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## Proof of Concept Center — A Promising Tool for Innovative Development at Entrepreneurial Universities

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### Abstract

The article reviews the USA experience in creating the new element of national innovative infrastructure for Russia — the Proof of Concept Center (POCC). The article uses the term POCC as an abbreviation; it considers the POCC functions, its role in the innovative chain, and its difference from Centers for Technology Transfer. Evidently, the key feature of POCC is the availability of its own foundation for financing innovative projects. The article analyzes the major sources for these foundations and suggests distinguishing the two types of POCC in terms of financing. It presents examples of POCC of the USA of varied scale and which were founded at different times. It highlights the correlation between the establishment of POCC and the increasing number of innovative companies. The work also presents information about the structure analogous to the first type of POCC in Russia, and considers the potential for creating university-based POCC of the second type. The article also presents information regarding the high potential and the efficiency of POCC as a unit of innovative infrastructure.

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### 1. Introduction

One of the major goals of innovation infrastructure at universities is to attract investment for development of promising high-tech projects. For that reason, universities scope the projects to present to investors. In a situation when the investor circle is wide, one has to consider the specific requirements of each. This brings about the challenges at the very stage of application due to the need to comply with contrasting formal requirements. Investors, in their turn only work with the projects that they are presented with, and can often be discontent with the quality of preparation of a project. One of the ways to improve the efficiency of working with innovative projects can be establishing the functional of project preparation and financial within the same structure.

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This approach has been implemented quite a long time in the USA, and is called Proof of Concept Center. This article uses POCC abbreviation due to the lack of a Russian equivalent and the direct translation that does not reflect the concept correctly.

## 2. Proof of Concept Center (POCC)

Despite the fact that the structure of such type have existed for more than 10 years, the term POCC has only been used in the USA in 2009 since the work ‘Strategies of Innovative Development in the USA: Moving to the More Stable Growth and Skilled Workplaces’ was published. In this work, POCC was defined as an important instrument of stimulating technology commercialization for technologies at the early stage of development; it also encourages growing number of companies established at universities, and, thus, transfer university technologies into the economy of the country. POCC played a special role in the implementation of the ‘i6 Green Challenge’ program announced in March 2011. 12 million dollars were allocated for establishment and development of POCC specialized in green economy technologies. Grants were given to the 6 winning businesses.

The following analyzes the functions POCC performs, what is its role in the cycle of innovative idea commercialization, and how it differs from Centers for Technology Transfer.

Judging by the name, POCC specializes in a comprehensive test of the promising ideas with the goals of confirming their viability as the basis for innovative business. For this purpose, POCC selects the projects at the stage of prototyping or when the developers are ready to prototype. The concept of commercialization at this stage is quite clear. The intellectual property is already turned into a material asset or close to turning into a material asset.

After the ideas are selected, they get packaged into projects, which includes development of the monetization model, business plan, staffing of the project team, formulation of the development strategy. Thus, it is at this stage the concept gets defined.

The next stage is to find seed investment for the projects and to have gone through the previous stages successfully. They receive grants to create the final competitive product. The projects get financed from the foundation under POCC. At this stage, the POCC specialists monitor the development of projects — the process of applied testing of the concept defined at the previous stage.

The analysis of POCC in the USA proves that numerous competitions conducted by the USA Ministry of Economy or the programs similar to the mentioned “i6 Green Challenge” can be the sources of internal financing. Other sources of the internal university resources can come from foundations formed with the project commercialization profits, and voluntary donations.

As a rule, POCC are formed on the basis of large universities. At the same time, single POCC can be a host for the projects from several universities of close proximity, or, alternatively, several POCC can serve one university as in the MIT case. Table 1 presents the descriptions of several POCC of the USA of varied scale and established at different times.

There are two distinctive POCC models in terms of sources of project financing. If POCC receives money from the government within the framework of a specific program, the projects are financed by the nonrefundable grant money. The same money covers POCC’s own expenses. In this case, the main goal is to increase competitiveness of regions and create new high-skilled workplaces. According to statistics of 8 large universities, the number of companies has increased by more than 50% on average (table 2) after POCC has been established (Bradley, 2013).

In cases when POCC manages the finances of the foundations formed with the university’s own resources, it receives a share in the company. The profit from this share in the established companies refinances the next cycle of development.

The main differentiating feature of POCC is the unity of POCC functionality and its innovative infrastructure.

The functionality of the traditional objects of innovative infrastructure that exist in the majority of today's universities is limited to the selection and promotion of projects as well as the consulting services they provide (Chistyakova N., 2007). At the stage of attracting investment, the universities should follow the various formats and conditions stated by investors. The POCC model solves this problem. The POCC professionals understand the criteria the projects should comply with, and the format of documentation necessary to apply for investment.

From the point of view of investment, POCC has the clear advantage over the seed and venture foundations. POCC guides the project from the very beginning, performs directional selection, packaging, prepares the project for financing, and controls every stage of its implementation. The traditional investors rely on the existing projects with the finished business ideas. They don't have enough resources to work with the project, therefore a part of the developments that have potential doesn't get their attention, even though it needs very little improvement.

To conclude the abovementioned, we can say that POCC is an independent and very efficient object of innovative infrastructure. The POCC functionality allows performance of the full cycle of selection, financing, and market launch of the university projects, thus making up for the deficiencies of the most common objects of innovative infrastructure (Zhivicja A., 2007).

The establishment of POCC at a university doesn't conflict with the existing objects of infrastructure. In the US model, POCC acts as a part of a Center for Technology Transfer. It complements the center by financing and development of the projects at the early stage of development. It performs team building and acceleration of promising projects preparing them to establish new businesses.

Guiding and supporting the existing companies is the task performed by Centers for Technology Transfer (Maia, Catarina, and Joao Claro, 2013). In addition, the Center for Technology Transfer is responsible for licensing the agreements for technology that do not require establishing a company for commercialization.

The experience of POCC described above is typical for the USA. Let's review the applicability of this object of innovative infrastructure to Russian universities. There are structures in Russia that function according to the POCC model. An example is Nanotechnology Center 'SIGMA. Tomsk' established by State Corporation JSC ROSNANO. The center focuses on projects by Tomsk universities and the institutes of the Tomsk branch of the Russian Academy of Sciences. The projects are based on these developments and financed by the center. The investment capital is formed with the finances from JSC RUSNANO. Considering the profile of the key investor, the major criteria for selection of projects is the affiliation to the nanotechnologies.

The feasibility of the second POCC model is supported by the fact that Russia has started to develop seed foundations at universities. The seed foundation of the Moscow Physicotechnical Institution has been active for a couple years. The Saint-Petersburg University of Information Technologies, Mechanics, Optics and the Ural Federal University have announced their plans to launch venture foundations. The integration with the existing innovative infrastructure will create all the conditions necessary for the Russian university POCC to appear.

Table 1. Examples of POCC in the USA

Name	Year Established	Volume of Financing	Partner Universities	Services	Number of Projects
Von Liebig Entrepreneurism Center	2001	10 million dollars — donations	Jacobs School of Engineering, University of California, San Diego	Seed financing of projects, consulting, educational programs and programs of technology acceleration	10-12 a year
Deshpande Center	2002	17.5 million dollars — donations	University of Massachusetts School of Engineering	Programs of grant support, acceleration programs, team building, organizing and hosting events	90+

University of Georgia VentureLab	2002	2002 to 2010 — 19 million dollars	University of Georgia, Georgia Tech, Emory University, Georgia State University, Medical College of Georgia, Clark Atlanta University	Seed financing of projects at the following stages: Phase 1 - \$50 000 (grant). Proof of concept, formulating a business plan, market tests Phase 2 - \$100 000 (grant). Building a prototype, establishing intellectual property Phase 3 - \$250 000 (investment). Developing the product, the team, and the strategy.	107+
University of Colorado Proof of Concept Program	2004	Profit from commercialization of intellectual property	University of Colorado	4 types of programs: POC - small grants POC - investment POC - biotechnologies POC - Institute of Renewable Energy	139
Commercial Ventures and IP technology Development Fund	2004	Profit from commercialization of intellectual property	University of Massachusetts	Grants for university researchers to accelerate early stage technologies	66
Stevens Institute for Innovation	2007	22 million dollars — donation	University of Southern California	Trainings, mentorship for business teams of young researchers, support for establishing and commercialization of intellectual property, development of the proof of concept system in the sphere of healthcare.	—*
Biomedical Accelerator Fund	2007	6 million dollars — donation	Harvard University	Development of financing for projects at the stage of a 'financial black hole' or 'death valley'. Area - biomedical projects.	27
QED Proof of Concept Program	2009	\$ 300 000	Delaware State University, Drexel University, Harrisburg University of Science & Technology, Lehigh University, New Jersey Institute of Technology, Penn State College of Medicine Hershey, Philadelphia College of Osteopathic Medicine, Philadelphia University, Rutgers University, Temple University, Thomas Jefferson University, University of Delaware, University of Medicine & Dentistry of New Jersey, University of Pennsylvania, University of the Sciences in Philadelphia, Widener University	Developing the projects in the sphere of healthcare at the early stage of development - building the 'bridge through the death valley'	12
Maryland Proof of Concept Alliance	2010	5.1 million dollars — state investment	University of Maryland system	Search for and proof of concept for the University of Maryland development projects	—*
Iowa innovation Network i6 Green Project	2011	1 million dollars — federal grant	Iowa State University	Proof of concept, commercial viability of projects, support in product definition and market launch.	—*

Proof of Concept Center for Green Chemistry Scale Up	2011	580 thousand dollars — federal grant. 500 thousand dollars — Michigan Corporation of Economic Development	Bioeconomy Institute of Michigan State University	Development of 'green' technologies, project incubation for the Department of Agriculture and Administration of the USA	—*
Louisiana Tech Proof of Concept Center	2011	1.1 million dollars — federal grant	Louisiana Tech University	Proof of market viability, support in prototyping and cooperation with private client organizations	—*
University of California Proof of Concept program	2011	2.7 million dollars — university investment in 2011. 2.6 million dollars — in 2012	University of California	12 month project commercialization program for university projects	35
Proof of Concept Gap Funding Initiative	2012	500 thousand dollars of federal investment	University of Illinois at Chicago	Proof of concept, support in overcoming commercial risks, support in attracting additional investment	4 projects at the first circle of financing, 4-5 expected projects in the second circle

Table 2. The number of university startups before and after the establishment of POCC

Name	University	Year Established	Delta of Startup Business After Establishment, %
Deshpande Center	University of Massachusetts	2002	+5
Commercial Ventures and Intellectual Property Technology Development Fund	University of Massachusetts	2004	+66
University of Colorado Proof of Concept Program	University of Colorado	2004	+252
Boston University-Fraunhofer Alliance for Medical Devices, Instrumentation and Diagnostics	Boston University	2007	+60
Biomedical Accelerator Fund	Harvard University	2007	+72
Stevens Institute for Innovation	University of Southern California	2007	-32
Vermont Experimental Program to Stimulate Competitive Research Innovation Fund Awards	The University of Vermont	2007	+27
Institute for Advancing Medical Innovation	The University of Kansas	2008	+50

Medical Devices Center	The University of Minnesota	2008	+90
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## Conclusion

The second model of POCC based on the university resources is better equipped to meet the interests of universities as the developer and the owner of the intellectual property created. It will improve profitability from the investment into the projects, which is an important factor for the current competitive environment. It will encourage growth of the innovative network in the university, which, in its turn, will contribute to the formation of the culture necessary for the entrepreneurial university.

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