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MODEL TECHNOLOGY PLATFORM FOR COOPERATION OF RESEARCH CENTRES WITH THE BUSINESS SECTOR

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Introduction

One of the ways of facilitating communication between the research and scientific sector and the business sector is to establish network forms of cooperation. Network is understood as a long-term relationship between partners connected through ventures which define the scope of their cooperation.

International experience shows that network forms of cooperation are beneficial both for science and business: they intensify the processes of commercialization; level out negative phenomena on the labour market; and boost company competitiveness. Around the world the share of companies declaring that they cooperate with scientists amounts to 75-80%. In Poland the scale of cooperation between these spheres is 30% lower.

In order to boost the cooperation of the science sector with enterprises the Institute for Sustainable Technologies - National Research Institute in Radom has initiated the establishment of a model technology platform which is the effect of research and development work on advanced material technologies, modern mechatronics, IT, control and steering systems, technical and ecological safety support systems, and research and testing equipment. Product and process solutions disseminated under the technology platform umbrella are the result of implementation of the Strategic Program titled „Innovative systems for technical support for sustainable development of the economy" and other development work and research projects. The main aim of this paper is to present good practices in the area of measures taken within the technology platform and presenting the ways and effects of cooperation of Institute for Sustinable Technologies - National Research Institute in Radom (ITeE-PIB) with the industry.

The basis of development of the knowledge-based economy is innovation. Introducing new technologies to the market (products, materials, systems, and services) is the most tangible effect of cooperation between science and business. The implementation of an efficient mechanism of transfer of scientific research results to economic practice boosts the competitiveness of enterprises and thus stimulates the country's economic growth. Poland has great intellectual potential and the results of research in many areas gain recognition around the world. At the same time the results of these research works are not used

to a sufficient degree by national scientific units or enterprises[1]. The results of a report prepared by the Ministry of Science and Higher Education show that 1/5 of Polish entrepreneurs don't know much about the possibilities of cooperation with the scientific community[2], among companies that have decided to start cooperation with scientific centres up to 1/3 think that the main obstacle in cooperation of science and business is the lack of information. These figures show very well that it is necessary to start marketing and information measures that will allow matching of enterprises to particular scientific teams[3].

The establishment of Polish network forms of cooperation should take advantage of good international practices and at the same time take into consideration the local environment.

Over the course of the objective Strategic Program, research on network forms of cooperation functioning on the European market was carried out[4]. An analysis of case studies was conducted. Two factors were taken into consideration in the analysis:

- the goal of the network - the following networks were identified: territorial, service, specific, branch[5] networks;
- the coverage of the network - the following networks were identified: regional, national, international networks.

On the basis of these analyses it was concluded that network cooperation facilitates the process of collecting, processing and utilization of knowledge and technology transfer, it streamlines communication between entities interested in the implementation of innovation. Network cooperation allows achieving effects of scale, and contributes to the intensification of innovative processes in companies. A network enables the transformation of knowledge into products by offering focused operative tools, and often the financial assets necessary for the process. Raising such funds in one company, especially a company from the SME sector, may often be unattainable. Cooperation networks can be created through the establishment of project consortia (e.g. Industriell Dynamik, Sweden)[6] or based on www sites (e.g. Madri+d, Spain)[7]. Cooperation networks help companies initiate activities associated with innovations (e.g. Systens, Holland)[8], promote the development of research and run policy stimulating innovation

1 A. Mazurkiewicz (ed.): Rozwój metod transformacji wiedzy i transferu technologii, Sprawozdanie z realizacji Projektu Badawczego Zamawianego PW-004/ITE/01/2004, Instytut Technologii Eksploatacji – Państwowy Instytut Badawczy, Radom 2006, Raport Bariery współpracy przedsiębiorców i ośrodków naukowych, Ministerstwo Nauki i Szkolnictwa Wyższego, Departament Wdrożeń i Innowacji, Warszawa 2006, Report Policy mix for Innovation in Poland, Key Issues and Recommendations, OECD, Warszawa 2007.

2 Report Bariery współpracy przedsiębiorców…., op. cit., p. 4.

3 Ibidem, p. 13.

4 http://www.jinnove.com, 09.08.2012 r., http://www.industrielldynamik.se, 20.08.2012 r., http://een.org.pl, 13.08.2012r., http://www.madrimasd.org, 12.08.2012 r., http://ec.europa.eu/dgs/jrc/index.cfm, 15.08.2012 r., http://www.yet2.com, 13.08.2012 r., http://www.nanobionet.de, 06.09.2012 r., http://www.syntens.nl, 19.08.2012 r., http://www.setn.org.uk, 27.08.2012

5 E. Książek, J.M. Pruvot, Budowa sieci współpracy i partnerstwa dla komercjalizacji wiedzy i technologii, PARP, Warszawa 2011, p. 16.

6 http://www.industrielldynamik.se, 20.08.2012

7 http://www.madrimasd.org, 12.08.2012

8 http://www.syntens.nl, 19.08.2012

(e.g. Setn, Great Brtain)[9], they organize conferences, fairs (eg. Syntens, Holland)[10] and they offer support in the search for project partners and trade partners (eg. NanoBioNet, Germany)[11]. Technology platforms help transform ideas into products, and processes and services into added value (Jinnove, France)[12], they support the development of start-up and spin-out companies (eg. Yet2.com, USA)[13], they deal with economic consulting for companies (eg. Syntens, Holland)[14], they launch support programs for entrepreneurs in the form of grants (eg. Jinnove, France)[15], they run marketing activities supporting entrepreneurs (eg. Syntens, Holland)[16], they deal with promotion of science and technology and offer apprenticeships, scholarships, and training courses (eg. Syntens, Holland, Madri+d, Spain)[17].

Networks with international coverage run horizontal activities to secure friendly legal and institutional environment for entrepreneurship; they take measures aimed at boosting internal security of the European Union (eg. JRC)[18], they provide information and consulting services in the area of tech transfer, and they offer help in raising financial assets (eg. EEN)[19].

Beneficial regulations, a clear system of protection and control over intellectual property, as well as a mechanism stimulating the processes for commercializing research results play a very important role in the effective functioning of network forms of cooperation. In the Polish economy these are the factors that need regulation so that networks can develop fully and efficiently tap the high potential of Polish scientists, stimulating economic growth in the country.

Technology platform of ITeE-PIB

The technology platform established at the Institute for Sustainable Technologies - National Research Institute in Radom is a network structure which integrates science and the economy[20]. The development of mutual relations of cooperation between the Institute and the participants of the network and, as a result, also with their suppliers, subcontractors, clients and service providers guarantees cooperation, boosts collective efficiency and contributes to the growth of efficiency of implementation of innovative products together with recommendations for the directions of production of technologically advanced solutions. For companies, especially for the SME sector, participating in a network form of cooperation stimulates the growth of innovativeness, boosts competitiveness and stimulates the development of entrepreneurship on the macroeconomic level.

9 http://www.setn.org.uk, 27.08.2012
10 http://www.syntens.nl, 19.08.2012
11 http://www.syntens.nl, 19.08.2012
12 http://www.nanobionet.de, 06.09.2012
13 http://www.yet2.com, 13.08.2012
14 http://www.syntens.nl, 19.08.2012
15 http://www.jinnove.com, 09.08.2012
16 http://www.syntens.nl, 19.08.2012
17 http://www.syntens.nl, 19.08.2012, http://www.madrimasd.org, 12.08.2012
18 http://ec.europa.eu/dgs/jrc/index.cfm, 15.08.2012
19 http://een.org.pl, 13.08.2012
20 Report on the implementation of research project RC/1/I.3.2/PS conducted under the supervision of mgr Marcin Olifirowicz in course of Strategic Program titled: Innowacyjne systemy wspomagania technicznego zrównoważonego rozwoju gospodarki.

The ITeE-PIB technology platform (figure 1) is addressed to recipients from all over the country, in particular to entrepreneurs, institutions from the business community, and research and scientific units, as well as to foreign organizations. The platform consists of two modules:

- A platform for dissemination of innovative solutions in the economy, driven by a system of assessment of innovative solutions and
- An IT platform.

Within the technology platform, activities associated with the promotion of innovative product and process technologies, with creating effective structures and mechanisms of transfer of innovation and assessment of the efficiency of these structures are conducted. Analyses of potential directions of development of innovations resulting from the needs of the industry and trends in the economy are conducted. IT tools facilitating the process of collecting, processing and utilizing knowledge and technology transfer, facilitating communication between entities interested in innovation are being created. Thanks to the activities of the technology platform, joint initiatives from scientific workers and entrepreneurs are emerging. Business projects are created and developed facilitating the commercialization process for technological solutions resulting in the provision of new technologies and new products to the market.

Picture 1. Organizational structure of the model technology platform.

Source: Report on the implementation of research project number RC/1/I.3.2/PS conducted under the supervision of mgr Marcin Olifirowicz in course of the Strategic Program titled: Innowacyjne systemy wspomagania technicznego zrównoważonego rozwoju gospodarki (ed. Innovative systems for technical support for sustainable development of the economy).

Platform for dissemination of innovative solutions in the economy

The main goal of the platform for dissemination of innovative solutions in the economy is to spread information about research and development activity, implementations and innovative projects; new technologies created in ITeE-PIB; and organization and supervision of the establishment of scientific--industrial consortia which are created by the Institute and companies from a number of sectors of the economy interested in cooperation.

The platform for dissemination of innovative solutions in the economy functioning within ITeE-PIB is supposed to establish connections between the companies, scientists and experts who are functioning within a given research area concerning technical support for sustainable development of the economy. Operational activities are carried out using three information channels:

- Direct contacts,
- Internet websites,
- Printed materials.

The first is based on direct contacts and it covers: preparing offers dedicated to potential recipients; answering inquiries about the offer; presentations of solutions at conferences and scientific meetings; thematic seminars; providing consultations; expert advisory; and organizing pilot implementations.

Data concerning the results of research and innovative products are disseminated over the web, through internet websites of:

- Strategic Program[21],
- Institute[22],
- Partners in the project (enterprises, science and research units, higher education facilities, organizations from the business community),
- Technological websites and internet services promoting innovations.

One source of information concerning the activities of the Institute and solutions created over the course of the active programs is the electronic newsletter published cyclically. Among the basic tasks of e-marketing is the establishment of strong ties with recipients and creating the image of the Institute as a productive and modern research unit.

One of the main advantages of this form of communication is the fact that it is quick, simple, cheap and reaches a very broad group of recipients. Recipients can subscribe to the newsletter directly on the Institute's website. The database of the newsletter includes several hundred mail addresses for companies, private and public institutions, higher education institutions, organizations from the business community, and private persons.

The third information channel is the traditional form of communication, covering publications in periodicals, individual publications, press articles, and information and promotion materials.

Within the platform for dissemination of innovative solutions in the economy, the Institute holds two seminars a year which are supposed to not only present the scope of research and development, project

21 http://www.programstrategiczny-poig.itee.radom.pl, 12.10.2012
22 http://www.itee.radom.pl, 12.10.2012

and implementation works of ITeE - PIB, but above all to establish and intensify cooperation between business and the Institute. About 40 representatives of the business sector from the whole country, as well as members of the management of Business Centre Club and representatives of the government of Mazowieckie voivodeship took part in the last meeting (May 2012).

The platform has a formal structure and over 30 commercial entities have confirmed their official participation in the platform.

As a result of these seminars, new consortia from the Institute and participating companies have been established in order to carry out joint research and development, as well as implementation projects, often with the use of public funds. The establishment of consortia is associated with direct benefits, including economic and financial; on the macro scale it stimulates the development of the knowledge-based economy for both sides.

Within the platform, constant monitoring of the market is conducted. Information is collected concerning the possibilities and needs of companies as well as institutions working for innovation.

System for the assessment of technologies (solutions)

The activities of the platform for the dissemination of innovative solutions in the economy are supported by a model system of technology assessment[23]. The system is used to review and assess a particular technological solution. This complex tool allows the identification of technologies that stand the chance of being implemented in economic practice. It defines the real business potential of solutions at various levels of advancement.

Additional effects of the process of assessing innovative technologies are facilitating communication between implementers of research subjects, and the exchange of experience allowed during the discussion concerning the advantages and disadvantages of particular solutions.

The following elements constitute a comprehensive system for technology assessment:

- The assessment of its degree of readiness for implementation;
- The assessment of commercial potential
- The assessment of innovative potential.

The assessment of a technology's degree of readiness for implementation (SDW)[24] serves the role of identifying the phase of progress and a precise assessment of the readiness of the solution for implementation. The method takes into consideration technical aspects and the level of progress of research and development work. The tool supports the process of transformation of knowledge and the transfer of advanced process and product technologies in the area of exploitation of machines and technical equipment. The method has been implemented over a broad range for the assessment of Strategic Program tasks and for the evaluation of the maturity of technologies and new products at universities, rese-

23 A. Mazurkiewicz, B. Poteralska, System of complex technology assessment, Problemy Eksploatacji, 4/2012 (87), Radom 2012, p. 5-18.

24 A. Mazurkiewicz, W. Karsznia, T. Giesko, B. Belina, Metodyka oceny stopnia dojrzałości wdrożeniowej innowacji technicznych, Problemy Eksploatacji 1/2010 (76), Radom 2010, p. 5-20.

arch and development institutions and for the assessment of implementation of development projects in the industry (over 100 external implementations). The SDW method can be used on various levels of the process of creation of an innovative solution, from planning research and development work and preparing a concept for a solution to detailed application for the assessment of innovative products on various levels of advancement.

The assessment of the commercial potential[25] allows identification of the degree to which solutions are prepared for implementation on the market. By this means, aspects from the technology, market, economic and legalorganizational areas are identified and analysed. The prepared methodology allows collecting information about the assessed solutions, objective analysis and the choice of technologies with a market potential. The assessment can be used at all stages of the evaluation of solutions.

The module of assessment of innovativeness[26], taking into consideration, just as the two previous models of assessment, the characteristics of a technology from the area of technical support for the su- stainable development of the economy, allows rapid identification of the level of innovativeness through the assessment of added value for potential buyers of the solution subject to assessment.

The main goal of the technology assessment is to estimate the commercial potential and possibilities for implementation, as well as defining the place of the innovation on the market. The system of technology assessment allows in-depth analysis of the applications of a particular technology. Using it for the assessment of solutions that are being developed contributes to the growth of innovativeness and competitiveness in the economy through more effective control of the process of implementation of scientific research results into commercial practice.

IT platform

The IT platform[27] supports the integration of the sphere of science and economy in the process of transfer of scientific research results to practical applications. It contains a set of instruments for collecting, processing and disseminating knowledge about innovative solutions that are the effect of the Strategic Program. One of the objectives of the IT platform is to establish a community of highly qualified specialists - scientists and entrepreneurs looking for contacts with scientists. The main goals of the IT platform are[28]:

- Granting access to the results of research online for the members of the platform for the dissemination of innovative solutions in the economy;
- Diffusion of information about innovative products;
- Generating new ideas concerning innovative products;

25 Report on the implementation of the research project RC/2/I.3.1/PS conducted under the supervision of dr Beata Belina in course of a Strategic Program titled: Innowacyjne systemy wspomagania technicznego zrównoważonego rozwoju gospodarki.
26 A. Mazurkiewicz, System oceny technologii, Materiały poseminaryjne 2go spotkania w ramach Platformy upowszechniania w gospodarce innowacyjnych rozwiązań, ITeE-PIB, Radom 18.05.2012.
27 J. Dobrodziej, Multipurpose computer platform supporting the transfer of innovation to business practice, Scientific Problems of Machinery Operation and Maintenance (Zagadnienia Eksploatacji Maszyn), Vol. 46, 1(165), 2011, Polska Akademia Nauk, Komitet Budowy Maszyn, p. 15-27.
28 http://www.pinf.itee.radom.pl, 12.10.2012

- Optimization of the implementation and commercialization processes based on the criterion of efficient flow of information;
- Carrying out advanced market analyses;
- Regular exchange of information about the state of work on an innovative product.

The IT platform consists of two main modules[29]:

- A knowledge database containing a module of data about solutions developed in course of the Strategic Program,
- IT applications supporting the work of the platform for the dissemination of innovative solutions in the economy.

Knowledge databases collect information from the area of intellectual property law, opportunities for financing innovation, scientific search engines are provided and a database of scientific news sources is created. The core of the module is constituted by databases of solutions developed at the Institute for Sustainable Technologies, which enable:

- Collecting, processing any amount of data and information in electronic form;
- Analysing structurally complex problems;
- Greater degree of objectivity in decisions;
- Faster and more comprehensive flow of information between implementers of scientific subjects, coordinators of the platform for dissemination of innovative solutions in the economy, and external users.

The databases contain systematic and detailed information about solutions, which covers:

- Technical specifications of a solution;
- Marketing data describing the potential scope of application of the solution (sectors of the industry) characteristics of existing competition with indication of target geographical market (European,
- national, international) obstacles to entering the market;
- Economic data including the costs of distribution;
- Register of inquiries for more detailed technical specifications; Register of buyers of commercialized solutions.

At the current stage, work on providing data for the database is in progress. The process is carried out using a system securing repeatability, transparency and thus the possibility of carrying out a broad analysis of collected characteristics of solutions in the Strategic Program. Another important module of the IT platform are applications influencing the positive building of relations with partners interested in cooperation with ITeE-PIB, supporting management decisions of companies. Some of these applications are: generatINN, a system of online seminars and video conferences, system in the SOA concept, I-Questionnaires.

29 Report on the implementation of research project RC/3/I.1.2/PS conducted under the supervision of dr inż. Jerzy Dobrodziej in course of a Strategic Program titled: Innowacyjne systemy wspomagania technicznego zrównoważonego rozwoju gospodarki.

The GeneratINN application (Virtual Brainstorm)[30], which is based on the method of brainstorming, perfecting of group decisions in commercial entities. It is a tool supporting the generation and assessment of ideas and concepts for innovative solutions. One of its advantages is the option to conduct a session from any geographical location via the internet and a browser. Access to the system from the level of an internet browser allows registering the ideas provided - the ideas added appear directly in the active session window and are constantly visible to all participants in the meeting. It is easy for the moderator to prepare a session (defining the parameters of a session, sending messages about the meeting to the participants) and to have control over the work of the team (direct communication with the participants, managing phases of the session).

One of the advantages of the application is that there is no need to install specialized software on the local stations of conference participants. The system makes it possible to conduct many sessions at the same time. Voice and visual communication between the moderator and the participants of the session takes place by means of microphones and video cameras connected to the stations of particular participants. An additional advantage of the system of video conferences and online seminars is the virtual presentation wall, which displays the content of sessions and files presented by the participants. The wall is visible to all participants and is equipped with tools allowing the moderator to highlight graphic elements in the presentation. Moreover, the system has a chat room which allows the participants to communicate among themselves during the session. A text communicator enables information exchange without interrupting participants' discussions and disrupting the session in progress.

CRM, a system of relations with clients (Customer Relationship Management) - is a set of procedures and tools essential in managing the relationship with clients. The CRM system:

- Is a group of business strategies aimed at raising the long-term market value of a company by maximum utilization of the potential connecting the company and its clients;
- Is a philosophy of running business focused on the client which permeates the culture of the whole organization;
- Covers with its essence profitable management of the processes of identifying, gaining, maintaining and developing appropriate clients;
- Provides the company with a uniform image of the relations with clients and provides the client with a uniform image of the company consolidating all available media and information channels;
- Is based on management of knowledge concerning the client allowing the optimization of value exchanged with the client;
- Covers the areas of marketing, sales and service;
- Is supported by appropriate IT systems of CRM class, which comprehensively serve the processes of flow of information in a company.

30 Wójcicki T., Błaszczuk E., Dobrodziej J., Kaczyński J.: Technologie informatyczne w rozwiązywaniu zadań innowacyjnych na przykładzie systemu komputerowego implementującego metodykę burzy mózgów, Problemy Eksploatacji (Maintenance Problems), 2/2012, p. 178-193.

Based on CRM, within the framework of the IT platform there is a system for communication with economic entities (SOA), which allows managing product files, registering services and offers, collecting orders, handling distribution, recording applications for technical support and complaints, invoicing, planning marketing activities, analysing profitability of marketing activities, carrying out analyses with the use of Business Intelligence (BI) tools.

The I-Questionnaire application serves to build, collect and publish surveys online. Properly built surveys provide the information expected by the pollster; encourage the respondent to give answers by suggesting how to formulate answers; and allow quantitative and qualitative analysis of the material supplied by the respondents.

The IT platform is used to collect and present materials addressed to participants of a network form of cooperation. Its goal is to create an integrated environment enabling communication within the community of the platform. The basic advantage of an IT platform is that it saves time - entering information into the program one time enables access to the information in many locations and to many pieces of information gathered in one place and, thanks to a uniform system of databases, there is the capability to match and compare offers. The applications provided are a response to the needs of businesses, especially from the SME sector, functioning on the market in a modern way. These applications provide them with fast and ergonomic systems supporting company management. The IT platform functioning within the framework of the technology platform facilitates communication and integration of operational activities of ITeE-PIB and businesses cooperating with the institute.

Conclusion

This paper presents experience of the ITeE-PIB platform. The experience affects the creation of lasting and effective methods of cooperation between science and industry, both in the process of implementation of scientific research and implementation projects and in the process of commercialization of scientific results.

Within the technology platform the following functions are provided:

- Marketing: sharing information concerning the solutions developed and the participants on the platform - their resources and products, receiving information from companies concerning their needs for particular technologies;
- Communication: seminars, conferences, contact information;
- Information: collecting, cataloguing and searching for information concerning companies, products and resources;
- Registration: monitoring the market, the work schedule, possibility of assessing the potential for implementation, the commercial and innovative potential.

The mission of scientific and research units in a knowledge-based economy with modern technologies should be building up mutual, complex relations. The Institute for Sustainable Technologies -

National Research Institute in Radom, as a scientific and research unit, wants to serve as a link between science and entrepreneurs in the area of innovative technical challenges supporting sustainable development of the economy. By means of the technology platform the Institute promotes its activities, and contributes to dissemination of knowledge about research conducted and results achieved. Together with entrepreneurs it raises money from government and European programs allocated to the implementation of new technologies, which stimulate growth in the Polish economy.

The efficient functioning of the ITeE-PIB technology platform is the effect of work by an interdisciplinary team consisting of specialists in the areas of technology transfer, marketing, research management, and IT. Among them are both scientists and professionals. ITeE-PIB has at its disposal unique research resources (specialized laboratories, equipment, access to developed and thematic databases and knowledge databases) and very well educated and experienced employees, which directly affects the development of network form cooperation.

The platform is an effective tool supporting the transfer of scientific research results and developed technological solutions into business practice. Its key goal is to convince Polish entrepreneurs to recognize the benefits of participation in an innovative network structure.

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