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**OPEN INNOVATION AND ICT TECHNOLOGIES:
GREAT MODERN PHENOMENA AND ITS INTERCONNECTION**

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**ОТКРЫТЫЕ ИННОВАЦИИ
И ИНФОРМАЦИОННО-КОММУНИКАЦИОННЫЕ ТЕХНОЛОГИИ:
СОВРЕМЕННЫЕ ЯВЛЕНИЯ И ИХ ВЗАИМОДЕЙСТВИЕ**

This paper deals with the analysis of main trends in ICT development and its influence on the modern business environment. Interconnected links between Open Innovation paradigm, ICT phenomena and coworking as a form of infrastructure for emerging business have been demonstrated.

OPEN INNOVATIONS; ICT; SOCIAL COMMUNICATIONS; CROWDSOURCING; COWORKING.

Статья посвящена изучению основных тенденций развития информационно-коммуникационных технологий и их влияния на современную бизнес-среду. Продемонстрированы взаимосвязи между парадигмой открытых инноваций, информационно-коммуникационными технологиями и коворкингами как формой инфраструктуры для зарождающегося бизнеса.

ОТКРЫТЫЕ ИННОВАЦИИ; ИНФОРМАЦИОННЫЕ ТЕХНОЛОГИИ; СОЦИАЛЬНЫЕ КОММУНИКАЦИИ; КРАУДСОРСИНГ; КОВОРКИНГ.

Introduction. The term «Open Innovation» is currently popular in management literature. In recent years, the number of the use of this term in the literature has been exponentially growing. According to Stefan Lindegaard, «*In five to seven years, we will no longer talk about open innovation. The term «open innovation» will disappear and we will just view this as «innovation. The key difference is that innovation will have a much higher external input that we see today»* [1]. These words force us to look at the openness of innovation as a distinct phenomenon that has a significant impact on the development of methods, tools and business infrastructure.

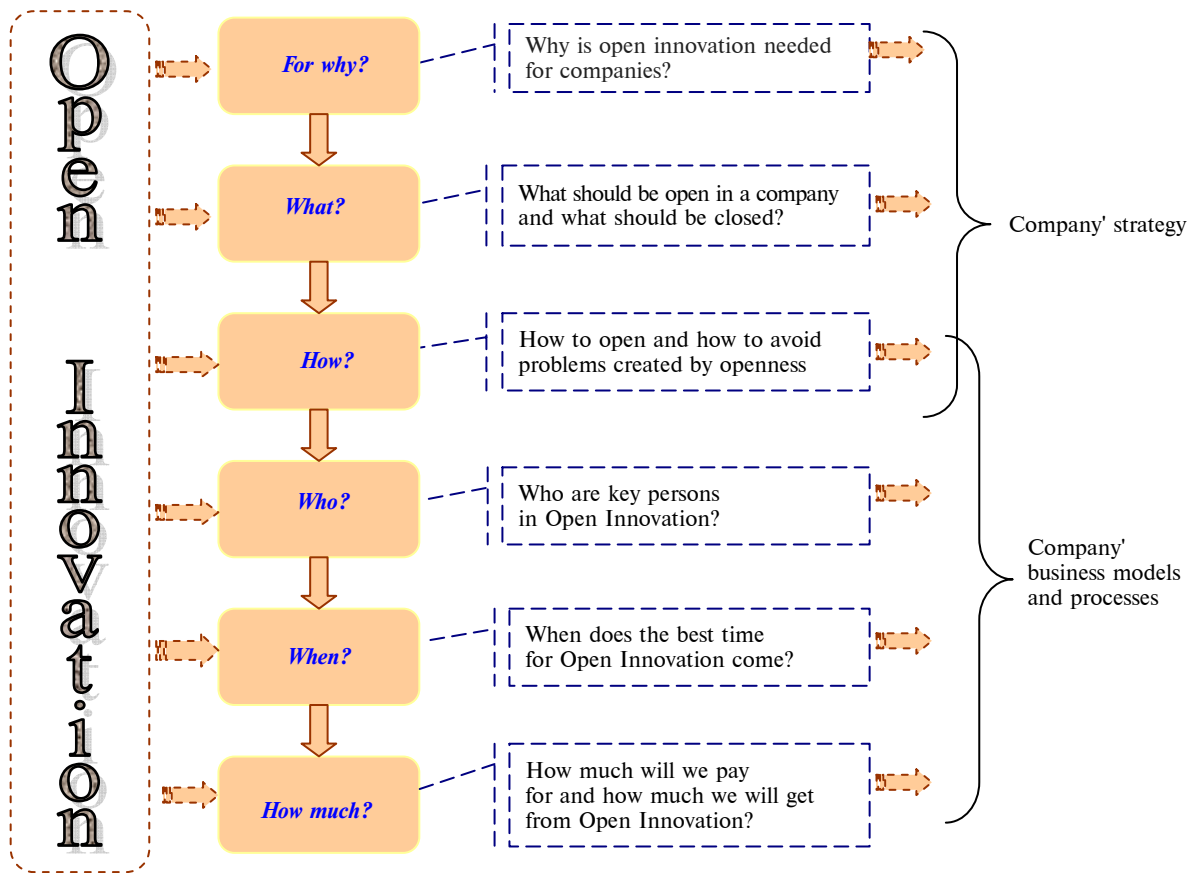
The original idea of open innovation was formulated by Henry Chesbrough as follows: *the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for external use of innovation respectively.* He coined the term «Open Innovation» in the book «Open Innovation: The New Imperative for

Creating and Profiting from Technology» [2]. In the most general terms, the nature of open innovation could be described by means of six open innovation principles (see table below, reference: Chesbrough, H. (2003).

Table 1

Open Innovation principles

Open Innovation Principles
If we create the most and the best ideas in the industry, we will win.
External R&D can create significant value: internal R&D is needed to claim some portion of that value.
We don't have to originate the research to profit from it.
Building a better business model is better than getting to the market first.
If we make the best use of internal and external ideas, we will win.
We should profit from others' use of our IP and we should buy others' IP whenever it advances our business model



Open Innovation as a company strategy and business processes

Problem definition. Open Innovation seems to be a simple concept. To develop new products and services companies should focus their activities on external expertise and ideas instead of doing everything themselves. However, as a lot of researches have rightly pointed out, the devil is in the details. To put into practice Open Innovation must be transferred from the concept level to the level of a management technology and business processes. The following logical progression of questions must have clear and reasonable answers to be used in business practice (Figure).

A lot of studies of open innovation topics have been devoted to answer the question «Why is open innovation needed?» [3–6]. The shortest and most intelligible answer to this question was given by Marko Torkkeli, Professor at Lappeenranta University of Technology: «You must be open or you will be closed». This aphorism reflects the realities of the modern world where the competition exists in the new constantly changing conditions and the openness

to market requirements and trends in science development becomes a key factor of the competitiveness of a company.

The question «Why Open Innovation?» corresponds to the level of the company's mission development. Being used in business, the Open Innovation principles can be based on a winning strategy for companies. To be used in practice the Open Innovation paradigm must be supplemented by the relevant principles of the company's strategy. Strategy's level corresponds to the questions «How?» and «What?». It means that to use Open Innovation Principles in the company's strategy they must be accompanied by answers to relevant questions. (see Tab. 2).

The questions mentioned above have come under review in management and the answers to them have been received in relation to the traditional management. Open Innovation as a new business paradigm makes us find new answers to these questions. Henry Chesbrough proposed the basis for this search comparing open and closed innovation. Later this comparison



Table 2

Fundamental questions on Open Innovation

No.	Open Innovation Principles	Fundamental questions
1	If we create the most and the best ideas in the industry, we will win	How and where could we find the best ideas that will help us win?
2	External R&D can create significant value: internal R&D is needed to claim some portion of that value	What is internal R&D needed to claim the maximum of the value of external R&D?
3	We don't have to originate the research to profit from it	What should be done to originate research profitable for us?
4	Building a better business model is better than getting to the market first	What should we do to build the best business model?
5	If we make the best use of internal and external ideas, we will win	How could we combine internal and external ideas to get profit?
6	We should profit from others' use of our IP and we should buy others' IP whenever it advances our business model	How could we get others' IP and what should be done to get profit from our IP?

has become very popular and continues to be used in a number of papers to explain the essence of open innovation [7–11]. However, it often falls out of consideration the fundamental questions: What is the radical newness of the principles put forward by Henry Chesbrough?; Why was his work accepted by the scientific community and has gained an enormous popularity just in the early 21th century? Let us consider the impact of ICT on open innovation as just in the late 20th century and in the early part of the 20th century ICT phenomena began to have a substantial impact on different aspects of the business.

Problem analysis. To answer these questions Yury Nurulin analyzed global trends in the development of an external environment of an innovative business at the start, when, in fact, the concept of open innovation originated [12]. The following Great ICT Phenomena were selected. Let us study links between these phenomena and Open Innovation Fundamentals.

The phenomenon of personal computing means that thanks to the development of a microelectronics technology and personal computers, there is no an organizational barrier between a researcher and the instrument to solve scientific problems any more. In the scientific activities a researcher has got a direct access to the instrument (a computer) without mediators (computer operators, etc.). In business there is no need in performers (typists, draftsmen, clerks,

etc.), which are the mediators between the problem's formulation and its solution.

The phenomenon of open communication means that thanks to the development of information and communication technologies, organizational and financial barriers to exchange the information of any size and content disappear. This eliminates the necessity to exchange paper documents for their agreement, cancels any unnecessary business trips for holding meetings and guarantees the constant readiness of workers to share information materials, regardless of their geographical location. This phenomenon establishes the basis for an uninterrupted information exchange and also for business, especially for services in a mode of 365*24. It is known that an effective business is based on an effective communication and the key word «open» in the above-mentioned phenomenon reflects not only the communication level but also the business itself. To be used in practice this phenomena requires serious changes in business models, company's processes and staff mentality (business contacts should not be interrupted for lunch breaks, vacations, etc.).

The phenomenon of cooperative technologies consists of a computer supported cooperative work of the development team on a common project. It has become possible thanks to the development of concurrent engineering methods that provide a controlled access to different parts of the project for group members, the version management and the version of project

documentation and the implementation of the coordinated work in a sequential procedure. This phenomenon reflects the growing openness of the development process.

The mobile computing phenomenon is a phenomenon when in some cases thanks to micro- and nanotechnologies a direct link between a work place and the work content disappears. Mobile computing, at least, reduces the costs to maintain the business infrastructure by means of transferring some business processes from the company premises to private or public ones. The company can receive an additional effect of mobility due to the intensification of employees' labor and reducing time expenditures on commuting, business trips, going to banks, etc. However, the greatest effect on the development of mobility occurs when the number of information contacts of the staff increases, both within the organization and outside. Traditional vertically-oriented organizational structures of the enterprise create specific barriers preventing the employees from the open exchange of information, knowledge and ideas. It is quite a common situation if employees of neighboring departments of the same organization meet and discuss their team work not in the company office, but at conferences, third-party seminars, etc. As a result, companies suffer from the symptoms of group selfishness and informational isolation of their departments and other negative emotions for the lack of mobility. Thus this phenomenon has a significant impact on the work management and the company internal regulations, i. e. its business model (see OI Principle 4).

The phenomenon of distributed computing does not contradict but completes the phenomenon of personal computing and is inextricably linked with the phenomenon of distributed computing mentioned above. Thanks to the Internet personal computers could be connected in a complex that is focused on serious problem solving and it requires extensive computer resources. It shows that the medium is separated from a number of procedural knowledge that is expressed in information technologies of solving complex problem. To develop such procedural knowledge the technologies and software of distributed and high- performance computer systems are used.

In fact, the phenomenon of distributed computing reflects the cyclical nature of the society development. We could observe a return from personal to centralized computing at a totally new level, while the centralization is not determined at the physical level (a central computer located in a separate room and surrounded by the special infrastructure facilitates to prepare data for their use) but at the informational level (conditional, orientational and individual knowledge). Widely spread in recent years supercomputers and Cloud Technologies reflect this phenomenon and it requires our readiness to move our research task (i. e. our idea) outside. To originate necessary research we will use some outside equipment with an open access (see OI Principle 3). The openness provides additional effectiveness for users of this equipment if new business models could be implemented (see OI Principle 4).

The phenomenon of independence of the information from a medium appears when due to the Internet the users do not take interest in a physical medium of data and information they need. Saying that «the information is stored on the Internet,» we admit the fact that the information is separated from a medium. The user does not know and does not want to know which particular computer or memory element stores the information he needs. The main thing is to provide access to this information. A key factor in the competitiveness of the enterprise becomes not so much the possession of a powerful resource for the storage of the information as the possession of access to information on the Internet. To get the information about projects, resources, schedules, etc. we just need access to the Internet as a global storage of data and information. What is more important – we consider the Internet as global storage of *knowledge* or as an instrument for knowledge creation. The separation of the information from the physical media inevitably leads to weakening of links between the information and the subject. The numerous copyright infringement recorded on the Internet reflects this fact. Addressing these violations is evolving and will evolve. However, its effectiveness decreases while the transition from declarative to individual knowledge. Open Innovation paradigm reflects this process objectively. In fact, the strategy of intellectual



property (IP) *protection* within the framework of Open Innovation should be replaced by the strategy of IP *use*, replacing *restrictive and prohibitive* measures with organizational and economic measures to create *a balance of interests* for all subjects of innovation activities that corresponds to OI Principle 6.

In addition to the above we could mark **the phenomenon of social communication**, when social groups and nets have become a productive force. We could see a lot of examples when the opinion of social nets directly influences on art, politics and people behavior. Social groups are used in marketing (studying customer preferences), in research (searching for solutions to scientific tasks), in business (fund-raising and project execution), in innovation (searching for new ideas or solutions to business problems). This phenomenon is reflected in the group of methods combined by the term *crowdsourcing* which consists of words «crowd» and «sourcing». The idea of these methods is to appeal to a large group of people for services or information instead of formal requests by a company staff. The business-model of crowdsourcing is based on transferring some tasks to large groups of people both doers and suppliers (OI Principles 1, 2, 3, 4, 5).

Crowdsourcing is based on a well known statement that for all activities the most part of knowledge is outside of any organization specialized in this sphere. In contradiction to traditional methods, the number of participants in crowdsourcing is not limited by one focus-group. Using crowdsourcing a company could appeal to the majority of clients at the moment of problem solving without additional efforts and resources.

According to the use of results the following types of crowdsourcing are selected.

Business. There are a lot of examples when large and medium companies use crowdsourcing to solve designer's tasks, to search for innovation technologies, to create and support Internet platforms, to search for new product ideas and new commercial ideas for existing products and marketing and many other things.

Services. A vivid example is a freelance marketplace. The IT platforms that support this type of crowdsourcing provide the connection of project customers and potential doers – freelancers (see *ScriptLance* [<http://www.freelancer.com/>],

Elance [<https://www.elance.com/>], *Guru* [<http://www.guru.com/>] *Free-lance.ru* [<https://www.fl.ru/>] etc). Customers formulate the tasks and work conditions, select doers from freelancers offering their service. To do it customers have to open their tasks and ideas for everybody that means that Open Innovation principles are fundamental for this approach. Another example is tourism where croudoursing is becoming more and more popular.

Social sphere. As an example searching for missing people or providing the assistance to the victims of natural or man-made disasters could be mentioned.

Fund-raising. We could see a lot of examples of a collective cooperation where volunteers, ready financially to support projects or ideas initiated by other people or organizations, are involved. The project idea is published on social nets with all the necessary information (project mission, tasks, the required sum of money and time limits, etc). If the project gains the required sum of money, the customer withdraws it from the account, thanks the sponsors and implements the project. Fund-raising may be used for seriously ill people including children or the rehabilitation of housing in flood-affected areas.

State-political sphere. Croud sourcing is traditionally used to discuss different public initiatives such as the support of entrepreneurship, the development of national policy, etc. and is carried out in the mode of voting or collecting some specific views. Due to the rapid development of social networks in recent years, crowdsourcing is used by politicians not only to collect information about the public mood in the society, but also as an instrument for a direct influence on the society for political purposes.

According to the technologies of network actions the following types of crowdsourcing could be selected as follows:

Crowdvoting – voting for different variants of the proposed solutions without the choice explanation and proposals for other variants. It is mostly used in politics, art and marketing.

Crowdstorming – commenting ideas, idea generation and also their combination. It is extensively used in innovation business and science.

Crowdslapping – splashing of negative emotions towards a company or a certain person that caused these emotions. It is used for the pressure

on competitors and the expression of personal animosity in social networks.

Crowdproduction – the development of the product that is important for a social group or a network (a distributed selection of the information such as road traffic, etc; collecting knowledge, for instance, in Wikipedia, etc.; the development of program products, etc). To develop new products and services crowdproduction is based on Open Innovation principles even if this term is not pronounced (see, for example, IT platforms *InnoCentive* [<http://www.innocentive.com/>], *IdeaConnection* [<http://www.ideaconnection.com/>], *Innoget* [<http://www.innoget.com/>], *NineSigma* [<http://www.ninesigma.com/>]).

Summarizing the above, we can say that there are close links between the Open Innovation and ICT phenomena since just ICT provide a new level of openness in exchange of ideas, in tools for R&D and management and in business models. An additional argument that proves this conclusion could be found while comparing those times when mentioned phenomena appeared and became popular. Henry Chesbrough published the study «Open Innovation: The New Imperative for Creating and Profiting from Technology» in 2003 and we could see a rapid growth of Internet users and the development of new ICT products and instruments at the same time.

The above mentioned ICT phenomena created a new type of physical space for business that got the name coworking [13]. The openness

in coworking is presented at the level of working space and to get profit from it the owners of coworking should follow OI principles in their business models and processes. At first the focus group of coworking were freelancers specialized in programming, but at the moment coworking have become serious competitors for traditional incubators and other forms of the innovation infrastructure aimed to emerging business in general. It means that ICT spread their direct influence on programming and other business areas [14].

Conclusion. The study has demonstrated interconnected links between 3 subjects:

- ICT as a technological base for modern business;
- Open Innovation as a paradigm to create effective business models for a science-intensive business;
- and coworking as a type of infrastructure for emerging business.

In the current business environment these links will developed and could be the subject for our further studies. One of the first researches in this area was done within the framework of the project SE631 «Open Innovation Services for Emerging Business – OpenINNO». It was implemented in 2012–2014 within the program of «South-East Finland – Russia European Neighbourhood and Partnership Instrument ENPI». The results of the project are available on the project website [15].

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