Information technology: current status and trends

Emma Sharyan¹,²*, Nadezhda Poliakova¹, Anna Chekan², and Elvina Bagdasarova³

¹Moscow Polytechnic University, 107023 Moscow, Russia
²State University of Education, 141014 Moscow Region, Russia
³Russian State University for the Humanities, 125993 Moscow, Russia

Abstract. In the article, the authors talked about support measures for employees of IT companies in the crisis period. The Ministry of Digital Industry has prepared a number of measures to retain software developers and develop IT companies in the country. The agency has already officially confirmed that the proposals were developed taking into account the opinion of the IT industry. On March 2, 2022, Vladimir Putin signed a document on measures to accelerate the development of the IT industry in the country. Due to the ambiguous situation in the country, companies risk losing IT specialists who are already in short supply. Information has already appeared that about 5 thousand employees - Russian IT specialists announced plans to leave. To prevent the outflow of IT specialists from the country and not lose valuable personnel, you need to be proactive. For example, accredited IT companies were exempted from scheduled inspections until December 31, 2024. It will not be possible to switch from one software to another quickly enough. It is still difficult for many Russian companies to replace such a small tool as a distance learning system even as planned. And now many programs have to be replaced. Only an integrated approach with all its attributes allows to avoid problems with such urgent import substitution. Problems occur not only when switching from Western software to Russian, but vice versa. If a business has already undergone through one or two crises, it has the potential to survive the current conditions. The new system is new logic, architecture and capabilities.

1 Introduction

The main topic of the coming years in Russian information technologies is import substitution. The task is complicated by the fact that it is necessary to change the software (software) and equipment of unfriendly countries in almost all production and technological "verticals" [1].

The main thing that happened in the Russian IT market is the diversification of the business of the largest IT companies, which is often associated with the struggle for niches which remained after foreign companies have left Russia [2-3].

* Corresponding author: sharyan-emma@mail.ru
Changes in the IT technology market have increased the following risks in the IT industry:

- Leakage of qualified personnel.
- Unavailability of foreign software.
- Loss of access to technology.
- Restrictions on the export of IT services.
- Strengthening of state regulation.
- Freezing or delaying of investment projects.
- Rise in cyber attacks.
- Lack of system capacity.
- Tougher legislation.

Due to the current situation, the following IT infrastructure has arisen and additional costs have been added to resolve them [4-6]:

1. Unavailability of foreign software. Russian companies are worried about the programs for warehouse accounting and operational accounting of processes least of all. Such software is relatively easy to find a replacement on the Russian market. The tolerant situation concerns the software for numerical control, which is used in production. The most difficult situation is connected with the import substitution of management software, but not due to the shortage, but the labor intensity of the transition to Russian analogues and the lack of qualified IT specialists. Those companies that plan to switch to Russian software in 2023 add an average of 25 percent to price due to the speed of the task.

2. Cyberattacks. The cost of maintaining the security of IT infrastructure is planned to increase by 10-15 percent.

3. Increase in equipment and repair costs. It is recommended to put 20 percent in addition to the current price. In 2023, a record share of purchases will fall on used iron, so it is necessary to clarify which share of purchase is planned without VAT.
2 Materials and methods

When writing the article, a modern scientific toolkit for complex analysis and situational analysis were used. The listed methods were used in different combinations at different stages of writing the article depending on the goals and objectives set, which made it possible to draw reasonable conclusions.

3 Results and discussion

Due to the increase in costs, you need to decide what IT costs can be sacrificed without harm to business?

To reduce the cost of IT support for the corporate information system, first of all, it is worth preparing a general register of costs and then choosing candidates for reduction.

Information technology costs that can be sequestered without damaging the corporate IT system [7-9]:

1. IT equipment maintenance costs.
   The main method of reducing the cost of supporting equipment is its unification. Therefore, when preparing a sequestration plan, it is necessary to lobby for the idea of using the same models of printers, copying equipment, phones, etc., in the company. This allows you to reduce stocks of critical spare parts, as well as save on personnel. After all, if IT service specialists have a broader knowledge of equipment lines, then the cost in the labor market will become higher. When the employment of your own IT specialists is noticeably less than 100 percent, you can consider the option of outsourcing service functions.

   Practice shows that equipment breakdowns are often associated with its improper operation. For example, a permanently open copier cover or feeding stapled pages into a streaming tray. To reduce repair costs it is recommended to prepare instructions for personnel to work with equipment. It is better to place the documents next to office equipment, as well as provide for personal responsibility for damage to property.

2. Software support.
   First of all, it is worth determining whether it makes sense to pay for support for each software. This is especially true for corporate information systems, which are often quite significantly improved during implementation and deployment. Manufacturer updates are often useless for them. In addition, the cost of buying and installing "native" software updates can be so significant that it is more profitable to carry out work by standard IT specialists.

   If the company uses relatively standard software, you need to try to persuade the supplier to make a discount. A good argument is a willingness to standardize software.

   Experience shows that with an insignificant difference in functionality and price of various software, you can solve the company's problems using a line of one manufacturer. This allows you to get two discounts at once - for the volume of purchases and for software support.

   Another way to reduce the cost of software maintenance is to replace software with free software. Such software products are free for the company. But the costs of supporting this software, its development and the risks of breakdowns are borne by the companies themselves in this case. Therefore, it is important not to forget to take them into account when assessing the effectiveness of the event.

3. Purchase of consumables for the IT service.
   To reduce the cost of purchasing spare parts, you can implement print volume control and personalized cost accounting. It is recommended to track who of the employees prints using a personal password or chip card. Periodic monitoring of print volumes allows you to establish personal responsibility for employees.
Another effective measure of cost reduction is to set the default printers to save cartridge and double-sided printing.

As in the case of equipment maintenance costs, it is worth thinking about outsourcing the printing function. In this case a third-party outsourcing company fully takes over the maintenance of printing equipment, the purchase of cartridges and paper.

The services of an outsourcing company are usually paid per printed sheet. This cost may be lower than when the company is fully engaged in printing on its own, since the outsourcer buys consumables at lower prices due to volume discounts.

4. The salary of IT specialists.

The structure of the division is being revised to optimize labor costs for IT specialists. It is necessary to make sure that the functions of IT specialists are not doubled, and the scope of tasks facing the service corresponds to the number of employees. If there are such disadvantages, you need to assign the performance of several functions to one official unit or transfer services to outsourcing. The issue of salary remains crucial. Previously, interesting candidates had to be persuaded to relocate and it was necessary to spend money on their move and adaptation. Now remote work has become the new norm, and Russian companies have to compete for IT talents not only with each other, but also with international corporations that promise high salaries in foreign currency. It is almost impossible to find a valuable candidate with moderate salary wishes in the region today. According to the Ministry of Digital Science, the deficit of IT specialists ranges from half a million to a million people in Russia.

Now the salary of IT specialists in the regions has practically equaled the level of salaries in Moscow. You can find out the current level of salaries in several ways. The first is on HeadHunter. The second way is to analyze salaries from large personnel agencies. But it must be looked at with the understanding that the main task of such agencies is to hire IT specialists as quickly as possible. Therefore, sometimes salaries are exaggerated there. There is also the third way - to find a candidate by skills and determine the salary and bonuses according to his requests. The way the salary for IT specialists in Russian companies is determined is shown in Figure 2.

![Fig. 2. How is the salary for IT specialists determined?](image)

What IT professionals expect from the company in the first year of work is shown in Figure 3.
The work of IT service employees is difficult to normalize, so the head of this department should be interested in optimizing the structure. To interest him, the variable part of the payment should be tied to the key indicators of the service's performance. But it is advisable to reimburse such costs only when implementing fundamentally new IT solutions that have a tangible economic effect.

5. Training of users to work in information systems.

The cost of supporting software users includes the cost of instructions and trainings that develop skills with these programs. They are relevant, for example, when implementing a corporate information system. In order not to pay for the training of new personnel, it is recommended to introduce mentoring in the IT division. This will make possible not only to reduce costs, but also to improve the quality of content. After all, specialists who work in the desired program all day and know all its nuances will be responsible for it.

Experienced developers can be offered to educate and support the young. The way how to choose a good project manager for the development team is presented in Table 1.

**Table 1.** How to choose a good project manager for the development team.

<table>
<thead>
<tr>
<th>Required quality</th>
<th>Interview questions</th>
<th>Markers of a good manager</th>
</tr>
</thead>
<tbody>
<tr>
<td>Genuine interest in people</td>
<td>Tell us a case of successful negotiations from your practice</td>
<td>In the past, there are cases that a specialist has an interest in people. Ready to be a mentor</td>
</tr>
<tr>
<td></td>
<td>Are you ready to be a mentor, participate in training and support programs?</td>
<td></td>
</tr>
<tr>
<td>Multitasking</td>
<td>Is it easier for you to solve problems one after another or can you keep them in your head at the same time?</td>
<td>Multitasking</td>
</tr>
</tbody>
</table>
Knowledge of the subject area

Tell us about your experience in IT, development. Are you ready to consider the position of the lead developer in the team?

To a provocative question he answers that he is able to be a developer, but wants to become a project manager

Initiative

What are your ideas that have improved the work of the team and company?

He suggested organizing a "week of fixabags," improving technical documentation or the interview process

How do I control IT service costs?

To track IT support costs, you need to ensure that all service requests are registered and recorded. To do this, you need to implement a specialized information system for registering requests. It is worth highlighting a single telephone number, e-mail support services.

The IT service should periodically analyze requests for detail by their types and initiating departments: who requested what, as well as how much the execution cost. It is worth conducting a qualitative analysis in addition to financial one. For example, the number of calls to support department can increase sharply due to the introduction of a new function into the information system. In this case, such a surge in user activity is most likely a temporary phenomenon. Therefore, the number of requests will decrease as users learn the system and troubleshoot the new software. In other situations, in order to reduce the burden on IT, it is worth conducting additional trainings for the personnel of structural divisions or analyzing and supplementing user instructions.

In this regard, another question arises: How to find an IT specialist?

Next in the article, let's consider an example of the correct announcement about the selection of an IT specialist:

DevOps engineer. Salary 250 000-350 000 rubles in hand. Moscow. Required work experience: 3-5 years. Full time, full day.

Hi! My name is Ilya Sergeev. I am the head of the IT department at Toolkit.

Toolkit is the main tool for recruiters in the CIS. Here they maintain a resume base, work story, discuss resumes with colleagues, correspond with candidates and make reports.

With the help of Toolkit, the largest companies in Russia and the CIS - Mail.Ru Group, Yandex Workshop, AliExpress, Leroy Merlen and many others - gather their teams.

Now there are two support engineers and one DevOps engineer in the Toolkit team. The DevOps load in the department has grown, so I'm looking for another DevOps engineer.

Development processes in Toolkit:

Our development process is as follows: designers design and describe functionality → developers decompose and evaluate the task → begin to develop → code review → testing on a separate test stand → merge → release. DevOps can take part in the development process, code review, testing and release.

We make 3-5 releases a week: we do not wait for the sprint to end, but we will also release features to customers immediately after development, review and testing.

We are developing on Github, and we track tasks in Jira. We have implemented CI Jenkins, which allows you to run independent tests for each branch and raise the test bench for each feature without blocking testing of neighboring features.

Stages of recruitment:

1. Video interview with me and HR, which includes general and technical issues.
2. Interview with Chief technical officer (CTO).
3. Offer.
Responsibilities:
1. Set up and improve existing CI/CD processes.
2. Introduction of new technologies and solutions.
3. Working together with colleagues from related departments on emerging issues and tasks.
5. Configuring and administering hardware firewalls, lifting IPSec tunnels with clients.
6. Improvement and development of the monitoring system.
7. Keeping documentation up to date.

Requirements:
1. Knowledge of OS Linux (Ubuntu) at the administrator level
2. Experience with git, nginx, docker, ansible, postgresql
3. CI/CD Configuration Experience
4. Experience with monitoring systems, we use Prometheus
5. Ability to write scripts in bash or python

Process Stack: Python 2.7, 3.5 + (now moving from 2.7 to 3.5), Tornado, Aiohttp, PostgreSQL, Redis, Docker, Pewee, Elasticsearch.

Working conditions:
1. Official employment (white ZP + 10% annual bonus, vacation and sick leave according to TC).
2. Format of work to choose from: office in Moscow (metro Novokuznetskaya) or remotely. Every six months we gather everyone in Moscow to relax together.
3. VHI with dentistry and home physician care after probation (3 months).
4. Working macbook as needed.
5. Professional training, advanced training at the expense of the company from the first working day. Send your resume to toolkit@mail.ru or Telegram @ toolkit.

The advantages of this summary:
1. The name of the company is indicated and a description of its scope is given.
2. Information on the number and composition of the team.
3. Detailed information on the development is described.
4. The working conditions are clearly formulated - the project stack is spelled out.
5. There is a final text that prompts action and contacts are indicated.

If you need a business analyst of the information system, then it is preferable to deepen the skills of the financiers themselves, and not overpay the developers. IT specialists are usually involved in the development and maintenance of the accounting base. For example, to curate the current modification, prepare non-standard reports or special print layouts. To support accounting programs, it is enough to have one year experience at an industrial enterprise in a similar position. Such a specialist, as a rule, has regularly interacted with a large number of users and is able to solve issues in emergency mode.

To develop new programs, you need to consider applicants who have worked in an integrator for more than three years. Excluding technical support specialists, but those who were directly involved in the software. As a rule, such candidates have extensive experience in software implementation and teamwork skills. It is also necessary to clarify what was the role of the candidate in the project: the leader, the leading specialist or the one who simply formed the layout and algorithm for filling out the printed form. The latter, most likely, will not cope with the project in which it is necessary to train colleagues from related departments[10].

IT specialists can be involved not only in solving local digital problems, but also in training financiers and colleagues from related blocks on the peculiarities of working in
information systems. For large projects in the field of automation, IT specialists are used as analysts. They can be assigned to prepare technical assignments for third-party contractors. In the developer's background, there must be experience in working with accounting systems and participation in projects to optimize business processes. He must understand the basics of accounting, be able to visually educate users and have comprehensive business thinking.

A candidate who boasts about his success in correcting routine operations is not suitable. It is recommended to conduct an interview only with IT specialists, and not give verification tasks, since it is impossible to perform a serious test without analyzing the base, and easy tasks will not tell anything about the applicant. It is proposed to develop a list of key questions that must be asked, for example, to candidates for the position of IT specialist for the financial unit [11]:

1. "What's the toughest or most interesting task you've dealt with lately?" If the applicant describes how the "production" block was implemented at a multi-transfer enterprise, its qualification should be considered high. And the preparation of candidates who tell how they set up, let’s say, the routing of advance reports, is considered low.

2. "Have you ever rewritten the period-end closing process?" Such refinements turn the closing process from a user routine operation into a complex procedure. And the programmer in the future can use such an employer's dependence to demand the best payment terms. Therefore, you should immediately weed out such candidates who brag about how they corrected routine operations.

3. "In what format do you usually work with the customer?" Preferences are given to candidates who are used to working with a clear technical task, since in this case the risks of errors and discommunications are lower.

4. "How do you test the results of your work?" Unfortunately, often candidates answer that their work is tested only by the customer. Usually this approach creates problems for the employer, since you need to spend a lot of time double-checking and finding errors. The specialist shall monitor the correctness of all points of the terms of reference. For example, verify that the report displays all required fields that the accountant requested.

At the interview candidates are not only asked about their experiences and the projects they participated in but they are also given test tasks.

The hierarchy of recruiters is proportional to the level of the IT specialist. Recruiters - "humanitarians" will cope only with requests for junior positions, freelancers and sysadmins for small amounts of work. We recommend that you trust a dedicated IT recruiter and an external personnel agency with IT specialization in the selection of middle and senior level specialists. The selection funnel there is very wide, the conversion of the transition between stages is low - accordingly, the price of the error is high and a strong examination in the IT selection is needed. What IT positions the company's recruiters can close themselves are presented in Table 2.

<table>
<thead>
<tr>
<th>Candidate position</th>
<th>Recruiter level</th>
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<tbody>
<tr>
<td>Junior positions, freelancers and sysadmins for short tasks</td>
<td>Beginner level: understanding terminology, superficial knowledge of processes</td>
</tr>
<tr>
<td>Middle-and-senior-level</td>
<td>Separate IT recruiter and external personnel agency with IT specialization</td>
</tr>
<tr>
<td>IT managers</td>
<td>IT Hunter</td>
</tr>
</tbody>
</table>

Table 2. What IT positions can the company recruiters close on their own.
Novice specialists - junior developers - can be found on job portals, as well as at career fairs and open events of educational institutions. It is convenient to select such applicants through a system of internships, interaction with universities and specialized courses.

The IT recruiter needs a deep understanding of the interests, forums and platforms on which experienced candidates communicate. Basically, direct search is working now. If you publish vacancies on job search portals, then you will have to spend a lot of time cleaning the selection. Finding a serious candidate on work sites is a rarity.

IT specialists of the middle- and senior-level are found on LinkedIn, AmazingHiring, GitHub, StackOverflow, Podbor.io, thematic channels in Telegram. With social networks, Google and Yandex advanced search tools are used - boolean operators. You can design complex searches using the free X-Ray Search service. An even stronger move is to create your own channel for developers, following the example of Dodo Pizza t.me/dododev.

The selection of developers with a specific stack for functional programming is carried out through highly specialized communities and groups on Telegram, Twitter, Reddit Twitter and on special sites for functional programmers. As for such positions as project managers, testers, system analysts, they are placed on resources with a wide IT audience. For example, on hh.ru and geekjob.ru. And on vc.ru and habr.com, professional articles about IT are published.

Usually, hard skills are checked either by hiring managers or by someone from the IT team. Here are four popular tests.

1. Live coding with or without auto-checking bugs. The interview applicant launches a screen demonstration and writes the code.
2. A technical interview in which someone from the IT team talks with the candidate.
3. Analysis of repositories published by the candidate.
4. Terms of Reference: The IT team prepares a special development environment in which the candidate performs a specific task.

The list of questions includes three mandatory items:

1. "How do you approach the task?" It is important to find out if the applicant performs the task the way the user formed it, or is trying to understand the problem and offer alternative solutions. That candidate is considered a good one who is in no hurry to immediately fulfill everything that users ask him about. The customer may not understand the consequences of, say, adjusting the location of the button in the program or reconfiguring the report column. The IT specialist should analyze the labor costs of completing the task and compare related risks in order to filter unreasonable user requirements.

2. "What projects have you already implemented in conjunction with the finance department?" According to the candidate's answers, you can understand how his project background coincides with the tasks facing the financial service.

3. "Were the deadlines for projects often delayed?" We need an IT specialist to control the contractor's handover process. Therefore, in a conversation with a candidate, you need to look at what attention he pays to deadlines. You need to ask a specialist to describe the reasons for the shift in the deadlines for the delivery of projects. It is noted whether the applicant offered alternative options to complete the task on time, or took a passive position.

Application of testing. As a test, it is proposed to prioritize the tasks of three divisions and justify your choice. For example, colleagues from accounting, production and client department turn to the applicant. Accountants are asked to help find a system error when
forming a VAT declaration. Manufacturers say that they cannot conduct a document on the production of products, and businessmen cannot form an act of reconciliation.

According to the candidate's answer, you can understand what priorities were in the companies where he previously worked, and whether this paradigm coincides with this company. So, at one of the interviews, the applicant proposed, first of all, to solve the problem of accounting in order to minimize tax risks. But if there is any delay in shipment dates, then this will significantly affect the company's reputation. Therefore, for a company, the priority is production. In this regard, first you need to solve the problem of production workers, and only then accountants and businessmen. Sometimes, as a small task, you can ask the applicant to tell how he will customize the purchasing report. Preference should be given to those who, instead of fitting all the requested data into one cumbersome report, will offer several small but more informative forms.

Recruiters recommend to select IT specialists for the company the following way. The scope of the search depends on the original query of the hiring manager. Most often they are looking for developers with a specific set of competencies or team leaders on "Khabr. Career," Stack Overflow or GitHub, and on hh.ru. In addition, you regularly need to use Boolean Search queries on Google. With their help, you can see only those web pages that contain the necessary data in the search engine output. For example, skills inherent only in Python developers.

In most cases, soft-qualities are checked at the interview stage. They ask about previous teams and relationships with former leaders. According to the candidate's answers, you can understand to what extent his mindset and worldview coincide with the values of a potential employer. You always need to clarify what is important for a person in the workflow, and what situations demotivate him. Subsequently, being aware of this, you can offer the applicant the most relevant offer. It is recommended to check the candidate's hard skills in a duet with someone from the IT team.

If there is not a single developer in the team, you can start the selection with a team leader. He should have the skill to work in the target subject area for at least five years. Such specialists are usually not satisfied with a technical interview. Analysis of business processes is considered more important for this position. Usually, right at the interview, the problem is indicated and the candidate is asked to propose solutions. For example, they talk about how the payment process works now, and listen to what disadvantages the candidate will indicate. Next, they are asked to draw an algorithm for solving the problem using flowcharts and tell what tools the developer offers and why.

Hiring the rest of the IT specialists in the team can be shifted to timlid. He will conduct technical interviews in which he will test coding skills. Example questions for dialogue with Java Teamlead:

1. Which work format is more comfortable - hybrid/office/completely remote?;
2. What type of design is considered - TK/GPC/IP?;
3. What is the composition of the team now? How much was the maximum person in submission?;
4. How do you motivate the team? What are you doing to develop it?;
5. Which projects can you select from the latest or important? On which stack are they implemented?;
6. What specific tasks did you have in the framework of these projects?;
7. Is there an experience with brokers and multithreading?;
8. Do you write the code yourself now, and in what percentage with management?
4 Conclusion

The support measures proposed by the Ministry of Digital Science will definitely help Russian companies retain IT specialists and find new ones. The exemption of IT companies from personal income tax will allow employees to calmly increase their salaries by 10-30 percent, which will already slightly improve the situation against the background of the fall of the ruble and rising prices in the consumer segment.

 Preferential mortgages with a rate of 5 percent per annum, when the key rate of the Central Bank is 20 percent, can become another significant advantage in the direction of IT companies of the Russian Federation. Since specialists against the background of rising prices for money and loans will be able to take out a mortgage without thinking about overpayments for real estate. Delay from the army and grants for software development will fix the vector of the movement of the IT industry in the Russian Federation for import substitution.

There are a lot of foreign software and IT solutions from abroad in Russia, which have no competitive analogues in the Russian Federation. Taking into consideration the political situation, foreign companies will take or close the access to these solutions and products in the Russian Federation. Accordingly, a huge layer of directions will appear, in which it will be possible to implement IT products and digital solutions for entire industries.

A clear example is when the Central Bank of the Russian Federation found a target group of specialists to develop the Swift analog system under the threat of sanctions from the West.

References