

# Living Labs as a Form of Innovation Development

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## Abstract

**Purpose:** The general purpose of this paper is to present living labs as a new form of innovation activity based on the concept of user-driven innovation. More specific goals are to show the development of living labs around the world and to identify the possibilities for the development of this new form of innovation in Poland.

**Methodology:** Because of the lack of official statistics regarding the effects of living labs, this paper presents the quality aspects of the problem.

**Findings:** In Poland, living labs are in their first stage of life. The possibilities of using new forms of innovation activities are determined by partnerships between firms, research institutions, authorities and local communities. The main obstacle for the development of living labs is the lack of an institutional and legal framework with respect to the concept of user-driven innovation.

**Research limitations:** Because of their short period of life, it is not possible to estimate the effects resulting from the activity of living labs. Therefore, this paper presents only the theoretical aspects of this new concept and reviews the opportunities of using it in practice.

**Originality:** The paper describes a new phenomenon in the area of innovation activities. The added value of the paper lies in the identification of various factors influencing the development of living labs.

**Keywords:** living labs, user-driven innovation, open innovation

JEL: O31, O32, M30

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## | Introduction

One of the latest trends in the field of innovation activities of enterprises is moving away from the model of innovation generated in closed laboratories towards the open innovation model. In the United States, Germany and the Scandinavian countries we can observe that competitive advantage is being created based on the user-driven approach. These countries have implemented programs to support innovation activities and one of their elements are ideas obtained from consumers.

The essence of the user-driven approach to innovation is the direct involvement of users in the development processes of products and services. This way their expectations are fulfilled, and ways of meeting their needs are sought after and disclosed. This process requires the use of appropriate research methods and techniques among users, allowing to identify the real needs and subsequently implementing that knowledge in the design and manufacturing processes.

The main goal of the paper is to present living labs as a new form of innovation activity based on the concept of user-driven innovation. The general purpose includes a number of more specific goals, namely presenting the characteristics of the development of living labs around the world, as well as identifying the possibility of spreading this new form of innovation in Poland.

Living labs quickly established themselves in the Nordic countries, where it can be observed that the innovation development strategy is being built based on the concept of the user-driven approach and the model of public-private-civil society partnerships. This new way of creating products and services is also being increasingly popularized by American corporations.

In Poland, the issue of innovation coming from the users and their practical use in the form of living labs is still in its early stages of development. The possibilities of using this new form of organization of innovation activities are determined by the potential which is present in the collaboration between enterprises, research institutions, local governments, institutions and communities.

## | The Concept of User-Driven Innovation

Ways of creating new products and services have evolved in the last decades along with the search for sources of competitive advantage. In the 1960s and 1970s the market position was determined by the cost saving opportunity. In the subsequent two decades advantages were believed to be found in factors determining the quality and speed of production (Hamel and Prahalad, 1994). After 2000 the period began of looking for sources of competitiveness in the field of innovation activities. At the same time, such phenomena as the dissemination of knowledge on a global scale, the increase of the intensity of research at academic centers as well as the

increasing activity of financial institutions, which provide capital for innovative projects, have led to significant changes in the processes of innovation development.

As a result of the dissemination of knowledge, many new solutions began to appear in the environment, and the research studies that were conducted within corporations were becoming less and less effective. Under such conditions, the innovation development model in the form of research laboratories within companies was losing its importance and was being replaced by an open innovation model, based on which the solutions that emerge both within the company and outside of it are the source of innovation. Companies began to develop ideas that were not their own, as well as sharing their own solutions with other organizations (Chesbrough, 2003). At the same time the innovation development process began to include other market participants. This was the result of a new way of perceiving the innovation creation process, which requires the participation of various areas of activity (Chesbrough, 2006). This gave rise to the development of cooperation between the scientific community and entrepreneurs, the creation of cluster structures and public-private partnerships, an increased interest in the consumer and the need to adjust the offer to the needs of the consumer.

An example of enterprises opening up to the needs of the consumers is market research, through which companies gain knowledge about consumer expectations. These studies, however, are no longer sufficient and companies have started to include the users of their products in the creation process of innovative products and services. Including the consumer in the process of creating value can be described using the concept of presumption. This is the phenomenon of merging the processes of consumption and production while blurring the boundaries between them. According to this concept the prosumer is an active consumer, who tests the qualities of a given product and shares his opinion on this issue with other prosumers. He is a user that is aware of his own needs (Bywalec, 2007).

A prerequisite for using the user-driven approach to innovation is that the company has to prepare an appropriate infrastructure, which will enable the users to collaborate with the company as well as with each other. The factors determining the co-creation of new products by customers are: dialog, access, risk assessment and transparency. Dialog includes knowledge sharing between the company and the users who are involved in the process of value creation of the company. The next step is to offer the users access to the product at the stage of its design. This involves certain risks for the company, associated with an increased awareness of the users. Consumers that co-create products cease to be an unaware group that can be influenced using marketing tools. In this case, transparency of information is a prerequisite for building trust between the company and its customers (Prahalad and Ramaswamy, 2004).

Already towards the end of the 1970s Eric von Hippel pointed out the role of users in the innovation creation process. According to him, it is the consumers that recognize the need for improvement or for the implementation of solutions that will add new value the fastest (Hippel, 1986, p. 791). The inclusion of users is currently referred to as the user-driven innovation approach (UDI) and

is defined as the process of using consumer knowledge to identify new opportunities to create value, i.e. to improve products and services as well as to develop new ideas. Thus, in this case the consumer is not only a potential source of information, but also an active participant of the process, who suggests solutions and who can influence the form of the new product or service. Eric von Hippel further developed his theory in subsequent years, based on the concept of the so-called “lead user” (Hippel, 2005). As part of the user-driven innovation approach he distinguished two trends used in the process of innovation development (Table 1):

- 1) “Mass user” – this approach focuses on the identification of hidden consumer needs and their creative thinking in order to improve the shape, appearance and other elements of a product that already exists in the market. The company bears the burden of innovation and the user is only an adviser.

**Table 1 | Sources of user – driven innovation**

Criterion	Mass user	Lead user
Aim of the process	Identifying of consumer needs	Identifying of new solutions
Where innovation takes place	In the company, often with consulting support	Outside of the company
Costs	Less expensive than traditional innovation methods	Lower costs of the competition control
Methods of innovation development	Concentration on a product, identifying of the customer needs, brainstorming, testing	Cooperation with customers to find new ideas, identifying of the lead-users, prototyping and testing

Source: Norden (2006, p. 13).

- 2) “Lead user” – this approach consists in finding and developing new solutions, which come from the consumers, outside the company. The role of the users is not limited to only giving an opinion on the finished products, but also includes developing their own ideas, independently or in collaboration with the company.

As regards the applied methods of researching user needs it needs to be emphasized that they are very diverse. In case of the “mass user” they include collecting ideas, improving or changing the qualities of existing products. Techniques such as observation, brainstorming and workshops are used, as well as testing solutions designed by users, methods involving consumers creating projects and ideas arising while using the products. This allows creating products that have been tested in practice. The methods appropriate for the “lead user” are used outside the company and consist in identifying solutions that are created by consumers. New to the programs of collaboration with users is equipping them with special tools and software packages to enable them to independently create their own projects and subsequently prototypes of new products, which satisfy their individual needs. The next stage consists in reviewing and testing these projects. The techniques used are focus groups or testing. The conducted research tests make it possible to select the best ideas (Stahlbrost and Bergvall-Kareborn, 2011).

The subject of innovation created by users can be very diverse. Innovation can apply to products and services, as well as to the organization of processes and technologies. The user category is not only made up of individual consumers, but also businesses and institutions. It often happens that companies encourage their employees to submit innovative solutions. Information and communication technologies are essential for applying the user-driven innovation approach, including the next generation Internet – Web 2.0, which enables users to create and publish content (Jensen and Smed, 2010).

Innovation activity based on the user-driven innovation approach is a process that requires companies to go through several phases (Rosted, 2005):

*Phase 1. User observation.* During this phase companies monitor consumer needs. Identifying unrecognized needs is much more difficult than identifying needs that have already been recognized and requires the use of specialized tools as well as the participation of many experts, including in the fields of anthropology, sociology and psychology. This is because the social conditions, cultural trends and lifestyle need to be analyzed.

*Phase 2. Developing new solutions and concepts.* After identifying the needs, the next step is to develop solutions that can be used to meet the needs of the users. These solutions may include new products, services and concepts combining various elements. What is essential in the process of creating new products is developing such a product that other users will not be able to copy.

*Phase 3. Production.* The commercial potential of new products should be reflected in the price that consumers will want to pay for them. This requires a prior analysis of the available technologies, production capacity and production costs.

*Phase 4. Assessment of market opportunities.* Each company has a specific business plan that determines what type of product is consistent with the strategy of the company. Prior to incurring expenses, identifying customer needs or designing new solutions, it has to be determined whether the new solution is consistent with the preferred company development strategy.

*Phase 5. Elaborating an innovation development strategy.* If the new solution requires only minor changes in the existing products or is similar to the existing ones, then there is no need to introduce major changes in the business strategy of the company. Otherwise, radical changes are necessary, which will require adjustments to the company's business model, changes in the production methods as well as a new delivery system and marketing.

*Phase 6. Implementation.* The final phase of the innovation process is the introduction of the product to the market. What is important here is the moment of entry and whether the competition will also be offering new products at the same time.

In the innovation creation process with the participation of potential consumers different types of relationships between the company and the user occur. The following types of interaction can be distinguished (Bergvall-Kareborn and Stahlbrost, 2010).

- 1) the user brings about innovations for personal use by modifying the product independently, without interaction with other consumers;

- 2) the user shares his ideas with other users, either for free or not;
- 3) the user starts the process of obtaining a patent for his idea;
- 4) the user shares his innovation idea with the company for free, which can commercialize it;
- 5) the user shares his ideas for free with a company producing the product, either individually or as part of a cooperation program;
- 6) the user generates a project in close cooperation with the company, using its tools, materials, software and submits it for commercialization.

Cooperation with consumers, aimed at obtaining innovative ideas, is usually developed by large corporations. Small businesses are rarely active in this field, although they are more flexible in terms of the development of their range of goods and product qualities. In order to stimulate innovation in small and medium-sized companies in many countries special programs are initiated. Such programs include creating collaboration platforms between companies and users, also known as living labs.

## | The Essence of Living Labs

The concept of the user-driven innovation approach has been used to create living labs. This refers to areas of towns, villages, municipalities, academic institutions, where innovation is developed based on modern technologies. The new solutions that are developed can be technological, organizational, business related or social. The innovation development process is the result of the cooperation between companies, research institutions, local governments and local communities. The operations of living labs are conducted based on the user-driven innovation approach and consist in a joint design of products and services by the producers and the users, identifying hidden applications, behaviors and market opportunities, testing new solutions, evaluating concepts, products and services according to established criteria (Macełko and Mendel, 2011).

In the literature on the subject two approaches to the concept of living labs are identified. (Bergvall-Kareborn and Stahlbrost, 2009). These are:

- 1) the methodology of conducting research and development activities in a knowledge-based economy and information society, as a result of which new ideas are developed and subsequently tested in real conditions. Users are involved in all the phases of creating a new product;
- 2) an environment in which innovation is created, where consumer needs are an essential criterion for the development of new products and services.

The core objectives of living labs are:

- stimulating cooperation and innovation in research activities;

- facilitating the participation of users in the innovation development process;
- concentrating the innovation development processes not only in the field of new technologies but also in the social field;
- ensuring the participation of users in the innovation development process in all its phases (Stahlbrost, 2008).

The structure of living labs consists of the following elements: infrastructure and information technologies, the management sphere, partners and users, the area of research, the methods and techniques used in practice. In the case of such organizations also certain key principles are indicated, which should be applied by the labs in their operations. These include: openness, the ability to influence, realism, value creation, sustainable development based on environmental, economic and social objectives (Bergvall-Kareborn et al., 2009).

Placing living labs in the Quadruple-Helix model – which includes the sectors: business, public, academia and civil society – allows to determine the functions of living labs in the innovation process. Depending on the criterion of who plays the central role in them, the functions of living laboratories can be characterized (Arnkil et al., 2010).

In a Quadruple-Helix model where the business sector plays the dominant role, the public sector is responsible for supporting and financing the environment that is necessary for the development of innovation, including companies, research institutions and the creation of living labs. The business sector commercializes products and services, is responsible for the use of user knowledge and gathering information on consumer needs. The academic sector creates new knowledge for living labs, educates and employs experts for the living labs. The social sector is responsible for providing information about its needs, takes part in testing the products in living labs, participates in the development of innovation.

In a model where the main role is played by the public sector, the business sector is responsible for the commercialization of products and services and the use of user knowledge. The role of the public sector comes down to the development of public services, increasing the involvement of citizens and the development of living labs. While the academic sector is responsible for creating new knowledge and research methods for the living labs. The role of the social sector boils down to providing information about its needs and experiences, as well as testing products and services under real conditions.

In a Quadruple-Helix model where civil society plays the dominant role, the business sector is responsible for the commercialization of innovative products, the public sector provides the tools necessary for the implementation of innovative processes, such as any kind of platform for dialog and decision-making. While the academic sector supports the innovation activity of citizens, businesses and public authorities in activities based on new ideas and solutions. In this

model the social sector is responsible for the development of innovation, it decides which types of innovation should be implemented.

Regardless of the adopted approach, living labs have common features, which include:

- 1) participation, which means that all stakeholders in the value chain participate in the innovation development process, given the possibility to establish direct contact with the end user of the product or service under real conditions;
- 2) services for the customers of living labs are provided at all stages of innovation development;
- 3) the activity of the lab is focused on user needs and any evaluation is made from the perspective of the user;
- 4) the infrastructure and all the necessary tools for the creation of innovation are offered by living labs.

The benefits of participating in a living lab which forms a partnership of companies, universities, local governments, institutions and local communities apply to all participants. User participation brings savings due to the in advance identified needs and preferences. This is particularly important since 70–80% of unsuccessful products and services are not the result of insufficient use of new technologies, but the lack of understanding of consumer needs. Users create certain products and services, which are tailored to the needs of the buyers and consequently they generate savings. As a result of using the resources of living labs, small and medium-sized enterprises have the chance to enter new markets. For large firms, cooperation with other companies increases the efficiency of the innovation process. As regards research institutions, the establishment of cooperation between the sphere of business, citizens and public authorities is conducive to creating a system of innovation, which integrates technologies and society, and increasing revenue from investments in research and development. Living labs have in general an important role in filling gaps. They bridge the different gaps between technology ideation and development on the one hand, and market entry and fulfillment on the other (European Commission, 2009).

The idea of living labs was established within the framework of the international network of specialists AMI@Work Family of Communities, which was set up in 2004 and collaborated with the European Commission. In subsequent years, an important role in popularizing the idea of living labs was played by the European Network of Living Labs – EnoLL, which was established in December, 2006. The aim of this organization is to support innovation processes and to popularize the idea of open innovation with user participation, both in Europe and beyond. The most laboratories have been established in the Nordic countries. Companies from all over Europe test their products in these countries, because their residents are the most willing to participate in this process. Each year the ENoLL gains new members. At the end of March 2013 the number of laboratories affiliated to this organization amounted to 320 (*European Network of Living Labs*, 2013).



Table 2 | Examples of living lab activities

Living lab	Tasks and activity areas	Country/Institution
Mind Lab	Cross-governmental program for creating more effective solutions in the sector of public services, based on the identified needs of citizens	Denmark Ministry of Taxation Ministry of Employment Ministry of Economic and Business Affairs
Nokia Beta Labs	A website through which Nokia informs the users about new product applications. The consumers can submit their feedbacks relating to the new applications. Nokia uses the needs and preferences of customers in developing of innovative products	Finland Nokia Company
Living Lab	Platform for developing and testing of the ICT- products and services	Sweden Service Research Center at Karlsbad University
Business & Design Lab	Platform for communication and organizing of meetings on management and marketing strategies in the design sector. Initiative of meetings relates both to public organizations and private firms	Sweden University of Gothenburg's School of Business, Economics and Law
Laurea Living Lab Network	Network of laboratories developing various innovative services, including medical services, ICT, design and social services in rural communities	Finland Laurea University of Applied Sciences
International Center for Decision Sciences and Forecasting	Supporting of innovative enterprises in planning their technological strategies, focused on ICT. Developing of modern methods of computer-aided decision support and optimization methodology	Poland Progress and Business Foundation in Cracow
Turecki Living Lab	Development of regional tourism, recreation and landscape protection, activating of post-mine areas	Poland Turkowska Unia Rozwoju
Living Lab Kielce Technology Park	Creating of the network of micro, small and medium-sized companies associated with utility and industrial design	Poland Kielce Technology Park

Source: European Network of Living Labs (2012).

Examples of living labs operating in the Nordic countries and in Poland (Table 2) point to a wide array of support opportunities and commitment to the process, both of public and private entities. The activities that they undertake focus on development, research and education. Living labs serve the development of innovation, including in the field of environmental protection, the development of entrepreneurship, the elimination of social exclusion, health care and improving the quality of life.

As for the level of development of the open innovation policy, including the use of the user-driven innovation approach, in most countries of the European Union it is in the early stages of development. The implemented support policy usually refers to the national level, without taking into account the specificity of regions. Support programs in the service sector concern the sector

of information and communication technologies, finance, business services, logistics, tourism, creative industries, biological and medical sciences. The most developed mechanisms have been created by the Nordic countries. This policy usually involves four directions: the development of competencies, financial and fiscal incentives in the field of innovation activities, ensuring adequate infrastructure and the creation of an appropriate regulatory environment (Ministry of Employment and the Economy, 2010).

The programs implemented in Finland and in the UK can serve as examples of innovation policy based on the user-driven approach. In Finland, the user-driven innovation approach constitutes a key element of the national innovation strategy. The Finnish approach emphasizes social needs, such as health care, as well as the citizens and the government as the main users of innovation. This is achieved by an action plan for the user-driven innovation approach, which includes projects in the field of knowledge and skills development, regulatory reform and infrastructure improvement. Living labs are mainly concentrated in the public sector and also to a lesser extent in the private and business sector (PARP, 2012).

A specific instrument in Finland is the so-called “urban innovation”. This is a project that is supposed to encourage cities to generate innovation created by users, especially in the field of energy efficiency, transportation, the provision of municipal services and social activity. Open innovation is supported in Finland through facilitating the flow of knowledge and technology. What is important here is the availability of technology centers as platforms for networks of collaboration between businesses and research institutions (NORDEN, 2012, p. 34). In the UK, the approach in innovation policy that promotes open innovation in the service sectors is a relatively new phenomenon. The instrument used here is the “Knowledge Transfer Partnership”. This initiative was established in 1975 as the Teaching Companies Scheme and it constitutes a form of collaboration between the business sector and academic institutions, under which companies can benefit from the achievements of the academic sector (Bos et al., 2010).

## | The Determinants of Using Living Labs for Innovation Development in Poland

The development of living labs in Poland based on the popularization of the user-driven innovation approach is still in its early stages of development. At the end of March 2013 only three Polish labs were members of the ENoLL. The first Polish living lab was established in 2002 by the Progress and Business Foundation in Cracow, which took part in promoting the activities of labs in the countries of the Visegrad Group. The main area of activity of this living lab, which was admitted to the ENoLL in 2010, is to support innovative enterprises in planning their technological strategies, focused on ICT, including modern methods of computer-aided decision support and optimization methodology (*All our Living Labs*, 2013).

That same year the Turecki Living Lab (TUR-LL) became member of the European Network of Living Labs. Their main objective is to undertake activities for the development of rural communities within the framework of partnerships established in both the local and international arena. Partners of this lab include municipalities of the Turek County, companies operating in the field of information and communication technologies and social organizations. The initiative is aimed at activating the tourist region and it includes research and development activities. The products and services are developed, tested and refined under real conditions, within the framework of multidisciplinary teams including researchers, enterprises, local authorities, civil society organizations and citizens (*Pierwsi w Polsce*, 2013).

With the spread of knowledge about the user-driven innovation approach in Poland, it can be observed that more and more living labs are being established. An example is the Kielce Technology Park (KTP), which in March 2012 joined the international project “Central European Living Lab for Territorial Innovation” (CentraLAB). The project aims to transform Central Europe into an extensive laboratory of innovation realized in the social, organizational and technological dimension, under which the innovation development process will be carried out with the participation of users. The KTP will conduct research studies in small and medium-sized enterprises using the method of living labs. The project is realized in cooperation with partners from seven countries, including Slovenia, the Czech Republic and Hungary. Each of these countries implements a program from a different sector. The projects are linked to the profiles of various institutions and the needs of users. The task of the KTP is to create a network of micro, small and medium-sized companies associated with utility and industrial design (Kielecki Park Technologiczny, 2013).

The prospects for the development of living labs in Poland based on the user-driven innovation approach should be considered both from the point of view of the opportunities arising from the very nature of the organization and from the point of view of the external conditions of its functioning.

First of all, it should be noted that the potential for the development of living labs lies in the needs of innovative companies. The interdisciplinary nature of innovation puts pressure on the need for companies to establish cooperation with users, especially when it comes to small and medium-sized enterprises, which are characterized by a low share of external sources of innovation, including consumers and research entities.

What is important for the formation of this new type of organizations, i.e. living labs, is to base their development on public-private-people partnerships (PPPP), understood as the cooperation between business, science, citizens and public authorities in the innovation creation process. Companies that represent the business sector within this model are responsible for the commercialization of products and services, for using the knowledge of experts and users, and for systematically gathering information about the needs and experiences of consumers. A particular

role in ensuring the functioning of living labs is played by public administration, which is responsible for enabling the public to participate in innovation processes and thus in processes of local and regional development. Public sector organizations are responsible for supporting and financing development and for creating an environment for innovation and research. The academic sector is responsible for creating new knowledge serving the needs of living labs, while the local community is to provide information about their own needs and experiences, to participate in product testing and in the development of new concepts. Currently, the process of creating such partnerships in Poland comes down to just a few initiatives.

One of the factors determining the development opportunities of living labs in Poland is the type of cooperation undertaken by companies as part of their innovation activities. In the years 2009–2011 32.6% of innovatively active industrial enterprises and 28.1% of the companies in the service sector cooperated with other entities in the field of innovation activities. The tendency to cooperate in the field of innovation activities was evident to a greater extent in public sector enterprises, where 43.3% of the companies from the industrial sector were involved in some form of cooperation and this percentage amounted to 46.4% for companies from the service sector. Both in industrial enterprises and in the service sector the main partners in cooperation in terms of innovation activities in the years 2009–2011 were suppliers of equipment, materials, components and software. This form of cooperation applied to 24.6% of the companies in the industrial sector and 35.9% in the service sector. As for the participation of consumers, it amounted to 13.0% and 10.6% respectively, universities 12.2% and 8.2%, research institutions 14.6% and 2.9%, while companies in the same industry 23.6% and 24.3% (GUS 2012, p. 73). On this basis it can be concluded that the dominant role in the innovation activities of enterprises is played by internal sources. In the case of external sources, the leading position is taken by suppliers that co-participate in the implementation of new solutions, while consumers, research and development entities, and universities play only a minor role in providing knowledge about innovation.

In Poland there is no dissemination of knowledge on the scope of utilization of the user-driven innovation approach by entrepreneurs, and there is also a lack of awareness regarding the benefits of implementing this new concept. The consumer and his needs have not been the focus of enterprises for a long time. Companies mainly used information obtained from secondary sources or from wholesalers or retailers rather than directly from the consumer. This information then formed the basis for developing new products or improving existing ones. What we need now is to take measures to raise awareness regarding the desirability of getting to know the needs of consumers and the importance of the impact of this kind of knowledge on the creation of products tailored to the expectations of the market. These types of initiatives have been implemented in Poland on a large scale only since 2011.

Companies that choose to conduct market research, often do this on their own rather than outsourcing it. However, they do not possess the necessary knowledge or expertise to properly

conduct such research studies or interpret the results. Therefore, companies need specialized knowledge regarding the methods of conducting such research. It should be emphasized here that mainly large companies make use of consumer surveys, while small companies, due to the cost of such studies, have less knowledge about the process of new product development.

Living labs play an important role in eliminating gaps. First of all, they eliminate the gap between the phase of developing ideas and their elaboration, commercialization and introduction to the market in the form of finished products. Therefore, the user-driven innovation approach, manifested in the ability to identify and meet the actual needs of the consumer, is already being adopted in some countries as a prerequisite for future market presence and achieving competitive advantage.

The new possibilities in terms of disseminating this new form of innovation development have been included in the Framework Program for research and innovation entitled “Horizon 2020” for the years 2014–2020, in which it is assumed that cities and regions will participate in the creation of new types of joint ventures aimed at public-private partnerships with the participation of citizens and in highlighting the stronger role of users and open innovation. Here the multidisciplinary and multicultural dimension of innovation should be emphasized, which in turn requires a strong participation at the level of everyday life. Research laboratories are no longer traditional academic facilities and are becoming regional innovation systems that act as testing grounds for the preparation of many types of innovation resulting from the needs of users. They cannot be created or maintained without the active participation of local authorities and citizens (Wniosek dotyczący..., 2011).

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