Theme: Place based innovations, **topic:** Building and accelerating regional clusters

Title: Technology Platforms in Russia: A Catalyst for Cluster Development?

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Introduction

Technology platforms and innovative clusters represent rather new instruments of government-led innovation policy in Russia aimed to connect major actors of the system. This is an important task because Russia stays behind not only developed countries but also BRIC countries by the indicators showing the level of connectivity among major actors of innovation system.

Technology platforms as communication instrument were initiated at the government level in 2010 and innovative clusters – in 2012. The major goal for establishment of technology platforms, according to government documents, was the development of perspective

commercially-valuable technologies[1]. In addition, technology platforms should create beneficial conditions for companies who joined them, due to:

- Access to new resources for R&D implementation,
- Participation in the defining of priority directions for the country economic development,
- Participation in the development of new technology standards and regulations,
- Optimization of business planning since among the members of platforms are companies-producers and companies-consumers of new technologies,
- More effective use of resources due to outsourcing,
- Development of international cooperation,
- Solving various human resources problems.

Innovative clusters were also initiated as a government measure to support innovative development. Open competition for "cluster awards" was conducted in 2012 by the Ministry of economic development of the RF. The specificity of the Russian selection process was in the fact that applications were submitted not only by the existing clusters but in most cases – by groups of organizations wishing to create an innovative cluster.

The Russian ministry of economic development, which initiated the cluster support, gives the following definition of innovative cluster[2]: a number of organizations and companies located in a limited territory which may be characterized by the presence of value chain in one or several economic areas; of mechanism for coordination and cooperation among these organizations; and there should be synergy effect that appears due to high level of concentration and cooperation of these organizations which, in turn, raises their economic activity.

In this respect potentially the role of technology platforms may be rather high since they may improve linkages among cluster members, help them to develop vision, stimulate better involvement of small innovative companies into the cluster activities.

[1] http://innovation.gov.ru/taxonomy/term/546
[2] http://innovation.gov.ru/taxonomy/term/545

At the present time there are 32 technology platforms and 25 innovative clusters in Russia that were initiated and selected for further support at the government level. These two instruments were partially borrowed from foreign experience, especially with regard to technology platforms – the concept was adapted from the European Union (European Technology Platforms).

In the European Union the instrument of technology platforms has appeared about 10 years ago. Initially it was an instrument for negotiations of inter-country interests in technological area. They were defined as a space where strategy for research and technological development is developing which creates the basis for programs and projects of EU Framework Program. The major stakeholders of EU technology platforms include representatives of research organizations and universities, industry, government bodies, financial institutions (banks, investment funds), venture funds, and civil society representatives.

Innovative clusters in Europe have longer history then technology platforms and were studied at large and with different goals. One of the latest concepts regarding cluster development is dealing with "smart specialization"[3]. Many clusters were created not as a result of government initiative but naturally and evolutionarily and were studied as economic phenomenon as well as policy instrument. There is no unified definition of clusters in scholarly literature; their typology depends on a choice of what will be considered as key cluster characteristics.

The goal of this article is to benchmark Russian experience with the European one and to define factors that assure successful work of technology platforms and innovative clusters and interconnections between the two instruments. The second task is to analyze the specificity of Russian way to apply these instruments into practice and suggest areas for improvement.

The study is based, first, on the literature review, including policy documents, second - on interviews with government officials responsible for implementation of mechanism of technology platforms in Russia and in the European Union. Third element of the methodology is case studies of Russian technology platforms. Case studies were conducted in order to

[3] Foray, D., David, P.A., Hall, B. Smart Specialization: The Concept //Knowledge for Growth. Prospects for Science, Technology, and Innovation. Selected papers from Research Commissioner Janez Potochnk's Expert Group. November 2009, p. 20-24.

understand self-perception of platform coordinators and analyze their views on the relationships with innovative clusters.

State of the art

Russian innovation system is still largely influenced by the Soviet legacy. In the Soviet Union R&D system including industry was government-owned and controlled. This system consisted of three main pyramids in organizational and institutional terms which for sake of convenience can be called the "university system," the "academy of sciences system," and the "industrial and defense ministry system." Table 1 gives a very approximate description of the organization and shares of research personnel and budgetary funds of each of the three pyramids.

Table 1

Organization of R&D System in the Soviet Union, 1990

Characteristic	University system	Academy of Sciences system	Industrial system
Types of organizations	Higher educational institutions and universities	Academy of Sciences of the USSR, 14 Academies in union republics, Agricultural academy, Medical academy, Pedagogical academy	Industrial research institutes; closed military ("postbox") research institutes
Number of researchers, headcount	600 000, including faculty members as well as researchers	125 000 of researchers	800 000 of researchers
Share of researchers with candidate and doctoral degree	9% of all-country specialists with doctoral degree, 13% - with candidate degree	54% - doctoral degree, 33% - candidate degree	37% doctoral degree, 54% - candidate degree

Share in total R&D budget	6.7%	12.5%	80.8%

Source: Based on Graham, L., Dezhina, I. *Science in the New Russia: Crisis, Aid, Reform.* Indiana University Press, 2008.

University system was by large teaching institution with not much research; institutes under the auspices of the Academy of sciences were involved in most of fundamental research. The industrial and defense ministerial system was primarily concerned with applied science, although it performed some fundamental work as well (just as the Academy of Sciences system performed some applied work.) Military research occupied a very large role, not only in this industrial-defense pyramid, but also in the universities and academy institutes. In fact, the military was given about 75% of all resources.[4]

In post-Soviet Russia the situation did not change too much: the latest data (2011) show that 72.5% of all research and development (R&D) was performed at government-owned R&D organizations and only 14.4% was conducted in private organizations. This is slight increase of government share in comparison with 2000 (71.7%) even though the share of private organizations has also increased (it was 9.5% in 2000)[5]. The rest of R&D is conducted in organizations of mixed property. As of 2011, Russian industry contributed only 27.7% of the national R&D expenses which is decline when compared with the year 2000 (33%). It is important to note that in the developed countries this percentage is much higher (varies from 45% in UK to 66% in Germany)[6].

Therefore government continues to be the center of Russian triple helix. It still looks more like "pyramid" rather than "helix" with main linkages between government and R&D organizations

[4] Boris Saltykov, "The Reform of Rusian Science," *Nature*, Vol. 388 (July 3, 1997), p. 16.
[5] Indikatory nauki – 2013. Statistichesky sbornik. M.: National research university – Higher school of economics, 2013. P.29.
[6] Indikatory nauki – 2013. Statistichesky sbornik. M.: National research university – Higher school of economics, 2013. P.353-354.

from one hand and government and industry – from the other. Linkages between R&D sector and industry continue to be weak.

Many elements of innovation system were constructed during last 15 years in Russia but it did not give much of innovation boost. Eventually it was discovered that one of the major reasons is in disconnect among key stakeholders. The major changes in innovation policy were occurring during last 7-8 years. In 2006-2008, with increased resource capabilities of the Russian state, an objective was declared to proceed to innovative development, with a focus on a demand-driven model. During this period, a number of tax measures were taken to stimulate innovation in business, were created the largest institutes for development (like Russian Venture Company, Russian Corporation for Nanotechnologies), and government money were also invested in further development of innovative infrastructure (meaning technical infrastructure such as technology parks, incubators, technology transfer offices – organizations, aimed to create "value chain" for innovative development).

Then, in the active phase of the financial crisis (end of 2008 – 2009) stimulating innovations was not a priority direction for government. The corresponding budgetary expenditures and some instruments of innovation policy were partially "retargeted" to compensate the losses from the crisis[7]. However, exactly in this period at the state level there has been a "reevaluation" of the role of innovation in relation to the competitiveness of the Russian economy, and as a result the modernization theme turned to be among the main priorities declared by the state.

Since around the second half of 2009 the innovation policy has been reinvigorated, and fundamentally new measures were introduced, including those aimed at connecting the main actors of the innovation system (innovation city "Skolkovo", technology platforms, innovation clusters, "forcing" large state-owned companies to innovation, the mechanism of "matching grants").

[7] Dezhina, I. (2010). Russian Science Policy During the Crisis. Sociology of Science and Technology, 1, 67-88. (in Russian); Simachev, Yu., Yakovlev, A., Kuznetsov, B., Gorst, M., Daniltsev, A., Kuzyk, M., Smirnov, S. (2009). An Assessment of Policy Measures to Support Russia's Real Economy. *Working Papers of the Research Centre for East European Studies 102*, Bremen.

A distinctive feature of Russian innovation policy in the post-crisis stage was the focus on the support of cooperation between different stakeholders, networking and partnerships. However Russia continues to be far behind in the parameters that characterize the coherence of the innovation system in comparison with not only the developed countries, but also the BRIC countries (table 2).

Table 2

Linkages in the innovation systems, according to the "Knowledge Economy Index", measured on the scale from 1 to 7 (data for 2010).

Indicator / Country	**USA**	**Great Britain**	**Germany**	**France**	**Brazil**	**India**	**China**	**Russia**
Level of cooperation between companies and universities	5.8	5.6	5.2	4.0	4.3	3.7	4.6	3.7
Level of protection of intellectual property rights	5.1	5.3	5.7	5.9	3.1	3.6	4.0	3.0
Availability of venture capital	3.8	3.0	2.8	3.2	2.6	3.2	3.3	2.3
Presence of value chains	5.1	5.5	6.3	5.7	3.7	3.9	4.0	2.6

Source: http://info.worldbank.org/etools/kam2/KAM_page3.asp

Russian innovation system at the present time reminds unfinished construction when all elements seem to be in place however they are not assembled in full. This is mainly the result of the government policy that was rather changeable during last two decades and more situation-based rather then carefully thought-out. The intention is to get fast results and this does not work in innovative area. At least 5-7 years have to pass since the start of an initiative so that it could yield positive (or at least evident) results. In Russia the outcomes are expected in a year or two and if they are not seen then often the measure would be given up and a new one would be initiated. Long-lasting projects in innovation area continued to be a rare case. However technology platforms and clusters have potential to become such instruments. Another reason

why they are worth exploring is because this is an imitation of foreign (Western European) experience and one of the first attempts to create "communicative instruments". According to the Strategy for innovation development of the Russian Federation till the year 2020, technology platforms are defined as **communication instrument** aimed to activate creation of new technologies and products due to synergy of business, science, government, and civil society[8].

In Russia, since not much time passed since the creation of platforms and clusters, the effectiveness of these two instruments was not studied enough. There are several publications that touch the subject of Russian technology platforms and clusters (O.Luksha, N.Shelyubskaya, E.Kutsenko), however they are mostly related to analyses of adaptability of European experience.

In EU technology platforms were evaluated at the government level[9] and this is an ongoing process[10]. Innovative clusters are studied by many scholars, both in Europe and USA (M.Porter, M. Piore, C.Sabel, C M.Muro, B. Katz , D.Foray, C.Ketels, D. Dohse and others)[11].

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[8] Strategy for innovation development till the year 2020. Approved by the government order of the Russian Federation on December 8, 2011, #2227-p. Source: www.rg.ru/pril/63/14/41/2227_strategiia.doc (in Russian)

[9] Evaluation of the European Technology Platforms. Final Report. August 2008, P.41 ftp://ftp.cordis.europa.eu/pub/technology-platforms/docs/evaluation-etps.pdf; Strengthening the role of European Technology Platforms in addressing Europe's Grand Societal Challeges. Report of the ETP Expert Group, October 2009. EK DG for Research, 2010.

[10] European Technology Platforms-2020. Draft Strategy. European Commission. Brussels, November 5, 2012.

[11] Piore, M., Sabel, C. (1984) The Second Industrial Divide: Possibilities For Prosperity. New York: Basic books; M.Porter, (2001) Clusters of Innovation: Regional Foundations of U.S. Competitiveness. Council of Competitiveness, Monitor Group; Michael E. Porter, "Clusters and Economic Policy: Aligning Public Policy with the New Economics of Competition," Institute for Strategy and Competitiveness White Paper, revised May 18, 2009; Mark Muro and Bruce Katz, "The New 'ClusterMoment': How Regional Innovation Clusters Can Foster the Next Economy," Brookings Institution Metropolitan Policy Program, September 2010; Solvell, O., Lindqvist, G., Ketels, C. (2003). The Cluster Initiative Greenbook. http://www.cluster-research.org; Dirk Dohse, Tanja Staehler BioRegio, BioProfile and the Rise of the German Biotech Industry // working paper No. 1456, October 2008, http://www.ifw-members.ifw-kiel.de/publications/bioregio-bioprofile-and-the-growth-of-the-german-biotech-industry/KWP_1456.pdf; Dirk Dohse Technology policy and the regions — the case of the BioRegio contest // Research Policy 29 _2000. 1111–1133; Dirk Dohse. Cluster-Based Technology Policy - The German Experience // Industry and Innovation, Vol. 14, No. 1, 69–94, February 2007; Alexander Eickelpasch, Martina Kauffeld, Ingo Pfeiffer The InnoRegio - Program: A new way to promote regional innovation networks - empirical results of the complementary research. (DIW Berlin). July 2002; Alexander Eickelpasch, Michael Fritsch Contests for cooperation—A new approach in German innovation policy // Research Policy 34 (2005) 1269–1282; Alexander Eickelpasch The promotion of regional innovative networks – Lessons from the German InnoRegio-Programme //Innovation Pathways and Knowledge Economy, Final DISTRICT Conference, 16th April 2008, Brussels, Belgium; Thierry VAUTRIN Innovation and Competitiveness clusters Policy in France. Mexico, March 6th 2009; http://proinno.intrasoft.be/index.cfm?fuseaction=wiw.measures&page=detail&ID=8922 ; Lionel Fontagné, Pamina Koenig, Florian Mayneris and Sandra Poncet Analyzing selection into subsidized clusters: The French policy of competitiveness clusters. November 20, 2011; http://www.industrie.gouv.fr/poles-competitivite/brochure-en.html; Foray, D., David, P.A., Hall, B. Smart Specialization: The Concept //Knowledge for Growth. Prospects for Science,

The interconnection between technology platforms and innovative clusters is not that obvious however in European practice technology platforms tend to be seen as policy measure that may encourage networking within innovative clusters. Technology platforms are also considered as an instrument of inter-cluster cooperation since they are not associated with some given region and thus may help in working out directions for development important for various clusters.

Methodology

The aim of the study that is presented in the paper was to analyze the difference between Russian and foreign technology platforms and clusters, to assess the level of interconnectivity among them, and to suggest policy measures (at the level of federal government) that should increase effectiveness of these instruments in Russia and strengthen the innovation system.

The methodology included studies of foreign and Russian literature on the outlined topic, analysis of policy documents, strategic plans developed by technology platforms and innovative clusters, and conducting of three case studies in Russia. For case studies three technology platforms from different industrial sectors were selected, based on such criteria as level of development of strategic plans and roadmaps, actuality of the industry sector for the country development, and level of interactions with innovative clusters. The chosen industries included: biotechnological, resource-extracting industry and radiation technologies (as part of nuclear industry). The three industries were selected based on the following assumptions.

First, it is important to analyze situation in those areas where Russia has different standing in the world. From this standpoint the choice of very different economic areas seem to be the most logical. Resource extracting industry is very strong but not really innovative. Industries with high technology potential – accumulated but not quite used – could be represented by nuclear

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Technology, and Innovation. Selected papers from Research Commissioner Janez Potochnk's Expert Group. November 2009.

industry. Finally, industry that may be considered as mainstream of modern economic development is biotechnology.

Second, the existing linkages between given technology platforms and clusters should be taken into account; under clusters in this context we consider those 25 created with the government support in 2012.

Based on these two considerations, the abovementioned platforms were selected.

Interviews were conducted in fall 2012. These were unfocused interviews which were based on a set of basic questions. During the discussions new themes could arise and then they were included in further interviews. Interviews were conducted with representatives of organizations that serve as platform coordinators as well as with some organizations that are members of platforms (universities, R&D organizations or industry). The average duration of each unfocused interview was 2 hours.

Findings and Interpretation

Russian technology platforms are very different from European ones.

If Europe applies bottom-up approach, Russia follows its traditional path of top-down initiating and regulation. Government is a core creator and facilitator of technology platforms. It sees them not only as communicator among actors of innovation system but also as experts for industrial policy design.

The role of big companies in technology platforms is underestimated and generally businesses are more passive in the operation of platforms, then in the European Union.

The key participants of technology platforms in Russia are universities and government research institutes (including those by the auspices of the Russian Academy of Sciences) and thus their major focus is on development of R&D projects and search for their financial support.

Therefore the attitude in the EU and in Russia to technology platforms as to instrument for innovative development differs to a considerable extent. European Commission sets possible directions of activity for platforms in the form of recommendations, not the order. In Russia platforms are obligated to fulfill certain functions (like roadmaps development or participation in analysis of policy decisions). At the same time Russian technology platforms did not get any initial support for their operations while in the EU certain financial assistance was provided to coordinators of platforms so that they could start their activities. As a result, Russian platforms as a collective expert do not function effectively so far. Moreover, they had difficulties in defining which areas of R&D they should select as priorities for their development[12].

It should be mentioned that there is no definite answer either for Russia or for Europe on what should be considered as a positive outcome of platforms' operation. According to opinion of European Commission representative[13], the result of platforms' work may be measured in presence of "vision", outlined in strategic plans for development, as well as in the growth of new joint R&D projects that were implemented by members of platforms. EU experience shows that over time some platforms have been transformed into more formal partnerships with industry (so called "Joint Technology Initiatives") while some other – stagnated. Since technology platforms in EU are self-organized structures, then such result could be expected because it reflects evolutionary development.

The major differences between European and Russian technology platforms are summarized in table 3.

Table 3

Technology Platforms: EU versus Russia

Characteristics	**EU**	**Russia**
Principle of formation	Bottom-up	Top-down

[12] S.Kozak. Technology platforms as basis for innovative development // Trade-Industrial Gazette, 14.09.2012. http://tpp-inform.ru/analytic_journal/2708.html (in Russian)

[13] Interview of the author with Manuel Hallen, EU Commission representative in Russia, September 2012.

Goals	1) Coordination EU countries interests 2) Linking fundamental research and practical applications 3) Synergy among major stakeholders	1) Creation of new technologies 2) Attraction of additional resources for R&D 3) Improvement of legal regulations in R&D and innovation
Tasks	Development of Strategic Plan and road maps Marketing of ideas in EU	Development of Strategic Program Development of programs to disseminate new technologies Educational activities Expert functions for the government
Financing	State, private, self-financing	Government financing (planned), private (planned), self-financing
Government role	Promotion of platforms concept Limited financial support of operational activities	Participation in governance of platforms Attraction of platforms as experts Monitoring of platforms' activities

Source: compiled by the author.

Russian technology platforms still have indefinite future, not only in financial terms but also in terms of how many of them will continue to work and which of them will be "closed". The term "closure" is quite appropriate in Russian context since the platforms were initiated by the government, as a policy instrument, and thus may be also closed by the government.

So far at the government level three sources of support for technology platforms are under discussion:

First – cooperation with large government-owned companies and corporations that have to implement programs for innovative development. They may outsource platforms for their needs in R&D and related activities. In such alliance there may be mutual benefit: technology platforms may develop vision for certain areas in which companies are interested in, and companies may take part in development of strategies of respective technology platforms.

Second – providing subsidies to the platforms from the federal budget. In 2011-2012 this option looked quite realistic but in 2013 the chances for this scenario are diminishing since there are no outlays for such purposes in the draft federal budget for the next three years.

Third – implementation of R&D projects suggested by technology platforms, through the mechanism of government goal-oriented projects (the main mechanism of competitive-based R&D in the form of government procurement or / and grants).

Cluster as an instrument for innovative was studied profoundly but still there is no definite answer on how cluster initiatives should look like, which parameters to have, and what are the most effective forms of government support. The very definition of clusters varies considerably in policy documents – from "industrial networks", "resource zones" to "innovation networks"[14]. Naturally evolved clusters usually do not need hands-on management from side of government (such as, for example, setting priorities for clusters activities). In this case government mainly implements "soft" regulative function (most commonly may be found in USA and the Netherlands). If cluster is the result of government initiative, then main priorities, goals and tasks, as well as major stakeholders are identified prior the cluster development, as a result of dialogue between government, science, and industry. Then it is start for cluster development which is usually supported by the government through various measures including direct financial support[15].

Assessment of clusters as instruments of innovation policy is even more complicated than evaluating performance of technology platforms. Analysis of foreign experience allows summarizing the advantages for stakeholders to participate in cluster initiatives. These are:

- Access to various resources;
- New linkages, including horizontal ones;
- Various forms for outsourcing of R&D;
- Change in entrepreneurial culture through growing trust;
- Easier access to global value chains.

However despite to growing popularity of clusters as instrument of government policy (for example, much more attention to clusters is now given in the United States), clusters continue to

[14] Boosting Innovation. The Cluster Approach. OECD Proceedings. OECD Publication Service, 1999. P.415.
[15] Boosting Innovation. The Cluster Approach. OECD Proceedings. OECD Publication Service, 1999. P.418.

be rather risky policy measure. Cluster initiatives are long-lasting and expensive, and thus in case there was a mistake in the process of selection of the objects for support, the losses will be substantial. Aside of that, almost in any cluster initiatives more than half of their budgets comes from the federal sources, and moving of clusters to self-support (indicator of sustainable development) in most cases is problematic. In this respect there is growing common opinion that it is more effective to identify and support naturally developed clusters rather than to create the new ones from the scratch.

In many scholarly papers and policy papers technology platforms are seen as one of the instruments for the cluster development[16]. Opposite situation may be found more rare, i.e. clusters usually are not considered as stimulus for the development of technology platforms. Platforms, depending on their composition, may be focused on stimulating of various partnerships, including the following ones: (1) between research organizations and universities; (2) between research organizations and universities from one hand and industry from the other; (3) between companies. For cluster development the support of all these types of linkages is important.

In Russia during the cluster selection process the factor of availability and connection with technology platforms was not taken into consideration. The review of 25 programs for cluster development (for the clusters that were selected for support in 2012 as a result of open competition) shows that 1/3rd of them does not take into account the existence of technology platforms in their area of specialization; and only 4 clusters plan to work with existing technology platforms or to establish its own platform within a cluster.

One of the explanations for such outcome is that 25 innovation clusters that have been chosen at the government level are not necessarily clusters with history. In many cases these are projects outlining intentions to create cluster on a certain territory. In other words, the Russian government has chosen approach according to which in selection process there was no stage of

[16] Country responses to the OECD Science, Technology and Industry Outlook 2012 policy questionnaire and OECD (2010), OECD Science, Technology and Industry Outlook 2010, OECD, Paris; OECD Science, Technology and Industry Outlook 2012. P.187.

identification of existing clusters. Instead, the idea was to support the best projects promising to create new or develop existing innovation clusters. As a result, clusters that are under establishment do not have much experience and thus they did not carefully think over the possibility to use existing communication instruments, such as technology platforms.

Both platforms and clusters see the major obstacle for their development in the lack of financial support from the government. Indeed, the latter one did not allocate even quite modest resources necessary for implementation of the first steps of platform / cluster development – i.e. financing of their organizational work (which was done in case of European technology platforms), and of the design of strategic plans and R&D programs. Simultaneously, business was not willing to put its own resources into the wstablishment of platforms.

As of the beginning of 2013, neither technology platforms nor clusters started to work in full capacity. The question of financial support from the federal budget is still under discussion. The planned initiatives for platforms and clusters overlap to a certain degree. For example, both platforms and clusters are obligated to cooperate with Russian institutes for development, and they have to work closely with government-owned companies and state corporations. These are potential sources of support for them. The very fact that clusters and platforms have to apply similar procedures may stimulate closer relations between them, though at the same time they may increasingly become competitors.

In order to have more precise view on the current development of technology platforms in Russia and the potential of their impact on clusters, three case studies were conducted. Technology platforms related to resource extracting industries, biotechnology industry and radiation technologies were chosen as the objects for analysis. The three platforms differ in terms of composition of key stakeholders (though R&D organizations and universities dominate in all of them), by the level of development of strategic documents and plans for their realization, and by the ability to attract external financial resources for R&D. In biotechnology platform the strategic program was already developed, the platform “Radiation technologies” conducted deep

foresight while resource-extracting industry platform only started to work on a program for development.

Finally, two out of three platforms started to work with clusters but to a different extent – one is more focused on domestic clusters and the other one – on foreign ones.

All Russian technology platforms have to implement a number of tasks which the government has assigned to them. These are:

- Selection of R&D projects;
- Search for budgetary and nonbudgetary sources for their support;
- Assistance to companies in development high tech production;
- Improvement of legislation for research and innovation;
- Assistance to development of educational initiatives.

It should be noted that all these functions are also important for cluster development. The summary of how the chosen clusters fulfill these activities are presented in table 4.

Table 4

Tasks implemented by surveyed technology platforms

Task	**Biotechnology platform**	**Radiation technologies platform**	**Resource-extracting industry platform**
Attraction of budgetary sources for R&D	Yes	Yes	Yes
Attraction of nonbudgetary sources for R&D	No	No	No
Interactions with state corporations	No	Yes	Yes
Expert evaluation of government decisions	Yes	Yes	Yes
Assistance in development of educational activities	No	No	No
International activity	Yes	Yes	No
Interactions with clusters	**Yes (foreign)**	**Yes**	**No**

Source: compiled by the author.

Case studies were conducted with the aim to clarify a number of issues including the following ones:

1. Motivation of organizations to participate in technology platforms;

2. Nature of financial resources that were attracted by platform;
3. Scope of expert functions implemented by platforms;
4. International activity;
5. Criteria of effectiveness set by platform coordinators (if any);
6. Nature and pace of interactions with innovative clusters.

Motivation of organizations to participate in technology platforms

The major motivation for organization to become a member of technology platform is either hope on easier access to financial resources for its R&D, or possibility to take part in the development of government regulations in the area of technical standards, certification, intellectual property rights protections and such. At the same time the views of the three platforms slightly differ. Resource-extracting industry platform underlines importance of more active involvement of companies in lobbying their interests at the federal level and they consider platforms as instrument of government relations. Platform is also seen as a stimulus for companies to invest more in R&D. At the present time, according to interview, oil companies are not that much interested in innovations since they buy most of technologies abroad. Better connections with universities and R&D institutes may change the situation and persuade companies to look more carefully at domestic resources.

Technology platform in radiation technologies underlines importance of consolidated effort. In their area there are many small companies disconnected with each other; platform may ensure consolidated expert opinion, select priorities and in this way stimulate merging and acquisitions which may be good for this industry. Coordinator of the platform also thinks that platform is a tool for international development.

Biotechnology platform stated that there is no much enthusiasm among organizations working in this area to become members of platform. Therefore the platform is mainly represented by Academy institutes and universities which are more responsive to government initiatives since they are all in federal property and hope to get extra financial support from the government. One

of the main goals for this platform is very ambitious one - to form biotechnological market in the country, in the conditions when biotechnology industry in Russia is barely visible and therefore almost not presented among platform stakeholders.

Overall self-perception of platforms stakeholders continues to be individualistic and each type of stakeholder has its own agenda which is not yet coordinated with other stakeholders. The skill of negotiation is at initial stages of its development.

Nature of financial resources that were attracted by platform

Extract resources industry platform has attracted federal financing for its R&D projects but was not able to find private sources even though a number of large companies participate in the platform. Coordinators stated that companies are not interested to support pre-competitive research. This is in line with more general trends that are characteristic for big companies in Russian resource extracting industries – they are oriented towards purchase of foreign technologies rather than on development of their own ones.

Platform specializing in radiation technologies represents a special case from financial point of view: organization-coordinator is located in Skolkovo and thus small companies – members of platforms are more informed about possibilities and conditions for receiving financial support in form of grants from the Skolkovo fund. They indeed managed to apply for support and get it. At the same time nonbudgetary sources were not attracted in this platform as well despite the fact that there are quite successful private companies in the platform. However they prefer not to outsource R&D but support their in-house R&D divisions. This is one of the indicators of low level of linkages within platform.

Finally, the biotechnology platform to the date of the interview was not able to attract financing and all organizational work was supported due to redistribution of budget within the organization-coordinator.

To sum up, in the platforms mechanisms of self-support did not start to function yet; government did not provide financing for organizational work though it was planned; business that is

involved in technology platforms is so far reluctant to provide financing for R&D projects initiated within platforms.

Scope of expert functions implemented by platforms

All surveyed platforms took part in various expert groups and analytical work by request of government bodies, represented first of all by the Ministry of education and science and by the Ministry of economic development. Despite absence of federal support for functioning of platforms, they still were very responsive to such requests. This is one more indicators of government dominance and control – major characteristics of Russian R&D system. Technology platform related to resource extracting industries was involved in development of legal documents related to tax exemptions; two other technology platforms did not specify their tasks but stated that there were constant requests from the government to conduct expert evaluation of projects or documents.

International activity

Two platforms out of three recognize that international activity is an important component of platform functioning. Platform in radiation technologies managed to attract foreign specialists to their Board and this helps to develop modern vision for the respective industry. At the same time they do not cooperate with European platforms. The reason they stated is that this specific area is not covered by any of European platforms. Platform in biotechnology is one of the most internationally-involved Russian platforms but only in pure research area, not in technological innovations. The cooperation started long before platform was created so the platform per se "inherited" linkages that existed in a number of Academy organizations with their international partners. The coordinators of platform hope that transfer of technologies will be to Russia from abroad since within the country this industry is underdeveloped and far behind European countries. Resource extracting industry platform is not involved in international cooperation as an entity. However some leading companies-members of the platform have well developed linkages with foreign partners.

Criteria of effectiveness set by platform coordinators

This was the most difficult question to answer. The organizations-coordinators of technology platforms did not develop yet a clear set of indicators or characteristics by which they will be measuring their success and / or shortages. Strategic plans that were developing by the platforms do not include questions of self-assessment. Therefore in predominant number of interviews it was real time improvisation on what may be considered as criteria measuring effectiveness of platforms. Most of respondents consider that number of joint projects initiated by platforms and amount of additional financing would be good indicators of success. These are the most obvious indicators since the tasks of platforms include initiating of joint projects which would attract new financial resources.

At the same time there are different accents in each platform related to the composition of its stakeholders. Resource extracting industry platform considers that it is important to involve large companies in cooperation and to initiate more joint science-industry projects. Radiation technologies platform expressed the view according to which it is necessary to force commercialization of R&D results through small companies. Finally, biotechnology platform suggested an additional criterion - volume of financing attracted through paid membership. Overall it is noticeable that in average development of linkages is not a priority and each of the platforms stands at the point of view most close to the position of core organizations within platform.

Nature and pace of interactions with innovative clusters

Since linkages are not the major priority, it is explainable why innovative clusters are not seen by the majority of platforms as a related instrument. Only one technology platform has identified cooperation with the clusters as a way to move forward and to achieve research and technological goals.

Resource extracting industry platform stated that they do not cooperate with clusters so far but to their view the platform as an instrument is analogous to a cluster. The main reason of disconnect

however is in the fact that the fate of 25 newly selected clusters is not clear yet and therefore companies-major stakeholders of this platform decided to wait until it will become clear whether support of innovative clusters is a long-lasting and serious government agenda. A biotechnology platform partially shares the view that “cluster” and “platform” are analogous though “cluster” as an instrument is more adequate for biotechnology since they have certain geographical localization.

Platform related to radiation technology considers that instrument of platform may help cluster development. Coordinators of this platform started to cooperate with several clusters from those 25 supported by the government. They see function of platform in the development of strategic vision for the clusters. Also, clusters may be the place where R&D project selected by platform will be implemented. Finally, one of the perspective directions of cooperation with clusters is in educational area. Platforms may organize training programs in technological entrepreneurship for the members of the clusters.

Conclusions, Policy Implications and Directions for Further Research

New Russian initiatives to stimulate communications at the level of certain industries (technology platforms) or regions (innovative clusters) are based on adaptation of foreign experience. However specificity of Russian innovation system where government is dominating in terms of financing and hands-on regulations has influenced the design of new policy measures. Platforms may not be considered yet as communication instrument since their participants are still disconnected to a considerable extent. Participants of technology platforms have low stimulus to cooperation. This in turn means that platforms did not become yet a tool for cluster development.

Overall the innovation system is rigid to the change. Path dependency and belief in solely federal support is a real hamper. There is no natural demand for cooperation though it is clear that the

whole system may not continue functioning based on schemes inherited in large from the Soviet experience. Positive aspect in recent developments is in a very attempt to initiate the changes by introducing instruments of technology platforms and innovative clusters. In a long run it may help to change mentality of the stakeholders. However, government policy with unclear plans of utilization of the new instruments and not thought-out motivations may easily flub up initially good ideas.

The study shows that there are a number of factors which may help to involve platforms in development of innovative clusters. The factors may be divided into two large groups: organizational and financial ones. It should also be taken into account that linkages between technology platforms and clusters may be very different and depend on the nature of industrial (technological) profile. From the standpoint of policy implications this means that government measures should be flexible, without assignment of priority of one measure over the other one. Policy implications outlined below are based on this assumption.

Organizational changes:

1. For better coordination of technology platforms and clusters the representative offices of platforms may be opened in respective clusters.
2. Thematic areas developed by platforms and clusters may be jointly discussed and unified decision made on which areas should become a priority. “Smart specialization” may be one of the approaches for selection of such directions.
3. The composition of stakeholders in platforms should be widened due to involvement of banks, venture companies and other financial institutions. This may help both clusters and technology platforms to define the perspective and commercially attractive projects.
4. It may be reasonable at the federal level to decrease the degree of control and push to various activities for technology platforms and then assess which of them will survive. Survivors may suggest new ways of networking and strengthening innovative clusters.

Financial instruments:

1. Important beneficiaries of platforms and cluster initiatives abroad are small innovative enterprises. In Russia their role is insignificant. It is worth trying to use federal mechanisms of small companies support both in clusters and technology platforms – such as loans, subsidies, state insurance agreements.
2. Roadmaps should include information and calculations on types of financial resources needed by platforms and clusters; as well as their amounts and projective ways to obtain financing.

Finally, such aspect as monitoring of technology platforms and cluster initiatives is not thought-out yet. Here two aspects are of major importance: 1) monitoring of cluster / platforms performance; 2) monitoring of effectiveness of government measures that were applied towards clusters and technology platforms.

Directions for further research should include:

- Follow-up interviews with various stakeholders of those technology platforms that make attempts to interact with clusters;
- Analysis of prospects on cooperation from side of clusters;
- Monitoring of changes in government regulations towards technology platforms and clusters and assessment of their influence on cluster development.

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