellent translation of the report into English. Thanks to our colleagues from Tomsk and Chelyabinsk for helping to gather information in their cities, which raised the number of questionnaires filled out to a record level, and made it possible to analyze the situation in the regions. And of course, my most sincere words of gratitude go to our analyst Dmitry Zhelvitsky for his enormous work on gathering additional information, for preparing the report, and for forming ratings of leading companies and universities.

We are very grateful to the Association of Computer and Information Technology Companies and our sponsors for support in carrying out the study.

I would also like to thank everyone who took part in the survey and provided information about their companies.

Yours sincerely,
President of RUSSOFT Association   *Valentin Makarov*

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CHAPTER 1.

Russian positions on the world IT market
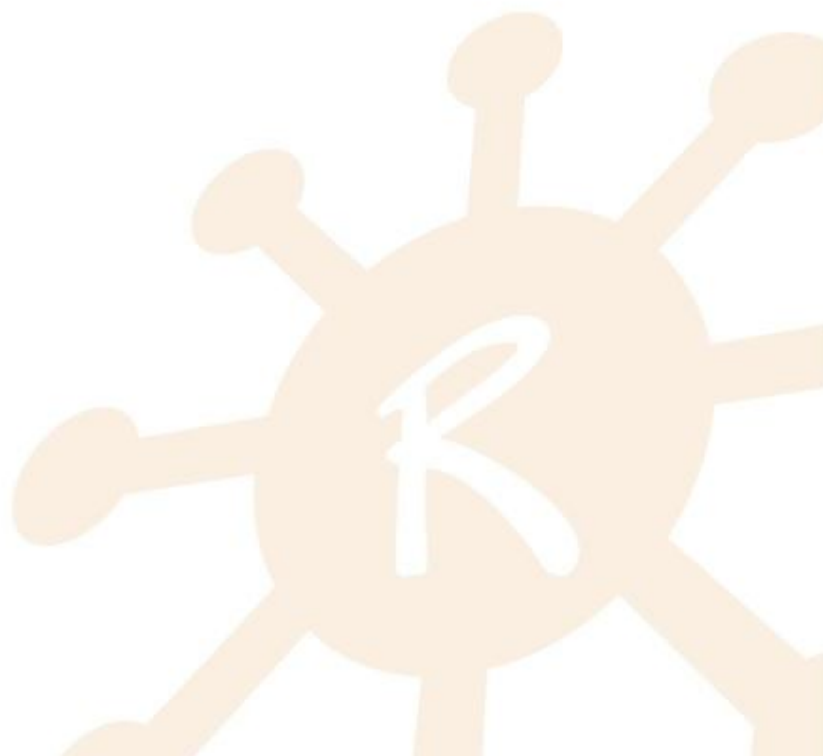
Business from scratch in Russia: what are the odds?

Is it possible to set up a business from scratch in that country? And if it is an innovative and a quality one? And with hardware? And when the main clients are b2b and major Enterprise? Is it possible to change lifestyle and expose bottleneck of biggest well-off clients?

The country starts up many support programs for high tech companies: technology park, accelerators, state grants, competitive tenders etc. But barriers for entry are high and red tape, inconsistent interpretations of rules, intricate conditions of participation and reporting eat up precious time of your team. And above all, the serious business also eludes your pink sandbox.

We have made up 5 postulates towards achieving the goal and we keep on focusing on them. But for sure ones should remember all about books tell us.

Cooperation with b2b clients and partners at an early stage of product development. Major customers don't think in new but in ready-made solutions as they want stability. They do not want your MVP product. Eminent vendors grill you about SLA to guaranties of company viability. And that is exactly what you need. Climb down, pond the pavement and stand on reminding that you have come for an advice. In our realities it is not easy to get a feedback but all well know how it is important. Luckily today there is a tendency of an advice oriented swing in big business, since it is more willing to advice and help to raise a product together. The system integrators will be with you. A creation of new client oriented solutions is only possible in star tap-integrator pairing. As they see wide and you fresh. Desegmentation of IT market plays into the hands as well as business diversification. For example, banks and telecommunication companies all around the world are facing the crisis of its services and proposals outdating.

Perfectionism in communication. They forgive your resources constraint, and blame if you vanish. Since the first contact, message, product presentation and production of information materials you should take into account every detail. There is no second chance. Clients around the world are pampered by international vendors and will be pleasantly surprised if you maintain a high level of communication and offer quality information material and service.

Globalization since an embryonic state. You should not rely on import-substitution as it is for military and critical industries. Therefore in other cases it is essentially to make new values of quality and functionality. And among other the international market acts as the censor of quality. Checking of competitiveness and consumers reactions is necessity and it can be made with the support of the REC and RUSSOFT. International standards orientation would be helpful on the domestic market as well, and allows business to live not just today but tomorrow.

Mentality and Agile: a balance between strict discipline and creative spirit of the team. Both are important. How to innovate without creativity? Agility and creativity, applications of agile practices should be on all company levels and not only somewhere in the depths of development department. Indeed, many top managers ought to change their state of mind. Team searching is also a challenge. Russian mentality can be subdued only by uncompromising requirements to resources, processes and values (standards) of the company.

Analytics: new as before. What does company analytic usually do? Makes a SOW at clients' prompting. But your team is in charge of a new product? The SOW and conditions are constantly changing! To survive it is necessary to consider everything: modern and out of date technologies, changes in technological trends and technical standards, commercial and political aspects, as well as to analyse clients and competitors even in related areas. Everyone is to be analytic of the company.

Business is always a battle, a selection from the best available, but not always well enough, and this is immensely eagerness to the above principles that let the innovation companies to tackle with difficulties owing to gape between the early stage of life and skyrocketing conjuncture requirements of the market, to pass through pass and downs and convert threats into strong competitive advantages.

Maria Rukavishnikova
CEO, Getmobit cofounder

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1.1. Russian ICT market

Until this midyear, some analysts, heads of major distributors and other Russian IT companies time and again advanced an opinion that the Russian IT market in 2016 had stabilized. Some experts even discovered that the market growth set in at the end of the year. However none of research companies presented its estimates concerning the volume of the whole Russian IT market at year-end 2016. It will be recalled that RUSSOFT does not do this market research. The Association's analysts conclude about the IT market performance only on the basis of data taken from a lot of sources (reports of research companies, published ratings, official figures of major Russian IT companies).
RUSSOFT within the scope of input from our own research can just assess an accuracy of software market measurement as we have information on sales of Russian software developers in the domestic market.

Some 5-10 years ago it might be possible to analyze the volume of the whole Russian IT market according to 3-4 research companies including IDC and Gartner. More recently this information was publicly presented just by IDC. At year-end 2016 they also left the room. From all appearances, the interest of foreign analytical companies in the Russian IT market went down, on the other hand, Russian researches who would be able to cover the whole market never manifested themselves.
The Ministries of Communications and Mass Media and Economic Development and Trade now and then present their data , however all indications are that public servants confine themselves to conversion of indicators of IDC (or Gartner) into rubles adjusted for inflation (or not), and also in their own fashion determine what solutions and services refer to the IT market.

Although IDC for the first time did not published the main indicator of the Russian IT market, its value can be reasonably calculated from information about market segments which could have been collected in different publications. It turns out that in dollars terms the IT market decline at year-end 2016 was around 3-4%. Compared to the crash by 39% in 2015, this contraction can be adequately called the stabilization that is precisely what the IDC analysts have done.
At the same time in 2016 H1 they predicted the IT market decline at the end of the year by 13%. RUSSOFT predicted the IT market growth by 2-3% or a similar decline but in ruble equivalent. A similar figure in USD was predicted depending on the exchange rate of the ruble against the dollar. Actually, the national currency went down in values by some 10%, and the decline of the IT market (if guided by IDC) turned out to be much fewer.
It is fair to assume that in 2016 there was even a small growth of the IT market in dollar equivalent. There is a good reason to believe that it was so as though the cumulative turnover of 100 major companies in USD in the TAdviser100 rating has reduced by 1.5% (and increased by 4.7% in the CNews rating), but the small-sized software companies which could not get in these ratings, have increased sales domestically in rubles by 36% (by calculation of RUSSOFT based on yearly inquiry).
Judging from the results at the end of the year of domestic and foreign software companies this market not merely reduced but even increased by 11-12% (in USD).

1.2. IT market in view of different market players

Let us from the beginning base ourselves just upon the IDC data indicating that the estimated volume of the Russian IT market should be no less than $17 billion. In this case all its large segments (equipment, software, IT services) decreased by 3-5%. Therefore, the broad structure of Russian IT market has not become fundamentally different.

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If one splits it into smaller fragments, the changes will be significant as some fragments have shown the considerable growth while others – the significant reduction.

Translated into rubles, the IT market has increased by 5.1% that roughly corresponds to the official rate of inflation 5.4%. Therefore, in ruble terms and in comparable prices the market volume remains the same.

There is also an estimate of the IT market made by the Ministry of Economic Development and Trade, but only in a form of forecast published in autumn 2016. By assumption of public servants the IT market at year-end should have been reduced in comparable prices by 1.7% to 747.4 billion ($11.2 billion). But in all appearances they did not take into account the last (quite successful for selling IT companies) quarter as well as such growing and large segment of the IT market as SP.

If we consider the volume of the IT market in dollar terms as well as data on many segments and other indicators we may perform an additional analysis. The necessity to do it is related to the fact that RUSSOFT, contrary to foreign analysts, looks at the domestic market not from the standpoint of vendors who are interested just in foreign currency revenue. For another thing, RUSSOFT takes into account the interest of other important market players including IT users (both individuals and corporate customers of IT companies), and also domestic companies including those RUSSOFT's most special allies – software companies.

To Russian users it is important to get from the IT market a certain useful functionality. Even if we imagine that they get this functionality free of charge (that is at the zero size of the appropriate market), they will get the best of it though foreign analysts will declare the crash of the IT market. It is impossible to get the free ride in terms of IT products or services (even the free software, as a rule, requires a fee-based support), but price-cutting in the IT area is not uncommon. It brings about the reduction in market size and broadening options for getting a bigger functionality for same money.

It is challenging to assay the functionality and benefits in the context of the whole IT market. However one may speculate about its qualitative alteration. Especially, that there are also quantitative estimates for some market segments (number of devices, cumulative power, etc.).

The changes of the condition of the IT market for users can be assessed in some measure by the RUSSOFT bi-currency-index with account for change in $ and ruble prices. Thus it is possible to determine the trend and the significance of changes though to a poor accuracy.

As it would not be correct to determine the influence of IT upon economy and society by the estimate of market volume in a certain currency (it depends both on dollar and ruble prices), RUSSOFT has developed a method of index determination which allows for accounting the process in different currencies.

The point is as follows. The market is divided into imported and domestic solutions, and the growth in a respective currency is determined for each segment. Afterwards, the weight of each segment is accounted for. A share of Russian companies during the year increased just slightly, so we may ignore its change in our calculations.

For Russian companies a size of the IT market is of importance, but they mostly measure revenues in rubles. So the market capacity in ruble terms is more important for them.

Following this methodological introduction it may be reminded how the volume of the Russian IT market has changed in earlier years. High growth rates calculated in tens of percent were typical for the period from 2000 to 2008 inclusive. That time ended with the world financial crisis impacting negatively on the Russian economy. As a result, after a long period of growth, in 2009 the Russian IT market decreased by 16% in dollar terms.

The not altogether bad growth rebounded to the previous level already at year-end 2010, the pre-crisis market volume in dollar terms was rapidly exceeded.

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However after the crisis the top managers of IT companies declared that the Russian market for them had changed once-for-all-time because corporate customers drastically corrected their IT penetration programs and procurement policy.

Russian IT market in 2013-2017

		2013	2014	2015	2016	2017 (forecast)
From the standpoint of foreign companies	in USD (growth/drop in a year)	$33 billion (-1%)	$28 billion (-16%)	$17.8 billion (-39%)	≈$17 billion (-3-4%)	$18.5-20.5 billion (+10-20%)
From the standpoint of Russian companies	in rubles (growth/drop in a year)	₽1.05 trillion (+3.9%)	₽1.063 trillion (+1.2%)	₽1.08 trillion (+1.6%)	₽1.137 trillion (+5.3%)	₽1.19-1.25 trillion (+5-10%)
	Change in rubles with allowance for official inflation	-2.4%	-9.1%	-9%	≈0%	+0-5%
From the standpoint of Russian IT users	RUSSOFT bi-currency index	-	-10.6%	-25%	≈0%	+5-10%

Source: calculated according to IDC

The next growth of the IT market stopped in 2013 with a symbolic reduction of 1% (according to IDC), however the issue still was not an economic crisis. The situation in next two years the analysts of international research companies described as a crash of the IT market. In their opinion, it ended in 2016, and in 2017 they expected a significant growth.

However this history of the Russian IT market is presented from the standpoint of foreign corporations. During the world crisis 2009, as far back as 7 years ago it was borne in that such biased view did not allow to sum up the situation adequately in its entirety. In 2010 nobody could state that the shock of the previous year took a heavy toll on Russian economy as a whole and on IT industry especially. Investments in information technologies became more comprehensible and well thought out, at the same time many software companies which earlier grew rapidly on domestic market began to look at non-CYS countries where sales provided greater stability.

Summing up the results of 2013 it was found out that stagnation which was identified by the symbolic contraction of the volume of the IT market in USD, from the standpoint of users was mythical. Any depression was out of the question. Obviously, the teeming activity in the field of information support in Russia was ongoing. Some segments grew by 10% and more, others decreased just as significantly. Analysis of these changes showed that cheaper technologies (not infrequently the best for users) forced out those which required greater expenses. Above all such supersession was demonstrated by the quite wide-scale change-over to cloud technologies.

In addition, it must be taken into account the significant cheapening of computer equipment and the emerging trend of change-over to free software. Thus, it was assumed that the users in 2013 as well got more useful functionality than a year before.

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Meanwhile another factor was manifested – the oncoming saturation of a number of conventional segments of the IT market. For example, web-connected computers were almost in every household and ERP and EDMS – almost in every enterprise which lacked it.

RUSSOFT identified the following factors which apart from macroeconomic problems determined in 2013-2016 the contraction of the Russian IT market in dollar terms:
1. Improvement of the effectiveness of investment in IT (the biggest influence in the years most critical for economy)
2. Emergence of alternative technologies including public domain software
3. Saturation in some conventional segments
4. Dollar price-cutting (for computer equipment)
5. Lack of sensational specialties (there is every likelihood, that the accessibility of large-scale implementation of a wide range of new technologies will allow for forgetting this factor in the nearest future).

If you take an unbiased look at the current history of the IT market from the standpoint of users (from the perspective of impact upon domestic economy) and the history of Russian IT companies, you can call a recession year in the real sense of the word only 2015. Only in that year the users got from the IT industry apparently less functionality that in the previous one (nevertheless they got sufficiently much because even limited expenses on IT made it possibly not only to maintain already working systems and equipment but also ensure their development). In view of market changes at the same time in rubles and in USD by bi-currency index, then from the view of users the market reduced by 25%. This index does not account for replacement of some technologies by other ones and conversion to free software, but even considering these processes the drop all the same was significant — at the best roughly by 10%.
Regarding 2016, such firm conclusion on contraction of the IT market from the perspective of users already cannot be made. Either insignificant contraction or small increase took place (depending on a market segment).
For Russian IT companies assessing their failure and success in rubles, no market contraction in ruble terms took place in any year in the recent 16 years. Even in 2014-2015 the market has grown by a symbolic value. Truly speaking if the official inflation is taken into account a significant contraction over this period ultimately took place (by 9.1% and 9% correspondingly). In 2013, in comparable prices in rubles the IT market also slightly decreased but this drop was more that outweighed by the fact that Russian companies seized a certain IT market share from foreign vendors.
The issue of necessary import phase-out in Russia in 2013 was not discussed so actively as in the next two years, but still it was going on with a gradual growth of the share of Russian companies in some segments of the domestic IT market.
Consequently, from the point of view of Russian companies it can be said about existence of a crisis at the domestic IT market only in respect of 2014 and 2015. Predominantly difficult was 2015 when turnover of a number of Russian companies reduced by tens of percentage points even in ruble terms. At the same time, such drop in some degree was indicative of market reconstruction (i.e. a quite positive event). For example, the companies which offered cloud solutions enjoyed a rise in these 2 years. And indeed sales of software developers within Russia slightly increased even with account for the official rate of inflation (in USD they anyhow lost ground).
It might be that turmoil at the domestic market has even strengthened the Russian software industry rather than weakened it. Moreover, Russian companies were given more impulses to work at the global market.
Summing up the results of 2016 only foreign vendors can talk about any crisis at the Russian IT market. For that matter even for them the contraction turned to be nonthreatening. Some vendors with such contraction in Russia even succeeded to

increase sales calculated in USD. IT users and Russian IT companies in 2016 were faced with the emerging appreciable growth.

In this context notwithstanding the general contraction of the IT market in dollar terms (according to version of IDC), most its segments experienced a significant growth. The drop centered around just those segments which are decreasing also within the whole world market. Such shrinkage speaks for saturation of these segments, or introduction of new technologies, but not for crisis developments at the market.

There is no room for doubt about IDC data, however it is fair to assume that the methodology of this global research company is developed primarily with consideration of information of the same global corporations having a considerable market share worldwide. It may be assumed that specific local segments of the IT industry in different countries could be underestimated.

Anyway, an estimate of sales at the domestic market by Russian software companies provides suggestion that the market of products of software developers (including sales of licensed software, sales of development, installation and support services as well as provision of software as services) in Russia is much higher than the indicator mentioned in IDC reports (for further information please refer to the corresponding subsection on the Russian software market). Own data on software market let RUSSOFT assume that the volume of the Russian IT market should be not $17 billion, but not less than $20 billion

Basic indicators which characterize the Russian ICT market in 2016

Indicators	Absolute value following the results of 2016	Drop (-) /Growth (+) following the results of 2016	Drop (-) /Growth (+) following the results of 2015	Source
Cumulative business volume of 100 major Russian IT companies	₽1.145 trillion ($17.1 B)	+8.4% (-1.5%)	-	Rating TAdviser100
Cumulative income amount of 100 major Russian IT companies	-	+15% in rubles (+4.7% - in $)	+9.1% (-31.7%)	Rating CNews100
Cumulative income 0f 20 major IT suppliers in retail segment	₽35.7 B	+11.7%	+11.6%	CNews Analytics
Russian telecommunication market (volume)	₽1.688 trillion ($25.2 B)	+0.8% (-8.7%)	⅂% (-37%)	TMT Consulting
Mobile services	₽880 B	-0.3%	-	TMT Consulting
IT expenses of Russian federal public authorities	₽106.2 B	+10%	-	TAdviser
IT expenses of Russian regional public authorities	₽38.7 B	+10%		TAdviser

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Beyond that, stemming from the results of 2016 we may deduce not only about stabilization at the Russian IT market, but also about its obvious widening if we look from the standpoint of domestic IT companies and IT users. It can be ranked at 5-10%. Such growth for domestic companies with the almost unchanged market size in ruble terms (adjusted for inflation) means a reduction in the share of foreign corporations and the suggested by us underestimation of certain segments of the Russian IT market in the part of IDC. For users the prices in 2016 both increased and decreased while growth was provided by change-over to cloud technologies and free software.

Crucially, the conclusions of RUSSOFT and IDC do not disagree. They differ only because that in one case the IT market was looked at by Russian companies and Russian IT users, and in another case – by foreign vendors. Especially that just IDC remains a source presenting the most comprehensive idea about the Russian IT market environment. Calculations and conclusions of RUSSOFT are definitely and largely based on data of this company.

Unfortunately, there is no such relevant inner referral source about the IT market in Russia. For the state statistics (Rosstat) the IT sector and IT market do not exist at all. Activities of statistics have not been readjusted yet to current market-driven economy with fast developing high-tech companies. It may be seen in the presented statistical information which appears with a long time lag (sometimes within 1.5-2 years when the situation in economy and different branches can be quite different) and in the same form that was prepared many years ago for the state-controlled economy. It is also seen from lack of many important indicators representing development of high-tech economic sector in statistical reports.

The Ministry of Communications and Mass Media as far back as in July 2014 made a statement: "At the moment in Russia there is no official uniform statistical indicators for the IT industry, so from viewpoint of formal statistics such industry is non-existent".

The regulator proposed to develop a uniform procedure of performance evaluation of the Russian IT industry which resulted in the draft order prepared by the ministry. However three years have passed and nothing is known about the results of this proposal.

The RUSSOFT headquarters in St. Petersburg made an attempt to obtain from Rosstat the information on total revenues of St. Petersburg software companies with explanation about the source of data, but even the request made on a paid basis was ignored.

1.3. Some pieces of information allow for drawing conclusion on what is going on the Russian IT market

According to TAdviser, total IT expenses of all state bodies (federal and regional) comprise 12-13% of the whole volume of the Russian IT market.
IT budget of Russian federal authorities amounts to 0.6% of the total amount of Russian federal budget expenses (₽16.1 trillion). In the USA this figure is 2.2%.

According to OCS Distribution, one of the largest Russian distributor companies, the Russian IT market has stabilized and at year-end 2016 can increase by 2-3% in dollar terms. This prediction was given at the very end of the year so it should be sufficiently accurate.

Import phase-out according to OCS Distribution was a newsmaker already in 2016, but will be much more significant in the next years. Business of many Russian vendors with products in the portfolio of the distributor company is growing faster than by 10% per year. It concerns not only software suppliers but also domestic hardware producers (for example, Yadro, NT and Aquarius).

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Results of 2016 of some Russian and foreign companies

Name	Profile	Growth/drop of turnover in ruble terms
Docsvision	developer of Docsvision — system for document and business process management at enterprises and organizations	+30/40%
ALP Group	IT outsourcing	Turnover of IT outsourcing department has increased 1.5 times. Such activity areas as retail and work with Open Source solutions within import phase-out have increased 1.8 and 2.3 times correspondingly.
IntelTelecom	developer of systems in the area of call processing automation in Russia and CIS countries	growth > 30%
Vocord	developer and producer of professional tools for cctv and telecommunication solutions	+7/9%
iSpring	international company, developer of professional tools for eLearning, online presentations and arrangement of long-distance learning	+100%
Oblakoteka	cloud platform on IaaS	+70%
Syssoft	multiservice provider and SI, supplier of cloud solutions, software and hardware in Russia and CIS countries	growth > 90%
EDCOM	supply of interactive equipment, 3D printers, robotic modules and computer equipment for educational establishments, training centers and commercial companies	growth > 100%
Security Code	developer of software and hardware information security tools	+29.5%
Infosecurity	Russian holding company specializing in the area of information security of automated control systems	+31%
Netlab	distributor of computer equipment and components	+43%
OCS Distribution	full-range distributor developing areas of volume and design distribution	+23%

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Results of 2016 of some Russian and foreign companies

Name	Profile	Growth/drop of turnover in ruble terms
Marvel Distributions	full-range IT distributor	growth >10%
Sales of foreign companies in Russia		
QNAP (Taiwan)	supplier and developer of wireless network appliances	+20%
TP-Link (China)	supplier of wireless network appliances	+32%
SAP CIS (Germany)		+11%
SAS (USA)	developer of technological software and applications of Business Intelligence, Data Quality and Business Analytics grade	growth > 40%
IBM (USA)		-20%
Apple Rus (Russian subsidiary of Apple)		+70% (according to SPARK system)

1.4. Structure of the Russian IT market

Structure of the Russian IT market at year-end 2016

	absolute value	change	share
IT equipment	$10.6 B	-3-4%	62%
IT services	$4.27 B	-5.3%	25%
Software	$2.208 B	-4%	13%
Total:	$17.1 B	-4%	100%

Source: calculated according to IDC

A share of IT services in 2014-2015 markedly increased — from 20% to 25% (in 2016 it has not changed appreciably). It shows that the market is becoming more mature, though this change was primarily caused by significant rising cost of imported equipment bringing about a reduction of sales. If the situation is evaluated from the standpoint of Russian users and Russian vendors, all indications are that the total share of IT services and software in the volume of the Russian IT market is more than 38% and can reach 45%.

1.5. Russian IT market segment information

If at year-end 2015 the overwhelming majority of segments of the Russian IT market was decreasing, in 2016 the picture is quite another — the growth is prevailing, what is more in some segments the growth us very high — by tens of percent.

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Individual segments of the Russian IT market

Indicator	2016	Drop (-)/Growth (+) at year-end 2016	Source
Hardware			
Russian market of external data storage systems (total capacity)	$382.77 million (663 002 TByte)	+0.5% (+35.7%)	IDC
Russian PC market	4.47 million pcs	-7.9%	IDC
Russian PC market (desktop and notebook)	5.084 million pcs	+1%	ITResearch
Russian tablet computer market	4.71 million pcs	-22.9% (-27.8% in $)	IDC
Russian server market	102033 pcs ($531.3 M)	-4.5% (-20.1%)	IDC
Russian printer market	2.28 M pcs ($489.78 M)	+0.4% (+11%)	IDC
Russian smart watch market	-	+11% in pcs (+44% in rubles)	M.Video
Tablet computers	4.9 M pcs (₽50.2 B)	-24% (-14%)	ITResearch
Printers and desk MFD	2.2 M pcs	-11.9%	ITResearch
Monitors	2.33 M pcs ($369 M)	+10.6% (+5.4%)	ITResearch
UPS	1.08 M pcs ($292.6 M)	+4.5% (+9.2%)	ITResearch
Software			
Volume of Russian market of computer games	₽97.5 B	+13.7%	J'son & Partners
Russian EPR market	$632.72 M (₽42.2 B)	-1.1% (+8.8% in rubles)	IDC
Services			
Number of customers of virtual exchange services	149.9 thousand	+26%	iKS-Consulting
Russian market of IT services	$4.27 B	-5.3% (+3.6% in rubles)	IDC
Russian IaaS market	₽8.07 B	+37%	SAP, Forrester Russia, 2017
Russian SaaS market	₽13.79 B	+48%	SAP, Forrester Russia, 2017
Future markets			
Number of Russian companies working in AR/VR	183 (105 — in Moscow, 25 — in St. Petersburg)	+205%	AVRA
Expenses on products and services, related to Internet of Things (IoT)	₽85 B ($1.2 B)	+42% (+29%)	AC&M Consulting
Revenue of Russian operators from IoT servicing	₽7.6 B	+25%	AC&M Consulting

As for the external data storage market: if in dollar terms it is still at a sufficiently low level of 2015, then the total capacity of systems has increased almost by 40%. It means that foreign companies engaged in supply had just a nominal increase in sales in Russia, but users got much more functionality for the same dollars than a year ago.

Noteworthy is a significant difference in information about PC market between IDC and ITResearch. If in amount of sold computers the difference is not too big (probably, it is accounted for by different methodologies), then in change of this amount during the year the difference is huge: IDC registered a drop by 7.9%, while ITResearch — growth by 1%.

Recession at the server market IDC treats as development of segment of cloud services and service virtualization technologies. The market of cloud services is growing by tens of percentage points per year.

Volume of the Russian market of cloud technologies in 2014-2017 (growth in a year)

	2014	2015	2016	2017 (forecast)
SaaS	₽6.95 B (+46%)	₽9.3 B (+34%)	₽13.79 B (+48%)	₽13.79 B (+23%)
IaaS	₽4.75 B (+57%)	₽5.87 B (+24%)	₽8.07 B (+37%)	₽10.1 B (+25%)

Source: SAP, Forrester Russia, 2017

1.6. Russian software market

The Russian software market reached the maximum size in 2013 and amounted to $5 billion (according to IDC version). In next two years it decreased more than twice — to $2.3 billion. In 2016 free fall came to a stop. Judging by from media as referred to IDC, the software market shrank up by 4% more. Therefore, it has decreased up to $2.2 billion Yet according to RUSSOFT estimates (which account for sales of both products and services of Russian software developer companies), sales of Russian software companies at the domestic market are as much as $4.4 billion. With due account of results of the RUSSOFT annual inquiry, it is likely that this indicator in practice is higher (roughly by $1-2 billion).

The custom software development which IDC classes with the IT service market accounts for $1.3 billion. Here we have no direct contradiction because the volume of software development services is 30% of the whole Russian market of IT services ($4.3 billion). Nevertheless, there remains $3 billion received from sales of replicated solutions.

Partly the statement that the sales results of Russian software companies turns to be greater than the entire software market (according to IDC) may be explained by a double count as in development of solution on the platform of certain vendor payment to this vendor is accounted for twice — in income of the final solution developer and in income of the platform developer. Yet this double count hardly exceeds $0.5 billion.

In addition, $3 billion of total sales of software by Russian software companies at the domestic market hides revenue from activities at other markets. For example, developers of standard replicated solutions sell not only software products but also hardware and software packages and equipment based on the own software. Monetization of mobile applications can be performed through advertizing. These revenues of software companies at other markets also hardly exceed $0.5 billion.

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Anyway the volume of sales of Russian software companies at the domestic market is no less than the volume of entire market. At the same time in Russia foreign software is also sold that accounts for $1.5-2 billion at least. Therefore, the whole software market should be no less than $4-5 billion, and with custom software development – at least $6-7 billion.

At the same time, methodologies, purposes and goals of research of certain markets can differ dramatically. Indeed, there may be a great amount of methods to measure the software market. Hence there are serious discrepancies in research findings. Shall we include custom software in the concept of "the software market" or not? Shall we count SaaS as IT services or as software? Shall we account for revenues of software companies from introduction and support or not? If a company develops custom software for a specific customer, but on its own replicated platform, is it a service or a standard solution? If a software company sells mass-produced software-hardware complexes on the basis of its standard software, does it present sales of equipment or software? There are plenty of such questions. In majority of cases methodological difficulties are still related to the issue whether a certain segment is included with the IT services market or the software market.

That is why both $2.2 billion and $6-7 billion can be at once quite correct estimates of Russian software market. Perhaps, IDC accounts for just license fees whereas frequently 30-40% from the revenues of product software companies falls within this part while the remaining income the developers receive from support, implementation and other services.

Aside from different from IDC estimate of absolute size of the Russian software market, RUSSOFT differently evaluates its alteration. Different data show that contraction of software sales results in 2016 is unlikely in any measurement units. Russian software developers increased their sales at the domestic market by 16% on average. Upon that the growth was achieved in USD, and in rubles the growth was 28%. Foreign software companies, which disclosed their sales figures, state that revenue in Russia and CIS in USD either remains the same or has increased. For example, the growth of SAP was 1%, and that of SAS — over 25%.

In fact, many software companies including foreign ones have revised ruble prices for their software products. Particularly, Microsoft in early 2017 advanced the price more than the ruble devaluated against the dollar during 2016. This price revision shows that also Microsoft has reduced sales in Russia.

Perhaps, contraction took place in license selling, but it no way is related to Russian economic situation as software leaves product category for service category. Software companies on massive scale reduce a share of revenue from sale of licenses and increase a share from sale of services similar to SaaS which IDC most probably includes with IT services.

At the Russian custom software market the local developers prevail. Their aggregate income from sales at the domestic market was $1.3 billion having increased in 2016 by 13%. Arguably, the whole corresponding segment has increased by the same 13%.

It may happen that once more complete information on software market is received its volume may be adjusted forward — to $8-9 billion Anyway, one of RUSSOFT's calculation methods assuming that in Russia operate 3 thousand software companies (to all appearances more) indicates that Russian companies have sold at the domestic software market to the amount of $6.3 B (without double count). This indicator should be added at least by $1.5-2 B which foreign companies got from sales in Russia.

Growth of Russian software market in dollar terms was in 2016 11-12%, and in rubles — 22-23%.

For software users the situation has improved though the software price advance has significantly exceeded the official inflation rate (5.4%). The growth of expenses on software largely made compensation for rise in tariffs but users got their additional functionalities through change-over to free software and SaaS.

Basic characteristics of the Russian software market in 2015-2016

	2015	2016	Comment
Market volume (change in a year)	$2.3 B (-43.1%)	$2.2 B (-4%)	IDC version
	$5.5-6.4 B (-30/32%)	$6-7 B (+11/12%)	RUSSOFT version
Change in rubles with account for official inflation rate	-19%	+16/17%	RUSSOFT version

1.7. Use of Internet technologies

Putting some kind of growth slowdown to the side one may state that there was no crisis for Russian Internet industry in 2014-2015. Generally, this slowdown stemmed in some measure from the fact that a number of Internet users as far back as 2013 approached saturation threshold and in no way could recover momentum.

In 2016, the high grow rate of some indicators of use of Internet technologies in Russia recovered. According to RAEC estimates, in 2017-2019 the annual growth of Internet market will amount to 10-15%.

Use of Internet technologies in Russia

Indicator	Time	Absolute value	Indicator change	Penetration indicator	Source
Number of mobile Internet users	end of 2016	62 M	-	-	RAEC
Contribution of electronic economy to Russian GDP (with account for dependent markets)	at year-end 2016	2.8% (19%)	-	-	RAEC
Number of people involved in Runet industry	spring 2017	2.5 M	-	-	RAEC
Volume of e-commerce in Russia	at year-end 2016	₽1238 B	-	-	RAEC
Volume of Russian market of Internet advertizing	at year-end 2016	₽136 B	-	-	RAEC
Volume of Russian market of M2M/IoT	at H1-end 2016	₽300 B	+33% (compared with the same period in 2015)	-	RAEC

Use of Internet technologies in Russia

Indicator	Time	Absolute value	Indicator change	Penetration indicator	Source
Amount of online payments to 686 billion rubles (growth by 17%)	at year-end 2016	₽686 B	+17%	-	RAEC
Volume of e-commerce in Russia	at year-end 2016 (forecast for 2017)	₽920 B (₽1.1 trillion)	+21% (+20%)	-	APKIT
Proceeds of mobile application e-shops in Russia	at year-end 2016	almost $300 M	-	0.5% of all sales worldwide	App Annie
Share of Russians using electronic government services	in 2016 (plans for 2018)	51.3% (70%)	-	-	Ministry of Communications and Mass Media
Total number of users of Common Government Services Portal (EPGU)	at year-end 2016	40 M people	+75%	-	Ministry of Communications and Mass Media
Services ordered via EPGUs	at year-end 2016	₽7.9 B	growth by almost 200%	-	Ministry of Communications and Mass Media
Runet audience (used at least once a month, above 12 years of age), people	spring 2017	86.To7 M	+4.5% (compared to year-end 2015)	71% (81% in Moscow, 80% in St. Petersburg)	Mediascope (former TNS Russia)
Mobile internet audience (used at least once a month, above 12 years of age), people	spring 2017		+15% (only from mobile devices - +24%)	46%	Mediascope (former TNS Russia)
Internet audience in Russia aged 16 and older, people	end of 2016	84 M	no growth over year	70.4%	AllRussian omnibus GfK
Number of stationary broadband access users in individual segment in Russia, people	end of 2016	31.3 M	+4.7%	56%	TMT Consulting
Volume of Russian ARPU market	at year-end 2016	₽125.6 B (₽341)	+2.9%	-	
Total number of pay television subscribers in Russia	H1 2017	41.65 M subscribers	+0.6% (in QII)		TelecomDaily

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1.8. Telecommunications market

Mobile services	at year-end 2016	₽880 billion	-0.3%	TMT Consulting
Russian telecommunications market	at year-end 2016	₽1.688 trillion	+1.6%	TMT Consulting
Fixed telephony service cancellation	at year-end 2016	1.7 million subscribers	-	TMT Consulting

According to TMT Consulting, telecommunications market in ruble terms unadjusted for inflation increased in 2013 by 5% and in 2014 and 2015 – only by 3% with a much higher inflation. In 2016, growth rate decreased even more - up to 1.6%. However the inflation was much lower than in a couple of previous years (5.4% instead of 11-13%).
According to the analytical company iKS-Consulting, in 2015 the volume of the Russian business communication service market was 148 billion rubles, for the first time lowering — approximately by 1.5-2% as compared to the previous year. In 2014, the growth was 1.4%.

However concerning the telecommunications market we can state neither stagnation nor crisis. The existing cost effectiveness of telecommunications operators definitely permits to introduce new technologies, to enlarge the coverage area. In recent years, in different regions LTE (4G) networks have been put into operation, data transmission rate has been increased with stable tariffs. The Ministry of Communications and Mass Media already offers prospects of launching large fragments of next generation networks (5G) in 2019.
A flat path of sales of business communications services can be attributed not only to the tough economic environment in Russia but also to transfer to less expensive technologies. For example, telephone communication is shifting to VoIP telephony.

The growth of subscriber base of cellular communication operators is provided by mobile Internet subscribers (including M2M connections). In spring 2017 about 4% of all subscribers can be attributed to M2M connections. However an increase in number of subscribers does not lead to a similar growth of operators' income.

Russian market of cellular communication and mobile phones

Indicator	Time	Absolute value	Change	Source
SP sale (in rubles)	at year-end 2016	26.8 M (₽329.8 B)	+5%	Evroset
Cellular phone sale, pcs	at year-end 2016	-	-14%	Evroset
SP sale (in rubles)	at year-end 2016		+5% (+26.3%)	MTS
SP sale (in rubles)	at year-end 2016	26 M (₽320 B)	+3% (+25%)	Svyaznoi
SP sale (in rubles)	at year-end 2016	26.4 M	+4.4%	J'son & Partners Consulting
SP sale (in rubles)	at year-end 2016	30.66 M pcs	+15.2% (+16.1%)	IDC Russia
Sales of LTE-supported devices, pcs	at year-end 2016	-	+103.9%	IDC Russia

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Russian market of cellular communication and mobile phones

Indicator	Time	Absolute value	Change	Source
Share of SP in total sales of mPOS terminals	at year-end 2016	71%	+5 percentage points	J'son & Partners Consulting
SP sale with LTE module	at year-end 2016	-	> 2 times	J'son & Partners Consulting
Market of paid TV	at year-end 2016	₽74 B	+11%	TMT Consulting
Market of broadband Internet access	at year-end 2016	₽181.5 B	+3.8%	TMT Consulting
Number of private broadband access users has increased by 4%, to 31.2 million subscribers	at year-end 2016	31.2 M subscribers	+4%	TMT Consulting
Cellular communication spreading factor	end of 2016	178%	-	J'son & Partners Consulting
Number of cellular communication subscribers	end of 2016	257 M	+2%	J'son & Partners Consulting

The market of telecommunication services in 2017 to all appearance will grow by several percentage points in ruble terms as a result of tariff revision. The growth in dollar terms may exceed 10% due to the recent strengthening of the ruble.

1.9. IT market in the nearest future

The available information on sales results of a number of companies at the end of 2016 and in two first quarters of 2017 shows that in 2017 there predictably will be reached an appreciable growth of the Russian IT market in dollar terms. Even the segments which have not grown yet start widening. For example, supply of desktops has increased by 6% after three years of continuous decline showing growth of demand in corporate sector. A number of sold printers, smart phones, smart watches have also increased.

The ruble appreciation also will impact upon market volume in dollar terms. If sales results in rubles in all segments of the IT market remain the same, then in USD one may expect the growth by 10%. However due to apparently improving economic situation the IT expenses of households, enterprises and government agencies may increase by 5-10% in ruble terms as well.

When saturation in some segments of the IT market approaches the put-up demand should come into play as well as an interest in relatively new technologies (Internet of Things, blockchain, alternate and virtual reality, artificial intelligence). The companies in compliance with areas of activity develop their own innovative solutions. Among other things, the work on introduction of these solutions is addressed inside governmental agencies which usually are most conservative as regards new technology. Particularly, the Central Bank of Russia engages in activities on creation of crypto-currencies on the basis of blockchain technology.

Therefore, in 2017 one expects the growth of the Russian IT market by 10-20% in USD. In ruble terms the growth most probably will be much lower — up to 10%. Values of alteration of the volume of the IT market in different currencies will largely depend on the situation at the currency market in 2017 H2.

Noteworthy is that Russian software companies plan to increase sales at the domestic market by 16% in dollar terms, and that would mean that the growth of software market can be as much as 10-15%.

1.10. Russia, Russian cities and Russian software companies in world ratings

In 2017 Russia in the world ratings looks questionable as in the middle of 2017 some ratings have not been updated yet.

In terms of competitiveness among countries of the world Russia definitely is moving upward which is supported by the 40th place in Doing Business compared to the 51st in 2016, the 43rd place in The Global Competitiveness Index against the 45th in 2016. Although in the rating of the IMD World Competitiveness Yearbook the position of Russia underwent degradation by two points – 46th place in 2017 compared to the 44th in 2016.

#	Name of rating	2015	2016	2017
		Year / place of Russia in ratings	
**Competitive edge**				
1	Doing Business	62 (↑30) out of 189	51 (↑11) out of 189	40 (↑11) out of 189
2	The Global Competitiveness Index	53 (↑11) out of 144	45 (↑8) out of 138	43 (↑2) out of 138
3	The IMD World	45 (↑7) out of 61	44 (↑1) out of 61	46 (↓2) out of 63
**Innovations**				
4	Bloomberg Innovation Index	14 (↑4) out of 69	12 (↑2) out of 50	26 (↓14) out of 50
5	Global Innovation Index	48 (↑1) out of 141	43 (↑5) out of 128	45 (↓2) out of 127
6	Gesamtergebnis des innovations indikators	28 (↓1) out of 35	—	27 (↑1) out of 35
**ICT**				
7	Global Cybersecurity Index)	12 out of 196	—	10 (↑2) out of 193
8	ICT Development Index	45 out of 167	43 (↑2) out of 175	—
9	E-Government	—	35 (↓8) out of 193	—
10	Networked Readiness Index	41 (↑9) out of 143	41 out of 139	—
11	GfK Connected Consumer Index	44 out of 78	43 (↑1) out of 78	—
12	BSA Global Cloud Computing	—	17 (↓3) out of 24	—
13	The Global Retail E-Commerce Index	8 out of 30	—	—
14	Human Capital Index	26 (↑25) out of 124	28 (↓2) out of 130	—

If one geared to international ratings which characterize innovation development of countries across the world, then in 2017 Russia decreased its positions – in Bloomberg Innovation Index and Global Innovation Index Russia lowered to the 26th and 45th place correspondingly, and only by one position rose in the rating Gesamtergebnis des innovations indikators (innovation indicator) to the 27th place.

In ratings assessing ICT condition, in 2016 Russia remains in the first third of these ratings not sinking in the scale below the 40s places (except Global Cybersecurity Index, where Russia has risen to two positions more and takes the 10th place among 193 countries that really reflects the high profile of Russia and its IT industry in the cyber security area). Russian cities in 2017 have also lost their positions in the 500 Top Innovation Cities Global Index. But for Moscow, 19 Russian cities dropped in the rating by 27-152 places. This difference may be explained either by the actually increasing gap between Moscow and the rest Russian cities, or growth of strong world cities - competitors. It also should be taken into account that the methodologies of rating compilation Tcan differ from year to year bringing unexpected results.

Doing business —the 40th place (↑11)

Doing Business) is a global research including the rating of countries across the world by the indicator of creating the favorable business environment which has been conducted since 2002 according to the methodology of the World Bank.

Doing Business 2017: Equal opportunities for all is the 14th issue of the series published on the annual basis by the World Bank Group which measures regulations directly affecting businesses as well as regulations limiting business activity. The survey and the ranking of countries were prepared based on information as of June 1, 2016. The survey uses quantitative indicators assessing the ease of legal regulations for doing business and protecting property rights as well as allows for comparing data for 190 countries as the rules progress in the course of time.

The survey focuses on analysis of legal regulations concerning activities of private businesses in 11 areas of life cycle. This year ten areas were included in the consolidated rating of ease of doing business. They are: Starting a business, Dealing with construction permits, Getting electricity, Property registration, Getting credits, Protecting minority investors, Paying taxes, Trading across borders, Enforcing contracts, Resolving insolvency.

The alteration of position of Russia in this ranking, and in our case the research was based on such cities as Moscow and St. Petersburg, is witnessed by the summary table below:

#	Indicator	2015 (place in rating)	2016 (place in rating)	2017 (place in rating)
	Ease of doing business	**62 (↑30)**	**51 (↑11)**	**40 (↑11)**
1	Starting a business	34 (↑54)	41 (↑7)	26 (↑15)
2	Dealing with construction permits	156 (↑22)	119 (↑37)	115 (↑4)
3	Getting electricity	143 (↑2)	29 (↑114)	30 (↓1)
4	Property registration	12 (↑5)	8 (↑4)	9 (↓1)
5	Getting credits	61 (↓6)	42 (↑19)	44 (↓2)
6	Protecting minority investors	100 (↑15)	66 (↑34)	53 (↑13)
7	Paying taxes	49 (↑7)	47 (↑2)	45 (↑2)
8	Trading across borders	155 (↑2)	170 (↓15)	140 (↑30)
9	Enforcing contracts	14 (↓4)	5 (↑9)	12 (↓7)
10	Resolving insolvency	65 (↓10)	51 (↑14)	51

The experts draw the following conclusions for Russia. They evaluated as positive the change in the legislation of St. Petersburg facilitating procurement of construction permits (that raised the rating of Russia from the 119th to the 115th place) and as negative – the added complexity of procedure of enforcing contracts due to introduction of the mandatory settlement agreement prior to issuing claim form (lowering the rating of Russia from the 5th to the 12th place).

A general trend can be named positive because in 6 criteria out of 11 there is a positive rate of advance in the world rating including the main criterion "Ease of doing business". This year Russia raised in the rating from the 51st to the 40th place among 190 countries maintaining the last year's growth rate. If the growth rate remains unchanged then the instruction of the RF prime minister V.V. Putin given in late 2011 demanding that by 2020, Russia should move up in the Doing Business rating to the 20th place, can be considered as quite enforceable.

E-Government Survey 2016: E-Government Development Index (EGDI) — the 35th place

The United Nations E-Government Development Index is a comprehensive indicator assessing readiness and potentiality of the national government agencies to use information communication technologies (ICT) for providing state services to citizens. The survey has been performed since 2003 and is updated every other year by the UN Department of Economic and Social Affairs. The survey comprises information on level of electronic government development in various countries, as well as a benchmark of trends in ICT application by government agencies. All countries under survey are ranked on the basis of a weighed index of estimates by three main components: Internet services coverage and quality, Level of ICT infrastructure development, Human capital. The last survey was conducted in 2016 among 193 countries across the world: UN E-Government Survey 2016, and Russia took the 35th place out of 193 (see Table).

As the Table shows, Russia could not hold the high 27th place in the rating which had been sweepingly achieved in 2012. In 2016, Russia lowered to the 35th line due to downfall of Internet services coverage and quality and Level of ICT infrastructure development, and consequently left the TOP30 highly developed countries in E-government development index.

#	Indicator	2012 (place in rating)	2014 (place in rating)	2016 (place in rating)
	E-Government Development Index	**27 (↑33)**	**27**	**35 (↓8)**
1	Internet services coverage and quality	37 (↑55)	27 (↑10)	37 (↓10)
2	Level of ICT infrastructure development	30 (↑32)	33 (↓3)	39 (↓6)
3	Human capital	44 (↓17)	37 (↑7)	37

The Global Competitiveness — the 43rd place (↑2)

 The Global Competitiveness Index, a global survey and an accompanying rating of countries of the world by the economic competitiveness indicator is annually performed since 2004 by the World Economic Forum. The survey is based on the combination of publicly-available statistic data and results of global pool of company executives. The Global Competitiveness Index considers 113 variables. The population of variables by two-thirds consists of results of global pool of company executives, and by one-third of

statistics and results of research regularly conducted by international organizations. All variables are combined in 12 control indicators which determine national competitiveness. Following the results of the Global Competitiveness Report 2016–2017 among 138 countries Russia took the 43rd place in global competitiveness index.

#	Indicator	2015 (place in rating)	2016 (place in rating)	2017 (place in rating)
	Global Competitiveness Index	53 (↑11)	45 (↑8)	43 (↑2)
1	Institutional environment	97 (↑24)	100 (↓3)	88 (↑12)
2	Infrastructure	39 (↑6)	35 (↑4)	35
3	Macroeconomic situation	31 (↓12)	40 (↓9)	91 (↓51)
4	Health and basic education	56 (↑15)	56	62 (↓6)
5	Higher and vocational education	39 (↑8)	38 (↑1)	32 (↑6)
6	Efficiency of goods market	99 (↑27)	92 (↑7)	87 (↑5)
7	Labor market efficiency	45 (↑27)	50 (↑5)	49 (↑1)
8	Financial market maturity	110 (↑11)	95 (↑15)	108 (↓13)
9	Level of technological development	59	60 (↓1)	62 (↓2)
10	Size of market	7	6 (↑1)	6
11	Companies' competitiveness	86 (↑21)	80 (↑6)	72 (↑8)
12	Innovations	65 (↑13)	68 (↓3)	56 (↑12)

The growth rate of Russia in the rating in the previous 3 years is at its very worst, at all appearances, even if it retains the existing positions will be lost. The best Russian positions are Size of market, Higher education and infrastructure, the worst – Financial market maturity, Macroeconomic situation, Institutional environment, Efficiency of goods market, Companies' competitiveness. The greatest loss Russia suffered in Macroeconomic situation, having lost 51 positions in 1 year.

Researchers note that the financial sector of Russia is plagued by reduction of capital inflow related to earnings from mining operations, accessibility of credits and venture capital is cooling down.

Separately, experts ranked issues associated with doing business in Russia (listed in descending order of priority): inflation, rate of taxation, corruption, access to financing, fiscal regulation, political instability, bureaucracy, exchange controls, lack of skilled workforce, insufficient provision of infrastructure, poor propensity for innovations, poor work ethic of national workforce, government instability, crime and theft behavior, restrictive work quotas, health care underfunding.

Human Capital Index 2016 — the 28th place (↓2)

The World Economic Forum issues the third Human Capital Report 2016 with ranking of 130 countries by Human Capital Index. The previous ratings were compiled in 2013 and 2015. The World Economic Forum defines human capital as knowledge and skills allowing for providing economic merit. The rating considers two categories – education and employment each of which is characterized by 23 indicators for assessing education and employment levels. The index is prepared for 5 age groups: 0-14 years, 15-24 years, 25-54 years, 55-64 years and over 65 years. However this method has been employed just from 2015, so it is impossible to the full extent to compare all surveys. Data for Index were presented by international organizations UNESCO and ILO which in their turn receive information from national governments. Russia in this rating takes the 28th place.

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Experts draw the following conclusions about Russia: the country benefits from very high levels of primary, secondary and tertiary education in all age groups, but has a low expectancy of life - 61 years (the 86th country in the world) that from the standpoint of employment is not very efficient.

#	Indicator	2015 (place in rating)	2015 (place in rating)	2016 (place in rating)
Human Capital Index		51	26 (↑25)	28 (↓2)
1	Age group 0-14 years	—	44	53 (↑9)
2	Age group 15-24 years	—	13	14 (↓1)
3	Age group 25-54 years	—	29	28 (↓1)
4	Age group 55-64 years	—	17	18 (↓1)
5	Age group over 65 years	—	15	15

In terms of people having higher education, the USA, China and India have comparable figures (66-77 million, in RF - 29 million – however, a number of graduates from technical universities is greater precisely in China and India (4.6 million and 2.6 million people). In Russia they are 561 thousand and in the USA - 568 thousand.

World Competitiveness Yearbook (IMD) — the 46th place (↓2)

The annual IMD World Competitiveness Yearbook is a global survey and an accompanying rating of countries across the world in economic competitiveness according to the Swiss Institute of Management Development which has been prepared since 1996. The competitiveness of a country the Institute understands as a capability of national economy to create and maintain the environment where competitive business may emerge. Each of 63 countries in the rating is assessed through analysis of 333 criteria in four basic key aspects of a nation's economic life: Economic performance, Government efficiency, Business efficiency, Infrastructure. The calculation considers international organizations data, polls of analysts, top management of major corporations and executives. Ranking is based on the ratio: 2/3 — statistical data and 1/3 — expert estimates. In the last survey Russia went down by 2 lines from the 44th to the 46th place among 63 countries.

#	Indicator	2015 (place in rating)	2016 (place in rating)	2017 (place in rating)
World Competitiveness Yearbook		45 (↑7)	44 (↑1)	46 (↓2)
1	Economic performance	43 (↑2)	49 (↓6)	46 (↑3)
2	Government efficiency	44 (↓7)	39 (↑5)	46 (↓7)
3	Business efficiency	54 (↓1)	52 (↑2)	51 (↑1)
4	Infrastructure	36 (↑1)	36	36

The loss of positions can be explained by lowering of the indicator Government efficiency by 7 positions which in its turn is characterized by low values of Price (51st place), Institutional environment (56th place), Business legalization/incorporation (56th place).

The IMD experts note the following changes happened in Russia: increase in the share of state participation in Russian enterprises; anti-Russia sanctions and volatility in oil prices; high rates of interest with a hard ruble due to the changed trade strategy; lack of indexation of pension payment and draining away of the RF Reserve Fund; social instability associated with the coming presidential elections and the constant threat of terrorism.

Bloomberg 2017 Innovation Index - the 26th place (↓14)

Bloomberg Innovation Index is annually prepared by Bloomberg. In the last rating of 50 innovation countries Russia took the 26th line, falling by 14 positions in one year due to drop by 21 positions in Manufacturing value added, by 24 positions in Productivity and by 16 positions in High-tech density.

#	Indicator	2015 (place in rating)	2016 (place in rating)	2017 (place in rating)
	Bloomberg Innovation Index	14 (↑4)	12 (↑2)	26 (↓14)
1	R&D intensity	31 (↑2)	31	31
2	Manufacturing value-added	37 (↑20)	27 (↑10)	48 (↓21)
3	Productivity	15 (↑32)	18 (↓3)	42 (↓24)
4	High-tech density	15 (↓8)	8 (↑7)	24 (↓16)
5	Tertiary efficiency	2 (↑2)	3 (↓1)	3
6	Researcher concentration	26 (↓1)	27 (↓1)	27
7	Patent activity	6 (↑3)	15 (↓9)	16 (↓1)

The rating authors believe that the main reasons of Russia' lowering in the rating were economic sanctions and consequences of two-year drop of energy prices.

It may be noted that the Tertiary efficiency in Russia remains at the highest level already for several years (the 3rd place), at the secondary level (the 16th place) remains Patent activity.

Both the methodology of the rating and a low coverage of countries under consideration allow for being skeptical about neutrality of the presented final information and a critical stance towards it.

Global Innovation Index – the 45th place (↓2)

The Global Innovation Index is a global survey and an accompanying rating of countries across the world in innovation index according to the INSEAD business school. It has been performing since 2007. The Global Innovation Index consists of 82 different variables among 127 countries and allows for determining an efficiency of efforts to develop innovations in one or another country.
As a year before, in the survey Russia was presented by the Higher School of Economics.

#	Indicator	2015 (place in rating)	2016 (place in rating)	2017 (place in rating)
	Global Innovation Index	48 (↑1)	43 (↑5)	45 (↓2)
1	Innovation Input	52 (↑4)	44 (↑8)	43 (↑1)
2	Innovation Output	49 (↓4)	47 (↑2)	51 (↓4)
3	Innovation Efficiency Ratio	60 (↓11)	69 (↓9)	75 (↓6)

In 2017 rating Russia lost two positions and moved to the 45th place making way to Turkey. At a lasting growth rate of Innovation Input (growth by 13 positions in three years) Innovation Output is lowering as well as Innovation Efficiency (drop by 26 positions in 3years).

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Experts stress the following strength areas of Russia (a place among 127 countries):
- Female employed with advanced degrees (the 2nd place)
- Market capitalization (the 6th place)
- Utility models by origins (the 8th place)
- Trade, competition and market scale (the 12th place)
- Graduates in science & engineering (the 13th place)
- Pupil/teacher ratio, secondary (the 14th place)
- Knowledge-intensive employment (the 15th place)
- PCR patent applications (the 15th place)
- Intellectual property payments (the 16th place)
- Tertiary enrolment (the 17th place)
- Knowledge creation (the 22nd place)
- Citable documents H index (the 22nd place)

In addition to that, weak points of Russia are as follows (a place among 127 countries):
- Political stability and safety (the 112th place)
- Knowledge impact (the 111th place)
- Growth rate of PPPS GDP (the 110th place)
- GDP/unit of energy use (the 108th place)
- Innovation linkages (the 105th place)
- Rule of law (the 104th place)
- Regulatory quality (the 102nd place)
- Political environment (the 100th place)
- Logistics performance (the 96th place)
- Investment (the 95th place)
- Regulatory environment (the 94th place)
- ISO 14001 environmental certificates (the 94th place)
- FDI net inflows (the 94th place)
- Venture capital deals (the 90th place)
- Global ent. & media market (the 48th place)

Innovation indicator (Gesamtergebnis des innovations indikators) 2017 – the 27th place (↑1)

Innovation indicator is annually issued by the German Academy of Sciences (Acatech) and the German Industry Federation (BDI) for 35 countries since 2000. It comprises 38 indicators covering economy, education, science, state and society. Basically, the innovation indicator enables to assess a level of readiness of one or another country to use innovations.

#	Indicator	2015 (place in rating)	2016 (place in rating)	2017 (place in rating)
	Innovation indicator	28 (↓1)	—	27 (↑1)
1	Economy subindicator	25 (↑3)	—	26 (↓1)
2	Science subindicator	31 (↑3)	—	34 (↓3)
3	Education subindicator	27 (↓5)	—	21 (↑6)
4	Government subindicator	26 (↑3)	—	24 (↑2)
5	Society subindicator	26 (↓1)	—	32 (↓6)

For all the time of compiling this rating Russia has never risen higher than the 22nd place in 2000, and in the recent years fluctuates within the 27-28th place. In 2017 Russia took

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the 27th place in the rating in advance of Poland and Greece, but making way for Italy and China. The strongest point of Russia, in opinion of experts, is the position in the Education subindicator –the 21st place, due to the active participation of state in research funding. A moderate growth rate is observed for the Government subindicator – the 23th place. The worst position Russia takes in the Society subindicator which keeps on falling – the 32nd place, as well as in the Science subindicator – the 34th place.

Global Cybersecurity Index 2017 – the 10th place (↑2)

The survey was for the second time performed by the UN International Telecommunication Union. The Global Cybersecurity Index is an indicator of cybersecurity development of one country or another. The level of development of each country is analyzed by 5 categories of measures: organizational, legal, technical, capacity building and enhancing cooperation. 25 indicators were assessed based on the questionnaire results. The questionnaire included 157 yes/no questions to get more details. The information was considered in areas of legislation, standards, policies, national strategies, certification, regulations, occupational training, awareness-raising and collective partnerships.

#	Indicator	2015 (place in rating)	2016 (place in rating)	2017 (place in rating)
	Global Cybersecurity Index	12	—	10 (↑2)

Russia upheld its leading position in the Global Cybersecurity Index taking the 10th place among 193 countries and showing a high value of all measures aimed at provision of national cybersecurity: organizational, legal, technical, capacity building and enhancing cooperation. Among the CIS countries Russia takes the second place after Georgia outscoring Belarus.

The strong position of Russia is characterized by experts as follows:
- the commitments of Russia vary from developing of cybersecurity standards through R&D and information of the public to national cybersecurity industry. Case in point is Kaspersky Lab established in 1997, which software protects over 400 million users and some 270,000 organizations;
- Russia officially adopted the Strategy of National Security in 2000 and the Concept of National Security, as well as the Concept of Foreign Policy in 2013. In 2000 Russia put in place the Doctrine of National Security, every Russian government agency performs annual audit of own networks and systems in accordance with the Doctrine and areas specified in different adopted strategies;
- in Russia there were established the Computer Emergency Response Team focusing on information systems of government agencies of the Russian Federation (GOV-CERT), the Russian Computer Emergency Response Team focusing on cyber incidents outside government agencies (RU-CERT and CERT-GIB); the Computer Emergency Response Team for financial sector (FinCERT).

ICT Development Index 2016 - the 43rd place (↑2)

The ICT Development Index is a composite indicator characterizing achievements of countries across the world from the standpoint of development of information communication technologies (ICT). It is calculated according to the methodology of the International Telecommunication Union, the specialized UN division which specifies world standards in the ICT area. The index was developed in 2007 on the basis of 11 indicators which the International Telecommunication Union employs in estimates of ICT development in 190 countries.

The results of the ICT Development Index will be presented in November 2017, so below is factual information for 2016 when Russia rose by 2 lines from the 45th to the 43rd place.

Compared to other countries, Russia has a low value of Fixed-telephone subscriptions per 100 inhabitants and also of Fixed-broadband subscriptions per 100 inhabitants.

#	Indicator	2015 (place in rating)	2016 (place in rating)	2017 (place in rating)
ICT Development Index		45	43 (↑2)	—
1	ICT access	48	49 (↓1)	—
	Fixed-telephone subscriptions per 100 inhabitants			
	Mobile-cellular telephone subscriptions per 100 inhabitants			
	International Internet bandwidth per Internet user			
	Percentage of households with a computer			
	Percentage of households with Internet access			
2	ICT use	44	45 (↓1)	—
	Percentage of individuals using the Internet			
	Fixed-broadband subscriptions per 100 inhabitants			
	Active mobile-broadband subscriptions per 100 inhabitants			
3	ICT skills	19	14 (↑5)	—
	Mean years of schooling			
	Secondary gross enrolment ratio			
	Tertiary gross enrolment ratio			

Networked Readiness Index– the 41st place

The Networked Readiness Index characterizes a level of ICT development in countries across the world. It is issued by the World Economic Forum year over year since 2002.

#	Indicator	2015 (place in rating)	2016 (place in rating)	2017 (place in rating)
Networked Readiness Index		41 (↑9)	41	—
1	Environment subindex and pillars	63 (↑24)	67 (↓4)	—
2	Readiness subindex and pillars	27 (↑10)	32 (↓5)	—
3	Usage subindex and pillars	39 (↑14)	40 (↓1)	—
4	Impact subindex and pillars	42 (↑2)	41 (↑1)	—

The index measures the ICT development level by 53 parameters combined into four basic groups (listed in Table) among 139 countries. The authors proceed from the premise that development of economy and development of ICT are inextricably intertwined since ICT influences all areas. As the Networked Readiness Index for 2017

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has not been presented yet, below the Russian position in 2016 is presented – the 41st place as a year before.

Enough as it is, not very good environment for ICT development is all downhill (the 67th place), as well as readiness to use ICT (the 32nd place). The practically the same is the level of ICT usage and impact on economy (the 40th and 41rd place correspondingly).

Experts indicate that development of Russia is hindered by the weak and degrading regulatory landscape. Consumption of Internet services by individuals is also growing owing to communication tariff cheapening. A rate of ICT infrastructure growth does not match the demand having a negative impact on accessibility of Internet services.

The Web Index – the 35th place

#	Indicator	2014 (place in rating)	2016 (place in rating)	2017 (place in rating)
The Web Index		35 (↑6)	—	—
1	Penetration	29	—	—
2	Content quality	27	—	—
3	Freedom and openness	55	—	—
4	Rights and opportunities	31	—	—

The Web Index is a composite indicator characterizing a level of Internet impact on different areas of public life in countries across the world. It was developed in 2012. The Index is annually published by the international organization World Wide Web Foundation. It is compiled in four groups: Penetration, Content quality, Freedom and openness, Rights and opportunities. Calculations are made on the basis of statistical data of international organizations: UN, International Telecommunication Union, World Bank, World Economic Forum, Wikimedia Foundation. The last survey covers only 2014 when Russia got the 35th line among 86 countries.

As of the middle of 2017, the Web Index has not been updated yet. With due account for trends in Russia noted in 2014 concerning large-scale censorship on the part of government services in the absence of any convincing tools of privacy protection, it would be interesting to look at the dynamics of changes.

The 2015 Global Retail E-Commerce Index — the 8th place

In the A.T. Kearney global retail e-commerce rating Russia took the sufficiently high 8th place among 30 developed and developing countries (in 2014 it took the 13th place). In their ranking the A.T. Kearney experts used generally objective indicators: market size and growth, condition of infrastructure, consumption in global Internet. The list is headed by China with the world biggest number of Internet users. But for instance India with more than 1.2 billion people was not included in the rating owing to infrastructure problems.

In opinion of rating's authors, the population of developing countries faster tune themselves to current changes than people from developed countries. The inhabitants of developing countries use telephones for search for goods, price comparison and information sharing with their friends in social networks.

Russia with 18% of forecasted annual average growth rate by 2018 and online business volume of $10 billion is transformed in one of the e-retail markets appealing to both domestic and foreign retailers. Among all European countries, it enjoys the most numerous Internet users' community (over 70 million people). 33 million of Russian people buy goods online. At the same time, the experts forecast that Russian online business will grow at the average rate of 18% by 2018.

In the first half of 2017, there have been no updated versions of this index yet.

GfK Connected Consumer Index — the 43rd place

In the GfK Connected Consumer Index which demonstrates a level of availability and usage of technical devices (including those with internet connection) by consumers of different countries, Russia in 2016 took the 43rd place among 78 countries having risen by 1 line as compared to the previous rating.

Innovation Cities Global Index 2016-2017

The International Innovation Agency 2thinknow presented the results of rating of the most innovation cities of the world Innovation Cities Index 2016-2017. This year a number of rating participants includes 500 cities worldwide.

City	2015 (place in rating)	2016 (place in rating)	2017 (place in rating)
Barnaul	—	—	446 (↓41)
Vladivostok	367 (↑14)	—	415 (↓48)
Volgograd	365 (↑13)	—	432 (↓67)
Yekaterinburg	220 (↓7)	—	358 (↓138)
Izhevsk	400 (↓6)	—	454 (↓54)
Kazan	223 (↓1)	—	339 (↓116)
Kaliningrad	303 (↑11)	—	397 (↓94)
Krasnoyarsk	280 (↑23)	—	412 (↓132)
Moscow	45 (↑18)	—	43 (↑2)
Nizhny Novgorod	273 (↑9)	—	388 (↓115)
Novosibirsk	244 (↑9)	—	394 (↓150)
Omsk	362 (↑9)	—	421 (↓59)
Orenburg	406 (↑1)	—	448 (↓42)
Perm	340 (↑14)	—	419 (↓79)
Rostov-on-Don	289 (↑28)	—	392 (↓103)
Samara	282 (↓16)	—	434 (↓152)
St. Petersburg	48 (↑33)	—	75 (↓27)
Saratov	341 (↑14)	—	437 (↓96)
Togliatti	407 (↑1)	—	455 (↓48)
Tomsk	339 (↑4)	—	444 (↓105)
Total cities in rating:	442	—	500

The rating makes possible to determine a potential of participants in the field of creation, implementation and translation of innovative ideas.

The cities are evaluated by 162 special indicators including evolution of market relations, investments in technological progress, business environment, level of development of science, education, health care, culture as well as urban sports, financial and information communication infrastructure.

2015 was a year of rise of Russian cities, whereas 2017 was for all cities but Moscow unfortunate one: the cities literally broke down in the rating having lost from 27 to 152 positions. Curiously enough, St. Petersburg suffered the same fate – from the 48th place it dropped to the 75th and rubs shoulders with Athens (Greece) and Sao Paolo (Brazil). In contrast, Moscow even rose by two positions to the 43rd place and is laced with Denver (USA) and Lyons (France). Such discrepancy can be explained either by over increasing disparity between Moscow and other Russian cities, or by appearance of strong competitive cities.

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Data-driven city

In 2016, the research company PricewaterhouseCoopers (PwC) studied the experience of 28 main world metropolitan cities in implementation of the DDC (Data driven city) concept. In the quadrant Data-driven city Moscow was among the leaders. Only New York and London were slightly ahead. The survey served double duty. First, it was focused on international practice in urban management mechanisms and studying of the most successful examples of the DDC concept implementation. The study is based on two complementary methods: semantic analysis of metadata about the cities and technologies, and expert assessment on data-driven solutions that are used in five leading cities: New York, London, Barcelona, Sydney, Moscow. In 2017 there have been no updated versions of the survey.

2016 BSA Global Cloud Computing — the 17th place

Business Software Alliance (BSA) in 2016 undertook the study BSA Global Cloud Computing, to rank the cloud computing readiness of 24 countries that account for 80% of the world's IT markets. Russia took the 17th place among 24 major countries. In 2013 that position was higher — the 14th place. Such lowering is associated with the fact that the Russian legal and regulatory framework hinders development of cloud-based computing. The experts note that Russia adopts the protectionist policy in the cloud computing field creating a barrier to innovations therein.

At the same time, cloud technologies just in the last 4 years began to be actively entrenched in Russia with tens of percent rate of growth, and it is hardly possible to talk about any restraint policy having such rate. Apparently, this information has not reached the rating authors yet. In 2017 the survey BSA Global Cloud Computing has not been performed.

Indicator	2015 (place in rating)	2016 (place in rating)	2017 (place in rating)
BSA Global Cloud Computing	—	17 (↓3)	—

Stability of Internet national segments — the 3rd place

The Russian national segment of Internet according to the 2016 research of Qrator Labs specialized in DDoS attack countermeasures has become the 3rd in terms of stability among national segments of Internet worldwide. The stability of one or another national segment is determined depending on a share of operator which experiences the biggest impact in case of failure. Just so, Runet according to Qrator Labs calculations is mainly conditional on the company Rostelecom which malfunction would cause the global unreachability of no more than 5.5% of the Russian segment networks. In 2017 the rating was not updated.

Tholons Top 100 Outsourcing Destinations

The consulting agency Tholons on yearly basis prepares the rating of 100 outsourcing attractive world's cities. Comparing positions of Russian cities over the period from 2015 to 2016, one may deduce that Russian cities are losing relish from the standpoint of the rating compilers. All our cities decreased their scores in the rating by 1-8 positions while Novosibirsk left the Top-100 at all. Today Moscow rubs shoulders with Ahmadabad (India) and Xian (China), and St. Petersburg with Jaipur (India) and Belfast (Northern Ireland).

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City	2015 (place in rating)	2016 (place in rating)	2017 (place in rating)
Moscow	56	64 (↓8)	—
St. Petersburg	34	37 (↓3)	—
Nizhniy Novgorod	59	60 (↓1)	—
Novosibirsk	92 (↓1)	—	—

Such reduction of outsourcing attractiveness in Russian cities the authors relate to decline of oil prices and Western sanctions against Russia, with Russia involving itself in the turmoil in the Middle East.

As of the middle of 2017, the rating of the cities has not been updated.

1.11. International ratings of Russian companies

The presence of Russian companies in the international ratings appreciably improves the level of credibility towards them and allows for carrying on the more successful international business activity. On a provisional basis they can be divided into service and product companies' ratings.

In the rating The Global Outsourcing 100 (the rating of the International Association of Outsourcing Professionals) 2017 ICL Services, Auriga, Luxoft, MAYKOR, EPAM Systems were added MERA and First Line Software.

In the rating ISG Outsourcing Index in 2017 Luxoft was joined by First Line Software.

The rating Software 500 as of the middle of 2017 has not been updated but considering that two last years it included EPAM Systems, Luxoft, CFT Group, Diasoft, Artezio, Simbirsoft, it is highly probable that they also will appear in the 2017 rating.

As of product companies and Magic Quadrants of Gartner, a number of Russian companies were in 2017 the biggest in the security segment: Kaspersky Lab, InfoWatch, Zecurion, SearchInform, Group IB. In Disaster Recovery as a Service a niche position took Acronis. In Web Application Firewalls in 2017 Positive Technologies more than likely will retain the visionary status, and in Data Center Backup and Recovery Software/Solutions Veeam will stand its ground of the leader status.

The 2017 Global Outsourcing 100

#	Russian company	2015 (status/score from 4)	2016 (status/score from 5)	2017 (status/score from 5)
1	Artezio	Rising star	—	—
2	Auriga	Rising star 1	Rising star 4	Rising star 3
3	Luxoft	Leader 1	Leader 3	Leader 4
4	MAYKOR	Leader 3	Leader 4	Leader 4
5	EPAM Systems	—	Leader 4	Leader 5
6	First Line Software	—	—	Startup 2
7	ICL Services	—	Leader 3	Leader 4
8	MERA	Leader 0,5	—	Leader 2

The International Association of Outsourcing Professionals (IAOP) for 12 consecutive years has been compiling the rating of 100 TOP world's outsourcing companies. To be included in this rating, since 2016 the companies are judged on five criteria: size & growth, customer references, awards & certifications, programs for innovation, corporate social responsibility. It should be taken into account that the Association is interested in attraction of new members that may impact on the rating of companies which are not the IAOP members. In and of itself no rating with sequential numbers has been prepared since 2015, but each company is given a status of leader or rising star depending on compliance with 5 criteria. In 2017 the rating includes 7 Russian companies (against 5 in 2016), 5 of which are leaders. The only one Russian company meeting all 5 criteria is EPAM Systems followed in path by Luxoft, ICL Services, MAYKOR, MERA, Auriga, First Line Software.

ISG Outsourcing Index 2017

In 2016 and 2017 in the quarterly reports of Information Services Group which prepares the list of outsourcing industry leaders (ISG Outsourcing Index) there were included the following Russian companies:

Luxoft – in 2016 the company was included in TOP-15 groundbreaking companies at the outsourcing market in America, EMEA and Asia with turnover up to $2 billion, becoming the only Russian company in this rating in 2016 and retaining positions in 2017 Q1;

EPAM Systems joined Luxoft in the rating of TOP-15 groundbreaking companies at EMEA the outsourcing market following the results of 2017 Q1 with turnover up to $1 billion.

Deloitte Technology Fast 500 EMEA 2016

According to Deloitte in TOP 500 of the most fast developing high tech companies EMEA in 2016 there was included only one Russian company involved in the Avito project (classifieds site) and took the 171st place in category Media with the growth indicator 621% (at an average growth of high tech companies 967%). The rating of companies was compiled in 2016 based on the revenue growth indicators over the period from 2012 to 2015.

Software 500

#	Russian company	2015 (place in rating)	2016 (place in rating)	2017 (place in rating)
1	EPAM Systems	122 (↓9)	111 (↑11)	—
2	Luxoft	171 (↓3)	144 (↑27)	—
3	CFT Group	188 (↓37)	222 (↓34)	—
4	Diasoft	344 (↓38)	389 (↓45)	—
5	Artezio	436 (↓20)	420 (↑16)	—
6	Simbirsoft	497	471 (↑26)	—

As a year before, six Russian software developers were present in the rating of 500 world best software companies in terms of business volume: EPAM Systems with turnover of $905M, Luxoft $521M, CFT Group $218M, Diasoft $30M, Artezio $16M, Simbirsoft $4M. Compared to the previous year, in 2016 almost all companies except CFT Group and Diasoft, improved their places in the rating by 11-26 positions which indicates a positive dynamics. But as before, not all companies are included in the rating, only few of them provide their turnover information to the rating compilers.

Magic Quadrants of Gartner

The Gartner Group analytical agency ratings are one of the most prestigious ratings of product companies (software product vendors). This agency year over year publishes so-called Magic Quadrants of Gartner, which include the products and the companies that are among the leaders in certain software segments.

Gartner Magic Quadrant	2015 / Russian company	2016 / Russian company	2017 / Russian company
Endpoint Protection Platforms	Kaspersky Lab (leader)	Kaspersky Lab (leader)	Kaspersky Lab (leader)
Enterprise Data Loss Prevention	— — —	InfoWatch (niche player) Zecurion (niche player) —	InfoWatch (niche player) Zecurion (niche player) SearchInform (niche player)
Treat Intelligence	Kaspersky Lab Group IB	Kaspersky Lab Group IB	Information on research not available
Business Intelligence and Analytics Platforms	PROGNOZ (niche player)	—	—
Advanced Analytics Platforms	PROGNOZ (niche player)	PROGNOZ (niche player)	Information on research not available
Web Application Firewalls	Positive Technologies (visionary)	Positive Technologies (visionary)	Information on research not available
Data Center Backup and Recovery Software/Solutions	Veeam (visionary) Acronis (niche player)	Veeam (leader) —	Veeam (leader) —
Contact Center Infrastructure, Worldwide	NAUMEN (NODA)	NAUMEN (NODA)	NAUMEN (NODA)
Disaster Recovery as a Service	Acronis (visionary)	Acronis (pretender)	Acronis (niche player)
Enterprise File Synchronization and Sharing	Acronis (niche player)	—	Information on research not available
Enterprise Backup Software and Integrated Appliances	Acronis (niche player) Veeam (visionary)	— Veeam (leader)	Information on research not available

The leaders take a significant market share and impact greatly upon the market, to a large extent determine its development. The visionaries understand market trends but do not have sufficient facilities to affect the market.

The niche players focus on small segments or the other way round are "defocused" and do not boast by functions or potentialities.
The pretenders have a significant market share or take up a large segment, but it is not they who govern the market environment by their steps.

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As of the middle of 2017 not all Magic Quadrants of Gartner have been updated, but it is safe to say about leading positions of Russian companies in the following segments:

Endpoint Protection Platforms - Kaspersky Lab steadily makes the top three for the second year in a row;

Threat Intelligence — this software segment is presented by two Russian companies: Kaspersky Lab and Group IB falling under the leading global players within the segment.

Enterprise Data Loss Prevention— InfoWatch and Zecurion were added by SearchInform, and all three companies in 2017 turned to be in the zone of niche players, in so doing InfoWatch somehow moved up towards leaders;

Web Application Firewalls,

Data Center Backup and Recovery Software/Solutions – in the first segment in 2017, most likely Positive Technologies will retain its visionary status, and in the second segment Veeam has maintained and strengthened the leading position;

Disaster Recovery as a Service - Acronis for three years was all downhill in this segment and in 2017 lost the pretender status and became a niche player.

Therefore till the end of 2017 we expect to see 10-12 Russian software companies in Magic Quadrants of Gartner.

CHAPTER 2.

Volume and structure of sales by Russian software companies in domestic market and abroad

2.1. Sales volume of Russian software development industry

In 2016 the total sales of the Russian software companies increased by 27% in ruble terms. In the previous crisis year an increase in turnover in rubles amounted to 40%, but the reduction of growth rate of ruble revenue in this case does not reflect changes that have taken place – the situation in industry became entirely different, much better. In 2015 such a high amount of growth in ruble terms was produced mostly due to a ruble exchange rate fall (annual average dollar rate increased from 38 rubles to 61 rubles) at a quite usual in the recent years growth in foreign sales by 12%. In fact, the increased sales volume in a greater degree took place in accounting statements than in reality.
Noteworthy, in 2015 at a 40% growth in rubles the turnover in dollars for the first time in history of Russian software industry reduced. In 2016 all turnover indicators turned to be positive (in dollars, in rubles and in inflation-adjusted rubles). A decline in the ruble appreciably came to a halt (from 61 rubles to 67 rubles per $), whereas the basic incremental growth of turnover was ensured just by domestic market. If we count in rubles, then foreign sales increased by 24% and sales at the domestic market by 34%. In $, the growth of foreign sales remained at the last year level— 13% (in 2015 - 12%).

The question about the best currency to measure the industry's sales, in our opinion, is not appropriate. Everything depends on what we want to determine. If we estimate the share of Russian software industry in the global software market, then USD must be used. If we want to determine the movements in development of the domestic companies, then it is better to use ruble still as they operate in the ruble zone. In this case, one can estimate the sales either without or with regard to the inflation rates..

As RUSSOFT tries to show the industry's evolution in various aspects, then we provide the total sales variations and indicators of cumulative turnover in different measurement units. In addition, we have introduced our own bi-currency index to be calculated as an average growth of revenues in foreign currency and rubles considering the weight of earnings from exports and domestic market sales. As per the results of 2015, the index amounted to 1.1 (i.e., the corporate sales increased integrally by 10% on the average for the year, and in 2016 – 1.21 (growth by 21%). This indicator better reflects the main trend of change that took place in industry within the year than growth/reduction of total revenue in rubles or dollars (though one has to consider also depreciation of currencies – both dollar and ruble inflation).

2.2. Basic indicators of Russian software industry

Volume of foreign sales in 2002-2017 (annual increase)

2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017*
0,345	0,53	0,74	0,95	1,41	2,15	2,6	2,75	3,3	4	4,6	5,4	6	6,7	7,6	8,6
	+55%	+39%	+28%	+49%	+52%	+21%	+5%	+20%	+22%	+13%	+17%	+11%	+12%	+13%	+13%
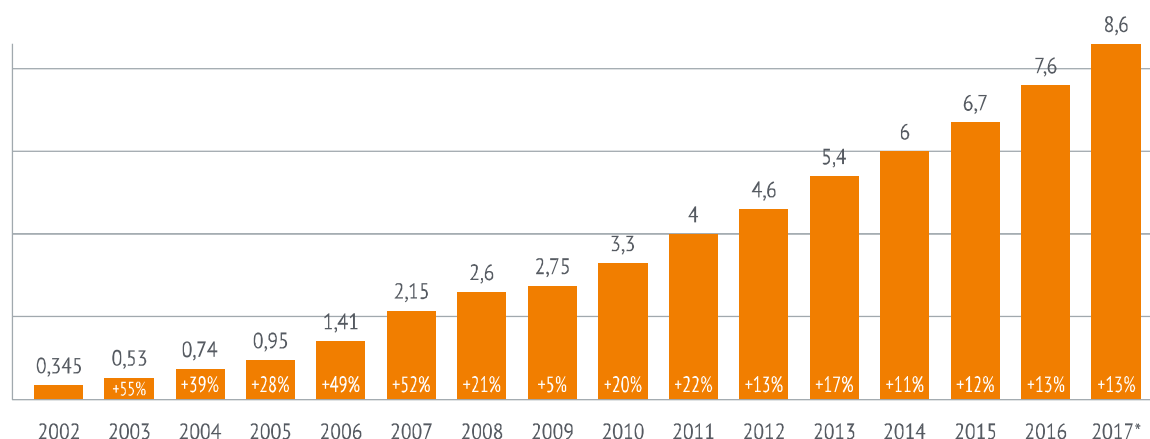
* - forecast

The number of Russian software companies and consolidated numbers of core employees

Number of Russian stable software companies	at least 3200
Number of companies with export receipts	at least 2000
Consolidated staff numbers industry-wide	thousand persons
Software developers working in IT industry in Russia	465-475
Software developers working in Russian software development industry (total) including:	180-195
- in development centers abroad	50-60
- in Russia	130-135
in service companies (for foreign customers)	73-78 (26-27)
in product companies	≈53
in Russian R&D centers of foreign companies	>5

Basic figures characterizing the Russian software industry in 2013-2017 (growth/decline compared to similar indicator in the previous year)

	2013 *	2014	2015	2016	2017 **
Cumulative turnover of Russian software companies, $	over $11 B	$12 B (+5%)	$10.34 B (-10%)	$12 B (+16%)	$13.6 B (+13%)
Volume of foreign sales, $	$5.4 B (+17%)	$6 B (+11%)	$6.7 B (+12%)	$7.6 B (+13%)	$8.6 B (+13%)
Share of foreign sales in cumulative turnover	49%	50%	65%	63%	63%
Volume of sales in domestic market, $	$5.6 B	$6 B (+7%)	$3.64 (-39%)	$4.4 B (+21%)	$5 B (+14%)
Volume of sales in domestic market, ₽	₽178 B	₽240 B (+35%)	₽220 B (-8%)	₽294 B (+34%)	₽300 B (+2%)
Cumulative turnover of Russian software companies, ₽	₽363 B	456 B (+25.5%)	₽630 B (+40%)	₽802 B (+27%)	₽816 B (+2%)***
Change of cumulative turnover of Russian software companies in inflation-adjusted rubles	-	+12.8%	+23%	+20%	-3%
RUSSOFT bi-currency index	-	1.23	1.1	1.21	1.09

* - before 2013 RUSSOFT did not determined an amount of cumulative turnover so no information of turnover growth as compared to 2012 is available.
** - forecast
*** - a low figure of growth of total sales is due to the anticipated appreciable strengthening of national currency

The growth rates of sales of software products and development services have been falling steadily during 4 most recent years, as a rule, within 11-13%.

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Due to new sanctions and increased difficulties of work done at Western markets, in 2016 it would be possible to expect a reduction of growth, however it did not happen. First, in the previous couple of years the competitiveness of Russian companies rose sharply because their labor costs in dollar terms decreased (due to a decline in the ruble in Russia a level of wages in dollars dropped by half). This factor was of landmark nature for service companies, the growth in foreign sales in 2014-2015 was largely provided by custom software development. Second, software developers began to align with new markets (Africa, South and Latin America, Southeast Asia and Middle East). In addition, it emerged that the problems at markets of North America and Western Europe cause distress but by no means are critical for business of Russian companies in these regions.

It is fair to assume that Russian companies lost some contracts but generally in a sector under government control. In a private sector the customers also were sensitive to anti-Russian rhetoric in media but in most cases made pragmatic decisions — kept on working with Russian companies, when it was profitable for them.

Nevertheless, the risks related to a focus of Russian IT companies on Western markets persist under the condition of geopolitical stand-off between Russia and the West. These risks could be stemmed primarily through a more active development of other markets. This is exactly what is going on, in particular, with the assistance of the Russian Export Center. Thus, a number of business missions to developing countries with participation of Russian software companies in 2017 increased drastically.

It is fair to assume for a good reason that there exist opportunities for further turnover expansion of Russian software development industry at a rate at least equal to that in 2016. At the domestic market the anticipated economic revival will assist the growth of industry, as well as a next wave of implementation of technologies which are ready for mainstream use (or on the edge of it), and also the taking shape imports phase-out.

A negative factor in form of the anti-Russian campaign in most Western media should ultimately be covered with changes in relations of Russia with European countries positive for Russian developers.

A noteworthy detail is that the drive to imports phase-out in IT area (or it's more accurate to say – to "Digital sovereignty") exists not only in Russia but in many countries outside the western world. For one, imports phase-out may happen as substitution of import from one country by import from the other country. Taking into account a critical difference of the levels of IT development in developed and developing countries, in most undeveloped countries just such imports phase-out is much more likely than the substitution of the US solutions by their own local ones.

The existing global technological trends also operate to the advantage of Russian developers. Software development in future-oriented segments of the new Technological mode stipulates a high level of physical and mathematical foundation which still remains in place in Russia, upon all problems of the Russian system of higher education.

However, the existence of potential is a table stake. To use all available opportunities the comprehensive full-scale government support is a must. Its individual components are in place in Russia (to start with, maintenance of the insurance premium exemptions up to 2023, export support by efforts of the Russian Export Center, support of venture capital financing and so on), but any comprehensive approach is still out of the question (in more detail about IT industry supportive measures in Chapter 4).

The export support effects cannot be considered only from the standpoint of tax revenues and employment growth. An expansion of the software exports permits to diversify the Russian economy vond reduce its dependence on the global commodity price fluctuations. The software exporters obtain the competences and knowledge from abroad, which they use to operate in the Russian market. With that they transfer to Russia not only technological competences but also methods of facilitating best practices (among other things, the teamwork of the customer and contractor).

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It is important to realize that renovation of the Russian conventional economy sectors is not possible without information technology. All the modern businesses of the high-tech economy sectors depend on the software. The more the high-class developers offering successful global competition experiences in Russia, the higher the chances to develop competitive solutions in any segment of the global innovative economy. If IT engineers leave Russia in vast numbers (in private capacity, or with the companies which shift operations to another jurisdiction) it will be a hard blow to the whole national economy.

2.3. Foreign sales and net foreign currency inflow

Due to the confusion that has occurred often when the software companies' exports mentioned by RUSSOFT have been confused with the volume of foreign sales from the standpoint of Russian legal entities (which is measured by the net foreign currency inflow into Russia for completed parts of contracts), we have elected to use the term "foreign sales" instead of "export". The point is that foreign sales of the software developed by Russian companies are not always leading to a direct foreign currency flow to Russia. A percentage of cash is left in other countries when sales are made by the legal entities established by Russian companies in accordance with the global practices to be closer to the customer in order to mitigate its risks of dealing with foreign companies (this is much more relevant under the current geopolitical environment). Those funds are spent partially for the evolvement of foreign development centers and sales offices, including the marketing costs. In addition, some funds are left in the accounts with foreign banks where the owners of Russian companies deposit their cash (the more so as many major Russian companies feature foreign co-owners).

From the inception of annual surveys by RUSSOFT (since 2002), there was little difference, if any, between volume of foreign sales and net foreign currency inflow from them, because sales were generally performed from the standpoint of Russian legal entities, and almost all funds received by foreign sale offices at the growth rate of 40-50% per year were reinvested in expansion of Russian offices and development of their own solutions. Therefore, the volume of export which implies net currency inflow, and the volume of foreign sales by software companies were largely in line with one another.

As time goes by, more and more received currency was left in the accounts of foreign offices of Russian companies. That is why it became necessary to determine the measured values more accurately and introduce a concept of the "volume of foreign sales".

Comparison of volume of exported software services (statistics of CBR (Central Bank of Russia) and volume of foreign sales of software companies (as per calculation by RUSSOFT)

		2011	2012	2013	2014	2015	2016
Foreign sales of Russian software companies (as per calculation by RUSSOFT	Absolute value, billion $	4	4.6	5.4	6	6.7	7.6
	Annual change	+22%	+13%	+17%	+11%	+12%	+13%
Export of software services (according to CBR)	Absolute value, billion $	1.666	1.995	2.508	2.651	2.455	2.664
	Annual change	+30.9%	+19.7%	+25.7%	+5.7%	-7.4%	+7.7%
Share of exported software services in foreign sales of software companies		42%	43%	46%	44%	37%	35%

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It is quite difficult to determine exactly the net foreign currency inflow in 2016 from the Russian-made software, however, based on the data we have obtained from different sources, it is possible to suggest that it amounts to about $4.8-$5 B (most likely, at the least). Aside from sales of software and development services from a perspective of Russian legal entities, this value includes currency inflow from sales of software as a part of the software and hardware packages, from sales of software and development services through aggregators in Internet as well as incomings for other services not accounted for by CB of Russia as software ones. At the same time, the total foreign sales at year-end 2016 amounted to $7.6 B.

The estimated net foreign currency inflow due to foreign sales by Russian IT companies is based, for instance, on the formal data of the Central Bank of Russia, according to which the volume of cross-boundary software services provided in 2016 amounted to $2.664 B, increasing within the year by 7.7%.

A year before, for the first time during the most recent years, no growth of foreign currency proceeds for cross-boundary software services was observed in CBR statistics, given that the foreign sales by IT Companies in 2015 increased by 12% as per our estimates. If we look at transformation of these values since 2011, the unconformity of data of CB of Russia and RUSSOFT takes place only in 2015. All other years not only the course of changes (upward or downward), coincided but also increase/decrease of growth rate. If an increment of software services export according to CB of Russia increased less (or more) as a year earlier, then growth rates of foreign sales of software companies from the RUSSOFT inquiry also became slower (or accelerated).

It is worth mentioning that before 2013 inclusive the growth rates of software service export according to CB of Russia were much higher than those of foreign sales of software companies according to RUSSOFT. From 2014 on, all three next years — on the contrary, much lower.

Even if this refers to different indicators (the explanation will be found hereinafter), nevertheless the conformity of changes should take place. The multidirectionality in 2015, as well as dramatic reduction in the growth rates of the volume of exported software services in 2014 may be attributable to situation in the national economy. The ruble fall started in early 2014, and before long different indicators for the entire economy were getting worse. Under these circumstances it seems quite logical that the top managers of companies more often than not began to refuse transferring money from customers to Russia and converting $ or EUR to rubles; the revenues left abroad exceeded those in times of geopolitical and relative economic stability.

In addition, the anti-Russian sanctions and threats relating to imposition of the same on foreign customers of the Russian companies have compelled our companies to relocate, to a growing extent, their sales and support centers (and sometimes, their headquarters) abroad under the jurisdiction of countries that offer much less risks of being subject to the anti-Russian sanctions in the eyes of their customers.

This business model is more cost-intensive than direct sales from Russia, so any de-escalation in tensions makes possible for Russian companies to return to direct export sales (one has to add export by new players at the export market who always emerge in the period of reduction in political tensions).

Stemming from these quite logical assumptions, the de-escalation in tensions in relations between Russia and Europe as well as emerging growth of Russian economy in 2017 should result in acceleration of growth rate of the volume of exported services registered by the Bank of Russia that again should be greater than the growth rate of foreign sales by software companies. Results of Q1 confirm this forecast: the volume of exported services has increased by 38%, whereas the growth of foreign sales is anticipated at the level of 2016 (+13%).

However, the ratio between indicators "software export" and "foreign software sales" may be affected by other factors as well, e.g. relaxation or tightening of currency control compels to change schemes of money transfer in Russia or more often to forgo such

transfer at all. Another possible factor may be the growing popularity of Internet software sales. Such sales are most likely not shown by the CBR's statistical data whereas the annual RUSSOFT inquiry shows that it has been growing over the last years both for major and small companies.

Consequently, we have three different indicators characterizing foreign economic activity of Russian software companies in 2016:
1. Total foreign sales of Russian software companies - $7.6 B (as per calculation by RUSSOFT);
2. Currency inflow in Russia from foreign sales - $4.8-5 B (RUSSOFT expert estimate);
3. Export of software services - $2.7 B (CBR statistics).

By estimate of RUSSOFT, out of $7.6 B - $2.1-2.3 B received from foreign sales of Russian software companies, comes to Russia but not reflected in the CBR statistics as "software service export". Another $2.6-2.8 B is left abroad (used for office development outside Russia or to owners' accounts).

Prior to explanation of the way $2.1-2.3 B come to Russia without registration in the CBR statistics it is necessary to put some clarity into what the concept "software services" means. The statistical foreign trade data on the services is generated pursuant to an international methodology set forth in the UN Manual on Statistics of International Trade in Services 2010. Software services are classified as the transactions relating to the production and integration of software: engineering, development, delivery, and supply of documentation for customized software; purchase of ready-to-use software supplied electronically; acquisition of the licenses for software without an entitlement to duplicate and distribute the same.

In addition, that class of services include the work relating to data processing, generation, recovery, hosting, storage of and operations with databases; services relating to production, design, and hosting of web-pages; those relating to installation, repair, and maintenance of hardware and software; provision of consulting services relating to software and operation of computers as well as training within a consulting framework. The primary information sources to generate the statistical data on foreign trade in services of the Russian Federation are the details contained in the reporting of lending institutions to be adopted by the Bank of Russia.

The relevant information has been provided by the CBR statistical department. It is a rare occasion when a Russian government agency so clearly presents the requested information and replies to a question. CB of Russia is a rare exception.

But unfortunately still it is not possible to measure an inflow of currency provided by software companies, if it is not included in statistics as software service export. The inflow is scattered in other statistic items of CB of Russia.

Potential methods of obtaining export revenues of software companies not reflected in the CBR statistics as Software service export are as follows:
1. Transfers to natural persons. This method is applied in practice but transferred amounts are not big, nor a frequency of using the channel by companies can be high (though there is no legal limitations for getting formal wages by this manner).
CB of Russia concerning 2016 results says the following:
An average of a transfer from the USA (it is largest market for Russian software companies) has reduced in a year by half to $19 thousand. Free transfers from abroad in favor of physical persons-residents also have significantly reduced, in 2016 their volume decreased by 28% to $2.0 billion. At the same time, have increased free transfers to the Russian Federation from the USA and Germany through payment systems. An amount of receipts of wages and other bank transfers under contracts in favor of residents of the Russian Federation in 2016 increased by 9% to $1.9 billion. In the geographical structure of input the volume of transfers from non-CIS countries increased by 6% to $15.5 billion.

2. R&D services. These services are provided by software companies, and they may account for a substantial proportion of all receipts from R&D performance.

3. Advertizing, marketing, public opinion research. Monetization of free application is often provided by ads posted in this application (shown by means of application).

4. Payment for intellectual property usage. Intellectual property is closely related to software development.

5. Hardware and software. A lot of software companies produce equipment (hardware and software packages) based on software developed by them. A volume of sales of this equipment abroad (including neighboring CIS countries) may be estimated at hundreds of million dollars.

6. Professional services and consulting services in the field of management. It is worth mentioning that services in the area of management provide over $5 billion. At that more 96% of export of these services according to the CBR statistics is provided just by non-CIS countries. Russian specialists in administration are out of the picture at developed markets. On the other hand, software companies implement projects under which the corresponding services rendered to Western customers. In some areas associated with IT introduction Russia possesses appropriate competences.

7. Direct investments (aside from banking sector) and intercompany transfers. In some years the foreign investments to Russia by 80-90% came from small countries like Luxembourg and Cyprus. It stands to reason that the best part of it had the Russian origin. In many cases it was more profitable to transfer to Russia one's own funds from foreign accounts in form of foreign investment. In addition, in two last years a partial payback to Russia from foreign sales was made in compliance with Russian law regulating corporate operations.

Statistic data on currency incoming to Russia by types of transfer usable by software companies (at year-end 2016)

Transfers to natural persons within the territory of the Russian Federation (residents)	$15.9 B
… including receipts of wages and other bank transfers under contracts in favor of residents of the Russian Federation	$1.9 B (+9%)
R&D services	$0.395 B
Advertizing, marketing, public opinion research	$2.876 B
Payment for intellectual property usage	$0.548 B
Hardware and software	$24.3 B
Professional services and consulting services in the field of management	$5.273 B
Direct investments (aside from banking sector)	$33.9 B

From Statistic data on currency incoming to Russia by types of transfer it is apparent that $2.1-2.3 billion received from foreign sales of software companies and not reflected as "software services" in the CBR statistics, can be easily distributed among different export earners.

According to the CBR statistics, the export of goods and services at year-end 2016 amounted to $332.4 billion. Thus foreign sales of software companies account for 2.3% of the whole export. Here methods differ, but data comparison of the entire export and foreign software sales in this case is fully justified for monitoring of dynamics. If in contrast we take into account just the CBR statistics, it will be impossible to explain quite big fluctuations of data related to software services (which is natural because they reflect only a part of foreign sales of Russian software companies).

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Comparison of the volume of foreign sales of software companies with the total RF export of goods and services, billion $

	2011	2012	2013	2014	2015	2016
RF export of services	58.04	62.34	70.12	65.74	51.7	50.55
RF export of goods	515.41	527.43	521.84	496.81	341.42	281.85
RF export of goods and services	573.45	589.77	591.96	562.55	393.12	332.4
Growth/decline of export of goods and services per year	29.8%	2.8%	0.4%	-5.0%	-30.1%	-15.4%
Foreign software sales according to RUSSOFT (annual change)	4 (+22%)	4.6 (+13%)	5.4 (+17%)	6 (+11%)	6.7 (+12%)	7.6 (+13%)
Proportion of foreign software sales in the total RF export	0.7%	0.8%	0.9%	1.1%	1.7%	2.3%
Export of software services (annual change)	1.7 (+30.9%)	2 (+19.7%)	2.5 (+25.7%)	2.7 (+5.7%)	2.5 (-7.4%)	2.7 (+7.7%)
Proportion of software services in the total RF export	0.3%	0.3%	0.4%	0.5%	0.6%	0.8%

Source: Statistics of CBR, RUSSOFT (only data of foreign software sales and calculation of shares)

The proportion of foreign software sales in the total RF export in the last 15 years has been on the rise. In 2002, it was 0.3%, and in 2016 reached 2.3 % (in software services the share has increased from 0.1% to 0.8%). This figure reduced temporarily only in 2011, when owing to the recovered oil prices the total RF exports of goods and services increased by 30%.

Export of major products from Russia in 2015-2016

Goods and services	Proportion in total volume of export of goods and services	
	2015	2016
Foreign sales of software companies	**2%**	**2.3%**
Foodstuff and agricultural raw materials	4%	5.1%
Cereals	1.4%	1.7%
Timber and pulp and paper products	2.7%	2.9%
Chemical industry products, natural rubber	6.5%	6.3%
Nonferrous metals and articles made therefrom	3.7%	3.5%
Machinery, equipment and transportation facilities	6%	7.3%
Military equipment	4.4%	4.5%

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The sharp increase in the share of foreign sales of Russian software companies in the last three years was caused by significant reduction of Russian export of goods and services. It should be pointed out that the volume of the even shrinking Russian export in 2016 was almost 2.5 times bigger than in 2002 (due to the fact that oil prices were higher than 15 years ago). Whatever be the reasons, but an indisputable fact is that foreign software sales have become much more important to the foreign economic activities of Russia.

In the recent 7 years RUSSOFT has been comparing the volume of foreign sales of software companies to exports of different major products in order to assess and show the rising importance of industry for the national economy. In so doing it is assumed that the comparison is conditional as a proper amount of export of any group of goods or services may assume different importance, e.g. in various exported goods a share of added value or a value provided by natural resource royalty. The same agricultural raw materials result not only from farmers' labor but also from fertile land, foreign equipment and imported seeds.

In this context it is worth mentioning that in terms of a share of added value the software development in one of the leaders of the whole world economy

This is far from being for the first time when our comparison between the volume of foreign sales of software companies and the export of other industries comes under criticism, as RUSSOFT calculations based on polling of market players are correlated to official statistics. However calculated data on foreign sales of software companies adequately agree with official statistics as is shown above. The suggestion of our critics to exclude from comparative calculations that part of revenue which is left abroad is not quite the thing to do because other branches also have expenses on promotion, participation in exhibitions, foreign office services and deposits at foreign banks.

At the same time, in the volume of foreign sales of IT industry is not considered the income of the Internet companies at all, which are associated with software developed by them. For example, the aggregate turnover of Yandex and Mail.Ru Group at year-end 2016 again approached $2 B after decrease by approximately $0.5 B due to ruble devaluation. Some of the earnings could be classified as export ones (most likely, 10-15%). The turnover of the whole Internet industry is many-fold bigger. Russian and foreign Association of E-commerce (RAEC) estimates the turnover of e-commerce at almost $20 B.

It is not groundless to consider Internet companies as software ones, but their successful promotion in the global market is possible, first of all, thanks to the new software solutions that are created by them independently. Therefore, their export income should be partially considered in the total volume of exported software (on the model of IT-enabled services, accounted for in their export by Indian IT companies).

As these companies can be considered neither as standard software developers nor as customized software developers, their export revenue shall be accounted separately. There are serious problems concerning determination of this value. First of all, it is difficult to identify the export revenue in the cumulative income if an Internet company mainly earns at the expense of advertising. Such advertising may be oriented towards both the Russian audience and the audience of Internet users in the near- and far-abroad countries. Besides, it is incorrect to sum up the revenues (such as the export ones) from advertising and e-commerce. It is more correct to identify as an online store income not an entire turnover but only the margin which is not as great for e-commerce as for offline commerce.

There are a lot of methodical difficulties but some estimates still can be made if more complete information about Internet companies is available. For example, the export share can be calculated taking into account the proportion of the Russian and foreign audience. Presently, about a half of Russian-speaking Internet users are citizens of other states.

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Based on the available data, we can assume that the export volume of the Internet companies that use their own software and therefore can be accounted for in investigation of software development export industry exceeds $1.5 B.

It is not improbable that Internet companies may sell abroad their own solutions or services based thereon as well. For example, Yandex has already established a new segment based on its own Big Data analysis development.

As regards export of all IT companies, it would be necessary to add manufacturers of computer equipment (there are such companies in Russia which supply their products to CIS countries), system integrators and distributors (some of them work both in neighboring and far-abroad countries).

2.4. Foreign sales movements for different company classes

When comparing the economic performance of companies offering a different turnover, it is safe to say that small companies face much difficulty to grow (or often just to maintain the previous income levels and survive) than major companies. The larger the company, the better its turnover movements and foreign sales. Such regularity has been identified almost throughout all the years of surveying. It was only once (in 2013) when small companies made a contribution comparable with that of major companies into the growth of exports. In this context, small businesses became much more vulnerable during the crisis periods (in 2009 and 2014-2015) than major companies.

On the one part, the situation is normal when a high number of new small businesses emerge in the country as a result of considerable market situation changes and, following a certain general rise, some begin to lag behind the competitors and cease to exist. In economically and technologically developed countries, a significant percentage of startups also undergo difficulty and most of them fail to survive. Some entrepreneurs start their business several times, and a success comes to them following that only (although not at all times). However, the survivors must join medium and then major businesses very soon.

Among the Russian companies established during 10-15 most recent years, there are very few ones with a turnover of at least $10 million or approaching this figure. Even though judging by Russian standards, those are not very large companies. Besides, some of them are spinoffs of major businesses (where IT is either core or noncore segment) and, consequently, have belonged to a major entity from the very beginning.

Dependence of turnover changes and foreign sales on the size of respondent companies

Company classes by turnover amount	less $1 million		$1 million to $5 million		$5 million to $20 million		over $20 million	
	2015	2016	2015	2016	2015	2016	2015	2016
Total revenue change in US dollar	-24%	+28%	-31%	+14.5%	-8%	+9%	+21%	+20%
Foreign sales change in US dollar	+5%	-23%	+1%	+7.5%	+16%	+7%	+24%	+21%

It is possible to state that 10 most recent years have seen better stimulation towards the establishment of startups on the governmental part, which has resulted in a corresponding boom of startups in 2010-2013. However, the numbers of established IT companies have

decreased during 2 most recent years. This can be explained in part with a worsening geopolitical situation, economic crisis in Russia, and a contraction of the domestic IT market. In addition, no integrated support to the industry's businesses is observed on the governmental part, which could not only help starting a business but also become a medium or then major business.

The indicators of large and small enterprises in the previous three years became more or less similar thanks largely to a reduction of threshold staff numbers which allow for pretending to get privileges (in 2010 from 50 persons to 30 persons and since January 2014 - to 7 persons). Since 2010, only large and medium-sized enterprises (with staff number 50 people at least) have had premium exemptions that gave them additional competitive advantages at the labor market. As a result, they demonstrated growth of turnover and export above all others.

The rule works with few exceptions. However, at year-end 2013, the growth of exported products and replicated solutions to a large extent was provided just by small companies (primarily, startups with export receipts no more than $1 million), and not by large enterprises as it happened in previous years. Small product companies had a higher value of export and turnover growth. In addition, the number of small companies was also rapidly growing in recent years.

It is possible to suggest that the growth rates of small IT enterprises were influenced by the created Development Institutes (RVC, Skolkovo, FRII) and improved by appearance of technological clusters in some Russian cities. Several such clusters provided the preferential rent rates and services of business incubators and accelerators. Experience shows that good conditions of employment and correct organizational management can considerably raise labor productivity of software developers and as a consequence provide a certain increase of turnover without hiring new employees.

In 2014, better indicators of small product companies retained only partially. The indicator of growth of cumulative business volume of small companies engaged in development of software and replicated solutions was higher than that of 35 major companies (with the turnover of $20 million at least) of the same profile — 10% against 6%. However, small companies' export increased only by 4% and that of major companies — by 11%.

In 2015, dependence of the performance on the turnover levels of product companies enhanced significantly. For example, the difference between variations in the sales of companies with a turnover below $5 million and those with a turnover exceeding $20 million amounted to 20 percentage point in 2014, and 48 in 2015. Especially hard is the crisis in Russian economy for small companies, as it's difficult for them to offset losses at the domestic market by foreign sales.

In recession year 2015, out of the small companies with a turnover below $5 million, the service companies suffered from the crisis most of all (first of all, due to an anti-Russian campaign abroad and the economic crisis in the Russian market). Their turnover reduced by 30%, while the foreign sales increased by as low as 1%. The product companies of the same size reduced their turnover as well, though to a bit lesser extent — by 27%, while the growth of foreign sales appeared to be quite remarkable — 7% in US dollar. Thanks to the growth of exports, their turnover reduced to a lesser extent than that of the small service companies.

In 2016, even small companies run a profit margin (increased both turnover and foreign sales), a difference in indicators became much less pronounced, however, the growth of small businesses turned to be much less than that of the middle- and large-sized companies. For small companies it is peculiarly difficult to increase foreign sales. There was no significant growth of these sales in 2015, neither at year-end 2016.

Such apparently lower exports of the small companies as compared with medium and large ones should upset the Russian Government. It means that they have few chances to become medium and large companies. However, once upon a time all current leaders of

the world software market were small companies and in due time received the state support in one form or another. According to the Stanford University professor Henry Etzkowitz, well-known by his concept of the innovation development of society Triple Helix, a cornerstone of all high-tech companies of Silicon Valley was the results of governmental research projects many of which were implemented by orders of Pentagon. It is also known about a lot of tools for supporting exporters (including tools of marketing support of small companies), which are widely used in many countries with developed or rapidly developing economy.

As a rule, small companies vary wildly in terms of indicators of sales behavior depending of the age thereof. During all years of inquiry the incumbent companies were growing slowly while the young ones were developing quite dynamically.
At year-end 2015, this consistent pattern was not observed. The companies with a turnover below $5 million, established in the last 10 years reduced the turnover by 29% (in USD), and increased foreign sales by 4%. Similar companies active at the market already more than 10 years show the same reduction of the turnover — by 29%, and foreign sales remain unchanged. From above it may be deduced that the crisis smoothed the indicators of small companies of different age.

In 2016, once again almost all indicators were better among younger companies with the turnover below $5 million. The companies under-10 increased the staff by 15%, the turnover — by 36%, a foreign sales almost remained unchanged (decreased by 0.6%). In the companies which already are over-10, the staff increased only by 2%, the turnover — by 2%, foreign sales — by 1%.

Both of them plan to increase the growth rate of foreign sales in 2017, but the companies under-10 plan to grow by 15%, and those over-10, only by 4%.

2.5. Head office location

Dependence of turnover changes and foreign sales on the head office location of respondent companies

Head office location	Moscow		St. Petersburg		Other cities	
	2015	2016.	2015	2016	2015	2016
Overall revenue change in USD	+11%	+17%	+9%	+20%	-8%	+12%
Foreign sales change in USD	+24%	+19%	+23%	+20%	+9%	+7%

Moscow and St. Petersburg companies showed better figures of the total sales and exports than the regional businesses. In 2016 with the emerging Russian economy recovery this advantage has somehow weakened but still is palpable. The primary reason is that most large and medium software companies of Russia concentrate in the two Russian capitals. It is their size, thanks to which they have been growing, although the head office locations are also of importance. The brand awareness of two Russian capitals is a factor, as well as a closer interlinking with other countries. First of all, it is referred to flight connection, but from St. Petersburg it is also easy to get to the capital of the neighboring EU country by high-speed train or by car. As a matter of fact, these factors are no longer critical as almost all major Russian cities enjoy quite comfortable flight connection with foreign countries.

2.6. Share of foreign sales in the turnover of companies

The results of 2012 for the first time showed the departure from the rule that the higher share of exports of companies resulted in the higher turnover growth. Maybe, it is a consequence of implementation of several large projects in Russia during that year (in 2012, the total turnover of companies grew more than their exports). Judging by the results of 2014-2015, this rule again turns to be fair. During the crisis years 2014-2015, it was even more obvious that the companies with a high export share were much more resistant to the manifestations of crisis than the companies more oriented towards the domestic market. As per the results of 2015, the companies offering a share of foreign sales in excess of 50%, reduced their turnover generally by 21% in USD, that have not been observed throughout the years of surveying.

In 2016 the active work in foreign markets did not give much precedence due to recovery of the growth of domestic market for Russian companies, nevertheless the precedence is in place.

Random fluctuations of optimal ratio of export income and sales in the domestic market are quite possible however the evaluation over the past few years shows that if the software development companies intend to provide the stable turnover growth, the export share in their consolidated revenues must be at least 50%. It is especially true with the existing contraction of Russian software market in dollar terms as well as state budget curtailment for information system development.

Income growth of companies offering a different share of foreign sales

Share of export	less than 10%	less than 50%	over 50%	over 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%
Income growth /reduction in 2015	-34%	-21%	+22%	+25%
Income growth in 2016	+14%	+15.5%	+18%	+18%

2.7. Dedication of companies

Addition of a new question about the company's dedication in 2015 has permitted to assess the most growing business segments as well as the structure of respondent companies depending on their segments of activity. In many aspects, the structure shows the share of companies across the industry for each dedication. In this case, an error is quite high, but it is just possible to obtain a general understanding.

As we have the data on dedication of the companies for three years still, it is possible to make initial comparisons.

The most frequently mentioned business segment of companies is "Custom engineering". The survey results can show the growth of a number of companies dealing with mobile applications and navigation systems. This growth is quite logical. It is no coincidence that Embedded software was mentioned as a priority segment by 5-fold companies more than a year before (the growth apparently in place across the industry but hardly it is 5-fold). Our experience in surveying shows that popularity of business areas can vary widely over time. To spot a trend on the back of random fluctuations a longer time duration is needed. Nevertheless, it is possible to get even now an overview of dedication of Russian software companies.

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Dedication of respondent companies

	Core business segments	Survey 2015	Survey 2016	Survey 2017
1	Custom engineering	73%	53%	68%
2	Mobile applications	37%	40%	44%
3	Replicated enterprise (institution) management, document flow automation, design and production process systems (ERP, CRM, ECM, EDMS, CAD, APCS and other)	30%	40%	32%
4	Site designing	13%	24%	20%
5	Basic software development (DBCS, OS, office applications, virtualization tools, programming languages and tools)	25%	22%	23%
6	Embedded software (equipment, devices)	19%	20%	21%
7	Scientific researching	14%	20%	19%
8	Information security solutions	11%	15%	14%
9	Geographic information systems (GIS)	7%	14%	12%
10	Computer games	7%	6%	7%
11	Navigation systems	4%	5%	9%
	Other	16%	33%	28%

Priority business segments

		Survey 2016	Survey 2017
1	Custom engineering	21%	39%
2	Replicated enterprise (institution) management, document flow automation, design and production process systems (ERP, CRM, ECM, EDMS, CAD, APCS and other)	14%	8%
3	Basic software development (DBCS, OS, office applications, virtualization tools, programming languages and tools)	9%	9%
4	Mobile applications	5%	7%
5	Scientific researching	4%	0%
6	Information security solutions	4%	2%
7	Site designing	2%	5%
8	Embedded software (equipment, devices)	1%	5%
9	Navigation systems	1%	1%
10	Geographic information systems (GIS)	1%	1%
11	Computer games	1%	2%
	Other	24%	11%
	Not sure	13%	11%

The highest growth rate of turnover in the last three years was provided by 5 business areas (they vary little from one another in terms of weight): Site designing, Navigation systems, Embedded software (equipment, devices), Custom engineering and Mobile applications. The same areas ensure the highest share of foreign sales in consolidated revenues.

Change of turnover vs. business area

Business area	Average increase in turnover in 2014-2016
Site designing	23%
Navigation systems	21%
Embedded software (equipment, devices)	20%
Custom engineering	19%
Mobile applications	19%
Geographic information systems (GIS)	17%
Replicated enterprise (institution) management, document flow automation, design and production process systems (ERP, CRM, ECM, EDMS, CAD, APCS and other)	13%
Information security solutions	13%
Basic software development (DBCS, OS, office applications, virtualization tools, programming languages and tools)	12%
Scientific researching	9%
Computer games	3%
Other	4%

Export share vs. Business area

Business area	Average share of foreign sales at year-end 2015-2016
Site designing	89%
Mobile applications	83%
Custom engineering	82%
Navigation systems	81%
Embedded software (equipment, devices)	78%
Basic software development (DBCS, OS, office applications, virtualization tools, programming languages and tools)	77%
Scientific researching	77%
Computer games	73%
Geographic information systems (GIS)	74%
Information security solutions	69%
Enterprise (institution) management, document flow automation, design and production process systems (ERP, CRM, ECM, EDMS, CAD, APCS and other)	52%
Other	43%

All types of dedication ensure a share of foreign sales and turnover not less than 70%. Only Replicated enterprise (institution) management systems give a much smaller figure. Indeed, in far-abroad countries it is extremely hard to reach out to the market even with low prices. Notwithstanding it cannot be ruled out that there might be potential demand for them in the developing nations.

Change of foreign sales vs. business area

Business area	Average growth of foreign sales in 2014-2016
Site designing	26%
Navigation systems	24%
Custom engineering	23%
Mobile applications	23%
Embedded software (equipment, devices)	23%
Geographic information systems (GIS)	22%
Replicated enterprise (institution) management, document flow automation, design and production process systems (ERP, CRM, ECM, EDMS, CAD, APCS and other)	22%
Information security solutions	22%
Basic software development (DBCS, OS, office applications, virtualization tools, programming languages and tools)	14%
Computer games	13%
Scientific researching	7%
Other	15%

If the growth is estimated in absolute values such areas as Site designing and Embedded software never become bestsellers while Navigation systems will find themselves among outsiders. In terms of the absolute growth Custom engineering will win by a head however this area frequently overlaps with almost all others. The second best is taken (but not by a head) by Mobile applications (it also often mates with other business areas). At the same time, it must be taken into account that the companies dealing with information security are backward in answering the questions. Among them there are very large corporations which though not growing more than by 10%, but in absolute values have a very big growth against companies involved in other areas.

Within the scope of the study "Prospects of Russian IT developers at global market" initiated by SAP in 2017 H1, there was employed another division by company business areas. Besides, that study was focused not on the turnover growth in the past but on the forecast of the growth on a short time horizon (respondents were asked to give the anticipated export growth in the next 2-3 years). The results were as follows: the most popular among the growing export directions was development of corporate business applications (ERP, CRM, BI, ECM).

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Rating of business areas by enhancement of the maximum growth in absolute values

1.	Custom engineering
2.	Mobile applications
3-5.	Site designing
3-5.	Embedded software (equipment, devices)
3-5.	Basic software development (DBCS, OS, office applications, virtualization tools, programming languages and tools)
6.	Enterprise (institution) management, document flow automation, design and production process systems (ERP, CRM, ECM, EDMS, CAD, APCS and other))
7.	Information security solutions
8-11.	Navigation systems
8-11.	Geographic information systems (GIS)
8-11.	Computer games
8-11.	Scientific researching

Under the same study there were made in-depth interviews with 31 experts. Most of them saw no view of success for sales of Russian corporate business applications in developed foreign markets, however they did not deny that in emerging markets prospects of these applications could be hopeful.

Nevertheless, 1C, the major Russian developer of corporate business applications, announced a new development strategy imposing an active expansion abroad. The goal is to raise a level of revenue from sales of ERP system "1C:Enterprises" at foreign markets to that in Russia (currently foreign markets account only for 20% of sales of this solution). In the past 1C has already attempted to secure a foothold in the far-abroad markets but they never set such challenging task.

It may be assumed that promoting Russian corporate business applications abroad will be particularly difficult though chances to make real progress exist all the same. Not least because there is sufficiently rewarding experience in sales of cloud service for site management of 1C-Bitrix (50% belongs to 1C) which is in operation by enterprises worldwide. In this case, good results may be explained by the fact that a Russian company could take advantage of the global trend of change-over to cloud technologies. Just the same, the company managed to secure a foothold in mature markets which supposedly have been formed and divided long time ago.

Russian information security solutions are promoted successfully abroad, though in the last years their growth rates are not high. Middle-sized companies rapidly increase foreign sales, but Kaspersky Lab, the Russian leader in this area has already reached positions that simply do not allow for growing faster than the global market. A number of major companies working in information security segment still generally cater to Russian market.

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Anticipated changes of export revenues in the above mentioned business area in the next 2-3 years (percentage of respondent companies)

	Corporate business applications (ERP, CRM, BI, ECM)	Basic software (DBCS, OS, office applications)	Engineering and special software for process flow automation	Embedded software (both own and custom product)	Other corporate software (portals, IS systems, connectivity software etc.)	Custom engi-neering	Mobile applica-tions
Any growth	38%	15%	28%	13%	19%	29%	26%
not higher 50%	24%	13%	19%	7%	12%	21%	18%
Growth by 50-100%	3%	1%	3%	3%	3%	4%	3%
Growth over 100%	12%	2%	6%	3%	5%	4%	6%

Source: Study "Prospects of Russian IT developers at global market" (SAP)

There is a persistent and quite popular opinion abroad (in any case, among the professionals) about high skills of the Russian information security professionals. So there is a high potential for significant growth of foreign sales in information security segment. A right choice of national markets for specific solutions is important. For example, in the world's biggest US market one may promote some corporate solutions while in certain segments it is hopeless due to legal and tacit bans.

2.8. Turnover change nature

Share of respondent companies with different turnover changes

	At year-end 2014	At year-end 2015	At year-end 2016 г.
No change	26%	4%	30%
Increase	51%	25%	42%
Decrease	15%	71%	11%
Not sure	7%	14%	17%

If in 2015 71% of respondent companies reduced their turnover in dollar terms, in 2016 they were only 11%, being illustrative of the fundamental change of situation across the industry.

The shocks are well shown by an average deviation from the change of overall revenues of all the respondent companies. While it was 6.4% at year-end 2014, then it achieved 20.4% at year-end 2015. In 2016 it reduced to 5% once again.
A high growth of the average deviation in 2015 is explained mostly with the fact that a ruble exchange rate fall impacted the Russian software companies in quite different ways.

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The companies focused mostly on foreign markets appeared to be in a much better position. Some of them even gained from crisis when their expenses in dollar terms had been reduced. The companies that focused mostly on domestic market reduced revenue in USD by tens of per cent. That is another evidence of an intense entry to the foreign markets being of critical importance. If a company pays equal attention just to several different markets, this will warrant its stability and protection against external impacts.

2.9. Distribution of foreign software sales depending on the business model

The definition of branch structure in terms of business model becomes more and more irrelevant as the differences between product and service companies are getting fuzzy. Now it is not easy matter to class one or another company with product or service business model. The product companies often insert in their contracts the services to adapt the products to the specific customer's design and also deliver their products as SaS. The classical outsourcing companies which reject any possibilities of developing their own software all the same have modules or units utilizable in different designs (in other words, the same replicated solutions).

Nevertheless, over a distance of 10 years there has been a definitive tendency implying reduction of a share of foreign sales software development services as well as software development services provided by R&D Centers of foreign companies. In comparison with 2008, a proportion of companies specializing in custom engineering have reduced from 55% to 46%, and that of R&D centers — from 15% to 7%. The companies with the product business model are taking center stage. More about prospects of each model see below.

We have had to improve the distribution of foreign sales of Russian software companies depending on business model. Earlier we determined the sales volume by the product of turnover of companies with a specific business model taken from the previous year survey by the turnover increase of respondent companies with the corresponding model from the next year study. Periodically, the distribution of sales is checked using another method when a total sales volume (e.g. of product companies) is determined with due account for their share in the population. A number of companies with each business model are also taken into account. In the current situation the outsourcing development is growing only due to companies (as a rule, major) established long time ago. New companies emerge scarcely. At the same time, many new product companies are established. For this reason their share of foreign sales in the most recent 10 years has increased considerably. Apparently, it will grow further on.

The factors which impact upon the R&D centers of foreign companies and upon Russian service companies in some degree coincide. At the growing for 10-15 years job compensation of software developers many foreign corporations appeared to be not prepared to enlarge their Russian segments of business. In addition, their activities were affected by deterioration in relations between Russia and the USA (many R&D centers with reduced staff belonged just to the US companies).

At the same time, the activities of R&D centers were also affected by decisions of some Western corporations which had a hard time doing and as a result undertook staffing cuts throughout the world including Russia.

Distribution of foreign software sales by business model at year-end 2008 and 2016

	At year-end 2008	At year-end 2016	
	Share of business model	Absolute value	Share of business model
Software development services	55%	$3.5 billion	46%
Sale of software products and ready-to-use solutions	30%	$3,57 billion	47%
Software development services provided by Development Centers of foreign companies	15%	$0.53 billion	7%

Distribution of sales at domestic market by business model at year-end 2016

	Absolute value	Share of business model
Software development services	₽87 billion	29.5%
Sale of software products and ready-to-use solutions	₽207 billion	70.5%

In the last three years the growth rates of foreign sales of Russian service companies were a little bit higher than those of product ones, but it was well in advance clear that this event is purely temporal. The situation for custom engineering improved in 2014 due to depreciation of the ruble and the corresponding drastic reduction of $ wages of Russian programmers. Nevertheless, whatever change in exchange rate may be, the rate of wages in $ in software development is gradually rising and getting better compared to competitors, otherwise the mass exodus of specialists from the country takes place.

At Russian market, the sales volume of product companies is more than twice as much as that of service companies due to the fact that the principal markets for service companies are in mature economies where an average level of prices for services may be much higher than in Russia.

Distribution of turnovers by business model

	Absolute value	Share of business model
Software development services	$4.8 billion	40%
Sale of software products and ready-to-use solutions	$6.67 billion	55.5%
Software development services provided by Development Centers of foreign companies	$0.53 billion	4.5%

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2.10. Service companies

Basic indicators of service companies at year-end 2016

	in dollars	in rubles	in ruble inflation adjusted	forecast for 2017, $
Turnover	$4.8 B	₽321 B		$5.47 B
Turnover increase	+15%	+27%	+20%	+14%
Volume of foreign sales	$3.5 B	-	-	$4 B
Foreign sales increase	+16%	-	-	+16%
Domestic market sales	$1.3 B	₽87 B		$1.47 B
Domestic market sales increase / decrease	+13%	+19%	+13%	+13%

The bulk of the increment in foreign currency from the software development services during several most recent years has been provided by major companies. Their growth rates are much higher than those of middle and small companies. The results of 2016 did not change this rule: the companies with the turnover below $5 million increased foreign sales by 1.6% (a year earlier — by 1%), the companies with the turnover of $5-20 million by 8%, the companies with the turnover over $20 million by 21%.

A lag of small companies in growth rate of the total turnover also takes place though not so big (for the companies with the turnover below $5 million - +9%, $5-20 million - +9%, over $20 million - +20%). It means that the small companies largely grow due to the domestic market while the large ones due to activities in foreign markets.

Major service companies may receive more beneficial orders and, consequently, pay better salaries to their employees than small businesses. This has been a reason for a flow of professionals to major companies from small ones.

Major companies feature one more advantage: an existing chain of sales offices and development centers throughout the world. As a result, they may compensate for the problems of anti-Russian propaganda and anti-Russian sanctions as well as expand their staff through the establishment of remote development centers in Russian various towns and abroad or through the acquisition of foreign and Russian companies.

Small software development service providers and, moreover, private developers operating as unincorporated entities have also a chance to receive foreign orders for software development as major service companies often ignore low-budget customers. However, they found it difficult to look for new customers abroad given their low turnover figures. Some are successful to maintain their turnover at USD 1-3 million, but the average growth of small companies' exports was either minute or negative.

The lion's share of the increase in software services export (as a year before) was provided by Luxoft and EPAM Systems which are leaders in their sphere not only in Russia but also in the whole Central and Eastern Europe.

The company EPAM Systems, though being a Belarusian company, has been viewed historically in our survey as a largest software development center employing over 2000 developers in Russia, since from the very beginning it was developing largely by acquisition of service companies and the growth of their own development centers in Russia. The company was the first to undertake IPO, following in steps of first Russian companies of IT sector Mail.ru and Yandex. The company held successfully an initial public offering at the New-York stock exchange.

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The company has retained a high rate of growth over all previous 5 years. At year-end 2015 its turnover increased by 25% to achieve $914 million, and at year-end 2016 the company surpassed the mark of $1 billion. Its turnover amounted to $1.16 billion having increased by 26.9% in a year.

At the beginning of 2012, EPAM Systems capitalization during IPO at NYSE was $490 million, and in June 2014 it was already evaluated at $2.14 billion.

Luxoft also strains for one billion-turnover. At financial year-end 2016 its turnover amounted to $785 million. At the current rate the company will reach $1 billion, most likely in 2018. In June 2013, the Luxoft company held a successful initial public offering at the New York stock exchange and since then has been growing about 20% every year. Its capitalization in 2016 exceeded $2 billion.

Almost all largest service companies were formed before 2000, and their number almost did not change during the last decade. Among new market players that recently came into the world elite (in the Global Services and IAOP ratings), we can mention MERA of Nizhny Novgorod and ICL Services, which staff numbers exceeded a level of 1000 persons and, according to their turnover, are the third and fourth largest exporters of software development services from Russia, respectively. One should also distinguish Artezio Company from Moscow, which showed persistently high growth rates over the years, specializing mainly in such vertical market segments as telecommunications and health care, ReturnOnIntelligence, as well as FirstLine Software and Reksoft from St. Petersburg that successfully combine operations at the Russian and global market.

It is also worth noting the DataArt company, which considerably increased its staff through the contracts in the USA in 2012-2015, and the Auriga company, which quite regularly appears in the global rating list of the leading service companies for about 10 years. On the rating list of the leading world engineering companies (Data Monitor, 2011) Auriga, which accommodates the main development resources in Moscow, took the absolute first place in the category of "software engineering", having outstripped such giants as IBM, Dell, HP, HCL, Wipro and Siemens.

As many as 5-6 companies from Russia are found persistently on the leading global rating list of IT outsourcing, The Global Outsourcing 100 (IAOP). In general, there is some rotation resulting from different causes (these are not always related to the achievements of particular companies during a year). In 2016, the IAOP rating list contained 4 Russian companies as follows - Auriga, ICL Services, Luxoft, and MAYKOR. In 2017 the rating comprises 7 Russian companies, 5 of which are classed as leaders. The only company that meets all 5 criteria of this rating is EPAM Systems, followed by Luxoft, ICL Services, MAYKOR, MERA, Auriga, FirstLineSoftware.

The range of companies that have been ever shown among the Top-100 of leading outsourcing companies of the world have not been modified for many years yet. This contains about 10 companies representing Russia. Therefore, it is important to emphasize a newcomer of the Rating List 2016, i.e. ICL Services of Kazan (the Republic of Tatarstan) that is growing vigorously. It has over 50 global customers in 26 countries, and its staff numbers exceeded 1 thousand employees one year ago yet. It is known that the company has hired 200-300 new employees per annum during most recent years.

On the contrary, some service companies that have gained or are still gaining the better part of income from export currently are increasing the share of sales in Russia. In particular, it is associated with participation in major public projects. For example, the Reksoft company is developing a sophisticated information system for the Federal Migration Service, Luxoft in the end of 2013 announced the successful completion of the full range of services of developing commercial software for the navigation information platform ERA-GLONASS, and Lanit-Tercom is carrying out maintenance and elaboration of the municipal system "Tenant" that calculates payment for housing and utilities services for 70% of St. Petersburg residential areas.

The expertise, competences, and experiences gained under the implementation of foreign projects appear to be useful in Russia. On the other hand, the implementation of unique projects of federal importance allows for obtaining funding as well as new competences and experience by service companies. All this may come useful for successful participation on complicated foreign tenders. The experience gained in recent years shows that for sustained growth and development it is essential to have customers in different countries and consider risks connected with special factors of one or another region. If in one part of the planet sales are reduced due to circumstances beyond company's control (as a result of economic crisis or aggravation of political relations), the wide business geography makes it possible to quickly cross over to other major markets.

2.10.1. Income structure and sources of service companies

The structure of total exports by service companies has been changing within the range of random fluctuations during 5 most recent years.

Structure of respondent service companies' total exports in 2012-2016

	Sales, introduction and support of own software	Custom software development	Introduction and support	IT outsourcing	Other
2012	1%	63%	25%	10%	1%
2013	1%	91%	3%	5%	0%
2014	0%	78%	6%	3%	12%
2015	2%	90%	2%	5%	1%
2016	2%	90%	2%	6%	1%

Structure of total sales of respondent service companies in the domestic market in 2013-2016

	Sales of software and solutions	Custom software development	Solution introduction and support	IT outsourcing	Other
2013	19%	48%	23%	10%	0%
2014	6%	58%	22%	6%	8%
2015	30%	52%	10%	5%	3%
2016	36%	44%	10%	9%	1%

Model of relationship with customers

	survey 2015	survey 2016	survey 2017
Company is a Customer-owned Offshore development center	20%	18%	14.5%
Company develops software (provides other IT services) to Customer's request	52%	83%	86.5%
Both models used	-	6%	10.5%
Not sure	-	5%	1%

While the Russian service companies always gain 85-95% of income from sales of custom software including deployment and support in the foreign markets, then in Russia this proportion is much smaller — about 70-80% (at year-end 2016 even less than 50%). In Russian market the service companies often play the part of integrators, not only selling software development and support services but also selling and installing third

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party software. A share of domestic sales of these products from 2013 to 2016 increased from 19% to 36%.

Since 2014, each year a share of service companies presenting customer-owned Offshore development centers has reduced. On the contrary, a share of the model that assumes Development to customer's requirement has increased.
That question was included for the first time three years ago. Perhaps, respondents did not understand it properly so in 2015 there were a big number of undecided companies.

Contract types used, % of respondent companies

	survey 2014	survey 2015	survey 2016	survey 2017
Payment on time consumed	44%	27%	43%	64,5%
Payment on fixed price	50%	40%	57%	48%
Both types	9%	5%	8%	25%

In recent years there has increased a percentage of companies (from 9% to 25%), which use both types of contract implying payment for time & materials consumed or fixed-price payment. This growth may be viewed as a tendency.

Considering that the shares of almost all types of services have increased, one may deduce that companies are diversifying services. If in 2014 on average companies indicated 2.36 types of offered services, in 2017 this figure increased to 2.73.

Type of offered services, % of respondent companies

Year of survey	Software development	Testing	Technical support of IT systems	IT consulting	Other
2014	80%	57%	49%	44%	6%
2015	60%	44%	49%	40%	11%
2016	88%	52%	57%	51%	11%
2017	90%	60%	68%	46%	9%

Major customers, % of respondent companies

	System integrator	End customer	Software developer	Other
2013	29%	88%	36%	1%
2014	24%	72%	33%	1%
2015	20%	55%	27%	2%
2016	27%	82%	36%	1%
2017	19%	78%	35%	4%

2.10.2. Forecast of turnover and foreign sales changes of service companies

In recent years, it has been difficult to forecast future earnings of the service companies due to the great existing (primarily, political) uncertainty. After all, they focus on the US and EU markets, which relationships with Russia have aggravated critically, and this has resulted in a negative image of the country in western mass media. Nonetheless, the growth rates of foreign sales of service companies from the outset of flare-up turned to be perfectly good (over 10%).
In some degree, the issue of non-cooperation of a number of the US and European customers with Russian companies was settled by re-domiciliation. This route was

selected by Luxoft and Mera which relocated the headquarters to Switzerland (from Moscow and Nizhny Novgorod, correspondingly).

The armed conflict in Ukraine has already seriously affected placement of forces at the market of IT outsourcing providers in the Eastern Europe. Before the Ukrainian crisis started, the staff of development centers of Russian service companies amounted to about 10 thousand people. It was thought that by some criteria Ukraine was a better place for development of custom software than Russia (lesser tax burden and labor costs).
In 2014, the situation changed fundamentally. On the one hand, business environment in Russia somehow improved. On the other hand, Ukraine fell into profound economic and political crisis, the country hardly will find escape from it in the next years, and in these circumstances almost any business will entail risk. The civil war in the east of the country by the middle of 2016 was fought not so actively as before. However, there are no symptoms of an improved situation in the Ukraine still — many problems have been suspended rather than settled.
On the one part, a cost of manpower in dollar terms in Ukraine has reduced greatly that facilitates development of custom engineering. However, Russian companies are leery of opening the development centers in the neighboring country though do not close those already in place.

The accession of Crimea to Russia provided potential increase of the total number of programmers by 4-5 thousand people. After the accession of Crimea to Russia, the Ukrainian software companies due to political pressure had to close their development centers in Crimea, whilst many local companies because of lack of capacity to work legally with foreign customers left in full force for other countries. Unfortunately, the software development companies in Crimea are faced with obvious problems at the world market owing to sanctions imposed by the US and EU on Russia. However, the experiences gains by the most successful companies of Crimea permits to believe that a solution can be found through reincorporation of the companies in Russia.

When relying on the expectations of respondent companies, then the growth of foreign sales by Russian service companies will amount at year-end 2016 to 16% (the same growth was predicted at year-end 2016). Nonetheless, the prospects of custom engineering in Russia look slim. High growth rates are provided just by the largest companies which increase staffing through expansion of their foreign development centers and opening in Russia of new production areas taking advantage of the temporary reduction in wages (in USD) of developers resulted from depreciation of the ruble in 2014-2015.
Long gone are the days when there was a surplus amount of inexpensive software developers in Russia. Although a total number of them is still growing but the growth rates are not sufficiently high to satisfy the entire industry (including fast-grown and dynamically developing product companies).
Within the study "Prospects of Russian IT developers at global market", initiated by SAP, in-depth interview among other things were made with top management of companies specializing in custom engineering. They all told about impossibility of mass recruitment at the Russian labor market. Some of them think that the classical custom engineering in Russia is a business model with no chance to success, and plan to develop other services or software products.
A certain strengthening of the ruble in 2017 is very impactful for custom engineering oriented toward foreign markets. Perhaps, an average dollar exchange at year-end will be around 60 rubles (though a year ago it was 10% higher). Service companies expected a dollar rate in 2017 about 70-80 rubles/dollar, but it turned out to be much lower. Nevertheless, the effect of inertia from ruble rate decline in 2014-2015 may give a chance to service companies to keep the growth in 2017 at a level of 10% per year.

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At the same time, in Russia the domestic market of IT services is recovering. It cannot be ruled out that it will expand due to customers among Russian product companies. They still do not take on the role of mass customers for service companies, but some examples of closer cooperation are underway. In July 2017, Mera made an agreement with Kaspersky Lab about services for development and testing of software for mobile devices.

It may be assumed that Russian service companies underestimate developing world markets. Surely, the cost of manpower there is lower than in Russia, and it will not be easy to come on stream with a classical custom engineering model, but subject to using accumulated expertise and ready-made modules or units, and working in cooperation with other companies (platform developers, system integrators), the theoretical possibilities of successful activities at these markets are in place.

One of major service companies of Russia which for many years had been working for western customers exclusively, considered a possibility of working in Iran. However, it refused to compete in a tender as it did not know how to work with government agencies and had trouble understanding the way the decisions are made in this Eastern country. On the other hand, the assumed cost of the project suited very well.

In many developing countries the establishment of information systems on a national-wide scale is required. Such large and dedicated IT systems are frequently carried out as a projects, wherein Russian service companies have requisite skills to do the job at the competitive price .

2.11. Software products and ready-to-use solutions

Product companies at year-end 2016

	in dollars	in rubles	in inflation-adjusted rubles	forecast for 2017
Turnover	$6.67 B	₽446 B		$7.5 B
Turnover growth / reduction	+12%	+23%	+17%	+12%
Foreign sales	$3.57 B	-	-	$3.96 B
Foreign sales growth	+7%	-	-	+11%
Domestic market sales	$3.1 B	₽207 B	-	$3.5 B
Domestic market sales growth / reduction	+17%	+28%	+21%	+13%

Given that the product companies should expand their sales easier (as they depend on availability of the vacant professionals in the labor market to a lower extent), their growth rates in the last three years appeared to be less than those of the service companies, whose sales are almost proportionately governed by the staff expansions. This delay is temporary because to a large extent it has been caused by a sharp decline in programmers' cost of labor (in dollar terms) due to depreciation of the ruble in 2014-2015. Before recession started in 2014, foreign sales of product were growing faster than those of service companies. Most likely, the same picture will be observed in future as well.

A sort of deceleration of software sales is explained by several reasons. First, new large exporters fail to appear among the Russian product companies, while the existing ones have exhausted their growth potential in the market segments. For example, Kaspersky Lab Company contributed to 20-30% of the increment in total foreign sales by the Russian developers from time to time several years ago, though now it cannot grow at the

previous pace as they hold currently the global 4th position from the top in their segment. It is almost impossible for a Russian company to be the global leader under the current geopolitical situation, even though they have the apparently best solution. Therefore, the 3-4th position from the top is the ceiling that it may be afforded, especially in such area as information security. The price and functionality of a developed solution is not the entire story in the segment. For instance, there are trivial prohibitions on the use of Russian software for the public authorities, and these produce a great effect on the global IT market.

The same is true for other major Russian software exporters. If they have not yet reached the ceiling, then they approach the same and so diminish the growth rates.

If we look at the next tier — medium-size companies according to Russian standards – then they fail permanently to make a breakthrough when trying to establish themselves in foreign markets. There are local success stories, though a shift towards new quality with an exponential growth of foreign sales has not resulted anyhow. One of the reasons is lack of a marketing budget that is adequate for active promotion of the software products. They replenish their marketing budget at the account of earnings in the Russian market, and it has shrunk considerably during 3 most recent years.

Probably, a mistake is to prioritize the Western Europe and USA markets (for example, the market of German-speaking countries) that are almost not growing. It is very difficult to urge the users to change over to another solution in those markets for political reasons, notwithstanding that the solution is cheaper and better. Therefore, it is necessary to size up (and examine intensely still) new and rapidly growing geographical markets, where there is no prevailing preferences towards vendors and where quite loyal attitudes exist towards Russian companies.

A pivot to new markets is underway. Many young companies successfully approach the markets of Brazil, China, India, Vietnam and other countries commonly referred to as emerging nations.

There is certain repeatability in development of software industry. New software companies were most actively created in certain time periods (for 3-4 years) during economic crises or just after them. A number of successful software product exporters appeared during the Soviet economy collapse in 1991-1992. The next startup boom took place in the late 1990s and early 2000s (in 1998, there was a default and economic crisis in Russia). The third wave is connected with the world crisis 2008, which also affected the Russian economy.

Small companies (for example, mobile application developers) sometimes achieve a many-fold growth of the turnover, though the cases are singular rather than frequent. The entry of small companies to the international markets has not been adjusted yet as a system. Unfortunately, many promising Russian companies have to shift IPR and profit centers to another jurisdiction, i.e. countries with more mature markets, favorable conditions for copyright protection and better financing terms.

At year-end 2015, the indicator of growth of foreign sales by product companies with the turnover below $5 million and over $5 million became almost equable (7% and 8% correspondingly). However, the turnover of companies with sales volume below $5 million declined by 21% in dollar terms (due to the big decline of national currency against dollar and a big share of domestic sales), and that of larger companies— by 11%.

In 2016 we again observe a huge discrepancy in change of volume of foreign sales: companies with the turnover below $5 million - decline by 4%, from $5 to 20 million - growth by 3%, over $20 million – growth by10%. At the same time, a total turnover of companies with the turnover below $5 million increased by 38%. From the look of it, they made a pivot to the growing and quite comprehensible for them domestic market. At the Russian market all product companies increased sales by 17% in dollar terms, and at the foreign market — only by 7%.

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At the same time, the anticipated growth of foreign sales of companies with the turnover below $5 million is 23% (for larger companies it is lower: +3% for companies with the turnover of $5-20 million and +14% for companies with the turnover over $20 million). Supposedly, the conditions for entry of small companies into far-abroad markets improve. Whether or no, in such a way the situation is evaluated by representatives of these companies, because the forecast for 2017 is based on their expectations mentioned in the annual inquiry. In 2018, it will be seen whether their expectations are met.

Forecast of software product sales

If we rely first and foremost on the expectations of respondent companies (as well as the expert estimates regarding the prospects of major companies), then foreign sales of software product developers in 2017 should increase by 11% (in 2016 the growth was 7%). Supposedly, it reflects not so much a reasonable prediction as an orientation of companies towards foreign market representation. During the survey of 2016 the companies also waited for a similar enhancing growth but there and then it did not work out. However, such task orientation sooner or later will deliver benefits.

The major Russian product companies, which have previously worked exclusively within the post-Soviet borders, strive for coming to far-abroad markets. The odds are that they will make a go.

There are a few other smaller companies that hold promises of promotion in foreign countries of their solutions successfully approved in the Russian market. This promotion is, in particular, supported by their inclusion in so-called Gartner Magic Quadrants (Gartner Magic Quadrants, see Chapter 1).

The relatively small companies start moving on in fast growing markets of developing countries (e.g., Brazil, China, India and even Vietnam). It is hard just to list the specialization profiles which allow for blossoming out in these markets. More often than not their achievements are untraceable because for promotion they do not need any publicity in Russia.

The growth of product companies at the domestic market in 2017 most likely will exceed 20% in ruble terms. Due to the probable strengthening of the ruble (average annual exchange-value) the growth in dollars will amount to some 10%. Consequently, the total turnover should increase at least by 10% in dollars.

2.12. Software development centers of foreign corporations in Russia

Volume of services provided to parent companies

Volume at year-end 2016, $	Change at year-end 2016, $	Volume at year-end 2016, rubles	Change at year-end 2016, rubles	Forecast for 2017, $
$0.53 billion	+3%	35 billion rubles	+13%	$0.56 billion (+6%)

The prevailing geopolitical situation and global problems of some western corporations (primarily, American) has resulted in a situation where a number of these corporations reduced their Russian R&D centers or closed them at all. Alcatel-Lucent, Motorola, HP, Google, Intel have followed suit. In 2017 they were joined by Oracle which completely closed its development center in St. Petersburg that, in particular, by 1/3 provided development of the programming language Java. Prior to adoption of anti-Russian sanctions nothing foreboded this course of events because the Oracle management expressed satisfaction with activities of St. Petersburg specialists. By all appearances, the

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closure of the development center in St. Petersburg was fuelled by the political position of the company management or by pressure of the US government entity.

The information background in foreign mass media misrepresents often the risks of operations in Russia. For that reason, top managers of the foreign corporations, if they have not elected to reduce the investments in Russian business units, then are not at least bent on an expansion of the same. At the same time, Russia has taken a number of measures complicating the operations of foreign corporations' development centers. In particular, foreign R&D centers have responded adversely to of adoption of the RF Law on personal data protection.

One may talk of rather massive exodus of internationally acclaimed IT companies from Russia, but their place is taken by Asiatic companies as well as young and dynamically developing Western companies, many of which were established by Russian-born businessmen.

For the first time throughout the years of our surveying, 2014 saw a reduction in the service exports by international software development centers and the cost of projects they implement with Russian universities and academic institutions. While the exports of such services were increasing steadily by 8-12% during the past years, then they declined by about 5% at year-end 2014. In 2015 and 2016the same changes are observed within 2-3%.

As far back as several years ago quite different indicators were expected. Since 2012 and through first-half 2014, many well-known international companies have opened or planned to open R&D centers in Russia. Generally, those centers appeared thanks to the Skolkovo Foundation and the innovation center under the same name, which construction is in progress, where the residents have already received certain tax privileges. A possibility of obtaining privileges (first of all, tax ones) supported an increase in the volume of foreign corporations' investment into R&D in the territory of the Russia.

Such powerful corporations as IBM, Cisco Systems, Microsoft, and SAP were among the active investors in implementation of R&D in the territory of Russia in the last 3 years. The SAP company planned to bring its research division staff up to 250 people, and its R&D investment volume – up to 45 million euro. The Microsoft company in Skolkovo planned to develop software for face and speech recognition in video as well as software for multimedia data broadcasting.

The R&D centers of the EMC and Samsung companies have been operating for a long time in St. Petersburg and Moscow, respectively, but the companies established additional centers at Skolkovo in 2012 as well.

The T-Systems company, Deutsche Telekom' subsidiary, while expanding the number of developers in its St. Petersburg office, entered the labor market of Voronezh, expanded considerably its office in Voronezh in cooperation with the Voronezh State University, which had been opened in 2012.

The Chinese Huawei Technologies company declared its plans to increase investments into R&D in the territory of the Russian Federation.

Qualcomm, a US mobile microelectronics vendor, last year started sourcing a team that can form the basis of creation of its Russian development center. The company is interested in the experts who have experience in application programming and digital signal processing. Facebook Company has also considered the establishment of its R&D center at Skolkovo.

In August 2014, The EMC R&D Center EMC in St. Petersburg signed an agreement with the Academic University of the Russian Academy of Sciences aimed at joining efforts to

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develop a simple and easy-to-use cloud platform for genomic variant analysis in clinical medicine. It will be helpful in revealing so called "hybrid genes" that often are sources of malignant neoplasm.

In April 2014, the R&D division of Microsoft Research announced the conclusion of 3-year cooperation agreement with the Moscow State University in the area of the newest IT solutions including opening of the joint research center. The cooperation will cover joint research projects on Big Data processing and visualization as well as computer vision. It also envisages organization of scientific and practical incentives for students

Symantec in the end of 2013 began to contemplate possible opening of its development center in Russia.

Since late 2015, a number of new market players have announced their development plans in Russia. ESET, a Slovak company, producing an antivirus NOD32 known in the world, informed early in 2016 about the investments in expansion of its own development center in Russia. Since the time of entry to the Russian market, they pursued a policy of as much business localization as possible. The center was opened in 2015 to participate in analytical studies, development of business products meeting the requirements of Russian customers. The company implements several joint technology projects with the Russian producers of information security solutions.

SAP Company announced the plans to open an Internet of Things Solution Center in Russia in 2016 on the premises of the Joint Innovation Laboratory. The purpose of the Center is to make the customers and partners familiar with the Internet of Things capabilities. In addition, support will be rendered to the SAP customers to optimize their business processes by means of Internet of Things technology with assurance of the Russian software developer companies and specialist equipment vendors. Above all, SAP Company is intended to establish a joint venture with the Russian gas giant Gazprom in the area of Russia to produce Russian software for automation of the enterprise management business processes. An appropriate agreement was signed in June 2016 at the St. Petersburg International Economic Forum.

D-Link Company, a Taiwan manufacturer of network and telecommunication equipment, opened another Research and Development Center of the company in Ryazan in May 2016. It will focus on the development of engineering solutions and mobile applications for prospective telecommunication equipment.

Export of services related to scientific researching and development, $ million

Year	Volume, million $	Change of volume per year
2010	364	-
2011	418	15%
2012	399	-5%
2013	383	-4%
2014	454	19%
2015	320	-30%
2016	395	23%

Source: Statistics of CB of Russia

Late in May 2016, an agreement was signed to set up a Russian-Chinese research and engineering innovation center at Strogino Tech Park in Moscow. The Center's goals are to develop Chinese-Russian cooperation concerning high technology and knowledge-intensive deliverables; establish an environment for emergence of joint projects and companies and entry to the Chinese market; enhance international cooperation; promote information exchanges. The Center is most likely to be financed also by the Chinese party.

In 2015, it became known about the recruitment of software developers by the Moscow development center of Lazada online store with its headquarters in Singapore. Lazada Group deals with e-commerce in Vietnam, Indonesia, Malaysia, Singapore, Thailand, and Philippines.

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In the last 2 years in Russian media appear more publications about closure or reduction of R&D centers than about opening thereof. Nothing has been said by international corporations about successful implementation of plans declared by international corporations in several previous years. In all appearances, some of them are frozen.

The data of the Central Bank of Russia on the volume of cross-boundary computing services in the R&D field was useful for clarification of information on volume of sales by the foreign development centers in Russia.

It is difficult to specify the trend of this indicator since 2010. More likely it is fair to say that it hovers around $400 million. A reason of sudden change of the trend and growth of this indicator in 2016 has to be explained.

Taking into consideration that the statistics of the Central Bank of Russia concerns not only services in the IT area (by estimates of RUSSOFT experts this share is about 20% of total amount of cross-boundary R&D services), it is possible to assess the export volume of IT services generated by Russian scientific and educational establishments at a level of $80 million.

The foreign companies that have their own R&D 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.

2.13. RUSSOFT rating of major software companies of Russia

In 2017, RUSSOFT has prepared the third version of annually updated RUSSOFT rating of Russian software development companies. Essentially, it is a list of the major software companies divided into categories (divisions) depending on size and growth rate (including predicted indicators during 2 years to come). No similar complete rating list of Russian software developers has ever been made.

Our objective was rather not ranking the companies by size but covering all Russian largest software companies. Perhaps, we do not have yet information of some companies worth looking at to be included in our rating list. However, it is arguable that there are only a very few such companies, and they have the turnover no more than $50 million.

Certain mass media made broader rating lists of IT companies where software development companies were ranked separately. But their ratings were obviously incomplete (at most, they covered 50% of major software companies), and included also system integrators with developed software, hardware makers as well as foreign software companies which informed about sales in the Russian market.

The main reason of non-coverage of software companies by available ratings is a lack of any verifiable information about consolidated revenues of participating companies. We intrinsically withdrew from such ranking, although we had collected information on the turnover of all largest Russian software companies. The point is that a substantial part of this information was obtained as a result of annual polling of software developers on non-disclosure terms, and we keep this rule inviolate (we also used data of other ratings (CNews, Tadviser100, RIA Rating and Expert RA subject to strong verification.

Furthermore, we think unacceptable comparing the indicators taken from audited financial statements of some companies with the past year results presented by employees of companies in the course of polling, or obtained by expert judgment.

It would not be exactly correct to rank strictly and compare companies with different business models.

Nevertheless, we compiled our own rating list with a primary focus on a company size. For fear of disclosing confidential information and avoiding rigorous ranking, all the companies were grouped and posted in alphabetic order without giving information about their turnover.

For each division, a sufficiently wide range of consolidated revenues was defined;, however, the companies were grouped out not only by existing volumes but also with consideration for their development trends.

Top Division (Division A)

1	1C
2	Kaspersky Lab
3	Luxoft
4	Veeam

The Top division consists of companies which already have capitalization in billions of dollars. We have included Luxoft Company into this division as it is historically a Russian company, it made IPO under the Russian flag, and has changed the jurisdiction of its head office as late as three years ago under the pressures of heavy geopolitical consideration.

Most likely, 1C company could have had a billion turnover if one takes into account the income not only from sale of own solutions but earnings from distributorship as well.

Division B

1	ABBYY
2	Acronis
3	Cognitive Technologies
4	CBOSS
5	Center of financial technologies
6	EPAM Systems
7	Parallels
8	SKB Kontur
9	Peter-Service
10	TRANSAS

However, the economic crisis (primarily, the ruble exchange rate fall) had an extremely unfavorable impact on its turnover in dollar terms as the company's main income is drawn in Russia.

Kaspersky Lab has enhanced its standing among leaders, but so far is not growing so rapidly as several years ago. It's possible that new solutions focused on security of Internet of Things will give the opportunity to speed up and reach a 1B turnover.

At year-end 2016, Veeam, as expected, moved into the Top Division. At the global market it portrays itself as an international company, however, the founding members were of Russian descent, and the basic development center is located in St. Petersburg.

The Division B also includes sufficiently large companies with the turnover from $100 million to $500 million.

Particularly, a Russian office of EPAM Systems which controls work of development centers in Moscow, St. Petersburg, Saratov and several other cities.

In the Division C ($50-100 million), there are two contenders for rise to Division B, judging from their turnover close to $100 million. However, in recent years their growth rates have not been very high.

Division C

1	BSS
2	Diasoft
3	Forsite
4	JetBrains
5	Infotecs
6	Dr. Web
7	DataArt
8	GDC Services (ICL-Services)
9	Kronshtadt
10	Mera
11	Positive Technologies
12	RTSoft

In the Division D, almost all companies have the turnover from $20 million to $50 million. However, it contains several companies with the turnover of $12-19 million.

In part, those are companies featuring good prospects to rise to Division C as well as the companies that reduced their revenues in USD due to their focus on the Russian market

only (and achieved the lower turnover threshold of $20 million). We thought it would be not quite fair to remove them from the rating list, but we shall have to do this if their turnover in dollar terms does not grow.

Division D

1	Arcadia	22	Group-IB
2	Artezio	23	InfoWatch
3	ASCON	24	Kodeks
4	Ashmanov and Partners	25	Lanit-Tercom
5	Atom Security	26	Naumen
6	Auriga	27	Scientific and Engineering Center SPb ETU – JSC NIC SPb ETU
7	B2B-Center (Economy Development Center)	28	Omnicomm
8	BARS Group	29	Paragon
9	Bercut	30	Parus
10	BIS (Bank Information Systems)	31	PROMT
11	BFT (Budgeting and Financial Technology)	32	SCANEX
12	CDC	33	Security code
13	Compass Plus	34	SIGMA
14	CryptoPro	35	Soft Expert
15	Devexperts (Expert-System)	36	SpeechPRO (Speech Technology Center)
16	Digital Design	37	SPIRIT
17	Elecard	38	RDTex
18	First Line Software	39	Reksoft
19	iiko	40	Return on Intelligence
20	Galaktika	41	R-Style Softlab
21	Garant	42	Zecurion

Compared to the previous version, aside from transfer of Veeam to the Top Division, another movement took place — EPAM Systems cranked it up a notch and entered Group B. In addition, 4 newcomers have been added to the updated rating list. In this case, one (Kronshtadt Group) directly was included in Division C. However, it is not altogether a newcomer because earlier its revenue was accounted for as a part of turnover of TRANSAS holding The TRANSAS owners sold it to Systema JSFC, but before not even an approximate turnover hereof was known. The place of Prognoz which was under bankruptcy threat was taken by Forsite, to which went over PROGNOZ brand, a right to substantive decision, key employees and customers. Forsite is a Muscovite, but the development center was left in Perm (Prognoz location).

Three newcomers of the RUSSOFT rating are Atom Security (developer of solutions in information security and employee control areas), CDC (developer of mobile solutions for different industries), and iiko which specializes in development of innovative management systems for facilities in hospitality sphere.

In total, our rating list contains 68 companies, whose total turnover is in excess of $7 billion.

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CHAPTER 3.

Primary Trends
in the Russian Software
Development Industry

3.1. General analysis

Replies to questions about the main goals of companies, about the conditions of their business and factors influencing the activity of software companies, allows us to assess the moods of company managers and how they have changed. Judging the real situation by a change in respondents' moods, but should be done cautiously and backed up by confirmatory information from other sources.

In particular, answers to the question about the main areas of activity not only provide the relevant information about companies' goals but also serve as an indirect indicator of a feeling of crisis (or growth). If a company mentions a smaller number of areas of activity than previously, more often than not this means that it has had to scrap plans to complete certain tasks. This may be due to uncertainty on the market arising from changed conditions, or lack of resources for adequate development. Naturally, in a down economy companies try to concentrate on solving just one task (or if possible, another one or two, but no more).

Accordingly, with a drastic decrease in the number of areas of activity mentioned by a significant number of respondents, we can speak of a present crisis. In 2016, with the growth of ruble turnover for the majority of companies, the crisis can be seen as a very relative concept. Judging by the change in the average number of areas of activity mentioned by respondents, the worst times for the industry were when the survey was held in 2014 and 2015. In 2016, this figure grew, if only slightly, although it did not reach the level of 2012-2013. This indirectly shows that the crisis was beginning to be overcome. The 2017 survey confirmed this supposition, as the number of main areas of activity per company surveyed reached the level of 2013.

The same conclusions can be made from the equivalent figure for the number of development trends indicated in replies, but with the adjustment that to a large degree this reflects the intensity of changes taking place, which may also increase during a crisis period. However, in the 2017 survey, this question was not present in the questionnaire, as it is not crucial and important, and so it can be asked once every 2-3 years.

Number of main areas of activity and trends per company surveyed
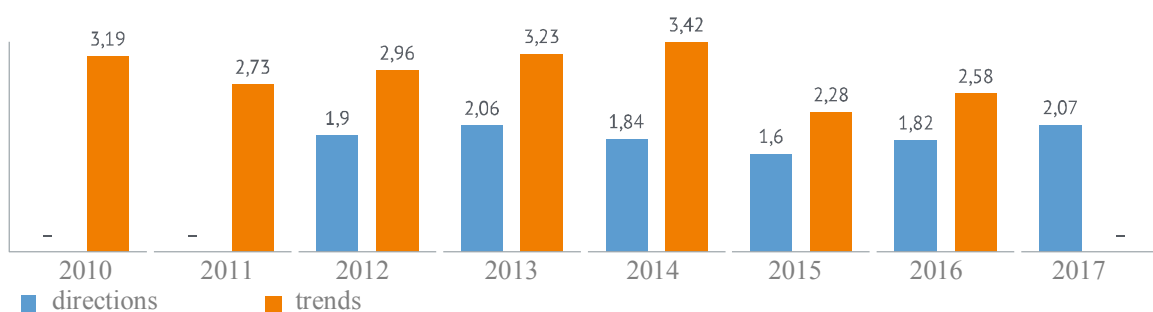
After the decrease in the share of respondent companies in 2015 which believed in the prospects of a growth of sales in Russia, when the prospect of a serious contraction of the domestic market was obvious, this share increased in the subsequent two years. Especially as in 2016, the growth of the domestic market was not only expected, but real.

The area "work for export/expansion of the marketing network abroad" was also indicated by respondents as one of the main area of activity more in the last two years. 36% of companies considered it to be a priority, and while 31% mentioned more active work on the domestic market. This confirms that developers see more prospects on the global market than on the domestic market, even when it is growing.

77% of respondents, as in the previous year previous, mentioned the growth of business (regardless of whether in Russia or abroad) as a priority task of this development for the next two years. In the 2015 survey, this figure was about the same – 75%.

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We should note the increasing attention of respondents to the area of "Certification of software development processes". In 2016 no company named it as a priority, but in 2017 5% of companies did. Evidently, in the aspiration to enter the global market, many companies have begun to understand that for successful promotion of their solutions and services abroad, they should have a certificate of compliance with international standards, which determines the quality of the software development process.

After the drop in the 2015 survey of the number of companies aspiring to create software development centers in the regions (up to 4%), in the next two years it climbed back to 15%, which shows the recovery of the market and a deficit of personnel.

Main areas of companies' development*

Year of survey/area	2009	2010	2011	2012	2013	2014	2015	2016	2017
More active work on the domestic market	66%	68%	77%	73%	81%	73%	63%	65%	68%
Growth of online sales	22%	31%	28%	29%	36%	27%	30%	32%	39%
Work for export/expansion of the marketing network abroad	-	-	47%	52%	59%	56%	50%	57%	66%
Certification of software development processes	8%	13%	12%	13%	10%	5%	7%	8%	16%
Establishment of regional development centers	7%	12%	13%	15%	15%	15%	4%	10%	15%
Other	-	-	8%	8%	5%	8%	6%	10%	3%

* - respondents could choose more than one area

Priority areas of companies' development

	2015	2016	2017
More active work on the domestic market	45%	36%	31%
Growth of online sales	17%	14%	11%
Work for export/expansion of the marketing network abroad	30%	41%	36%
Certification of software development processes	1%	0%	5%
Establishment of regional development centers	2%	2%	2%
Other	5%	8%	1%

* - 12% could not choose a priority area

Among other tasks which were not included in the questionnaire, surveyed companies indicated the following: "Optimization of internal processes", "Mastering new technological fields", "Equipment certification" and "Dealing with what we already have". We may say that they all involve a focus on development. In the previous survey, almost all the areas in "other" also reflected quite an optimistic mood. However, three respondents mentioned tasks which did not focus on development – carrying out present tasks, survival, and keeping afloat on the market. In the 2017 survey, no one mentioned survival as the main area of their activity.

In a comparison of the main areas of development of business in companies with a different turnover, we may note that small businesses (under $5 million) have begun to count on the domestic market more than large businesses. A year previously, the emphasis was on companies with a turnover over $5 million. It is small companies that are developing sales in Russia more swiftly.

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Main areas of companies' development with different turnover

	Turnover < $5 M	turnover > $5 M
More active work on the domestic market	69%	62%
Growth of online sales	41%	31%
Work for export/expansion of the marketing network abroad	65%	72%
Certification of software development processes	16%	14%
Establishment of regional development centers	15%	14%

Main areas of companies' development with different H.Q. location

	Moscow	St. Petersburg	Siberia	Urals	Other cities
More active work on the domestic market	72%	68%	74%	70%	57%
Growth of online sales	52%	15%	33%	80%	40%
Work for export/expansion of the marketing network abroad	61%	65%	67%	80%	71%
Certification of software development processes	30%	12%	7%	10%	9%
Establishment of regional development centers	20%	3%	15%	30%	17%

Modern trends in the Russian software development industry in the opinion of company managers in the industry

Year of survey/trend	2008	2009	2010	2011	2012	2013	2014	2015	2016
Domestic market growth	71%	44%	49%	54%	51%	58%	59%	35%	37%
Export growth	56%	19%	35%	35%	23%	37%	33%	32%	48%
IT outsourcing growth (IT infrastructure support)	30%	34%	32%	28%	35%	32%	33%	20%	28%
Growth of direct sales via Internet	31%	27%	39%	38%	39%	47%	48%	37%	42%
Market consolidation (mergers, takeovers, creation of holdings)	61%	21%	35%	30%	25%	31%	33%	23%	25%
Increase in product developments (Box/Licensed Software)	32%	21%	26%	19%	26%	27%	33%	28%	22%
Growth in development and adoption of software solutions (Services & Solutions)	50%	18%	35%	24%	37%	32%	35%	18%	25%
Increase in custom software development	38%	14%	35%	29%	30%	31%	41%	19%	12%
Adoption of quality management systems	38%	10%	21%	12%	20%	24%	24%	14%	12%
Other	-	-	12%	4%	10%	4%	3%	2%	7%

* - this question was not asked in the 2017 survey, as it was decided to include it in the questionnaire once every 2-3 years

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Traditionally, regional software developers, in comparison with companies in Moscow and St, Petersburg, are more focused on work for export. However, the results of the survey rather reflect the plans and aspirations to increase the share of foreign sales in their turnover, but by their volumes of sales the regions severely lag behind Moscow and Petersburg.

3.2. Quality management system certification

In recent years, replies to the question about the presence of a quality management certificate has not made it possible to make any logical conclusions. If there were changes in the results of these answers, they were probably coincidental. So the question about this was temporarily removed from the questionnaire. It would be logical to return it in the next survey, as after the end of the crisis period 5% of surveyed companies called "certification of software development processes" as a priority area of activity (this was not mentioned at all a year previously, in the 2016 survey).

According to the interviewed experts, the issue of establishing a quality management system in software development companies in Russia lost its urgency approximately in the middle of the 2000s, because to a varying degree practically all companies have their own quality management systems. For those service companies which participate in international tenders with formal requirements for CMMI certificates, this problem is resolved by the regulatory certification. All product companies and small service providers content themselves with ISO and implement their own quality management systems based on ISO and CMMI, but without requiring the expensive procedure of certification and confirmation.

Share of companies certified to international standards

	2009	2010	2011	2012	2013.	2014	2015	2016
Not certified	65%	61%	69%	64%	74%	71%	61%	61%
ISO	31%	31%	29%	35%	24%	24%	33%	30%
CMM*	0%	7%	3%	3%	1%	-	-	-
CMMI	4%	7%	2%	6%	6%	5%	4%	4%

* CMM was not included in the 2014 questionnaire as it was recognized to be obsolete and completely replaced by CMMI

In previous years the number of companies significantly dropped which plan to undergo certification in the next two years. If in 2012 among respondents without certificates there were 46% of them, in 2013 there were 27% and in 2014 19%. In 2015 this figure dropped even more – to 15%. In 2016, 19% of companies had these intentions. The small increase in this figure may be another confirmation that hard times are coming to an end (the intention of undergoing certification shows the possibility to develop). The fact that 16% of companies surveyed in 2017 called certification one of the priority tasks (a year earlier this figure was 8%), and 5% called it a priority (previously 0%), also shows a focus on development.

However, this is does not guarantee an increase in the share of companies which received a quality management system certificate.

As the problem of having certificates becomes less pressing, in recent years respondents have become less concerned about whether there is state support of certification (although this support is almost zero). In 2010-2013 more respondent companies showed dissatisfaction with the lack of this support. From 2014, the problem of certification became less significant in the face of serious changes in the external environment. Most respondent companies are not even aware that in competing countries the state is interested in the quality management system certification of domestic companies.

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It is noteworthy that 61% of respondent company could not assess state support of certification at all. Evidently they know nothing about it and are not sure that they need it. In 2016, a program was launched to compensate some of the expenses of Russian manufacturers for production certification on foreign markets (RF government decree № 1388, agent of the RF government for issues of providing subsidies determined as the Russian export center). In 2017, financing of 0.76 million rubles was allocated for this program. This decree approved the list of codes of goods of foreign economic activity of the Eurasian economic union (Armenia, Belarus, Kazakhstan, Kirgizia, Russia). According to these codes, compensation is provided for part of expenses for certification and approval of production.

The Russian ministry of economic development is at present formulating proposals to expand the list of production codes (request attached) manufactured with the following technologies: technologies reducing losses from socially significant diseases; nano-, bio-, information and cognitive technologies, biomedical and veterinarian technologies (presidential decree № 899).
The realization of this program has not yet had an effect on the Russian software industry. Its preliminary results may be evaluated in 2018.

The share of unsatisfactory evaluations of state support of quality management system certification increased in 2015-2017 from 38% to 50%. This growth did not so much take place because support has dropped, but because of the increasing demand for it. In this area, there is not yet any noticeable state support.

Evaluation of state support for international certification

	Low	Satisfactory	Good
2010	56%	40%	4%
2011	78%	21%	2%
2012	57%	41%	1%
2013	57%	39%	4%
2014	46%	44%	9%
2015	38%	59%	4%
2016	45%	48%	8%
2017	50%	38%	12%

In 2007, the first authorized (and later certified) CMMI Expert appeared in Russia and in 2009, the first Russian-speaking Lead Appraiser (which still remains the only one). This only led to a short-term and small increase in the number of certified companies as the share of the Russian experts' services cost in the total assessment and certification cost is not great enough to have a serious bearing on the certification cost.
In 2014, for the first time we included the question about the use of SCRUM or other kind of Agile Programming, but initially we could not obtain any reliable results. It is likely that employees of the agency and many respondents misunderstood the question.

The problem was solved in the following year. In 2015 and 2016, the share of companies using SCRUM or its equivalent were identical – 13%.

Over the last two to three years, the media barely mentioned CMMI or ISO certificates. Companies themselves probably ceased to consider this as an achievement or an important piece of news, although all large service companies probably underwent all the required procedures in the past. The only relevant piece of news refers not to a service company but to Kaspersky Lab, the solution developer in the field of information security. This company successfully underwent a certification audit for compliance with requirements of the new version of the international standard ISO 9001:2015. As the Kaspersky Lab press release stated, the company is the first among its competitors with customer relationship principles and processes that meet universally accepted requirements in management quality. In particular, the scope of certification covers management of single and multiple safety incidents, client request processing, knowledge management and internal support of Kaspersky Lab customers. The certificate validity

extends to technical support services working with corporate and home users of the company's products and services in Russia, Europe, North and South America.

In 2016, software developers mentioned the presence of any kind of certificate almost as frequently as service companies (36% and 40% respectively).

3.3. Investment promotion

Changes in the questionnaire prepared for the 2017 survey not only made it possible to determine attraction of investment or according plans among companies, but also the size of external financing (both existing and expected).

The share of companies which attracted investments last year, after a reduction of this figure in 2014-2015, is constantly increasing, reaching the pre-crisis level for year-end 2016. The data of a study of the venture market of Russia confirms that investment in software companies is increasing both by the number of transactions, and by volume in dollar terms (for more detail see the subsection "Venture market").

Besides the growth in the number of companies attracting investment, we may also note that there is now almost an equal share of companies which attracted investment in the previous year (in relation to the survey year) and which plan to attract investment in the present and subsequent years. Previously the difference between these shares was 2-3 times. We may conclude that most companies that hoped for external financing in the near future have not yet received it. 20-25% of surveyed companies expected investments, and in following years only 7-12% received them. We may assume that software developers have begun to assess their chances for external financing more realistically. Or the end of the crisis and the growth of sales on the domestic and foreign markets gives respondents hope for limited growth. This assumption may be tested next year.

At the same time, the total volume of investments attracted by surveyed companies is around $17 million for 2016, and in 2017 and 2018 this figure should increase by more than 3 times – to $55-57 million. Accordingly, there are expectations of a drastic increase of investment volume calculated per company. This means that the average size of an investment deal should grow significantly.

Share of companies which attracted or plan to attract investments

Year of survey	Last 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%

If 152 of companies surveyed in 2016 in total attracted external financing of a sum of $17 million, then as that there are at least 3,000 software developer companies in Russia, the total volume of investments in the Russian software industry should exceed $300 million ($335 million). At the same time, according to the survey of the Russian venture industry, "Money Tree: Venture Market Navigator", the venture market only came to $165 million, of which software and cloud services accounted for just over $40 million.

This is a large difference, but the venture market in the "MoneyTree: Venture Market Navigator" study only covers investments in startups, and in the RUSSOFT survey mainly older companies take part, which attract funds at other stages of development.

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What is the volume of outside investments attracted by your company in 2016 (forecast for 2017-2018)?

	In 2016 (actual)	In 2017 (forecast)	In 2018 (forecast)
Did not attract any and do not plan to	82%	77%	79%
Less than $1 million	9%	8%	5%
From $1 million to $5 million	2%	6%	6%
From $5 million to $10 million	0%	1%	1%
Over $10 million	0%	1%	1%
Could not give an evaluation	8%	8%	9%

Approximate volume of investment attracted by surveyed companies, $ million

In 2016 (actual)	In 2017 (forecast)	In 2018 (forecast)
17	57,5	55,5

Venture funds begin their operation in the Russian market mainly in Moscow, and continue to work there. Though they have begun to express an active interest in investment in the regions (the Russian Venture Company even arranges tours across the country to put the investors in touch with regional high-tech businessmen), it is still considered to be much easier to find investments in the capital.

At the same time, in Moscow the share of companies which attract investments was slightly less for year-end 2015 than in the regions, and much lower for year-end 2016. According to the results of a survey for the last four years, we may already conclude that regional companies even attract financing more frequently than Moscow companies (or at least not less frequently). The availability of money from Moscow venture funds for the regions in recent years has grown in many ways thanks to various regional events held by these funds.

It is possible that Moscow companies required outside financing to a lesser extent, as they can reinvest their own profit, and also use funds of shareholders which may have business in other fields.

Share of companies that attracted or plan to attract investments, by categories

Year of survey	Last year	This year	Next year
Business model			
Software developers	15.7%	17.6%	13.7%
Service companies	7.3%	10.4%	8.3%
Company size			
Turnover less than $5 million	10.6%	13.0%	10.6%
Turnover more than $5 million.	10.3%	17.2%	13.8%
Turnover from $5 million to $20 million	4.5%	13.6%	13.6%
Turnover more than $20 million	28.6%	28.6%	14.3%
Share of foreign sales			
More than 50%	14.0%	20.0%	20.0%
Less than 50%	8.8%	10.8%	6.9%
Age of company			
Older than 10 years	5.6%	10.1%	7.9%
Younger than 10 years	17.5%	19.0%	15.9%

Year of survey	Last year	This year	Next year
H.Q. location			
Moscow	4.3%	6.5%	2.2%
St. Petersburg	11.8%	17.6%	20.6%
Siberia	14.8%	11.1%	11.1%
Urals	10.0%	30.0%	30.0%
Other cities	14.3%	17.1%	8.6%
All regions	13.9%	16.7%	12.5%
Presence on markets			
Has worked abroad	12.4%	16.9%	13.5%
Has not worked abroad	7.9%	9.5%	7.9%
Present on new market	17.1%	25.7%	22.9%

Investment is attracted most frequently by regional and Petersburg software developers which are focused on the foreign market (especially markets of developing countries), and which were created not more than 10 years ago.

Companies which are primarily focused on the Russian market were more successful in attracting investment for year-end 2012 and 2013 than those which received most of their revenue from export (in 2012 13% and 10% attracted investments, and in 2013 8% and 3% respectively). This was probably because the prospects of development on the Russian market were more obvious for them than the possibility of developing on foreign markets. In 2014, the situation changed: 11% of companies surveyed which receive at least 50% of revenue from export were able to attract investments. For companies which are mainly focused on the Russian market, this figure was just 65. In 2015, the huge difference was not only preserved, but even increased – 17% and 7% respectively. In 2016 it became clear that the domestic market would grow. So companies that were primarily focused on this market began to attract investment more frequently. However, investors still give their priority to companies which work on the global market.

Evidently, the changes in the policies of venture funds (other institutes of development) which propose to stimulate startups to work on the world market, and not just in Russia, provide the expected effect. If external financing is supported a company which is initially focused on foreign markets, the payback from investments may be several times higher than if a similar sum is given to developers which are only interested in the Russian market.

In 2013-2014, not a single surveyed company from St. Petersburg attracted investments. In 2015 7% of these companies did, but this figure was still lower than the average for Russia. The selection for Petersburg companies in our study is quite high, so a growth of 7% cannot be explained by accidental factors.

These results of the survey gave food for thought about the investment attractiveness of St. Petersburg in the field of software development. In previous years there were grounds to assume that Petersburg lacked an investment climate which would favor venture investors, even when compared not with Finland or Silicon Valley, but with other large cities in Russia. At the same time, training of specialists in the IT sphere was established in Petersburg, and numerous international hi-tech conferences and forums are held. Judging by the number of software companies and technical institutions with a very high level of specialist training, Russia's second capital should be among the leaders for attracting investment in IT.

For year-end 2016, Petersburg had not yet attained leadership in the share of companies with external financing, but it only lagged behind the regions slightly, and was considerably ahead of companies from Moscow. It would seem that the investment climate in the northern capital has begun to improve.

Growth indicators of turnover and export among regional companies are still lower than in Russia's two largest cities. From all appearances, the relatively low growth rates are in

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many ways connected with the insufficient investments they have received over the last 10 years. Perhaps this problem has begun to be solved, as in the regions companies attract investments more frequently than in Moscow and St. Petersburg. However, these investments do not allow regional companies to increase growth rates in turnover and foreign sales. This may happen in 2017 and 2018.

It is impossible to determine what sources of financing are crucial for software developers only based on the "yes" and "no" answers received in the RUSSOFT survey. We may assume that the investment activity in the software industry was stimulated to a large extent by the state and state corporations. Major state investments in 2015-2016 directly to software development are not known about, but the policy for import phaseout in many hi-tech fields and the continuing financing of large-scale state programs form an expectation of a growth of demand in the future. Even if state investments are directed towards other fields, of the funds allocated something will certainly also reach software companies, as without custom software development or program products (or program-device complexes) no sector of the economy can develop (especially not hi-tech sectors).

The fact that 14% of surveyed companies planned to attract investments in 2017 (11% in 2018) does not mean that other companies do not require external financing. Most companies need funds for development, but in the near future they cannot count on attracting them.

The survey conducted in early 2016 as part of the study initiated by the SAP corporation: "Prospects of Russian IT developments on the global market" showed that for 52% of software companies, the growth of foreign sales is held back by an insufficient marketing budget, and for 33%, by insufficient funds for developing solutions which could be competitive on foreign markets.

In-depth interviews with 31 experts conducted as part of the study made it possible to conclude that above all there is a lack of "long-term funds" – investments for 3-5 years. It is not difficult to attract investments and take out a loan for a project which will provide almost guaranteed profit within a year. But in the hi-tech sphere it is rare when profit can be guaranteed. So venture capital is required.

Over the last three years, investments funds have reduced their activity in Russia because of the lack of examples of investors successfully moving from the capital of portfolio companies, which would show the success of their investments. However, in the software development sphere, venture deals in the last two years have still increased both in number and in the total volume of financing. Investment funds have lost interest primarily in investments in Internet projects, which were previously the main engine of the venture market in Russia.

Nevertheless, the insufficient financing of software companies is obvious, even with the annual increase of investment volumes they attract every year. There is a wide range of possible sources of financing development of program products and their release on the market – the companies' own funds, grant financing, borrowed financing, external investments from investors, including private individual, venture and seed funds, direct investment funds, public share placement (IPO). There is a sufficiently large number of examples of using these sources and their combination by Russian developer companies for financing international business. However, the effectiveness of using various tools of financing cannot be considered to be sufficiently high.

State institutions of development ensured a boom of startups which began in 2008-2009, but in recent years their activity has not been high. After the mass allocation of state funds to innovative companies through venture funds and grants for scientific study work, doubts arose that all the recipients of the state support deserved it and had any prospects of business development. In some cases, startups which had become quite successful and fast-growing companies changed their jurisdiction, becoming fully American or Western European companies. Accordingly, in these cases the Russian state supported the hi-tech sector of the economies of other countries.

As a result of the not particularly effective financing of startups, state institutions became more conservative. At the same time, the possibilities of the Russian budget decreased because of the economic crisis. So not only startups, but companies with a turnover of over $10 million found it very difficult to receive financing from state institutions of development. Complex and rather expensive bureaucratic procedures are required to receive loans, but there may also not be any guarantee of receiving funds, even for a very promising area. For this reason, IT exporters often do not even try to start the process of receiving a loan at a subsidized rate.

In some cases, distributors of state investments in hi-tech openly demand a percentage of the allocated sum. Information about these proposals swiftly spreads through companies in the industry, which discredits state institutions of development in general, although far from all of them have corrupt managers. Companies which could increase the growth of sales abroad with state financing often do not even begun to study the possibility of receiving this financing, as they see considerable risks in doing so.

Private business is also repelled from state institutions of development by the "toxicity" of funds that they allocate. The excessively harsh limitations, set for several years in advance, for using the money in projects and the compromising proximity to bodies of state power may also hinder the realization of a dynamically changing project, and its promotion on the largest world markets. The limitations set by state institutions of development do not help in attracting additional financing from private investment funds. So experts recommend looking for other sources if possible, which are not connected state structures.

At the same time, the experience of other countries shows that without state financing in some form or another, the hi-tech sector of the economy cannot develop. According to Stanford university professor Henry Etzkowitz, renowned for the concept of the Triple Helix innovative development society, the foundation for all hi-tech companies of Silicon Valley was the results of state research projects, many of which were commissioned by the Pentagon. In some cases, the US Defense Department commissioned the development of a complex information system (the final product, and not only research) which later allowed the developing company to become one of the world leaders.

Without state financing, Russia will not be able to create a powerful software development industry. The state must study the international experience of supporting the industry (there are also numerous tools for supporting exporters, which are used in many countries for developed or swiftly developing economies), and to create their own tools of financing taking into account Russian features. This work is also being carried out partially by the Russian Export Center, which already offers financing of international marketing activity (participation in foreign exhibitions, conferences, business missions). The REC is also prepared to provide loans for international projects (both to the solutions developer, and its foreign client) for 5% in rubles and over a period of up to 10 years. In the future it is proposed to pay western analysts to study Russian companies and their solutions better, and also the support of receiving patents, making it possible to protect intellectual property abroad.

State structures mainly finance software solutions (primarily in the information security sphere), but there is little official information about them. Nothing is yet known about cases of successful commercialization of these solutions with access to the global market.

Even if state investments in the hi-tech business are increased, and instruments of financing are improved, the state can only give the first boost, but cannot replace all sources of investments. In any case they must exist in a quantity and volume comparable with foreign countries.

In the current political situation, it is difficult to expect abundant financing from foreign investment funds. So we must primarily count on domestic resources. Foreign investors may come to Russia if local venture capitalists show that investments in the software industry are justified.

Experts who were interviewed in-depth as part of the study "Prospects of Russian IT-developments on the global market" initiated by the SAP corporation agree that in Russia there are sufficient free funds which their owners are prepared to risk by investing in IT companies. At the same time, the owners of these funds are interested in the possibility of investing them in hi-tech companies. However, in most cases they are in no hurry to make risky investments directly, as they usually find themselves dealing with a completely unfamiliar area, in which potential recipients of investments cannot guarantee anything, fearing unwanted inspections and suspicions of deceit.

Unit investment funds form a portfolio from shares of telecommunications and IT companies (including software companies), but the logic of changing the structure of this portfolio is not followed. At the same time, they invest funds in assets which are listed on stock exchanges, and only a handful of Russian software companies have these.

Unit investment funds investing in the software business may expand IPOs.

Although a number of Russian IT companies carried out IPOs at one time, including abroad, experts note the high cost and limitation of an IPO as an instrument of financing international expansion, even if it is on the Russian stock exchange. Nevertheless, the prospects of creating a section on the Moscow stock exchange which will develop work with IT companies are seen positively. It is easier for IPOs on the Russian stock exchange to be carried out by companies which are large by Russian standards. In Russia there are software companies (holdings) with a turnover of tens and even hundreds of millions of dollars which were previously focused mainly on the domestic market and the ex-USSR market (if they had sales abroad, these only provide a few percent of turnover). These companies at present are trying to find paths for international expansion, and are looking for investments to do so.

It is expected that in the next few years at least 10 such companies will carry out their first IPO on the Russian stock exchange. Active work is underway in this direction. The executive director for the innovations and investment market of the Moscow stock exchange Gennady Margolit announced in March 2017 that in the medium-term perspective, around 50 hi-tech companies would carry out an IPO. The infrastructure, demand and supply for these IPOs already exists, he believes.

However, for these expectations to be justified, certain fundamental changes are required. At present, potential stock market investors do not believe in IT companies because of the scarce information about them and the industry in general. For this information to appear, a pool of industry analysts is needed, who will prepare materials for the media. Journalists are currently writing about "blue chips" (Sberbank, Gazprom, Megafon) but not about IT companies. For industry analysts who will cover changes in the cost of shares of IT companies, financing will probably be required, because in other industries it is customary to pay analysts (not so that they give praise, but so they constantly write something). So far it is unclear who will carry out this financing.

The topic of IPOs for IT companies on the Russian stock exchange is promising (especially if the use of pension money for investments in these companies is solved), but needs to be elaborated.

The following situation results: in Russia there is a large unsatisfied demand for investments in software companies, and a considerable volume of free funds received by companies of various industries, the owners of which do not understand the specifics of the IT business.

Perhaps these free funds may completely cover all the present demands of developers of software (and other hi-tech companies), Especially if we take into account the capitals formed in the oil and gas industry.

The money of oil and gas companies enters the IT sector in one way or another. For example, Gazpromneft has created a modern technology park in Omsk for research and development of hi-tech solutions in the field of automation of oil-processing industries. These solutions are so far only used at their own facilities. According expert evaluations

are being carried out in the field of the automation of oil processing, but they will probably not be spread in Russia fast enough.

The flow of inter-industry capital is hindered by the fact that there are very few specialists in Russia who know foreign markets and are capable of assessing the prospects of new program products created. A corresponding expertise is concentrated in USA and several more countries (for example in Israel, where companies are focused on the global market to begin with because of the limited domestic market and the concentration of good specialists, including Russian speakers, is very high). Partially for this reason, startups move to places where this expertise exists. They receive investments there and open companies, although the development usually remains in Russia. American venture investors, as a rule, demand a change in jurisdiction. They are not prepared to invest funds in a purely Russian company (with rare exceptions).

Russian venture funds also lack the necessary expertise, and did not work on expanding it, but rather expanded the geography of their activity, largely shifting their focus over the last 2 years from Russia to other countries.

The number of Russian specialists who know foreign markets and have product expertise is constantly growing, but this process must be accelerated considerably.

Pressure from potential investors and potential recipients of investments in the software industry should lead to a breakthrough in this area. The problem of the lack of expertise and knowledge can be solved by education programs, seminars and webinars, also featuring foreign specialists (possibly Russian-speaking). Especially as many people who have this knowledge and expertise are even prepared to share them for free.

3.4. Import phase-out

The topic of import phase-out has been discussed for at least 10 years with a varying degree of activity. At the same time, the constant increase in the share of Russian solutions on the domestic market has gone its way, regardless of how actively discussion took place at different levels. Initially the main factor that propelled import phase-out in Russia was the creation and improvement of Russian solutions. A typical path was shown by the company "1C", which began by developing accounting systems, but then created an ERP system, initially for small and medium companies, and then for large ones. So it captured new segments of the corporate software market, squeezing out foreign developers.

As a result, on the ERP systems market Russian developers also dominate, if their share is calculated not in cash terms, but in the number of projects, established solutions or jobs covered by the system.

In 2014 two more significant factors arose which accelerated the process of import phaseout somewhat. Firstly, the sanctions which involved a ban on sales of western software to a certain group of Russian companies. These companies had to look for an alternative to foreign software. Another group of companies face this threat, as corresponding state structures force them to move to Russian software (or Russian versions of freeware), or they see this need themselves. The disclosures of Snowden and WikiLeaks also played a role in recognizing the need for import phaseout.

The second new factor is the drastic drop of the Russian national currency, which led to a significant rise in price of foreign solutions in comparison with equivalent Russian solutions. This factor probably has the greatest influence, as the difference in price, which was already large, became enormous – sometimes ten times greater.

In the autumn of 2016, the publication CRN/RE asked a number of Russian companies to evaluate how much clients save if they prefer their solutions to foreign equivalents. RAIDIX saved 40-50%, SKALA-R of the IBS company by 30-40%, SPIRIT the total cost of ownership was 10 times lower, with SUBD RostrgeSQL in comparison to Oracle, expenses on technical support were 12 times lower, and expenses on licenses were the same, or even 20 times lower.

According to the company AXELOT, economic reasons were key in the transition to Russian software in 70% cases of import phaseout. Even companies which previously used Oracle and SAP on principle are now seriously examining the possibility of moving to 1C.

Perhaps the time has come to take into account a third factor as well, which surely had a significant influence on the software industry 10 years ago. This is the series of state measures to support and protect Russian software developers (along with protection of the Russian market). However, for a very long time, matters did not progress beyond discussions of the necessary changes in state policy.

From 2014, according decisions at state level began to be made at last, but for almost two years they did not give a significant effect. It turned out that first it was necessary to determine what needed to be stimulated, and what how import replacement should be defined. What was meant by a Russian developer had to be defined (it took almost a year to formulate this definition and make according changes to legislation). It was desirable to determine whether import replacement meant the replacement of one import solution by another, if an alternative developer looked more reliable. In many cases, import replacement had to be carried out in this way, although legislation did not define it as such, although to a large decree this did not concern the software market, but rather the market of electronic components and equipment.

When the definitions became clear, and requirements were formulated for state structures and companies not to buy foreign software on the condition that a Russian equivalent existed, it turned out that a control mechanism had not been developed. As a result, according to Russian developers, despite the bans state structures continue to have foreign solutions delivered (either justifying this by the lack of a Russian equivalent, or under trademarks of Russian companies, which use an OEM model for this).

While the state developed approaches to import phaseout and tried to form instruments of financial support for import replacement of software, Russian IT companies in 2014 began to take actions towards preparing alternative solutions for replacing imported software. In 2014, the establishment of a consortium of companies was initiated, aimed at creating comprehensive solutions on the basis of developments of certain companies or at jointly promoting the systems on the Russian market (in particular, in the public sector, including state-owned enterprises). Consortiums were established such as BETA, for formation of the full stack of domestic software (or freeware) and replacement of basic and application software for the banking sector) and SOYUZ – for the substitution not only of basic and application software for the oil and gas sector, but also for the replacement of import servers by domestic hardware on the basis of Elbrus processors. Looking at these actions by domestic companies, we may definitely state that preparation for an alteration of market structure (which is positive from the viewpoint of IT users and domestic developers) is underway.

In 2015, this process accelerated somewhat. However, this was caused not so much by decisions of the Russian government and changes in legislation as by anti-Russian sanctions and the devaluation of the ruble. A wide range of enterprises were faced with a situation where foreign vendors ceased to support previously purchased equipment, and they had to look for an alternative without any governmental stimulation of import phaseout. Several corporations which risked being included on the sanctions list did not wait for western vendors to deny their services. For example, JSC Russian Helicopters launched a project to move to basic freeware (primarily the operating system Linux of domestic assembly).

Nobody determined in quantitative indicators how actively the import phaseout process proceeded in the last few years, and how intense its acceleration was in 2015, and then in 2016. And indeed, it was difficult to do so, as the methodology was absent too. The traditional method of evaluation of the market share measured in dollars is unsuitable in this case. The fact is that Russian solutions which are often no worse than foreign equivalents are usually much cheaper. Owing to replacement of import solutions, IT

companies managed to increase sales by 30% in rubles in 2015, while western vendors had to decrease sales by 10% in dollars, but their shares on the market measured in dollars remained almost unchanged. In the event of a move to freeware that allows companies not to depend on the loyalty of foreign countries, this is not always about software sales. Small businesses download this software from freeware sites which do not request support and installation services.

The above example with different rates of sales in rubles and dollars is not completely hypothetical, as similar indicators really are typical for certain segments of the Russian software market.

According to the estimates of RUSSOFT, in 2015 all Russian software developers increased their total sales on the domestic market by 9% (in rubles). At the same time, the market itself contracted in dollar terms by 43% (foreign vendors decreased their revenues in Russia by approximately the same amount). In 2016, the Russian software market measured in dollars either contracted by 1-3%, or grew by about the same amount, while ruble sales of local software companies increased by 34%. In this case it would be more correct to calculate the change of revenues of western and Russian developers in different currencies (in the currencies in which they set prices).

If we compare the change of volume of sales in this way, we may say that the import phaseout process went full speed ahead. But this statement will not be quite correct, as it must be taken into account that import phaseout has mainly took place in segments dominated by foreign vendors. Additionally, it would not be quite right to assume that all western software companies strictly locked their ruble prices to dollar prices. As a rule, ruble prices changed with a certain lag in relation to the change in the ruble exchange rate.

The rate and the volume of import phaseout should be measured for each segment separately, with due allowance for pricing policy of main solution suppliers. To calculate afterwards an aggregated indicator is essentially possible, but hardly an absolute necessity as the importance of each segment (for information security and technological independence of the country) is very different.

The RF Ministry of Communications and Mass Media in the import phaseout program has already established existing import shares for each software segment (at year-end 2014), as well as guidelines for reducing them by 2020 and by 2025. For example, for the field "Business Applications" including ERP, CRM, BI, EDMS and other systems which are used in company management, the share of import is 75%. By 2020, it should decrease to 50%, and within the following five years to 25%. However, it is unclear how these shares were calculated — in dollars or in the number of installed systems. At the same time, there are reservations about the accuracy of calculations. For example, according to IDC, a company that is unlikely to overestimate the share of Russian companies, on the ERP market, domestic developers already occupy almost 50% of the Russian market (and dominate in number of installed systems). Therefore, it is possible to say that the plan has been fulfilled ahead of schedule, although the import phaseout process in this segment has so far proceeded of its own accord — uninfluenced by government authorities.

It is also doubtful that the share of import in the field of "Antivirus software and information security software" in 2014 was 60%. In any case, Russian companies dominate in the antivirus software sphere.

In the year since the last study by RUSSOFT, in various sources there have been reports about the shares of Russian developers on the domestic software market and a number of its segments. These shares are usually calculated by the companies themselves, which are interested in accelerating the import phaseout process.

In spring, Izvestiya newspaper reported: "The share of purchases of Russian software by companies with state participation in 2016 reached 94%. These figures were the results of following the directive of the first deputy prime minister Igor Shuvalov, which he issued a year ago… 80% of software in key technological processes has been replaced by

Russian software at Russian Railways as well." It is not indicated in the article who calculated the share of purchases, and how. Evidently, this is a governmental source. The data on Russian Railways were probably provided by the company itself.

The share of purchases and the share of software used are quite different indicators. With purchases of 94% of Russian solutions in a specific year, in fact primarily foreign software purchased in previous years may be used. However, even taking into account this explanation, there are doubts about the very high figure of import phaseout in the state sector.

According to a study by TAdviser presented in early autumn of 2017, import phaseout in the IT sphere barely affected federal state information systems (FSIS). Most of these systems continue to work on the basis of products from American vendors, Microsoft and Oracle, and only a handful use Russian software. TAdviser analyzed 339 FSIS from the register of federal IT systems for the basic software they used – database management systems (DBMS) and server operating systems.

The most popular DBMS were Microsoft SQL Server and Oracle Database, which accounted for 38.6% and 25.4% of all FSIS respectively. Their share dropped somewhat compared with 2015 when a similar study was made: Microsoft accounted for 41.1% and Oracle for 28%. Russian DMBS are only used by 2.9% of FSIS.

Among server OS, Windows Server leads with 67% of FSIS (in 2015 – 69.5%). Various modifications of Linux and Unix are used by 24% and 8.5% of FSIS respectively. The most popular OS with an open source code is the American Red Hat (a modification of Linux, 6.8% of FSIS). Only two FSIS servers work on the basis of Russian distributors of Linux: the portal gosuslugi.ru on the basis of Alt Linux and the complex "State services" of the Drug Control Directorate of the Interior Ministry on the basis of the Armed Forces Mobile System.

According to the study by TAdviser, it is difficult to judge the percentage of purchases of Russian software. Nevertheless, from the decreasing share of foreign DMBS and OS we may assume that Russian equivalents are being acquired with more frequency, or with much more frequency (primarily on the basis of freeware). This assumption is confirmed by data from the analytical center of the project "National rating of transparency of purchases" according to which in the second quarter of 2017 state companies spent ₽668 million on Microsoft products – six times less than in the second quarter of the previous year. State bodies in the 1st half of 2017 spent ₽4 million less on Microsoft products than in the equivalent period in 2016, and ₽91 million less than in the first half of 2015.

At the same time, imported engineering software in purchases of state structures and state companies in 2016 continued to dominate. According to the results of annual monitoring by the official portal for state purchase Zakupki.gov.ru conducted by Ascon, purchases of foreign engineering software and services connected with it came to around ₽3.5 billion, while purchases of Russian software was almost 5 times less (₽0.742 billion). Siemens PLM Software was the leader – its software accounted for state purchases of a sum of over ₽1.3 billion. It was followed by Intergraph with purchases of ₽610 million. In third place was Ascon - ₽304 million.

In the information security sphere, the situation is much better, if we take the results of the analytical study "Dynamics and features of import phaseout in information security" presented by the company Kod Bezopasnosti. The report on this study states that in the IS portfolio of all industries apart from the fuel and energy complex, the share of Russian solutions came to over 50% in 2016. From 2014 to 2016 a demand for import replacement of information security products in many spheres of the economy grew, and the level of trust in Russian security products, and their developers actively adapt products to the requirements of domestic companies and organizations. According to the study, there is a clear aspiration towards use of Russian IS products in all companies – regardless of the scale of their business. Trends for growth of using these solutions are most clearly seen among major players (31%); and the largest share of using Russian products is seen among small organizations (40%).

A completely different situation is seen on the PCS market for the oil and gas industry. According to the Union of developers of software and information technology of the fuel and energy complex, the PCS market for oil and gas processing (equipment and software) is 99.9% occupied by western manufactures. In the oil production segment, the share of foreign suppliers (controllers and software) is at least 80%.

The main task is not to reach a certain share of the domestic market, but to provide information and technology security of the country and create competitive domestic solutions in all critical segments of software (for some these solutions already exist). The goal of import phaseout should not be forcing foreign suppliers of software out of the Russian market (in some cases this will have to be done by non-market methods), but assisting the development of Russian developers, who should create solutions which can also conquer foreign markets. Some software companies have set themselves this goal – as part of the import phaseout process they develop these solutions and are preparing to promote them successfully on foreign markets.

State policy of stimulating import phaseout still plays a certain role. However, it cannot be said that its influence is very high, in the face of the threat of sanctions and the drastic price increase of foreign solutions in ruble terms. For example, bans on the use of foreign software if there is an equivalent of domestic software on the register, according to the results of the RUSSOFT survey, did not have any influence on 67% of companies which only work in Russia and the former USSR. Positive influence is felt more often by companies focused on the domestic market than companies which have already entered the foreign market – 24% opposed to 19%. At the same time, the percentage of those who see a negative influence of these bans is quite high – 9% and 15% respectively.

A survey of Russian companies by TAdviser shows a somewhat different picture. Most Russian vendors note the positive effect of a register of domestic software on their business.

How companies with differing dependence on the situation on the Russian market are affected by bans on using foreign software, if there is an equivalent on the register of Russian software: share of companies surveyed

	Do not work abroad	Work abroad
Very negatively (-3 points)	2%	7%
Negatively (-2)	5%	2%
Negatively, but effect is not significant (-1)	2%	6%
No effect (0)	57%	60%
Positively, but effect is not significant (+1)	11%	8%
Positively (+2)	11%	9%
Very positively (+3)	2%	2%
Average point	0.25	0.02
Could not answer	11%	7%

3.5. Technology trends

As part of the study "Prospects of Russian IT developers on the global market", the SAP corporation, using data from leading research companies, determined the following technology trends: "Internet of things", "Artificial intelligence (including machine teaching, neuro-networks etc.)", "Augmented and virtual reality", "New service architectures (flexible universal platforms", "Blockchain", "Personalization of manufacture of products and services". They may be named somewhat differently, and a more detailed classification is possible, but this list essentially covers all international technology trends. We should note that the solutions created for them require excellent training in the algorithm sphere, which is considered to be the strong side of Russian

developers and their competitive advantage. The existing potential must be realized. This may be hindered by the inability to sell their own developments abroad, small marketing budgets and insufficient state support.

Russian software companies, albeit with some delay, still work on creating the most promising technologies. A survey conducted as part of the study initiated by SAP, "Prospects of Russian IT developers on the global market", showed that only 21% of developers of B2B solutions do not have their own export product which does not fit into one of the world technology trends. At the end of this section there are example of how developers in Russia are working on creating solutions to fit these trends.

Technology trends where the export production of Russian developers of B2B solutions fit the best (respondent could indicate no more than 3 options)

Internet of things	Artificial intelligence (including machine training, neuro networks etc.	Augmented and virtual reality	New service architectures (flexible universal platforms)	Blockchain	Personalization of manufacture of products and services	Other
22%	26%	8%	22%	4%	16%	25%

Source: Results of a survey as part of a study initiated by SAP, "Prospects of Russian IT developers on the global market"

In the spring of 2017, the journal MIT Technology Review, published by the Massachusetts Institute of Technology, published its annual list of revolutionary technologies of the years to come.

1. Self-driving trucks (will be available in five to ten years). The company Otto from San Francisco is already testing technologies which will be able to send trucks on routes by themselves, even in entire colonnades. This will save on fuel, reduce transport expenses and decrease the number of accidents. Tests are being conducted on Volvo trucks. One of Otto's self-driving trucks made its first successful trip in October 2016. KAMAZ is also working on a truck of this kind

2. The face as a means of payment and access (technology already available). Face recognition technology is being developed most actively in China and is used in the security sphere, and for simplifying customer service. One of the companies working on this technology is Face++ in Beijing. The program and applications developed by Face++ scan a human face in 83 points at the same time, which ensures high precision of recognition. The technology is already used to transfer money through the mobile application Alipay, which is used by over 120 million people in China.
The Russian company "Speech Technology Center" has created and introduced a solution for face recognition in a crowd of people going to a stadium, to detect fans who are prohibited from attending football matches.

3. Quantum computers (will be available in five to ten years). The greatest success in developing this technology has been achieved by the Delft Technical University (Netherlands). Scientists here are working with unique quasi particles, only discovered in 2012 – the main components of future quantum computers. Scientists believe that very soon these computers will bring about a revolution in cryptographic protection, pharmaceutical studies, and material science, in the field of artificial intelligence.
Russian scientists working in cooperation with American colleagues have also achieved certain success in this field.

4. 360-degree photos (available). Special photo and video cameras are already available which film in 360 degrees. They put the viewer in the center of a photo or video, allow to look from all sides and receive a deeper impression from what is seen.

5. Hot solar cells (will be available in 10–15 years). Scientists at MIT have created much more effective thermal photo cells on the basis of solar panels, photo cells that are installed on the roofs of houses. They convert solar energy into heat, and then back into light, but within a spectrum that photo cells can use efficiently.

6. Botnets of things (already exist). Botnets (networks consisting of computers with autonomous programs) have existed since the early 2000s. For many years, hackers have used these networks to make DDos-attacks. The Internet of things (a network consisting of electronic devices with access to the Internet) appeared relatively recently. And now hackers use the Internet of things to create botnets consisting of tens of thousands of unprotected devices. In October, a botnet formed of 100,000 electronic devices partially disrupted the operation of the Internet provide Dyn. The websites of many companies, including Twitter and Netflix, became temporarily unavailable.

As MIT Technologies Review writes, the problem of botnets of things is unlikely to be solved in the near future. Devices in the Internet of things are practically never equipped with reliable software. Until a reliable system of protection is developed, hackers will continue to use botnets of things.

7. Reinforcement learning (will be available in one to two years). Reinforcement learning is the process of computer learning when a computer conducts experiments, receives the result of these experiments and uses the result to look for ways to perform tasks. Computers practically learn things like people, through the method of repeated attempts and failures without outside help. This technology, which is currently used in increasing the safety of self-steered cars, is now set to be applied to other fields as well., For example, robots may learn to perform actions which they have never seen and which programmers cannot teach them. This technology helped the computer AlphaGo created by the Google subdivision Deep Mind to learn the very complex strategic board game Go, and in March 2016 to defeat one of the finest players in the world, the Korean Lee Sedol.

In late 2016, experts at IDC company published the technological forecast FutureScape, which includes the most promising trends of the near future. Analysts studied the new paradigm of development of the computer industry – the so-called "third platform", which unites social, mobile and cloud technology, and big data. IDC experts believe that in the next three to four years, digital transformation will attain a macroeconomic scale, creating a foundation for the beginning of the DX Economy era (DX – digital transformation).

In the FutureScape forecast, analysts listed what they believe to be the 10 most promising trends. By 2020, 50% of the companies from the Global 2000 list (the 2,000 largest public companies in the world according to Forbes magazine) will see the priority of their businesses as the ability to create products and services connected with digital technologies. For market leaders, the main source of swift growth of revenue will be information technologies. To achieve this, $2.2 trillion will be invested in the DX Economy era worldwide by 2019 – almost 60% more than in 2016. Also, experts believe, by 2019 companies connected with third platform technology will spend around 75% of all expenses on IT (previously ICD analysts believed that the figure would be 60%, but the growth dynamics of the third platform adjusted the forecast).

As for cloud applications, companies will spend around 65% of all IT expenses on them, according to the forecast. The "cloud' will transform, consolidating and becoming more focused on industries. As a result, at least 75% of this market by 2020 will be concentrated under the control of five companies working on IaaS/PaaS models (IaaS – infrastructure as a service, PaaS – platform as a service).

Among other forecasts of the digital future, experts named the growth of the number of departments in companies working on issues of digital transformation, an increase in the number of brokers in cloud services, and the development of new standards of digital work and digital quality – kinds of benchmarks. It is also expected that by 2020 the first wave of goods and services for private consumers will appear, connected with the integration of digital technologies into the human body – the "Augmented human".

3.5.1. Blockchain

Every year, new applications of the blockchain technology arise. It is predicted that the system of distributed transactions will allow companies to dispense with intermediaries in any operations – whether these are financial transfers or signing of contracts. The blockchain technology does away with the need for functions of entrusted storage, transfer and confirmation of reliability of information, which are currently entrusted to banks, depositaries, notaries, document circulation systems and state registers.

The fact that blockchain connects a huge number of devices on the Internet is not a vulnerability, but an advantage: these computers ensure protection for each other, simply confirming the same invariable data on transactions.
Many developers of blockchain platforms claim that with their use it will be possible to control the illegal circulation of arms and even draw society's attention to problems of ecology.

In 2014, the Canadian programmer of Russian origin Vitalik Buterin created the blockchain system Ethereum. Its basis is the concept of "smart contracts", which carry out obligations to parties only after the set conditions are fulfilled. As in the case with financial transactions, observing the agreements of a contract does not require the participation of intermediaries, which take a commission for their work. Mathematical algorithms are used to check that all rules are implemented, the encryption and transparency of the system ensures protection of the contract.
The appearance of "smart contracts" may be seen as another step towards the Internet of things, which as Gartner experts claim will be an indispensable part of human life by 2020

3.5.2. The Internet of things

According to forecasts by IDC, the number of installed termination points of the Internet of things in the world, which in late 2016 came to 14.9 billion, will exceed 82 billion in 2025. At this rate, the Internet of things will soon become as indispensable as the Internet itself. However, despite the mighty growth stimulus, data given in the new study by Cisco show that 60% of IoT projects get stuck at the prototype stage, and only 26% of companies consider their IoT projects to be fully successful. A third of all completed projects were considered unsuccessful. In the Cisco study held in the USA, the UK and India, 1,845 managers participated.

At first glance, the Internet of things is a purely technological affair, but an enormous role in it is played by such factors as culture, organization and leadership. Three of the four main factors that determine the success of IoT projects are related to people and their interaction. Cooperation between IT and business department was in first place (54% of respondents); technological focused culture of manufacture, based on principles of top-down leadership and the support of leadership, was in second place for 49% of respondents; experience in the field of the Internet of things acquired within the organization or as a result of cooperation with external partners was chosen by 48% of respondents.

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Organizations whose IoT projects were most successful used the advantages of an ecosystem partnership more widely than others. They cooperated with partners at all stages, starting from strategic planning and ending with an analysis of data on results of introduction.

Despite problems, many participants of the study looked optimistically at the future of the Internet of things, which for all its fast development is still at the initial stage of evolution. 61% of respondents believe that they have only started to study the possibilities which IoT technologies will open up for business.

3.5.3. Self-driving transport

In August 2017, at the conference on future technologies, "Future in Tech: What's Next", leading specialists in the transport sphere predicted the development of autonomous vehicles. Self-driving transport with a share on the market of over 90% is not expected until after 2030. This mass transition to new transport will change the economic model of the entire industry.

3.5.4. How Russia fits into world technology trends

The results of the first large-scale study of the demand for virtual reality (VR) technology in the Russian economy were presented at the panel session "real sales in augmented reality" at the Petersburg international economic forum. 247 managers and specialists of various fields were surveyed in the study, representing over 200 major companies of Russia from all the key areas of the economy.

The main result of the study was that the level of awareness of representatives of major Russian companies and industries on the possibilities of applying virtual reality technologies in business is high, both in the real sector and in the service sphere. Almost two thirds – 65% of respondents know of the possibility of using VT and AR technologies at companies. The greatest awareness of real cases of using VT in technological and business processes was shown by representatives of such fields as metallurgy, machine building, the building sector, energy, transport companies, and also the financial sector and IT/Telecom. Examples of real use of VR and AR technologies named by study participants were solutions for industrial, construction and engineering planning, real-estate sales, virtual tours of production facilities, and use of VT in training personnel (trainers and simulators).

Almost a quarter (24%) of Russian business representatives said that their companies already used or planned to use VT technologies (15% of those surveyed said their companies were already introducing or had introduced these technologies, while 9% said that this introduction was planned in the foreseeable future). 41% said that although VR technologies were not being introduced in their business, they were aware of examples of this introduction in other companies. 35% of respondents had not heard of the use of VR in business. The majority of companies already working with VR and AR technologies represent the real sector of the economy (machine building, production and processing, energy). The main spheres of using the technology were personnel training, planning and marketing. This means that in the very near future on the Russian market, the share of VT projects in the corporate sector will increase, and demand will grow for VR devices and professional systems of visualization.

Representatives of companies not yet working with VT technologies displayed moderate optimism: 70% of them believe that the use of virtual reality in their organization and field is possible and promising, while almost two thirds (65%) named specific examples of the use of this technology in other companies.

The study also revealed objective factors which prevent the introduction and wide distribution of VR technologies in the corporate sector. The main obstacle, respondents believe, is the high cost of solutions and technologies, and also the lack of a clear

correlation with economic effectiveness. Besides large expenses, respondents also named technical limitation and the high cost of introducing VR technologies. This shows a lack of a sufficient number of qualified specialists on the market capable of introducing and servicing professional VR systems.

At the same time, the survey showed the high level of readiness of Russian business for innovations: the factors "Opposition from management" and "Fear of introducing new technologies" received the lowest assessments, and according to the respondents these are not an obstacle.

The Internet of things, according to a forecast by PwC, may become one of the growth factors of the Russian economy. The distribution of these technologies in the next few years may reduce expenses by ₽2.8 trillion. Even more money may be saved if threats of cyber security are reduced, regulation appears and IoT standards are introduced, market participants add.

The economic effect from introducing IoT in the electricity industry will come to around ₽532 billion, in health ₽536 billion, in agriculture ₽469 billion, in transport ₽542 billion. The effect in the municipal housing service may reach ₽3.6 trillion by 2025.

According to a study by the SAP company, in Russia over the last 10 years (since 2007), state and business structures have financed 1,386 scientific projects on artificial intelligence. Most of the projects (1229) are non-commercial, they are conducted as part of federal targeted programs or financed by various foundations. This shows that Russian business is so far little interested in developing and using artificial intelligence in its projects.

Around ₽23 billion was allocated over ten years on research and development in the field of artificial intelligence. The volumes of state financing lag behind other countries. For example, in the USA around $200 million is allocated from the state budget annually for studies of artificial intelligence. It should also be noted that the level of financing in Russia is low taking into account the number of projects and total number of scientists involved (from 6,000-10,000 people).

Great potential exists in Russia in the sphere of training qualified specialists for projects with AI. According to the SAP study, in 286 universities there are relevant masters' programs, around 50,000 students study 65 subjects relating to data analysis, machine training, speech and image recognition, computer linguistic etc. Over the last five years over 200,000 people have undergone training under these programs.

In the summer of 2017 the Russian blockchain platform Exonum with an open code was released. It will help private companies and state structures to create solutions and services based on blockchain, safely and easily. Developers may freely include, adapt and expand the initial code of Exonum in accordance with established tasks.

Before the platform was launched, it underwent testing at a project in Georgia, where the registration of ownership rights was realized on the base of Exonum.

In September 2017, at the National University of Science and Technology, the Center of competences on new materials and breakthrough technologies was created, with a main focus on the technology of blockchain, convergent and quantum technologies. This was the first center of such competences in Russia. Its main task is to accumulate knowledge on innovative technologies, development of platforms for their use in state organizations, training and popularization.

Scientists at the Russian Quantum Center reported in the spring of 2017 that they had created the first quantum blockchain in the world. The technology makes it possible to distribute, store and verify data, including financial data, while operations with them are protected using quantum encoding. Quantum protection should protect blockchain from being hacked, which will be possible with the distribution of the quantum computer. Combining blockchain and quantum networks, the RQC intends to develop a series of products with which it will be possible to store data in an allocated way, and also keep distributed databases.

In the summer of 2017, the company S7 Airlines began to sell plane tickets, using blockchain technology and the Ethereum protocol based on it. The company does not rule out the possibility that ti may start to work according to the same scheme with other partners: suppliers of on-board catering, fuel etc. Ethereum is an open platform which makes it possible to use blockchain instead of a traditional juridical procedure in carrying out cash operations. The idea of the platform was formulated in 2013 by the Canadian programmer of Russian origin Vitalik Buterin, the founder of Bitcoin Magazine. The platform has its own cryptocurrency – Ether.

In the summer of 2017, A Russian-American group of physicists led by the cofounder of the Russian Quantum Center and Harvard University professor Mikhail Lukin reported the creation of a programmable 51-qubit quantum computer.

Many teams of specialists call 50 qubits a sufficient system to demonstrate quantum supremacy – q quantum computer which solves tasks that are intentionally more complex than the tasks that traditional computers are capable of solving.

3.6. Need for cooperation

The situation on the world market is forming in such a way that for Russian companies to promote their solutions and services abroad successfully, they must unite efforts at different levels – from development to marketing.

Firstly, in Russia there are no companies with annual revenues of billions of dollars, which could compete on equal terms in turnover and accordingly in production expenses and marketing budgets with world leaders. Even the largest Russian software company, Kaspersky Labs, with an annual turnover of over $600 million, understands the need for cooperation. It may even take place at the level of information exchange.

The management of Kaspersky Labs believe that the more Russian companies there are on a certain market (especially in countries that are sufficiently exotic for them), that better it will be for them to do business and develop on this market. Essentially, successful Russian IT exporters are prepared to help innovators even free of charge, if possible. Especially if these innovates may become potential technological partners.

Secondly, according to data from the Russian Export Center, on developing markets there is a demand for complex solutions. Clients usually prefer not to form them themselves, and wait for an according supply on the market. These solutions require unification not only of different software product developers, but also cooperation with developers of custom software, system integrators, distributors, manufacturers of equipment.

This topic is especially close to RUSSOFT, as the association arose because 18 years ago several companies decided to unite, realizing how small they were on the American market. Assisting the cooperation of Russian software companies is one of its strategic tasks.

In-depth interviews conducted with experts (managers of successful IT exporters, representatives of development institutes) as part of the study initiated by the SAP corporation, "Prospects of Russian IOT development on the global market", and also many years of observations of events in the software industry, allow us to conclude that Russian business has difficult establishing cooperation, even if it is very beneficial for all parties.

There have been numerous efforts to unite in the software industry over the last 20 years. However, it is much easier to point to clearly unsuccessful efforts than clearly successful ones. In some cases, formerly united companies divided, as their owners could not reach an agreement on a certain issue. Disagreements sometimes lead tom the complete collapse of a business, or its division on the principle of synergy in reverse, when from units divided into two, not halves result, but for example two quarters or two fifths. There have even been cases when even general founders could not unite two companies which supplemented each other.

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The situation is described well by a statement by one expert from a report on the study "Prospects of Russian IT developments on the global market: "If we're talking about Russia, for us the problem of trust between businesses is still very serious. They take a long time to reach agreements, but at the first obstacle they have a falling out."

To all appearances, Russian business (and ordinary Russian citizens) have a mentality problem which hinders them from establishing cooperation. However, if the problem is serious and holds back development, then it can and must be solved. We may note that despite the individualism that exists in western countries, both ordinary employees and entrepreneurs cooperate quite successfully, if they see personal benefit in this cooperation. In some cases, Russian entrepreneurs may be taught to reach agreements and guarantee that agreements are observed. Perhaps a healthy way of doing business should be promoted at state level.

3.7. Examples of Russian companies uniting efforts

Despite the existing mentality problem which hinders cooperation, there is a realization for the need of cooperation in the Russian IT industry. In 2017, new attempts were made to unite efforts (the previous time was in 2014 in the aspiration to make use of favorable conditions for import phaseout to the maximum level).

1. In early autumn of 2017, Kaspersky Labs and R-Vision company announced technological partnership – its goal will be the joint and more effective opposition to cyber threats on remote service channels. The companies united their solutions for recognition and prevention of fraud on the Internet: Kaspersky Fraud Prevention Cloud (KFP) и R-Vision Incident Response Platform (IRP).

2. In early autumn 2017, MTS and Group-IB will exchange data in the cyberthreat sphere and provide each other organizational and methodological support, and assist with technical, financial and personal resources. In particular, MTS will provide asses to the database of its Security Operations Center, SOC< created to provide services to outside clients, and Group-IB will provide expert support. Additionally, Group-IB will provide MTS services on the prevention and investigation of incidents with the use of its hardware-software solutions and services.

3. In September 2017, the company Russian Scientific Technologies and Group-IB signed an agreement on developing a fundamentally new technological platform for the detection, analysis and prevention of computer attacks. The solution will be designed for departmental and corporate centers of the State system of detection, prevention and liquidation of consequences of computer attacks on information resources of the Russian Federation, and also services of information security of companies and enterprises of spheres with critical information infrastructure (FZ № 47571-7).

4.. In mid-summer 2017 the company Diasoft Platform and Oz Forensics put on the market an integrational platform with the ability of biometric identification, and detection of digital forgeries. They agreed on technological partnership and conducted integration of program platforms of their own development. Thanks to this, financial organizations will receive unique functional capabilities to detect digital forgeries and biometric identification.

5. In the spring of 2017, the company RAIDIX signed a partnership agreement with suppliers of equipment solutions SRV-LEGION (system integrator SRV-TRADE). The joint solution on the base of the SRV-LEGION servers and the managing software of RAIDIX is successfully integrated at Russian companies in the corporate sector and media industry.

6. In February 2017, the Internet Development Institute and the affiliated structure of Rostech, the National Center of Informatization, announced a consortium of developers of domestic software. The main goal of the consortium is to consolidate competences of Russian companies working on software creation. The economy effect, creators of the consortium expect, will be hundreds of millions of rubles,. One of the reasons for creating

the consortium is that it is hard for clients to choose domestic products as they are not confident that they will receive comprehensive support that it will be compatible with solutions of other companies.

7. In the spring of 2017, the video communications system developer TrueConf signed a deal on acquiring the integrator of audio and video systems and Internet store of the same time, Unitsolutions. After the merger, the Unitsolutions team is focusing on deliveries of peripheral video conference communications equipment to TrueConf clients in countries of the CIS, Eastern Europe and Asia.

8. In late spring of 2017, the company Zecurion announced the expansion of cooperation with the company ABBYY. As part of partnership, Zecurion may use the new version of the ABBYY technology, FineReader Engine in all its products for recognizing texts in graphic files. Zecurion and ABBYY have been working together for over six years now. Previously the technology of optical recognition of texts of ABBYY FineReader Engine was only used in Zecurion Zlock (Device Control) и Zecurion Zgate (Traffic Control). According to the new conditions of partnership, the technology is used in all products of the Zecurion DLP complex. With the help of ABBYY FineReader Engine solution, Zecurion recognizes information in images, which makes it possible to detect violations of security policy and prevent leaks of confidential data.

9. In the summer of 2017, the affiliated company of the state corporation Rostech, the national Center of Informatization, working on the development, elaboration and integration of IT products, reached an agreement with the company Group-IB, specializing in the manufacture of information security products and provision of services for protection from cyber threats, on the creation of a joint enterprise to develop and elaborate solutions to oppose computer attacks. As part of the agreements, Group-IB will provide its technologies to Rostech, including solutions for detecting targeted attacks, protection of state and corporate portals, cyber-attack early warning systems, and also create analysis security systems using big data. In its turns, the NCI will conduct work to improve production and services and advance them on the markets of presence, and also take on operational activity, including cooperation with bodies of state power, certification of production and other issues.

CHAPTER 4.

The business
environment
in Russia

4.1. Results of general analysis

The assessment of the business environment in Russia received on the basis of information obtained from respondents improved on the whole in 2017. The average mark for all conditions assessed was 2.86 (a year previously it was 2.82). This may mean that according to the respondents' assessment, the business environment is assessed as "satisfactory" (on the five-point scale), but still does not even reach this level.

The role of accidental factors in determining this assessment is still important, and external economic and political conditions influence the way that respondents perceive the business environment.

For this reason, it is important to understand that the average mark (and also changes to it) primarily reflects the opinion of respondents on the existing business environment, and not the environment itself or the way the environment has changed, although there is a certain dependence of the opinion reflected in the survey on the real situation.

Average assessment of conditions of activity in Russia on a five-point system based on the results of a survey of software exporters

State support in the IT sphere: 2,9 3,14 3,16 3,21 3,09 3,06 3,16

Protection of rights of intellectual property: 3,1 3,16 3,17 3,13 3,08 3,13 3,14

Provision of personnel and the education system: 2,83 2,64 2,58 2,71 2,73 2,75 2,83

Tax system: 2,37 2,61 2,73 2,87 2,88 2,91 2,95

Financial support of small business and startups: 2,38 2,65 2,67 2,79 2,85 2,8 2,85

State support of international and marketing activity: 2,23 2,31 2,36 2,44 2,58 2,45 2,51

Bureaucratic and administrative barriers: 2,34 2,47 2,45 2,69 2,69 2,71 2,67

Presence of modern infrastructure: 2,82 3,16 2,98 3,17 3,24 3,16 3,13

State support of certification for compliance with international standards: 2,24 2,44 2,47 2,63 2,66 2,64 2,62

Financing of R&D: 2,7 2,68 2,64 2,7

2011 2012
2013 2013
2015 2015
2017

On the basis of many years of observations, one may conclude that in a worsening foreign economic and political situation, respondents assess conditions for business as being worse that do not depend on external factors at all. Evidently, a general negative mood of respondents has an effect. Additionally, when serious problems arise, companies expect major support from the state, and if even nothing changes in this support, their responses show a more critical attitude to officials' actions.

An insignificant improvement of conditions for doing business took place in all parameters. Respondents had a higher assessment for issues of protection of intellectual property, the tax system, the quality of staff potential, state support of international activity and financing of R&D. However, the change in the assessment proved insignificant.

The dependence on the assessment on business conditions on company turnover in 2017 was insignificant and varied from 2.75 points (for companies with a turnover above $100 million) to 2.92 (for companies with a turnover from $1 million to $5 million).

Evidently, after a certain worsening of business conditions for small companies (which was in many ways connected with the economic crisis), a change in the trend has taken place. Various data shows that small companies have started to grow in Russia, not just in the software industry, but in other industries as well.

Assessment of existing conditions for doing business in Russia depending on company turnover

	below $1 M**	from $1 M to $5 M. ***	from $5 M to $20 M. ****	over $20 M	from $20 M to $100 M	over $100 M
2010 survey	2.72	2.72	2.67	2.77	-	-
2011 survey	2.56	2.54	2.68	2.66	-	-
2012 survey	2.76	2.65	2.87	2.92	-	-
2013 survey	2.72	2.73	2.71	-	2.73	2.93
2014 survey*	2.82 (2.8)	2.85 (2.84)	2.86 (2.85)	-	2.91 (2.88)	2.81 (2.78)
2015 survey	3.01	2.84	2.85	-	2.68	2.9
2016 survey	2.78	2.86	2.83	2.9	2.89	3
2017 survey		2.92	2.81	2.85	2.78	2.75

* - in brackets taking into account the assessment of financing of R&D, which was introduced in 2014
** - before 2016 - below $0.5 million
*** - before 2015 - from $0.5 million to $4 million
**** -before 2015 - from $4 million to $20 million

In 2016, a decrease in the average point was observed in the assessment of doing business among companies in Moscow and Petersburg, while it increased in the regions. This trend may be explained by favorable conditions which were created in a number of large Russian cities for high-technology business and the development of infrastructure for high-technology companies and start-ups.

In 2016, as in previous years, the lowest assessment of conditions for doing business was seen among Petersburg companies. Siberian and Ural companies give the highest assessment of conditions in their regions.

In 2017, the assessment among Moscow and Petersburg companies improved, while Siberian and Ural companies became more critical. At the same time, we must note that the number of surveyed companies in the two capital is quite sufficient, but for the Urals and Siberia the selection is not good enough to make definitive conclusions. Probably no signficiant worsening of conditions for Ural and Siberian companies took place. Perhaps Moscow and Petersburg companies have begun to promote themselves more actively in the region, which created major tension on the labor markets of a number of large cities.

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Assesssment of conditions existing in Russia depending on company location

	Moscow	St. Petersburg	Siberia	Urals	Other cities
2011 survey	2.61	2.65	2.42	2.45	2.57
2012 survey	2.74	2.76	2.81	2.72	2.65
2013 survey	2.7	2.76	2.86	2.9	2.65
2014 survey*	2.92 (2.89)	2.7 (2.69)	2.96 (2.93)	2.91 (2.91)	2.84 (2.83)
2015 survey	2.86	2.82	2.83	3.02	2.84
2016 survey	2.82	2.72	2.93	3.07	2.87
2017 survey	2.95	2.85	2.76	2.79	2.85

* - in brackets taking into account the assessment of financing of R&D, which was added in 2014

4.2. Structure of expenditure

In 2016, the introduction of a new question made it possible to determine how significant certain items of expenditure are for companies. As a result, it was discovered that if we exclude expenditure on salaries, software companies spend the most on R&D and rental of office space. In 2017, an increase in eth share of expenses on R&D increased from 5-6% to 11%. We can also observe an increase in expenses on rental of office space from 4.7% in 2015 to 8.3% in 2016. Expenditure on marketing takes up a smaller percentage of the structure of expenditure of IT companies, but we should note an increase in expenses on marketing from 2.2% in the 2016 survey to 3.7% in 2017.

Structure of expenditure of companies surveyed, % of all expenses

		Telecommu-nications services	Marketing	Office space rental	R&D
2016 survey	For all companies surveyed	1.7%	2.2%	4.7%	5.6%
	Without data of the largest company surveyed, with a large business outside Russia	3.5%	3.8%	7.6%	6.1%
2017 survey	For all companies surveyed	3.3%	3.7%	8.3%	11%
	Without data of the largest company surveyed, with a large business outside Russia	3.6%	6.6%	9.2%	11%

We may assume that the figures of companies for each of the articles indicated are a little higher in reality. In some cases, companies did not indicate a specific figure. For example, with rental of office space it is not clear whether the respondent does not know the specific amount of rental or does not wish to report it, or the company does not rent office space at all, but owns it (or the company personal work in their own apartments). However, there are not so many of these cases, and all major companies either determined their structure of expenditure, or did not answer the respective question (the average figure is only calculated according to the companies that answered this question). We may only judge a change in the significance of a certain item of expenses with the existing margin of error in a period of several yeears. Data for 2 years give us a general idea about the structure of expenses.

The 2017 survey showed that expenses on R&D were still absent in 51% of companies (or companies refused to answer the appropriate question). The share of companies that spend no more than 10% of all expenses on R&D dropped from 23% (2016 survey) to

15% (2017 survey), while the share of companies that spend more than 10% of all expenses on R&D increased from 26% to 35%.

The share of companies surveyed which have no data on marketing expenses increased from 32% to 34%. In 2017 the share of companies dropped (from 53% to 20% which have a marketing budget of not more than 10% of all expenses, and increased from 15% to 45% for those which spend more than 10% of their budget on marketing.

For developers of program products, the market budget on average is more significant than for all software companies., In the 2016 survey it was 7.9% of all expenses, and in 2017 it was 9.7%.

The number of product companies surveyed which spend more than 10% on marketing increased from 28% to 40%. Accordingly, the share of companies with expenditure of marketing below 10% decreased (to 28%). 33% of respondents who were developers of program products had difficulty answering this question in 2017.

Expenses on R&D for product companies increased from 12.6% to 19.5%, which is more than they spend on rental, 11.5% (5.7% in 2016) and on telecommunication services, 3.3% (4.4% in 2016). Almost the same number of product companies spent more than 10% of R&D as in 2016, 33%, and 14% spent less than 10%, 14%.

33% of product companies did not indicate expenses on marketing, and 53% did not indicate expenses on R&D. On the whole, the figures that reflect the structures of expenses changed insignificantly over the year, if we take into account the existing margin of error. In 2017, a significant difference in structure depending on company size was not seen.

4.3. State support in the IT sphere

The results of the survey do not so much reflect the assessment of real state support, as the change in attitude to it from respondents. So the more critical attitude to this support in 2014 and 2015 may be explained by the fact that in crisis periods, increased demands towards how state bodies treat the industry. The market expectations in the crisis years to receive more elaborated, thorough and significant state support were not fully met. As a result, the average assessment of state support worsened. The share of companies surveyed who saw improvements in the state's attitude to IT dropped from 30% to 17% and the share of companies that believe that there is less support increased. The number of critical respondents still increased insignificantly – from 9% to 11%, and the vast majority assess the change quite objectively (76% of respondents in 2015 did not see changes in state support, and 72% in 2016).

In 2017, the situation in general for the software industry improved, and positive changes in state support were noted by 26% of companies surveyed (more than a year previously). Respondents noted an important improvement as being the extension of privileges on payments to insurance and pension funds.

This decision was taken in December 2016. Another positive change noted was the work of the Russian Export Center. A number of companies only began to feel a real effect from this work several months after the survey was held, but the fact that this center began to devote attention to the IT sector was assessed positively by companies. The positive assessments of state support from regional companies also evidently reflects improvements at a regional level.

Assessment of how state support in the IT sphere has changed over the last 2 years

	2008 survey	2009 survey	2010 survey	2011 survey	2012 survey	2013 survey	2014 survey	2015 survey	2016 survey	2017 survey
Worsened	2%	3%	19%	24%	13%	9%	9%	8%	11%	11%
No change	66%	89%	72%	61,5%	61%	67%	61%	76%	72%	63%
Improved	32%	8%	9%	14,5%	26%	25%	30%	16%	17%	26%

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Attitude to state support over the last 2 years by companies of different sizes (result of 2017 survey)

Turnover	Below $1 million	$1-5 million	$5-20 million	over $20 million
Saw worsening, % of surveyed companies with corresponding turnover	13%	6%	5%	0%
Average point	3.08	3.2	3.33	3.16

An assessment of changes of state support of IT traditionally depends on the size of the company: the greater the turnover, the more often companies show a higher assessment of state activity. Of companies with a turnover below $1 million, 13% noted a worsening in the state's attitude to IT in 2017 (15.1% in 2016), with a turnover of $1-5 million, 6% (12.2% previously). The share of companies did not decrease which noted a worsening of state support only in the category of companies with a turnover of $5-20 million (figure increased from 4.3% to 5%). The largest companies (turnover above $20 million) usually do not see a worsening.

In 2016, in the group of small companies with a turnover below $5 million there was a major difference in assessments of state treatment of IT between young and relatively "old" companies (formed before and after 2009 respectively). Young companies assessed the situation better. In 2017, there were practically no differences in assessments in these categories of companies. Evidently this is because startups have found it much more difficult to receive state support through institutes of development.

In 2016, the average assessment of state support of the IT industry (on the five-point scale) was higher among regional companies (3.12) than companies in Moscow (3.09) and Petersburg (2.9). In 2017, an improvement of the assessment in Moscow (3.18) and St. Petersburg (3.23) was seen. In the regions, the assessment did not change.

Companies which are more focused on the domestic market require state support to a greater decree, but do not yet receive it in full measure. For example, the process of software import phaseout is not stimulated in any way by the government (so far there are only compulsory measures in requirements for state structures to purchase software from the register of domestic software). As a result, in companies with a share of export below 50%, the assessment of state support is worse than developers which receive over 50% of revenue from sales abroad (3.14 versus 3.23).

Expectations for support of domestic manufacturers on the domestic market are probably not justified, although sales in Russia have begun to grow more quickly than foreign sales. Thus, the growth of sales on the Russian IT market is not connected by respondents with the existing ban on purchasing foreign software, and the formation of the register of domestic software. We may assume that existing sanctions, the threat of new sanctions and the devaluation of the ruble play a major role in the growth of sales on the Russian IT market that the existing state policy of import phase-out.

In previous years, developers of program products assessed changes of state support of the IT industry somewhat better than service companies. The 2016 survey in this sense did not show anything new, but we may assume that the difference in assessment by representatives of the two business models has decreased. The average point became almost equal: for developers of program products 3.07, and for service companies 3.05. In 2017 the difference became slightly larger – 3.19 and 3.15 respectively.

The situation on the Russian market and on some foreign markets has changed fundamentally since the beginning of 2014. Threats or even real restrictions have appeared for business, and along with them new opportunities, which will often be difficult or impossible to make use of without state support. Russian software companies

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are already having problems on foreign markets (not only in countries with which Russian has tense relations). At the same time, the Russian IT market may become more attractive for domestic companies in connection with the task of ensuring technological independence in the face of sanctions from the USA and EU, directed towards raising barriers on the path of Russia's access to dual-use technologies.

Software exports must turn to new markets, and give more attention to promotion in Asia, in the Middle East, Latin America and Africa. For access to these new markets, state support is very important.

This is partially carried out at the highest state level with intergovernmental contacts, but this is clearly insufficient.

New challenges have appeared, which must be reacted to. The state shows resolution to help exporters, creating the Russian export center on the basis of VEB and EXIAR. Initially, instruments of the REC were directed towards supporting goods export and were practically inapplicable for companies exporting virtual products, which do not cross customs borders. Additionally, these companies do not have property taxes necessary for export loans. In 2016, with the creation of an IT department at the REC, the situation began to change, and in 2017 real support appeared in the form of financing business missions and support of participation in foreign exhibitions. This support did not cover a very large circle of software companies, but the first steps were made.

The majority of companies in the software industry are so far satisfied with privileges on insurance payments and are not yet prepared to demand more powerful, diverse and thorough support from the state. However, the experience of providing support of foreign marketing from the REC should push IT companies to become involved in state projects on the basis of private-state partnership.

From the end of 2015 a whole series of important decisions were taken, connected with state support of the IT industry (see below for more detail). However, they rather reflect the intentions and plans of the state than real support. We may hope that these plans will be realized in the near future. The basis for this hope is that the Russian president now keeps track of support of the IT industry.

One important governmental decision to support the IT industry in the field of statistics has already been passed (it is not connected with the political events of 2014). In July 2015, the Ministry of Communications and Media prepared a decree "on the approval of collective groups of the IT industry", which officially sets the boundaries of this industry – types of corresponding economic activity and IT production. Thanks to these changes, it will become possible to have statistical information about the industry.

The activity of IT companies in state statistics has up to this point only been reflected in 2-3 indicators, the precision of which caused doubt. Thus, it was very difficult to determine how a certain government decision or change in legislation affects the industry. Feedback at present is primarily carried out through industry associations, and they themselves often need factual information which only state bodies can gather. This feedback is important, in particular to see how the "Strategy of the development of the information technology industry in the Russian Federation in 2014-2020 and its prospects until 2025" is realized, which the government approved in late 2013.

However, initiatives directed towards a change in the work of the statistics department were also made in the past, but led to nothing. There is no data about whether statistics have begun to determine the situation in the IT industry, not just any better, but to reflect it in any way at all. The state statistics committee is a closed organization which does not make contact with industry analysts, and replies to requests by associations in words of one syllable, without explaining what the data supplied reflects.

Another important government decision which was originally directed towards supporting the IT industry was passing legislation banning state organizations from purchasing imported software. From now on, state clients will be obliged to announce the

purchase of imported software on their website, and explain the choice of foreign software if there is a Russian equivalent in the register of Russian software. According to this legislation, software is declared Russian if the rights to it belong to a state organization, Russian citizen or company in which the Russian side owns more than 50% of capital. An important restriction is also that payments to foreign manufacturers in the price of software do not come to more than 30%, and the software is included in the register of Russian software.

In mid-2016, there was no obvious effect from providing preferences to Russian companies with software on the register, as the register only began to compiled closer to mid-2016. We may expect that an effect from the register will be seen in the second half of 2016 and in 2017. Judging from the results of the RUSSOFT survey, it does exist, but is not as significant as expected.

List of events and decisions of state bodies which influenced or may influence in the near future the assessments of changes in the field of state support of the industry by software exporters:

2009-2011
1.Restoration of privileges for payment of insurance fees to the Pension Fund, the Fund of Compulsory Social Insurance and the Federal Fund of Medical Insurance (which practically ceased to function with the abolition of the ECH from 1 January 2010) and the subsequent expansion of the circle of software developer companies which may be given these privileges bay reducing the threshold of personal of companies from 50 to 30 people, and then in 2013 from 30 to 7. The privileges were valid until 2017, and in mid-2016 a number of high-ranking officials opposed their preservation. However, as representatives of the IT industry drew attention to the problem to Russian President Vladimir Putin, the privileges were extended to 2023.
2. On 31 December 2009, Dmitry Medvedev, at that time the president of the Russian Federation, issued decree № 889-rp «On a work group for the development of a project for creating a territorially separate complex for development of research and development, and the commercialization of their results". Several months later, the construction site was determined – Skolkovo in the Moscow region. In December 2010, the innovation center Skolkovo began to be built, while both chambers of parliament completed work on bills which ensured the normative base of the work of Skolkovo, and also the approval of amendments to the Tax Code of the Russian Federation, establishing privileges on profit tax, property and the value added tax for innovative companies of the Skolkovo center. In 2010, the Skolkovo foundation was also created. It is a non-commercial organization with the main task of creating and ensuring the functioning of the innovative territorial cluster "Skolkovo innovation center". The fund provides grants (including to software companies) to conduct promising research.

2012
1. In December 2012, Russian Prime Minister Dmitry Medvedev approved the program "Development of science and technology", which determines state policy in the scientific and technological spheres of Russia until 2020. The main areas of financing are forming a modern infrastructure of Russian science, development of its personal potential and a material and technical base and improving the effectiveness of fundamental and applied research.
2. In autumn 2012, the deadline for the final move of Russian bodies of power to electronic documentation was determined. This must be done within around 5.5 years. In the USA a much longer period is given for automation of documentation. There is no data about the extent to which this task has been carried out, but progress in this sphere is evident.

2013

1. In March 2013, two meetings were held in the Russian government on stimulating export. At one of them, Russian Prime Minister Dmitry Medvedev named the strategic policy of the state as increasing the export potential of Russia by increasing the share of high technology and scientific production. A key role was given to EXIAR (Export insurance agency of Russia), which was created two years ago. The agency began to issue insurance policies making it possible to reduce risks of exporters.

2. In 2013, the government approved the "road map" developed by the Ministry of Communications and Media for the development of the IT sphere.

2014

1. In June 2014, the State Duma passed in the third reading the federal law "On amendments to article 13.2 of the Federal Law "On the legal position of foreign citizens in the Russian Federation". The bill was developed by the Ministry of Communications and Media as part of realizing the "road map" "Development of the IT sphere". It was directed to improving the conditions for Russian IT companies doing business and allows them to hire highly qualified foreign specialists according to a simplified procedure.

2. Under the leadership of the entrepreneur Sergei Belousov, the founder of the international companies Acronis and Parallels, the venture fund Runa Capital and the Russian quantum center, the company project X, which received 76 million rubles from the Ministry of Education and Science and Cronis, launched a study in optimizing the storage and processing of large amounts of data. In 2016 it became clear that the results of this study could be beneficial in realizing a packet of laws of anti-terrorist nature (known as "Yarovaya's law from the name of one of the initiators of passing this packet of laws).

3. In December 2014, President Vladimir Putin in his address to the Legislative Assembly mentioned the need to develop and realize a National Technological Initiative designed to prepare Russia to become one of the world leaders on new markets, which will appear in the new development of the world economy as part of the 6th Technological Wave. Over the year, 8 work groups were formed on priority areas of development, which compiled a road map of realizing programs of development on each market.

2015

1. In April 2015, the Russia Ministry of Economic Development began to work on forming a unified center of analytical, information-consulting and service support of Russian exporters of innovative and high technology production on issues of protection abroad of the products of their intellectual activity.

2016

1. In 2016, in accordance with the order of Russian President Vladimir Putin, the Ministry of the Economy, Ministry of Communications and Media and the Ministry of Industry and Trade developed an issue on the priority of Russian software over foreign software. In April 2016, the demands of the president were specified, and four areas of prioritization were determined. The first involves the subsidy of part of expenses on the development of system program products, which are OS, DBMS, mobile OS and other. The second measure is the privileged crediting for IT companies. The third tool is co-financing of part of expenses for promoting products, including abroad (through participation in exhibition, conferences etc.). The fourth tool is creating a center of competences, which will consist of a group of specialists which on a permanent basis must keep track of what software is purchased by state clients, and state companies, in order to distribute the best practices, suggest how a move to Russian products can be made, and stop annual expenses on purchasing and supporting licenses for foreign software.

2. The Russian government allocated 30 billion rubles to innovation in the anti-crisis plan for 2016. Funds from the budget and anti-crisis fund were received by the Fund of development of industry, the fund of infrastructural and educational programs and the fund to assist the development of small companies in the scientific-technical sphere ("Bortnik fund")

3. In 2016, a program was launched for compensation of funds spent by Russian manufacturers on certification of products on foreign markets (decree of the Russian Government № 1388, agency of the Russian government on issues of providing subsidies determined the Russian Export Center). In 2017, financing of this program was stipulated at 760 million rubles. This decree confirmed the list of codes of goods of foreign economic activity of the Eurasian Economic Union (Armenia, Belarus, Kazakhstan, Kyrgyzstan, Russia). On these codes the compensation of part of expenses of certification and approval of products is carried out.

4. In October 2016, the competition "DEVELOPMENT OF NTI" was announced as part of realization of the National Technological Initiative (NTI). This competition gives a start to necessary processes at companies in the orbit of clusters and technology parks which prepare to offer the market truly advanced and in-demand technological solutions and products. According to government decree 225-r, issued in February 2017, it was proposed to allocate 8.5 billion rubles over the course of the year to support projects carried out as part of the NTI. In 2017 it was proposed to spend a total of around 12.5 billion on this initiative, taking into account the transfer of part of funds from last year.

5. According to data from the RVC (Russian Ventures Company, which is a state institution of development) and RUSSOFT, in 2015, 100 Russian IT companies received support as part of realization of the Program for stimulating export of high technology products. The main goal of the program is the development of the ecosystem of the support of export of innovative and high technology production of Russian companies in the industry business association and technological platforms. As part of the project, IT specialists from Russia took part in international industry events. In particular, throughout 2015 representatives of Russian IT companies attended the Mobile World Congress (GSMA) in Shanghai, took part in a road show in Switzerland, in a special seminar and contact exchange in Austria Software Days), in Global Technology Symposium (GTS) in California, USA, and took part in a joint event with the Samsung corporation for mobile technology in South Korea. Specialists of RBK and RUSSOFT also organized business meetings of Russian entrepreneurs with representatives of foreign corporations from China, South Korea, Singapore and other countries. Over 450 Russian IT specialists took part in foreign events.

2017

1. From 1 January 2017, the decree developed by the Ministry of Communications and Media came into force on the priority of goods of Russian origin, according to which state companies can give preference to Russian production on equal conditions. The decree states that in holding a competition and other procedures in which the winner is determined by assessment and comparison of applications, proposals on the delivery of Russian production are assessed with a reducing coefficient of 15%, and the agreement is made according to the price offered in the application. If the winner of the auction is a supplier offering foreign products, the agreement with them is made according to the price reduced by 15%.

2. In 2017, at the opening of new laboratories as part of the state program of mega grants directed towards supporting national scientific research, it was proposed to allocate an additional 3.5 billion rubles. This was reported by Russian president Vladimir Putin in December 2016. He says that this program, calculated for 2010-2020, helped to open over 200 laboratories.

3. In January 2017, Russian Prime Minister Dmitry Medvedev signed decree no. 56 on creating a Russian fund for the development of information technologies. This document

approved the charter of the fund, according to which the functions and powers of the founder is carried out by the government or a federal body of executive power authorized by them (which the Ministry of Communications and Media is today). From the documents passed, it follows that realization of the decree passed will be carried out with financial funds previously stipulated by the law passed on the federal budget for the according year and the planned period.

4. In July, the Russian government passed the federal program "Digital economy", which was aimed at:

- creating an ecosystem of the digital economy of the Russian Federation, in which data in digital form are a key factor of production in all spheres of socio-economic activity;
- creation of necessary and sufficient conditions of an institutional and infrastructural nature, elimination of existing obstacles and restrictions for creation and (or) development of high technology businesses;
- raising competitiveness on the global market both for individual spheres of the economy of the Russian Federation, and for the economy as a whole.

In particular, the program involves creating a new federal wireless network of the LPWAN standard in Russia. This network is designed for data collection from devices of the Internet of things, and will cover the majority of the country's territory. It is proposed to build it on the basis of Russian equipment. In the 3rd quarter of 2018, planning of networks of narrowband communications with the LPWAN technology was carried out, and the procedure for launching and creating it. By the 3rd quarter of 2018, LPWAN communications networks were introduced in the first five cities of Russia with a population over 1 million people, and Russian equipment will be used in these networks.

According to the program "The digital economy of Russia", all Russians must have digital recordings of personal trajectories of development, at universities free Wi-Fi and electronic counters will be introduced everywhere, and graduation works can be defended in the form of startups. Additionally, it is planned to attract foreign IT specialists to Russia, and bring back compatriots who left Russia in previous years.

The program will require around 100 billion rubles of annual investments.

5. In June 2017, the government of the Russian Federation approved a plan for the realization of a Strategic of scientific-technological development of the country in 2017-2019, directed towards forming a modern system of management in the sphere of science, technology and innovation, and also to ensure the innovative attractiveness of the R&D sphere. In particular, the development of the state program "Scientific-technological development of the Russian Federation" is envisaged, which includes support of fundamental research and comprehensive scientific-technological programs in priority areas. Realization of these comprehensive programs will be financed from other state programs, institutions of developments and funds of support of scientific, scientific-technical and innovative activity.

6. In June 2017 at the Petersburg international economy forum, Russian President Vladimir Putin and proposed the idea of state corporations managing startups, which will accelerate the transition to the digital economy and help to reduce the gap between the poorest and richest people in Russia.

7. In the spring of 2017, the Agency of innovations of Moscow launched the project Stanislavsky Ventures, which is aimed at expanding the presence and raising the recognizability of ambitious Moscow innovative companies on the world ventures market. It involves five months of free training for top international startups competitions, such as TechCrunch Disrupt, The Next Web, Web Summit, SXSW and others.

This list of events and decisions of state bodies in chronological order shows that in 2016-2017, the state began to devote more attention to the high-technology sector of the Russian economy. This attention is usually shown in passing programs of development

and allocating budget funds as part of these programs, but the most important thing is how they will be realized. The history of Russia in almost the last two decades shows that far from all state initiatives have been realized. However, there are some which subsequently provided a certain effect, although perhaps expenses on them could have been significantly reduced with a better thought out realization. It is encouraging that all initiatives to support the high-technology sector of the economy are supported by the Russian President. Their realization is under his control, which in the present situation in Russia is particularly important.

4.4. Assessment of the taxation system

Over the last 5-7 years the attitude of respondents to the Russian taxation system has improved significantly. The share of companies dissatisfied with the taxation system dropped from 66% in 2011 to 26% in 2016. Software developer companies assess the taxation system better because of the amendments to Federal Law FZ 212. Thanks to these amendments passed in 2010, it was established that the rate of insurance payments for software developer companies accredited at the Ministry for Communications and Media and corresponding to requirements on the share of software development in turnover and by staff size, remains at the level of 14% (as was the case in 2008-2009 only for software exporters).

Assessment of the taxation system

	Poor	Satisfactory	Good
2008 survey	45%	54%	1%
2009 survey	37%	52%	11%
2010 survey	50%	42%	8%
2011 survey	66%	30%	4%
2012 survey	49,5%	42%	9,5%
2013 survey	36%	55%	9%
2014 survey	30%	53%	17%
2015 survey	26%	59%	15%
2016 survey	26%	57%	17%
2017 survey	26,5%	52%	21,5%

Over the last year, significant changes were not seen in respondents' opinions on this issue, but the number of respondents who assessed the taxation system as «good" increased slightly. In 2016, thanks to the activity of companies and associations representing the software industry, and the support of the Russian president, it was possible to overcome the wish of a number of officials to deprive software developers of privileges for payments to social and pension funds.

RUSSOFT surveyed a number of companies, and on the basis of this survey presented calculations to the government, which showed that abolishing preferences on insurance payments would not cause budgets of funds to increase, but rather to decrease.
At the same time, a blow would be dealt to a critically important sphere for the entire economy. As a result, the president decided to extend privileges for another five years – until 2023.

This battle was also waged in previous years. In late 2010 the Russian finance ministry supported the initiative of RUSSOFT and the Ministry of Communications and Media to apply the privileges on insurance payments to a wider circle of IT companies by reducing the barrier for the minimum number of company employees from 50 to 30 people. An amendment to federal law 212 was passed, which stipulated that this privilege would apply until 2017, but could subsequently be prolonged.

In the course of implementing orders by the Russian Prime Minister formulated in a congress of the Presidium of the Council for the modernization of the Russian economy on 24.12.2012, at the initiative of RUSSOFT proposals were prepared for the further lowering of the threshold of company personnel entitled to privileges on insurance payments from 30 to 7 employees. An according amendment to FZ 212 was passed by

the State Duma in late 2013, and from 1 January 2014 this decision entered into legal force.

As a result of the two measures to decrease the staff threshold (firstly to 30, and later to 7 employees), the assessment of the taxation system from large and small companies became even. Previously these assessments were higher in large companies. In 2014, small companies showed a slightly greater level of loyalty to the taxation system than larger ones: 74% of companies with a turnover below $5 million gave the assessment "good" and "satisfactory" against 71% of companies with a turnover above $5 million. The best attitude to the taxation system was shown by startups, which were formed after 2009. A year ago, these companies were the least dissatisfied, and in the last survey none of them were dissatisfied with the taxation system at all. Half of these companies assess the taxation system as "good".

The 2016 survey showed that companies with a turnover above $5 million were the leaders in assessment of the taxation system. They assessed the taxation system better (average point 3) than smaller companies (2.88). Small companies (younger than 10 years) had a higher average assessment – 2.92 They are more frequently the recipients of privileges and measures of state support, as they are startups.
In 2017, the dependence of assessment on the size and age of companies remained the same, but the difference between points in companies with a turnover under $5 million and companies with a turnover over $5 million decreased (2.94 and 3 points respectively). However, companies with a turnover below $5 million and with an age of more than 10 years were more critical of the taxation system than younger companies of the same size (2.89 points against 3 points).

In 2013, companies in the regions were more frequently dissatisfied with the taxation system than companies in Moscow and Petersburg. This is because in the two capitals there are comparatively more large companies which were more loyal to how and how much they had to pay taxes. In 2014 Moscow and Petersburg already did not stand out against the regions, as the attitude to the effectiveness of the taxation system from relatively small regional companies improved. The surveys of 2015-2016 did not show any clear changes in companies; assessments depending on their location. Large fluctuations of this indicator in the Urals and Siberia can only be explained by the small selection of companies of respondents for these regions, and accordingly a major influence of accidental factors.

Average assessments of the taxation system depending on company location

	2014 survey	2015 survey	2016 survey	2017 survey
Moscow	2.95	3.03	2.91	3
St. Petersburg	2.74	2.74	2.93	2.9
Siberia	3	2.72	3.2	2.83
Urals	2.67	3.33	2.67	2.9
Other cities	2.88	2.88	2.88	3.07
Sum of deviations from average point (2.95)	0.61	0.97	0.66	0.39

In 2017, the highest point of assessment of the taxation system was in regional companies (except in Siberia and the Urals). At the same time, we may note that the spread of assessments in companies with different locations of head offices dropped. This is shown

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by the indicator "Sum of deviations from the average point". If we examine all regional companies, the average point will be 2.95. In Petersburg, the assessment is traditionally lower, and higher in Moscow. The levelling of the average point probably reflects real changes: all positive changes in the taxation system, including simplification of procedures, reaches the regions slightly later. At the same time, local authorities may provide additional privileges on a number of taxes.

Before 2014, companies with a share of export over 50% were more often more critical in the assessment of their activity in Russia, and in particular in their assessment of the taxation system. But over the last two years the average assessment of the effectiveness of the taxation system was higher in companies focused more on foreign markets than those that work more within Russia. Exporters are constantly forced to compare the taxation system in Russia and other countries. The price of their services and products depends in many ways on the size of taxes and insurance payments, and also the results of participation in major foreign tenders. Perhaps loyalty to the taxation system from exporters arose because their competitive ability on the world market increased thanks to the drastic decrease of the average salary in Russia in dollar terms after the devaluation of the ruble in 2014-2015.

The results of the 2017 survey may be affected by the fact that privileges on payments to pension and insurance funds that are important for work on foreign markets were prolonged to 2023, although in the summer of 2016 there was little hope for this. The last survey showed that companies with an export share of over 50% assess the taxation system on average at 3.19 points, and companies which are more focused on the Russian market at 2.83.

The main conclusion that can be made on the basis of regular observations is that on the whole the assessments of all surveyed companies of the taxation system have steadily improved over the last few years.

Surveys before 2015 stably showed that the taxation system was even slightly better assessed by companies which do not have privileges on insurance payments under Federal Law №212. In 2016, everything fell into place – recipients of privileges now assess the taxation system better than companies which do not have these privileges (average point 3.04 and 2.79 respectively). In 2017 almost all large and medium companies surveyed had privileges on insurance payments.

However, studies of previous years showed that the assessment of the taxation system depends in many ways on the information background that existed during the time of the survey. So it is useful to track these assessments by different categories of companies, but we should not draw categorical conclusions on these changes. The average assessment of the taxation system is growing, but still remains at a level just under 3 points out of 5 (lower than «satisfactory"). Thus, even the actual provision of privileges does not guarantee the loyalty of companies surveyed to the taxation system. We may assume that in this way companies do not so much express their negative attitude to high taxes, as to the system of their administration (above all in the sphere of currency regulation, financial and accounting reports).

According to previous surveys, privileges on insurance payments are usually enjoyed by companies which are focused on foreign markets. Among companies which receive over half their turnover from export, the privilege system of payments to state insurance funds in 2016 was 57% (in the previous two years it was 70% and 61%), and companies which receive less than half their turnover from export, it was 35-40% in 2014-2016.

Naturally, the most active in receiving privileges are developers of custom software, on the cost of whose services (and the price of services is 70-80% determined by the level of

expenditure on payment of employees) in many ways depends their competitive ability on the world market. So service companies more frequently used a privileged system of insurance payments (49% in the 2016 survey). Among developers of readymade solutions, only 30% of surveyed companies have these privileges. Similar indicators were also characteristic for the industry in the previous 2 years.

Economy gained as a result of receiving privileges under federal law 212 (% of surveyed companies)

	2014 survey	2015 survey	2016 survey
below 1% (from expenditure on salary)	-	-	8%
below 5%	37%	22%	15%
from 5% to 10%	42%	43%	46%
above 10%	21%	35%	31%

Privileges allow companies most frequently to save from 5 to 10% or above 10% on salary payment. One of the two answers were chosen in 2015-2016 by almost 80% of respondents. There should not be major deviations from the data of surveys of the previous two years. So the according question was excluded from the survey.

To receive privileges on insurance payments for innovative companies, there is also another path – through the status of resident of the innovation town of "Skolkovo". In the autumn of 2010, the State Duma passed a law determining the creation and functioning of the "Skolkovo" innovative center, and also approved amendments to the tax code of the Russian Federation, establishing privileges on the tax on profit, property and value added tax for innovation companies of "Skolkovo". Over the course of 10 years, project participants were exempted from payment of VAT, and the total amount of payments to compulsory pension, medical and social insurance for them was reduced to 14%. The first residents of "Skolkovo" which could enjoy privileges appeared in the spring of 2011.
In 2014, the Ministry of Economic Development proposed to apply tax privileges granted to participants of Skolkovo to 25 innovative territorial clusters, approved in the same year by the government (a decision on this proposal was not passed).

Additionally, there is privileged taxation for different categories of companies at reginal level. For example, the profit tax rate for IT companies in the Novosibirsk Region was reduced from 20% to 15.5% from 1 January 2015.

4.5. Presence of modern infrastructure

As a result of many years of observations, it was established that the most significant factors in an assessment of the business state of infrastructure are: the growth or decrease of rental rates and other expenses ensuring the functioning of offices, and also the effect of publications in the media on public opinion. These two factors can significantly influence the number of companies dissatisfied with infrastructure in just a year, although in reality the infrastructure itself cannot change to the same degree in such a short time.

Nevertheless, from the results of surveys we may also assess the real state of infrastructure, but we must compare it over several years. This comparison shows that in 2008-2011 the share of companies dissatisfied with the state of infrastructure varied between 15% (when the cost of office space rental dropped drastically) and 52%. Over the last six years, this share has varied between 10% and 25%. The difference is considerable, but it reflects that over the past decade, throughout the country modern infrastructure has been created, which is not only required by the high-technology business, but every sphere of business. Enormous investments in telecommunications

infrastructure were made both by the state and private companies. For example, the coverage zone of the 3G network has already reached its maximum possible size, and in almost all regions cellular network of the next generation, 4G (LTE) has been launched. By its speed of data transfer in LTE networks and coverage of the territory of the country, Russia is ahead of the USA. Additionally, the bandwidth of main communications channels is increased, the problem of "digital inequality" is solved, which affects settlements that are small and remote from Moscow. Over the last decade, new modern airports and roads have been built in various cities, a high-speed railway has been built between Moscow, Petersburg and Helsinki, and also between Moscow and Nizhny Novgorod, with a planned extension to Kazan (an according project is in the process of realization).

Assessment of infrastructure existing in Russia

	Poor	Satisfactory	Good
2008 survey	52%	42%	6%
2009 survey	20%	60%	21%
2010 survey	15%	59%	26%
2011 survey	40%	37%	22%
2012 survey	11,5%	60,5%	28%
2013 survey	25%	52%	23%
2014 survey	16%	52%	32%
2015 survey	10%	56%	34%
2016 survey	21%	42%	37%
2017 survey	19%	48%	33%

In recent years, large-scale updating of equipment of network infrastructure in the electric power industry has been taking place, which is confirmed by foreign specialists and heads of foreign companies which have carried out solutions for the industry. By its percentage of new equipment in the electrical power industry, Russia is already one of the world leaders.

According to the 2015 survey, a steady improvement in assessments of the state of infrastructure took place. For the first time, over a third of respondents assessed existing infrastructure as «good».

The progress is quite logical: it can be explained by a reduction in rent rates in dollar terms and the opening of new technology parks in 2014, in which young companies in some cities have privileged conditions for office rental.

The 2016 survey did not show such a clear improvement. The share of companies which assessed infrastructure as "good" increased, but at the same the percentage of "bad" assessments increased significantly. The "satisfactory" percentage decreased somewhat, which was probably connected with the gradual increase of rental rates and the smaller number of media reports about major infrastructural projects realized.

The 2017 survey did not show any fundamental changes. The development of infrastructure, which is constantly taking place, is partially compensated for by the existing growth of rental rates.

With a division by cities where the head offices of respondent companies are located, the selection decreases. So the importance of accidental factors grows. Moscow companies in almost all the recent years of the survey assess infrastructure more positively than all the others. However, the assessments of regional and Petersburg companies are not much worse.

Assessment of existing infrastructure in Russia depending on company location

	2014 survey	2015 survey	2016 survey	2017 survey
Moscow	3.29	3.35	3.19	3.32
St. Petersburg	2.88	3.23	2.9	3.23
Siberia	3.53	3	3.1	2.88
Urals	2.83	3.33	3.33	2.7
Other cities	3.14	3.25	3.29	3.16

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Assessment of existing infrastructure in Russia depending on company turnover

	2014 survey	2015 survey	2016 survey	2017 survey
below $1 million*	3.39	3.29	3.1	3.06
from $1 million to $5 million**	3.14	3.24	3.27	3.18
from $5 million to $20 million	3.1	3.3	3	3.33
from $20 million to $100 million	3	3	3.22	2.83
over $100 million	3	3.5	4	-

* - before 2016 - below $0.5 million.

** - before 2016 - from $0.5 million to $5 million

The evident dependence of assessments of infrastructure on company size is not seen. Until 2014 inclusive, companies with a turnover below $0.5 million assessed existing infrastructure much more positively than others. This is probably connected with the low requirements of some of these companies for infrastructure, as they do not have serious clients which could demand that their suppliers observe international standards of doing business. Since 2014 the assessments of companies with different turnovers and different head office locations have levelled out.

4.5.1. Office space

Surveys conducted in 2015 determined that software companies paid much less for office rental than indicated in studies by realty companies on class A and B business centers. In the survey, the growth or decrease of average rental rates throughout Russia and in the two largest cities was determined. This information on changes could be trusted if we allow an acceptable margin of error. However, the absolute size of the cost of office rental of companies did not tell us much. Especially as certain average figures of received results did not have an explanation. For example, several years ago the average rental rate in Petersburg was much higher than in Moscow, although from reports of realty companies it was known that capital office space costs around 30-40% more, if we examine properties with identical characteristics. These divergences from data of professionals shows that the RUSSOFT survey probably did not allow to determine the absolute level of rental cost with acceptable margin of error. It does not really need to be measured, as this information is openly available.

From 2015, the question was asked as follows: How has the cost of office rental changed over the past year in ruble terms? Additionally, the survey made it possible to determine the share of expenses accounted for by telecommunications services, marketing, office space rental and R&D. As a result, information was received on the structure of expenditure of companies surveyed. In particular, it was discovered what share of expenses is accounted for by office rental on average. Judging from the results of the surveys of 2016-2017, office rental accounts for 8-9% expenses of IT companies.

Share of expenditure accounted for by office space rental (for 2016)

All companies surveyed	With turnover below $1 million	From $1 million to $5 million	From $5 million to $20 million	From $20 million to $100 million	Over $100 million
8.3% (9.2%*)	10.1%	9.5%	9.1%	8.7%	7.5%

* - without data of the largest company taking part in the survey

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The larger the company, the smaller percentage office space rental has in the structure of its expenditure. This is explained by more considerable expenses on marketing and personnel (salaries are higher in these companies). Additionally, larger companies receive discounts from rental companies, and also have remote centers of development abroad more often, where rental rates are still lower than in Russia.

In 2014, with a sue of a different method, the growth of rental rates was 4.25%. An increase in the cost of rental was noted by 43% of respondents, 49% did not face a review of rates, and 8% noted a drop in rental rates.

Share of companies with different change in rental rates in 2015-2016

Change in rental rates	2015	2016
No change	68%	63%
Increased	28%	36%
...increased by over 10%	16%	19%
Dropped	3%	1%

Growth of rental rate in different categories of companies in 2015-2016

	for 2015	for 2016
For all companies surveyed	5.4%	4%*
Business model		
Developers of program products	1.7%	3%
Service companies	5.8%	4%*
Company size		
Turnover below $5 million	2.2%	4%
Turnover above $5 million	5.8%	4%*
Share of foreign sales		
Above 50%	6.4%	5%*
Below 50%	1.6%	3%
Age of company		
Older than 10 years	5.5%	4%*
Younger than 10 years	3%	5%*
Location of head office		
Moscow	6%	6%*
Petersburg	3.4%	4%
All regions	2.2%	3%*

* - without the two largest companies surveyed, for which rental increased by 20% and 24%

In 2015, on average for all surveyed company, rental rate for software companies in ruble terms grew by 5.4% (in dollar terms, which is important for exporters, it dropped by more than 30%).

In 2016, with a growth of 4% in ruble terms, the cost of rental rates in dollar terms continued to drop (by around 5%).

In 2015-2016, around two thirds of companies surveyed did not see a change in rental rates, and for about a third they increased.

Thus, in the last three years the cost of rental of office space grew by 4-5% per year.

In 2015, rental rates grew more for software companies which had respectable turnover increase compared with other Russian software developers. These companies, which specialize in developing custom software, are more focused on working abroad (they won out most of all from the devaluation of the ruble), and are large or at medium-sized, with a head office in Moscow or Petersburg. It is logical to assume that these companies have the need to carry out urgent expansion of production facilities, which was exploited by rental companies, which raised their rates slightly more than the market average. Chances for this increase were especially high when software companies had to rent a large amount of office space at once.

In 2016, the increase of rental rates for different categories of companies levelled out, because growth rates of turnover for them ceased to be very different.

If in 2015 software companies began to spend slightly more to rent an office, in general prices on the market of office real-estate did not grow. According to reports of real-estate market analysts (primarily Jones Lang LaSalle and Colliers International), in 2015 the rental rate in Russia not only dropped in dollars, but also in rubles. In 2014 in Moscow and Petersburg (and probably also in other large cities of Russia), properties with a record

amount of office space were put into operation, and demand not only did not increase, as developers expected, but even dropped. In 2015-2016, the number of new business centers put into operation dropped drastically, and demand began to grow from early 2016. As a result, rental rates gradually rose (not more than several percentage points over half a year), but only in ruble terms, and at rates lower than inflation rates.

According to Colliers International, in Moscow the average balanced rental rate of class A office space in rubles dropped in 2015 by 7%, and came to 28,000 rub./ m²/ per year. For class B, rental rates dropped by 25%, to 14,500 rub./ m²/per year/ In 2015, the drop in rental rates reached its maximum historical value. Over the year, the average rental rate in US dollars dropped for class A by 36%, and for class B by 40%.

Rental companies did not repeat the mistakes of 2009, when they reviewed rates depending on the dollar exchange rate, which led to a loss of clients. Especially as in recent years many properties were put into operation, while demand for them over the last three years did not change fundamentally. Accordingly, competition grew. Previously, rental rates in Moscow and Petersburg were higher than in many cities in Europe (for example Stockholm or Helsinki), sometimes twice as high, which reduced the competitive ability of Russian companies. Now there is no significant difference with other European cities. In 3 years, rental rates in Russia dropped in dollar terms by over 40%. Analysts report that in Europe, the cost of office space rental rose during this time. As a result, Petersburg and Moscow dropped in the rankings of the most expensive cities for doing business. If we only examine the capitals and major business centers, the two Russian capitals are now in the middle of the world ranking of "expensive" cities.

The results of a study by professional participants of the real-estate market confirm the growth dynamic of office rental costs, which was brought to light by the RUSSOFT survey. According to data from Colliers International, in Moscow the growth of rental prices in 2016 in ruble terms was 6%, and in dollars a reduction by 4% was recorded. Class A prices dropped in dollars by 3.5%, and class B, which are most frequently rented by software companies, by just over 7%. The average balanced rental rate for class B space was $329/m²/per year in 2016. As the results of the RUSSOFT studies of previous years showed, for Moscow software companies they are on average considerably lower.

In St. Petersburg, Colliers International recorded growth of rental rates for class A space by 8%, for class B by 4%, and on average by 6%. The average balanced rental rate of class B space came to 957 rubles/m2/per month in 2016.

Average figures are not given for the whole of Russia, but judging from the supply and demand described, the situation is similar – the cost of rental has grown slightly in ruble terms and fallen in dollar terms. Growth rates are probably slightly lower on average than in Moscow. They may be different in a number of large cities, but in a small range (the growth is unlikely to be more than 10% in rubles).

An analysis of new office space and existing demand for the first half of 2017 by Colliers International allows us to assume that for the entire year there will be similar growth in rubles as was seen in 2016. However, in dollars the increase is quite respectable (over 10% because of the strengthening of the ruble), which will negatively affect exporters. For example, in Petersburg the average balanced rental rate of class B office space reached 986/m2/per month in the first half of 2017, 3% more than in 2016.

It is noteworthy that in 2016-2017, analysts of realtor companies began to call IT companies the engine of the real-estate market (primarily software companies) on an equal level with oil and gas companies. This is another sign of the growing significance of the software development industry.

4.5.2. Technology parks

In 2016, there were over 200 organizations which had certain features of technology parks (around 500 have this name) in Russia, of which 107 technology parks met the requirements of the national standard "Technology parks. Requirements" to the fullest degree. Of these 107 technology parks, 44 are developed by private owners, and the others are financed in full or partially by the state, in accordance with a number of state programs (data of the Association of clusters and technology parks of Russia).

In 2016, the Russian board of standards passed changed to the national standard "Technology parks. Requirements", which came into force in March 2017 and specified requirements for technology parks, their infrastructure and list of services provided by the managing company of a technology park, and also privileges provided. According to assessments of the Association of clusters and technology parks, introducing requirements and recommendations of a standard will lead to an increase in the effectiveness of state support of technology parks at federal and regional levels. A similar effect is expected from the introduction of a national rating of technology parks. An according study with ranking of technology parks is conducted annually by the Association of clusters and technology parks.

In compiling the 2nd national ranking of technology parks of Russia, which was presented in late 2016, applications were examined from 118 technology parks from 85 regions of the Russian Federation, but 25 of them were included among the best (from 15 Russian regions).
The highest integral values of effectiveness of work in all indicators were shown by the following technology parks:
1. Nanotechnology center "Technospark" (Moscow)
2. MGU science park (Moscow)
3. Scientific technology park of Novosibirsk Akademgorodok (Academpark) (Novosibirsk Oblast);
4. "Moscow" Technopolis (Moscow)
5. Strogino technology park (Moscow)
6. Innovative production technology park "Idea" (Republic of Tatarstan);
7. "Technopark-Mordovia" (Republic of Mordovia)
8. Ulyanovsk Nanotechnology center (Ulyanovsk Oblast)
9. Western Siberian Innovative Center (Tyumen Technopark);
10. Technopark in the high technology sphere "IT Park", Kazan (Republic of Tatarstan).

In November 2017, the awards of winners of the 3rd National rankings of technology parks of Russia will be held, for which 33 technology parks from 17 regions have been selected.

The assessment of activity of managing companies of technology parks was made according to 12 indicators connected with innovative activity and economic activity of residents, and also the effectiveness of the business model of the managing companies of technology parks. In particular, in assessing technology parks such indicators are taken into account as the volume of expenditure of residents on scientific research and development; number of protected objects of intellectual property created by residents; total turnover of residents, share of turnover from additional services in the total turnover of managing companies of technology parks etc.

The average labor productivity in technology parks in 2017 increased from 2.7 million rubles per person to 3.7 million rubles per person. This is 12% higher than the average Russian figure of labor productivity in manufacturing activity (3.3 million rubles per

person). The average taxation basis of technology park residents also increased significantly – from 335 million rubles in 2016 to 440 million rubles in 2017 (by 31%). Additionally, the level of occupancy of rentable spaces of technology parks is 76.2%, which is 0.7% higher than the figure for 2016. The occupancy figure is already very high, given that a considerable amount of spaces are constantly being put into operation, and so are not immediately occupied by tenants.

According to data from the Association of clusters and technology parks, at present the industry of technology parks in Russia has not been fully formed. These sites have only been created in 47 regions of the Russian Federation. They are the most economically developed regions. At the same time, less than a third of existing site fully correspond to the main classification criteria of technology parks.
In 2015, the summary turnover of residents of all technology parks of Russia (data of the Association of clusters and technology parks)) came to 188.6 billion rubles. In 2016 it exceeded 210 billion rubles (+10%).

A number of major technology parks appeared thanks to federal and regional budgets. According to data of the Russian ministry for communications and media, as part of the complex program of development of technology parks in the high technology sphere, which was effective from 2007 to 2014, 12 technology parks were built in 10 regions of the Russian Federation with a total area of over 480,000 square meters. Investments in the program from the federal budget came to 13.4 billion rubles, and Russian regions invested 19.5 billion rubles in them. The total turnover of residents of technology parks since the program was launched until mid-2016 has come to over 180 billion rubles.

Several years after the program is completed, the regions should ensure the implementation of economic indicators connected with the development of the ecosystem of technology parks, and with the effectiveness of their work. By 2018, technology parks must be at least 90% occupied, their budget effectiveness must be at least 55%, and the share of export in the turnover of residents at least 12%.

It is noteworthy that in the two Russian capitals, where the measures of support of high-technology appeared before they did in the regions, state technology parks had still not been built before the end of 2014. In Moscow one only appeared in May 2015, and Petersburg completely missed the opportunity to receive appropriate funding from the federal budget in 2014.

Petersburg authorities decided to build the technology park "Ingria", which was first planned in 2005, with funds from the city budget. On 30 October 2013, the St. Petersburg City Agency for Attracting Investment announced the results of a competition to plan the administrative building of the technology park. But subsequently a different path was found in the city to create a technology park – by renting out a large part of the territory of the "Lenpoligrafmash" factory, which the factory owners specially had reconstructed for the requirements of a technology park.

The fact that in some parameters, the regions outstrip the two Russian capitals in the development of infrastructure for the high technology sector of the economy is cause for hope. Between major cities, healthy competition has arisen for supporting innovative business. Heads of a number of cities are very envious of what their neighbors do in this field, and even try not to lag behind Moscow, which has a city budget that is tens of times larger. For example, the IT cluster in Nizhny Novgorod which was created in the summer of 2017 should be one of the top three leading equivalent territorial formations of Russia by the end of 2021. It is proposed to invest over 2 billion rubles in the project. Creators of the cluster expect that in four years its members will be at least 300 Russian and foreign

companies, and their turnover in Russia and from export will be 1.5 billion and 1 billion rubles respectively.

Heads of regions not always adequately assess the financial possibilities of the local budget, and their projects look unrealistic, but their focus on the development of the innovation economy gives certain results.

In some large and economically developed regions of the country, the process has come to a standstill. For example, this took place in the Krasnodar Territory, where tourism and agriculture have historically developed, with a lack of a large number of IT companies. Perhaps in these regions it was not possible to connect IT with traditional companies for them, and find their niche in the entire IT industry of Russia.

We may assume that the Ulyanovsk Nanotechnology Center occupied 8th place in the national ranking of technology parks for good reason. By its population, Ulyanovsk only holds 22nd place among Russian cities, and has a modest city budget, but in a number of parameters of the development of the IT business it surpasses several of the 15 cities with a population of over 1 million. Foreign experience shows that even a city with a population of several tens of thousands become centers of development of the high technology business, at least on the level of their own country. This experience must be studied and borrowed (especially as it also exists in Russia. An example may be Taganrog, in which dozens of IT companies function successfully).

Technology parks in Russia have not only been created as part of the federal complex program. In Tatarstan, the first Russian technology park "Idea", which began to accept residents in 2010, was built from funds of the republic budget without federal financing. It has already paid off the investments made in it and provides a profit to its owners, although receiving a profit is not the main goal. By the end of 2013 it was 98% occupied, with over 400 companies employing over 7,000 people.

In Petersburg, the Ingria business incubator has functioned successfully since 2008, and is a component part of a future technology park of the same name. In 2015, this incubator moved to a new building, reconstructed and leased by the owners of the Lenpoligrafmash shareholding company. It is planned that various support tools of high technology will gradually be gathered on the basis of the complex of reconstructed building, including an accelerator, engineering centers, so this complex will become a de facto technology park. In particular, in 2016 the city government allocated around 90 million rubles to equipping and running the engineering center Sefnet NTI, which should be put into operation in December 2017.

Another private technology park opened in Kazan in February 2014. It specializes in support of device projects (areas covered: robotics, 3D printing, smart devices, smart home systems, portable electronics). Its founders are Vasil Zekiev, the manager of the business incubator at Kazan and Nazberezhnye Chelny IT parks, and the director for development of Runa Capital Foundation Ramil Ibragimov. The total sum of investments in these technology parks came to 120 million rubles ($4 million). It was planned that in 2015 in Perm and Ufa these investors would also start to build similar technology parks (sum of investments in these projects around $1 billion rubles or $30 million respectively).

In early 2016, the Moscow Scientific Production Site Itelma was recognized as a technology park by the capital authorities. By 2017 it should grow to become an engineering and laboratory site, which will allow it to gain the status of Technopolis. This technology park specializes in the manufacturer of electronic automobile components.

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It should be noted that in the construction of state technology parks, private investors are also involved, although the majority of investments are provided by federal and regional budgets.

It is important that at functioning technology parks, an environment starts to form which affects the development of high technology in the entire region. So there is an indirect positive effect, which is very difficult to measure even approximately.
Criticism of technology parks built on budget financing undoubtedly exists, but usually it concerns deadlines of launch, conditions for receiving status of resident and privileged conditions of rental, and also not particularly serious errors by designers and builders. On the whole, the majority of high technology companies of Russia are either positive about how the federal program for building technology parks is being realized, or neutral (if there is no technology park in their city or no need to move to one).

The federal program "Creating technology parks in the high technology sphere in the Russian Federation" only functioned until the end of 2014. However, other sources appear for financing the construction of such sites under other programs. The Russian ministry for communications and media has already begun to select regions of the country with the right to receive state support in the form of subsidies to compensate for expenses on creating infrastructure of technology parks in the high technology sphere. The rules of selection and the list of documents provided by regions of the Russian Federation is approved by a decree of the government of the Russian Federation № 1119 of 30 October 2014.The new mechanism will allow Russian regions to receive compensation for part of funds used in creation infrastructure of technology parks, from federal subsidies, proportional to the volume of tax and customs deductions received into the federal budget as a result of activity by residents of technology parks created. The volume of compensation of funds used in construction of infrastructure of technology parks from federal subsidies cannot exceed 60,000 rubles per 1 m2 of the total area of sites of technology parks and 75,000 rubles per 1m of the total area of technology parks in projects of reindustrialization. In the summer of 2015, the government abolished the requirement that residents of technology parks could not have branches and separate divisions outside the specific region. Additionally, the list of documents provided by the region in the application for compensation of expenses was reduced, and the requirements for the certificate of the technology park project were clarified.

The Ministry for Communications and Media insists on building a technology park in the Crimea, which was annexed to Russia in March 2014. It should be in Sevastopol or Simferopol. A special source of financing will probably be offered for it, as subsidizing involves a significant share of investments from the local budget, which will be deficit in the Crimea for several more years owing to the need for significant investments in the infrastructure of the peninsula. In February 2016, an IT center was opened in Simferopol, which aims to develop Crimean startups of various startups of various kinds and promote their solutions on the world market. In 2015 with the support of RUSSOFT the Crimea IT cluster was created. However, it is difficult for this cluster to develop in the atmosphere of sanctions.

In the spring of 2016, MERLION acted as a strategic partner in a project for the creation of «Park of High Technologies" in Yakutsk. The initiative to build an IT park was supported by the head of the republic of Sakha Yegor Borisov, the development fund of the Far East and the development corporation of the Republic of Sakha. On the basis of the Yakutsk technology park, it is proposed to develop projects actively connected with cryogenic, information and nanotechnologies, and also genetics and bioengineering. The area of the High Technology Park is assessed at 20,000 m².

4.5.3. Special economic zones, innovation towns and science towns

Besides the construction of state technology parks, two very large projects are being realized in Russia connected with infrastructure for needs of high technology companies – Skolkovo, 3 km from the Moscow ring road, and Innopolis in Tatarstan. They will offer their residents a favorable environment not just work in, but also to live in. Skolkovo and Innopolis are supposed to become new super-modern cities.

The official opening of the new town of Innopolis took place in June 2015, although active construction would continue for more than a year. However, there are already sites which can allow us to say that a new town has been built. In September 2015 mass study of students at the Innopolis University began, which according to a selection process from May to July, around 350 students were selected from 45 regions of Russia and 10 foreign countries. In October, sale of apartments in residential buildings of the town began. By the end of 2015, the Popov building had been completely finished, the Innopolis university building, the first part of the campus for students of 4 dormitories, over 10 residential buildings, medical center, sport complex, kindergarten and school buildings, a café, shop, power station, water pipeline station; construction of the Lomonosov building, residential buildings and city roads continued. On the 11th of January, 2016, the Lyceum Boarding School for Gifted Children at the Innopolis University opened.

By mid-summer 2015, the Popov administrative and business center was completely ready for use, designed to house 2,500 specialists. Additionally, modern and high-quality residential infrastructure was created. Most apartments were provided for residents on the basis of rental agreements with all necessary selection of furniture and home appliances. Special attention is given to developing social infrastructure of the city.
Judging from information on the city website, in 2017 around 3,000 people live in Innopolis, of whom 1,300 were employees of around 50 resident companies. At the local university of the same name, 600 students studied and 13 scientific research laboratories worked. In March 2017 Schneider Electric signed an agreement of intentions with Innopolis and Innopolis University. It is expected that the main spheres this center will be developments and solutions in the field of cyber security, localization of program solutions for the oil and gas industry, and carrying out scientific research.

56 IT companies have opened or planned to open their offices at Innopolis, including Sbertech, Bars Group, Yandex, Kaspersky, Acronis, RTK Labs, Tinkoff, Infowatch, Cognitive Technologies, New Cloud Technologies (My Office) and others.
Over 12,000 square meters of real-estate have been rented, and basic infrastructure has been launched: 16 residential buildings, a kindergarten, school, IT lyceum, medical and sporting centers; there is a postal office, two banks, a supermarket, several cafés and a bar, a car wash and pharmacy. In May 2017, construction of a new living complex of six buildings with 700 apartments began.
In 2017, 169 students of Innopolis University completed their studies. They received 284 job offers from partner companies (Yandex, Sberbank Technologies, MTS, Open Mobile Platform, Cognitive Technologies and others. Graduates of the IT university also founded 3 of their own startups: BeTrip, OWN and Anybots.
Evidently, the town is growing and developing, but not without problems, which heads of IT companies of Tatarstan report. It is located 40 km from Kazan in an empty area which is not such an attractive place of residence for young people. Additionally, the effectiveness of work of a number of Kazan universities is insufficient to provide the required mass inflow of highly qualified personnel to the new growing town. It should be taken into account that this personnel is partially taken by successfully working technology parks of Tatarstan.

Development is also underway of another innovation town that is being built in the former Moscow region in the area of Skolkovo (after the expansion of the boundaries of the Russian capital, it became part of Moscow). The "smart town" concept for "Skolkovo" in the summer of 2012 was created together by Cognitive Technologies, Ernst&Young, Cisco and Panasonic. Besides 3D modelling of building, it takes into account transport flows, security systems etc. It was initially planned to complete construction of the innovation town fully in 2017, but evidently the plans were reviewed. But subsequently a project was discussed in which budget financing of 125.2 billion rubles until 2020 is proposed. By that time, on an area of 2.5 million m², around 50,000 people will live and work. The town occupies almost 400 hectares, but allocation of additional land is already under discussion.

Unlike Innopolis in Tatarstan, Skolkovo does not report how many registered residents there are in the city in a specific time, to track its settlement. Nevertheless, certain data that shows the realization of the project is published from time to time. According to the president of the Skolkovo foundation, Viktor Vekselberg, by October 2016 around 50% of residents of the innovation town had a market realization of their developments. Every day from all residents one patent application for an invention was submitted, and the share of international patents in Skolkovo is much higher than the average for the country. The total integral effect for the Russian economy came to 30 billion rubles, although according to plan it should have been lower – 20 billion rubles. The method by which this effect was calculated is not stated.

At the end of 2016, Russian Prime Minister Dmitry Medvedev summed up the results of the project development. In six years, almost 1,600 innovative companies were created at Skolkovo. Over 100 of them already take part in various international deals, and have entered international markets. Over 21,000 high technology jobs have been created as part of the project. Over 100 billion rubles have been allocated to the project from budget funds. Comparable funds were invested in developing infrastructure by private investors – around 92 billion rubles. The total annual turnover of residents was 40 billion for 2015. The results for 2016 were summed up by the vice president of Skolkovo Igor Bogachev. According to him, residents earn almost 100 billion rubles.

Major foreign companies are very enthusiastic about the project. By February 2013, 24 corporations, 16 of them international, had announced their intentions to invest a total of around 30 billion rubles (around $1 billion) in creating R&D centers at Skolkovo. This is about a third of the investments that the innovation town expects from private investors. The declared intentions do not carry any obligations, but if the project is realized successfully, most corporations will create their own development centers at the innovation town. Especially as some corporations have already hired employees of R&D centers that have become residents of Skolkovo and encountered problems of housing them.

Over the last three years, there has been no information about major companies abandoning already declared plans to have a presence in Skolkovo, even from foreign corporations that are losing their position in Russia and so plan major cutbacks of personnel. The media reported that the construction of a technology park of the largest Russian financial crediting institute Sberbank has been delayed, as announcing the results of the tender to develop the architectural concept was delayed to the end of September 2015. At the same time, new potential investors have appeared. In January 2015 the major Russian system integrator, Lanit, reported the intention to invest 250 million rubles in creating a science center at the innovation town, in which by 2017 around 100 employees will work on development of computer technologies. At the first stage, the center is concentrated on new technologies in the field of personal and mobile electronic education.

In May 2015, another systems integrator, Ai-Teko, announced plans to create its own research center at Skolkovo, the main direction of which will be the realization of a program platform and instrumental means of development, directed at creating software in the banking and financial sector and focused on processing Big Data. Around 100 people should work at this center.

From mid-2015 to mid-2016, there was virtually no significant news about the appearance of new residents at Skolkovo, putting new sites into operation and moving to the town from any renowned companies. The next wave of settlement took place in the autumn of 2017. During the forum held at the innovation town, "Open innovations", the Skolkovo fund signed a number of major agreements with new and old industrial partners, including the Italian energy giant Enel and the Magnitogorsk Metallurgical Combine. They intend to open R&D centers at Skolkovo. The Rostech corporation announced that it would create a partnership center at the innovation town, to which it will allocate 300 million rubles to financial operations before 2020.

Skolkovo and Russian Railways agreed on formation of a system of selection and acceleration of innovative startups to be introduced into the sphere of railway transport. The Skolkovo fund intends to provide support in looking for innovative projects and teams of developers among the innovative community, provide methodological support of organizing work with startups, and also to provide the opportunity for Russian Railways to make use of necessary infrastructure and services on the territory of the innovation town.
The fund signed another agreement with Rostelecom and Nokia. It involves the creation of an experimental zone of the 5G network on the territory of the innovation center.
Rosseti, the Skolkovo Fund and the French company Schneider Electric have determined the conditions of strategic partnership for the development of technologies in the field of localization, development and introduction of the program technical complex of systems of operative technological control of distribution electrical networks of the new generation. 1C company announced the expansion of its cooperation with Skolkovo which intends to develop its own startups on the basis of the innovation town.

SAP and Skolkovo foundation have created a joint program for support of developers of innovative solutions on the basis of the open platform SAP Cloud Platform, and also a selection of materials for sale and promotion of solutions (Sales Kit).

Until autumn 2017, Skolkovo was associated not so much with the location of high technology companies, as a place to hold large-scale and important events. News from the innovation town was primarily devoted to this. We can also speak of diverse support of residents – from money allocated by them through the Skolkovo fund to mentorship and assistance in promoting solutions abroad. However, many residents are physically located outside the innovative town, although they visit it often. At the same in the last few years it has become much more difficult to receive the status of resident than it used to be.

The Skolkovo fund organizes events not only in the innovative town itself, but also abroad. For example, in the autumn of 2016, 20 Skolkovo companies first took part in one of the largest exhibitions of information technologies in the world, the Gulf Information Technology Exhibition (GITEX) in Dubai. In the autumn of 2017, in the run-up to the latest forum "Open innovations" to be held at Skolkovo, 8 Skolkovo companies visited Luxembourg and Belgium on a business mission.

International marketing involves developing. The Skolkovo fund together with partners intends to assist the expansion of access of Russian manufacturers of high technology

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production to take part in leading international exhibitions and business missions, and also create international hubs and formation of industry export consortiums.

There is criticism of the large-scale project. It concerns determining criteria of effectiveness of investing money in the Innovation town of Skolkovo and the fund of the same name. Additionally, there is no established connection with the academic community. However, the problem, if it exists, is quite solvable if this is desired. At the same time, the academic community itself is also criticized.

An equivalent of Skolkovo and Innopolis was planned for construction near Petersburg. In June 2015, a large-scale project of an innovative town of science and technology was announced on the territory of the satellite town Yuzhny at a cost of 25 billion rubles, which will be realized by Start Development. Besides the developer, the St. Petersburg government, ITMO University and Rosnano are taking part in it, and have signed an according agreement.

The total volume of investments in construction will be 219 billion rubles. Construction should begin in 2018, and end in 2033. 4.3 million sq.m. of housing and another 1 million sq.m. of commercial real-estate will appear on the territory of Yuzhny. The area of the satellite town is around 2,000 hectares. $100 million for realization of the project was promised by the Russian Direct Investment Fund and the international corporation Renaissance Construction.

For development of high technology industries in Russia, special economic zones have been created of the technical and introduction type, which are primarily focused on manufacturers from the sphere of machine building, pharmaceuticals and device construction. Software companies, if they do not organize material production, were not very interested in these zones. Evidently, a new type of SEZ has appeared in Tatarstan. This status was given to Innopolis, which is primarily focused on the development of information technologies.

The construction of special economic zones is carried out at the expenses of the state budget (construction of infrastructural sites and administrative buildings) and funds of companies with the status of residents (they build their own production and office facilities). By mid-2014 there were 5 SEZ of the technical innovation type. Besides Innopolis, they are Dubna and Zelonograd in the Moscow region, St. Petersburg (two sites) and Tomsk. They received their names from the cities in which the zones are located.

These special economic zones are indeed developing: construction of infrastructure facilities, and new residents are approved.

We may assume that existing SEZ of the technical innovation type will function and become points of growth for the high technology sector of the economy, but they will have more influence on goods production (instrument making, pharmaceuticals and others) than on software development.

It seems that the development of science towns has been frozen definitively. The government does not show an interest in them, and the principles are still unclear by which they have received and continue to receive money from the federal budget. Information on how effective state investments in Russian science towns have been is either completely lacking, or is only possessed by a narrow circle of officials. Nevertheless, in the "Strategy of innovative development of the Russian Federation in the period until 2020", science towns are still mentioned. For example, for allocating federal

financing it is proposed to take into account the level of activity of regional authorities in forming the regional innovative system, level of commercialization of development, and dynamic of development of innovation business.

It was proposed that the status of science town would allow the region to receive additional financing, in particular for transport infrastructure. But this did not happen. It seems that receiving this status gave nothing to the towns themselves, or the organizations working in them.

Nevertheless, in the spring of 2015 the Federal Law was passed "On amendments to the Federal Law 'On the status of science town of the Russian Federation' and the Federal Law 'On science and state scientific-technical policy". As Kommersant newspaper reports, the new law establishes a new approach. Now a science town is not just a territory on which a large number of scientific and educational establishments are located. Science should become the basis for the socio-economic development of the territory, ensure the development of innovative business, attract additional investments to the development of science-intensive industry. It is proposed that the creation of special territories with special authorized bodies of local self-administration will also be reflected in the new law on science.

4.5.4. Telecommunications

In 2014, surveyed companies spent an average of 2.4% of all expenses on telecommunications services. This is less than in the previous year (in 2013 these expenses came to 3.2%). This figure changed insignificantly in previous years. On the survey that analyzed 2014, the method for determining the average percentage of expenses on telecommunications services changed. So a comparison with previous years should take this change into account. Nevertheless, we may assume that a reduction in expenses on telecom continued. For all companies surveyed in 2015, the share of expenses on telecommunications came to 1.7% from all company expenses. If we exclude data on the largest company in the survey, this share increased to 3.5%. For companies with a turnover below $20 million, the share of expenses on telecommunications services is higher – 4.7%.

In 2016 the average figure for all companies surveyed was 3.3%. For companies with a turnover below $1 million it was 5.5% with a deviation from 0.5% to 30%, for companies with a turnover from $1-5 million, 4.7% (deviation from 0.3% to 20%), companies with a turnover above $5 million, 3% (deviation from 0.2% to 5%).

Thus, observations for several years show that on average software companies spend 3-4% of their expenditure on telecommunication services. The deviation is very large, and it cannot be said that for the majority of companies the share of these expenses is close to 3-4%. Evidently, the larger the company, the lower the share of telecommunications services in general expenses.

A gradual reduction of the percentage of these expenses is probably taking place. Revenue of companies and their budgets in dollar terms over the last 2 years either increased or dropper to a lower degree than dollar prices for telecommunications services (they have also barely increased in rubles). Additionally, technologies are being introduced in Russia which will make it possible to reduce expenses on communications. The universal transition to IP telephony, which is becoming an alternative not only to traditional wire telephony, but wireless. 3G and 4G networks have covered almost all major cities of Russia.

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According to the rankings of OpenSignal, Russia held 23rd place in the world by speed of data download to mobile devices with fourth generation LTE technology. It holds the same place in coverage of the country by according cellular networks. A total of 29 countries are on the list, in which the USA and Japan are lower than Russia.

Reports on the development of the telecommunications of infrastructure in Russia have become fewer, but not because there is no development, but with the availability of all basic communications services to the majority of companies, serious breakthroughs are no longer possible. As part of realization of the 'Digital economy" program, it is proposed to build Wi-Fi and 5G networks in large cities. It is planned to launch equipment for 5G and a new standard of gigabyte Wi-Fi – 802.11ax.

4.6. Situation in the sphere of protecting intellectual property rights

In recent years respondents who do not see changes over the past 2 years in the sphere of protecting intellectual property rights has remained stable at a level of 80%. Indeed, some significant changes in the sphere took place in the active battle against piracy 7-8 years ago. Nevertheless, these changes do exist. In particular, legislation changes, in which the concept of "website" as an object of protection recently appeared. Additionally, in mid-2013 a court on intellectual rights began working. Experts refrain from drawing conclusions as to how it influences protection of intellectual property rights. They advise registering rights to intellectual property, using numerous mechanisms for this, while admitting that their advice is not given much heed.

According to the BSA association, in Russia for the first time since observations began, the level of use of pirated software has risen. In 2015 it reached 64%, 2% higher than in 2013, when the last such study was conducted. The authors of the report believe that the fall of the ruble led to an increase in the cost of imported software, and a drop in the disposable income of Russian software users, creating a favorable environment for using unlicensed program products. However, we may say that the level of piracy has stayed at the previous level, and fluctuations of 2% can be partly explained by accidental factors and a margin of error.

According to NP PPP, a drop in the number of criminal cases involving violation of authors' rights to software has dropped. The number of crimes under article 146 of the Russian criminal code (violation of authors' and mixed rights) committed towards participants of NP PPP in 2013 was 1772, in 2014 1211 and in 2015 1070. Law-enforcement bodies increasingly apply fines as a punishment, the sums of which are constantly growing.

The management of the Federal institution of industrial property believes that the widespread opinion that Russian legislation is incapable of protecting authors' rights in the field of industry and high technology at a modern level is mistaken. The legislative base fully corresponds to international requirements in this sphere, although there are problems of applying it in practice. According to the FIIP, in recent years a stable growth in the number of submitted and approved application for registration of authors' rights has been observed, and for every 100 programs there are 10 databases and one topology. The peak of submitted applications took place in 2014 (over 1600), after which a small drop was recorded, which can probably be explained by a worsening of the general economic situation in the country.

On the subject of piracy, the battle against it is continuing with about the same intensity as in the previous few years. We should remember that the level of unlicensed software used, according to BSA methods, only shows that a user has uninstalled software, but not whether the user uses the software or not. In many cases, instead of unlicensed software, users use the function that exists in alternative cheaper or even free solutions (freeware).

Evidently, the subsequent battle with piracy with the existing methods can no longer increase sales of BSA members in Russia – the alliance that unites the largest software companies in the world.

At present, by the level of piracy in the IT sphere, Russia is in about the middle of the world rankings, along with countries of Eastern Europe. Evidently, new swift and significant progress in this sphere is impossible.

The Russian government will have to think about how better to protect rights of intellectual property of Russian developers, and not just inside Russia, but also on the world market. Current political circumstances make it necessary to devote particular attention to this problem. Russian companies so far rarely face patent trolls (only one case of according legal disputes of the company ABBYY in the USA is known). But as the foreign business of Russian software developers grows, interest in it from structures which exploit the shortcomings of the system for protecting intellectual property (above all in the USA) will increase.

We may assume that work on ensuring rights of intellectual property is being carried out, but it is not very noticeable. So it is probably no coincidence that in 2016 there was an increase in the share of respondents who saw improvements in this sphere in the last 2 years – from 13% to 18%. The 2017 survey showed that fewer companies see improvements. At the same time, only 1% indicated a worsening, while a year ago this share was 6%.

The average assessment of the situation in the 2016 survey was higher among developers of program products for whom protection of rights of intellectual property was especially important. They assessed changes in this sphere at 3.14 (on a five-point scale), and service companies at 3.09. In 2017 the situation was the opposite – service companies at 3.16, and product companies at 3.1.

The dependence on the assessment of changes on the size of the company also changed. If in 2016 large and medium (with a turnover above $5 million) had a higher average assessment point of the situation on the protection of authors' rights (3.19), and for smaller companies this point was 3.05m in 2017 it was 3,04 and 3.16 respectively.

Evidently, these fluctuations are accidental. The vast majority of companies with any business model and any size do not see any changes, which is quite logical.

Assessment of changes over the last 2 years in the sphere of protection of rights of intellectual property

	2008 survey	2009 survey	2010 survey	2011 survey	2012 survey	2013 survey	2014 survey	2015 survey	2016 survey	2017 survey
Worsened	7%	0%	6%	6%	2%	1%	1%	5%	6%	1%
No change	46%	59%	72%	79%	80%	80%	86%	82%	76%	84%
Improved	47%	41%	22%	16%	18%	19%	13%	13%	18%	15%

In summer 2016, the Russian government determined the procedure for subsidizing foreign patents of new developments in Russia. Prime Minister Dmitry Medvedev signed a decree determining the procedure for providing subsidies to support patenting of Russian developments abroad. Subsidies will be provided to Russian organizations which provide services to national manufacturers and exporters on foreign patenting of inventions and useful models. Subsidies should help many Russian developers, who would like to patent their inventions, but do not have sufficient funds.

Practical measures to apply this regulation are entrusted to the Russian Export Center. The provision of these subsidies in 2016-2017 did not prove very effective because of the complex procedure of application and reporting, and also the low sum of subsidies

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compared to the cost of patenting in the USA. So at present these regulations are being elaborated, to raise the sum of subsidies and simplify the procedure of receiving them. Preliminary results may be seen in one to two years.

4.7. State support of international marketing activity

In past years we could say that there was as yet no regular and significant state support of international marketing activity in Russia in the high technology sphere. At the end of 2017 this judgment is not quite accurate. It is early yet to say that there is regular according support, but it is becoming quite noticeable, although it does not cover a very large group of companies.

It is no coincidence that 10% of companies which replied to this question assessed this support as "good". This is a record indicator for the entire period of surveys. At the same time, 50% of respondents could not give any assessment of state support of international marketing activity. Evidently, they know nothing about it.

In previous years, as part of the Interdepartmental commission on exhibition and fair activity at the Russian Ministry for Commerce and Trade, a budget was allocated to organize Russian displays at major international exhibitions. However, the selection of exhibitions and the organization of them was in the hands of officials, and industry associations were removed from preparing and taking decisions, as is customary in developed and developing countries of the world. This meant that the money allocated to international marketing was used ineffectively. In particular, in 2015 funds were not allocated to supporting the collective involvement of Russian companies in a single major international IT exhibition. So in assessing the condition of activity in Russia, surveyed companies traditionally were most critical towards this area of state support of the IT industry.

At the Petersburg international economic forum in 2015, government officials promised the principle of one window for supporting exporters. On the basis of VEB and the agency of insurance of export credits, the Russian Export Center (REC) was created, designed to realize the function of "one window" to support exporters and remove administrative barriers in the path of export. However, the REC essentially became just an umbrella structure above VEB and ESKAR, continuing to devote attention exclusively to measures of financial support for machine building export. The specifics of export of virtual product, which formally do not pass through customs bodies, was not taken into account in any way.

The situation changed in 2016-2017. First an IT department was opened at the REC, which established ties with software exporters (including potential ones). Then financing of foreign marketing events in the form of business missions took place. A survey was regularly conducted of companies about the exhibitions and conferences that they found most interesting, and the Association of IT business was invited to these events to organize the participation of Russian companies. In 2017, an agreement of cooperation was signed between REC and RUSSOFT, under which RUSSOFT organized a business program for participants of delegations of IT companies in business missions and a number of exhibitions.

In the second half of 2017, with the financial and organizational support of REC with the participation of RUSSOFT, a business mission of Russian IT companies in Indonesia was organized, and then 25 companies took part in GITEX (Gulf Information Technology Exhibition) in Dubai.

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Assessment of state support of international marketing activity

	2008 survey	2009 survey	2010 survey	2011 survey	2012 survey	2013 survey	2014 survey	2015 survey	2016 survey	2017 survey
Poor	75%	59%	62%	79%	71%	67%	60%	49%	58,5%	60%
Satisfactory	25%	36%	35%	20%	27%	30%	35%	44%	37,5%	30%
Good	0%	5%	3%	1%	2%	3%	5%	7%	4%	10%

State support of international marketing activity is slightly better assessed by companies with a turnover below $5 million – the average point in 2017 was 2.54 (2.47 in 2016). For larger companies with greater demands, the average assessment is lower – 2.42 (in 2016 2.39).

Developers of program products assess this support at 2.63 points (in 2016 2.55), and service companies at 2.4.

4.8. Financing of R&D

In 2014, for the first time since the survey was held, respondents were asked to assess the level of state financing of R&D in the IT sphere.

Assessment of state financing of R&D

	2014 survey	2015 survey	2016 survey	2017 survey
poor	41.50%	39%	45%	44%
satisfactory	47%	55%	46%	41%
good	11.5%	6%	9%	15%

Assessment of state financing of R&D among different categories of companies surveyed, average point

	2016 survey	2017 survey
For all surveyed	2.64	2.7
Business model		
Developers of program products	2.59	2.67
Service companies	2.71	2.71
Size of company		
Turnover below $5 million	2.69	2.76
Turnover above $5 million	2.62	2.47
Share of foreign sales		
Above 50%	2.61	2.56
Below 50%	2.66	2.76
Company age		
Above 10 years	2.62	2.6
Below 10 years	2.69	2.8
Location of head office		
Moscow	2.73	2.79
Petersburg	2.44	2.57
All regions	2.69	2.72

The new question was included in the study as the topic of finding sources of financing R&D became especially important in recent years, primarily thanks to the activity of the Skolkovo Foundation.

It suddenly turned out that the state was capable of allocating funds to R&D not only among universities, establishments of the Russian Academy of Sciences, state enterprises and a narrow circle of businesses close to the bureaucracy, but also among a wide range of commercial companies. Several years ago, this phenomenon simply did not exist.

It cannot be said that this financing is sufficient, but it was noticeable. Around 60% of respondents in the 2014-2015 surveys assessed the level and quality of existing financing of R&D from the state as "satisfactory" and "good". However, the average assessment of quality of support from the state in this sphere (2.68 in 2014 and 2.7 a year previously) still differed from the assessment of respondents of other measures of state support for the worse.

In 2016 the level of respondents dissatisfied with financing of R&D increased from 39% to 45%, which was probably linked to the crisis, which led to a drop in this financing, and in 2017 decreased to 1%. From 9 to 15% increased the share of companies which assessed financing of R&D as "good". However, it must be taken into account that this 15% includes companies which answered this question, excluding 45% of respondents which had difficult assessing state financing of R&D.

Companies could receive more money allocated from the budget to scientific research, but are held back from the lack of information about existing possibilities, difficult procedures from receiving grants and existing restrictions for receiving financing.

If we compare the assessments of different categories of companies, it is difficult to say which of them is more satisfied with state financing of R&D, as all have an average point much lower than 3. More problems are faced in receiving money for scientific research by developers of program products, large and medium companies, companies with an export share of over 50%, companies older than 10 years, Petersburg software developers. Evidently, a small number of small young companies (startups) which are focused on the Russian market and located in Moscow (for example, in Skolkovo) receive money from the budget to carry out scientific research.

4.9. Bureaucratic and administrative barriers

In 2014, a considerable improvement was noticed in respondents' assessments on how the problem of bureaucratic and administrative barriers is solved. Above all, the share of respondents dropped drastically who believe that this problem is solved badly – from 57% to 39%. Surveys of 2015-2016 showed that the share of these assessments has barely changed – for three years in a row, around 40% of respondents were unhappy about how the problem of bureaucracy is solved.

If we look at the results of the survey for the past 5-7 years, we can safely assume that this improvement of assessments is unlikely to be a coincidence. Without sufficiently effective work by officials, it would be simply impossible for the mass accreditation of IT companies at the Ministry for Communications and Media, the allocation of grants from the Skolkovo Fund, and receiving the status of resident at state technology parks.

We may note that as in previous years, companies with an export share in turnover above 50% on average assess the Russian bureaucratic system worse than companies focused on the Russian market. However, the indicator for these two groups of companies is gradually leveling out. If in 2014 the average point for them was respectively 2.59 and 2,73, in 2015 it was 2.65 and 2.71, but in 2016 the difference increased again – 2.62 and 2.74. Average assessment for the survey in 2017 showed almost no change and still show the need for all interested participants to continue working on removing them.

It was not possible to detect any regular and explicable differences of assessments of the level of administrative barriers for companies of different sizes. The same applies to the influence of the location of respondents (taking into account the large number of participants of the survey from St. Petersburg, we can say that the lowest assessment of the bureaucratic system from Petersburg companies has foundations). Average assessments vary from year to year too greatly, which cannot correspond to real changes involving a solution to the problem of bureaucratic and administrative barriers. Evidently, in replying to the question on administrative barriers, respondents are particularly prone to the influence of emotions and unverified information.

With the existing gradual improvement in solving the problem of bureaucratic barriers, the average point may be negatively affected by the increase in the number of companies which have attempted to receive state support.

Assessment of the influence of bureaucratic and administrative barriers on companies' activity

	Poor	Satisfactory	Good
2010 survey	65%	29%	6%
2011 survey	71%	24%	5%
2012 survey	57%	39%	4%
2013 survey	57%	41%	2%
2014 survey	39%	53%	8%
2015 survey	41%	48%	11%
2016 survey	40%	49%	11%
2017 survey	40.5%	52%	7,5%

For this reason, they have had to deal with officials and complex procedures that are unclear for business for the first time. Without support programs, these companies may have had no reason for a critical attitude to the work of state structures. From the results of the study, we may conclude that over the last 5-7 years, in solving the problem of bureaucratic and administrative barriers, clear positive changes have taken place. Progress has probably taken place in the last 3-4 years as well, but was relatively small and accompanied by the appearance of new barriers, and so was not clearly reflected in the assessments of respondents.

4.10. Financial support of startups

Assessment of financial support of startups

	Bad	Satisfactory	Good
2014 survey	36%	49%	15%
2015 survey	10%	56%	34%
2016 survey	39%	43%	18%
2017 survey	38%	39%	23%

The significant reduction of the ventures market in 2015 was reflected in assessment of respondents on financial support of startups in 2016: the share of dissatisfied assessment grew drastically – from 10% to 39%. The 2017 survey reflected small improvements.

Assessment of financial support of startups for different categories of surveyed companies, average point

	2017 survey
For all surveyed companies	2.85
Business model	
Developers of program products	2.89
Service companies	2.81
Company size	
Turnover below $5 million	3
Turnover above $5 million	2.81
Share of foreign sales	
Above 50%	2.94
Below 50%	2.8
Age of company	
Older than 10 years	2.8
Younger than 10 years	2.89
Location of head office	
Moscow	2.94
Petersburg	2.86
Siberia	2.88
Urals	2.78
Other regions	2.78

The entire ventures market in 2016 continued to shrink, but the rates of its reduction were less than in the previous year. At the same time, investments in the software industry increased.

This situation led to a very large share of surveyed companies (44%) having difficulty in how startups are financially supported.

Fewer problems with financial support of startups are seen by companies in Moscow with a share of export above 50% in turnover, developers of program products, and small companies with a turnover below $5 million. Thus we may say that Moscow startups with their program products are focused on work on the global market, and have access to the funds required for this. In Petersburg and the regions there are more problems in receiving funds for startups.

More detail about the ventures market of Russia can be found in Chapter 3.

4.11. Influence of external factors on doing business in Russia

Thanks to the additional question that was introduced in 2015, it was possible to find out how such external factors influence companies as the economic crisis in Russia, western sanctions against Russia and responsive anti-sanctions, and the devaluation of the ruble in relation to the dollar and Euro.

In the survey respondents had to choose an option from -3 (very negative influence) to +3 (very positive influence). Zero indicated no influence at all.

In 2015 it was found that external factors did not have any influence, or had a negative influence, on the vast majority of companies surveyed.

The 2016 survey showed that the negative influence of external factors has increased. The average point on three factors which also existed a year ago reached -0.44 (on four factors – 0.42). The influence of the economic crisis became more noticeable (if in 2015 the average assessment of its influence was -0.5, in 2016 it was -0.95, and the influence of western sanctions was less significant (-0.4 and 0.27 respectively).

The significance of devaluation remained at a level of almost zero (-0.09 instead of -0.1), but this is only the average indicator for all surveyed companies. For some companies focused more on foreign markets, the influence was very positive, but for others for which the majority of revenue comes from the domestic market, it was negative. As it is mainly large companies that have a large share of export, we may assume that the positive influence of devaluation for the entire IT industry outweighs the negative one.

In 2017, the situation changed, and new formulations of external factors were included in the questionnaire. From the questionnaire of the previous year, the factor "Western sanctions against Russia" was retained. Although its formulation changed somewhat ("responsive sanctions: were excluded), a comparison can still be made. If in 2016 the influence of this factor was assessed at -0.27 (i.e. negative but insignificant), in 2017 the significance of sanctions was higher (-0.66). For 22% of surveyed companies they are a serious problem.

About the same number of respondents (19%) noted a negative or very negative influence of the anti-Russian mood of western media.

For all the heated debates and discussions of preferences for Russian companies as part of import phase-out, the factor of "Ban on use of foreign software with an equivalent in the register of Russian software" only had a positive and very positive influence for 12% of surveyed companies. This is not very many. Especially as a comparable number called this factor negative and very negative – 8%. The import phase-out process is underway, but largely thanks to other factors – requirements of a regulator on information safety and technology independence and the price increase of imported software compared to Russian equivalents since the devaluation of the ruble.

We should note significant deviations in the assessment of the effect of the law prohibiting state structures to purchase imported software between product and service companies, and also between companies focused on the Russian market and primary exporters. Product companies and companies focused on the Russian market highly assess this law and the creation of the Register of Russian software, while service companies and companies primarily focused on export believe this measure has a negative effect.

The effectiveness of the work of REC was assessed by respondents in spring 2017 as not being very high. However, it should be admitted that the REC launched support of IT export only in 2017. At the same time, the first successful measures with the involvement of Russian software companies were carried out after the survey was conducted. So the fact that 14% of respondents positively assessed the work of REC may be called a good indicator. It should clearly increase from the next survey of respondents next year.

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Assessment of influence of external factors, share of surveyed companies

	Bans on using foreign software with equivalent on register of Russian software	Western sanctions against Russia	Stimulation of software export (in particular the work of the REC – Russian export center)	Negative attitude to Russia in western media
Very negative	5%	8%	1%	7%
Negative	3%	14%	1%	12%
Negative, but insignificant influence	4%	20%	1%	11%
No impact	59%	48%	68%	63%
Positive, but insignificant influence	9%	3%	9%	1%
Positive	10%	3%	5%	0%
Very positive	2%	0%	0%	0%
Difficult to say	9%	4%	16%	6%
Average point	0.12	-0.66	0.13	-0.58

Average assessment of influence of external factors on companies of different categories (average point)

	Bans on using foreign software with equivalent on register of Russian software	Western sanctions against Russia	Stimulation of software export (in particular the work of the REC – Russian export center)	Negative attitude to Russia in western media	Average point on all 4 factors
All surveyed companies	0.12	-0.66	0.13	-0.58	-0.25
Company size					
Companies with turnover above $5 million	0.07	-1.11	0.11	-0.93	-0.46
Companies with turnover below $5 million	0.13	-0.55	0.13	-0.50	-0.2
Business model					
Developers of program products	0.43	-0.52	0.28	-0.64	-0.11
Service companies	-0.01	-0.72	0.05	-0.49	-0.29
Export shares					
Companies with export share below 50%	0.21	-0.61	0.22	-0.47	-0.16
Companies with export share above 50%	-0.06	-0.75	-0.07	-0.80	-0.42

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The most negative influence of all the external factors is felt by large companies, developers of custom software and companies which are more focused on foreign markets than the Russian market. Sanctions and the negative attitude towards Russia and Russian companies from western media affects them to a much greater degree than small product companies mainly working in Russia.

4.12. Importance of measures of state support

In order to understand better how the IT business arranges priorities that should be possessed by state structures responsible for the development of the high technology sector of the economy, in the 2015 survey a question was added to the survey about the importance of certain measures of state support for software companies.

The results of the survey confirmed the hypothesis that for the vast majority of software developers, "Provision of tax privileges" (including privileges on insurance payments) had special importance. Other measures of support have much lower assessments. The REC, which supports export of different industries, notes a certain passivity of software companies, whose position is characterized by the following words: "The privileges have been kept. Thanks! We don't need anything more". According to representatives of the REC, companies of other industries are more demanding of the state and more active.

Significance of main measures of state support (2017 survey)

	Provision of tax privileges (including privileges on insurance payments)	Support of international marketing activity	Stimulating export of software	Financing of R&D	Support of certification of quality control under international standards	Development of necessary infrastructure for business	Removal of bureaucratic and administrative barriers
No significance (0 points)	3%	19%	14%	15%	16%	7%	5%
Low significance (1)	4%	16%	14%	20%	22%	7%	8%
Medium significance (2)	22%	26%	26%	20%	19%	32%	32%
High significance (3)	64%	22%	34%	28%	15%	39%	42%
Difficult to say	7%	17%	13%	17%	27%	15%	13%
Average point (2017)	2.4	1.34	1.68	1.44	1.05	1.88	1.98
Average point (2016)	2,3	1,5	1,9	1,7	1,1	1,8	2,1

We may assume that the position of software companies will change as the state accumulates experience. In any case, the importance of such measures as "Support of

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international marketing activity", "Stimulating export software" and "Financing R&D" for them significantly increased over a year.

The second most important thing, after extending privileges on insurance payments, is "Removing bureaucratic and administrative barriers". This shows that these barriers exist in the minds of surveyed companies, although we may assume that the actual opinion on the existence of the barriers does not quite correspond to the real situation. Especially as in previous years this problem was indicated by companies which must not constantly overcome any bureaucratic obstacles, and their ideas were based on existing stereotypes. For product companies in comparison with service companies, "financing of R&D" is more important, "Support of certification of quality control under international standards" and "Support of international marketing activity", while service companies have greater need of "Development of infrastructure necessary for business".

Importance of main measures of state support for companies of different categories in 2017(2016) (average point)

	Provision of tax privileges (including privileges on insurance payments)	Support of interna-tional marketing activity	Stimulating export of software	Financing of R&D	Support of certification of quality control under interna-tional standards	Develop-ment of necessary infra-structure for business	Removal of bureaucratic and administra-tive barriers
Company size							
Companies with turnover above $5 million	2.7 (2.4)	1.6 (1.6)	1.7 (2.1)	1.6 (1.7)	1.3 (1.3)	2.2 (1.7)	2.4 (2.1)
Companies with turnover below $5 million	2.6 (2.3)	1.6 (1.5)	2.0 (1.8)	1.8 (1.7)	1.5 (1.0)	2.3 (2.0)	2.3 (2.3)
Business model							
Developers of program products	2.7 (2.2)	1.8 (1.4)	2.0 (1.8)	2.0 (1.9)	1.7 (1.3)	2.0 (1.8)	2.2 (2.0)
Service companies	2.6 (2.3)	1.5 (1.6)	1.9 (1.9)	1.6 (1.5)	1.4 (1.0)	2.3 (1.9)	2.3 (2.2)
Export share							
Companies with export share below 50%	2.6 (2.1)	1.5 (1.5)	1.8 (1.8)	1.7 (1.7)	1.5 (1.1)	2.1 (1.7)	2.2 (2.1)
Companies with export share above 50%	2.6 (2.6)	1.7 (1.6)	2.1 (2.1)	1.7 (1.6)	1.4 (1.2)	2.4 (2.0)	2.4 (2.3)

CHAPTER 5.

Geographical Research and Vertical Markets of Russian Software Developer Companies

5.1. The Russian market and global presence

Over half of the sales volume of Russian software companies is accounted for by foreign markets. The share of these markets in the total turnover was calculated by two methods. Both of these methods are based on the results of a survey conducted by RUSSOFT as part of its own annual study, and on a collection of data for major companies which did not take part in the survey. In the first case, the calculation was made from the share of foreign sales indicated by respondents (accordingly, remaining sales are accounted for by the Russian market), and in the second by the importance that they attached to a certain market. The share of Russian sales received by these two methods in total turnover differs considerably – 37% and 54% - which reflects the different structure and focus of the question.

The first method, in which the result was 37%, should be more precise, as it asked the respondents to give a precise quantitative indicator. The second method (54%) is based on giving the quantitative indicator a qualitative assessment of importance of a certain market for respondent companies. If a certain market was called a key one in 2016, it was assessed at 3 points, but if only individual projects were realized on it, then it was assessed at 1 point. This conversion of qualitative assessments to quantitative ones may give very approximate guidelines of the share of joint sales that were accounted for by a certain market. An undoubted merit of the second method is that it makes it possible at least approximately to assesses in figures the significance of different markets, while the first method is limited to a comparison of the sales volume for the year in Russia and total sales abroad in general (without any separation of them).

The two methods for determining the share of sales in Russia gives quite definite boundaries – the indicator is definitely located between 37% and 54%. As the precision of calculation in the second case is considerably lower than in the first, we may narrow the interval to 40-45%. Accordingly, sales on the domestic market account for less than half of the total turnover of Russian software companies. Thanks to the two methods of calculation and other information we possess, we may determine the dynamic quite precisely – the direction in which this indicator is changing.

Evidently, after the reduction in the preceding two years, the share of software sales and development services increased in Russia in 2016. The growth is not very large, but is confirmed by the two methods of calculations. According to the first method, it increased from 35% to 37%, and according to the second (according to responses by respondents on the significance of different markets), from 51% to 54%. Additionally, the last survey showed that for 2016 sales on the domestic market increased more than sales abroad. However, there are no grounds to say that companies are deliberately reorienting themselves towards the domestic market. They only partially restored the sales volumes (in USD) which they had before the crisis. This took place as a result of the stabilization of the economic situation in Russia and because of the reduction in the share of sales of foreign companies, or the growth of those segments in which Russian developers dominate (which is connected with import replacement – both brought about by state policy, and by the increased prices on import from the devaluation of the national currency in 2014-2015).

Share of sales in Russia in the total turnover of Russian software companies (calculated according to the indicated share of foreign sales)

2013	2014	2015	2016
51%	50%	35%	37%

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Share of sales of software and development services in Russia in the total turnover of software companies for 2016 increased. However, this growth does not show a conscious reorientation towards the domestic market.

Despite the increase in the share of sales on the domestic market in total turnover, software companies, on the contrary, strive to enter foreign markets or expand their presence there.

This aspiration is shown clearly by the results of the study "Prospects of Russian IT developers on the global market" which was conducted in 2016 on the initiative of the SAP corporation. Unlike the annual large-scale study by RUSSOFT, in which a wide range of problems of the software industry in Russia was examined, the SAP initiative was directed towards a deeper study of prospects and aspirations of Russian software companies to promote their solutions and services on corporate markets abroad. These two studies supplement each other and in many ways intersect (there is mutual adoption of initial data and conclusions).

The main conclusion of the study "Prospects of Russian IT developers on the global market": The vast majority of Russian software companies working on the B2B market show the desire to work actively on foreign markets or to expand their presence there, if this work is already being carried out. At the same time, Russian companies have a good chance of making a breakthrough, although a great deal more needs to be done for this.

It is noteworthy that only 28% of the total revenue of participants in the survey held as part of the study "Prospects of Russian IT developers on the global market" is accounted for by sales abroad. Thus, around 70% of the turnover is accounted for by the domestic market. The significant difference from the data indicated above for the entire industry (37% and 54%) is connected with the fact that in the corresponding survey, major and medium companies virtually did not take part (their opinion and assessments were received from in-depth interviews). It is much harder for small companies to work abroad. So the share of foreign sales in their turnover is on average much lower than for the industry as a whole. This is also confirmed by the annual survey by RUSSOFT, according to which companies with a turnover of up to $5 million receive on average 60-70% of their revenue from sales in Russia (according to the latest survey – 61%, but in previous years this figure was consistently around 70%).

Although respondent companies in the SAP study mainly work in Russia, they showed their aspiration to enter foreign markets and consolidate their presence there. The results of this survey made it possible to make the following conclusions:

1. Around 10-15% of Russian software developer companies are not yet prepared for international expansion. They either create solutions for the Russian market, or work abroad with a narrow circle of clients, which they do not intend to expand. Accordingly, 85%-90% of companies see their expansion abroad as a possible strategy of development in future. At present, not more than 60% of Russian software companies work on foreign markets, around half of which do not develop their own program products, but provide services to develop custom software.

2. 74% of respondents are in the process of creating export products, and 65% not only indicated the existence of such developments, but also gave brief descriptions of them.

3. Of the companies whose sales were previously limited to Russia and countries of the post-Soviet sphere, 12% plan to enter foreign markets for the first time in 2017, and 14% in 2018.

4. Forecasts of leading world analytical centers show that in coming years on the world market high-tech solutions will be in particular demand, which require a high level of physico-mathematical training of developers, and this is the main advantage of Russian specialists. The results of this survey confirm that Russian software developing companies specialize above all in searching for solutions in the most specific segments of world software ("big data", artificial intellect, computer vision, machine learning etc.). In

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many cases they are oriented towards the global market from the beginning. Only in 60% of cases, export oriented developments coincide with developments for the Russian market, and in 40% of cases companies create software that is originally oriented towards the foreign market.

Results of recent surveys by RUSSOFT as part of their own annual study also show that companies look more frequently to prospects abroad than on possibilities on the domestic market. According to the latest survey conducted in spring 2017, "Work on export/expansion of the marketing network abroad" is the priority task for 34% of companies, and "More active work on the domestic market" for 33%. A year earlier these figures were 41% and 36% respectively. At the same time, it should be remembered that in 2016 companies significantly increased sales on the domestic market, and at the time of the survey it seemed likely that this growth would continue in 2017.

We should recognize that the growing Russian market must also not be ignored. Especially as small companies realize that however much they would like to do so, carrying out international expansion will be very laborious. Real possibilities to increase sales in the near future are only linked with the domestic market, in which the post-Soviet region is usually also included.

The respondent companies for which foreign sales account for not more than 25% of revenue (which means in the vast majority of cases that they only work in Russia and the post-Soviet area) name "Working for export/expanding the marketing network abroad" as their "priority task" in 20% of cases, and as "one of the tasks" in 54%. The task "More active work on the domestic market" for these companies naturally has great importance (a "priority" for 45% and "one of the tasks" for 85%). However, it is notable that a considerable percentage of these companies seriously examine prospects for working abroad.

Thus, there are grounds to expect a constant increase in the share of foreign sales in the total revenue of Russian software companies in coming years. The corresponding mood of companies and the state support shown for international marketing activity should ensure the growth of this share. Perhaps this increase will not take place for year-end 2017, or initially it will be very small, but it will take place only if there is a significant increase in the domestic market (this short-term growth is possible after the enormous contraction that took place in 2014-2015).

5.2. Distribution of sales by macro-regions of the world market

For year-end 2015, we received data on the sales of Russian software companies in different macro-regions of the world for the first time. However, in the previous comparable report this data was not included, as calculations were made after it was prepared. In previous years the significance of individual regions of the global market was only assessed by the number of respondent companies which indicated their presence in a certain macro-region.

The calculations of shares of markets in cash expression, as was stated above, have a large margin of error. Nevertheless, we can get a general idea about the significance of certain markets and see the change in this significance, if other information exists to check these calculation

The precision of calculations is increased in the process of aggregating indicators – for example by bringing together all markets of western countries, countries of the post-Soviet region and all new markets for Russian companies. Additionally, more precise data has been received for medium and small companies, as calculations for them were only made on the basis of data of the survey; Especially as in the last survey 130 companies with a turnover of less than $20 million took part, and this is quite a respectable selection to judge the general total.

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For larger companies, there is almost no reliable data for sales on a certain market. Accordingly, we had to make approximate assessments of the activity shown by these companies on various markets.

Distribution of sales of Russian software companies by macro-regions of the global market (calculation by assessment of significance of specific markets)

	Approximate volume of sales, million $	Percentage of sales in total turnover
Russia	6630	54.1%
Belarus	166	1.4%
Ukraine	216	1.8%
Other countries of the former USSR	461	3.8%
USA or Canada	1580	12.9%
Germany and German-speaking countries	826	6.7%
Scandinavia and Finland	299	2.5%
Other countries of Western Europe	791	6.5%
Countries of Central and Eastern Europe	285	2.3%
Southeast Asia	493	4.0%
South and Central America	153	1.3%
Africa	98	0.8%
Australia	141	1.2%
Countries of the Middle East	106	0.9%
Total	12246	100%

Distribution of sales of small and medium Russian software companies (turnover not exceeding 20$ million) in macro-regions of the Global market

	Share of sales in total turnover
Russia	60.4%
Belarus	2.0%
Ukraine	1.9%
Other countries of the former USSR	4.6%
USA or Canada	10.9%
Germany and German-speaking countries	4.2%
Scandinavia and Finland	3.3%
Other countries of Western Europe	5.4%
Countries of Central and Eastern Europe	2.1%
Southeast Asia	2.3%
South and Central America	0.5%
Africa	0.6%
Australia	1.0%
Countries of the Middle East	0.9%
Total	100%

Russian software respondent companies are present on average in 3-4 geographical markets (the last survey showed an average figure of 3.42, and the 2016 survey 3.6). At the same time, the average number of key markets increased over 2 years from 1.5 to 1.87. Accordingly, we may assume that software developers have begun to concentrate on certain geographical areas. The companies indicated all 14 markets as key ones, which the global market is divided into by geographical, language and culture features. One year previously, 3 macro-regions were not mentioned as being key ones by any respondent. This change is a sign that Russian developers are increasingly interested in markets which were not previously traditional for them.

Historically traditional markets for Russian developers are Europe and North America, and also the market of Russia and post-Soviet countries. Entrance into markets of economically developed countries took place thanks to numerous former compatriots

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who moved en masse during the perestroika years to countries with a higher standard of living. Large-scale migration to these countries from the post-Soviet region took place especially in the 1990s.

The countries of the post-Soviet area (former USSR republics) are often considered by Russian developers to be the domestic market, as this market was well-known to them, and clients and customers know Russian well.

Service companies were initially oriented exclusively towards the developed markets of the USA and Europe, as in Russia and neighboring countries there were no solvent clients. However, the situation gradually changed, and having gained serious experience of working for foreign clients, companies began to take part in major projects on the domestic market and in CIS countries.

If we look at how the significance of certain markets has changed since 2007, we can see that the share of all foreign markets dropped in some years, and increased in others, but on the whole there is a decreasing tendency, with an increase in activity on the markets of countries formed after the collapse of the USSR. This reflected the real reorientation of Russian companies towards markets of Russia and ex-Soviet countries, which have become more attractive in recent years.

However, this is only partially true. The fact is that in recent years the amount of new software companies has increased drastically (primarily product companies), which usually began their activity in Russia and CIS countries. The total number of Russian software companies present on foreign markets did not decrease during this time, but increased. Just like after the crisis of 2009, with the contraction of the domestic market and the factor of the devaluation of the ruble, from 2014 Russian IT companies became active on developed markets – in the USA and Western Europe.

From 2007, the percentage of respondent companies working on the American market began to decrease. This mainly concerned small companies (although large companies also reduced their activity in the USA somewhat). In 2013-2014, interest in the American market was revived, but in 2015 because of geopolitical risks this interest dropped once more and was only a little higher than in 2012. We should not try to draw a clear-cut conclusion about the long-term drop of interest of Russian IT companies in the American market, because firstly this market is the largest in the world, and it would be unwise to reject it, and secondly this market is the most competitive, and so it will call for hi-tech solutions regardless of the political climate and geography of vendors.

Calculations show that the percentage of the macro-region "USA and Canada" in total sales of Russian companies over the last 3 years has dropped significantly – from 20.4% to 12.9%. However, other data does not confirm such a great loss of interest in this market. The share of companies present on this market shows an insignificant change (there is even a small increase from 36% to 37%). This market was key in 2016 for 25% of respondent companies, and in the year previously for 21%. Additionally, 9% of companies plan to enter the American market in coming years, and a year previously this figure was 8%. Nevertheless, the percentage of the macro-region "USA and Canada" probably dropped, but not so significantly. At the same time, in absolute figures (in dollars) a growth in sales volumes could be seen.

A drop in the percentage of the market "USA and Canada" in the total volume of foreign sales is quite probable, because we may confidently say there is a growth in Russia's share on new markets for Russian companies (Southeast Asia, South and Central America, Africa, Middle East countries, Australia). It should also be remembered that an increase or decrease of the figure for the year does not yet show any tendency, even if the calculations are made precisely. A tendency can only be detected by analyzing data for several years (sometimes for 5-10 years).

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Change in distribution of sales of Russian software companies by macro-regions on the global market in 2015-2016

	2015	2016
Russia	51.1%	54.1%
Belorussia	0.6%	1.4%
Ukraine	1.5%	1.8%
Other countries of the former USSR	5.7%	3.8%
USA or Canada	20.4%	12.9%
Germany and German-speaking countries	6.0%	6.7%
Scandinavia and Finland	1.5%	2.5%
Other countries of Western Europe	5.0%	6.5%
Countries of Central and Eastern Europe	1.5%	2.3%
South and East Asia	3.9%	4.0%
South and Central America	1.0%	1.3%
Africa	0.4%	0.8%
Australia	0.6%	1.2%
Countries of the Middle East	0.6%	0.9%

Presence of Russian companies on world markets, % of respondent companies

	2007	2013	2014	2015	2016	Planned to enter the given market for the first time in 2016-2017 (2016 survey)	Plan to enter the given market for the first time in 2017-2018 (2017 survey)
Russia	55%	93%	94%	92%	87%	2%	3%
USA and Canada	55%	41%	48%	36%	37%	8%	9%
Ukraine	17%	39%	30%	32%	25%	2%	3%
Other countries of Western Europe	35%	34%	37%	32%	30%	13%	14%
Other countries of the former USSR	39%	31%	45%	40%	42%	6%	5%
Belorussia	32%	33%	27%	33%	28%	6%	8%
Germany	25%	22%	24%	27%	19%	12%	12%
Scandinavia (with Finland)	28%	17%	17%	18%	16%	5%	7%
South and East Asia	19%	8%	12%	15%	13%	12%	8%
Countries of Central and Eastern Europe	-	-	-	-	16%	-	9%
Australia, Africa, South America	25%	14%	12%	-	-	-	-
South and Central America	-	-	-	8%	8%	6%	5%
Africa	-	-	-	9%	7%	2%	2%
Australia	-	-	-	8%	10%	4%	5%
Middle East	-	8%	6%	9%	11%	7%	10%

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If we compare the presence of companies on foreign markets in 2017 and 2016, it will be clear that there has been a reduction in the share of markets of the western world. This is taking place gradually, with fluctuations going up and down in individual years, but this tendency can still be observed. This slow reduction in the share will probably continue in future years, as Russian companies clearly have a growing interest in new markets. However, it may also not take place slowly if a worsening in political relations means that geopolitics hinder Russian companies from working in the USA and countries which are considered to be America's allies. These hindrances are already being created by bodies of power and foreign media, which sometime tries to discredit Russian companies (especially those which work in the sphere of information security).

Key markets, % of respondent companies

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

The grouping of markets makes it possible to increase precision. Accordingly, we can confidently say that there is a growth in the share of "Russia and other countries of the former USSR" and "New markets", and a reduction in the share of the "Western World". Especially as during the study respondents provided us with other information which confirmed these changes (significant increase in sales on the domestic market and a growth in the amount of news about activity on the new markets).

If we examine sales only in foreign countries, we get the following picture: 46% of sales of Russian software companies come from the USA and the EU, and 6-7% - from the developing World.
This ratio does not correspond to the geographical structure of the world market. If we look at data from Gartner and IDC, the USA and EU account for around 60% of world ICT-expenditure (including communications services). Accordingly, for 40% of the world ICT market only 6-7% of foreign sales are accounted for by Russian software development companies.

This discrepancy conceals a huge potential for increasing foreign sales on developing markets. The last two years show that Russian companies have become more interested in these markets.

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Distribution of sales of Russian software companies by groups of markets

	2015	2016
Russia and post-Soviet area	59.4%	61.1%
Western world	34.7%	32.0%
New markets	5.9%	6,9%

In 2016, the significance of new markets increased, and the significance of the Russian market was partially restored. Sales in western countries still account for around a third of the turnover of Russian software companies, but their percentage significantly dropped.

5.3. The emergence of "problem markets" caused by increasing political tension

In terms of sales, the US market remains in confident second place (after Russia) throughout all the years of our surveying. As we know, for major Russian exporters the shares of sales in the USA in total turnover is often measured in tens of percent, and sometimes reaches 50% and even 80%. Service companies are leaders in dealing with developed markets (the USA and EU), with the share of their segment's companies operating in these markets being almost twice as much as that of the product companies. Nevertheless, for major product companies the US market provides very significance volumes of export turnover. For example, Kaspersky Lab, a major Russian developer of information security solutions, annually earns up to $200 major on the US market.

In the last three years, certain political risks have arisen on traditional markets for Russian developers. This concerns countries of the EU, USA, Canada and Ukraine, where a campaign is being conducted in the media to generate an adverse image of Russia. Government structures are prohibited to purchase Russian software in any form.
Commercial companies are recommended not to acquire Russian software or engage Russian companies to develop software in case this is used to the benefit of the Defense Ministry.
In case of any violation, a penalty follows in a judicial procedure. In autumn 2015 the USA Department of Justice obligated two American companies to pay a multimillion dollar fines for engaging programmers from the Russian Federation to create source codes for U.S. defense systems.

In Ukraine, where the government tries to present the situation in relations with Russia as a state of war, President Pyotr Poroshenko signed an addendum to the decree prohibiting government purchases, applying the ban to several dozen more Russian companies.
However, 2015 saw a significant reduction in the presence of Russian companies only on the USA/Canada market. An outflow from the Ukrainian market was observed in 2014, but in the past year, this process has stalled, judging from a number of symptoms. Approximately a third of the companies we surveyed continue to work in Ukraine (they both supply their solutions and benefit from the skilled local engineering personal). Some new players intend to enter this market in the next two years (around 2% of surveyed companies). In 2014, there were no companies wishing to do so, although the 2015 survey showed that despite all political declarations, it is possible to do business in Ukraine.

The deterioration in the economic situation and devaluation of the hryvna has led to the price/quality ratio of software developers' services in Ukraine becoming even more attractive. And this competitive advantage overcomes barriers connected with anti-Russian rhetoric, criminal risks and the outflow of developers from Ukraine to neighboring European countries.

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Problems with Ukraine are not only connected with the political situation. Its IT market is shrinking rapidly. As a result, the IT market of Belarus, with a population 4 times smaller than Ukraine, is of just as much interest to Russian IT companies as the Ukrainian IT market.

Nevertheless, Russian companies have made significant departures from the Ukrainian market. For example, the company Infowatch, which actively attempts to assimilate new geographical markets, closed its sales office in Ukraine over a year ago. This does not mean that sales have completely stopped, but the importance of the Ukrainian market for Infowatch has clearly dropped.

In the spring of 2017 the U.S. government saw products from Kaspersky Lab as a threat to national infrastructure, on the grounds that former Russian military worked at the company, and that the Russian authorities have access to any information on the territory of their country. An open letter from the head of the company Yevgeny Kaspersky clarifying this issue did not help matters. In mid-summer, the US administration removed Kaspersky Lab from two lists of product suppliers on state contracts for reasons of "government safety on the Internet", and in August 2017 attempts began to force the Russian company out of the non-governmental sector as well. The FBI decided that the solutions of the Russian company are a threat to U.S. national security, even if they are used in the private sector.

Attacks containing very harsh accusations towards Russian IT companies were also made in western media, not only concerning Kaspersky Lab, but other information security companies as well (for example Infowatch).

The tendency for Russian companies to be increasingly forced out of the markets of western countries (primarily the USA) probably has a negative effect on their sales on these markets (growth could possibly be greater than it is now). At the same time, there are so far no grounds to expect a breakthrough and change in attitude to Russia and Russian software companies.

5.4. New markets

The decreasing appeal of a number of traditional markets pushes companies to look more actively for opportunities of sales in Southeast Asia, Latin America, the Middle East and even in Africa. According to the mass media, a number of companies are opening offices and realizing projects in countries which Russian software developers showed almost no interest in just 5-10 years ago (see the selection of news reports below). Russian developers of software products have taken an interest in the markets of Latin American countries, Vietnam, Mongolia, the Philippines, Zimbabwe, Indonesia, Nigeria, South Africa, India, China, Nepal, the United Arab Emirates and other countries.

Unfortunately, the macro-region of "Middle East countries" was not included in the questionnaire until 2013. It became clear that it should have been added earlier, as the market proved to be more significant than markets that had been present on the questionnaire for a long time. 11% of Russian software developer companies are present on the IT market of the Middle East. At the same time, 10% of companies plan to enter the market in the next two years.

8-9 years ago, RUSSOFT advised Russian companies to consider the prospects of new markets, which while smaller than the American and European markets, were sufficiently large and growing fast. These markets are also good because in developing countries, competition is not so strong, and so it is possible to capture a greater market share than in the USA and Western Europe. Additionally, as a rule, these countries show good attitudes to Russia and Russian developers.

A gradual turn towards new markets is taking place. It may only be gradual at present, as entering Asian markets, for example, requires a comprehensive understanding of local

specific features and intricate establishment of contacts. Sales usually appear 3-4 years after promotion starts.

RUSSOFT association assists Russian companies in entering new markets. In 2015, together with RVC it organized a road show in various countries and held webinars, in which managers exchanged work experience on little-studied markets. Over the last year the Russian Export Center (REC) has become active, which engages RUSSOFT and other associations of the IT business, or independently assists the promotion of solutions and services of Russian IT companies, above all on markets of developing countries.

RITE, an affiliated structure of Rostech corporation, tries to use of the promotion channels of its parent company (offices in foreign countries) so that Russian IT companies can start to work in countries which "do not speak American" (i.e. have tense relations with the USA).

By joint efforts, in recent years it has already been possible to change the attitude of Russian IT companies to new markets. It is possible that in several years, a new name will have to be found for these markets, as it will be difficult to call them new and non-traditional any longer. A turn towards these markets is confirmed by the number of news reports in which a certain interest in them is shown by Russian hi-tech developers and state structures. If in 2015-2016 (in the period between the end and start of the next annual study of RUSSOFT), there were 11 of these news reports, in 2016-2017 there were 26. So a breakthrough in this area is quite possible in the years to come.

This is especially likely given that the sanctions policy of the USA authorities undermines trust in American solutions and platforms in many countries, as their leadership fears that American sanctions may be applied to any country without any special reason. For example, in summer 2017 it was learned that Apple was deleting application from the App Store by Iranian developers in connection with the US sanctions against Iran. Previously Apple had asked Iranian IT companies to remove all paid options from applications. The developers obeyed, but this proved insufficient. Thus, Iranian owners of iPhones were deprived of the possibility to download necessary applications which local companies had developed for them.

5.5. Geography of preference of service and product companies

Developers of program products, compared with developers of custom software, are traditionally orientated to a great degree towards the Russian market and markets of former USSR countries. Not all of them have the required marketing budget to work abroad. If the state provided IT companies with support in foreign marketing, the export of Russian product companies could be increased significantly. This especially applies to developing markets, where there is quite a loyal attitude to Russia, but a lack of information about Russian software companies. It should be noted, however, that on the markets of Western Europe and the USA there are also opportunities to increase Russian software export.

Attitude of Russian product and service companies to work abroad

	Service	Product
do not plan to work abroad in 2017-2018	27%	58%
did not work abroad in 2016	36%	54%

If one assesses the presence of companies on foreign markets and plans to work on these markets in the next 2 years, there is almost no difference between product and service companies – only a small number of the former and latter limit themselves exclusively to the Russian market. However, if one looks at foreign markets, service companies have a much greater presence there.

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At the same time, more product companies plan to enter new markets in the next 2 years (more of them were also present on these markets in 2016). At the same time, we should ascertain why the markets of developing countries are of interest to developers of custom software. As we know, new complex project developments in these countries are barely realized. Classic outsourcing companies, as a rule, do not examine the prospects of working on markets at all where the average salary of programmers is lower than in Russia. Perhaps this position is not quite correct, but these companies are so far exclusively oriented towards markets of western countries.

However, far from all service companies are classic outsourcing companies. Many of them are software integrators, and deliver third-party program products and services of elaboration, installation and support. Additionally, they may regard developing countries not as a sales market, but as a labor market.

Presence of Russian product and service companies on world markets, % of respondent companies

	Product			Service		
	Presence in 2015	Presence in 2016	Plan to enter in the next 2 years	Presence in 2015	Presence in 2016	Plan to enter in the next 2 years
Russia	93%	86%	0%	94%	89%	3%
USA and Canada	22%	24%	10%	43%	43%	7%
Ukraine	39%	44%	0%	29%	16%	5%
Other countries of Western Europe	28%	26%	16%	34%	32%	13%
Other countries of the former USSR	54%	66%	4%	34%	31%	6%
Belarus	52%	48%	10%	23%	18%	7%
Germany and German-speaking countries	22%	16%	12%	30%	21%	12%
Scandinavia (with Finland)	9%	12%	8%	24%	19%	6%
South and East Asia	15%	18%	10%	14%	12%	5%
Countries of Central and Eastern Europe	-	22%	12%	-	14%	7%
South and Central America	7%	10%	8%	8%	7%	3%
Africa	11%	12%	4%	7%	4%	2%
Australia	0%	10%	8%	13%	9%	3%
Middle East	7%	12%	8%	10%	9%	12%

5.6. Geographic distribution of marketing and sales offices of Russian companies

Activity on different markets and interest in them from Russian software developing companies is reflected in whether they have marketing and sales offices in Russia and abroad, and also plans to open them. These offices functioned in 2016 for 34% of respondent companies. A year early this figure was 38%. The reduction of this figure is related to a change in the pattern of respondent companies. The percentage of large and medium companies which could afford to open sales offices dropped from 59% to 53%, and the share of companies with a turnover of less than $1 million increased from 41% to 47%. The share of young companies (formed after 2009) also increased considerably – from 17% to 23%.

The change in the pattern of respondent companies was reflected in the share of companies which plan to open sales office in the next 2 years. If there were 34% of them in the 2016 survey, in 2017 there were only 24%. For the total number of respondent companies, this reduction did not take place, and our study shows a growth in the number of companies with sales offices (if we examine not only the respondent companies, but all the software companies in Russia whose data we used in our study). We may note that before 2013 the share of respondents indicating at least one sales office, regardless of any change in the pattern of respondent companies, did not usually exceed 20%.

Presence of sales offices (share of respondents specifying a country or region)

	2011	2015	2016
Anywhere	34%	38%	34%
In Russia	19%	29%	25%
abroad	27%	32%	20%
non-CIS countries	-	21%	14%
in Belarus	2%	7%	3%
in Ukraine	3%	8%	3%
in other CIS countries	6%	8%	7%
in other countries of Western Europe	16%	11%	7%
in Scandinavia and Finland	-	-	1%
in Germany and German-speaking countries	-	-	4%
in countries of Central and Eastern Europe	3%	5%	3%
in the USA and Canada	19%	12%	7%
in Southeast Asia	6%	5%	3%
in South America	3%	2%	1%
in Australia	-	2%	0%
in the Middle East	3%	2%	0%
in Africa	-	0%	0%

Plans to open sales offices by macro-regions (percentage of respondents indicating country or region)

	Planned to open in 2017-2018	Plan for the first time in 2017-2018
in Belarus	4%	8%
in Ukraine	2%	5%
in other CIS countries	5%	7%
in other countries of Western Europe	6%	9%
in Scandinavia and Finland	1%	6%
in Germany and German-speaking countries	5%	9%
in countries of Central and Eastern Europe	2%	6%
the USA and Canada	11%	15%
in South and East Asia	6%	10%
in South America	2.5%	7%
in Australia	2.5%	7%
in the Middle East	3.5%	8%
in Africa	1.5%	6%

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Plans to open sales offices in the next 2 years, % of respondent companies

Anywhere in 2017-2018	Abroad in 2017-2018	Outside the CIS in 2017-2018	None in 2016 and no plans to open any in the next 2 years
24%	18%	14%	57%

If until 2015 inclusive, product companies usually had sales offices abroad, according to the results of the 2016 survey, service companies came close to them in this figure and even overtook them (39% of service and 36% of product companies had foreign offices). Service companies also announce plans to open new offices in the next 2 years more frequently – 37% versus 32% of product companies. The results of the 2017 survey showed that product companies have more sales offices (39% versus 30%). However, in regards to foreign offices, there is hardly any difference between them (20% of product companies have sales offices, and 21% of service companies). This is explained by the fact that as the market recovered after the collapse in 2015, developers of program products began to increase their sales on the domestic market to a greater extent. Service companies continue to orient themselves to a greater extent towards markets of foreign countries.

5.7. Geographical distribution of software development centers

Remote centers of development are established by Russian companies to achieve two goals: either so that developers are closer to the customer and can handle all issues arising with them on a 24/24 and 7/7 basis, or (which happens more often) to receive access to the local human resources on the labor market.

Russian companies usually find required specialists in another city of Russia (30% of respondents reported a development center functioning in Russia in 2016). A year ago, this figure was 36%. The drop in this figure is partially explained by the increase in the percentage of small companies participating in the survey. However, the local labor market has indeed become less attractive. In 2014-2015 the average salary of Russian programmers in dollar terms dropped drastically, but in 2016 it began to increase. At the same time, the number of respondents increased who reported they had development centers outside the former USSR.

Fewer companies announced plans to open new development centers in the next 2 years than in 2016.

Presence of development centers and plans to open them in 2017-2018, percentage of respondent companies

	Has at least one remote development center in Russia or abroad	Plan to open a center in Russia or abroad in the next 2 years	Have a center abroad	Plan to open a center abroad in the next 2 years	Have a center outside the former USSR	Plan to open a center outside the former USSR in the next 2 years
2016 survey	40%	32%	22%	22%	11%	15%
2017 survey	43%	25%	22%	11%	14%	9%

22% of the respondent companies have functioning development centers abroad, 14% outside the former USSR. In the USA/Canada, 3% of respondents have development centers, and 5% in Western Europe. This is a case when development centers are required in order to be closer to the main clients. However, expenses for them are often not much different from equivalent centers in Moscow in Petersburg. In some countries of Western Europe, the average salary of programmers before the crisis was much higher than in Russia, but the higher costs of employees were compensated for by the lower cost of leasing offices. This was the situation when the exchange rate of the dollar was less than ₽40.

In 2014-2015, the average wage in Russia became much lower than in developed countries, and the cost of office lease evened out. Nevertheless, the attractiveness of the USA and Western Europe for opening development centers was high (5-7% of respondents reported in 2016 that they planned to open American and Western European centers in the next 2 years). In many ways, this can be explained by the sanctions and negative attitude towards Russia from western media. It was important for clients to show clients not only a western jurisdiction, but also the presence of a resource in development centers in the USA and the EU.

In 2016 for all macro-regions fewer development centers functioned than a year previously. This can be explained by annual random fluctuations (in the 2017 survey, many more small companies took part than in 2016). For all the years since 2011, only Ukraine remained a stable location for development centers for Russian companies. It is likely that a number of companies closed their development centers in this country in 2014-2015. Nevertheless, 1-2% of respondent companies plan to open development centers there in 2017-2018.

Presence of remote development centers (percentage of respondents specifying a country or region)

	2011	2012	2013	2014	2015	2016
in Russia	28%	24%	34%	32%	36%	33%
in Belarus	7%	8%	11%	7%	6%	5%
in Ukraine	7%	10%	14%	9%	12%	4%
in other CIS countries	3%	6%	12%	4%	7%	5%
in other countries of Western Europe	5%	5%	10%	7%	7%	4%
in Germany and German-speaking countries	-	-	-	-	-	1%
Scandinavia and Finland	-	-	-	-	-	0%
in countries of Central and Eastern Europe	3%	1%	2%	3%	5%	3%
in the USA and Canada	3%	4%	14%	9%	8%	3%
in Southeast Asia	5%	1%	3%	3%	4%	1%
in Africa	0%	0%	2%	1%	1%	0%
in South America	0%	0%	0%	2%	2%	1%
in the Middle East	0%	1%	1%	0%	1%	0%
in Australia	-	-	-	-	1%	0%

If we simultaneously assess the presence of a development center and plans to open them in the next 2 years, the interest in these centers dropped noticeably in relation to Ukraine, the USA and Canada, and also to Southeast Asia.

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Interest in macro-regions as a place for creating development centers (percentage of respondents specifying a country or region)

	Functioning in 2015 or planned to open in 2016-2017 (2016 survey)	Exists or planned to open in 2017-2018 (2017 survey)
in Russia	40%	41%
in Belarus	8%	8%
in Ukraine	12%	6%
in other CIS countries	11%	9%
in other countries of Western Europe	11%	8%
in Germany and German-speaking countries	-	2%
in Scandinavia and Finland	-	1%
in countries of Central and Eastern Europe	7%	4%
in the USA and Canada	12%	5%
in Southeast Asia	7%	2%
in Africa	2%	0%
in South America	3%	1%
in the Middle East	1%	1%
in Australia	1%	0%

Plans to open remote development centers in 2017 and 2018 (percentage of respondents specifying a country or region)

	2017	2018
in Russia	14%	11%
in Belarus	3%	3%
in Ukraine	1%	2%
in other CIS countries	3%	3%
in other countries of Western Europe	0%	3%
in Germany and German-speaking countries	1%	1%
in Scandinavia and Finland	1%	0%
in countries of Central and Eastern Europe	1%	2%
in the USA and Canada	1%	3%
in South and East Asia	1%	1%
in Africa	0%	0%
in South America	1%	1%
in the Middle East	0%	1%
in Australia	0%	0%

43% of respondents have development centers in Russia or abroad. This figure has practically not changed in the last 3 years. It is noteworthy that almost all companies which have foreign development centers also have these centers in Russia.

5.8. Facts relating to the expansion of Russian companies on foreign markets over the last 5-6 years

The amount of news reports that reflects the activity of Russian software companies on foreign markets grows every year. This growth became significant and apparent from around 2013. At the same time, interest was primarily caused by markets which are not yet traditional for Russian software companies.

2015-2016

1. Yota Devices began sales of YotaPhone 2 in China and Latin America. China, according to the plan of Yota Devices, will account for 50% of total sales of the smartphone. By the end of the year, the company also plans to enter the markets of Indonesia, Turkey, India, South America and the USA. Yota Devices is regarded as a manufacturer of user equipment. But the core of the equipment is the complex and unique in-house software.

2. Ascon launched beta testing as part of preparation to launch its new package of civil and architectural CAD, oriented towards primary activities not with blueprints, but with 3D building models. In the spring of 2015, Ascon, the developer of Compass-3D software, presented its core to its partner in Sweden for use in a product intended for designing wooden staircases.

3. The well-known service company DataArt from St. Petersburg announced the opening of its latest offices in Munich (Germany) and Wroclaw (Poland). The company is represented in 15 cities around the world.

4. ABBYY announced the expansion of its presence in the Middle East. It opened an office in Dubai (UAE), which will provide consulting and marketing support to partners and customers of ABBYY in this region.

5. Judging from statements made in early 2015, the Skolkovo foundation considers one of its priorities to be the support of projects which involve promoting solutions on markets of the Asia and Pacific region. According to Skolkovo experts, Russian innovation companies should be oriented towards the global market from the beginning. They stated that cooperation with the Asia and Pacific region has always been essential for the foundation, but has now become even more important with regards to geopolitical changes.

6. InfoWatch has begun active development of a new international market – Latin America. By that time, InfoWatch had over 10 partners and system integrators in the region, cooperation with the communications ministries of several Latin America countries, and pilot projects in companies of the financial sector in Columbia and Peru.

7. T-Platform announced an agreement for supplying its own supercomputer to the German Julich computer center. The sum of the transaction will amount to €17 million Euros.

8. Representatives of the Chinese IT-business discussed their participation in Russian projects with Russian Prime Minister Dmitry Medvedev. It is expected that Russian companies will also gain access to the Chinese market.

9. In March 2016, Russia reached a preliminary agreement with Iran on deliveries of Russian Elbrus processors to the country once international sanctions are lifted from it.

10. Terrasoft company group, the developer of a platform for managing marketing, sales and service, opened in Singapore and Australia in the first half of 2016.

11. In November 2015, the Docsvision company opened an office in Belarus.

12. In 2016, the Russian startup from Perm Promobot sold Keysi Microelectronics, a Chinese company from Hangzhou, five of its humanoid consultants, received payment for another four, and also signed two agreements with the company on further cooperation.

13. The Speech Technology Center (STC) signed an agreement in early 2016 with the New York company HYPR, which works with major corporate clients, providing them with customized solutions for verification of users based on various combinations of biometric attributes: voice, face, retina and fingerprints. In cooperation with HYPR, STC will promote its own biometric solutions on the American market.

14. In 2016, UN Economic and Social Commission for Western Asia began cooperation with the IT company PRGNOZ, which will implement a project to develop and integrate the ESCWA Online Statistical Information System, EOSIS, designed for the statistical data processing and analysis under various development segments of the Arab region.

15. The Kazan company Eidos-Medicine delivered 15 humanoid simulators of its own manufacture in 2015 for novice surgeons at the Juntendo University of Tokyo for a sum of $1.5 million.

16. The first Russian billionaire to transact real deals in Iran when it opened after sanctions were lifted was Vladimir Potanin. His direct investment foundation Winter Capital Partners (with a capital of over $300 million, mostly funds of Interros) became a co-owner of a wide range of Iranian Internet companies, including the country's largest Internet retailer Digikala.

17. PROMT company, a developer of automated translation solutions, signed an agreement on strategic partnership with Chuanhow Technologies – a distributor and provider of technological solutions in the Asian and Pacific market. Thanks to the new cooperation, the company will be able to offer its latest solutions in Taiwan, China and Hong Kong: the PROMT Translation Server 11 for corporate clients and PROMT Professional 11 for private users.

2016-2017

1. In October 2016, at the GITEX exhibition in Dubai (the largest regional IT exhibition for the Arab East), a stand with an area of 56 sq.m. was leased for small Russian IT companies – residents of Skolkovo.

2. In March 2017, the partner of the company 1C Bitrix, the company InformUnity, together with an integrator from Peru, announced the development of a mobile application for the government of Mexico.

3. In March 2017, Bars Group began to carry out a pilot introduction of a medical information system in the Republic of Kazakhstan. The project is being realized together with the Health Ministry of the Republic of Kazakhstan and the World Bank, in connection with institutional reform of the health system in Kazakhstan.

4. In March 2017, Terrasoft company group, the developer of the bpm'online line of products for managing business processes, announced a global tour on the art of managing companies in an era of changes. The large-scale project will encompass 10 cities on four continents: Moscow, Boston, Kiev, Almaty, Sidney, Singapore, Paris, Berlin and Sao Paolo.

5. In 2016, the company Positive Technologies began to develop the sector of study and development abroad. In particular, it began to select personal in the study sector for its London office. Additionally, in 2016 the company opened a development center in Brno, Czech Republic.

6. In summer 2017, the company Addreality continued international expansion. This Russian software developer in the sphere of client analysis, in partnership with the international company group thirtyseventy digital, a manufacturer of content and IoT solutions for advertising and marketing communications, put a complex DS solution on the European market. Addreality had previously made the first successful entry on to the market of Uzbekistan with local partners, and entered the Chinese market.

7. In autumn 2016, the companies Huawei and Diasoft signed a partnership agreement. According to document, the parties will carry out global cooperation in the financial sphere, development and preparation of joint innovation cloud solutions, and promotion and realization of hardware and software innovative package solutions for the financial sector.

8. In summer 2016, PROMT company, the developer of automated translation solutions worldwide, signed an agreement on strategic partnership with Chuanhow Technologies – the distributor and provider of technological solutions on the Asian and Pacific market. Thanks to the new cooperation, the company will be able to offer its latest solutions in Taiwan, China and Hong Kong.

9. In spring 2017, the company 1C announced the creation of the company 1C International, which will promote products of 1C Enterprise on foreign markets.

According to the new development concept, products are oriented towards both developed and developing countries (for example Germany, Romania and Vietnam).

10. In autumn 2016, Kaspersky Lab opened its first European center of research and development in Dublin. Investments in the new office came to around USD $5 million. Over the next three years the company intends to create 50 new jobs in R&D.

11. In a joint project, the American University of Science & Technology in Beirut, Lebanon and the Petersburg company TSRT opened a tuitional biometric and criminological laboratory with 40 work stations. The Russian company provided expert software and hardware for working with voice and facial biometrical data, and study materials.

12. In spring 2017 the software developer for data storage systems RAIDIX signed a partnership agreement with the Italian system integrator and IT vendor Share Distribution. The Italian company is engaged in equipment distribution, manufacture and delivery of server solutions and date storage systems for many industries.

13. At the end of 2016, the company RAIDIX launched a special version of RAIDIX software with automatic write-through function for the Japanese high-performance computing market. The new solution will be introduced in Japan in cooperation with the Core Microsystems system integrator.

14. The manufacturer of data storage systems RAIDIX signed a new partnership agreement in Brazil. The deliverer of IT solutions for the corporate sector, cloud environments, monitoring and video surveillance infrastructure, Storagecorp, will deliver RAIDIX software-defined technology as a key component for complex IT projects.

15. In September 2017, InfoWatch company group presented updated versions of solutions to ensure information security of organizations in Southeast Asian countries at the international exhibition Security, fire and safety expertise for the entire Southeast Asian region 2017 (IFSEC Southeast Asia), which was held in Kuala-Lumpur, Malaysia.

16. In autumn 2017, InfoWatch announced the opening of its full-cycle local office InfoWatch SDN BHD in Kuala Lumpur, which will work on the markets of Malaysia, Indonesia and Vietnam with the aim of organizing a comprehensive presence in Southeast Asia.

17. In the spring of 2017, Natalya Kasperskaya's company Infowatch became the first Russian company working on the market of protecting organizations from information leaks to open an office in Dubai. From there, the company plans to start working with the entire Middle East. InfoWatch plans to spend around $2 million on conquering the Middle East. Russian cyber safety products have been sold in the Middle East since 2010 – from four companies: Group-IB, Positive Technology, Solar Security and InfoWatch itself. Local integrator firms are responsible for their realization.

18. The Tomsk company Micran began manufacture of telecommunications equipment in Indonesia in the summer of 2017 to provide the countries markets with cutting-edge and competitive technologies.

19. The Budker Institute of Nuclear Physics reported signing a deal in 2017 with the European Organization for Nuclear Research (CERN) and development of software which will unify the information platforms of all experiments of the Large Hadron Collider.

20. In the spring of 2017, the Russian company NtechLab took first place in the rating of the US Trade Ministry. The second place was also taken by a Russian project, 3DiVi. The Russian Vocord company was also present on the list of 11 testing participants. All of them, according to the conditions of the rating, received the right to take part in state tenders in the USA and in other countries.

21. In early summer 2017, ASBISc Enterprises PLC, one of the distributors of products and solutions on the basis of information and communication technologies in the region of Europe, the Middle East and Africa, signed an agreement on strategic partnership with Addreality, the Russian software developer in the sphere of client analysis. As part of the partnership, ASBIS will take part in language localization of digital solutions, organize

the first line of support and take responsibility for sales and development of the partner network in other countries of the region of Europe, the Middle East and Africa.

22. In the winter of 2017, the Petersburg robotics company ROBBO together with the charitable organization We Foundation supplied equipment for teaching programming and robotics in 25 schools in Finland.

23. In the winter of 2017, the company Megaplan opened an office in Kazakhstan. Initial investments in promoting CRM Megaplan on the Kazakhstan market will come to 2 million rubles.

24. In the spring of 2017, Addreality, the developer of program software for Digital POS and client analysis systems entered the market of Uzbekistan. Together with its partner, the international company Star Screen, the developer began to connect clients in Uzbekistan to the Addreality platform, and also provide services for their introduction, configuration, adaptation and integration.

25. In the autumn of 2016, the company Atlas Software announced it was entering the European market. European users can familiarize themselves with the new system through the free version of AtlasCRm. This version does not include the more complex BPM, MES and WMS modules.

26. The company Peter-Service announced great potential to develop its business in Southeast Asia, Africa and the Middle East. The company took part in the international conference Iran MVNO Forum 2016, where it presented its own solutions for virtual communications operators and shared its vision of the development of MVNO projects in the Middle East/

27. In the summer of 2016, the Russian developer of the office applications package "My Office" announced that it was planning to promote its products abroad using the new structure of Rostech, created for these purposes. The zone of the developers' business interests includes countries of Eastern Europe, the Middle East, South and Southeast Asia, Africa and Latin America.

28. In the spring of 2016 it was reported that the direct investment fund Winter Capital Partners had invested over $300 million (mainly funds of Interros) and had become the co-owner of a number of Internet companies in Iran, including the country's largest Internet retailer Digikala.

29. The Russian developer of information security software SearchInform entered the market of the United Arab Emirates.

30. In the summer of 2017, the Russian developer of information security software SearchInform announced that it was entering the Latin American market. The company assesses this region as promising for the promotion of its program solutions, including its flagship product – DLP systems.

31. In May 2016, especially for the promotion of Russian IT products on the international market, an integrator company of Russian IT solutions, RITE, was created. Its zone of interests: countries of the CIS, Eastern Europe, the Middle East, South and Southeast Asia, Africa and Latin America. Operative work with foreign nations is carried out in coordination with core Russian bodies of state power.

32. In September 2016, the company Yandex announced that it planned to export its speech technologies outside Russia. The company hired the top-manager of the American developer of linguistic and graphic software at Nuance, Vitaly Yurchenko. The market of voice recognition technologies may grow to $10 billion in coming years, experts predict.

33. At the end of 2016, the company TSRT, a developer of innovation systems in the sphere of multimodal biometry, speech recognition and synthesis, and analysis of audio-video information, entered into partnership with Falcon, an Egyptian supplier of security solutions.

34. In February 2017, the company Yandex launched a search engine in Turkey under the Yaani brand. This is a joint project of the company and the largest Turkish mobile operator Turkcell.

5.9. Vertical markets

Throughout the period of surveying by NP RUSSOFT, no regular change in the importance of particular vertical markets for Russian software developers have been revealed. Most fluctuations of the figure are of a random or temporary nature. In general, it can be concluded that the industry priorities of Russian exporter companies have not changed principally for the decade.

The only regularity revealed clearly in connection with vertical markets was the drastic reduction in their mentioning frequency during a period of crisis. In 2009-2010, software developers were forced to focus their efforts on areas where they were most competitive, or which were less by the global crisis to the least extent. A similar reduction in this figure was identified in the survey of 2015-2016.

Mentioning frequency of vertical markets in 2007-2017 (% of all respondents)

Survey years/vertical markets	2007	2009	2011	2013	2015	2016	2017
Information Technology	89%	69%	74%	74%	68%	70%	80%
Banking*	35%	36%	23%	26%	34%	29%	20%
Telecom	34%	33%	26%	31%	27%	27%	30%

**Mentioning frequency of vertical markets in 2007-2017
(% of all respondents)**

Survey years/vertical markets	2007	2009	2011	2013	2015	2016	2017
Industries	31%	31%	27%	38%	37%	33%	28%
Hospitality, Travel & Transportation	24%	31%	28%	29%	31%	27%	28%
Government	28%	25%	21%	24%	28%	24%	22%
Power supply, Gas & Oil	18%	24%	17%	22%	29%	21%	18%
Healthcare & Pharmaceuticals	23%	24%	23%	28%	28%	24%	26%
Retail & Distribution	35%	24%	26%	29%	24%	26%	22%
Education	36%	23%	21%	28%	24%	25%	22%
Science & Research	-	-	18%	26%	20%	20%	26%
Gambling & Entertainment	20%	11%	9%	15%	17%	15%	16%
Media	-	-	13%	18%	18%	13%	14%
Sport & Travel	-	-	10%	17%	11%	15%	16%
Insurance	-	-	13%	15%	15%	13%	11%
Building & Real Estate	-	-	12%	17%	28%	17%	16%
Services	-	-	27%	35%	26%	22%	28%
Finances	-	-	25%	26%	21%	19%	19%
Energy	-	-	17%	21%	24%	22%	21%

* - prior to 2011 - Banking & Financial Services

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CHAPTER 6.

Human

resources

6.1. Assessment of the general situation of human resources in the industry

Data on the number of core employees obtained from companies participating in the survey, and also data from major companies which did not take part in the survey, but posted information about specialists on staff in the public space (on their websites or in the media) allowed us to calculate the total number of software developers in the industry ten years ago, and then adjust this figure annually. The calculation is made taking into account the company's weight in the Russian software industry for which data is available. Weight is determined by the share of these companies in the total number of Russian software companies in each category which is arranged depending on the size of the company and business model (service or product-based). We believe that we have information on all major companies with a turnover of over $50 million. For this category of companies, data on the number of employees is simply added up. For other categories, we take into account the total number of companies and the share of the category on which we have information about the number of employees.

RUSSOFT assumes that there are at least 3,200 software companies in Russia (there are probably many more, especially if we count ones which only employ a few people). The Ministry for Communications and Media has already accredited around 7,500 IT companies (as of 18.09.2017), which are mainly software companies. They include legal entities which are essentially divisions of mother companies. We count these companies as divisions of companies rather than separate companies. However, there are probably not more than 2-3,000 of these.

In any initial data that is determined by the interval of company turnover, the lowest value of this interval is used. Accordingly, for all the results of calculations by RUSSOFT concerning the total number of software developers working in Russia, one can add "at least".

Every year, the Association has the opportunity to calculate data on the number of software developers by two methods – the method given above, and by multiplying the figure of the previous year by the average balanced increase of staff in the companies surveyed by us. Additionally, from time to time it is possible to check calculations on data from various sources. For example, recruiting agencies also determine the average growth in staff numbers of software companies. They have data on distribution of vacancies by city, and other source information required for calculations. In spring 2015, another opportunity arose to check calculations for the number of all programmers in Russia. The IT department of Moscow published information about Muscovites employed in the IT sphere. According to this data, which was based on statistics of the Russian Statistics Board for the region, around 140,000 programmers work in the capital. As it is known from various sources that Moscow accounts for just over a third of Russian specialists in the software development field, the total number of programmers in Russia can be assessed at 430-440,000. During the study of the export industry of software development in Russia, in 2015 RUSSOFT obtained a similar figure. We also made similar checks previously. The margin of error may come to tens of thousands of people, but it is highly unlikely that the total number of programmers working in Russia lies outside a range of 400-500,000 people.

According to RUSSOFT calculations, at the end of 2016, 470-480,000 software developers were working in Russia, including those who were employed in IT services of companies of various fields. 132-137,000 specialists worked directly in the software industry (without taking into account foreign development centers) in 2016.

According to the RUSSOFT survey, in companies for developing client software, core specialists account for an average of 80% of all staff, and in developers of program products, this figure is 63%.

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Data on core employees working in Russian software companies

	Total number, thousand persons	
	end of 2015	end of 2016
Software developers working in Russia	450-460	470-480
Core employees of Russian software companies (total)	170-180	180-190
in foreign development centers	40-50	48-53
in Russia	125-130	132-137
in service companies (for foreign customers)	70-75 (25-26)	78-84 (28-29)
in product companies	≈50	≈53
in Russian R&D centers of foreign companies	>5	>5

According to data of the Higher School of Economics, in all companies of the IT industry, 381,000 Russians were employed in 2016. Evidently, this data does not include employees of IT services of companies in other industries. Thus, these calculations do not contradict RUSSOFT data. Young people under 30 account for 39% of the total number of employees of Russian IT companies. Accordingly, the annual growth from university graduates is around 5-6%, which also corresponds to the data from the RUSSOFT survey. According to the calculations of the Higher School of Economics, a total of 1.35 million people work in the sphere of information and communications technologies (including telecommunications companies).

According to the Ministry for Communications and Media, there are around 25 million programmers in the world (around 4 million in the USA, 3 million in India, and 2 million in China). According to data from the ministry, in Russia there are around 350,000 software developers, which is lower than the number calculated by RUSSOFT. However, the concept of programmer may mean a different circle of specialists (broader or narrower).

If Russia lags behind by the total number of specialists (and perhaps not only behind the three countries listed above), by quality of their training it is among the world leaders. This is confirmed not only by the performances of Russians in various competitions (primarily the constant victories at the prestigious student world championship, ACM International Programming Collegiate Contest), but also testing of ordinary specialists (not those who prepared for competitions specially).

According to a study by HackerRank, which has an online platform of programming tests, Russia is in second place among countries, with an insignificant lag behind China. Chinese programmers received 100 points in the tests, and Russians 99.9. Russia was the best on algorithm tests – the most difficult and competitive sphere of software development. This is reflected in the fact that almost all the technology trends indicated by Gartner analysts require good algorithm skills. It is noteworthy that the world leaders by number of programmers, the USA and India, are only in 28th and 31st place respectively on the HackerRank list. American programmers have only 78 points, and Indian programmers 76.

It is planned to solve the lack of specialists in software development in Russia as part of the program "Digital economy", which provides legal, technical and organizational and economic support of the work of IT specialists, and attracts new employees, including citizens who have limited health possibilities, are of a mature age and are exempted from traditional sectors of the economy. It is also planned to simplify attracting former compatriots and foreign specialists with the necessary competence to the digital economy of Russia.

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Mechanism of training, advanced training and self-instruction in the digital economy will work throughout a person's life. The share of state attestation of graduates with the use of digital tools should come to 40% by 2025.

With the gradual emergence from the demographic slump that arose in connection with "perestroika" in 1991-1995, from around 2018 the number of graduate students will slowly increase. An additional growth of IT specialists in future may be provided by female students wishing to study exact sciences. According to a study commissioned by Microsoft and conducted by KRC Research and Creation communications group in August-September 2016, in Europe around 40% of girls aged 11-18 realize the practice importance of subjects with exact sciences and scientific disciplines. In Russia, over 60% of Russian girls believe that this knowledge will benefit them in life. The study also showed that in Europe, girls traditionally start to take an interest in exact and natural sciences at an age of 11 on average, while in Russia they do so at the age of 10. 9,500 girls from Italy, Germany, Finland, France, the UK, Ireland, Poland and the Netherlands, and 1,500 schoolgirls and female students from Russia took part in the survey.

6.1.1. Change and distribution of the number of software developers

In 2016, the total number of core employees of Russian software companies grew by around 6-8%. In foreign development centers it increased more – by 10-11%. Approximately the same figures were seen a year earlier, but slightly lower. Up to 80% of the growth of personnel in Russia is provided by university graduates. This flow of personnel also comes from abroad (primarily former Soviet republics), but also from other industries in which programmers work in IT services. We may assume that over the last three years, owing to the crisis and the development of cloud technologies and outsourcing, which allow IT departments to have a smaller number of specialists, there is a growing flow of software developers from companies of various areas of the economy into software companies.
A small addition is also given by retraining of technical specialists who previously did not work in software development.

According to the results of our 2016 study, around half of companies planned to increase staff in 2016. Around the same number expanded de facto, but only 4% of surveyed companies expected a growth of more than 10%, while the number of them for year-end proved much greater – 23%.
Based on plans reported by respondents of the 2017 survey, in 2017 there should be even more growing and swiftly growing companies.

Change in number of staff, share of surveyed companies

	For year-end 2015	Forecast for 2016 (made at start of year)	For year-end 2016	Forecast for 2017
Increase	46%	50,5%	49%	55%
Growth more than 10%	2%	4%	23%	35%
Reduction	11%	7%	13%	3%
No change	40%	31,5%	31%	31%
Could not say	3%	11%	7%	12%

Based on the results of the survey by Antal Russia of 193 Russian and international organizations from 16 sectors of the economy working in Moscow, St. Petersburg and Kazan, the situation in the software industry is much better than in the country's economy as a whole. As part of the survey that was held in autumn 2016, experts at Antal Russia

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established which companies plan to hire new employees over the next 3-6 months. It turned out that only 31% of companies had these plans (among software companies over 50% were already planning to expand their staff before the end of the year in spring 2016, when the situation in the economy was less certain than it was in autumn).

If we only examine respondent companies (without projection to all Russian software companies), the growth of employees in them in 2016 was on average 13%, and in 2017 a growth of 15% is expected.

At the same time, companies with a turnover of more than $5 million forecast the same increase of staff as they had in 2016 – by 14%, and companies with a turnover of less than $5 million expect a drastic increase – from 7% to 18%. Our experience shows that forecasts for growth in turnover, if there are no unexpected upheavals, are usually justified with a deviation of not more than 1-3%, but forecasts for increase in staff are usually overestimated. The expected growth of staff reflects new ideas, plans to launch new areas or expand existing ones, open financial possibilities, but not the situation on the labor market. In many cases, plans for hiring do not correspond to the supply of competent specialists in Russia. Nevertheless, it is important to note that small companies are focused on the swift growth of personnel in 2017.

Service companies whose turnover depends almost directly on the number of employees increased their staff in 2016 to a great extent than product companies (growth of personal by 10-11% and by 5-6% respectively). Both business models predict an increase in 2017: surveyed service companies plan to increase staff by 16% (but this takes into account the personnel of foreign development centers, where hiring takes place more actively), and product companies by 10%.

In Moscow, software companies employ around 50-55,000 people (core employees only). The growth over one year was around 10%. At the same time, only 4% (of the average number of employees) are university graduates, and for Russia this figure is 6%. Moscow companies can afford to attract specialists with experience from Russian regions and former CIS countries. About half of the flow of new employees to software companies in Moscow comes from the regions and Petersburg.

For Petersburg companies, the outflow of employees to Moscow and the inflow of employees from the regions is equivalent. So migration in this city does not have a great influence on the change in the total number of software development specialists. Software companies in Petersburg employee a total of 24,500-27,000 core employees, which is around 10% than a year previously. Recent graduates caused the number to grow in 2016 by 6%.

Regional companies are largely forced to rely on graduates of their regional universities. With a growth in the total number of companies surveyed by 8%, recent graduates provided a growth of 7%. In 2017, the staff of regional companies was forecast to grow by 20% on average.

Approximate distribution of software developers by major cities of Russia

Moscow	35%
St. Petersburg	15%
Yekaterinburg	5.2%
Novosibirsk	5%
Nizhny Novgorod	2.5%
Kazan	2.4%
Voronezh	1.2%

Source: ANCHOR High Technologies

It is unlikely that these plans will be realized with the current outflow of employees to Moscow and Petersburg, but some companies from the regions plan to compete with Moscow companies on the labor market in the capital itself, opening their development centers there.

An approximate distribution by cities can be determined based on data of recruiting agencies and the share of regional software or IT companies in the Russian IT industry.

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They correlate between each other quite well. The share of Moscow is 32-35% in all cases, and in Petersburg 11-15%. The fact that the share of the two capitals in vacancies of young IT specialists is lower than these figures can be explained by the fact that in these cities a large number of large companies are concentrated, which can afford to invite experienced specialists from the regions and abroad.

Distribution of vacancies for IT specialists by cities in 2015 (% of all corresponding vacancies in Russia)		**Distribution of vacancies of young IT specialists by cities in 2015 (% of all corresponding vacancies in Russia)**	
Moscow	32%	Moscow	22%
St. Petersburg	11%	Moscow region	12%
Voronezh region	5%	St. Petersburg	7%
Moscow region	4%	Nizhny Novgorod region	4%
Nizhny Novgorod region	3%	Republic of Tatarstan	4%
Republic of Tatarstan	3%	Krasnodar territory	3%
Novosibirsk region	3%	Rostov region	2%
Rostov region	3%	Perm territory	2%
Krasnodar territory	2%	Sverdlovsk region	2%
Samara region	2%	Voronezh region	2%

Source: HeadHunter   Source: HeadHunter

Distribution of companies accredited at the Ministry for Communications and Media in Russian cities as of 18.09.2017

	Number of companies	Share
Moscow	2762	36.8%
St. Petersburg	951	12.7%
Novosibirsk	235	3.1%
Nizhny Novgorod	125	1.7%
Kazan	176	2.3%
Izhevsk	84	1.1%
Yekaterinburg	231	3.1%
Tomsk	82	1.1%
Omsk	62	0.8%
Perm	116	1.5%
Saratov	63	0.8%
Rostov-on-Don	87	1.2%
Chelyabinsk	95	1.3%
Penza	40	0.5%
Krasnodar	96	1.3%
Ulyanovsk	91	1.2%
Ufa	66	0.9%
Samara	126	1.7%
Moscow region	219	2.9%
Other	1794	23.9%
Total	7501	100.0%

Source: calculated from data of Ministry for Communications and Media

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6.1.2. Job attraction factors

A survey conducted by HeadHunter in April 2016 among 225 respondents indicated that high salaries were the prime reason for job appeal to IT professionals. They mentioned an interesting job (86%) and a prospective and dynamically evolving segment (58%) most frequently. Salary was only mentioned by 39% of respondents. 23% appreciated a flexible work schedule, while 23% appreciated that IT professionals were in demand and protected against staff reductions.

Based on a survey conducted in May-July 2016, HeadHunter made a profile of an IT jobseeker. Those were mostly men (88%) of an age of 26-35 (54%), who had over 6 years of work experience (62%). The smallest segments were professionals of an age of 46-55 (4%) as well as inexperienced jobseekers (3%).

According to a joint study by Microsoft and SuperJob, the results of which were published in early summer 2017, over half of employees want to work in companies which stimulate the "desire to create". They must encourage independence and initiative of employees (mentioned by 50% of respondents) and create conditions for effective interaction between departments – 46% of respondents consider this of "maximum benefit".

The need for change was mentioned most often by young professionals aged 25 to 34. This generation wants to do away with official barriers, and is prepared to study, master new technologies and mixed competences by any means. Young employees also suffer most from a low level of involvement and lack of communication between departments.

According to data from the Superjob portal, the year 2017 was in many ways a turning point for the Russian labor market. A policy of effective expenditure continues: companies will strive to hire the best, and give current employees the ultimatum to "develop or leave". In some spheres, even the best employees are being replaced by automatic programming systems: companies in a number of fields are already preparing the foundation for this.

The activity of employers in competitive industries will grow, and the average monthly growth rates for the number of vacancies will come on average to +5% per month. The year 2017 will be the last year when a general growth in the number of real jobs is observed.

From 2018, a reduction in proposals for employees with low qualifications will begin, by 5% every year. Real unemployment will grow by the same amount. Thus, with the existing trends, the general level of real unemployment in Russia may grow several times by 2022, to 20-25%. At the same time, the demand for highly qualified specialists will only continue to increase.

Analysts at SuperJob expected an increase in demand for specialists in 2017, primarily in the IT sphere. The most sought after will be developers for mobile systems, web developers, specialists on information security and cyber safety, and big data analysts with knowledge in other fields.

6.2. Migration of labor resources

From early 2015, the issue of migration flows came under discussion once more. Historically, the largest migration of software developers was observed from the 1990s and approximately until the mid-2000s. From the early 1990s, the outflow of human resources abroad was a serious problem for Russian software companies. By around 2005-2007, salaries in Russia had grown so much that for many developers, it was no longer worthwhile to go abroad to work. Some specialists who had previously left began to return to Russia. At the same time, there was a stable flow to Russia of software developers from Belarus and Ukraine (including those who came to Russia to get education and found a job after graduation).

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After 2007 (until the Ukrainian crisis began), migration in both directions dropped. The outflow of human resources abroad ceased to be a problem. At the same time, the inflow of specialists from former Soviet republics seriously decreased. Russian companies increasingly chose to open development centers in Belarus and Ukraine. Especially since the tax legislation in these countries was more favorable for software development than in Russia.

After the political, economic and humanitarian crisis in Ukraine, which began in 2014, the flow of IT specialists to Russia from former CIS countries increased once more.

There is no official data on the migration flows of programmers. However, there is cause to believe that these flows increased in 2015. One of the reasons to do so is that in 2014 and the first months of 2015, the number of responses by Ukrainian applicants to vacancies in the IT industry in Russia substantially increased. According to the recruiting company HeadHunter, this figure increased drastically at certain periods of an escalation of the crisis in Ukraine. After the events on Maidan in February-March 2014, the number of responses from Ukrainian IT specialists in the same period increased almost four times (by 277%) compared to the same period of the previous year. The next spurt in job applications to Russia was in the summer of 2014 – after the tragic events in Odessa on the 2nd of May, 2014.

Judging from reports in the Ukrainian media, the problem of the mass emigration of IT specialists really was serious. However, these publications usually only mentioned the West as the destination of migration flow. From the standpoint of salaries, relocation for a new job in western countries is a better choice compared to Russia where salaries in dollars also decreased during the last year and a half. However, many Ukrainian IT specialists do not know foreign languages. So it is much easier to find a job outside Ukraine in Russia, as they speak Russian fluently (for more than half of Ukrainians, it is their native language).

In summer 2016, the Ministry of Education and Science of Ukraine recognized the problem of the outflow of educated professionals to Russia and Western countries, where salaries are better. At the same time, Ukraine has seen a catastrophic reduction of governmental funding of science over the last five years.

Based on various data (on total migration, numbers of vacancies with a willingness to relocate to Russia, the share of the jobseeker who not only declare an ability to relocate but also decide to do so), it was predicted that 5-10,000 software development professionals would appear in the Russian labor market from the former USSR (and not only the former USSR) countries from 2014 through mid-2015 (according to HeadHunter, not more than 5-7,000 relocated to Russia). This inflow could not avoid affecting the labor market. Evidence of the impact is the increasing average number of applicant CVs per vacancy. This drastic increase was noted by recruiting agencies.

With the reduction of salary in dollar terms by more than 1.5 times, the outflow of software developers probably increased. But in the same period (from early 2014 to mid-2015), it probably did not exceed 1-2,000 specialists. But this relatively small outflow became a problem for a number of companies, as the most skilled developers with a good knowledge of foreign languages left.

6.2.1. Moving abroad

With the growth of the outflow of personnel abroad, in the 2016 survey questions were included to determine the influence of migration flows on the software industry. As a result, it was found that migration of employees abroad was a problem for 14% of companies surveyed. This indicator did not depend on the share of foreign sales and barely at all on the business model (for developers of program products it was 13%, and for service companies 14%). Regional companies face the problem of migration abroad slightly more frequently (16%). In Moscow and Petersburg, 13% of respondents replied "yes" to the appropriate question. The problem was noted by 15% of companies with

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turnover below $5 million and 12% with turnover above $5 million. It seems that employees leave companies where the salaries are lower (regional and small companies). But in different categories of companies there were no large deviations from the average figure.

We may assume that the share of companies whose activity were negatively influenced by employees leaving the country was close to zero before 2014.

The problem of an outflow of specialists abroad for different categories of companies, % of companies surveyed

	2016 survey	2017 survey
All companies surveyed	14%	18%
Company size		
Turnover below $5 million	15%	19%
Turnover above $5 million	12%	14%
Location of head office		
Moscow	13%	4%
Petersburg	13%	15%
Regions	16%	28%
Share of export		
Below 50%	14%	16%
Above 50%	14%	22%

A similar question in the 2017 survey makes it possible to see a dynamic. The obtained results show that the group of companies which recognize the problem of an outflow of personal abroad is growing. This growth mainly took place in regional companies with a turnover below $5 million, which receive the majority of revenue from export.

A growth in the share of companies that recognize the problem of an outflow of personal abroad does not mean that in 2016 and early 2017 (before the survey was conducted in spring) more specialists left the country than in 2015 and early 2016.

It is clear that in spring 2016 in Russia the number of vacancies for software developers began to grow much more swiftly than the number of according CVs.

Accordingly, when employees left who had decided to work abroad, it became more difficult to find a replacement for them. Thus, we may assume that the outflow of specialists abroad may not have increased, but the problem of emigration has begun to be felt more strongly.

There are no statistics which could give more definite conclusions about the outflow of specialists abroad. When Russian citizens cross the border of their own country, they are not asked about the goal of their trip. When entering other countries this question is asked, but not always. There is data about applications for residence permits in EU countries and in the USA, but no division by profession of applicants. The dynamics of movement for all citizens does not always coincide with the dynamics of specific specialists moving (for example, software developers). Many specialists do not go abroad for good, but work under contract. In this case statistics can be found, but all labor migrants will also be calculated without division by profession. Additionally, even the statistics commission of the European Union only has data for refugees for 2015. Evidently, European statistics do not manage to reflect current changes.

It is noteworthy that even the American Russian-speaking community does not have precise data on the number of IT specialists who have moved to the USA from the post-Soviet region. There is only the assumption that in Silicon Valley alone, there are at least 50,000 of them.

The Russian state statistics board gives data on everyone leaving the country. According to this data, Russians began leaving the country in 2016 less often than in 2015 (333,000

people against 353,000). In 2016, 54,400 left the CIS, and a year previously this figure was 56,700.

The number of people arriving in Russia in these two years exceeded the number leaving. So there was a migration growth in relation to countries not in the CIS (Ukraine is still formally a member of this commonwealth).

For specialists in the software development sphere, it is unlikely that this growth exists. However, we may note that for the entire country, moving abroad for a lengthy period has not become more common. Furthermore, the number wishing to leave has decreased. A year previously things were different: according to official statistics of the Federal Migration Service of the Russian Federation, the number travelling abroad in 2015 grew by 6% from 51,300 to 54,400.

Sometimes the media discusses the great threat of an outflow of personal based on surveys conducted by recruiting agencies. Indeed, a very large share of specialists surveyed declare their wish to work abroad. Depending on the audience studied, the formulation of the question and the time of the survey, this figure varies from 20% to 60%.

According to data from a study by Contact agency held in spring 2017, the majority of both Russian top managers and young specialists are prepared to consider offers to move for a new job. Among young specialists, only 5% completely reject the possibility of relocating for a job. Almost half (45%) have received an offer and considered it, and 58% would be glad to receive this offer for the first time. But the vast majority (84%) do not have any experience of a real move, only 10% have moved to another city, and 6% to another country.

Desirable countries for relocation of IT specialists from Russia (based on CVs posted from May to April 2016)

USA	8.2%
Germany	5.9%
Great Britain	5.2%
Canada	4.7%
Australia	3.8%
Belarus	3.4%
Switzerland	3.4%
Czech Republic	3.3%
Spain	2.9%
The Netherlands	2.8%
Austria	2.7%
Sweden	2.7%
France	2.7%
Finland	2.6%

Source: hh.ru

36% of respondents would agree to move solely to Europe, another 15% only to the USA or Canada, but there is also a large percentage who would be glad to move anywhere (28%) or any other country (24%), The HeadHunter recruiting agency assumes that IT specialists are more mobile, and for them almost all the figures characterizing a wish to move abroad are higher. This company also conducts similar studies itself.

For example, on the basis of a survey made in May-July 2016, HeadHunter experts made the following conclusion: despite IT professionals' aspirations to move abroad, only 15% of them read professional literature in a foreign language, and only 3% speak foreign languages fluently. At the same time, just over a quarter of them (26%) do not speak a single foreign language, and 24% of job-hunters only indicated basic knowledge of a foreign language in their CVs.

Furthermore, the reasons that specialists wish to move abroad has great importance. The reason may be the desire to leave the country for good, which will be a definite loss, if well-trained specialists are leaving. But it may be the desire to gain new experience and knowledge, and subsequently return to the country.In the summer of 2016, HeadHunter presented the following data: 36% of job-seekers with IT training are prepared to change their place of residence for a job, and 22% are considering moving to another country. Similar figures were shown in Ukraine. But the reasons that make them consider moving to another country differ fundamentally. Most Ukrainians (52.6%) would like to leave the country for a higher living standard, 45.2% mentioned social guarantees, 40% high salaries and only 36.9% the opportunity to gain new knowledge.

For Russians, foreign experience was in first place (44.6% of respondents), then a high living standard (44.4%), social guarantees (42.1%) and salary (26.5%). In this study, the level of dissatisfaction with the living standard in respondents' own country was not assessed.

According to various surveys, in 2015 around 60% of IT specialists were prepared to move abroad. This would seem to be a high figure. But the number who were seriously thinking about looking for a job abroad was three times lower. And only a few percent of IT specialists actually tried to find a job abroad, rather than just thinking about it. At the same time, far from all of them adequately assessed their abilities to find a satisfactory job abroad.

The main factor that complicates preparations for moving is indecisiveness. This factor means that around 80% of those who wish to work abroad do not make attempts to leave. Another 16% are held back by an insufficient knowledge of a foreign language, and 8% by a lack of technical knowledge.

There is no mass outflow of personnel abroad. However, often even the loss of one key employee leaving the country is a problem for a specific company, as the most competent developers who know foreign languages leave. So the percentage of companies for which migration of specialists abroad is a problem was 14% of in 2016 and 18% in 2017.

6.2.2. Inflow of personal from abroad

Thanks to another new question which was included in the 2016 survey, we can calculate how many programmers from former Soviet countries have moved to Russia. In 2015, only 2.36% of new employees of surveyed companies were citizens of neighboring countries (primarily Ukraine, Kazakhstan and Belarus), and 20% of surveyed companies hired these specialists. Thus, the inflow of specialists to software companies in Russia from the CIS did not exceed 300-400 people. Taking into account software developers hired by other IT companies and IT services of companies in various spheres, this figure is much greater, but the flow cannot be measured in the thousands.

How actively employees from the CIS were hired by different categories of companies

	Average percentage of new employees from the CIS (of all hired in 2016)	Percentage of companies hiring employees from the CIS in 2016
All companies surveyed	6.7%	18%
Company size		
Turnover below $5 million	6.8%	13%
Turnover above $5 million	6.7%	41%
Location of head office		
Moscow	7.2%	7%
Petersburg	2.5%	29%
Regions	6.4%	21%
Export share		
Below 50%	4.0%	16%
Above 50%	7.0%	24%

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The results of the 2017 survey show that software companies have begun to hire specialists from the CIS more actively: they accounted for 6.7% of new employees hired in 2016. This is at least 500 people. However, about the same percentage of companies hired specialists from the post-Soviet region – 18% of all surveyed (20% in the previous year).

The percentage of labor migrants from the CIS in the total of new employees in companies with a turnover below $5 million and above $5 million is approximately the same. Naturally, major companies usually employ at least one employee from abroad.

As in the previous year, in Moscow the percentage of migrants is slightly higher than the average Russian figure, and lower in Petersburg. At the same time, Petersburg companies hired specialists from neighboring countries more often than others, but probably not en masse, only individually.

The main donors of IT specialists for Russia are Ukraine, Kazakhstan and Belarus.

According to data from the border service of the FSB, which was posted by the State Commission of Statistics on its website, in 2016 there was no increase in the migration flow any of these CIS countries, from which the largest amount of IT specialists come to Russia. A decrease by 10-20% was seen, both in the number of business trips, and the number of arrivals for permanent residence. Receiving citizenship has almost no influence on the total flow of migrants, because only 56 people indicated this goal on entering the country in 2016.

However, according to these statistics (and statistics for travelling abroad), we cannot make any assumptions on a change in the flow of IT specialists from the CIS. This flow could increase with a drop in the total number of people entering the country, as the percentage of specialists in the general flow is small (perhaps not more than 1%).

Indeed, with a reduction in the total flow of migrants to Russia, the number of work permits increased significantly – by 44% (from 149,000 to 214,000). At the same time (which is especially important when the software industry is concerned), the number of permits to highly-qualified and qualified specialists grew by 57% (from 41,700 to 65,700). A certain number of these specialists are directly involved in software development. So it is possible that the flow of qualified personnel to the software industry in Russia from abroad actually increased.

Representatives of surveyed Russian companies with development centers in Ukraine have not closed or cut back their Ukrainian offices in the last two years. Usually these companies are focused on western markets and carry out client software development in Ukraine.

Probably Ukrainian outsourcing companies working primarily for export are in the same relatively stable position. For them, the drop in the national currency rate is even a good thing. Employees of Russian development centers and Ukrainian software export companies are unlikely to want to move to Russia in large numbers. Firstly, they have not lost their jobs. Secondly, the majority of them know at least English well, and can count on successful job-hunting in western countries.

According to Russian legislation, Russian-speaking refugees from the CIS may submit a simplified list of documents under the state program of resettlement of compatriots, and receive Russian citizenship quite swiftly. This also enables the move of specialists to Russia.

Before the Ukrainian crisis, the Russian government took a number of decisions to enable the inflow of foreign specialists. It is proposed that these decisions will make it possible to attract up to 200,000 qualified specialists from abroad by 2020.

In particular, to achieve these goals, in autumn 2013 the Russian ministry of communications and media proposed to reduce the minimum payment threshold for foreign specialists from 2 million rubles per year to 1 million rubles. This will make it possible not only to invite very "expensive" specialists from abroad, but also those seeking an average salary for IT specialists (or slightly higher than average). The greatest inflow of personal may be expected from the CIS (Ukraine, Belarus and other CIS

countries). However, the conditions offered to programmers by employers in Russia are also quite attractive for programmers from Southeast Asia and even from Southern Europe, where there is a high level of unemployment.

In 2014, the considerable increase in an inflow of IT specialists in Russia was caused by the crisis in Ukraine. But from 2015 this channel decreased drastically. At the same time, the inflow of even 5,000 (maximum 10,000) software developers moving to Russia every year is too small to achieve the task to attract 200,000 qualified specialists to Russia. Especially as this inflow was not seen for 2016. The program is practically not working. Perhaps this is because Russia is not actively promoted abroad as a country where people can move to find work.

6.2.3. Internal migration

The migration of IT professionals takes place also within Russia. According to a study by the Mayor's Office of Innopolis (a new town in Tatarstan) and HeadHunter, 48% of Russian IT professionals are ready to relocate to another region of the country, while 16% of them have already gained this experience. The most preferable places for relocation were: Moscow (29.2%), St. Petersburg (27.7%) and Krasnodar Territory (11.3%). The top 10 also included the Moscow, Novosibirsk, Nizhny Novgorod, Kaliningrad, Leningrad and Samara regions, and the Republic of Tatarstan. As for relocation to technology and IT parks of Russia, the top five that respondents know about are Skolkovo Innovation Center (Moscow), Academpark (Novosibirsk), Phystechpark (Moscow), IT Park and Innopolis (Tatarstan). At the same time, it would be interesting for over 60% of professionals to work at a technology park, 20% of them have not thought about this opportunity, 10% reject this option and 10% have already worked or currently work there. IT professionals define the main advantages of technology parks as the opportunity to exchange experience or learn something new, advanced technology, and higher salaries.

IT professionals of general management and those dealing with database administration think about relocation most often. The relocation to other regions of Russia is least appealing to mobile application developers (18%), who would rather prefer to relocate abroad (25%). Both test engineers (21%) and programmers (16%) also share this preference.

According to HeadHunter data, the first half of 2015 saw a rapid increase of CVs from IT professionals from the Crimea. They were prepared to relocate to other regions of Russia. In the year following the accession of the Crimea to Russia, the offices of Ukrainian software companies closed. The economic situation was difficult, which also contributed to the staff reductions. In total, about 4,000 people were looking for a job (this is a significant percentage of IT professionals in the peninsula, if not a majority). All indications are that the situation has changed drastically in 2016. According to the statistical data of hh.ru web-site, there are as few as 1-2 jobseekers per job in the Crimea's IT segment against the standard of 5-6. Therefore, it is possible to state that the excessive supply has been replaced by a deficit of human resources. IT professionals desiring to relocate to the Crimea from other regions have already appeared. However, desirable salaries of jobseekers from other regions as indicated in their CV at hh.ru are 55,000 rubles on average in the IT segment, but the salary level offered by employers on the peninsula are much lower, 36,000 rubles.

According to data from a study by the Higher School of Economics, the results of which were published in summer 2017, from 8% to 57% of university graduates (depending on the region) annually move to another region of the Russian Federation (this concerns all graduates, not only IT specialists). In half of the regions, including Moscow and St. Petersburg, the percentage of these graduates is from 30% to 40%. The greatest outflow of graduates is from Adygeya (57%), Khanty-Mansiisk Autonomous Region (52%) and the Ivanovo Region (52%), and the smallest is from small and remote regional systems of

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higher education: from the Kamchatka Krai (15%), Sakhalin Region (14%), Ingushetia (12%) and Tyva (8%).

The authors of the study divided regions into four groups for convenience. The first group, where young Russians go to study and subsequently work included St. Petersburg and Moscow and their regions, Tatarstan and the Sverdlovsk Region. Regions where universities are in demand, but the number of people who find work in the region and outside it is approximately the same included the Voronezh, Tyumen, Omsk, Ivanov, Oryol and Saratov Regions, and Mordovia. The third group (regions with unpopular universities, but good potential for finding jobs) included the Magadan and Murmansk Regions, the Perm and Krasnodar Territories, the Republic of Komi, the Altai and Kabardino-Balkaria. The fourth group loses both graduates and young specialists: the Pskov, Vladimir, Tver, Kurgan and Vologda Regions, and also Chuvashia and Adygeya.

6.3. Deficit and rotation of human resources

There are not many tools for measuring changes in the significance of personnel deficit. There are no absolutely precise ways of determining insignificant changes at all. Nevertheless, the data from the annual RUSSOFT survey and studies by recruiting agencies make it possible to get certain ideas about how a personnel deficit reflects on the activity of software companies at different periods of time.

One of these tools is the work monitoring index "HeadHunter Index", which reflects changes in the number of CVs received for one vacancy, in various professional fields. The software industry is indicated by "IT, Internet, telecom", although this index reflects the situation in the entire ICT sphere. In May 2016 the number of vacancies in this sphere exceeded the figure for May 2015, while the number of CVs only increased by 15%. In general, the hh index (number of CVs received for one vacancy) in the IT sphere decreased. If in 2015 it varied from 3.7 to 4.7, from January to August 2016, it varied from 3.0 to 3.6. This means that a personnel deficit in the IT sphere increased.

By the end of the year the situation did not change fundamentally. From January to July 2017, a reduction in the index from 3.4 to 2.9 took place, but this change is almost within the margin of fluctuation that existed throughout 2016. Nevertheless, some change in the hh index for the entire ICT industry is taking place.

If we see that how companies surveyed by RUSSOFT assess "Provision of personal and education system", from spring 2016 to spring 2017 a significant improvement took place – the average evaluation mark on a five-point scale grew from 2.75 to 2.83. For product companies, there were even more changes – from 2.82 to 3.00. However, service companies, which are usually very dissatisfied with the possibility of increasing staff in Russian development centers, the average mark grew from 2.72 to 2.76. The situation with personnel is assessed a little better by companies which are primarily focused on the Russian market (they had the largest growth indicators in 2016).

In previous years of the study, these assessments of respondents coincided in the vast majority of cases with data on the situation on the labor market obtained from various sources (above all from recruiting agencies). So there is every reason to assume a real improvement of the situation on the labor market for software companies, despite the small drop in the hh index for the entire ITC industry. This improvement is not logical, given the growing demand for specialists (if supply has not increased further). Universities annually provide additional personnel for companies, but these are stable, and so it cannot be considered to be a new factor. This factor may be the significant growth of the number of specialists moving to the software industry from other industries, and also the growing inflow of software developers from abroad.

If we recall that because of the economic crisis and the move to cloud technologies at IT companies which are not software companies, at telecommunications companies and at IT services of companies of various industries in the last two years, mass cut-backs have taken place, we find a logical explanation for the discrepancy in the change of the hh

index for the entire ITC industry and assessments on the situation of the labor market by software companies. For example, in the first three quarters of 2015, the number of people employed in the ITC industry in Moscow dropped by an amount that was quite considerable even for the capital – by 22,100 people. After retraining, all these specialists could apply for positions as system administrators or testers in software companies (and sometimes also as software developers).

A year earlier, as part of the RUSSOFT study, this mass move was seen as a theory which had to be tested. The results of the survey held in 2017 allow us to state that the test has taken place – software company now have a better assessment of the situation on the labor market. Not only the total number of employees in 2016 has increased, but there are ambitious plans for hiring specialists in 2017.

The theory on the flow of personal from other industries, which is quite significant for the software industry, is confirmed by the results of a study by hh.ru conducted with the educational IT portal GeekBrains. These results show that representatives from other professional spheres mainly aspire to move to the IT industry. Every fifth job-seeker announced the wish to find work in the IT industry. This is more than in the resources or oil and gas sectors, which are traditionally very popular in Russia. This mass aspiration is explained by the fact that the IT industry is one of the leaders by level of salary on the Russian labor market, only behind the resources industry and on the same level as the oil and gas sector. At the same time, the competition in IT is about twice as low as in the raw materials sphere. Furthermore, unlike resources companies, the IT sector showed a positive dynamic of demand for specialists even during the crisis, remaining the main driver of the labor market in Moscow and Petersburg.

Respondents' assessment of the situation may have been influenced by the widespread optimistic mood among them concerning the near future, connected with resources for hiring new employees appearing from a growth in sales. However, the survey results probably show a change not only in the mood of respondents, but also a certain increase in supply on the labor market.

The probable increase of an inflow of specialists from abroad may also be a factor which had a positive influence on mitigating the problem of personnel deficit (see section 6.2 for more detail).

The situation on the Russian labor market for software companies in 2016 and until spring 2017 at least did not get worse, but it is quite probably that it became slightly better as a result of the increasing inflow of IT specialists from other industries and from abroad.

The share of companies surveyed which did not show any activity on the labor market also reflects changes. Between the crises of 2009-2010 and 2014, this figure dropped: firstly from 28% in 2010 to 15-16% in 2011-2012, and then in 2013 to 11%. Before 2009 it fluctuated on a very low level – within 5-10%.

Share of companies which did not hire new employees in 2012-2015, depending on company turnover

year	over $100 million	from $20 million to $100 million	from $5 million to $20 million	from $1 million to $5 million*	below $1 million**
2012	0%	9%	11%	8%	59%
2013	0%	14%	0%	10%	26%
2014	0%	0%	10%	20%	50%
2015	0%	22%	12%	13%	43%

* - before 2014 "from $0.5 million to $5 million"
** - before 2014 "below $0.5 million"

In 2014, the share of companies which were forced to stop hiring new employees increased drastically – from 11% to 22%. In 2015, an increase to 26% took place, but at

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the same time this figure for companies with a turnover below $5 million dropped, which anticipated an improvement of the situation.

The share of companies which did not hire a single employee in 2016 was not determined, as this question was not present in the last survey (RUSSOFT decided to ask less significant questions only every 2-3 years). Nevertheless, there is every reason to assume that this figure dropped.

According to information of HeadHunter, the most in-demand professions of the near future will be specialists in the field of machine learning, data mining, and big data. The number of vacancies mentioning big data grew by more than 28 times compared with 2012. If in 2012 there were 83 vacancies for the whole of Russia, in 2016 there were 2,389. The number of mentions of the close field of big data and data mining grew by more than three times in four years.

The number of vacancies which require knowledge in all fields (machine learning, data mining and big data) grew by almost three times in 2016 compared to 2015 – from 275 to 775.

6.3.1. Staff turnover

The indicator of staff turnover has varied insignificantly during most recent years, remaining at a sufficiently low level if compared with other countries (for example, India), which is one of Russia's competitive advantage. During 2011-2012, it was at the level of 6%, while for 2013, it increased somewhat (to 7.7%) along with activity of employers. In 2014 staff turnover decreased again to 5.7%, in the context of decreasing vacancies and a lack of large-scale dismissals.

In 2015, staff turnover increased to 6.3% because of the increase of activity of companies on the labor market, and in 2016 reached 9.5% (59% of companies surveyed reported staff turnover, while 9% had difficulty answering the question).

If previously staff turnover was generally higher with small companies, over the last two years companies with a turnover of $5 million to $20 million have been suffering from this phenomenon to a greater extent.

Annual indicator of staff turnover depending on company size

year	over $100 million	from $20 million to $100 million	from $5 million to $20 million	from $1 million to $5 million*	below $1 million.**
2012	4.56%	8.29%	9.02%	8.41%	4.76%
2013	7.7%	7.4%	7.8%	8.2%	13.1%
2014	5%	6.5%	7.4%	6.6%	7.7%
2015	6%	6.1%	8.1%	6.1%	6.2%
2016	11%***	6.7%	10.9%	6.2%	6.5%

* - until 2014 inclusively "from $0.5 million to $5 million"
** - until 2014 inclusively "below $0.5 million"
*** - only one company

Companies focused to a large degree on foreign markets prefer to hire specialists with experience. So the share of graduates on staff is always higher in companies which receive the majority of revenue from sales in Russia. However, for 2016 the difference was not as large as in 2015 (when the share of graduates was 6.9% and 10.9% respectively).

New graduates are usually hired by small and new companies, and also by international development centers.

Staff turnover at international centers is also high. Employees leave companies with an export share of over 50% slightly more often than companies which are mainly focused on the Russian market. This was also the case for the results of 2015.

In 2015, the figure for staff turnover was more than twice as high as it was for service companies in comparison with product companies (6.6% against 3.2%). 74% of service companies and 51% of product companies faced employees leaving (average for all companies 65%).
In 2016, staff turnover for developers of client software was also higher than for developers of replicated solutions, but the difference was not so great – 9.8% and 6.1% respectively.

Figures for staff turnover in companies of different categories for 2016

	Staff turnover	Share of specialists – university graduates from average number of personal
For all companies surveyed	9.5%	6%
Company size		
Turnover below $ 5 million	6.3%	8.0%
Turnover above $ 5 million	10.2%	5.2%
Business model		
Service	9.8%	5.5%
Product	6.1%	5.7%
International development centers	16.1%	14.8%
Share of foreign sales in turnover		
Below 50%	7.4%	6.4%
Above 50%	9.9%	5.8%
Age of company		
Less than 10 years	9.9%	7.4%
More than 10 years	9.3%	5.3%

If in previous years, major companies drew personnel with work experience from smaller companies, in 2016 employees began leaving companies with a turnover above $5 million more frequently. Small (mainly product) companies evidently have become quite competitive on the Russian labor market.

Activity on the labor market by surveyed companies depending on their location for 2016

	Hired no one	Staff turnover figure	Hired university graduates	Share of companies with staff turnover	Staff turnover figure	Hired university graduates
Moscow	25%	6.1%	7.7%	39%	10.8%	4.1%
St. Petersburg	25%	7.5%	10.3%	79%	7.9%	6.0%
Regions	23%	6.5%	8.2%	62%	7.8%	6.7%

In almost all the years of our survey, the highest activity on the labor market is invariably recorded in Petersburg. In this city, the staff turnover is traditionally higher, and has the largest percentage of university graduates on staff. For 2016, Petersburg ceased to be the

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leader in these figures, but it had more companies from which core employees left. On the whole, staff turnover took place for the vast majority of Petersburg companies, but on average it was not very high (at the level of the regions, and lower than in Moscow).

There are usually fewer companies in the capital which core employees leave, and the figure of staff turnover is lower. Additionally, Moscow companies hire fewer university graduates, as they have a supply of experienced specialists from the regions. For 2016, Moscow became a leader for the figure of the average staff turnover. However, this leadership in the companies surveyed was provided by 2-3 major software developer companies. Only 39% of Moscow companies faced a loss of core employees in 2016, which is much less than in Petersburg and the regions. Evidently, Moscow's leadership in the staff turnover figure was caused by accidental factors (perhaps the reorganization of the major companies surveyed).

Owing to the geopolitical crisis and the drop in average growth rates of staff number, the share of graduates in the staff of companies dropped considerably. If in a period of high activity on the labor market it grew in 2013 by 8.4% (4.6% in the previous year), in 2014 this figure dropped to a record low level – 0.8%. However, in 2015 the figure increased to the 2013 level – 8.1%. In 2016, a small drop to 6% took place. Evidently, this was because of the increase in the number of experienced specialists (from migration of IT specialists from neighboring countries and other industries). From 2014, interest in graduates dropped primarily among major software companies.

6.3.2. The most in-demand specialists

Since 2008 the demand for employees of different types for all companies surveyed has changed insignificantly. Every year, the three most in-demand specialists have been solely developers of C/C++, Java and C#. As there have only been insignificant changes in this sphere over a relatively long period, it was decided not to ask the appropriate question of respondents every year, but with a certain regularity – once every 2-3 years.

For 2015, the most in-demand specialists not included in the table were programmers of 1C, Python (3 mentions), Delphi (3), Objective-C (2), JavaScript (2), ABAP and SQL.

Specialists whom surveyed companies hired most frequently in 2015	
Developer (C/C++)	24%
Developer (Java)	27%
Developer (C#)	24%
Developer (DB)	1%
Test engineer	18%
Web programmer (PHP/MySQL)	15%
Web programmer (ASP.Net/MS SQL)	8%
System administrator (Win)	5%
System administrator (UNIX)	2%
Others	15%

Also in demand were analysts, project heads for introducing banking software, marketing specialists, sales managers, operation managers, 1C analysts, 1C consultants, leaders of software development projects, information protection specialists, technical support specialists and multimedia specialists.For work on foreign markets, developers of Java and C# are most frequently required. For working on the Russian market, the demand for PHP/MySQL programmers is higher.

In Petersburg, companies traditionally hire developers of Java most frequently. We may assume that their share among all developers in the second capital is higher than in any other city of Russia, as the programming language itself (its new versions) were developed in the Petersburg R&D center of Oracle until it was closed in 2016.

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6.4. Remuneration of labor

6.4.1. Average salary in Russia, in the IT sphere and in the software industry

Statistics saw an improvement in the Russian economy only in 2017. However, in a number of areas an emergence from the crisis was noted or even began in 2016. One of these signs is the increase in the average level of salary, which led to a significant slowing down in the drop of real incomes of developers. The breakthrough took place in 2016: the average salary grew, but still proved somewhat lower than the official level of inflation.

A study by the Korn Ferry Hay Group held in the summer of 2016 showed that the for the first time since the start of the crisis, the drop in salaries in the Russian Federation in real terms began to slow down – it came to 1.7% (in 2015 9.6%). Employees were assisted in reducing losses by the more significant increase in salary by employers – nominally it came to 7% (in 2015 5.6%, in 2014 6%) with a decreasing level of inflation.

Another study (by the recruitment company Antal Russia) showed that employers raised salaries more frequently than they planned to do in early 2016. In March, 54% of employers planned to increase salaries, and in September 75% international and 56% Russian companies participating in the survey announced a salary increase to their employees. In most cases the increase came to around 4-9%.

The State Statistics Committee of the Russian Federation even recorded a growth in salary that was higher than the inflation level, although by symbolic fractions of a percent (0.6%). For 2017 an increase of 2-3% is expected.

Software companies seem to be in a parallel world to the rest of the country's economy, when the crisis and change in the level of salaries are concerned. There is a connection and dependence on other industries, of course. But if the country's GDP drops in ruble terms, the total turnover of Russian software companies may grow by tens of percent. If in almost all industries, salaries freeze or drop, for software developers it increases. But specialists are still not satisfied with the growth rates.

This especially concerns software companies which receive the majority of their revenue from foreign sales. For them, changes on the global market are more important, not only of services and products, but of labor, as their employees are mobile and can move abroad in search of higher wages.

In connection with this, comparative data on the increase in salary for the entire economy and the software industry are illustrative. According to data from HeadHunter, in 2016 only 32% of employers increased the salary of their employers. However, the percentage that reduced salary was almost three times less – 11%. The rest (57%) did not make any changes in the payment of their workers. According to the results of a RUSSOFT survey which involved 152 software companies, only 2% of software developer companies reported a reduction in salary of personnel in 2016. Less than a third (28%) did not raise or lower the level of salaries. 57% of surveyed companies increased the average salary. At the same time, 28% of respondents increased salary by more than 10%. 13% had difficulty answering this question.

If we ignore the companies which did not answer the question, 65% of software companies saw a growth in salary, which is twice as high as for the entire economy for the country, according to the data from HeadHunter.

The salary for all the software companies surveyed by RUSSOFT grew in 2016 by 10% on average. This is almost twice as high as the official inflation level. Companies of other industries also saw this growth, but it only exceeded the price growth in the country insignificantly.

With a 10% growth, the average wage in the software development sphere in Russia came to ₽82-84,000 at the end of 2016. Judging from data from recruiting agencies, in 2017 the growth will remain at the level of the previous year. Accordingly, we may assume that average salary by the end of the year will exceed ₽90,000.

In Russia in 2013-2016, few specialists could expect an increase in salary. Among these few were software developers. However, they also have reason for dissatisfaction. Firstly, their salary was only reviewed in ruble terms, and in dollars it dropped considerably. Secondly, software developers previously achieved a salary increase of 10-20% per year. The increase was almost guaranteed to be higher than the level of official inflation. Before 2016 for three years this growth either remained at the level of inflation, or was lower.

If in 2013-2014 the dynamic of salaries of software developers corresponded to the dynamic of official inflation to some extent, in 2015 the growth of salary was clearly not as great as the growth of prices. In 2013, according to the results of the RUSSOFT survey and data of recruiting agencies, salary increased by 4.5-7% and inflation came to 6.6% In 2014, the average growth of salary for companies surveyed came to 11.6% with inflation of 11.2%. However, this figure took into account payment of salaries at foreign development centers (for example in Ukraine, where the national currency dropped in value even more than in Russia). If we exclude the data of company with a turnover above $20 million with a considerable percentage of employees in other countries (above all in Ukraine and Belarus), growth came to 8.4%, which corresponds to the growth of the average salary in Russia. We should remember that only companies which have foreign sales took part in the RUSSOFT survey, and exporters have always had more possibilities to increase salary in ruble terms.

In 2015, the average growth in salary for companies surveyed (without taking into account the largest ones with a large number of foreign centers) came to 8% with official inflation of 12.9%.

The increase in the average salary determined by RUSSOFT fully corresponds to data from various sources. The consulting company in the management sphere Korn Ferry Hay Group states that people employed in the IT sphere received a salary increase of 7.9%. HeadHunter recorded a salary increase of 9%. The salary index of SuperJob (SJI) for IT increased by 6.4% for the year (from January 2015 to January 2016), and before June added another 4% to the level of the beginning of the year. Differences of 1-2 % in this case are absolutely insignificant, as agencies use different methods of gathering information and calculations. Recruiting companies are usually focused on vacancies – i.e. the salaries offered by employers to new employees. The RUSSOFT survey shows how salary changes for working specialists.

In general, according to data of the SuperJob portal, in the IT industry in 2016 salaries increased on average by 8.2% (this is how the nominal offer by employers increased). This growth was the highest among all spheres of the Russian economy. In construction and the banking sector, the growth came to over 4%, and in marketing and advertising, 3.4%.

Analysts at HeadHunter determined the highest paid industries in 2016. The IT industry was in second placed after the raw materials industry, which does not include oil and gas production (it is placed in a separate category). In IT companies, the average salary was ₽78,000 (at companies of the raw materials industry ₽104,000). The oil and gas sector was in third place. The average salary did not grow over the year and came to ₽76,000).

6.4.2. Cost of person hours

Data on the cost of person hours help to determine the approximate range of expenditure on payment of work in carrying out custom development. However, not a very large percentage of respondents reply to this question (usually around 30%). Accordingly, the selection is not big enough to talk of an acceptable margin of error. When companies are

divided into categories, the margin of error increases even more. In the majority of cases, changes in the cost of person hours (reduction or growth), and also differences in different categories of company look quite logical.

However, for example, it is unlikely that workers are paid less per hour in Moscow than in Petersburg. At the same time, Moscow companies usually have development centers in other cities and abroad. Accordingly, the cost of person hours that they indicate does not show Moscow prices, but the prices for companies with a distributed structure of production departments. The majority of the staff of Moscow companies may be located outside Moscow or even outside Russia.

The increase in the price of person hours per year can usually be seen from the upper level of the range received in the survey. This growth is around 10%. In the lower level there is even a decrease. Evidently this is because the circle of companies surveyed has widened significantly.

Cost of person hour, $ (survey held in spring 2017)

	Software development	Testing	Project managers
For all companies surveyed	25-47	22-40	35-50
Depending on location of head office			
Moscow	22-48	22-39	25-43
Petersburg	27-51	24-45	42-57
Regions	22-36	17-28	26-37
Depending on size			
turnover below $5 million	22-31	18-26	26-33
turnover above $5 million	26-53	23-46	39-56
Depending on share of export in turnover			
below 50%	25-34	20-26	24-34
above 50%	25-49	22-42	37-53

6.4.3. Change in average salary in different categories of companies

Average growth of salary in ruble terms for different categories of companies surveyed

	For 2015	For 2016
All companies surveyed	+8%	+10%
Location of head office		
Moscow	+7%	+7%
Petersburg	+8%	+8%
Other cities of Russia	+10%	+14%
Company size		
turnover below $5 million	+9%	+9%
turnover above $5 million	+7.8%	+10%
Export share		
below 50%	+6.6%	+10%
above 50%	+10%	+9%
Business model		
developers of ready-made solutions	+4%	+7%
developers of custom software	+9%	+11%
Age of company		
more than 10 years	+10%	+10%
less than 10 years	+8%	+9%

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Over the last two years, we should note higher growth rates of average salary in regions than in Moscow and Petersburg, and also an increase in salaries in companies which are primarily focused on the Russian market. Developers of ready-made solutions over the last two years raised salaries to a lesser degree than service companies which drastically increased export. However, in 2016, the difference between them decreased.

6.4.4. Level of salary for individual popular professions

Of the 10 professions which had the highest increase in salary according to Superjob, 6 were directly connected to information technology.

IT professions which featured in the top 10 professions with the highest salary increase in 2016

	Salary range	Annual increase
Oracle developer	₽100-120,000	21%
Head of software testing department	₽120-165,000	18%
Head of Internet projects	₽100-150,000	17%
Java programmer	₽100-130,000	14%
PHP programmer	₽90-120,000	12%
System analyst	₽90-140,000	11%

* This range corresponds to the salary of specialists with work experience from 1 to 3 years and a qualification level not below the average
Source: Superjob.ru

Average salaries offered in 2016 in major Russian cities (level of position – specialist), ₽ thou.

	Moscow	Petersburg	Novosibirsk	Tomsk	Yekaterinburg	Kazan	Rostov-on-Don
Web-developer	85	68	62	51	58	53	45
PHP-programmer	92	81	63	52	63	62	48
Developer of mobile applications	132	98	70	69	71	69	66
Java programmer	132	107	84	89	70	75	-
Android developer	131	109	79	73	73	70	60
iOS developer	136	108	76	75	75	80	69
C++ programmer	110	93	81	71	81	96	77
C# programmer	104	78	61	58	62	49	57

Source: HeadHunter

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The ratio of the average salary in Moscow, Petersburg and other major Russian cities has not changed significantly in recent years. Evidently it will stay the same in coming years. If in a certain region there is a breakthrough in software development, with the emergence of major companies of an international level, the salary level there may approach the Moscow level.

Salary of PHP developers in Moscow

Level of professionalism of employee	Work experience	Salary range	Maximum salary
Junior PHP developer	None	₽40-60,000	₽65,000
PHP-developer	From 1 year	₽90-120,000	₽180,000
Leading PHP-developer	From 3 years	₽120-150,000	₽250,000
Head PHP-developer / Team Leader	Over 5 years	₽150-220,000	₽300,000

Source: Superjob.ru

Change in salary indexes of Superjob (SJI)

	01.01.2016	01.01.2017	Growth in 2016	1 Sep. 2017	Growth in first 8 months of 2017
System administrator	122.22	133.33	9%	137.78	3%
PHP-programmer	172.73	185.45	7%	190.91	3%
Web-designer	144.44	157.78	9%	166.67	6%
1C Programmer	136.99	136.99	0%	143.84	5%
Specialist on information security	146.55	137.93	-6%	137.93	0%
Java programmer	155.88	176.47	13%	202.94	15%
System analyst	153.85	166.15	8%	161.54	-3%
Internet project manager	155.56	168.89	9%	166.67	-1%
Oracle developer	146.15	176.92	21%	187.69	6%
Technical support specialist	162.96	166.67	2%	177.78	7%
Average index	149.73	160.66	7%	167.38	4%

Source: Superjob.ru

As in 2014-2016 the ruble devalued in relation to the dollar by more than two times, the average salary of software developers in ruble terms dropped in this period by 31%-35%. For employers, the purchase power inside Russia dropped insignificantly, but the competitive ability of Russian software companies on the world market increased (this primarily concerns developers of custom software).

In 2017 a growth of the average level of salary by around 10% is expected, along with a strengthening of the ruble in relation to the dollar (also by around 10%). Accordingly, revenues of specialists in software development will grow in dollar terms by more than 20%. Thus, the pre-crisis level of salary will not be reached, but at these rates it will be possible to reach it in one to two years.

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6.5. Personal training. Universities

6.5.1. Number of graduates by IT profession

The existence of a clear major deficit in the software industry and the IT sphere in general shows that the number of graduates of the appropriate professions must be increased significantly. However, there is no data about what this growth should be, the possibilities for increasing the selection of graduates of universities with required basic knowledge and the number of qualified teachers, or which IT professions that are especially in demand should show a higher growth.

The current requirements of the industry are not quite clear – how many, what kind and what level specialists are required. Not to mention the future demand, taking into account the emergence of a large number of new high technology companies and international technological trends.

There is not even reliable information about existing volume of the number of graduates who have studied IT professions in Russian universities. There is only some data which makes it possible to make very approximate (practically expert) assessments.

Of 2,607 Russian universities, training specialists in the field of information technology is carried out in 951 universities. This information was received from the study "The economy of runet 2014-2015 RAEC, Superjob.ru".

According to data from the Federal service of state statistics, in Russia there are 4,766,000 students. 2,269,000 of them study intramurally. There are approximately five times fewer graduates, and IT professions account for 14% of all study programs. Thus, in Russia there are around 60,000 graduates who have studied intramurally, and have a degree in information technology (if we accept that the percentage of programs corresponds to the percentage of students).

If we take into account students with other forms of study, we get around 130,000 students. Almost all IT specialists have programming skills, but not more than half can work as programmers. The number of graduates must be divided approximately in half, if we need to determine who will work in their chosen field. As a result, of 60-65,000 university graduates who received training in the field of programming, around 30,000 work as programmers. Software companies get around 8-10,000 of them. Generally, this agrees with RUSSOFT data on the growth of the number of software developers working in the entire economy of the country, and only in the software industry. Additionally, we know that around 65,000 people pass the IT state exam. This is about the same number as those who enroll in IT subjects at universities with intramural form of study.

The largest collection of data on future graduates who study at universities in IT professions was conducted by the Club of professional development "IT Planet" in 2017. A survey of Russian universities took place in the first half of 2017 as part of preparation for holding the competition "IT Planet 2017". The information gathered in this way was submitted to RUSSOFT for analysis. It was found that 111 universities had trained 22,500 engineers in 2017 who study IT professions (or professions closely related to IT).

However, even this large-scale survey did not include the leading universities of Moscow and Petersburg. Many regional universities did not answer the questions of the IT Planet professional development club either. We may assume that the total number of university graduates in 2017 was around 3 times higher than at the 111 regional universities.

The study conducted by the IT Planet club of professional development with RUSSOFT made it possible not so much to calculate the total number of graduates in IT professions as to determine the dynamic (universities indicated how many graduates they expect in 2017-2021) and compile a series of ratings (professions, regional universities, cities and federal districts).

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Thanks to the activity of the industry umbrella Association of companies of computer and information technology (ACCIT) the number of budget places for IT professions at Russian universities has increased in recent years. At any rate, in 2016 the Ministry for Communications and Media reported an increase of 31%. As a result, in recent years the state order for IT specialists has grown by more than 70%, rising from 25,000 to over 42,500 budget places. In 2017, an increase of around 30% more is expected from a reduction of budget places on other professions which are not in demand. Accordingly, in several years the number of graduates in IT professions should double.

In late 2011, Russian Prime Minister Vladimir Putin approved the list of professions at universities and fields of scientific workers complying with priority areas of modernization and technological development of the Russian economy. The list included more than 100 professions, around a third in the ICT sphere. From 2012, students and scientific workers who chose professions corresponding to priority areas are eligible for presidential and governmental scholarships, which are quite respectable by Russian standards.

Additionally, the Russian Education Ministry approved a three-year program for retraining engineering personal, in which at least 15,000 people will study. Realization of this program will take place according to the principle of private-state partnership. The education ministry is prepared to finance up to 50% of expenses of employers for training engineers. For these aims, it is proposed to allocate up to $10 million annually from the state budget of the ministry. This program involves retraining in Russia, and also internship by specialists abroad. Similar measures are being carried out and prepared at regional level.

The Russian government passed a decision on monitoring job-placement for university graduates. An according system was developed by the Minister of Education and Science, the Federal Education and Science Supervision Service and the Pension Fund. The heads of these department signed an agreement in May 2015 on information cooperation for forming data. It is proposed that an analysis of job placement of graduates will help to predict the demands of the Russian economy and qualified personal in determining the number of budget places by profession and areas of preparation for training under programs of higher education.

6.5.2. Popularization of IT education

With the general drop in the number of school graduates as a consequence of the "democratic slum" caused by perestroika, the popularization of IT professions becomes particularly important. With the goal of stimulating young people to enroll in IT fields at universities, the large-scale campaign "Code Hour" was held in Russia in December 2014, in which over 7 million children from over 35,000 schools in all federal districts of the country learned about the basics of programming. This campaign encompassed 70% of Russian schoolchildren over the course of a week. In 2015, over 8 million children took part in a similar campaign.

The campaign was held with the support of the Ministry of Education and Science, the Ministry of Communications and Media, and also leading companies of the Russian IT industry. It allowed children and their parents to assess the importance of IT as a subject of the school curriculum, and perhaps decide that IT was the sphere for subsequent study and building a career.

Additionally, for the popularization of IT and initial preparation in the field of information technology, the Ministry of Communications and Media and the Moscow department of education together with the companies 1C, ABBYY, Mail.ru group and Yandex selected 50 Moscow schools in a competition to organize IT subjects and IT classes. Ministry representatives believe that this experience may be applied to other Russian cities.

Evidently, the popularization of the IT professions is bearing fruit. According to a survey conducted by Levada Center in mid-2016, 17% of parents want their children to become programmers. This is the highest figure among all professions, at the same level as doctors. Lawyers, economists and financiers each received 13%.

A survey by VTSIOM held at around the same time shows a great difference in the popularity of technical and humanitarian specialists. 40% of Russian surveyed would like to see their children and grandchildren as specialists in a technical sphere, and only 16% in a humanitarian sphere. The enrollment in universities in the summer of 2016 also shows that technical professions are increasingly attracting young people.

In summer 2017, it was decided to popularize the "digital economy" among schoolchildren. Graduates in 2020 will be able to take a test on knowledge of a number of appropriate disciplines, which will give them a few additional points to enroll at university. The project of the state program "Digital economy" contains the section "Personnel and education", which includes the "system of attestation norms of competence for the 'digital economy', which gives enrolling students advantages equivalent to GTO norms".

On the whole, various one-off campaigns, methodological work and the example of young people who find good jobs in software companies in various cities are bearing fruit. Studies show that over half of Russian schoolgirls see a future in studying mathematics, physics and IT. Essentially the further increase of the share of schoolchildren who are prepared to enroll in universities in IT professions is not all that necessary. It is more important to give these schoolchildren the chance to receive a full higher education, which will enable them to become highly qualified specialists in demand by Russian IT companies.

6.5.3. Quality evaluation of university work

For all the deficit of IT personal (in particular software developers), the main thing is not so much the number of young people with a diploma of high education in the appropriate profession, as the quality of training. We can only talk of a sufficient or insufficient number of graduates if they have certain knowledge and skills which make recent students in demand among Russian companies (especially Russian software exporters).

In connection with this, the question arises about the quality evaluation of universities in training IT specialists (programmers). If we examine Russian software developers in general, there are quite objective indicators of the high level of their training. If they are not the best, they are among the best. This is also shown by the victories of Russian students at various programming competitions (for more detail see subsection 6.5.10. participation of Russians in international programming competitions), and the work of hundreds of thousands of graduates of Russian universities abroad (at the same time they hold high positions in major world companies).

The data for testing knowledge on programming for a considerable number of programmers (not necessarily the very best) also shows that Russian programmers are among the finest in the world. The results of a study based on this test was presented in the summer of 2016 by the company HackerRank, which has an online platform of test exercises on programming. The conclusion is the following – Russia is in second place on the international general rating after China, with an insignificant lag (99.9 and 100 points respectively). Both leaders are ahead of Poland, which holds third place with 98 points. The lead on the USA, which holds 28th place with 78 points, is enormous, despite the fact that American companies are able to attract the best programmers from all over the world. India, which leads the world market of services for custom software development, is even lower – in 31st place with 76 points.

If in the general rating of HackerRank Russia is in second place, it leads in solving tasks involving algorithms. These tasks correspond most fully to the technological trends which were determined by Gartner analysts and other research companies with authority

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in the world. Tasks connected with algorithms are the most popular: they are chosen by around 40% of participants of HackerRank tests. They involve carrying out, for example, data sorting, dynamic programming, search by key words etc. To solve these types of tasks, any programming language may be chosen.

HackerRank also ranked countries by other types of tasks, which are divided by programming languages or certain spheres. Russia is in 5th place in the Java category, in 4th place in Data Structure, 2nd in C++, 5th in Python, 4th in SQL, 4th in Artificial Intelligence, and 3rd in Functional Programming.

Victories in competitions, and the mass hiring of Russian developers overseas and the results of testing make it possible to assess the general level of Russian programmers, but not the quality of training of a specific university. This assessment exists in part, if teams from a university take part in competitions, but victories of these teams shows the high level of training at a certain department or laboratory, and not the entire group of students. Usually universities that nurture champions also have quite a high average level, but from the employers' standpoint, there is no guaranteed 100% link between the victories of their best representatives and the effective work of the university. Additionally, winners and prize winners of prestigious international programming competitions come from 10-20 universities, and hundreds need to be assessed.

6.5.4. Postgraduate education

Software companies gain staff not only from university graduates, but also as a result of retraining personal. Many universities graduates who are not IT specialists can requalify quite quickly, as they have certain basic knowledge. To solve the problem of the personal deficit in the IT industry, in 2015 the Ministry of Communications and Media together with the Ministry of Labor and Social Welfare and regions of the Russian Federation initiated the inclusion of IT professions in regional program financed by the state for the requalification of freed-up specialists from other fields. At the moment of preparing this survey, we only have one example of realizing these programs in the regions. In 2016, as part of this program in St Petersburg over 50 people underwent training. The ministry for economic development plans to conduct 2 pilot projects on the basis of this experience in Perm and Tula in 2017.

The first example of retraining IT specialists in St. Petersburg was based on the initiative of RUSSOFT to create a system of raising qualifications and retraining personal by study centers of software developer companies. In June 2013 in St. Petersburg, RUSSOFT, with the support of the American Chamber of Commerce, founded the Academy of postgraduate IT education, where on the basis of study centers of commercial companies, around 10 departments work which offer modular programs for retraining specialists in various IT spheres – from programming and testing software to applied programs at the level of city/company.

For all the desire of software companies to take part in this project, in 2016 only a few companies made appropriate applications. Applicants for city subsidies were deterred by the procedures of organizing retraining, which are directed exclusively to retraining specialists at universities, and also by drawing up of a large number of documents and the risks involved from checks connected with state financing. These checks take time, and violations may take place because of an ignorance of legal subtleties.

6.5.5. Study at foreign universities

In 2014, the Russian government launched the program "Global education", which involves paying students scholarships of up to 1.38 million rubles per person. Subsequently this limit was increased to 2,763,000 (around $40,000) because of the devaluation of the ruble. This sum may be spent on training Russian students at leading foreign universities in a number of IT professions (in particular "computer and

information sciences", "information and computing technology" and "information security"). The scholarship may also be spent on travel to the place of study, medical insurance, accommodation, food, educational and scientific literature etc.

The government has determined the list of foreign universities and fields of training that come under the program. This list has been expanded in recent years. As of October 2017, it included 288 universities from 32 countries, including American universities: Harvard University, Massachusetts Institute of Technology, the Universities of California in Berkeley and Santa Cruz, Columbia University and others.

Initially this program was planned for 2014-2016, but then was extended until 2025.

The condition for a state scholarship is a decree not lower than a bachelor's degree, and the obligation to take a job in the acquired profession at a Russian company, university, scientific or medical organization for a period of three years. Breaking the last condition means returning the sum received and paying a fine of double the amount.

By October 2017 40 people had been placed in jobs, who had received additional education abroad under the "Global education" program, and another 17 people had completed studies and were waiting for suitable vacancies. Of all the people who found jobs, 22 were engineering and science personnel. It is proposed to give a total of 718 people training and job placement under the program.

According to comments by young people who studied abroad, they were able to look at the situation in their own country from the outside, and find out how certain problems were solved in other countries. Additionally, this study leads to a growth in the number of personal ties, which then has a positive effect on the international business of Russian companies, including IT developers.

6.5.6. Involvement of business in the process of training personnel

Software companies (both Russian and foreign) make a great contribution to training highly qualified personal. In many ways, thanks to them the share of graduates who immediately or after brief additional training find work in their acquired profession of software developer is around 50%. Without business and the self-training of young people this percentage would be close to zero.

As teaching work is still not well-paid and prestigious, universities still have teachers who do not know the industry that they train specialists for. This problem is partially solved by representatives of business (including even owners) going to universities themselves and delivering lectures to students. This is how students find out about the industry.

Major and even medium-sized companies, besides working with universities, have their own study centers, where they train specialists for their own companies and for the entire industry. Some representatives of the industry believe that personnel for the IT industry can be trained at private universities, which should be founded by big business.

However, at present commercial companies carry out the function of the state for training personnel at their own expense. At the same time, officials from the ministry of education and science force private educational centers to undergo licensing and try to control their work. Software companies do not expect anything from this control but extra expenses and bureaucratic pressure.

In the summer of 2017, the Institute for the Development of the Internet and RUSSOFT sent the Ministry of Communications and Media proposals to train personnel for the digital economy. These proposals involve introducing tax preferences for IT companies which work in education or retraining specialists in IT. For example, they organize joint departments with universities of the country. A reduction in VAT rates by 6-7% is also proposed. But these proposals have yet to be accepted.

According to our study, in 2015 and 2016 the share of companies which have programs for working with universities increased. Almost all major IT companies which have been working actively and for a long time with universities, announced in 2013 and the first

half of 2014 about the launch of new education programs, or the expansion of already existing cooperation. There are many more reports about such initiatives than in the previous several years.

If we judge by the results of the RUSSOFT survey, in 2014 the activity of software companies in this sphere dropped compared to the previous year, but in 2015 it began to restore itself again – 60% of surveyed companies worked with universities. This is the highest figure since 2008. In 2016 it increased further up to 70%.

Main forms of cooperation of companies with universities in 2008-2016

	2008	2009	2010	2011	2012	2013	2014	2015	2016
Internship for students	42%	41%	41%	37%	39%	45%	38%	43%	51%
Job placement for graduates	34%	23%	26%	32%	31%	32%	24%	39%	36%
Courses for employees	24%	21%	18%	17%	19%	14%	12%	23%	18%
Others	1%	14%	10%	17%	12%	19%	37%	11%	9%
No cooperation	42%	48%	48%	48%	53%	46%	53%	40%	30%

According to the survey by the research center Superjob conducted in summer 2017, according to the majority of young specialists, the main obstacle in finding a job after graduation is the lack of work experience (67%). 14% of respondents mentioned a small amount of vacancies in their field, and 6% were unhappy with the salaries offered. Only 5% confidently stated that they did not have difficulties finding a job, as they had internships during study at university or even combined work and study.

62% of young people found a job in the company where they did an internship. Another 19% received a job offer, but turned it down for various reasons. Only 13% completed an internship without receiving an offer to remain in the company. The survey was not limited to any particular field, but similar results are probably seen in the IT industry.

A change in the share of companies cooperating with universities has taken place over the last two years, mainly from companies with a turnover below $5 million.

Main forms of cooperation of companies with universities depending on company turnover in 2016

	over $100 million	from $20 million to $100 million	from $5 million to $20 million	from $1 million to $5 million	under $1 million
Internship for students	100%	67%	77%	45%	46%
Job placement for graduates	100%	67%	45%	29%	35%
Courses for employees	100%	50%	32%	14%	14%
Others	0%	17%	27%	10%	3%
No cooperation	0%	17%	0%	41%	32%
(previous year)	(0%)	(22%)	(17%)	(41%)	(52%)

Among large and medium software and IT companies (both Russian and foreign working on the Russian market) there are very few which do not cooperate with universities, and this has been the case for a long time. Medium and large companies have launched new programs in recent years offering support of the education system.

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In 2014, the share of companies surveyed increased significantly which practiced other forms of cooperation (besides internship, job placement and courses for their own employees). If in previous years these forms of cooperation were mentioned by 10-20% of respondents, in 2014 37% mentioned them. Evidently, in the crisis year companies began to look for new possibilities of establishing cooperation with universities, which are of interest to the universities and which involve financing even for not very large companies. In 2015, the share of companies practicing other forms of cooperation dropped to the level seen before 2014, and in 2016 a further drop took place – from 11% to 9%.

Other forms of cooperation (beside internship, job placement and courses for employees) mentioned by respondents over the last four years were the following:
- creation of a basic department and laboratories;
- summer internship;
- graduation practice;
- themed conferences, science festivals
- free software (or at preferential prices);
- free training center for students;
- mentoring programs;
- stands for universities;
- educational programs;
- training courses for local university students;
- joint educational projects
- provision of study materials;
- career days and vacancy fairs;
- competitions of degree works;
- programming competitions, organization of Academic Olympics;
- student projects under guidance of company employees;
- free training center for students;
- advanced training programs
- participation in qualifications commission;
- lectureship, research work;
- joint research and development efforts;
- student center for software development;
- provision of corporate scholarships;
- sponsorship of Academic Olympics at universities, meetings, seminars.

A vast list of various cooperation programs has been presented traditionally by the EMC Company (in particular: successful freshman's scholarships, a mentorship program, a joint research program, joint student educational projects, excursion programs for students and schoolchildren, an academic partnership program). Other foreign corporations offer an extended list of cooperation programs as well. They are involved intensely in the training of human resources.

6.5.7. Russian universities in international and Russian ratings

As a rule, Russian universities are placed far outside the first hundred of the international rating lists of universities, although in some fields they can be considered to be among the world's best. One of the main reasons is the small volume of R&D carried out by higher education institutions by orders of companies. Historically, Russian universities have never focused on this kind of research, which was dealt with by other organizations (sector research institutes and institutions at the Russian Academy of Sciences).

However, in recent years universities have changed their attitude towards R&D, and the government has encouraged the emergence of universities with the status of "national research universities".

In addition, it is of great importance to the position of higher education institutions on the rating list that they have not yet learned how to work with rating agencies, which do not have enough information on higher education in Russia. In the future, the situation may change and Russian educational institutions will break into the lists of the world's leading universities in international ratings. To implement measures to achieve this result, it was proposed to allocate 40 billion rubles over the course of 4 years (later the amount increased to about 60 billion rubles). As a result of the first tender, a percentage of this money has been already allocated to 15 Russian universities. In 2013, each of them received about 600 million rubles ($20 million) for those purposes. In October 2015, another tender was held, as a result of which the number of higher educational institutions increased to 21.

The goal of the "5-100" Program is not to break Russian universities into the top 100 on any international list by any means possible. The main thing is to improve the quality of university work by maximizing the competitive position of the group of leading Russian universities in the global market of educational services and research programs. It is quite possible that the quality can improve without any upward movement on the rating lists.
As regards some parameters, it is incorrect to compare Russian educational institutions and foreign universities at all. For example, the USA, Great Britain and other English-speaking countries have had an initial advantage that the lecturing is in English, which is an international language. Therefore, universities of these counties can attract foreign students more easily, who under all other equal conditions will still desire to learn English rather than Russian (foreign student numbers significantly influence a university's position on the most renowned international rating lists). Some Russian universities launch their educational programs in English, though the main language must be the national and native one for the majority of citizens.

It is also difficult to attract foreign students because of the negative way that Russia is portrayed in the western mass media. Even the climate could be an important factory — many young people would prefer to live in warm California than in the severe conditions of Siberia.

So there is no reason to bewail the fact that the best Russian universities are outside the top 100 of the international rating lists. The main thing is that progress can be seen in the quality of university work. This progress is partly reflected in the upward movement on international rating lists, and this has been observed in recent years.

For 2013, the renowned QS World University Rankings included 8 Russian universities in the top 500. In the following year almost all of them improved their positions.

In 2015, Russia's presence in the top 500 of the QS World University Rankings rose to 9 universities, while a total of 21 Russian universities entered the top 800. However, when compared with 2014, 7 universities moved up in the rankings and 6 moved down (the rest kept their positions).

In the 2017 rankings, Russia's presence increased to 22 universities as the Novosibirsk State Technical University entered the ratings. 15 universities were ranked higher than 2 years previously, while 6 stayed in the same position. Only St. Petersburg State University dropped in the rankings, but the move was insignificant.

Russian universities on QS World University Rankings

Position in 2017	Position in 2015	Position in 2014	
108 (=)	108	114	Lomonosov Moscow State University
258(↓)	256	233	Saint-Petersburg State University
291 (↑)	317	328	Novosibirsk State University
306 (↑)	338	322	Bauman Moscow State Technical University
350 (↑)	397	399	Moscow State Institute of International Relations (MGIMO University)
350 (↑)	431-440	411-420	Moscow Institute of Physics and Technology State University
411-420 (↑)	471-480	481-490	Peter the Great Saint-Petersburg Polytechnic University
400 (↑)	481-490	501-550	National Research Tomsk Polytechnic University
377 (↑)	481-490	491-500	Tomsk State University
401-410 (↑)	501-550	481-490	National Research Nuclear University MEPhI (Moscow Engineering Physics Institute)
411-420 (↑)	501-550	501-550	National Research University Higher School of Economics (HSE, Moscow)
501-550 (↑)	551-600	551-600	Kazan (Volga region) Federal University
551-600 (↑)	601-650	601-650	National Research Saratov State University
601-650 (=)	601-650	471-480	Peoples' Friendship University of Russia
551-600 (↑)	601-650	601-650	Southern Federal University
601-650 (=)	601-650	551-600	Ural Federal University named after Boris Yeltsin
551-600 (↑)	651-700	701	Far Eastern Federal University
701+(=)	701	701+	Lobachevsky State University of Nizhny Novgorod
601-650 (↑)	701	701+	The National University of Science and Technology "MISIS"
701+(=)	701	701+	Plekhanov Russian University of Economics
701+(=)	701	701+	Voronezh State University
701+ (↑)	-	-	Novosibirsk State Technical University

Note: ↑ - rating up, ↓ - rating down, = - no change

The Times Higher Education World Reputation Rankings 2017 are compiled on the basis of an expert survey by representatives of the international academic community. The opinions of over 10,000 scholars from over 100 countries are taken into account in its preparation.

A Russian university first appeared on the World Reputation Rankings in 2013 – the Moscow State University took 50th place. In 2015, the St. Petersburg State University also appeared in the top 100 (71st-80th place), and MGU rose to 25th place. In 2016 there were three Russian universities in the top 100 – MGU was 30th, SPBGU was 81st-90th, and the Moscow Physico-Technical Institute was 91st-100th. In 2017 MGU remained in 30th place, while SPGU and MFTI were not included in the top 100. Perhaps the reputation of the two Russian universities was affected by the negative attitude of the foreign media towards Russia in general.

In the rankings of the Times Higher Education BRICS & Emerging Economies 2017, which assessed the universities of 41 countries (BRICS and Emerging Economies), of 300 universities, 24 were Russian, almost twice as in the previous year (but only 200 universities were included in the rankings). The highest positions were held by MGU (3rd), MFTI (12th), MIFI (19th), ITMO university (27th) and SPBGU (30th).

From Russia, besides ITMO University, the Higher School of Economics made its debut in the rankings, along with the Saratov National Research University (196th), RUDN (201st-250th) and the Novosibirsk State Technical University (251st-300th). Half of the Russian universities included in The Times Higher Education World Reputation Rankings in 2016 saw their positions drop, but the other half rose in the rankings.

In the Round University Ranking (RUR) for 2017, the number of Russian universities grew considerably – from 23 to 68. The total number of universities in the ranking grew from 700 to 763, but it included more universities from Russia primarily because they improved their positions. If we ignore the expansion of the ranking, there were 43 Russian universities in the top 700 compared to 23 in the previous year.

The highest place in RUR is held by MGU, which rose from 172nd place to 145th. The MIFI National Nuclear Research University was in second place among Russian universities. It also improved its position, rising from 271st to 231st. Tomsk State University (TGU) rose from 327th to 256th.

The RUR list shows that Russian universities are strongest in lecturing quality. In the ranking by lecturing quality, 9 Russian universities entered the global top 200. Moreover, MGU entered the top 50, taking 42nd place by lecturing quality (in 2016 it was in 46th place, and in 2015 67th).

Besides international rankings, there are also various Russian rankings of higher education that reflect certain strong points of the country's universities. For example, Superjob presented rankings of Russian technical universities based on salaries of graduates employed in the IT industry. MGU, which in international rankings is considered the best university in the country, is only in 5th place.

The ranking was made by the Superjob Research Center based on a comparison of the average income levels of the Russian university graduates in 2010—2015. The salaries of the university graduates residing outside Moscow were adjusted by regional coefficients to the level of the Moscow labor market. The regional coefficient is the ratio between the average salary level in a particular city and the average salary level in Moscow.

Superjob ranking of Russian technical universities in 2016 based on salaries of graduates employed in the IT industry, thousands of rubles

Place in 2017	Place in 2016		Average salary in 2016	Average salary in 2017
1	1	Moscow Institute of Physics and Technology (State University)	130	136
2	2	National Research Nuclear University "MIFI"	100	110
3	3	Moscow Bauman State Technical University	96	110
4	4	St Petersburg National Research University of Information Technologies, Mechanics and Optics	87	98
5	5-7	Lomonosov Moscow State University	85	95
6	5-7	Novosibirsk National Research State University	85	90
7	10	National Research University – Moscow Energy Institute	78	87
8	8-9	St. Petersburg State University of Aerospace Instrumentation Engineering	80	85
9-12	5-7	Perm State National Research University	85	83

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Superjob ranking of Russian technical universities in 2016 based on salaries of graduates employed in the IT industry, thousands of rubles

Place in 2017	Place in 2016		Average salary in 2016	Average salary in 2017
9-12	8-9	National Research University – Moscow Institute of Electronic Engineering	80	83
9-12	11-17	National Research Technology University "MISiS"	75	83
9-12	19-21	Moscow Aviation Institute (National Research University)	73	83
13-14	11-17	N.I. Lobachevsky Nizhny Novgorod State University (National Research University)	75	82
13-14	11-17	Ural Federal University named after the First Russian President B.N. Yeltsin	75	82
15	33-36	Kazan (Volga Region) Federal University	70	81
15-16	11-17	D.F. Ustinov Baltic State Technical University "Voenmekh"	75	80
15-16	19-21	Ufa State Technical Aviation University	73	80
17-18	11-17	St. Petersburg State University	75	79
17-18	33-36	Omsk State Technical University	70	79
19-21	11-17	Moscow Institute of Electronics and Mathematics – National Research University Higher School of Economics	75	78
19-21	11-17	Novosibirsk State Technical University	75	78
19-21	19-21	Yu.A. Gagarin Saratov State Technical University	73	78
22	59-60	Siberian Federal University	61	77
23-25	22-27	Moscow State University of Railroads	72	76
23-25	22-27	Far Eastern Federal University	72	76
23-25	33-36	R.E. Alexeyev Nizhny Novgorod State Technical University	70	76
26-29	18	Tomsk National State Research University	74	75
26-29	22-27	D.I. Mendeleyev University of Chemistry and Technology	72	75
26-29	-	Moscow University of Technology	-	75
26-29	28-32	Peter The Great St. Petersburg Polytechnic University	71	75
30-31	40-42	Tula State University	67	74
30-31	43-46	Astrakhan State Technical University	66	74
32-36	22-27	South Ural National State Research University	72	73
32-36	22-27	Ulyanovsk State Technical University	72	73
32-36	33-36	V.I. Lenin Ivanovo State Energy University	70	73
32-36	43-46	Izhevsk State Technical University	66	73
32-36	43-46	Ulyanovsk State University	66	73
37-42	22-27	M.I. Platov South Russian State Polytechnic University (NPI)	72	72
37-42	28-32	F.M. Dostoyevsky Omsk State University	71	72
37-42	28-32	Tyumen State University	71	72
37-42	37-39	Orenburg State University	68	72
37-42	40-42	Volgograd State Technical University	67	72
37-42	40-42	Far Eastern State University of Railroads	67	72
43-47	28-32	Irkutsk State University	71	71
43-47	28-32	Irkutsk National Technical Research University	71	71
43-47	37-39	Penza State University	68	71
43-47	37-39	Altai State Technical University	68	71
43-47	47-53	Ryazan State Radio Technical University	65	71

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RUSSOFT, as an association of software developers, makes its own rankings of universities based on a survey of CEOs of Russian software companies. It takes into account the number of mentions of universities as suppliers of employees for companies over the last 4-5 years. The respondents indicate the universities whose graduates they believe are in greatest demand.

The list has existed for several years. It is updated every year to take the most recent survey data into account, but over the course of a year it cannot show major changes, as data for several years is summed up.

As the RUSSOFT survey annually covered over 130 companies (152 in 2017) and every year the participants changed by 70-80%, the summary ranking over four years reflects the opinion of over 300 employers of the Russian software industry.

Rankings of universities according to the assessment of employers (software companies) over the last four years

1	Bauman Moscow State Technical University	72
2	St Petersburg National Research University of Information Technologies, Mechanics and Optics	69
3	St. Petersburg State Polytechnic University	66
4	Moscow State University	64
5	St. Petersburg State University	63
6	Moscow Physical and Technical Institute	41
7	St. Petersburg State Electrotechnical University	37
8	Novosibirsk State University	31
9	Moscow Institute of Engineering and Physics	27
10	Novosibirsk State Technical University	22
11	Southern Federal University	20
12	Tomsk Polytechnic University	15
13-14	St. Petersburg State University of Aerospace Instrumentation Engineering	14
13-14	Tomsk State University	14
15-16	Izhevsk State Technical University	12
15-16	Tomsk State University of Systems of Guidance and Radioelectronics	12
17	Penza State University	9
18-19	Voronezh State University	7
18-19	South Urals State University	7
18-19	Chelyabinsk State University	7
21-24	National Research Technological University (Moscow Institute of Steel and Alloys)	6
21-24	Ural Federal University named after the First Russian President B.N. Yeltsin	6
21-24	Belgorod State University	6
21-24	Ulyanovsk State Technical University	6
25-27	Omsk State Technical University	5
25-27	Don State Technical University	5
25-27	Higher School of Economics	5

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Rankings of universities according to the assessment of employers (software companies) over the last four years

28-33	Moscow State Institute of International Relations	4
28-33	Samara State Aerospace University (Kuibyshev Aviation Institute)	4
28-33	Kazan (Volga Region) Federal University	4
28-33	Nizhny Novgorod State Technical University (NSTU)	4
28-33	N.I. Lobachevsky Nizhny Novgorod State University (National Research University)	4
28-33	St. Petersburg Bonch-Brunevich State University of Telecommunications	4

Source: Annual survey by RUSSOFT

Over the last four years, respondents mentioned 97 universities (universities after 33rd place did not receive more than 3 votes), and a total of 119 since the rating was started.

A change has taken place at the top of the rating: the Bauman Moscow State Technical University has risen from second place to first, replacing the St Petersburg National Research University of Information Technologies, Mechanics and Optics (ITMO). But the difference between them is insignificant and located within a margin of error.

There is only a significant difference between the universities that occupy 5th and 6th place respectively. So we may confidently state that there are five leading universities are approximately at the same level (in the previous version the top seven universities could also be singled out in this way).

In the top five, we may note the move from 5th to 3rd place by the St. Petersburg State Polytechnic University, which is unlikely to be coincidental. This university demonstrates its development in various fields, which must also affect the quality of training personnel for high technology industries.

From the 6th to the 11th place, universities are arranged in pairs, judging by the similarity in frequency of mention by employers. Compared to the previous version of the rankings, they have maintained their positions.

We should also note the appearance of three Tomsk universities in the second group of 20 (they have an insignificant difference in number of mentions, and so they can be classified in the same category), along with the Penza and Chelyabinsk Universities, and also the South Urals State University (Chelyabinsk). This rise is connected with the more active participation in the 2017 survey by companies from Penza, Chelyabinsk and Tomsk. If they had also been active in the previous three years, their positions may have been even higher. We may say that universities of these cities have now occupied the positions that they deserve, because there at least 100 software companies working in Tomsk and Chelyabinsk (there are slightly fewer of them in Penza – 30-40).

There are also many software developer companies in Tatarstan. However, we have not yet been able to cover these companies fully in our annual survey, although attempts were made to include local institutions of development in the study. Owing to the low representation of companies of the republic, the highest position in the rating (28th-33th place) among universities of Kazan is the Kazan (Volga Region) Federal University. The positions of universities from the capital of Tatarstan should probably be higher.

We should note that some regions have a small number of software companies, which does not allow local universities to gather a sufficient number of rating points. Nevertheless, the quality of education at them is at quite a high level.

Also, some universities may train high-class specialists, but lag behind competitors by its number of graduates who go to work in software companies of the region, as their graduates go into other industries of the Russian economy. As we know, software companies account for 25-30% of all working programmers, and the rest work at other IT companies or at IT departments of various companies, organizations and state structures.

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Thus, the demand of software companies for graduates of a certain university does not always reflect the quality of their training 100%, although the presence of a mass of competent specialists with a good university education in a city means that this city should also have successful software companies.

6.5.8. Participation of Russians in international programming competitions

It is difficult to compare Russian and foreign universities, as historically they have had different goals. Nevertheless, higher education institutions in Russia take the highest positions in some specific rankings. For example, the St. Petersburg National Research University of Information Technologies, Mechanics and Optics (SPNRU ITMO) is the best in the world by results in the ACM International Collegiate Programming Contest throughout the entire period that the contest has existed.

SPNRU ITMO is a seven-time world champion. No other team has won so many times over the entire 39-year history of this competition (Russian companies have only been taking part in it since 1995).
Several other Russian universities in the organizers' ratings of this contest are in the top 20. A team from St. Petersburg State University has been world champion four times, and a team from Saratov State University won this title once.

Some more Russian universities also regularly take high places in this main contest of programmers. Over the last 6 years, there have usually been at least 4 Russian teams among the 12 prize-winners of the contest. A total of 14 Russian universities have won been prizewinners of the ACM ICPC world championship.
In June 2014, the ACM ICPC world championship was held in Russia for the second time in its 40-year history in Yekaterinburg. In the previous year, the prestigious contest competition was hosted by St. Petersburg. The performance of Russian students in 2014 was again triumphant. The team of the St. Petersburg State University was the all-round champion. The second place was taken by Moscow State University, which like SPbGU was awarded a gold medal (gold goes to the first 4 places). A bronze medal and the 9th absolute place was taken by the St. Petersburg University ITMO. Another medal (in this contest there are 12 of them) went to the National research university Higher School of Economics (a bronze medal and 10th place).

In 2015, only two Russian teams were ACM-ICPC prizewinners, but again they occupied the first two places. The team of the St. Petersburg University ITMO was the all-round champion for the 6th time, and 2nd place was taken by Moscow State University.
In 2016, 5 Russian teams were again among the 12 prizewinners. SPbGU students were the champions (for the fourth time in their history), the Moscow Institute of Physics and Technology came 4th, ITMO University 7th, Ural Federal University 8th, and Nizhny Novgorod State University 10th. Several more Russian universities were not far from prize positions – the Moscow Aviation Institute, Moscow State University, Saratov State University, and St. Petersburg Academic University. All of them have shared 14th position from the top with about ten universities of other countries. The top 50 of the competition included the Innopolis University from the new town of the same name in Tatarstan, and this university only welcomed its first students in 2015 (just over 300).
In 2017, ITMO University won first place, SPBGU came 4th, MFTI 5th and the Urals Federal University 10th. Perm State University was just one place behind the prize-winning 12th place. The top 20 also included Saratov State University and St. Petersburg Academic University.
128 teams took part in the final of the ACM-ICPC in 2017, after winning the regional semifinals. At the earliest stages of the competition, over 46,000 students from 2,948 universities of 103 countries took part.

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These competitions in many respects reflect the quality of programmer training. Judging by their results, programmer training in Russia is the best in the world, although in the last decade, Chinese universities achieved similar great progress. Among leaders and prize-winners, there have been teams from Poland, Belarus, and Ukraine, but these countries do not have as many strong teams as Russia and China. Individual representatives of Western Europe and the USA sometimes appear among the top teams. Champions and prizewinners in contests do not always achieve such outstanding results in practical work for commercial and state structures. However, they can usually also meet the most complex challenges in their labor activities, which is confirmed by the fact that many Russian ACM contest champions and prize-winners have established successful software companies or work as key experts for these companies (DevExperts, SPb Software, Yota, VKontakte).

Prize-winning places of teams of Russian universities at the ACM International Collegiate Programming Contest from 1999 to 2017 *

		1999-2012	2013	2014	2015	2016	2017
1	St. Petersburg State University of Information Technologies, Mechanics and Optics	3, 5, 3, 3, 1, 3, 3, 1, 1, 1	1	9	1	7	1
2	St. Petersburg State University	9, 1, 1, 6, 11, 3, 9, 4	5	1		1	4
3	Moscow State University	9, 2, 2, 9, 10, 5, 2, 10, 10	10	2	2		
4	Saratov State University	6, 7, 1, 6, 4, 7, 6					
5	Izhevsk State University	8, 9, 3					
6	Altai State Technical University	3, 8					
7	Moscow Institute of Physics and Technology	3				4	5
8	Perm State University	4	13				
9	Petrozavodsk State University	13, 10, 5					
10	Novosibirsk State University	5					
11	Nizhny Novgorod State University	5				10	
12	National Research University Higher School of Economics			10			
13	Ufa State Aviation Technical University	10					
14	Ural State University	13,11				8	10
	Total prizewinners	from 2 to 5	4	4	2	5	4

* the quantity of medal places varied from 10 to 13 during this period
Source: ACM International Collegiate Programming Contest, rating compiled by the RUSSOFT Association

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Russians also win other competitions of programing and information technology. Three years in a row, they have been the winners of the Facebook Hacker Cup. In 2013, as two years previously, these competitions were won by Pyotr Mitrichev, and in 2012 the winner was Roman Andreev from St. Petersburg State University. In 2014 the winner was the Belarussian Gennady Korotkevich, who became a student of the St. Petersburg ITMO university. He also won in 2015, and in the same year Gennady Korotkevich was the world champion as part of the ITMO team at the ACM ICPC contest. Additionally, in the summer of 2016 he won the prestigious annual programming competition Google Code Jam for the third year in a row.

Other graduates of ITMO University were also among the top 15 at these competitions: Yevgeny Kapun came 4th and Pavel Mavrin came 13th. In 2017, Gennady Korotkevich once more won Google Code Jam, third-year MFTI student Konstantin Semyonov came 2nd, and Vladislav Yepifanov from NNGU came 3rd.

In November 2015, teams from Moscow and St. Petersburg won four sets of medals – "gold" and "silver" at the 12th World Robot Olympiad (WRO) in Qatar. They won the two golds in the main category (middle age group) and creative category (senior age group), two silver medals in the creative category (junior age group) and in the student category. Another Russian team (from St. Petersburg) came fourth, missing out on a prize, at competitions for robot football, yielding third place to rivals from Hong Kong. Additionally, Russian school pupils took sixth to eighth place in the creative category and ninth place in the main category of the junior age group.

Projects by Russian senior school pupils in mathematics, chemistry, programming, material sciences and engineering won six main and three special awards at the 66th Intel International Science and Engineering Fair (ISEF). The final of the competition lasted almost a week, from 10 to 15 May 2015, and was held in Pittsburg, USA. At the International Olympics for Information Technologies, held in summer 2014 in Taiwan, Russian school pupils won four medals. The first of the two gold medals won by Russians went to the graduate of Lyceum №40 in Nizhny Novgorod, Nikolai Kalinin. The second gold was won by the graduate of the Specialized study center of the Urals Federal University in Yekaterinburg, Nikita Sivukhin. Silver medals were won by the graduate of Lyceum №41 in Izhevsk, Konstantin Semyonov, and the graduate of the Moscow Lyceum "Vtoraya Shkola" Nikita Uvarov.

Students' results at the world programming championship give an idea about the quality of training of students at Russian universities. However, it is more important to assess this quality by employer satisfaction. For this indicator, the rankings of universities will also not be fully objective, but a comparison of universities by different rankings, and ranking by different criteria make it possible to draw more informed conclusions about the work of different universities.

Main conclusions on training personnel for the IT industry:
1. Financing of Russian universities over the last 10 years has improved, which has allowed them to stop declining and to begin to develop.
2. In a number of universities, the teaching staff is getting younger, but this is not sufficient, and only slows down the aging process. There are many teachers in the higher education system who are far-removed from practical activity.
3. The still low salaries of teachers do not make it possible to nurture a new generation of promising and motivated teachers at universities, or attract IT specialists from the business environment to teaching.
4. While there is a lack of money in the entire education system, some universities have such low work efficiency that a justification of state financing may be called into question.
5. University teachers complain of increasing demands for preparing various reports, which take up a lot of teachers' time.

6. For all the criticism of the United State Exam, its introduction has helped many talented young people from the regions to enroll in leading universities that train IT specialists

7. Long-distance education, which many used to feel skeptical about, and the connection of all Russian schools to broadband Internet access, has helped young people in regions where there are no strong universities and schools of physics and mathematics to educate themselves.

8. Technical schools and colleges could cope the task of with training large numbers of programmers. But they are not a source of personnel for Russian software companies.

9. The list of IT professions which are taught at Russian universities has remained unchanged for 20 years. Educational programs are also updated very slowly, although swift changes are taking place in the IT sphere.

10. There is an urgent need for analytical work, both to determine the need of the software industry for different specialists, and to determine the possibilities of universities to satisfy these needs in the foreseeable future. It is very important to take into account the prospects for using computerized learning and systems of automatic programming, which will make it possible to do away with the services of a huge number of programmers with low qualifications. One cannot count on a growth in the number of graduates with degrees in IT without taking into account the quality of training. There are many universities with a large number of graduates whom employers from the software industry do not wish to hire.

11. The data of programming knowledge tests from HackerRank shows that Russian programmers are among the finest in the world. If in the general rating, Russian programmers share 1st and 2nd place with the Chinese, in solving tasks involving algorithms, they hold the absolute leading position in the world. These are the tasks that correspond to leading world technology trends which were determined by analysts at Garnet and other authoritative world research companies.

12. A major contribution to training specialists is made by commercial companies, but they solve state tasks at their own expense, without receiving preferences from the state. At the same time, officials try to control educational centers, in which they train personal for themselves.

13. Russian universities, as a rule, are improving their positions in international ratings.

6.6. Foreign language skills

The share of employees of software developer companies with a good knowledge of English has consistently come to around 70% in recent years. Evidently, after an increase of this figure in previous years, stabilization took place. The share of German-speaking specialists at the respondent exporter companies remains 8-10%. The share of employees speaking other foreign languages is almost the same.

As the figures change insignificantly from year to year, the question about the number of employees who knew foreign languages well was not asked of respondents in 2017.

Share of employees knowing foreign languages well (of total staff numbers of respondent 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%

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However, if the employees of foreign development centers are not taken into account, then the share of those speaking English will be much lower. According to the results of the 2016 survey, the share comes to 55-57%. The same applies to German and other languages (2-3% without employees of foreign centers).

As a rule, a knowledge of English (and other languages) is sufficient for communication with foreign colleagues, and local partners can carry out localization and promotion of solutions.

Among "other" languages (besides English), French was mentioned 9 times, Spanish 6 times, and Dutch, Italian, Korean, Latvian, Lithuanian, Finnish and Czech were mentioned once each.

Languages of the former USSR countries and Russian national republics were also mentioned, although they are unlikely to be useful in promoting services and solutions abroad. Naturally, almost all employees in foreign development centers have an excellent knowledge of the state language in the countries where the centers operate. However, these countries are primarily interesting as labor markets, not as sales markets.

Share of employees with good knowledge of foreign languages, depending on company location

	English	German	Others
Moscow	76%	14%	17%
St. Petersburg	76%	3%	2%
Siberia	72%	7%	6%
Ural	93%	0%	6%
Other cities	54%	4.5%	0.2%
Beyond Moscow and St. Petersburg	62%	4%	1.7%

Despite the obvious progress in foreign language acquisition by employees of software companies, many problems remain unresolved. There are not enough English-speaking employees in small and regional companies.

The increase in the total number of these employees is provided by the largest companies located in Moscow and St. Petersburg.

Level of knowledge of foreign languages, depending on company turnover

	less than $5 million	over $5 million
English	50%	77%
German	4%	12%
Others	1,8%	15%

This happens partly because these companies pay for their employees' foreign language training. However, this growth is mainly connected to the fact that companies from the two capitals have an opportunity to attract the best specialists from the regions and small companies.

The growth of the share of English-speaking employees in IT companies is not caused by improvements in the Russian state educational system.

People mainly study a foreign language at their own expense or at their employers' expense, which pay for study at language courses or hire teachers to give lessons at the company.

In Russia, skilled English teachers, as a rule, do not tend to work at schools and universities because of the low salary level at state educational institutions. This problem must be solved by the government. Otherwise, in its international competitive ability the high-technology sector of the economy will not correspond to the potential for training technical specialists that exists in Russia.

It is especially important to improve the language training level in regional universities and schools because many of these institutions provide a high level of education in the field of mathematical and technical sciences, but cannot provide their graduates with competitive positions with respect to foreign languages skills.

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Russia does not hold the worst positions in world ratings of English proficiency, but it is in the lower half.

For example, according to a study by the company GlobalEnglish to determine the level of proficiency in business English, Russia received 3.6 points. This was higher Colombia (2.75), Brazil (2.95), and Turkey (2.97), but much lower than in the Philippines (7.11), India (5.57), and a number of other large countries.

On the global ranking of English language skills, the EF English Proficiency Index 2015, Russia holds 39th position from the top, lagging slightly behind Ukraine, Peru, Chile, France, and Ecuador, and ahead of Mexico and Brazil.

Sweden and Finland, which take the top positions in the world English knowledge ratings, should be a reference point for Russia. In many respects, the high percentage of the English-speaking population in these countries ensures the countries' integration in the world economy and their considerable achievements in the field of high technologies.

An insufficiently high level of proficiency in English hinders the creation of competitive solutions and services by Russian companies, and especially their promotion in the global market. An unwillingness to follow global trends can in many ways be caused by weak competence in languages.

According to the superjob.ru portal, 84% of jobseekers specify knowledge of English in their CVs. However, in reality among them there are far fewer programmers with a good command of this language (most likely less than 70%, because roughly the same amount of English-speaking employees work at companies which predominantly work for export).

A more detailed analysis of CVs by Superjob shows that only 15% of software developers specify a "fluent" or "conversational" level of English in their CVs, 50% declare a knowledge of the language at the level of reading technical documentation, 28% admit that they have basic skills only, and 7% do not specify their level of proficiency in English.

According to ANCHOR High Technologies, the situation with the knowledge of English is much better: 64% of all developers (included in the recruiting agency's database) have a good command of English or are fluent in English.

Considerable differences in the data of the two companies can be explained by the fact that they cover absolutely different audiences. ANCHOR is more oriented towards recruiting personnel for international companies and Russian exporters, which implies stricter requirements for knowledge of foreign languages, while SuperJob focuses on a wider audience.

Studying foreign languages remains a problem, although not as serious as it was 15 years ago. However, improvements in this area are vital, especially in the light of plans for the declared international expansion of Russian software companies.

6.7. Global Labor Market

A shortage of software developers and IT professionals is a global problem. For this reason, the salary of programmers is increasing almost everywhere. However, notwithstanding the global staff shortage, the situation on the labor market may differ considerably in different countries. In some countries, an excess of specialists may arise. This occurs due to low export potential against the background of a contraction of the domestic IT market. For example, software companies of Southern Europe pay low salaries. At the same time, the prices of their custom developments are higher than those offered by outsourcing companies of Eastern Europe and Asia.

In 2015, ZDNet reported that over the last 5 years, thousands of software developers were forced to leave Greece. Over this period about 200,000 people under 35 left the country. Mostly they represent three sectors of economy — medicine, finances, and ICT.

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If programmers can find a job in "software development" in Greece, the conditions will often be unsatisfactory.

As shown by the results of a survey by MarketWatch, the problem of a drain of qualified personal exists not only in Greece, but also in Spain, Italy and Portugal. For example, in 2013 82,000 thousand able-bodied workers left Italy, of whom 30% were graduates of higher education institutions.

Even four years ago RUSSOFT saw Southern Europe as a potential donor for IT specialists. Programmers' salaries in the region were comparable to Russia, but at the same time many young specialists were unemployed. In the EU, the situation in the software development sphere looks paradoxical — a high level of unemployment in some countries along with a huge personnel shortage in other countries.

Quite a number of specialists from Western European countries work in Russia, but not enough to appreciably impact on the local labor market. As a rule, such specialists hold key positions for which is difficult to find job candidates within Russia. However, any mass flow of migrants from EU and the USA to Russia is not observed. Some countries showed an extensive outflow of professionals, though they were destined to the USA or other countries of the European Union. In addition, the appeal of Russian vacancies for Europeans began to decrease drastically after 2014 due to the drop in the exchange rate of the ruble. As a result, the average salary of a Russian experienced IT professional denominated in Euros dropped in half a year (starting from summer 2014) by about 60%. The following year and a half saw a continued reduction, though it was not so substantial. The growth of salary in 2016-2017 slightly compensated for the drop, but it is still a long way from the pre-crisis salary level in dollar terms.

Nonetheless, it makes sense for Russian software development companies to consider the possibility of opening development centers in Southern Europe — there are free human resources at a modest price. Besides, these offices bring companies closer to European customers. A center of this kind was opened in Italy 2 years ago by the St. Petersburg outsourcing company Lanit-Tercom.

6.7.1. Worldwide salary level

Average fixed monthly wages of an experienced IT professional in a number of countries, €	
USA	6821
Germany	5192
Great Britain	4484
Finland	4112
Singapore	4090
Turkey	3190
Beijing	2620
Russia (June 2014)	2546
Shanghai	2528
Czech Republic	2148
Russia (January 2015)	1634

Source: CNews, Hay Group

In late 2016, the international consulting company Korn Ferry Hay Group presented data on the change of the average worldwide salary. The results of the study are based on expectations of HR departments of 20 million employees of 25,000 organizations from 110 countries. When inflation is deducted, the actual growth of salary of employees worldwide came to 2.3%.

The leaders in salary growth are still Asian countries: the nominal increase came to 6.1%, and actual 4.3%. Record high growth rates of salary are expected in Vietnam (7.2%), Thailand (5.6%), Indonesia (4.9%) and India (4.8%). In China, the growth of actual income of employees dropped by 6.3% in 2016 to 4% in 2017, reflecting the more modest forecasts of growth of the Chinese economy. In Eastern Europe, salaries are increasing by 5% on average, but actual income by 2%. Similar figures of actual incomes (1.7%) are seen in Western Europe, where the growth of salary (2.1%) and inflation (0.4%) are both low.

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These changes cannot be automatically applied to the salaries of software developers, but they are probably also growing, although a little more swiftly than the average in each country.

The data of the Hay Group presented in the table below is already out of date, but fundamental changes have not taken place in the last few years, Russian salaries in US dollars barely changed while they increased in rubles, and in 2017 rose by around 20%, also thanks to the strengthening of the ruble. Thus, if we are guided by the method of Hay Group and the change in the ruble exchange rate, salaries increased from January 2015 from $1,634 to around $2,000.

At the same time, the USA shows a quite considerable growth of salaries in US Dollars. For example, according to the data of Glassdoor, a US recruitment site, the median aggregate salary of Google amounted to $143,500 in summer 2015, and a year later increased to $153,700. As the struggle for human resources continues, similar growth is observed for other major IT companies of the USA. A survey by Glassdoor indicated that in mid-2016 Juniper Networks offered the aggregate salary of $157,000, Lab126 $150,100, Facebook $150,000, Twitter $150,000, Walmart eCommerce $149,000, LinkedIn $145,000, Microsoft $141,000, and Adobe $140,000.

In 2016, judging from data from the job search website Dice, the salary in the IT industry in the USA on average dropped by about 1% to $92,100.

The consulting service for programmers Codementor compared incomes and expenses of programmers in large cities around the world. The results of the analysis were presented in August 2017. The rating takes into account the real income of programmers, taking into account accommodation and living expenses (food, transport etc.), local taxes and social welfare. Here the rental payment for apartments or houses in this case is the most determining factor.

In first place was Seattle, USA, in which the real annual income (minus compulsory expenses) came to $45,000. The following 10 places are also held by American cities. Outside the USA, the largest income for programmers was seen in Oslo ($28,000). Then came Tel Aviv ($23,000), Toronto ($19,000), Montreal ($18,000), Vancouver ($17,000), Berlin ($15,000), Tokyo ($14,000), Melbourne ($13,000), Taipei ($10,000) and Paris ($9,000).

Moscow held 22nd place in the ranking of cities outside the USA. In the Russian capital, software developers who receive an average salary cannot afford to rent an apartment in the city center. On average, Moscow programmers are short of around $6,600 per year. But all the initial data can only properly reflect incomes in the USA. The Codementor report only indicated 138 vacancies in Moscow for software development in international companies. The requirement for renting accommodation in the city center is also incorrect.

6.7.2. Number of software developers

If in the last 10 years, the number of university graduates with IT professions in Russia has grown, or at least not decreased, in the EU they have decreased. According to a report of the European commission, the number of graduates specializing in IT dropped by 13% from 2006 to 2013. As a result, the report forecast, in five years the number of vacant positions in the IT sector of the EU may grow to 825,000. To solve this problem, several educational projects have been launched in the EU, in 2013, the Grand Coalition for Digital Jobs was launched, in which IT is taught in Bulgaria, Greece, Italy, Malta, Lithuania, Latvia, Poland and Romania. It was later joined by Belgium, the Netherlands, Cyprus and the UK. In the UK, the task has been set to train 1 million IT specialists.

In connection with the continuing growth in threats to organizations of any size all over the world, the demand for qualified specialists in the field of information security has reached such a scale that it exceeds supply by a great deal. To assess the scale and expected effect of a lack of specialists on IS in the world, Intel Security together with the

Center for Strategic and International Studies, CSIS) prepared the report "Hacking the Skills Shortage". To assess the lack of IS specialists and the possible consequences of this, people were surveyed who took decisions in the IT sphere, in Australia, France, Germany, Israel, Japan, Mexico, the UK and the USA. In total, 82% of respondents reported that their organizations currently faced a deficit of IS specialists. It is expected that this deficit will remain until at least 2020. By that time another 15% of corresponding vacancies will not be filled. One of the consequences of this lack will be the higher salary of employees of IS services.

According to the Human Capital Index of the World Economics Forum (WEF) for 2016, in the next 10 years there will be a worldwide shortage of 50 million engineers and scientists. At present comparable indicators by the number of people with higher education are shown by the USA, China and India (66-77 million each). There are 29 million of these people in Russia. But China and India lead by the number of graduates with technical professions (4.6 million and 2.6 million people respectively). In Russia, 561,000 people graduate from technical universities annually, and in the USA 568,000.

According to a publication in Forbes, in Russia the average age of software developers is relatively low. It is 26.6 years. This is slightly higher than India, 25 years, but much lower than the USA, 31.6 years.

There are around 25 million programmers worldwide, of whom 4-5 million are in the USA, around 3 million in India, and around 2 million in China. Russia is probably in the top five countries with 0.5 million specialists.

In many ways, the USA gained its large number of software developers from other countries. Owing to the decision by the American government to toughen conditions for issuing H1-B visas, under which foreign programmers work in the country, the inflow of foreign specialists may stop. It is thought that the new leadership will primarily impact IT specialists from India.

In August 2017, it was reported that companies from Silicon Valley had begun to take far fewer foreigners on staff because of the immigration policy of US president Donald Trump. In the second quarter, the number of job interview offers at companies of Silicon Valley for foreign specialists had dropped by 37% in comparison to the equivalent period of 2016. In the first quarter, the drop was 46%. Jobseekers themselves have become less interested in the chance to work in the USA.

After surveying over 300 IT specialists, analysts at Hired discovered that 40% of them had started to consider moving to another country after the presidential elections. A third of them are examining the possibility of working China, which is followed in popularity by Germany, Asian countries and Australia.

Main
conclusions

The situation on the Russian IT market in 2016, after its contraction in dollar terms by 40% in the previous year, has stabilized. In 2016 the sales of foreign companies on average decreased, but not as significantly as in the previous year – only by a few percent. In rubles, the IT market increased by 5.11%, which almost corresponded to the official inflation level of 5.4%. Accordingly, in ruble terms and with comparable prices, the market volume did not change.

In 2017, we may expect a growth of the Russian IT market by 10-20% in dollars. In ruble terms the growth will probably be significantly lower – up to 10%, which can be explained by the strengthening of the ruble against the US dollar.

The Russian software market, according to the IDC, decreased by 4% to $2.2 billion. According to data of RUSSOFT, based on calculations using completely different methods, involving greater coverage of solutions and services sold, it grew in dollar terms by 11-12% to $6-7 billion. In ruble terms, taking into account the official inflation level, the growth of the Russian software market was 16-17%. At the same time, small companies with a turnover below $5 million increased their sales on the domestic market by more than 30%.

In 2017, Russian software companies plan to increase sales on the domestic market by 16% in dollar terms, and thus the growth of the software market may come to 10-15%.

In 2016, the total turnover of Russian software companies increased by 27% in ruble terms. In the previous crisis year, the growth of turnover in rubles reached 40%, but the reduction of the rate of the growth of ruble turnover means very little – the situation in the industry has become fundamentally different. It has become much better. In 2015, such a large growth in ruble terms was caused by the swift devaluation of the national currency against the dollar (the average exchange rate of the dollar increased from 38 to 61 rubles), with quite usual growth of foreign sales for recent years by 12%. Essentially, the increase in sales volume took place to a larger extent in accounting reports than in reality.

In 2016, all indicators of turnover were positive (in dollars, in rubles, and in rubles taking into account inflation). The drop in the ruble exchange rate slowed down considerably (from 61 to 67 rubles per dollar), and the main growth in turnover was provided by the domestic market. In rubles, foreign sales grew by 24%, and sales on the domestic market by 34%. In dollars, the growth of foreign sales remained at the level of the previous year – 13% (in 2015 – 12%). The entire turnover of the industry of software development increased by 16% to $12 billion.

The RUSSOFT dual currency index, which is calculated as the average growth of currency and ruble turnover taking into account the weight of revenue from export and from sales on the domestic market came to 1.1 for 2015 (i.e. turnovers of companies integrally grew on average by 10% in the course of the year, and in 2016 1.21 (growth of 21%).

There are three different indicators that characterize the foreign economic activity of Russian software companies in 2016:
1. Total foreign sales - $7.6 billion (results of survey and calculations by RUSSOFT):
2. Flow of currency to Russia from foreign sales - $4.8-5 billion (expert assessment by RUSSOFT);
3. Export of computer services included in the statistics of the Central Bank of Russia - $2.7 billion (statistics of CB Russia).

The share of foreign sales of software in the total volume of export from Russian Federation over the last 15 years has been growing constantly. In 2002 it came to 0.3%,

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and in 2016 reached 2.3% (on "computer services" from statistics of the BTS Russia an increase of this share took place from 0.1% to 0.8%.

In 2016, even small software companies increased turnover and foreign sales. Nevertheless, the growth of turnover of small businesses was much lower than for large and medium companies. It is particularly difficult for small companies to develop foreign sales. There was no significant growth in these sales in 2015, or in 2016.

If we compare companies with a turnover below $5 million of different ages, in 2016 all indicators were better among younger ones. Companies which had worked on the market for less than 10 years increased their staff by 15%, turnover by 36%, and their foreign sales remained almost unchanged (dropped by 0.6%). Companies which were 10 years or older, only increased staff by 2%, turnover by 2%, and foreign sales by 1%. Both types of companies plan to increase growth rates of foreign sales in 2017, but companies which is younger than 10 years plan to grow by 15%, but companies older than 10 years only by 4%.

Over the course of 10 years, the trend was followed that assumed the reduction of the share of foreign sales of services on development of software provided both to Russian service companies and R&D centers of foreign companies. If we compare with 2008, the share of sales of companies specializing in client development, in the total turnover of all software companies of Russia dropped from 55% to 46%, and the share of R&D centers of foreign companies from 15% to 7%. By growth rates, companies with a product business model are ahead. In 2014-2016, service companies grew more swiftly because of the devaluation of the ruble, but this was a temporary phenomenon. In general, the ratio of service and product fields in the industry is in a balanced state (53:47 in favor of the service model), with a trend in a certain growth of the product field.

Major American corporations are closing or downsizing their Russian R&D centers far more often than they are expanding them. However, the creation or expansion of these centers of companies is taking place in Germany, and development centers are being created by foreign companies that are not very well known (some of them have Russian roots), and also major corporations from Asian countries (South Korea, China).

Software companies spend the most amount (excepting salaries) on R&D and office rental. In 2016, an increase of expenses on R&D was seen from 5-6% to 11%. An increase of expenditure on office rental from 4.7% in 2015 to 8.3% in 2016 was also seen. Expenses on marketing occupy a smaller share in the structure of expenses of IT companies, but we may note an increase in expenses on marketing from 2.2% according to the 2016 survey to 3.7% according to the 2017 survey.

For developers of program products, the marketing budget is on average larger than for all software companies. In 2015 it was 7.9% of all expenses, and in 2016 9.7%.
Expenses on R&D for product companies increased from 12.6% to 19.5%, which is much more than they spend on rent, 11.5% (5.7% in 2016) and on telecommunications services, 3.3% (4.4% in 2016).

Among Russian software companies in recent years, the popularity has increased of the free object relational system of database management systems PostgreSQL. Over the past 2 years another rise has taken place, which made it possible for this system to become one of the three most frequently mentioned DBMS, which had remained unchanged for many years. The lag of PostgreSQL behind the third place held by Oracle became so insignificant that it can be ignored. Among companies with a turnover below $5 million, PostgreSQL is already in firm third place.

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Undoubtedly, the most popular development tool among Russian companies is MS Visual Studio. Intellij IDEA from the Petersburg company JetBrains, competing with the free Eclipse for second place, tore away from its rivals. This tool is used by 26% of surveyed companies (a year previously 21%, and 5 years ago there were not more than 10% of these users).

Serious growth can be expected from another solution from the JetBrains company – the programming language Kotlin, which in 2017 was noted by Google as one of the two recommended languages (along with Java) for mobile systems.

Human resources

The situation on the Russian labor market for software companies in 2016 and until spring 2017 at least did not get worse, which can be explained by the flow of IT specialists from other industries of the Russian economy from abroad.

In 2016, the total number of core employees of Russian software companies grew by around 6-8%. At foreign development centers, it increased more – by 10-11%. About the same indicators were seen a year earlier, but slightly slower. Up to 80% of the growth of staff in Russia is provided by university graduates. There is also an inflow of staff from abroad (primarily CIS countries) and other industries in which programmers work at IT services.

Results of the 2017 survey show that software companies have begun hiring specialists from CIS countries more actively: they accounted for 6-7% of new employees hired in 2016. However, hiring specialists from the post-Soviet area was carried out by about the same number of companies – 18% of all surveyed (20% a year previously).

With a reduction of the total flow of migrants coming to Russia, the number of work permits has increased – by 44% (from 149,000 to 214,000). At the same time (which is especially important when the software industry is concerned) the number of permits of highly-qualified and qualified specialists grew by 57% (from 41,700 to 65,700), which was also reflected in the increase in the number of new employees from CIS countries in the software development industry.

The 2017 survey showed that the group of companies which recognize the problem of an outflow of personnel abroad has expanded – their share increased over a year from 14% to 18%. The expansion mainly took place among regional companies with a turnover below $5 million, which receive most of their income from export.

In 2015, the indicator for staff turnover began to rise to 6.3%, because of the increase in activity of companies on the labor market, and in 2016 it reached 9.5% (59% of surveyed companies reported staff turnover, 9% of companies had difficulty answering the question). If staff turnover was previously highly among small companies, over the last two years companies with a turnover from $5 million to $20 million have suffered from this more.

The average salary in the software development sphere in Russia was 82-84,000 rubles by the end of 2016, with a growth of 10%. Judging from data from recruiting agencies, in 2017 the growth of the level of salary remained on the level of the previous year. Accordingly, we may assume that the average salary by the end of the year will exceed 90 000 rubles.
On the whole, according to data of the Superjob portal, in the IT industry in 2016 salary on average increased by 8.2% (this is how the nominal supply of employers increased).

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This growth was the highest among all industries of the Russian economy.

Salaries in US dollars barely changed in 2016, but in 2017 they probably increased (a growth of around 20% is predicted), which will lower the competition primarily of developers of custom software.

The system of higher education continues to train the finest programmers in the world with broad mathematical training and the ability to work at the meeting point of different sciences. However, this applies only to some universities, and a disproportion continues to exist in the entire university system between advanced and backward. With a lack of money in the entire education system, some universities have such a low effectiveness of training IT specialists that the justification of continuing their financing may be called into question. The low effectiveness of some universities is shown by the very low percentage of their graduates who have found work in their field.
For all the deficit 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 according IT qualification, as the quality of their training.

According to estimates of RUSSOFT, as of the end of 2016, 470-480,000 software developers were working in Russia, including those who are employed in IT services of companies of various industries. Directly in the software industry (without taking into account foreign development centers), 132-137,000 specialists are employed.

Influence of external factors

The portrayal of the Russian software industry in the foreign media in the last three years has not changed fundamentally, remaining two thirds negative. At the same time, the total number of publications is decreasing which may influence Russian export of software.

At the same time, to some degree we may note a positive change – foreign journalists have begun to cover achievements of Russian startups more frequently. However, they also include comments that discredit these achievements.

Attempts to discredit everything Russian has become the norm in western media. It cannot be said that it has become a rule, as around 40% of publications still have a positive tone on Russia (or more positive than negative).
Almost one fifth of companies surveyed (19%) noted a negative or very negative influence on their business by anti-Russian campaign in western media.

If in 2016, respondents assessed the influence of "Western sanctions against Russia" on their business at -0.27 (i.e. negative but insignificant), in 2017, the negative influence of sanctions was higher (-0.66). For 22% of companies surveyed, they are a serious problem. At the same time, companies which are mainly focused on markets of western countries have been continuing to increase their sales in the last two years. Accordingly, the damage from the anti-Russian campaign in western media, if it exists, is not critical.

The influence of the economic crisis on software companies may be determined by the average deviation of the increase/decrease in the assessment of the important of this factor on the change in the total turnover of all companies surveyed. If for 2014 it came to 6.4%, in 2015 it was 20.4%. In 2016 it once more dropped to 5%. The lower this figure, the more highly software developers assess the stability of the situation.

In all previous years, the share of companies surveyed which expected to receive investments in the next two years was over 20%, and for those who received external

investments in the previous year, the stability was 2-3 times lower. Evidently, respondents could not correctly assess their capabilities. The 2017 survey showed that unrealistic expectations had decreased – the share of those hoping for external financing in the current and following year was slightly higher than the share of companies which could attract investments in 2016.

The total volume of investments attracted by surveyed companies came to around $17 million in 2016, and in 2017 and 2018 this figure should increase by more than 3 times – to $55-57 million. It is expected that there will be a drastic increase of the volume of investments calculated per company. The total volume of investments in the Russian software industry for 2016 exceeded $300 million ($335 million). However, the requirement for funds is significantly higher.

In attracting investments in Russia, a situation has formed in which a large unsatisfied demand for investments in software companies and a considerable volume of free funds, received by companies in various industries, the owners of which do not at all understand the specifics of the IT business. The volume of these free funds may completely cover all current requirements of software developers (and other high technology companies).

For all the heated debates and discussions of import phase-out and preferences to national companies, the factor of "Ban on the use of foreign software with an equivalent in the register of national software" only has a positive and very positive influence on 12% of surveyed companies. This is not very many. Especially as a comparable number of surveyed companies said it had a negative and very negative influence – 8%. We may assume that on the whole the effectiveness of this measure for the entire industry is not high, and is only significant for part of the segment of manufacturers of program products.

The assessment of conditions for doing business in Russia from respondents in 2017 improved. The average point for all conditions assessed was 2.86 (a year earlier it was 2.82). This may mean that according to respondents, conditions for business are assessed as "satisfactory" (on a five-point scale). An insignificant improvement of conditions for business took place on all parameters. For all respondents, there was an improvement in the perception of work on issues of protection of intellectual property, the taxation system, personnel training, state support of international activity and financing of R&D. However, it must be admitted that the change in assessments was insignificant.

The dependence on the assessment of conditions for doing business in Russia on company turnover in 2017 is insignificant and varies from 2.75 points (for companies with a turnover above $100 million) to 2.92 (for companies with a turnover from $1 million to $5 million). Evidently, after a certain worsening of conditions for small companies, another breakthrough has taken place. Some data shows that in Russia not only small companies of the software industry have begun to grow, but also in other industries.

In 2016-2017 the state began to pay more attention to the high technology sector of the Russian economy. This attention, as a rule, is shown in passing programs of development and allocating budget funds to them. But the main thing is still how they will be realized. Russian history of the last two decades shows that far from all programs passed were realized. However, there were some which subsequently provided a certain effect, although perhaps expenses on them could be decreased significantly if they were realized with more thought. It is encouraging that all initiatives in supporting the high technology sector of the economy are supported by the Russian president.

Results of the survey confirmed the hypothesis that for the vast majority of software developers, the measure of state support has special importance which is «Providing taxation privileges" (including privileges on insurance payments). Other measures of support have much lower assessments, which can be explained by their complete lack in previous years. It is quite possible that the attitude of software companies to them will change. In any case, the significance of such measures as "support of international marketing", "stimulating export of software" and "financing of R&D" in assessments of respondents in 2017 increased.

Prospects on the global market

In the last two years, respondents began more frequently to mention "working for export/expansion of the marketing network abroad" as one of the main areas of their activity. At the same time, 36% companies consider it to be a priority, and 31% of respondents consider "More active work on the domestic market". This confirms that developers see more prospects on the global market than on the Russian market, even if it is growing. Only 10-15% of Russian companies are not considering the prospects of entering the global market.

The situation on the world market favors the growth of sales of Russian software companies. In 2016, world ICT expenditure stabilized, dropping by only 0.6% to $3.375 trillion, according to Gartner data. However, such important segments for Russian exporters as "Corporate software" and "IT services" grew by 5.9% and 3.9% respectively. These segments will also grow in 2017.

One of the important segments of IT in which Russia has good prospects of development is information security. According to IDC forecasts, in 2017 world expenses on security technology will reach $81.7 billion (+8.2%). It is expected that world expenses on solutions in the security sphere will increase in the next few years, reaching almost $105 billion by 2020 (CAGR in the period of 2015-2020 will be 8.7%).

In rankings of countries compiled by HackerRank on quality of programmers, Russia is in second place, with an insignificant lag behind China (99.9 points against 100). Russia is strongest in algorithms – the most complex and competitive sphere of software development. It is noteworthy that in world leaders by number of programmers (USA and India) are only in 28th and 31st place respectively in these rankings. American programmers only have 78 points, and Indians 76.

The technology trends of the modern IT market which were determined by analysts of Gartner and other authoritative research companies require good training in the field of algorithms, which is considered to be a clear strong side of Russian developers and their competitive advantage.
Realizing their own potential may be hindered by the inability to sell their own development abroad, a low marketing budget and insufficient state support (or the inability of the state to remove significant administrative barriers on the path of export).

For the successful promotion of their products, solutions and services abroad, Russian companies must unite efforts at different levels – from R&D to marketing – to interaction with Russian manufacturers of hardware. As a result of the geopolitical confrontation between Russia and the USA, on developing markets a clear demand for comprehensive alternative IT solutions is seen.

The main markets for Russian software companies are still markets of Russia, the CIS, the USA and Western Europe, but in the last few years the share of sales has been

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growing in countries which are exotic to a certain extent for Russians. In 2015-2016, RUSSOFT first determined the approximate size of this share, and also its change over a year. If in 2016 5.9% of total sales of Russian software companies were accounted for by "New Markets", in 2016 it was 6.9%.

In previous years, we could say that in the high-technology sphere in Russia there was no regular significant state support of international marketing activity. By the end of 2017 this judgement is not quite accurate. Support from the Russian Export Center and a number of ministries is becoming quite noticeable, although so far it only covers a small number of companies.

Participants of the Survey

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About Auriga

Founded in 1990, Auriga (www.auriga.com) was the first Russian company to provide software R&D offshore/nearshore services to EU/US customers. Auriga offers the full range of software engineering services – managed teams and projects – for high-tech and software vendors, allowing them to quickly build and scale teams, access required skills and expertise, focus on strategic tasks. Auriga services cover all aspects of software RnD either as an all-in-one full-cycle outsourced product development engagement, or as a set of sub-services including conceptualization, development, testing, maintenance, support, porting, etc.

In addition to technical expertise, Auriga pays special attention to soft skills - transparent communications, flexibility, engineering mindset, cultural compatibility, building trust. In 2011 Auriga was named world's #1 engineering services provider based on customer satisfaction survey by Datamonitor, ahead of such names as Wipro, Siemens, Capgemini, IBM, and others. Auriga client list consists of both established industry leaders and fast-growing start-ups, including IBM, Draeger Medical, Chrysler, Sberbank Russia, Yandex, LynuxWorks, Pigeon Point Systems, and many others.

Engineering Locations: 6 development centers in Russia (two in Moscow, N. Novgorod, Rostov-on-Don, St. Petersburg), + one in EU (Vilnius, Lithuania)

Services:
- Software Product Engineering and ADM
- Custom Software Development
- Product Maintenance
- Re-engineering and Porting
- Customization and Integration
- Software Testing and QA
- Product Support
- Technology Research and Consulting

Industry Standards:
- CMMI Level 4,
- ISO 9001,
- DO-178B,
- ISO 13485,
- IEC 62304,
- ISO 14971

Domain Verticals: High-tech, Telecom, Mobile, Healthcare, Finance and Banking, Information security, Enterprise, Computer SW, Education, Government, Automotive, Media & Entertainment, Robotics, Avionics, Logistics and more.

Technologies & Platforms:
- Embedded, system-level, and real-time systems
- Mobile and connectivity, cross-platform development, multimedia streaming
- Enterprise applications: Workflow, document and content management (EMC Documentum and other), CRM systems.
- Web services, high loaded distributed applications, Big Data, cloud storage, DevOps
- Industrial automation, IIoT
- Geolocation and Geopositioning
- Social networks, Web 2.0, Internet of Things, wearables
- Robot locomotion, sensors, computer vision, M2M, machine learning

Major Clients: IBM, Draeger Medical, Chrysler, Sberbank Russia, Lynx Software, Pigeon Point Systems, Digital Guardian, Conservation Services Group, HomeCredit, IBM, CROC, Stada, etc.

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 neoIT) 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

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Web site: http://www.auriga.ru   **E-mail**: info@auriga.ru

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Basic software development (DBCS, OS, o_ce applications, virtualization tools, programming languages and tools)

ABC	1993	Novosibirsk	www.abccenter.ru	383-211-92-50
AGGSoftware	1999	Vladimir	www.aggsoft.ru	910-180-78-33
Cryptopro	2000	Moscow	www.cryptopro.ru	495-995-48-20
EMAKET	2001	Tomsk	www.emaket.ru	495-668-09-75
KIBERNIKA	2014	Moscow	www.cybrus.ru	495-150-55-95
Oracle Development SPB	2004	Saint-Petersburg	www.oracle.com	812-334-64-51
PROMT	1991	Saint-Petersburg	www.promt.ru	812-655-03-50
PSS	1994	Saint-Petersburg	www.pss.spb.ru	812-622-10-14
Radmin	1999	Moscow	www.radmin.ru	499-705-68-74
Real-soft	1993	Moscow	www.real-soft.ru	495-470-56-10
Staffcop	2001	Novosibirsk	www.staffcop.ru	499-653-71-52
Tecom	1995	Nizhny Novgorod	www.tecomgroup.ru	831-432-66-87
Tenavo	2006	Saint-Petersburg	www.tenavo.com	812-336-36-12
Timbre	1998	Moscow	www.timbre.ru	495-679-19-28

Computer games

BIT.GAMES	2002	Penza	www.bit.games	927-289-05-89
Lesta Studio	1992	Saint-Petersburg	www.lesta.ru	812-320-84-31
Tortuga	2009	Penza	www.tortugasocial.com	841-220-33-93

Custom software development

Applied Technologies	2003	Chelyabinsk	www.appliedtech.ru	351-799-52-99
Aquarius Software	2002	Kostroma	www.aqua-soft.ru	910-660-46-18
Arcadia	1993	Saint-Petersburg	www.softwarecountry.com	812-610-59-55
Arsis	1993	Moscow region	www.arsis.ru	495-980-29-31
Artezio	2000	Moscow	www.artezio.com	495-981-05-31
Asgor	2004	Chelyabinsk	www.asgor.su	351-729-88-98
ATAPY Software	2001	Novosibirsk	www.atapy.com	383-363-96-99
Auriga	1990	Moscow	www.auriga.com; www.auriga.ru	495-713-99-00
Bevolex	1999	Makhachkala	www.bevolex.ru	872-293-55-39
CADWISE	2001	Novosibirsk	www.cadwise-n.ru	913-902-60-95
Cals	1998	Moscow	www.cals.ru	495-955-57-37
C-Blues	1991	Saint-Petersburg	www.c-blues.com	812-532-20-84
CITRONIUM	2007	Yoshkar-Ola	www.citronium.com	836-222-05-46
CodeInside	2009	Penza	www.codeinside.ru	927-649-32-47
Competentum Group	1993	Moscow region	www.competentum.com	495-514-11-00
CVisionLab	2011	Taganrog	www.cvisionlab.com	863-432-72-69
DataArt	1997	Saint-Petersburg	www.dataart.com, www.dataart.ru	812-333-44-40
DataEast	2001	Novosibirsk	www.dataeast.com	383-332-03-20
Devexperts	2006	Saint-Petersburg	www.devexperts.com	812-438-16-26

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Devpark	2009	Moscow region	www.devpark.ru	499-999-01-85
Enterprise Business Systems	2006	Tomsk	www.enbisys.com	903-953-46-71
Etton	2010	Kazan	www.etton.ru	843-221-72-76
First Line Services	2009	Saint-Petersburg	www.firstlinesoftware.com	812-336-55-33
General Computers	2004	Rostov-on-Don	www.generalcomp.ru	863-201-38-21
IATVT	1991	Moscow	www.iatvt.ru	495-782-00-53
INFOPRO	1990	Moscow	www.infopro.ru	495-105-92-32 доб 4105
Inreco LAN	1989	Vladimir	www.inrecolan.ru	4922-444-090
Instream	2005	Moscow	www.instream.ru	495-255-15-45
Insyres	2004	Moscow	www.insyres.ru	495-539-23-09
INTEC	2009	Tomsk	www.intecgroup.ru	913-828-22-29
Intec	2006	Chelyabinsk	www.intecweb.ru	8-800-100-45-85
Internet Frigate	2000	Novocherkassk	www.ifrigate.ru	863-522-41-10
Intersoft Lab	2009	Moscow	www.iso.ru	495-276-05-81
Intraseti	2006	Saint-Petersburg	www.intraseti.ru	921-942-42-89
Ipoint	2003	Irkutsk	www.ipoint.ru	914-913-39-39
Iron Water Studio	2008	Rostov-on-Don	www.ironwaterstudio.com	863-303-10-63
Itechnol	2014	Moscow	www.itechnol.ru	499-506-99-28
Itransition Rus	1998	Moscow	www.itransition.com	495-640-89-37
JSC Programmprom	1965	Moscow	www.programmprom.ru	495-455-16-42
KLIF.ru	2001	Moscow	www.klif.ru	499-704-25-81
Lanit-Tercom	1991	Saint-Petersburg	www.lanit-tercom.com	911-982-10-21
LLC CERERIS	2015	Penza	www.cereris.org	927-090-65-65
Luxoft Professional	2000	Moscow	www.luxoft.com	495-967-80-30
NetworkProfi	2011	Saint-Petersburg	www.networkprofi.ru	812-670-07-32
Noveo	2002	Novosibirsk	www.noveogroup.com	383-319-56-65
Omega-R	2011	Yoshkar-Ola	www.omega-r.com	906-139-57-77
Perpetuum Software	2001	Barnaul	www.perpetuumsoft.com	385-256-72-95
Prog-matik	2007	Novosibirsk	www.prog-matik.ru	383-335-61-47
Promsoft	2002	Novosibirsk	www.promsoft.ru	383-335-99-11
PTA	1995	Saint-Petersburg	www.ptaspb.ru	812-334-14-84
Reksoft	1991	Saint-Petersburg	www.reksoft.ru	812-325-21-00
RGSoft	1995	Novosibirsk	www.rgsoft.ru	383-236-25-01
Rino	1993	Obninsk	www.rinotel.com	484-397-11-00
SeaData	1999	Saint-Petersburg	www.seadata.ru	812-380-38-28
SibEDGE	2007	Tomsk	www.sibedge.com	382-270-18-41
Singularis Lab	2009	Volgograd	www.singularis-lab.com	905-332-84-87
SmartBear Software	1999	Tula	www.smartbear.ru	487-221-10-58
Soft-Consult	2001	Saint-Petersburg	www.soft-consult.ru	812-534-84-81
Stack Soft	2001	Moscow	www.stacksoft.ru	495-980-60-05

TomskASU	2010	Tomsk	www.tomskasu.ru	3822-701-899; 3822-701-849 доб. 111
ValMaster	1993	Saint-Petersburg	www.valmaster.ru	812-329-44-59
Vidar	1991	Moscow	www.povidar.ru	999-267-58-57

Embedded software (equipment, devices)

Cellnetrix	2007	Moscow	www.cellnetrix.com	499-995-07-73
Fiord	1992	Saint-Petersburg	www.fiord.com	812-323-62-12
OKTET Labs	2003	Saint-Petersburg	www.oktetlabs.ru	921-332-08-05
RAIDIX	2009	Saint-Petersburg	www.raidix.ru	812-622-16-80
Robotikum	2013	Saint-Petersburg	www.robotics-spb.ru	911-961-28-35
SpeechPRO	1990	Saint-Petersburg	www.speechpro.ru	812-325-88-48
Stream-Control LLC	2011	Novosibirsk	www.ck-llc.com	923-227-22-37

Geographic information systems (GIS)

Baltros	1994	Saint-Petersburg	www.baltrosgroup.ru	812-777-55-07
Racurs	1993	Moscow	www.racurs.ru	495-720-51-27, 812-777-55-07

Information security solutions

Intelcom	1993	Moscow	www.intelcom.ru	495-662-38-77
MDIS	1995	Moscow	www.mdis.ru	495-783-33-79
NCSD	2000	Moscow	www.ncsd.su	495-988-27-09

Mobile applications

Aximedia Soft	2010	Tomsk	www.aximediasoft.com	3822-222-137
Axis Projects	2000	Moscow	www.cybercontrol.ru	495-543-76-65
Bradbury Lab	2009	Moscow	www.bradburylab.com	495-363-17-53
MobileUp	2009	Saint-Petersburg	www.mobileup.ru	812-425-01-58
RedSolution	2007	Chelyabinsk	www.redsolution.ru	351-750-50-04
Rus Wizards	2008	Taganrog	www.ruswizards.com	903-488-55-20S
Sike Software	2008	Magnitogorsk	www.cs-plus.ru	351-922-22-44
Space-O Technologies	2013	Tomsk	www.spaceotechnologies.com	3822-228-990
Taxicomplex	2014	Chelyabinsk	www.taxicomplex.ru	922-010-95-44
Zennex	1999	Tomsk	www.Zennex.ru	913-888-51-01

Navigation systems

SCOUT Group	2005	Saint-Petersburg	www.scout-gps.ru	8-800-250-60-77

Replicated enterprise (institution) management, document ow automation, design and production process systems (ERP, CRM, ECM, EDMS, CAD, APCS and other)

APM	1992	Moscow region	www.apm.ru	498-600-25-10
bb software	2003	Moscow	www.bbsoftware.ru	495-648-63-86
DaleSoft	2006	Saint-Petersburg	www.dalesoft.ru	812-444-49-87
Digital Design	1992	Saint-Petersburg	www.digdes.ru	812-346-58-33

ELMA	2006	Izhevsk	www.elma-bpm.ru	341-293-66-99
EUROSOFT	1992	Moscow	www.eurosoft.ru	499-418-01-52
GPR	1995	Moscow	www.gpr.ru	985-262-17-20
iiko	2005	Moscow	www.iiko.ru	495-215- 22-00
ITAN	1999	Moscow	www.itan.ru	495-276-00-21
KPI Monitor	2007	Moscow	www.kpi-monitor.ru	495-669-11-91
Miraxoft	2011	Saint-Petersburg	www.miraxoft.com	812-409-93-32
Napoleon it	2011	Chelyabinsk	www.napoleonit.com	351-902-07-03
NPO Comp	2003	Izhevsk	www.npo-comp.ru	341-272-11-55
ORS	1993	Kirov	www.ors.kirov.ru	833-223-66-66
Qsolution	2008	Saint-Petersburg	www.qsolution.ru	812-575-79-44
SoftLab-NSK	1991	Novosibirsk	www.softlab-nsk.com	383-339-92-20
Solvo	1995	Saint-Petersburg	www.solvo.ru	812-606-05-55
Sphaera	1992	Moscow	www.sphaera.ru	495-672-70-36

Site designing

2engine	2010	Chelyabinsk	www.2eng.ru	351-750-08-89
38px	2013	Chelyabinsk	www.38px.ru	912-772-04-44
Belti	1997	Moscow	www.belti.ru	495-682-42-07
Edgestile	2004	Moscow	www.edgestile.com	495-229-45-50
Epsilon Interactive	2006	Moscow	www.epsilon-int.ru	499-322-23-39
FastWeb	2008	Moscow	www.fastweb.ru	495-755-83-23
KONDRALAND	2014	Chelyabinsk	www.kondraland.ru	950-749-99-02
Online-Media	2003	Tomsk	www.online-media.ru	3822-468-212
Picom	2000	Izhevsk	www.picom.ru	341-263-67-37

Other

ALDITECH	2006	Moscow region	www.alditech.ru	4967-736-220
ASP	2011	Krasnodar	www.aspcom.ru	
AstroSoft	1991	Saint-Petersburg	www.astrosoft.ru	812-494-90-90
Diasoft Platform	2014	Moscow	www.diasoft-platform.ru	495-780-75-74
Dom Programm	2001	Saint-Petersburg	www.domprog.com	812-320-21-36
EligoVision	2005	Moscow	www.eligovision.ru	495-780-01-59
FSA	2011	Astrakhan	www.fsa3d.com	851-252-44-44
GDC Services"	2006	Kazan	www.icl-services.com	843-567-15-88
Genery Software	2002	Novosibirsk	www.genery.com	913-743-17-99
Inesoft	1998	Moscow	www.inesoft.com	383-316-57-62
IstraSoft	1993	Moscow	www.istrasoft.ru	929-641-18-02
ITProject	2004	Moscow	www.itproject.ru	495-228-04-80
Mallenom Systems	2011	Cherepovets	www.mallenom.ru	8202-201-635
Mi-soft	2013	Omsk	www.itokna.ru	906-919-46-65
Mtels	1997	Saratov	www.mtels.ru	831-303-30-64
Multipass	2014	Tomsk	www.multipass.co.uk	44-747-940-20-34
NetUP	2001	Moscow	www.netup.ru	495-510-10-25

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PHPShop	2008	Moscow	www.phpshop.ru	495-989-11-15
SSP Software	2006	Tomsk	www.ssp-soft.com	382-290-10-32
St.Petersburg Development Centre EMC	2007	Saint-Petersburg	www.russia.emc.com/campaign/centre-of-excellence/index.htm	812-325-46-33
Supl.biz	2013	Tomsk	www.supl.biz	913-823-58-66
Viogem	1959	Belgorod	www.viogem-sp.ru	472-226-05-23

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