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Creating areas of innovation in the 21st century: Evolution of STPs into areas of innovation. Case: Skolkovo Innovation Center, Russia

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Executive Summary

Half-way into the second decade of the 21st century, there is a fresh wave of areas of innovation emerging internationally – in Russia, Latin America, Asia, Africa. These areas expand on the concept of science park environment and aim at creating sustainable, effective working and living conditions, forming appealing ecosystems for students, scientists, entrepreneurs, larger corporations, investors and startups, urban areas.

The paper is structured around the key aspects of an ecosystem establishment, keeping in mind the process of evolution of science and technology parks (STPs) into new spatial configurations and their scaling up. A topical real-life case of an area of innovation is analyzed: Skolkovo Innovation City, Russia. The results of the analysis demonstrate the STPs' role in enabling the concept export into innovation cities, and highlight the need for STPs as a testing ground and starting point in the evolution curve of new spatial configurations.

Methodology

The real-life case is used for research and discussion purposes in the article, Skolkovo Innovation Center, Russia. The article sheds light on the challenges that the innovation ecosystem faces at its birth, creation and initial stages of development, as well as practical solutions and first-hand experience for how to deal with them. The basis of the Russian model focuses on supporting R&D and commercialization, based on skilled human talent, the established scientific traditions, outstanding technological universities and scale scientific projects. Key implications are synthesized and introduced throughout the text.

Introduction: From concepts to measurable results

STPs are serving as important platforms for research and innovation. However, in the course of economic development, innovation does not create a single entity, but rather many stakeholders. Accordingly, companies are not the only creators of knowledge, with universities, research institutes, and even society emerging as key participants in the path of innovation. In addition, a new approach to the innovation system is required, in which participants eliminate the hierarchical and bureaucratic structures and cross the boundaries, and thus establish and develop new relationships. In this regard, the concept of STPs expands to achieve greater reach and impact on productivity, welcoming within it other elements that continue to be relevant.

There are multiple ways for measuring the success of innovation ecosystems (Santoro & Chakrabarti 1999[1]), all centered around several key categories: regional vitalization (e.g. number of companies, number of jobs), output of intellectual work (e.g. patents, licenses), private sector results (e.g. profitability, market share, commercialized IPR) and increasing collaborative activities (e.g. cross-border technology transfer, shared innovation creation projects). Based on the previous research by Launonen & Viitanen (2011)[2], it had been concluded that in order to achieve these desired outcomes there are multiple layers and elements to be addressed and managed within the innovation hub framework (Appendix 1).

As the main focus of the present article is to illustrate the practical side of the emerging innovation ecosystems, the framework will be used as a reference point for the managerial discussion. For the purposes of the discussion, the following three themes are high-lighted and focused on based on the innovation hub framework (Launonen & Viitanen 2011)2: national and regional innovation policy foundation; physical, service and R&D infrastructure; creating collaboration and innovation environment.

As Skolkovo's case demonstrates, measurable results can be achieved even short-term. Within the four years of its existence, in addition to the progressing construction of the innovation city (university, STP, residential and recreational areas, laboratories, etc.), Skolkovo has become a community of close to 1,100 high-tech startups, 200 students at brand-new Skoltech technological university, 50 multinational corporations as key partners, and 65 accredited venture funds. The total revenue of Skolkovo residents has reached 23 billion rubles and they have attracted approximately 9 billion rubles in private investment. More than 13,000

1. Santoro, Michael; Chakrabarti, Alok (1999), Building University Industry Research Centers. Some Strategic Considerations. International Journal of Management Reviews, Vol. 1, No. 3, PP. 225-244.

2. Launonen, Martti; Viitanen, Jukka (2011), Hubconcepts. The Global Best Practice for Managing Innovation Ecosystems and Hubs. Publisher: Hubconcepts Inc., Helsinki, Finland.

new high-tech jobs have been created.

It has been a combination of practical tools, setting measurable results and adapting rapidly to the demands of the key contributors to the infrastructure – adjusting the services, the cooperation approaches, the plans for the facilities to current and future needs.

National and regional innovation policy foundation

The hub framework builds on the national and/or regional innovation policy foundation, combining public policy driven actions with private sector interests. In the case of Skolkovo, the foundation was established by the Federal law with the aim to enable diversification and growth of the Russian economy through innovation and technology commercialization. While an STP (in case of Skolkovo, a subsidiary - Skolkovo Technopark) has its role in this process, the task is to establish a larger community, with the purpose of Skolkovo to create an ecosystem facilitating the development of entrepreneurship, and to accomplish this on the larger scale.

Five research priority sectors were identified: energy efficiency and conservation, strategic computer technologies and software, medicine technologies related to medical equipment and medication development, and space and nuclear technologies applicable for commercial use. Interestingly, these areas represent priority sectors of the national economy, derived from the higher-level modernization plans of the country. Within these sectors both the strong traditions of Russian science and the potential for market demand are highlighted.

Drawing on an international comparison and the role of the national policy in the birth of an ecosystem, there is often a parallel drawn between Skolkovo and Silicon Valley. This is not, however, a particularly accurate comparison. The formation of the ecosystems is different in its' nature – with the Silicon Valley case starting from grass-root level and growing from there, while Skolkovo has from its start enjoyed significant top-level government support, securing the rapid development and growth of the ecosystem. In this sense Skolkovo is closer to the examples of such areas of innovation as Adlershof in Germany or Sophia Antipolis in France. It is proposed that the regional context makes a difference in the way an area of innovation is born: by the need to utilize an existing area (Adlershof established in an area, for which the local government has tried to find the use for the economic benefit of the region, previously an old airport), to boost the economy of an existing area (Porto Digital in Brazil integrating elements of innovation infrastructure within the existing city Recife), to establish a modern flagship- innovation ecosystem to lead the way (Skolkovo), to establish entrepreneurship culture with economic impact without significant ties to physical infrastructure, an area of innovation unconfined by concrete borders (Startup Sauna in Finland, or Silicon Valley).

In Russia there are strong and long-term traditions of science, technoparks, university education. On the higher-level decision-making there were, therefore, several options: to establish an area of innovations within an existing STP structure, or to create one from green-field. Much of the infrastructure had been established during the Soviet Union time, and has recently been undergoing the process of modernization. The new and upgraded science parks are scattered around the country's wide geography. In the logic of Skolkovo's creation, however, the science park has been planned as one, but not the only element. Instead, the innovation city principal was applied in the creation of Skolkovo. The benefits that all parties engaged in the ecosystem gain from a broader conceptualization of an innovation city instead of just an STP construction have prevailed.

Based on the historical heritage and traditions, combined with a green-field –approach in the development

of an area of innovation has made Skolkovo a modern instrument and a driving force within the economy. Establishing a new area of innovation and starting the project from scratch has allowed a fresh view on how to create a working area of innovation, and to attract the best Russian and international talents, the best practices. Unprecedented benefits have served as a magnet in attracting top people, innovations, entrepreneurs to the ecosystem. The basic advantages for startups, for example, include taxation benefits, customs easings, migration policy, financing and other incentives. However, in Skolkovo's case the less obvious forces are in equal demand for the involved companies – searching for business or technological complementarity with other companies, finding relevant expertise and guidance, gaining access to the unique resources that the ecosystem as a whole – as opposed to the function of an STP - holds together.

The role of national policy foundation is notable not only at the establishment stage of an area of innovation, but throughout its existence and development. As one of the examples from Skolkovo's context, a degree of adaptability exists in the selected priority R&D-areas: in order to stay on top of the wave with the current macroeconomic developments, a new priority area is considered for addition to the existing ones – agricultural, in order to support the R&D and strengthen the technology base within this critical sector of the economy. As another example, the macroeconomic and political impact (such as an introduction of sanctions between countries and regions) influences also the processes within the sphere of science and technology. In this context the increased importance is assigned to the mechanisms and support of the globalization of R&D, which can be offered by development institutions and such entities as intergovernmental commissions, business councils, chambers of commerce and industry. Moreover, areas of innovation – in most cases being flagship-projects for the region – are often the first once in the need to react, adapt and shape their practices based on the changing policy and macroeconomic realities.

Implication 1: While a concept of STP is valuable for development and commercialization of R&D, in order to gain quick, significant and measurable impact in the new economic realities, areas of innovation offer the necessary synergies and scale.

Implication 2: Areas of innovation, in addition to the many typical benefits offered by STPs, provide a larger pool of available resources, connections and environment both for working and living.

Implication 3: The role of national policy impact is continuous, present both at the birth of an area of innovation and in its further development, often requiring for an area of innovations to be quick to react and adapt to the changing realities.

Physical, service and R&D infrastructure

The author moves forward the observation that in order to achieve measurable results within short periods of time within an area of innovation two paths need to be followed simultaneously: construction of the physical infrastructure and establishing a virtual community, consisting of scientists, entrepreneurs, startups and other critical elements of the ecosystem. Interestingly, one process is not overlooked for the benefit of the other, however, establishing a community is the priority to gain the momentum for once the physical infrastructure is ready to be used.

Skolkovo Technopark (the STP within Skolkovo's area of innovation) played an important part in the creation of physical, service and R&D infrastructure. While the physical infrastructure was still under development, the role of the STP was to serve as a testing ground for such critical points as finding the best way to work and accommodate the needs of the residents, learning about the services that are in demand and forgoing the

ones that are not, learning how to create the atmosphere of cooperation, to enable networking and forming useful connections. This approach made it possible to get down to brasstacks, and STP served as a platform to generate the first success stories. As portrayed by one of the first residents of the STP, Sergey Maltsev, founder and CEO of a startup RoboCV: “Today we already have a product and, what is especially important, sales. In particular, our client is the company Samsung. This is largely due to Technopark Skolkovo, which has given us great PR-support - we became rather well-known, and large, serious corporations noticed us. Our product is an autopilot for warehouse equipment, which can completely replace a real human driver. But this is only the beginning, and, looking into the future, we plan to create autopilot for normal vehicles. Technopark has provided us with comfortable working conditions, has offered assistance. Here we have a formed community of great entrepreneurs, and this undoubtedly contributes to the survival of startups in their earlier stage of development. For example, at the initial stage of our product development we depended on the orders received from other residents of Technopark”.

The STP, therefore, became the platform and the starting point for generating the best practices and approaches, especially at the initial stages of the development of Skolkovo’s area of innovation. Progressing further into the future, these learned lessons are being gradually scaled up: in autumn 2014 the employees of Skolkovo Foundation moved, together with its subsidiaries and the first 100 participants to the territory of the Innovation City, which is now their permanent location.

Skolkovo is being constructed into an innovation city within the area of 400 hectares, with the aim to respond to the needs of both providing working conditions (e.g. office spaces, laboratories, university, technopark) and favorable living environment (shops, parks, schools). The process is that of matching the vision of the city and the actual needs of its inhabitants. Previous best practices and an active, engaged dialogue with the users of infrastructure shape the physical and service landscape, while both of these undergo a process of evolution and development. An example of this is the constant evolution that we see within Skolkovo’s services or assistance that is provided to the residents. For example, at the initial stages of resident recruitment more emphasis was put on training programs and education – and while this still has a place for the earlier-stage companies, the increased focus has recently been introduced in the areas of acceleration and support in internationalization of residents. As the recruited pool of companies (residents) grow and advance in the design and commercialization of their technologies, the increased efforts are made by Skolkovo to support the startups in forming international connections with potential strategic, technological and commercial partners.

Often, when it comes to the sphere of startup support the ecosystems plays more of a role of an intermediator. For instance, attracting an investor is one of the key challenges for a startup. In this context Skolkovo puts in place simple, yet concrete instruments both in preparation of the startups (working on their presentation materials, preparing for pitch-sessions) and the facilitation of matchmaking (organizing pitch-sessions, investor competitions).

As the key mission of Skolkovo is to support R&D-processes of the residents, there had to be a way to be able to offer access to top R&D-facilities as soon as possible, while the city has not yet been constructed. Considering the rapidly growing number of residents from different parts of Russia, giving practical support in R&D-activities was a priority. With the lack of physical infrastructure, another scheme was developed. Skolkovo carefully selected the best available laboratory facilities around the country in order to, accredited them as official R&D-service providers, who would offer their services at special rates and conditions to Skolkovo startups. While these over thirty laboratories are spread around the country, with the progress of the construction of the city the necessary R&D-services will be provided locally. The approach has worked successfully and with the positive feedback from resident companies, even enabling further collaborations

and joint projects. As an executive director Ildar Gaforov ("Renarisobr") has highlighted in one of his statements, "Starting with the first handshake it was clear that "Microanalysis" (one of the accreted R&D-service providers) would be our provider for the analytical work for our project within Skolkovo. Modern equipment, qualified personnel, a wide range of services – all of it made the difference for us. Moreover, we have arrived to a conclusion that research on various modifications of sorbents can allow for joint research efforts in Skolkovo between our company and "Microanalysis"-laboratory".

In terms of the educational infrastructure, at the core of Skolkovo's area of innovation has been the technological university Skoltech, born in close cooperation with MIT (USA) and designed with the aim to provide both technological and entrepreneurial skills to it's students. The best international practices and international body of both students and professionals have been introduced with the idea that the graduates will be both skilled and inspired enough to develop their high-tech startups within Skolkovo upon graduation. While the first line of graduates is still on the way, several interesting cross-border migrations are notable, among others: students becoming involved in Skolkovo residents' projects, getting employed with larger corporations, which are part of the ecosystem, establishing their own startup companies.

Another type of a university established within Skolkovo is "Open University", which does not provide any degree programs, but selects the best students from technological universities to provide them with lectures, courses, camps, seminars and other type of events and activities, which would aim at giving them a look into the world of technological entrepreneurship and consider it as their career choice. The "Open University" is, hence, an essential way to attract the brightest young minds into the ecosystem.

While the universities have been up and running for close to four years, other education elements are currently in the process of being established, including elementary to gymnasium education, which are both to contribute to the favorable living conditions and inspire the spirit of innovations from early on.

While many of the proposed implications may be realized without the necessity of the physical infrastructure, for the magic to happen within the physical borders of the ecosystem, such parameters as easy access to location, easy access to people and resources, the atmosphere need to be considered. In the case of Skolkovo the physical access has been enabled gradually with the developing road infrastructure of the surrounding city and within the territory, with locating employees and some of startups physically within the area, with organizing key science, entrepreneurship, investor events in Skolkovo and making it, therefore, the place to be. This can only happen gradually and part of the access infrastructure is still work-in-progress, with the anticipated high-speed train connection in the future plans.

To create an easy access to Skolkovo's talents, people and resources, it had been necessary to step outside the physical boundaries of the area of innovation. As practical example, is Skolkovo's Startup Tour across different cities in Russia, with the participation of all major development institutions. During the Startup Tour a series of events is organized for local entrepreneurs in order to make the expertise and resources of Skolkovo and key development institutions available to them right there, on the spot. Startup Tour serves as a tool for Skolkovo's area of innovation to bring together in a dialogue science parks, incubators, universities from across Russia – working together on raising, improving, attracting new talents.

Implication 4: STP can serve as a testing platform for best practices in work with the residents and establishment of the community, with the following evolution to the larger ecosystem and export of the pre-tested concepts into an innovation city at large.

Implication 5: The core element is to create an easy access to the ecosystem – both in physical and mental

sense. The efforts need to be put into establishing a virtual community (attracting the key players, startups, investors, students, corporations) prior to having the physical infrastructure in place in the full capacity.

Implication 6: Universities and educational institutions (within the ecosystem and outside of it) as tools for generating inflow of new startups and resources into the ecosystem.

Implication 7: Out of the box solutions may be used to provide the necessary resources, even at the early stages of a city development, such as, for instance, accreditation of reliable and pre-selected service providers, e.g. for R&D-infrastructure.

Creating the collaboration and innovation environment

In a modern world, starting from its birth an area of innovation does not exist in an isolated environment, but is in active communication with the world in its immediate surrounding and at large. Furthermore, the authors propose the role of networking and community building from the very start is of critical importance for the success of an innovation ecosystem.

A notable part in this is for STPs. With the growing number of areas of innovation, it is easy for an independently standing STP to feel like a Lilliputian in the land of Gullivers. In Skolkovo's case a technopark, being the foundation's subsidiary, has played an essential role not only as a test ground for further scalability, but as an equal partner and a communication channel to other STPs in Russia and internationally. Establishing STP-to-STP dialogue has enriched Skolkovo's ecosystem and the innovation environment at large, allowing for best practices to be shared, joint initiatives formed and avenues for practical cooperation established. These are the interactions marked by constructive competition, collaboration and mutual feedback, which facilitate the flows of knowledge, ideas, people and capital (Lee et al. 2000)[3].

At the same time, some of the results are achievable on a bigger scale with an area of innovation as a more powerful engine than an STP. For example, having such a flagship innovation city as Skolkovo has allowed to attract unique projects, such as an international medical center and a center of sports medicine (together with the Olympics committee) to be established in the area, and a larger scope of talents, such as in connection with the largest entrepreneurship event in Russia – Startup Village, which was initiated by Skolkovo and attracts annually thousands of Russian and international scientists, startups, students, investors, STP-professionals. For the bigger impact and synergies – having and developing an area of innovation has proved critical. The context matters too, of course. While there are strong traditions of Russian science, high visibility needs to be given to an area of innovation such as Skolkovo in order to enable the development of the culture of high-tech entrepreneurship, which is not traditionally there and requires the ignition of inspiration.

In its immediate surroundings, an innovation ecosystem is faced with the need to integrate within urban and social landscape, but even more often so – with igniting and sustaining the culture of entrepreneurship, and in this way, shaping a community at large. For this and other community building purposes, networks of professional and business communities assume especial importance.

3. Lee, Chong-Moon; Miller, William F.; Gong Hancock, Marguerite; Rowen, Henry S. (2000), The Silicon Valley Habitat, in: The Silicon Valley Edge, A Habitat for Innovation and Entrepreneurship, eds.: Lee, Chong-Moon; Miller, William F.; Gond Hancock, Marguerite; Rowen, Henry S., Stanford University Press, Stanford, California.

There are several elements in the working regarding the creation of the atmosphere and environment for joint efforts and collaboration. There are also several levels for this to take place. On the institutional level, Skolkovo has become by its birth one of the largest and the most visible projects in contemporary Russia and within the science park and innovation environment. An innovation ecosystem of this impact has to prioritize it's relations with other development institutions, science parks and universities – often to switch the focus away from the sense of competition and towards collaboration, positioning itself as a center of attraction for other STPs and innovation structures. Thinking big is critical as well as seeing the larger picture of working jointly towards the same goals. The flagship-ecosystems also offer or may offer leadership for other, perhaps smaller by size, but not significant science parks. This applies to sharing the best practices; working jointly on specific issues, policies, initiatives; sharing information and valuable contacts; uniting efforts in advancing communications and projects internationally.

As the key anticipated outcomes of any partnerships, networks and activities are most often in the dimension of generating impact and results for startups and innovators within the ecosystem (commercialization of their innovations). In Skolkovo's experience some of these tools have included offering soft-landing programs, arranging fact-finding and matchmaking business missions, facilitating the participation in key global conferences, hosting international events and inviting guests from all over the world for participation.

Institutional partnerships in one of their forms may also be targeted at seeking complementarity. For example, Skolkovo focuses only on the support of R&D and first stages of commercialization, meaning that institutional partnerships can be focused on connecting to other stages of a company development, e.g. giving access to production facilities.

Simple mechanisms usually go the long way in involving other elements in the work of an ecosystem. For example, some of the concrete tools for working with large corporations within Skolkovo (aside from establishing R&D-centers), have been technology challenge competitions, startups pitching

their technologies to multinationals, having spin-offs of larger corporations enter the ecosystem as independent narrowly focused research projects.

The discussed research case has relied on establishing international partnerships to foster knowledge and information exchange, communication and integration of the best practices, sharing valuable contacts; using simple, yet effective mechanisms to take the best out of the global nature of cooperation. In the experience of Skolkovo, in the era of globalization it is not only the movement of people, talents and business that plays the role, but also the movement of technologies, science, technological ideas, which is critical from the perspective of commercialization of innovations. For example, a technology born in one STP or area of innovation can be in demand in another. The areas of innovation have the potential for the better visibility, not only locally, but also internationally, as well as for higher interconnectivity impact – not only at the level of STPs, but also universities, startups, R&D-centers and other players of the ecosystem. This is critical, because locally focused and optimized ecosystems cannot produce the highest-quality results anymore, while

4. Saxenian, AnnaLee (2006), The New Argonauts, Regional Advantages in a Global Economy, Harvard University Press, Cambridge, Massachusetts, USA.
5. Hautamäki, Antti (2008), Kestävä innovointi, innovaatiopolitiikka uusien haasteiden edessä, in: Sitran raportteja 76, Finland.

so much of the key global knowledge and talent exist outside of their reach. The only option is to interconnect the global value systems (Saxenian 2006[4], Hautamäki 2008[5]).

Implication 8: While bigger impact, quicker results and more synergies may be achieved within the areas of innovation, the role of STP-to-STP dialogue is unquestionably critical in allowing for best practices to be shared, joint initiatives formed and avenues for practical cooperation established.

Implication 9: On the institutional level instead of competition with other AIs, the power of an area of innovation is in thinking big and becoming a center of attraction for other science parks and innovation structures.

Implication 10: Simple and concrete tools are needed for working with large corporations, startups, investors and other elements of an ecosystem.

Implication 11: An area of innovation allows for a broad scope and nature of international cooperation, with global community builders, multinationals, universities, science and startup communities – gaining visibility and transcending on a larger scale the international borders.

Conclusion

The aim of the paper has been to analyze the case of an area of innovation and to synthesize key managerial implications and insights. The results show that STPs' evolution into new spatial configurations opens upon space for the role of an STP as a testing platform, prior to exporting STP concept and scaling it up to a city. STP-to-STP dialogue remains critical for the results of an area of innovation as a whole and innovation community impact. At the same time, as the case demonstrates, the visibility and the international interconnectivity that areas of innovations are able to generate, translate into better and quicker measurable outcomes for all engaged elements of the ecosystem. In the era of globalization, areas of innovation enable the engagement of all the critical stakeholders in the process of innovation, facilitate the international movement of technologies, science, technological ideas, which is critical to commercialization of innovations.

Appendix 1.
The innovation hub framework (Lauronen & Viitanen 2011)[2].