Celina M. Olszak, Jerzy Kisielnicki

Agile approach in project development

Recently, creativity and innovation are considered one of the most important factors that decide on the position of an organization at the market. According to the ranking of the Global Innovation Index the innovation level of Polish economy falls not satisfactory. Poland was located at the 49 place among 142 ranked countries (in 2012 at the 44 position). Similarly, the Global Competitiveness Report states that Poland was ranked at 42 place among 148 countries in 2013-2014 [Schwab, 2013].

Seeking an answer how to improve creativity and innovation in Polish organizations, we claim that R&D projects may be a stimulator of economic development [Maylor, 2003, Jincao, Kleiner, 2005, Park, Kim, 2005, Kisielnicki, 2014]. Particularly, IT projects are a chance for many organizations to reach a higher level of creativity and innovation. On the other hand, it is reported that implementation of many IT-projects fails. It fails due to the technology, organizational, cultural and infrastructure issues. Not appropriate methods and tools are used in design and management of such projects.

The main purpose of this paper is to provide a theoretically and empirically grounded discussion on using of agile approach in organizational creativity support design. Agile approach enables us to better understand a dynamic nature of organizational creativity and its computer support. The idea of this study is an attempt to answer the following questions: (1) what is the issue of organizational creativity support and agile approach, (2) how to use agile approach to develop an organizational creativity support. Search for answers to these questions is mainly conducted on the theoretical, methodological as well as the empirical foundation. At the start, a critical review of the relevant literature was conducted to identify the issue of organizational creativity and its computer support. Then, the theory of agility approach in project management was explored. Finally, lessons learned from organizational creativity support development were presented.

Organizational creativity support

Although the term *creativity* is rooted in psychology, it is used in different organizational contexts – in the context of business strategy, business processes, strategic management, competitive advantage, organizational development, leadership and innovation. According to many scholars [Klijn, Tomic, 2010, Zhou, Ren, 2014] *organizational creativity* means the capability to generate new and useful ideas that concern products, services, processes, managerial practices as well as competitive strategies. R.W. Woodman [1993] defines organizational creativity

as the creation of a valuable, useful new product, service, idea, procedure or process by individuals working together in a complex social system. New ideas must constitute an appropriate response to fill a gap in production, marketing or the administrative processes of the organization [Parjanen, 2012]. Therefore, creativity could be seen as an important organizational capability [Amabile, 1998], a possible source of organizational effectiveness and a source of competitive advantage. It is a collaborative psychological process that takes place in an organization and is affected by contextual and organizational factors [Blomberg, 2014]. According to A. Brennan and L. Dooley [2005] creativity within an organizational context can be regarded as the sum of following functions: the creative person, creative task, and the organizational context (culture). M. Stundgren and A. Styhre [2007] note that organizational creativity is something more than a collection of creative individuals. Thus, the mere presence of creative individuals in an organization does not guarantee organizational creativity, since it is the result of the whole spectrum of organizational factors.

The issue of IT-based organizational creativity support has not been widely investigated and discussed in literature. In recent years, some research studies have been conducted that concern computer supported creative problem solving. However, they are fragmentary, scattered and do not refer to the essence of organizational creativity. There is a lack of recommendations what approaches and methods should be used to develop organizational creativity support system (OCSS).

According to N. Davies *et al*. [2013] creativity support systems (CSS) refer to fuzzily defined domains, having unknown requirements, with fuzzily defined measures of success, and are intended to support not precisely defined users, or their users behave in an unconventional way. B. Schneiderman [2007] states that technologies that *enable people to be more creative more often* are referred to as creativity support systems. Technically, the term CSS concerns a class of information systems encompassing diverse types of IS that share the enhancement of creativity. CSS may be used to: (1) enhance a user's ability to perform creative tasks (the ability that the user possesses already), (2) support users in domain knowledge acquisition, in order to free up their creativity, (3) give users new experiences concerning creative tasks, thus giving them new task-solving capabilities. B. Indurkhya [2013] claims that CSS stimulate users' imagination, the creation of new ideas, and model creative processes. T. Lubart [2005] highlights the importance of "what-if" analyses, data and processes visualization, creative process' effects dissemination, visualization of ideas, human-computer dialogue in the problem solving process. S. Greene [2002] states that organizational creativity support software should be able to: explore problem domain, teach and discover new problems, support collaboration, visualize domain interdependences as well as to simplify storing, classifying and mining of notions. F. Ulrich and S. Mengiste [2014] highlight the importance of advanced human-computer interaction, business plan support, and storing of users' preferences.

We consider that a new look at the issue of organizational creativity opens within the Resource-Based View (RBV). It gives the foundation for a sustainable and comprehensive development of organizational creativity support and a sound basis for stating what resources and capabilities should be followed in IT-based organizational creativity support. Therefore, we interpret organizational creativity support as a system that enables an organization to acquire, collect, and analyze different information resources as well as to discover new knowledge in order to create

new ideas that concern, for example, new products, services, managerial practices, and competitive strategies.

OCSS opens a new emerging group of creativity support. In contrast to previous systems (individuals and group creativity support), OCSS is dedicated to the whole organization and its environment. The purpose of OCSS is to increase competitive advantage and an organization's performance by offering rapid access to different, heterogenoius, disspersed information resources, their analysis, knowledge discovery, its visualization, and suggesting some opinions that may be the foundation for the creation of new and useful ideas.

Agility in IT project development

It is noted that during the last century R&D management as an innovation stimulator has passed the evolution of 5 generations, characterized by simultaneous progress of handling R&D activities [Jincao, Kleiner, 2005, Park, Kim, 2005]. The complex attitude to the effective management of R&D according to a wide variety of management targets turns the R&D management process into multidimensional tasks. B. Miskulskiene [2014] highlights that every new generation adds an extra managerial task to the list of manager duties. The first generation of R&D management was expressed by corporate lab creation. The second generation emerged when R&D was incorporated into the entire business system. The third generation is represented by R&D project management and portfolio management. The fourth generation put suppliers and customers on the R&D management scene, while the next generation consists of a network of innovation actors and stakeholders.

An issue of R&D is strongly associated with a term of project. According to the Project Management Institute [2013] a project it is *a unique set of co-ordinated activities, with definite starting and finishing points, undertaken by an individual or organization to meet specific objectives within defined schedule, cost and performance parameters*. According to J. Kisielnicki [2014] R&D project is a system of various activities characterized by the following triad: project scope, deadlines (time), and resources (human, capital, material, technological, information needed for the project). It is highlighted that R&D projects are characterized by complexity, high uncertainty and high risk [Trocki, 2012, Maylor, 2003].

Last years, IT projects have become an important group among R&D projects. They have certain characteristics that make them different from other projects and increase the level of their failure [Flasiński, 2008]. According to K. Peffers, C.E. Gengler and T. Tuunanen [2003] such characteristics refer to : (1) abstract constraints which generate unrealistic expectations and overambitious projects; (2) difficulty of visualization which has been attributed to senior management asking for over-ambitious or impossible functions, the IT project representation is not understandable for all stakeholders and the late detection of problems; (3) excessive perception of flexibility which contributes to time and budget overrun and frequent requests of changes by the users; (4) hidden complexity which involves difficulties to be estimated at the project's outset and interface with the reliability and efficiency of the system; (5) uncertainty which causes difficulty in specifying requirements and problems in implementation of the specified system; (6) the tendency to software failure which is due to assumptions that are not thought of during the development process and the difficulty of anticipating the effects of small changes in software; (7) the goal to change existing business processes which requires IT practitioners' understanding of the business and process concerned in

the IT system and good process to automate and make them quicker.

K. Cormican and D. O'Sullivan [2004] claim that the practical management of IT projects finds significant difficulties as follows: (a) IT projects are often poorly defined, (b) codes of practices are frequently ignored and in some cases not many lessons are learned from past experience, (c) IT projects contain a greater degree of novelty than other engineering projects, (d) IT projects related to product innovation development are extremely complex, risky and expensive.

The analysis of the literature allows to state that different approaches may be used in project management and design. The most well known include [Wysocki, McGary 2005]:

- Traditional Project Management (TPM), a project is carried out according to a specific plan,
- Adaptive Project Framework (APF), a realization of a project is preceded by an analysis and definition of the structures,
- Extreme Project Management (XPM), called project management in extreme conditions; the project is based on the principles of rapid response to the changes and concerns the complex situations.

The practice shows that different criteria may be used to distinguish projects. They include:

The degree of detail:

- general projects including only such aspects of projects that are common to a wide group of projects. Their biggest advantage is the versatility, because they refer to the topics that are relevant for most projects;
- specialist projects – they concern the specialized topics i.g., technical aspects and different advanced technologies. The disadvantage of this group of projects is fact that they refer to a small group of potential customers, but they offer a very detailed study of specific topics;
- hybrid – usually arise from the above groups of the projects.

Focused on the management elements, especially on:

- soft elements – skills of persons involved in the project (staff, managers, clients), management styles of the persons responsible for the project, as well as, organization's culture and ethics,
- hard elements – strategies, formal methods, structures, formal presentation of data models, information systems or formal procedures.

Philosophy and design processes:

- cascade model (waterfall),
- spiral model – a prototype (prototyping), iterative and incremental development,
- evolutionary model.

During the last decades, a realization of most of IT projects was based on classical software development paradigm [Palmer, Felsing, 2002]. The traditional way to develop software methodologies follows the generic engineering paradigm of requirement, design, build and maintain. These methodologies are called waterfall-based. They are also known by many others names like plan-driven [Boehm, Turner, 2004], documentation driven, heavyweight methodologies and big design upfront.

Last generation of IT project development has evolved into agile and rapid ways of obtained results. The agile methodologies claim to insure that the final product is developed with a high probability of success, even in a constantly changing environment. A concept of agility is central to both the domain of strategic management theory where it is a major pillar in

the so called dynamic approach (DCA) and to systems engineering [Zimmer, Baars, Kemper, 2012, Cohn, 2005]. The DCA is a variant of the resource-based view that focuses on the internal resources and capabilities of a firm in order to explain differences in performance. While the classical RBV discusses properties of resources that lead to a long-term competitive advantage, the DCA concentrates on the ability to integrate, build, reconfigurate a given resource base of a firm [Teece, Pisano, Shuen, 1997]. It is argued that these capabilities are of central importance in the nowadays common turbulent business environment [Olszak, 2014]. In this context, an agility becomes very relevant. While the definitions for agility vary, their commonality is that they all stress the ability to quickly respond to unforeseen changes. Agility is the ability to sense and response to business prospects in order to stay inventive and aggressive in an unstable and rapidly shifting business environment [Highsmith, 2000]. An agile approach to development is a about agility of the development process, development teams and their environment [Boehm, Turner, 2004]. This approach incorporates shared ideals of various stakeholders and a philosophy of regular providing the customers with product features in short time-frames.

In the context of systems engineering agility means an interactive and incremental (evolutionary) approach to software development which is performed in a highly collaborative manner by self-organizing teams within an effective governance framework with just enough ceremony that produces high quality solutions in a cost effective and timely man-

Table 1 **Differences between traditional and agile approach in project development**

Issues	**Traditional approach**	**Agile approach**
Development life cycle	linear, life-cycle model (waterfall, spiral etc.)	iterative, the evolutionary-delivery model
Style of development	anticipatory	adaptive
Requirements	knowable early, largely stable, clearly defined and documented	emergent, rapid change, unknown, discovered during the project
Architecture	heavyweight architecture for current and future requirements	YAGNI precept (you aren't going to need it)
Management	process-centric, command and control	people-centric, leadership and collaboration
Documentation	heavy/detailed, explicit knowledge	light (replaced by face to face communication), tacit knowledge
Goal	predictability and optimization	exploration or adaption
Change	tend to be change averse	embrace change
Team members	distributed teams of specialists, plan-oriented, adequate skills access to external knowledge	agile, knowledgeable, collocated and collaborative, co-location of generalist senior technical staff
Team organizations	pre-structured teams	self-organizing teams
Client involvement	low involvement	client onsite and considered as a team member, active/proactive
Organization culture	command and control culture	leadership and collaboration, culture
Software development process	universal approach and solution to provide predictability and high assurance	flexible approach adopted with collective understanding of contextual needs to provide faster development
Measure of success	conformance to plan	business value delivered

Source: elaborated on Moniruzzaman A.B.M., Hossain S.A. [2013].

ner which meets the changing needs of its stakeholders. Agile software development was presented by K. Beck *et al.* [2001] in *Agile Manifesto*. According to this *Agile Manifesto*: (1) individuals and interactions are over process and tools; (2) working software is over comprehensive documentation; (3) costumer collaboration is over negation; (4) responding to change is over following a plan. Table 1 presents the main differences between traditional and agile approach.

These previous values have been further defined by twelve principles [Beck, *et al.*, 2001]:

- our highest priority is to satisfy the customer through early and continuous delivery of valuable software;
- welcome changing requirements, even late in the development. Agile processes tackle change for the customer's competitive advantage;
- deliver working software frequently, from a couple of weeks to a couple of months, with a preference to the shorter timescale;
- business people and developers must work together daily throught the project;
- build projects around motivated individuals. Give them the environment and support they need, and trust them to get the job done;
- the most efficient and effective method of conveying information to and within a development team face-to-face conversion;
- working software is primary measure of progress;
- agile processes promote sustainable development. The sponsors, developers and users should be able to maintain a constant place indefinitely;
- continuous attention to technical excellence and good design enhances agility;
- simplicity – the art of maximizing the amont of work not done is essential;
- the best architectures, requirements and design emerge from self-organizing teams;
- at regular intervals, the team reflects on how to become more effective, then tunes and adjusts its behaviour accordingly.

The principles documented in the *Agile Manifesto* provide valuable conclusions that can be applied to architecture and organizational design as well, particularly the general openness for change, the breakdown of the large processes into small interactive steps and a close interaction between user and developer [Zimmer, Baars, Kemper, 2012, Stare, 2013]. Examples of agile practices are: pair programming, daily stand-up meetings, unit testing and open work area. Approaches like Extreme Programming [Beck, 1999], the Dynamic Systems Development Method [Stapleton, 1997], Scrum [Schwaber, Beedle, 2002], Adaptive Software Development [Highsmith, 2000], Crystal [Cockburn, 2002], Future-Drive Development [Palmer, Felsing, 2002] follow various paths to achieve „agility". Each method focuses on specific values and there is no standard on how a method should implement its agility, e.g., the principle of Scrum lies in the fact that small teams working cross functionally produce good results.

Agile approach in development of IT

Research method

In this section, we propose a comprehensive framework for IT-based organizational creativity support and investigate how agile approach may be applied in design of OCSS. Different criteria (presented in Table 1 were used to present a value that agile approach offers in such design.

Additionally, paradigms and rules proposed by A.R. Hevner *et al.* [2004] that

are a widely accepted method of planning and designing of scientific studies, were used. They refer mainly how to conduct, evaluate and present design science research. According to these rules information systems are implemented within an organization for the purpose of improving the effectiveness and efficiency of that organization. Capabilities of the information system and characteristics of the organization, its work systems, its people, and its development and implementation methodologies together determine the extent to which that purpose is achieved. A design of information system has dichotomous nature. It may be both a process (set of activities) and a product (artifact). The design process is a sequence of expert activities that produces an innovative product. It includes: (1) problem identification and motivation, (2) design and development – create artifacts, (3) demonstration and use of the artifact to solve one or more instances of the problem, (4) evaluation – how well the artifact supports a solution to the problem, (5) communication – to researches and other relevant audience such as practicing professionals.

Findings and discussion

We propose a framework for OCSS. It provides a comprehensive view on organizational creativity support. This framework consists of six stages that are strictly interconnected and are of interactive nature. These stages include the following [Olszak, Bartuś, Lorek, 2015]:

1. Strategy of organisational creativity and identification of major creative needs of organisations / problem-finding. This step involves finding out which areas of an enterprise's function(s) need changes that would influence, for example, new products, new services or new managerial practices. These changes may stem from a necessity to improve an organisation's competitive advantage and relationships with customers and suppliers, from willingness to become a leader in a particular sector and from a desire to enter specific alliances. Decomposition, problem hierarchisation, creation of generalisations and elaboration of knowledge maps may be used to better understand and identify organizational needs. To identify creative needs of any organisation, it is possible to apply various methods and techniques that, inter alia, include the following: interviews, questionnaires, observations or documentation analyses.

2. Acquiring information resources. This stage involves some ability to reach diversified resources of information and to absorb new resources of knowledge. This calls for the exploration of both internal and external resources. The former include: paper files, documents that describe the enterprise's mission and strategy of development, selected sales documents, financial documents, databases, management information systems. External resources may include databases of patents, company reports, government records, library archives, and Internet resources including social media, blogs, comparison websites or communities of practices.

3. Information analysis, knowledge discovery, providing some suggestions concerning new ideas. The discovery of new knowledge may refer to: (1) new functionalities/features of products, (2) new organizational practices (new customer service, new forms of cross-selling), (3) new logistics chains and alliances, (4) new technologies, and (5) changes in products design. To understand the importance of discovering new knowledge for an organization, it is necessary to be aware of its relationships with enterprises, industries or the whole environment.

4. Evaluating and selecting discovered knowledge. Organisational creativity is an iterative process full of attempts and mistakes. Hence, the process in question requires control, evaluation and selection

of the analyzed information/discovered knowledge, and the best suggestions from the whole pool of the generated ones.

5. Communicating newly discovered knowledge in an organisation and considering whether the new knowledge should be transformed into innovation. Such communication should reach all potential departments involved (production, marketing, customer service, etc.) and individuals who might be interested in its utilisation.

6. Evolving creative knowledge in an organisation, organizational learning. It pays some attention to the fact that organisational creativity is not a closed cycle but a continuous and dynamic process that should lead to development of creative knowledge in any organisation. This completes the generation of one piece of knowledge but simultaneously attempts to integrate knowledge that comes from different research domains.

Below we discuss how agile approach may be used in development of the framework proposed. Different elements, identified in Table 1, were taken into consideration. They refer mainly to: (1) style and development cycle, (2) information requirements, (3) IT and software, (4) project management, (5) goal, (6) change, (7) team members and team organizations, (8) client involvement, (9) organizational culture, and (10) measure of success.

Style and development life cycle of OCSS

Agile approach is welcome in OCSS development because organizational creativity requires permanent development and adaptation to new challenges and expectations of an organization. Organisational creativity is an iterative process, hence, the evolutionary-delivery model of IT-support is required. This model in question requires control, evaluation and selection.

Information requirements for OCSS development

Information requirements of an organization and mainly creative requirements are very often unknown at the beginning of the project. They rapid change and may be discover during the project. It is worth mentioning that problems to be addresses by any organisation may be of different nature. A part of such problems are referred to as 'presented'. Others are referred to as 'discovered'. The former are defined and have solutions. The latter are ill defined and do not have clear-cut solutions. The latter contribute to considerable scientific breakthroughs. Problems to be solved by business partly include well-defined ones. However, there are also some problems that require new discoveries. In contrast to heavy methodologies, agile approach accepts changes in information requirements.

IT and software for OCSS

IT-based organizational creativity support may be created by means of different ICT tools and software. Data mining, artificial intelligence, data visualisation techniques are a very important group of ICT tools. These tools allow for exploring different sources of data, discovering new knowledge and identifying specific relationships and interdependencies. They may point e.g., to different trends that are observed on the market, customer behaviours or customer purchase preferences. On the other hand, data visualisation techniques enable perception and understanding of all interdependencies that are observed in case of data. Group work tools including virtual conferences, discussion forums, communities of practice along with upload and manager files in a shared folder may turn out to be useful. Group work tools show that creativity is not obtained in social isolation. Individuals and groups continuously participate in creative and interactive processes. Employees create an idea, present it to other

members of their teams and learn from others in order to eventually modify and enhance their primary ideas. Group work tools allow members of project teams to communicate easily, thus overcoming barriers of time and geographical location. People may work in networks and use joint resources.

Management of OCSS development

Management of competences, talent, knowledge and IT is crucial in development of OCSS. The staff, especially managers, or project managers should present high and unique skills, particularly in the use of IT. A design of OCSS was based on incremental units called interaction. Development time of each interaction is small, fixed and strictly adhered to. Agile software development of short interactive cycles offered an opportunity for rapid, visible and motivating software process improvement. The model development refers to three important things: product owner, master and developer. The product owner specifies the various features of software, the release data and priorities. It is a person who is responsible for creating and prioritizing the product backlog, choosing what will be included in the next interaction/Sprint and reviewing the system at the end of the Sprint. The master makes sure that the team is functioning properly, productively and enables cooperation across all roles and functionality. He/she knows and reinforces the product interaction and goals and values and practices; conducts the meeting and iteration demonstration. Developer it is a member of team that is committed to achieving a Sprint goal and has full authority to do whatever it takes to achieve the goal. The size of team (working cross functionally) oscillates about eight persons. Such size of team enabled effective knowledge sharing and communication between members. The project development was associated with sprint planning meeting, sprint meeting and sprint review meeting. Sprint planning meeting was between the customer and the team. An artifact called the Product Backlog prepared by the product owner has a list of features of the product including functionality and technical architecture. Sprint meeting is a short (15-30 minutes) session initiated by master. The meeting reviews the work that is done regarding development. The sprint review meeting held with the customer to discuss the code developed over last sprint or release cycle. Documentation in design of OCSS is replaced by face to face communication, knowledge sharing and collecting tacit knowledge. Such knowledge is critical in creativity and innovation. It consists of subject expertise, assumptions, and insights.

Goal of OCSS

In contrast to previous creativity support systems (individual creativity support system, group crativity sypport systems), our OCSS is dedicated to the whole organization and its environment. Its purpose is to increase competitive advantage and an organization's performance by offering rapid acces to different, heterogenoius, disspersed information resources, their analysis, knowledge discovery, its visualization, and suggesting some opinions that may be the foundation for the creation of new and usful ideas.

Change in development of OCSS

Determination of organization's readiness to change is one of the most important criteria in assessing of the project team. Traditional hierarchical structures are not appropriate for organizational creativity issue. They refer to an aversion to change. Such structures are not acceptable in research projects in the field of organizational creativity. OCCS should accept changes and dynamic of environment. An appropriate training system should be implemented to learn how to be open for a change.

Team members and team organizations in development of OCSS

A project's success is determinate by two basic factors. The first factor concerns the competences and skills of team members. It is crucial that such competences and knowledge of team members will be strengthen and extended. The second factor refers to an ability of team members to work together. Team organization is closely associated with a selection of appropriate team members. Self organizing teams are required in organizational creativity support domain. Individual members of a team should also accepted by colleagues and be able to communicate and co-operate together. The consequence is to minimize conflicts during the implementation of the project. The cooperation of individual team members may be strengthens by the appropriate software that allows direct communication, group working, and sharing knowledge.

Customer in development of OCSS

A customer is a member of a design team. Therefore, efforts should be made to ensure that a customer takes an active part in all meetings concerning the project. The customer should be one of the participants and not only a reviewer. In this way, a project's success is also the success of the customer. The customer is not only a beneficiary of the project but a project creator that helps us to quickly reformulate the individual tasks.

Organizational culture in development of OCSS

An organization that possesses a high organizational culture works better in a dynamic changing environment. A proper organizational climate, management and motivation system allow an organization to perform some tasks in a more effective way. Good relationships between team members, quick feedbacks, trust in team, qualified personnel are a basis for a creation of a high organizational culture in our project. Such culture is requires to explore completely new topics and to face new challenges in our project.

Measure of success for OCSS development

The success of OCSS development can be measured using a variety of criteria. They refer to quantitative and qualitative methods. Quantitative criteria relate to the size of the supplied new value for the user. The quality criteria concern a degree of customer satisfaction from the project. A customer who actively participates during the project's realization is able better to assess and evaluate project's success. In this regard, the use of agile approach has an advantage over the so-called heavy methodologies. Measure of success in heavy methods is assessment of planned tasks. Agile approach in our project is focused mainly on business value delivered.

Summary

This research was motivated by two considerations: (1) *Agile Manifesto* is an approach that may offer a new value for development of many information systems, mainly for organizational creativity support systems, (2) too little research has been conducted worldwide to focus on design of OCSS. This study explored differences between traditional and agile approach in project development. It discussed the issue of organizational creativity support and investigated the usage of agile approach in development of OCSS.

The study makes theoretical contribution to the relevant literature. Organizational creativity support issue is generally an unexplored field of research. Therefore, the current study contributes to the existing knowledge on organizational creativity and its computer support. It investigated how agile approach

may be used in development of OCSS. The first experiments and simulations conducted with our framework allow to state that agile approach is an appropriate way to design and manage of organizational creativity support system.

This paper has been supported by a grant: *Methodology for Computer Supported Organizational Creativity* from National Science Centre in Poland, 2013/09B/HS4/00473.

Bibliography:

1. Amabile T.M. [1988], A *model of creativity and innovation in organizations*, in: B.M. Staw, L.L. Commungs (eds.), „Research in Organizational Behavior", Vol. 10, pp. 123-167.
2. Beck K. [1999], *Embracing change with extreme programming*, „Computer", Vol. 32(10), pp. 70-77.
3. Beck K., Beedle M., van Bennekum A., Cockburn A., Cunningham W., Fowler M., Grenning J., Highsmith J., Hunt A., Jeffries R., Kern J., Marick B., Martin R.C., Mellor S., Schwaber K., Sutherland J., Thomas D. [2001], *Manifesto for agile software development*, http://agilemanifesto.org.
4. Blomberg A. [2014], *Organizational creativity diluted: a critical appraisal of discursive practices in academic research*, „Journal of Organizational Change Management", Vol. 27, No. 6, pp. 935-954.
5. Boehm B., Turner R. [2004], *Balancing agility and discipline: Evaluating and integrating agile and plan-driven methods Software Engineering*, ICSE, Proceedings 26th International Conference IEEE, pp. 718-719.
6. Bratnicki M., Olszak C., Kisielnicki J. [2014], *Twórczość organizacyjna i ICT jako nowa perspektywa zarządzania organizacją*, „Informatyka Ekonomiczna", nr 1(31), s. 13-35, Wydawnictwo Uniwersytetu Ekonomicznego we Wrocławiu.
7. Brennan A., Dooley L. [2005], *Networked creativity: a structured management framework for stimulating innovation*, „Technovation", Vol. 25, No. 12, pp. 1388-1399.
8. Candle J., Yeates D. [2001], *Project Management for Information Systems*, London, Prentice Hall.
9. Cockburn A. [2005], *Crystal clear: a human-powered methodology for small teams,* New York, Addison-Wesley Professional.
10. Cohn M. [2004], *Agile Estimating and Planning*, New York, Prentice Hall.
11. Cormican K., O'Sullivan D. [2004], *Auditing best practices of effective product innovation management*, „Technovation", Vol. 24(10), pp. 819-829.
12. Davies N., Zook A., O'Neill B., Headrick B., Riedl M., Grosz A., Nitsche M. [2013], *Creativity Support for Novice Digital Filmmaking*, in: Proceedings of the SIGCHI conference, Paris, France, ACM, New York, pp. 651-660.
13. Elssamadisy A. [2010], *Agile. Wzorce wdrażania praktyk zwinnych*, Gliwice, Helion.
14. Flasiński M. [2008], *Zarządzanie projektami informatycznymi*, Warszawa, PWN.
15. Global Innovation Index [2013], www.globalinnovationindex.org.
16. Greene S. [2002], *Characteristics of applications that support creativity*, „Communications of the ACM", Vol. 45, No. 10, pp. 100-104.
17. Hevner A.R., March S.T., Park J., Ram S. [2004], *Design Science in Information Systems Research,* „MIS Quarterly", Vol. 28(1), pp. 75-105.
18. Highsmith J.A. [2000], *Adaptive software development*, Dorset House.
19. Indurkhya B. [2013], *On the role of computers in creativity-support systems*, in: *Looking into the Future of Creativity and Decision Support Systems,* A. Skulimowski (ed.), Kraków, Progress & Business Publishers, pp. 233-244.
20. Jincao W., Kleiner B.H. [2005], *The evolution of R&D Management*, „Management Research News", Vol. 28(11/12), pp. 88-95.
21. Kisielnicki J. [2014], *Zarządzanie projektami*, Warszawa, Oficyna Wolters Kluwer Business.

22. Klijn M., Tomic W. [2010], *A review of creativity within organizations from a psychological perspective,* „Journal of Management Development", Vol. 29, pp. 322-343.
23. Lubart T. [2005], *How can computers be partners in the creative process: classification and commentary on the special issue*, „International Journal of Human-Computer Studies", Vol. 63, No. 4-5, pp. 365-369.
24. Maylor H. [2003], *Project Management*, New York-Boston, McGraw Hill.
25. McLean J.A. [2009], *Place for creativity in management*, „The British Journal of Administrative Management", Autumn, pp. 30-31.
26. Miskulskiene B. [2014], *Research and Development Project Management*, Vilnus, Mykolas Romeris University.
27. Moniruzzaman A.B.M, Hossain S.A. [2013], *Comparative study on agile software development methodologies,* CoRR, http://arxiv.org/ftp/arxiv/papers/1307/1307.3356.pdf
28. Olszak C.M. [2014], *Business Intelligence and Analytics in Organizations,* in: *Advanced in ICT for Business, Industry and Public Sector*, M. Mach-Król, C.M. Olszak, T. Pełech-Plichowski (eds.), Studies in Computational Intelligence, London, Springer, pp. 89-109.
29. Olszak C.M., Bartuś T., Lorek P. [2015], *A Comprehensive Framework for IT-Based Organizational Creativity Support*, „Information & Management", (in print).
30. Palmer S., Felsing M. [2002], *A Practical Guide to Feature Driven Development*, London, Prentice Hall.
31. Parjanen S. [2012], *Experiencing Creativity in the Organization: From individual Creativity to collective Creativity*, „Interdisciplinary Journal of Information, Knowledge and Management", Vol. 7, pp. 109-128.
32. Park Y., Kim S. [2005], *Linkage between knowledge management and R&D management*, „Journal of Knowledge Management", Vol. 9(4), pp. 34-44.
33. Peffers K., Gengler C.E., Tuunanen T. [2003], *Extending critical success factors methodology to facilitate broadly parcipitative information systems planning*, „Journal of Management Information Systems", Vol. 20(1), pp. 51-85.
34. Project Management Institute [2013], *A Guide to the Project Management Body of Knowledge,* 5th edition.
35. Schwab K. [2013], *Global Competitiveness Report 2013-2014*, World Economic Forum, Geneva.
36. Schwaber K., Beedle M. [2002], *Agile Software development with Scrum*, PTR Upper Sadle River NJ, Prentice Hall.
37. Shneiderman B. [2007], *Creativity Support Tools: Accelerating Discovery and Innovation*, „Communications of the ACM", Vol. 50, No. 12, pp. 20-32.
38. Stapleton J. [1997], *DSDM, dynamic systems development method: the method in practice,* New York, Addison-Wesley Professional.
39. Stare A. [2013], *Agile project management – a future approach to the management of projects?*, „Dynamic Relationships Management Journal", Vol. 2, May.
40. Stundgren M., Styhre A. [2007], *Creativity and the fallacy of misplaced concreteness in new drug development. A white headian perspective*, „European Journal of Innovation Management", Vol. 10, No. 2.
41. Teece D.J, Pisano G., Shuen A. [1997], *Dynamic Capabilities and Strategic Management*, „Strategic Management Journal", Vol. 18(7), pp. 509-533.
42. Trocki M. (ed.) [2012], *Nowoczesne zarządzanie projektami*, Warszawa, PWE.
43. Ulrich F., Mengiste S. [2014], *The Challenges of Creativity in Software Organizations*, in: *Creating Value for All Through IT*, B. Bergvall-Kareborn, P. Nielsen (eds.), Berlin, Heidelberg, Springer, pp. 16-34.
44. Woodman R.W., Sawyer J.E., Griffin R.W. [1993], *Toward a theory of organizational creativity*, „Academy of Management Review", Vol. 18, No. 2, pp. 293-276.
45. Wysocki R., McGary R. [2005], *Efektywne zarządzanie projektami*, Gliwice, Hellion.
46. Zhou J., Ren R. [2012], *Striving for creativity. Building positive contexts in the workplace*, in: *The Oxford Handbook of Positive Scholarship,* K.S. Cameron, G.M. Spreitzer (eds.), Oxford/New York, Oxford Press, pp. 97-109.
47. Zimmer M., Baars H., Kemper H.G. [2012], *The Impact of Agility Requirements on Business Intelligence Architectures*, 45th Hawaii International Conference on System Sciences, pp. 4189-4198.

Prof. dr hab. **Celina M. Olszak**, Uniwersytet Ekonomiczny w Katowicach.
Prof. dr hab. **Jerzy Kisielnicki**, Uniwersytet Warszawski.