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## INNOVATIONS' MANAGEMENT IN THE ICT SECTOR ENTERPRISES

**Abstract.** Generating and implementing of product's, process, organizational and marketing innovations is a part of essential process in a modern, developing organizations. Innovations' management in enterprises depends on organizing organization's proper functional conditions, regardless of its internal and external environmental altering conditions. In this paper the main trends of innovations' management on the basis of chosen examples from the ICT sector enterprises were presented. The case study presented innovative and dynamically developing organizations. Selected companies are characterized by a different approach to innovation management.

**Keywords:** innovations, innovation management, ICT

## ZARZĄDZANIE INNOWACJAMI W PRZEDSIĘBIORSTWACH Z SEKTORA ICT

**Streszczenie.** Kreowanie i wdrażanie innowacji produktowych, procesowych, organizacyjnych oraz marketingowych należy do kluczowych procesów we współczesnych, rozwijających się organizacjach. Zarządzanie innowacjami w przedsiębiorstwie polega na takim organizowaniu warunków funkcjonowania organizacji, w którym z powodzeniem są wdrażane innowacje pomimo zmienności jego otoczenia wewnętrznego i zewnętrznego. W artykule przedstawiono główne

trendy w zarządzaniu innowacjami na przykładzie wybranych przedsiębiorstw z sektora ICT. Do analizy wybrano innowacyjne i dynamicznie rozwijające się organizacje, które charakteryzują się różnym podejściem do zarządzania innowacjami, pomimo ich działalności w jednej branży.

**Słowa kluczowe:** innowacje, zarządzanie innowacjami, ICT

## 1. Introduction

Nowadays, organization's innovation is one of the main factors, shaping enterprises' competitiveness. Innovative processes and likewise their management can held on in different time and in many ways, depending on the branch, in which organization operates.

Presently it is hard to talk about tested, universal way of innovations' generating, implementing and management, in each enterprise. According to each organization specific characters (directly connected with enterprise's internal determinants such as size, localization, branch's specificity as well as economical and human abilities) and on the other hand external determinants related to environmental changes, it is worthy to take up a challenge of new, universal model of innovative organization activity creation, which would also include crucial influence of mentioned factors on the achievement of innovative solutions in the enterprise<sup>1</sup>.

Problematic aspects of innovative determinants have appeared in the literature recently. According to Oslo methodology enterprise's innovative determinants cover four widely understood determinants areas or categories i.e.<sup>2</sup>:

- general determinants such as institutions and general conditions which determine range and possibilities of innovations implementing,
- scientific-engineering base, encompasses scientific-technical institutions which support enterprise's innovative character by providing technical education and technical knowledge,
- technology transfer factors, such as human, social and cultural factors, which influence on the information transmission and learning processes in the organization,
- organization's internal innovation determinants so-called "innovative dynamo", which encompasses dynamic factors affecting organization or its direct surrounding and also having a direct impact on the level of innovation.

Innovative determinants in the enterprise are also shaped by other external factors such as<sup>3</sup>:

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<sup>1</sup> Motyka S.: Model kreowania systemu innowacji w przedsiębiorstwie. [w:] Knosala R. (red.): Innowacje w zarządzaniu i inżynierii produkcji pod redakcją R. Knosali. Oficyna Wydawnicza Polskiego Towarzystwa Zarządzania Produkcją, Opole 2014, s. 153-164.

<sup>2</sup> Podręcznik Oslo: Zasady gromadzenia i interpretacji danych dotyczących innowacji, 2008.

<sup>3</sup> Tidd J., Bessant J.: Zarządzanie innowacjami. Integracja zmian technologicznych, rynkowych i organizacyjnych. Oficyna Wolters Kluwer, Warszawa 2011.

- acceleration in the range of products based on knowledge development and manufacturing,
- globalization of products' based on knowledge distribution
- markets' division,
- markets' visualization,
- new users growth,
- technological and social infrastructure development.

## 2. Innovation management in an enterprise

Innovations in an enterprise are concerned to new, multi-faceted and multi-dimensional processes, related with all the aspects of enterprise's functionality. Oslo methodology<sup>4</sup> is one of the existing definitions and typology of innovations, widely cited and used in the subject's literature as well in research concerning innovations. According to brand new Oslo Manual, innovative activity is defined as a series of scientific (research character), technical, organizational, financial and commercial activities, which the main aim is to work out and introduce new or improved products and processes, organizational and marketing changes, taking into consideration that this changes should be new at least from the perspective of enterprise which introduces them<sup>5</sup>.

Manual distinguishes four types of innovations<sup>6</sup>:

- product innovations – product or service introducing, which are new or significantly modified in the aspect of features or usability; significant improvements in the aspect of technical, componential and material specifications, built-in software, easily operation or other functional features, can be classified here;
- process innovations – implementing of a new or significant improved production or delivering method; significant changes in the technology, machines or software area can be classifies to this category;
- organizational innovation – new organizing method implementation in the area of enterprise's approved functional principles of workstation or with environment relations;
- marketing innovations – new marketing method's implementation, which is connected with significant changes of product's project/construction or in packaging, distribution, promotion or prices policy.

Innovation management is defined in many ways in the source literature. Innovation management encompasses: proper style of innovative activity's leading, leading based on

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<sup>4</sup> Podręcznik Oslo: Zasady gromadzenia i interpretacji danych dotyczących innowacji, 2008.

<sup>5</sup> Ibidem.

<sup>6</sup> Ibidem.

team cooperation and workers' cooperation during decision process, management decentralization, high tendency to undertaken risk, concentration on future enterprise's activity, strong orientation to customers' needs, cooperation of research-and-development sector with other functional enterprise's compartment<sup>7</sup>.

Innovation management is an institutionalized mechanism of new ideas and solutions creating, developing and promoting, which ensures constant pro-innovative actions to the enterprise. It enables quick and elastic reacting on the signals coming out from the market, and as a result constituted strategy realization<sup>8</sup>.

Innovation management is a crucial process in the enterprise. It is based upon efficient information and knowledge management, human resources, risk management, project management. All this is done to create new products, new structures and processes, which are decisive factors of enterprise's survival and development on the market. Innovation management causes managers' entrepreneurial behaviors, subordinated to market reactions: innovations' effective creation, realization and implementation, which guarantees the enterprise's success on the market<sup>9</sup>. Innovation management is also a designing and supporting of complicated, predictable mechanism. It is based on creating such organization's functional conditions, which will be able to enhance the chance for efficient problems' solving, which appears in unsure environment<sup>10</sup>. On the one hand mentioned definitions shows the process in the action or attribution way. Penc underlines the problem of features and an aim of innovation management. Baruk undertakes the topic of innovations' management indicators and particular role of workers and customers' orientated strategy.

Innovation process management consists of the following stages<sup>11</sup>:

- search – searching in the internal and external organization's environment in order to find signals of possible new innovations appearance e.g. social changes, scientific discovers, law changes
- selecting – undertaken decisions connected with the way of enterprises' reaction
- implement – innovation idea transformation into product, service, process, and then implementation to the internal and/or external market. "Implement" stage needs taking into consideration following aspects:
  - gaining necessary resources, e.g. finances, knowledge
  - project management innovation,
  - implementing innovations to the market,

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<sup>7</sup> Baruk J.: Zarządzanie działalnością innowacyjną,[w:] Brzeziński M. (red.): Zarządzanie innowacjami technicznymi i organizacyjnymi, Difin, Warszawa 2001.

<sup>8</sup> Penc J.: Strategiczny system zarządzania. Placet, Warszawa 2001.

<sup>9</sup> Bojewska B.: Zarządzanie innowacjami jako źródło przedsiębiorczości małych i średnich przedsiębiorstw w Polsce. Szkoła Główna Handlowa w Warszawie, Warszawa 2009.

<sup>10</sup> Tidd J., Bessant J.: Zarządzanie innowacjami. Integracja zmian technologicznych, rynkowych i organizacyjnych. Oficyna Wolters Kluwer, Warszawa 2011.

<sup>11</sup> Ibidem.

- further innovation development,
- capture – undertaken operations in order to achieve profits from made investments.

For efficient and effective innovation management process in the organization proper staff managers' abilities are needed and also the rest of participating workers. Innovation processes should be ready to make use of implementation experiences, unsure acceptance and openness to taking risk.

Among innovation management principles following can be pointed<sup>12</sup>:

- customers' and other stakeholders' needs identification,
- product development and technology portfolio strategic planning,
- organizing of proper infrastructure supporting innovativeness,
- maximize of innovational abilities and resources possible to use,
- group work organizing, leaders' and techniques preparation,
- intellectual capital creating,
- creativity and entrepreneurship shaping,
- development of external hubs associations.

Corporation's innovation is a resultant of many complex factors, which make range and course conditional upon innovative activities. Changes introducing and also proceeding with innovative activities in modern enterprise needs maintaining of a new combination of resources, processes, abilities, and knowledge. Due to this fact it is significant important to point the crucial role of all the instruments supporting organizations<sup>13</sup>.

Both in source literature and in economy practice different approaches to innovation enterprise identification and characterization are presented. Existing conceptions, nowadays consider sixth generation of enterprises (beginning of XXI<sup>th</sup> century)<sup>14</sup>, which treats knowledge, human capital and enterprise's learning, as a main factors of innovative organization development. Creating conditions favorable for innovative activity includes five dimensions: strategy, systems, skills, staff, styles (Fig. 1):

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<sup>12</sup> Łunarski J.: Zarządzanie innowacjami - system zarządzania innowacjami. Oficyna Wydawnicza Politechniki Rzeszowskiej, Rzeszów, 2007.

<sup>13</sup> Motyka S.: Model kreowania systemu innowacji w przedsiębiorstwie. [w:] Knosala R. (red.): Innowacje w zarządzaniu i inżynierii produkcji pod redakcją R. Knosali. Oficyna Wydawnicza Polskiego Towarzystwa Zarządzania Produkcją, Opole 2014, s. 153-164.

<sup>14</sup> Brem A.: The Boundaries of Innovation and Entrepreneurship. Conceptual Background and Essays on Selected Theoretical and Empirical Aspects. Gabler Edition Wissenschaft, Universität Erlangen – Nürnberg, 2007.

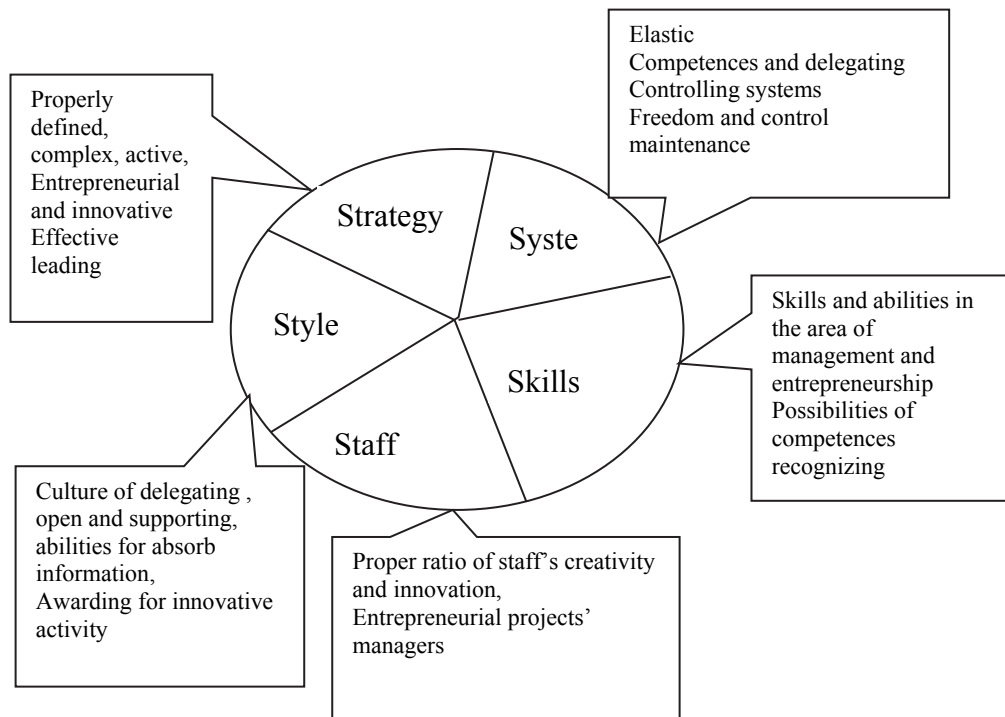


Fig. 1. Five innovation dimensions

Source: Brem A.: *The Boundaries of Innovation and Entrepreneurship. Conceptual Background and Essays on Selected Theoretical and Empirical Aspects.* Gabler Edition Wissenschaft, Universitat Erlangen – Nurnberg, 2007.

In modern self-learning models a crucial role plays simultaneous effect of all the innovation aspects. Innovation effects depend on the relations character and dimensional innovations specificity, which influence on the enterprise functionality.

### 3. Innovations' management in the ICT sector enterprises

In 1998 Information Society Indicator Working Group, constituted by OECD, defined information and communication technology sector. It was constituted that to the ICT sector are qualified enterprises, which main range of functionality is goods and services production, which enables electronical registration, processing, transmission, reproduction and information exposition<sup>15</sup>. In the information and communication technology sector, following enterprises can be pointed:

- producing telecommunication and IT devices
- producing software,

<sup>15</sup> GUS. Społeczeństwo informacyjne w Polsce – wyniki badań statystycznych z lat 2004-2006, Warszawa 2008.

- telecommunication services indicating, Internet accessing, services in the field of image transmission by cable network and satellite platforms.

Because of the innovation searching methods it is possible to point three basic kinds of enterprises (technological trajectories) <sup>16</sup>:

- enterprises based on the conducting research and development – the main aim of innovation strategy is brand new scientific achievement monitoring, own research and development conducting and products' development on the basis of effects, in this category electronic and computer devices manufacturers are dominant,
- enterprises based on cooperation with customer's – market researches and close cooperation with clients are the basis for technological development, the main aim of innovation strategy is answering to the clients' needs, gaining information from the advanced users and also new technologies adopting to the receivers' needs, in this category computer devices manufacturers are dominant,
- enterprises based on information processing - the main aim of innovation strategy in this organizations is information processing systems development and connected with it services development, telecommunication is dominant here, as well the provision of services connected with Internet availability and paid television.

In recent years, the subject of innovation management in organizations has been quite often taken by the literature<sup>17,18,19,20</sup>. The subject of innovation management in the ICT sector enterprises has been taken by the literature<sup>21,22,23,24</sup>.

An approach to the innovation management process in the information and communication technology sector on the example of chosen companies is described below.

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<sup>16</sup> Tidd J., Bessant J.: Zarządzanie innowacjami. Integracja zmian technologicznych, rynkowych i organizacyjnych. Oficyna Wolters Kluwer, Warszawa 2011.

<sup>17</sup> Kotler P., Trias de Bes F.: Innowacyjność przepis na sukces. Model "od A do F". Dom Wydawniczy Rebis, Poznań, 2013.

<sup>18</sup> Tidd J., Bessant J.: Zarządzanie innowacjami. Integracja zmian technologicznych, rynkowych i organizacyjnych. Oficyna Wolters Kluwer, Warszawa 2011.

<sup>19</sup> Szatkowski K.: Zarządzanie innowacjami i transferem technologii. PWN, Warszawa 2016.

<sup>20</sup> Żuber R. (red.): Zarządzanie innowacjami w przedsiębiorstwie. Wybrane aspekty. Difin, Warszawa 2016.

<sup>21</sup> Żebrowski M., Waćkowski K.: Strategiczne zarządzanie innowacjami. Strategie małych i średnich przedsiębiorstw IT. Difin, Warszawa 2011

<sup>22</sup> Vaccaro I.G., Jansen J.J.P., Van Den Bosch F.A.J., Volberda H.W.: Management Innovation and Leadership: The Moderating Role of Organizational Size. Journal Of Management Studies Vol. 49 Issue: 1 Pages: 28-51, JAN 2012.

<sup>23</sup> Miklošik A.: Effects of knowledge management implementation in the ict sector. European Journal of Science and Theology, October 2014, , Vol. 10 , Suppl. 1 , 121-129.

<sup>24</sup> Motyka S., Słonec J., Kaczorowska A., Łaciak E.: Supporting the climate of innovation in the SME sector-an application for SMEs. II International Conference of Computational Methods in Engineering Science (CMES'17), vol.15, 2017, 10.1051/itmconf/20171504011.

### 3.1. Cisco

Cisco is the worldwide leader in a field of grid technology dedicated to the Internet operations. The enterprise was established in 1984 by a group of IT specialists from the Stanford University. From the very beginning this engineers were the leaders in the area of grid technology based on IP protocol. Recently company employs over 72 thousands workers in 85 countries. The innovative tradition is being continued by generating best products and solutions in this branch of IT industry, in the field of routers, switches, safety, wireless technology, video, cooperation systems, data processing systems, visualization and cloud processing. The company each year gives over 6\$ billion for research and development, which causes not only new products generated by over 20,000 employed engineers but also enables new technologies development<sup>25</sup>.

Innovations are the significant factors of Cisco's productivity increase. New solutions creating is made use of company's own potential and other companies' acquisitions. Most of the products are created in the enterprise, because on having well qualifies specialists over the world.

In the company the Services Innovation Excellence Center (SIEC) was developed for innovations creating and innovational potential increase. According to mentioned system it is possible to point following enterprise's initiatives<sup>26</sup>:

- Innovations' Day – informal 4 hour long meeting, including short workshop connected with innovations, gratifying innovators and new ideas sessions, which enables sharing ideas with co-workers,
- afternoon meeting "Innovation Teatime" taking place in the special area called "Innovation Cube" in Brussel, Cracow and Sydney,
- Eureka Innovation Teams working in Singapore, South Korea, Australia and India.

Designed and developed by Services Innovation Excellence Center (SIEC) innovation abilities building strategy consists of following vectors<sup>27</sup>. Abilities' improvement, innovation boosting, future image building and dialog with customers.

Vector 1: Abilities' development.

Services Innovation Excellence Center (SIEC) guaranties an access to the tools and resources, stimulates awareness and workers' engagement, develops talents and improves striving for excellence. Workers have constant access to the Innovation Academy, which encompasses: e-learning materials, workshops for virtual teams and workshops dedicated specially for leaders. Training courses are conducted by internal and external experts.

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<sup>25</sup> [www.cisco.com](http://www.cisco.com)

<sup>26</sup> Cisco systems annual report. Cisco Systems. San Jose, CA, 2013.

<sup>27</sup> Ibidem.



Innovation Rotation program is another action which should result in abilities' development. It is advanced approach to talents' management. In this program participant during 6 months pretends a project manager and works on an innovation process acceleration in the field of his specialization. Depending on participant's own worked out solutions he is allowed to recruit creative persons, evaluate ideas by feedback, embed his ideas and take part in an innovation sessions with other teams' participants. Program is supported by training courses, coaching, mentoring and management staff, available for participants.

Vector 2: Innovation's boosting.

There is an efficient communication system in Cisco supported by newsletters sending and two events: Innovation Summit and Innovation Leadership Forum. Innovation Summit is a huge event in which many innovators, company's innovation followers and other specialists take part in.

Innovation Leadership Forum on the beginning was dedicated to head masters and management staff. Recently over 1000 staff take part in it. In every six weeks an internal or external innovation expert presents participants ideas and case studies. That are virtual WebEx meetings, after which there is time for discussion and questions. Cisco is working on an internal social service, where participants will be able to discuss presented ideas during webinars. Innovation Catalyst is an award dedicated to significantly engaged innovators.

Vector 3: Future's image creating.

This vector is being developed by constant staff's access to the SmartZone platform, dedicated to individuals and teams, who are able to present their ideas to over 5000 registered employees. There is also organized Launchpad competition, which is similar to TV program "Dragons' Den".

Vector 4: Dialog with customers.

From the very beginning Cisco was open to customers' needs and appreciated this source of innovations. Thanks to customers and for customers Cisco still develops it's processes to comply with the growing up market requirements.

Cisco has a very well-thought innovation management strategy, which is constantly supported by organizational and marketing innovations. Employees and customers are very important subjects in the innovation management process.

### **3.2. Comarch**

Comarch is an integrator and IT solutions producer. Since 1993 company helps clients to become more profitable, to gain profits from modern products and solutions, by the use of widen tools spectrum, complimented by best quality services. Comarch got an experience in

the main branches (such as telecommunication, financial, banking business, trade and services, IT infrastructure, public administration, industry, medical services, in the sector of micro and median enterprises), due to projects which were realized for biggest polish and international brands. In a very beginning Comarch worked our enterprise's technological reputation, which manufacture products and sell them with success in the national and international market. That is why still the main Comarch's strategic aim is new, competitive products development, which enables further company's development and improving its worth. Maintaining the sales dynamics requires financial outlay for products development and proper promotion, marketing actions. It concerns to modify existing products and technologies and also new products' designing. Comarch's politics establishes conducting research-and-development tasks connected with new products' implementation and products' standardizing from the very beginning of their preparation for customer. Due to that fact, even if product was prepared for particular customer, the part of or even whole software/code can be used for standard product preparation. In the result all the particular contracts are characterized by higher profitability and the customers' base is being broaden. In 2015 financial outlays for research-and-development tasks amounted 138,2 million zloty, and thereby reached over 12% of income from the Group selling. Comarch intended for that own wherewithal and also gained European funds<sup>28,29</sup>.

Comarch Innovation Centre observes new trends appearing in the IT market, at the same time developing authorial Comarch software. Nowadays there is observed the increase of applications and touch controlled devices. Touch screens have a significant influence on the transactions' duration, reducing it for over 50%, with the 100% of sent information correctness kept. Researchers show that client who uses such solutions has better feeling of his influence to the decisions which he is making. Comarch Innovation Centre uses the touch screens, which are being operated by users with natural guests, similar to that which people use to operate with daily used devices. Reactions are usually the same: rapture, surprise and willingness to try deal with the application. Innovation solutions application with the modern software is the key to the success.

Comarch Multitouch Solutions is an IT solutions package, arisen on the basis of best international business practices. The main advantage on touch reacting devices is guarantee of having fun during usage and at the same time exploitation of its proper functionality. Comarch Multitouch Solutions is a linkage of future world with business in the way which was expected for many years<sup>30</sup>.

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<sup>28</sup> [www.comarch.pl](http://www.comarch.pl)

<sup>29</sup> Comarch, Raport roczny, 2015.

<sup>30</sup> Skrzypek B.: Biznes wsparty przez innowacje. *Nowoczesne Zarządzanie* nr 2/2011, s. 24-28.

Comarch bases its innovation upon the<sup>31</sup>:

- innovations' creating (cutting-edge actions) – in this situation Comarch provides ready tools which builds companies' comparative advantages – customers,
- innovations' adaptation – (duplication, adaptation and adjusting actions),
- in this situation Comarch supports companies and helps them during innovations' implementation process by training courses.

The Comarch's cooperation with client philosophy is based upon his participation in the process of offered services constant creating and developing. Comarch implements projects within the timetabled budget and schedule. Comarch understands customers' business and technological needs, and solutions are created together with clients. Company ensures quick implementation and easier integration, which causes decrease of the potential project's risk level. The solutions easy to configure, which will be developed with the clients' development are being created. Products with the best quality to price ratio are offered. It indicates services to variety of business models, from traditional and wireless to virtual operators. It is also specialized in enterprise's ERP management systems, IT safety, CRM systems and sales support, electronic communication and business intelligence. It offers IT outsourcing services and consulting<sup>32</sup>.

### 3.3. Techland

Techland is the polish enterprise specialized in computer games' production, issuing and distribution. Company's offices can be found in Wroclaw, Warsaw, Ostrow Wielkopolski and Vancouver. Since its establishing in 1991 it has been consequently building and improving its market position, in order to enter international markets in 2000. At a very beginning company was distributing software only in Poland. Later, in the end of 90-ties, own production of software and video games was started. Nowadays, it creates large budgetary productions dedicated to all main amusement platforms - PC, Xbox 360, Xbox One, PlayStation 3 and PlayStation 4. The main technology being used for this is authorial engine (now version 6), which is a comprehensive development tool, being expand steadily for over 10 years. By using own engine company created and issued over 20 games, including very popular Dead Island, Call of Juarez, Dying Light and Dying Light: The Following. There are also created mobile games dedicated to iOS and Android systems<sup>33</sup>.

In the Techland's approach to innovations very important are: strong emphasis on creative staff gaining and activeness in founds for conducted research-and-development activities acquiring. The company employs over 260 ambitious and creative people, who are the specialists of variety disciplines, and also young people on the beginning of their professional

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<sup>31</sup> Ibidem.

<sup>32</sup> Comarch, Raport roczny, 2015.

<sup>33</sup> [www.techland.pl](http://www.techland.pl)

career path. For this team video games' creating is not only a work, but a hobby and life's passion too. By undertaking challenging projects and constant new things learning, are trying to achieve mastery in this what they are doing. Since years company improves itself in providing the highest electronic amusement.

Company underlines, that one of its advantage is working environment, which is created by<sup>34</sup>:

- talented people,
- innovation, brave IT projects,
- professionalism,
- friendly working atmosphere,
- availability of brand new technologies,
- enterprise's library and games rental office,
- knowledge and experience sharing.

From couple of years company successfully acquires funds in the European programs, such as: Innovative Economy and now Smart Growth. There are two projects which are currently realized by Techland: „Conducting studies on the development of innovative solutions and tools for the creation of high-tech computer games AAA” and „Conducting research on Virtual Reality Technology to increase the sense of presence of the recipient in the photorealistic virtual world in next-generation computer games”.

## 4. Conclusions

The process of innovation management in presented enterprises is based upon the human capital, realization and active research-and-development activities supporting. Emphasis on acquiring financial wherewithal from European Union funds can be observed especially in Comarch and Techland. Strategy realized by Cisco is based upon the six<sup>th</sup> generation innovative enterprise model, which can be successfully applied by enterprises from information and communication technology sector.

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