



УДК 338.364.4
JEL L86

Research: Russian Local Trends in Software Development and Implementation

PASHCHENKO D.S.

*PhD in Technical Sciences, MBA, consultant in software production improvement, Moscow, Russia
denpas@rambler.ru*

Abstract: Regulators of the Russian software market over the past five years have a significant impact on the market: from the serious requirements about the protection of personal data in information systems to the policy of import substitution. This article contains a part of the results of the author's research that covered 79 experienced engineers and managers in all federal districts of Russia. The expert's panel reviewed the change in costs and efforts in software development projects connected with stricter requirements for collecting and storing personal data, evaluated import substitution of system and application software and determined the possibilities of using technologies, based on open-source code. The results of the study are accompanied by brief recommendations of the author.

Keywords: Import substitution; software development; personal data protection; software technologies.

Российские тенденции в области разработки и внедрения программного обеспечения: результаты исследования

ПАЩЕНКО ДЕНИС СВЯТОСЛАВОВИЧ,

*канд. техн. наук, независимый консультант в области разработки программного обеспечения,
Москва, Россия
denpas@rambler.ru*

Аннотация. Регуляторы российского рынка программного обеспечения (ПО) в течение последних пяти лет оказывают заметное влияние на рынок: от серьезных требований к защите персональных данных в информационных системах до политики импортозамещения. В данной статье приводится часть результатов общероссийского исследования, охватившего 79 опытных инженеров и менеджеров во всех федеральных округах России. Экспертная панель рассмотрела изменение трудозатрат в проектах разработки ПО при ужесточении требований к сбору и хранению персональных данных, дала свои оценки по импортозамещению системного и прикладного ПО, определила возможности использования технологий, использующих открытый исходный код. Результаты исследования сопровождаются краткими рекомендациями автора.

Ключевые слова: импортозамещение; разработка ПО; защита персональных данных; технологии ПО.

Introduction.

Goals of research

Software development domain is changing rapidly because of development of approaches, technologies and customer's expectations. One of the key

factors in profitable IT business is tracking and adapting successful trends, use modern tools and technologies in optimizing software production. At this moment global software industry is the end of agile transformation, when world leaders switched



production process to “agile model”, using scrum, extreme programming, lean practices and other methods.

From the other side state regulators almost everywhere came in high-tech domain and starting attempts somehow influence on market. Operations of governmental regulators are focused on adherence to the rule of law, but it always connected with additional costs to market's players. Area of software development in Russia isn't so overregulated as other economical domains, but during last 4 years there is a set of local requirements, supported by governmental organizations and influenced on business. First of all it is a trend of import substitution in application and system software. Russia during last 25 year became one of the world leaders on software out-sourcing market (of course, with huge lagging from China, India and, perhaps, Israel) [1]. But we couldn't find even 10 worldwide known software products, developed by Russian companies at any domain. Governmental course on import substitution, started as a declaration and now became a real and very hard process, when state organizations are have to looking for any software from special Russian list called “registry of Russian software” to include anything in their own completions at times despite of quality or reputation of that software.

Another local Russian trend is raising efforts in information system development, focused on defending the personal data of customers. It has a long history from 2006 and in last 3 years received a continuation, connected with political reasons. Every regulation in that area makes software companies again and again rethink over this issue and (theoretically) spend more efforts.

This article presents some results of the author's research, conducted in all federal districts of Russia in March-April Of 2017 and included the opinions of 79 experienced engineers, project managers, software architects. The main goal of this research is to determine the demand for the global trends of 2016–2017 in the organization of software development. The research was conducted via a questionnaire with deferred feedback and with the opportunity for experts to comment on the summarized results. The study has the following tasks:

- 1) Determine the relevance in the Russian regions of current global world trends in the development and design of information systems, approaches of the organization of software development;
- 2) Get expert's opinions about local Russian trends related to the regulatory role of the Russian govern-

ment and the expectations of customers with a share of capital owned by government agencies related with import substitution and protecting of personal data.

In this article there are the analyzed results of the second task of the research. In the questionnaire for experts, the local trends were grouped in a separated chapter. For each trend, a description and a set of opinions was proposed, one of which was chosen by each expert in the questionnaire. The results were sent to the experts at the end of the study, some experts gave feedback on them, which, however, only confirmed the final results without making significant changes.

Research method, process and description of expert panel

This part of the article contains data about research method and process and also allows evaluating the panel of experts that presented its opinion about local trends of software development in Russian regions.

The main method of research is survey of experts via a questionnaire in tool Google.Forms. Every question was presented in following structure: a title of issue, short description with remarks and key word's definitions and set of opinions. For each question was presented an opportunity to choose one of the opinions. Answers of experts were summarized and analyzed and sent to experts as a deferred feedback with the opportunity to comment on the summarized results. Almost third of experts gave their comments that confirmed final author's conclusions of research and didn't change anything.

Also there is the information about age, experience, regions and focus of the work of experts in this part of article. From the perspective of experience, the panel data is presented in the following *table 1*.

From the point of view of age groups, data on experts are presented in the following *table 2*.

From the table it follows that more than half of the experts are conditionally in the most productive age for the industry — from 30 to 39 years. This is the stage of the most rapid professional and career growth for software development professionals.

Data on experts in the direction of their software development are presented in the *table 3*.

In terms of geographical location of the experts and the experience of the teams expressed in this study, the data are presented in the following *table 4*.

This breakdown of the panel's experience by geography reflects the author's view of the distribution



Table 1

Experience of experts

How many years have you been engaged in professional software development, relevant projects and teams?	
Answers	Percent in expert's panel
1–3 years	2,5
3–6 years	20,3
6–10 years	32,9
More then 10 years	44,3

Table 2

Age ranges of experts

Determine your age group	
Answers	Percent in expert's panel, %
Older then 40	5
30–39	53,2
20–29	41,8

Table 3

Direction of experience of experts

The experience you have presented in research for the last 2–4 years is most relevant to:	
Answers	Percent in expert's panel
System Integration Projects (system integrator)	11,4
Development of software for the company's own needs (in-house development)	15,2
Custom software development (including outsourcing)	36,7
Development of software (services, technologies) by an independent software vendors	36,7

Table 4

Geography of experience of experts

Identify the region of residence (the capital, the federal district) in which the experience is presented	
Answers	Percent in expert's panel
Moscow	34,1
Siberia Federal District	21,5
Privolzhsky Federal District	12,7
North-West Federal District (incl. St. Petersburg)	10,1
Southern and North-Caucasian Federal District	7,6
Central Federal District (without Moscow)	6,3
Ural Federal District	5,2
Far East Federal District	2,5



of labor resources on the IT market in Russia. Traditionally Moscow has been the center of information technology in Russia, and Novosibirsk, using its educational and scientific potential, in recent years has become a significant center for software development in Russia, pushing back St. Petersburg.

Expectation of Russian state regulators

State regulation on IT market in Russia is not so strong like in EU, there are only several areas, where are acting federal and regional laws and could be tracked any notable efforts for it's following at current moment. Of course, during last 2 years were declared a lot of initiatives for strong regulating of streams of data, its storing or operating according China or even North Korea model, but low-level of understanding of IT market mechanisms on site of government agencies is showing: new coming process would last for decades and do not have any influence in 2017.

That's why in this research are given opinion of experts only about real acting regulations, that have a solid history and more or less coordinated support from market players.

Defending of personal data became a first notable demand to market from Russian state regulators. The correspondent Federal Law No. 152-FZ «About Personal Data» was approved and entered in the force in 2006. But for information systems as well as for internet commercials it became a real issue and risk only somewhere in 2010–2011. Practically it meant changing a lot of information systems in country — adding features to help adherence to the rule of law. Second part of personal data regulation is connected with amendment of 2015 and practically meant a strong need of storage personal data, collecting in Russia within Russia. Current Federal Law Act doesn't have any details and leave its defining to data operators. But approximately from 2012 defending of personal data in Russia became one of the mandatory issues and risks in information system design in state organizations. Current requirements of regulator shortly might be described in following list:

All personal data, including name, address, date of ID documents should be stored within Russia;

- Opportunity of personal data storing include period of its storing;
- Process of personal data collecting include mandatory agreement of current person;

- Person at any time might cancel its storing.

So, modern information systems on stage of design, construction and exploitation should consider this regulation and contain relevant features for users in role model.

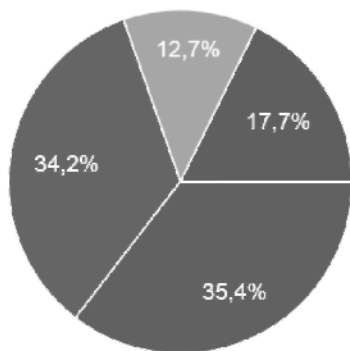
Another large shear in regulation of software market is connected with Crimea's crisis and sanctions from side of USA and EU in 2014. Counter sanctions and products embargo gave a trend of import substitution in grocery area and one year later in hi-tech technology. Legally it based on Order of the Ministry of Communications about approval of the plan for import substitution of software from 01.02.2015 № 96. And practically it went in three directions:

- Corporate software with competitiveness of domestic software;
- Corporate software without competitiveness of domestic software;
- Industry's specific software.

Segment of the market of corporate software, in which there is already a reserve of competitiveness of domestic developments on local market, might be described by several examples: antivirus software (like Kaspersky), browsers (like Yandex), business applications (like 1C.ERP or Terrasoft CRM). For sure, those examples might be comparable with world class solutions in their domains and even without assistance from government those vendors have huge shares on CIS-market. The approach of the state in that direction is the granting of preferences in the implementation of public procurement. In other domains sometimes it leads to unpleasant situations when state organizations have to include in their competitions low-quality local software from "Registry of Russian Software" according demands of regulator.

Next direction is a segment of the market of corporate software, there is no any reserve of domestic competitive counterparts, but such kind of solutions are innovative and playing huge role in digital transformation of business in near future [2]. Examples: mobile operating systems, tools for managing the "cloud infrastructure", database management systems (DBMS). The official state approach in that direction is assistance in the collective development of this software. Author didn't find any real projects in that direction, except disjointed supporting of Russian and "open-source based" different DBMS [3] in local projects of state organization in very little amount.

The third direction has a little share and huge potential: software related to industry specificity.



35,4% – yes, efforts and costs greatly raised;
 34,2% – efforts and costs slightly raised;
 17,7% – do not have any opinion;
 12,7% – efforts and costs didn't raised totally.

Fig. 1. Additional costs and efforts to storage and management of personal data

Such systems are designed to ensure the development of health care, fuel and energy complex, financial sector, transport, etc. Approach of the state has a character of formal declaration — joint interaction with responsible ministries and departments.

Expectation of regulator in this area is focused on changing IT policy of all state organizations: slow replacing of USA and global corporate's application software to local products and slow replacing of system software to products, based on open-source technologies.

Local Russian trends in software development: research results

One of the goals of author's research at the Spring of 2017 was defining reflection of IT domain professionals, who directly do software projects, of governmental regulation of last five years. To panel of experts were presented 2 main local trends in information system design: defending of personal data and import substitution.

Toughening of the Russian legislation in the field of collection and storage of personal data causes additional requirements, and therefore a waste of resources (time, efforts, money) and attention to this issue. In case of any abstract information b2c (business to customers) or g2c (government to customers) systems it assume changing the whole cycle of data storage — from it receiving till utilization. Panel of experts was asked how toughening of the Russian legislation about defending personal data influents on costs and efforts in software design and construction. Only 35% of experts confirmed that it

raised costs and efforts greatly (Picture 1). And for 34% of experts all costs and efforts were too small even for allocation this issue in a separate task in the project — defending of personal data for them practically meant only automation of receiving of person's agreement for data storage in database and using it in any services. In most cases it's just a "check mark" on one of the system interfaces, that means agreement of person for collection and storage of his/her personal data.

Research shows that almost half of experts do not changed greatly their information systems despite of state regulation, from the other hand current mechanisms of data management enough sophisticated to meet most of regulator's requirements.

Import substitution in software domain is a very new local trend and, of course, is going in different way for system and application software. System software is a core technologies with long history [3] — it is operational systems of devices, technologies of integration, Integrated development environments, etc. In comparing software development with real economic it's like the means of production. According author's research 82% of experts didn't find any signs of process relatively system software like operational systems, enterprise service buses or other core technologies. For sure, lagging with developed markets like USA, Korea or Japan is very huge, but system software is a key for "information independency" although if in global transparent IT-world it's still possible. By opinion of author, Russia as well as other IT outsource exporters (India, Chine, Turkey) would never build any competitive system technologies for current existing devices like personal computers, smartphones or tablets. The economic reasoned recommendation here could be only investing in attempts on new devices markets (like drones, quantum computers, etc).

For application software the situation is almost the same: 60% of expert didn't find any signs of import substitution and only 17,7% of experts is noticing that this process is actively going in Russia. For sure, a little more optimistic situation is connected with more developed local corporate application systems (DBMS, CRM, ERP, etc) and current big shares of Russian vendors on local market. There are several sub-domains where it's still possible to keep domination of Russian software products, for example, internet services of Yandex is withstand an impact of powerful Google Corporation for many years or Russian ERP 1C is a local leader for SME segment



at least for last 10 years. Also Russian vendors have chances in other niches: where there is not a lot of innovation, but customers are looking for cost reducing (CRM systems, Business Intelligence systems, some industry specified software).

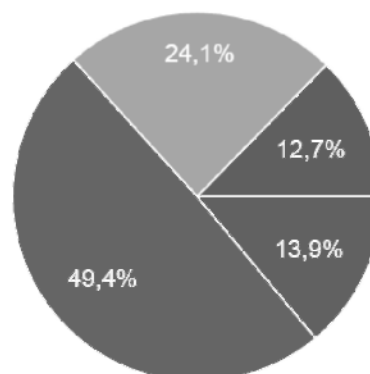
From the other hand overregulation in competitions for state organizations might have very controversial economical effect. Of course, it slows down digital transformation in governmental services, leads to a lot of problems: from risky data migration (from current systems to new ones) to hackneyed corruption in projects and competitions, where world-class software should be on-demand replaced with local ones.

One of the key solutions in import substitution is creating software, based on “free” open-source technologies, supported world-wide by thousands of software engineers. It’s a world trend, but in Russia it took political aspect and was declared by many of Russian system integrators as a major practice for official competitions in state organizations. In author’s research panel of experts also evaluate trend of replacement proprietary solutions to “open source based” (fig. 2).

According panel view it’s a notable and significant process, and Russian market in the same trend as European. But around half of experts connected rising of relevance of solutions, based on open source technologies, not with import substitution, but with natural economical and technical reasons. For sure, implementation of “open source based” solutions significant decreased project cost, because there is no any need to pay license fees to any vendor.

Experts of panel are providing their opinion about areas (sub-domains), where “open-source” solutions are in demand in Russia. The first place with most popularity is going to database management systems (DBMS): about 52% of experts have seen the real projects of proprietary DBMS substitution in their practice of last 2–4 years. Experts confirmed that from different points of view (costs, risks, data migration efforts) PostgreSQL is a favorite solution for substitution of Oracle, Microsoft and IBM DBMS, that now having together around 80% of Russian market of DBMS in money evaluation.

Second most popular area in Russia for substitution of proprietary solutions is system’s class of enterprise service buses (ESB): about 27% of experts have seen the real projects of proprietary ESB substitution in their practice of last several years. According opinion of expert’s panel the most relevant



49,4% – Rising of relevance of solutions based on open source technologies is notable and do not connected with import substitution;

24,1% – Don't see rising of relevance of open source software;

13,9% – Do not have any opinion;

12,7% – Rising of relevance of solutions based on open source technologies is notable and connected with import substitution

Fig. 2. Replacement proprietary software to solutions based on open source technologies

open-source ESB on Russian market are Mule ESB and JBoss ESB.

By the way, 31% of experts in research are sure that ESB approach even with open source technologies is obsolescent method of integration and using of micro-services approach is an actively new coming practice on Russian software integration market.

Conclusion

Regulation in area of protection of personal data has an influence on software market, took some attention of engineers, led to additional efforts in software development projects. From practical point of view almost half of experts in panel didn't find a huge impact of regulator's demand and didn't spent big efforts to meet those requirements in their projects. Formal following to this demand in information systems in Russia might be done as “check mark” or other elements of graphical user's interfaces without big changes in all processes of personal data management.

But also it could means that final customers of information systems do not have a strong need of protection their personal data in software — this issue shows that all parties concerned (developers, business and final customers) in many ways fill this regulation as formal thing without any real influence on their lives or business. From the other hand,



the organizational resistance to state regulation in software domain is very strong [4], it slows down any reasonable changes.

Official declarations about import substitution in software development do not have a strong reflection in panel of software development experts in author's research. This study shows that current global system software vendors are keeping their strong positions on Russian market and for the last 2–3 years there are no any changes in businesses of experts despite of official news and propaganda. By opinion of author capital investments and marketing positions of global vendors of system software and technologies aren't reachable now and for next at least 15 years. Experience of China shows that state strong regulation in system software domain leads to huge wastes and even possible only in case when the local market have millions of IT specialists. It's absolutely impossible in economic conditions of Russia, who is staying in crisis and recession from 2013.

Situation with import substitution of application software is a little more optimistic, but it is based on results of work of current Russian software leaders like Yandex or TerraSoft and do not have any connections with official state policy. Without a real aimed program of government author is not expecting any research projects in import substitution of application software. By the way, economically motivated Russian private venture funds are focused on hi-tech

development only in newest sectors and would never invest money in Russian software with long history and global competitors.

Using open-source and replacement of proprietary software is a common trend for EU and Russia. Local system integrators are actively using open-source technologies for achieving competitiveness on inner market. According to this research it happens not because of efforts of regulators in Russia, but mostly have economic reasons — low costs of open-source software. Russian IT companies are actively suggesting to their customers and implementing world leading solutions, based on open-source technologies like PostgreSQL and Mule ESB.

As a recommendation from author's side for regulators might be working on rising of image of open-source technologies for state customers and local business. Unfortunately, current image of it in Russia is not at fair level and might be improved in special marketing campaigns.

In conclusion there is a want to add that strong regulation in hi-tech domain is not working well at any country, because the software market is global and transparent. Perspective projects on overregulated markets just move in USA or Australia and with money of local venture funds working with new customers without any regrets about previous history. State policy in high-tech regulation should be soft and consider its leading role in the economy of the new century.

References

1. Russian Software Industry Overview (2012) Portal Software Russia. Available at: http://www.software-russia.com/why_russia/industry_overview (accessed: 25 May 2016).
2. Chris Dixon (2016) What's Next in Computing? Available at: <https://medium.com/software-is-eating-the-world/what-s-next-in-computing-e54b870b80cc> (accessed: 1 June 2017).
3. Import substitution of software in the public sector. Portal of the analytical agency TADVISER [Importozameshchenie programmnoy obespecheniya v gosudarstvennom sektore. Portal analiticheskogo agentstva TADVISER]. Available at: http://www.tadviser.ru/index.php/Stat'ja: Importozameshchenie_programmnogo_obespecheniya_v_gossektore (accessed: 15 May 2017) (In Russian).
4. Pashchenko D. S. (2014) Features of change management projects in Russian software development companies. Project and program management, 2014, vol. 1, pp. 22–32.

