TRADITIONAL and AGILE PROJECT MANAGEMENT
in PUBLIC SECTOR and ICT

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Abstract—**The article comprises the characteristics of traditional project management (TPM) and agile project management (APM) and indicates that when using a specific concept we should take into account the conditions of the sector in which the organization implementing or participating in IT projects is functioning. For it is not in all organizations that APM is more effective than TPM. Agility at the project level is one of the possibilities of which we should remember when seeking a tool for achievement of the organization's strategic objectives. However, such a tool becomes less effective if its use is not preceded by analysis of specific attainable benefits and conditions which have to be met to achieve such benefits. These conditions comprise, among other, the organizational and decision-making culture, projects financing method, as well as approach to change servicing, risk management or standardization of project management practices.**

I. INTRODUCTION

AGILITY at the executive – project level was defined in the principles of Agile Manifesto [4], and in practice implemented in numerous agile methods [1]-[2]-[3], the most popular of which is SCRUM [5]-[6]-[27].

The main project benefits which when reached facilitate an agile approach involve: higher easiness to cope with variable priorities, abbreviated time to market, decreased project risk, better adjustment of the objectives of IT and business [10]-[17].

However, the use of one of the agile methods does not guarantee the appearance of the mentioned benefits in each project, or their contribution to a higher efficacy of the whole organization.

Both the public sector organizations and the ICT (Information and Communication Technology) organizations undertake the IT (Information Technology) projects. Yet, they are functioning in different conditions and implementing such projects differently [37].

IT projects exhibit many identical characteristics, as is the case with other measures. They also bear their own specificity. The information project management consists of many activities related to planning, management and control.

According to B. Lent, the information project (IT project) is the „temporary form of organization aimed at designing and performing of applications, data banks, organizational solutions, computer accessories, system platforms and other solutions within the computer science" [9].

The public sector[1] is connected with the provision of a number of public services. Thus, the public administration bears the nature of services and is functioning within the legal regulations system [12]-[15].

The act on informatization of entities performing public tasks [20], of 17 February 2005 (hereinafter referred to as the UINF), constitutes the e-activity of all offices from this sector.

Owing to defining in the UINF [20] the term of information project of public use (art. 3 §6) legal use of such projects was enabled and entered the road of the formal setting up projects in entities of governmental and self-governmental administration.

"Information projects should be established in this sector mostly to make available further e-services and teleinformation systems owing to which they may be provided" [38].

The ICT sector is defined in many ways by various organizations. In the simplest way it is understood as a combination of IT sector and telecommunication sector.

The core of the definition of ICT sector is International Standard Industrial Classification – ISIC [14] which applies product distinguishing that consists in specification of conditions which have to be met by the products of a given business activity in order to qualify it as an element of the sector.

ISIC defines ICT sector as a set of enterprises conducting production and services activities consisting in seizing, transferring and displaying the data and information electronically [11].

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[1] According to the definition submitted by the Ministry of Finances the „Public sector is a part of the national economy which consists of:
1. State and self-governmental organizational units which are not corporate entities.
2. State and self-governmental special funds (State higher schools and State and municipal culture institutions as well as State enterprises are not included into the public sector)" (Art. 9 of the Act on public finances).

Organizations from ICT sector are usually suppliers of information solutions for the public sector. These organizations are much more experienced in using the Agile approach in IT projects implementation and may convince the public administration decision-makers to a more comprehensive use of APM in its future projects. First, however, suppliers from the ICT sector should try to gain trust through reliable indication that they had found a method to bend the rules without breaking them and that they can abide by them through co-implementation of IT projects in public administration entities.

Agile methods require such skills from project participants as: self-organization of teams, undertaking of group commitments and decisions, self-reliance, creativity and courage. These are elements of organizational culture, and not just project culture. The use of agile approach to project management in organizations from different sectors should also involve this aspect.

This paper is written from the perspective of the public and ICT sectors in Poland.

The comparison of traditional and agile project management in these sectors in Poland is based on the following criteria:

- legal consideration related to conducting of projects,
- approach to change and risk servicing,
- organizational and decision-making culture,
- project financing method,
- maturity in project management.

The public sector implemented from the private sector a form of management through the development of projects. Evaluation of the use of TPM and APM approach in Polish public administration entities was preceded by analysis of the most important legal acts [12]-[15]-[20] in this respect and positioning of our country in acknowledged European research within *eGovernment Benchmark Measurement* from the years 2004-2014 [21]-[22]-[23]-[24]-[25]-[26]-[31]-[32]-[33].

Opinions on the use of agile and traditional approach in IT project management was based on analysis of CHAOS reports [13]-[18]-[19] and conclusions from the research carried out by K. Jasińska and T. Szapiro [28]-[29] on the factors of success in project implementation processes management among Polish enterprises from the ICT sector.

II. TRADITIONAL VERSUS AGILE PROJECT MANAGEMENT

R. Wysocki [16] singles out the following methods of project management:
- Traditional Project Management (TPM),
- Adaptive Project Framework (APF),
- Extreme project management (XPM).

The method allocation criterion is the basis for project implementation. And so in TPM such basis is a strictly defined plan. In APF the implementation is based on an earlier analysis and defining of the project structure. XPM – otherwise referred to as management in extreme conditions – is based on the principle of a fast response to ongoing changes and appropriate facing of complex, unplanned situations.

The project approach to changes appeared in public administration in Poland quite recently, so its modifications may seem unnecessary to some decision-makers. However, new proposals have already appeared on how to increase the efficiency and effectiveness of project management, therefore the earlier approach is referred to as the traditional project management, whereas the newer one – the agile project management (APM).

Both the TPM and the APM are focused on the golden triangle (also referred to as the main triad [8]) of the project management. This is an equilateral triangle whose sides are the following parameters:
- the project operations range (resulting from the project objective),
- cost (budget which is the project financial restriction),
- time (the time framework of the project implementation).

These parameters, which at the same time are the project's main determinants, are the most important factors decisive of the success of the measure under implementation.

Assumed as a resultant of all the three parameters is the quality of the implemented project for which the project manager is responsible. It is his task to constantly monitor and improve the activities related to the project's key parameters. Each appearance of deviations from assumed arrangements or even the risk of such deviations is reported to the project sponsor who may decide that it is legitimate to start introducing remedial plans.

The critical factors of the project's success are strictly inter-related, they condition each other and determine the project implementation path and decide about the risk in a given project. Modification of the factors rests only with the project sponsor, and the relations between the parameters in case of such modifications should be as follows:
- lowering of the costs of the project – reducing the range of the project,
- abbreviation of the project implementation time – raising the costs of the project or/and decreasing the range of the project,
- increasing the range of the project – increasing the costs of the project and lengthening the project implementation time.

As early as at the stage of determining the project concept, the first requirements as to the project key parameters should be agreed between the sponsor and manager of the project. Furthermore, their priorities should be determined as early as possible. Such priorities indicate

which of the factors may be subjected to more changes and which should rather remain unchanged. Therefore, the factors should be balanced together, because all unbalanced proposals of the project limitations cause a risk that the measure will not be performed at the set time, cost or range.

At the TPM the project manager does his best to determine, describe and „freeze" the project range so as to base on it the determination of the project time and budget. He carries out laborious analyses at the beginning in order to prepare a detailed plan and avoid as many changes in the future as possible.

When the change is unavoidable, it is subject to analysis and once approved the changed elements are added to the project range. This usually leads to extension of the implementation time and increase in the project budget.

At the APM the time and costs are considered to be constant parameters, whereas management is aimed at an appropriate adjustment of the range to the current situation. Simultaneous creation of the best possible conditions for the work performance yields very good effects and increases the teams' creativity on both the business and technical side.

The project implementing team's expectations differ from those of the future user. Contractors aim at the compliance with agreed parameters of the project, to the extent consistent with the specification. The user represents a different point of view. He expects the actual use of the created and implemented SI which will effectively support the organization's basic activity, pursuant to both identified and unspecified needs.

The project management involves also activities connected with the best use of available resources. The primary resource are the people, other resources are various tools, equipment or premises. Competent organization of the people's work, methods of motivating to everyday productivity is an important element of the project implementation and constitutes an indispensable condition of maintained consistency with the basic parameters of the project.

APM as compared to TPM is more similar to the not quite perfect human nature, because it follows the principle: „ Do not change people. Change systems". This is one of the greatest „soft" differences between the traditional project management and agile project management. In APM the so called time boxes were used, i.e. constant segments of time, in the form of sprints covering the periods from 1 to 4 weeks. The determined length of the sprint must not change even by one hour. This was meant to avoid the syndrome of the student who performs his tasks at the very end in situations when the objective is considerably remote. On the contrary: in APM the objective is close and precisely determined in time, while as the sprint's effect the ready-to-use value arises.

Truly enough, there were attempts to use similar mechanisms in TPM, such as for instance the division of the project life cycle into phases. But completion of a phase at a strictly determined time is not perceived restrictively [36].

In the traditional approach the push concept is used, whereas in the agile concept – the pull concept is used. In push the tasks are allocated to the contractors well in advance. In pull – to the contrary – the sprint tasks are selected by a self-organized team whose individual members may use their preferable method of implementation. This is an element which significantly contributes to the contractor's higher commitment. The team does what is most important in a given moment of the project for the client's best possible results. Every short sprint is a consequence of the following steps: planning, implementation, survey of effects and retrospection consisting in collection of the so far acquired experiences. This is motivated by the idea of faster learning and adaptation to new situations in result of better working conditions and increased involvement and creativity of the team.

The TPM and APM approaches perceive the risks to the project differently. For the traditional management the highest risk is exceeding the planned date of the project completion, while for agile management – the lack of involvement of the business party. Every sprint is planned with the Product Owner (PO) who is a business representative. PO must know exactly what is most important during planning of a concrete sprint at a given moment of the project and share such information with the team. An adverse aspect of the fact that the PO may make plans in short segments of time is an unexpected lack of PO, because then the team cannot continue its work. What is positive is that he may introduce changes appropriate to the current situation in the project environment [27].

There is a great difference between the two approaches in the project objective. In APM the project objective is not its termination on time and within the planned budget but what matters most is the product and its development. The point of view in this approach is oriented to execution of the product, and not the project itself. This is particularly important when a change characterized by a high innovation is planned [7].

The project team in APM consists of the same roles, apart from the project manager whose competencies were assigned to the PO. All roles have one objective, which is the project product that will „enrapture" the client. PO draws up a list – arranged according to the business value - of functionalities necessary for implementation of the product or functioning of the service, which is referred to as the backlog. The lower the position of a given functionality on the list, the lower its value and accuracy of description.

A complete backlog is delivered to the project's team's meeting at which the sprint is planned. The team is servicing only that segment of functionality from the backlog which it is capable to perform within one sprint.

On the other hand there is a stepwise implementation of the sprint which ends in acquisition of active single functionality (or functionalities) (it is not yet the whole product – e.g. SI because of the lack of other functionalities contained in the backlog) whose activity may be checked by the PO. At the same time PO is capable to recognize and prepare the next required functionalities. In the last step of the sprint – retrospection the team discusses its activities and the process and selects and can estimate the most important elements which might be improved in the next sprint[2]. With each consecutive retrospection the team empirically knows better and better the pace of its work and is able to estimate with a higher accuracy the time needed for implementation of the functionalities remaining still in the backlog.

The product owner has the right to introduce changes in the backlog according to the rule of choosing the required and most needed functionalities for the client, which may be accomplished within the fixed time and budget. The PO may also take a decision to withhold implementation of the effects of several sprints till the moment of creating a set of functionalities which are important for the client.

In each consecutive sprint the consecutive functionalities of the product are performed or those performed earlier are changed according to the feedback information from stakeholders. Such a mode of work requires a lot of commitment from the PO during continuous updating of the backlog and when work is allocated to the team. The backlog updating moment is very important because it is exactly at that time that the product owner may consider the product to be good enough so that there is no need to develop it any further. The PO may also give up the least important functionalities of the product to replace them with other functionalities, even such which initially were omitted in the backlog.

III. TRADITIONAL AND AGILE PROJECT MANAGEMENT IN PUBLIC SECTOR

All public projects in Poland may be established owing to the *The act on informatization of entities performing public tasks* (UINF) [20], but they are also subject to the *Public Procurement Law* [12] hereinafter referred to as the UPZP. Most of the limitations and difficulties in project implementation result from the entries of that particular act.

Project implementation according to one of agile methodologies assumes the lack of precise specification of the final product parameters. Public administration

institutions are obliged by the act of the Public Procurement Law [12] to specify in detail the subject of procurement (at SIWZ) prior to selection of the contractor.

It is impossible to determine complete functionality of the solution at the beginning of the project. However, no matter which approach to the project management is applied, we should absolutely specify precisely the key assumptions and parameters. It is of utmost importance to specify the project purpose in a measurable way which allows to check if it is achievable. To put it generally, we should specify as precisely as possible what has to be done, how it will be checked, if it is implemented, and then to offer relatively much freedom as to how it should be accomplished. Public projects at the very start demand a very detailed description of the solution, thereby making it difficult to introduce subsequent changes.

For the choice of the contractors of the largest public projects in Poland the same criterion is used, i.e. the criterion of experience and knowledge, as is the case with less complicated works. Success in every project depends not so much on technical skills, but rather on the offerer' skills within the project management. Meanwhile, the national public procurement law demands specification of the procurement subject according to European, Polish or international standards, but does not require any description of offerers' qualifications within the project management. This creates quite a high probability of choosing a company which will not cope with implementation of a huge project or will cause selecting a foreign contractor who does not know Polish conditions.

The more and more prevalent (irrespective of the UPZP entries) requirement that the project managers have certificates confirming their management qualifications meeting the PMI or PRINCE2® standards is insufficient. Legal sanctioning of such a requirement would not quite solve the problem either, because the project manager may undertake activities exclusively within the procedures of the public administration entity for which he works.

A severe problem connected with the UPZP is that the Terms of Reference (SIWZ) do not include the risks which may occur during implementation of a given project. The lack of if only preliminary estimation of the risks by the public sector contracting authority deprives the potential contractors from the ICT sector the important knowledge about the realities of implementation of a future project.

SIWZ should be supplemented not only with a list of risks to which the project is exposed, but also with indication for which of them the responsibility rests with the contracting authority, for which – with the contractor, and for which both participants of the project process are responsible. Exclusively the contractor should be held responsible for the risks connected with direct project management, including those resulting from cooperation

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[2] Improvement - in a consecutive sprint – of the most important elements from the previous one is referred to as implementation of the Lessons Learned.

with sub-providers. The list of risks included in the SIWZ by the contracting authority would be specified by the contractor within the submitted bid. The contractor would be also obliged to estimate the consequences of all identified risks for the budget and schedule of works. Leaving the risk servicing almost exclusively on the contractor's side will probably make the offerers try and include their cost in the price they suggest. The cost of risk servicing should constitute a separated part of the bid's budget, to be launched at the moment a given risk occurs [7].

The use of agile approach to management of IT projects implemented in public sector is also exposed to difficulties caused by the principles of the provider selection and cooperation with him and also evaluation of the extent to which he managed to implement the project.

Presently, due to legal limitations, the complete departure from the cascade model of public IT projects implementation is impossible.

In the ICT sector we deal with clients, while in the public sector – with applicants or tax-payers. Contrary to the clients, the tax-payers have no choice and may not go to another provider when the product does not meet their expectations [3]. Consequently, the market pressure on improvement of public services is insignificant.

Introducing of project management into the public sector in Poland enables informatization of this sector, but first of all causes the development of eGgovernment, i.e. administration providing services electronically.

Analysis of the Polish eGovernment position in the research within the *eGovernment Measurement* [21]-[22]-[23]-[24]-[25]-[26]-[33] covering the years 2004-2013 (Table I and Table II) points to extensive backwardness of the public sector in Poland, as compared to other countries. This problem may be solved by effective management of IT projects financed with the EU support.

Successful IT project management in public sector is currently very important because more and more EU funds are obtained. It should be underlined, that not only the amount of EU funding is a measure of the beneficiaries success but the issues of effective project management ought to be the area of greatest engagement of executive management.

Before 2013 Poland participated six times in the *eGovernment Benchmark Measurement* [33]-[38]. For the first three years our country had one of the last positions on ranking lists, both in respect of the index of complete availability on-line of 20 basic public services and index of their maturity (Table I).

The last but one report on public services online has subtitle *Digital by Default or by Detour* [26]. It states that public services must be designed and delivered not in administration-centric but in a customer-centric manner. The new benchmark framework was used in order to

aligned it with the policy priorities of *the Digital Agenda for Europe* [31] and the current *eGgovernment Action Plan* (AP). One of four priorities of AP is „results driven government". „The results are based on a survey sample of more than 28 000 internet-using respondents in 32 countries who were questioned for this study" [26] and were named EU-27+.

TABLE I.
20 COMMON PUBLIC SERVICES IN POLAND IN RANKINGS OF E-GOVERNMENT AUTHORIZED BY THE EC

The year when the report was prepared	Poland's position in view of full online availability of services	Poland's position with regard to services maturity	Number of states participating in the study
2004	26	27	28
2006	25	26	28
2007	30	30	31
2009	25	24	31
2010	19	20	32

„Results driven government" evaluates the efficiency and effectiveness of government on the basics of synthetic indicate *Effective Government* (which building is presented in Table II; counted according to formula: *Effective Government* = average of *(eGovernment efficiency* and *eGovernment impact)* * percent of eGovernment users scaled on 100). Value of this indicator shows the extent to which governments succeed in satisfying their online users.

The synthetic indicator *eGovernment efficiency* is an average of e-government users satisfaction and fulfillment of expectation. While *eGovernment impact* is average of *Likelihood of re-use* and agreement with *Perceived benefits*.

TABLE II.
INDICATORS BUILDING THE EFFECTIVE GOVERNMENT BENCHMARK AND VALUES OF ITS COMPONENTS FOR POLAND VERSUS EU-27+

EFFECTIVE GOVERNMENT – Poland / EU-27+ EFFECTIVE GOVERNMENT – 18% / 26%			
eGovernment efficiency – Poland / EU 27+ eGovernment efficiency – 39% / 40%		eGovernment impact – Poland / EU 27+ eGovernment impact – 64% / 71%	
User Satisfaction – Poland / EU-27+	Fulfillment of expectations Poland / EU-27+	Likelihood of re-use Poland / EU-27+	Perceived benefits Poland / EU-27+
Top level satisfaction scores (8-9-10) across 19 life situations	% „better" and „much better than expected"	% „likely" and „very likely" to re-use	% „agree" and "strongly agree" with 8 perceived benefits"
37% / 38%	42% / 41%	83% / 86%	45% / 56%

The latest report from this series (subtitled *Future-proofing eGovernment for a Digital Single Market*) [31]-[32] accesses the state-of–play of the implementation of digital services in 33 European countries (including all countries of the EU, Iceland, Norway, Serbia, Switzerland and Turkey) who were named EU-28+.

A two-step clustering study has been carried out to place the performance of individual countries in the national context of exogenous factors such as eGoverment demand or the environment.

The first step of this study makes it possible to determine eGovernment maturity within countries and to identify different clusters of countries with similar eGovernment maturity performance. Five clusters have been identified: neophytes, high potential, progressive, builders and mature. Poland together with Austria, Germany, Bulgaria, Czech Republic, Italy, Latvia and Slovenia were qualified for the progressive cluster. Countries in this cluster have been working on a digital approach, but there are some factors that constrain full distribution of satisfying eGovernment services and the progressive cluster should focus on removing those barriers. Policies and innovation plans in countries from this cluster should specifically address and support deployment of a citizen - centric approach to further increase use of eGovernment services.

In the second step is taken into account that eGovernment maturity is affected by different variables. At the same time, undertaking an eGovernment project could have different meanings in different countries. Therefore, it is important to understand the impact of the national context on performance. Five groups of countries with a similar context are identified, based on the values of the context variables which were defined per country (eGovernment supply, eGovernment demand and environment).

Having categorised countries in terms of both absolute performance and their relative context, it is possible to analyze peers. The cross-analysis puts the individual performance of a country in its context. The purpose of mapping absolute performance clusters with clusters of countries with a similar context is to compare peers and to identify specific policy recommendations for each country that could support policy makers in moving forward. Although the background (e.g. economic, demographic and institutional factors) of European countries varies, all countries can find good example among their own peers. All contextual groups have at least one country in the well performing high potential, mature, progressive or builders cluster.

Poland was classified as a country of Group 2. Germany, Italy, France, the United Kingdom and Spain were also included in this group. Group 2 is composed of high income countries with the largest populations (and those populations are relatively older), level of education and the take-up of the internet are in line with the EU average. The ICT infrastructure is highly developed but the level of centralisation is low.

Clustering countries by contextual group and performance Poland found at the same cluster as Denmark and Italy (our peers). Policy recommendations received by our country are following: „Compared to the benchmark, in Poland context factors that limit digitisation may be the availability of digital skills and the difficulty to coordinate the efforts of the public bodies, although these factors are not likely to jeopardize the effectiveness of an appropriate eGovernment strategy. Similar considerations can be extended to Italy, although Poland may count on higher digital skills level" [31]-[32].

For the public sector entities as clients of the ICT sector enterprises the problems in project implementation are often tantamount to multimillion losses, disturbances in their functioning, and deteriorating their image in the society.

In the EU the public sector bureaucratization is increasing. It seems, however, that in Polish offices the projects will be managed pursuant to the APM principles. This, however, will demand bending the APM rules to one's needs and becoming creative. For example: if a public administration entity is required to conduct documentation related to the process or architecture of the implemented solution, such entity may prepare a video recording of the people creating on a board some graphic models of the system process or architecture. Such video recording is much easier to implement and understand. Actually, it may be also acknowledged as some type of documentation.

In public administration the projects are mostly managed in a traditional way. Effective implementation of projects requires continuous improvements. Even the division of a complex large project into smaller sub-projects while leaving the same budget, scope and general project imposed in advance, may yield the following effects: reduced risk and feedback information loop and encouraging people to extend their competences.

The on-going improvement of the project approach in public sector in Poland directly contributes to a change in public organizations management.

IV. TRADITIONAL AND AGILE PROJECT MANAGEMENT IN ICT SECTOR

According to ISIC [14], the ICT sector enterprises may conduct production (e.g. production of office machines and computers, wiring and components, production of instruments and devices used for measuring, control, testing, navigation, and for other purposes, except for industrial use) or services (e.g.: telecommunication, services connected with hardware, wholesale of computers and their components and software, electronic and telecommunication devices).

The following types of enterprises may be singled out among the ICT sector enterprises:
- providers of IT devices and (or) software
- providers of IT services (from simple repairs and servicing to solutions in the cloud and professional services),
- software developers,
- distributors – companies specialized in logistics, having preferential price conditions for some goods, reached through framework agreements with selected providers,
- integrators – companies constructing complex solutions and specialized in specific ICT technologies,
- telecommunication operators.

The companies of this sector implement projects without such legal limitations as those identified in the public sector.

Representing the contractor's party in the public project with EU cofinancing, such companies are subject to evaluation carried out by the project financing institution. The criteria used by the European Union during evaluation are: relevance, drawing the project up and its plan, efficiency, effectiveness, impact and sustainability.

The relationships between the ICT sector enterprises are characterized by a high level of cooperation, temporariness and insignificant formalization.

The ICT market is the client's market where the supply of ICT solutions exceeds the demand. The decisive party in the provider-purchaser relation is the client with whom we should continually and mutually modify the project results and adapt to the changing conditions of the project implementation.

The conditions of companies functioning in the ICT sector, where the enterprises are not so significantly limited by legal regulations and often together on the client-provider line search for the best model of cooperation largely predestine this sector organizations to conduct projects with agile approach.

In many enterprises participating in IT projects a view prevails that project implementation is an individual and unique activity, therefore the project management processes are not subject of the process management concern. This view should be verified, especially among the ICT sector enterprises, because the project implementation process is not functioning in the organization alone but is a part of a large system of all its processes.

Although the project itself is an individual and unique undertaking, yet we can distinguish various types of projects in the ICT sector, which constitute groups of undertakings characterized by similar features. In the ICT sector these may be the following groups of projects:
- - information projects – their final products mostly consist in development of software or services related to its development, service and maintenance,
- - IT projects – their final products mostly refer to computer hardware or related services,
- - telecommunication projects – their final products are mostly related to the network infrastructure,
- - electronic projects – aimed at the production of electronic devices, therefore they are colloquially called hardware devices,
- - electrotechnical projects – their final products mostly refer to electrotechnical solutions; they are also called low-signal projects; the monitoring network project may serve as such a project,
- - ICT projects – combining all the mentioned categories of projects; they are interdisciplinary but we could hardly indicate a dominant domain in them; corporate network projects may serve as an example here.

Implementation of specific groups of processes bears common features and involves resources with specific competences. Therefore, aiming at standardization of project activities should be a natural aim of every enterprise from the ICT sector oriented towards project implementation. Those enterprises in this sector which would each time start project implementation individually would be ineffective, because in each newly undertaken project they would have to build its implementation structures and acquire new resources. Understanding a project management in ICT sector enterprises as a process, conforms with the concept of B. Lent [9] and additionally analyses project management in the context of operational project activities (e.g. drawing up documentation), supporting (e.g. legal or book-keeping services) and mostly managerial and administrative activities (all activities oriented to harmonization of operational and supporting activities; they include project management). B. Lent differentiates between the project conducting process and the notion of project management itself. He means as the project conducting process the process during which the project is implemented starting from its concept, through planning processes and implementation till its successful completion. Meanwhile, the notion of project management itself refers to single processes of the project of the type of activities following a cyclical pattern of measures.

The project implementation process involves additional input and output processes connected with new projects and their course after formal closure. These activities are strongly connected with the specificity of the project implementing enterprise.

Management of project implementation processes with reference to processes going on in the ICT sector enterprise requires a favorable internal environment in which the project and process activities integration is of key importance.

Perception of project management in ICT sector enterprises as a process increases the possibilities of

enterprises of arranging repeatable elements of project implementation into systematized standards which form schemata ready for multiple use. Consequently, a project implementation process arises, which on the one hand enables carrying out unique projects, on the other hand it may be improved as any other repeatable process in the enterprise [29].

The studies carried out so far on the key factors of ICT project success are important, because they allowed not only for specification of the factors of success, but they were also an attempt of identification of implementation problems and searching for methods to limit or eliminate them.

As statistics of ICT projects failures, in Poland and elsewhere in the world, usually quoted are the research results of the Standish Group (tSG). The data presented by tSG should be interpreted with reference to established criteria of the project success. The Standish Group defines project success as on time, on budget, and with all features and functions as initially specified.

Observation of changes occurring on lists of key factors of ICT projects success allows to state that systematically growing is the importance of such factors as agile management processes and activities aimed at optimization of project operations.

Agile projects are successful three times more often than non-agile projects, according to the 2011 CHAOS report from the Standish Group. Exactly the report states that: "The agile process is the universal remedy for software development project failure. Software applications developed through the agile process have three times the success rate of the traditional waterfall method and a much lower percentage of time and cost overruns" [18]. Moreover, they do not report how many projects are in their database but say that the results are from projects conducted from 2002 through 2010.

When plans are established in the initial phase of the project, there is a need to increase the control processes which verify the consistency of the plan with actual requirements of the project at a given moment of implementation. This increases formalization which in turn absorbs time and budget. The complete departure from traditional planning is impossible and encumbered with a high risk of implementing the project ad hoc – only through responding to the ensuing events.

A higher flexibility in implementation of ICT projects expresses increased interest in the agile project management approach. Agile project management is presently treated as one of the most important ways of reducing the formalization and eliminating the difficulties with preliminary planning in projects.

In the latest tSG report of 2014 [19] the IT projects were classified into three types:
▪ successful projects,

▪ challenged projects (such projects are completed and operational but exceeded the funding package and time and offer fewer functions than planned),
▪ cancelled projects (at a certain moment during the development cycle).

The Standish Group further segmented successful, challenged and cancelled projects by large (any company with greater than 500 million dollars in revenue per year), medium (defined as having 200 to 500 million in yearly revenue) and small companies (from 100 to 200 million dollars).

Generally, on the part of the successfully completed projects the average reaches only 16.2% for IT projects completed on time and within the funding package (in smaller companies in total in 78.4% software projects at least 74.2% of their planned features and functions will be implemented, while in bigger companies only 9% of their projects are provided on time and within the funding package) [19]. The detailed data of such cross-analysis are presented in Table III.

TABLE III.
SUCCESSFUL, CHALLENGED AND CANCELLED PROJECTS
BY LARGE, MEDIUM AND SMALL COMPANIES

TYPES OF PROJECTS / TYPES OF COMPANIES	Large	Medium	Small
Successful – 16.2%	9.0%	16.2%	28.0%
Challenged – 52.7%	61.5%	46.7%	50.4%
Cancelled – 31.1%	29.5%	37.1%	21.6%

The three major reasons that a project will succeed are: user involvement (15.9% of responses), executive management support (13.9%), and clear statement of requirements (13.0%).

Software professionals from ICT sector are getting more and more knowledgeable about agile development and are now scaling it more broadly within their organizations, as compared to what officials could do [17].

The results of the studies carried out by K. Jasińska [28]-[29] among the Polish ICT sector enterprises indicate that the most significant limitation of ICT project implementation was the company's internal organization maladjusted to project implementation. To identify the organization's elements which generate the highest implementation difficulties, subjected to analysis was the area of processes, organizational structures and project management methods used in enterprises.

The highest percentage (92%) of respondents among those using the organization processes or their elements for ICT project implementation, used processes of planning the solution and sale and marketing. The fewest respondents (14%) used the technology development process, which may be associated with a limited need to develop technologies during the ICT project implementation. The processes with

inherent most significant limitations in the decreasing order: processes of designing the solution, sale and marketing, implementation of the solution at the client and company management.

In the planning process most prevalent were the problems associated with the lack of knowledge about the client's needs, purposeful reduction of the scope, costs and time limits, and insufficient integration.

In the process of production and sale most errors were associated with the lack of support for selling activities, improper project qualification, and taking the selling decisions by managers without suitable consulting the project team.

On the other hand, in the company management process most errors resulted from conflicts between the project and formal structures, maladjustment of the project management methods to the specificity of implemented projects and communication problems.

In the organizational structures area of research the highest appraisal was granted to the linear-staff structure as such which to the highest extent supports the ICT project implementation, whereas the lowest appraisal was that of the linear implementation of projects with functional isolation.

Within the project management methods use in the ICT sector enterprises in Poland it was found out that the most often used methods were: the Project Management Institute, and next - PRINCE2®.

The enterprises of the highest project maturity [34] are the integrators (level 4 according to H. Kerzner model [35]), and the lowest – telecommunication operators (level 1).

The results of the studies [28]-[29] connected with the critical factors of successful project and difficulties in project implementation in ICT enterprises in Poland are similar to those connected with failures of IT projects obtained by tSG and do not differ from the average results obtained by other organizations (the OASIG Survey, The Robbins-Gioia Survey or The Conference Bard Survey). This enables to use the results of the studies on IT project management, carried out by large organizations specialized in this area, in Polish ICT sector enterprises, to increase the efficiency of project implementation using the APM or TPM approach, depending on their effectiveness in implementation conditions of a specific project and conditions of the sector from which the client and provider come.

V. CONCLUSION

The development of project management seems to reflect evolution of management as a whole. Such development started from hard aspects in conducting of projects and aims at inclusion of more and more soft psychosocial aspects at the end of the 20th and the beginning of the 21st century. The development of an appropriate system of elements of hard and soft projecting largely depends on the project manager and the team he created.

The project management is a new approach in management, whose pillar has always been information but now it is also knowledge [8]. The most effective approach to project management is the project-resources approach which involves both the resources of information and the resources of the knowledge of the project-launching organization, furthermore – the intellectual capital is worked out owing to the people who use appropriate tools to accomplish specific project processes.

The greatest benefit of agile project management, as compared to the traditional management, is an increase in the risk management quality within the project. The agile – iterative approach allows to follow the project progress with a very high accuracy and gives a possibility to react in advance in case of risks of exceeding the budget, delays in implementation or supplying a solution the functionality of which differs from that expected by the client. Advance active response to risks finally translates into benefits in various areas of the project.

Many failures related to implementation of projects (especially large projects) in public sector point to the need for a profound reconstruction of the Public Procurement Office (UZP). For the largest projects, e.g. nationwide information projects, separate terms of their commissioning and implementation should be introduced. The criterion which qualifies a given measure to the group of large projects could be e.g. the preliminary estimation of the budget of works. It should not be important whether the budget of such a project amounts to 350 or 700 million PLN; what should matter is determination of specific valuating thresholds which would be the decisive factors as to whether a given project may be included into the cluster of large projects.

The Public Procurement Office (UZP) as a central institution most directly connected with implementation of public projects should first of all determine the projects management standards[3] as well as the ways of evaluating the contractors competencies (at best according to the project maturity models), and also supervise their subsequent use, at least in the largest projects. Actually, it is not important which of the internationally recognized standards (PMBOK® or PRINCE2®) and maturity models - Capability Maturity Model Integration® (CMMI) or Organizational Project Management Maturity Model® (OPM3) [34]-[35] will be selected as obligatory on the

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[3] In Great Britain even the Highways Agency which is a counterpart of the Polish General Directorate of National Roads and Highways, and not of a higher level such as the UZP, cares about the level of project management and issues recommendations for the projects of highways construction.

Polish market, because they all performed well in the project implementation practice. Perhaps the UZP will be assisted by the International Organization for Standardization (ISO) which in September 2012 issued a new standard of project management, marked as ISO 21500[4].

The Public Procurement Law should also allow to specify the scope of works during the project implementation. The cooperation between the employer and contractor at a change of the scope of works would then express a partnership approach to project implementation. Such form of cooperation between the employer from the public sector and the contractor from the IT branch is more and more popular in Hong Kong, Great Britain and the USA.

There are several differences between TPM and APM. The greatest methodological difference between the traditional ad agile project management is the approach to the project management golden triangle. Information about other differences may be obtained directly from Manifest Agile [4]. These are, for example, the following values put above other in agile project management:

- „Response to changes above following the plan",
- „People and interactions above processes and tools",
- „Cooperation with the client above formal decisions",
- „Software over extensive documentation".

Statistically [13]-[17] the project implementation in the APM model in most cases lasts from 4 to 5 times shorter, as compared to the TPM model. This mainly results from the fact the APM is used to form the most important functionalities, whereas other functionalities are skipped, which decreases the range of the project. Efficiency of work at the team's level is increased by approx. 200-300%, similarly to the probability of success. Efficiency at the team's level grows, because each member of the team may have an individual impact on the product development and soon sees the effects of his work, but at the same time the whole team works for one common objective.

The 8th Annual State of Agile^{TM} Survey [17] emphasizes that agile project management gives the client who orders the IT solution the following benefits:

- he has a high freedom within introducing changes and adjusting his requirements to the changing business environment,
- the investment may bring profits as early as during the project implementation,
- comprehensive outlook on the project – not only during its implementation but also during its subsequent maintenance,
- relatively low costs of the project maintenance due to a respectively high quality,

- the work performance concept which is flexible and prone to changes (the provider continually aims at creating a product ready for the fastest possible use),
- better concept on the client-provider line, which enables the provider a possibility of actual involvement through searching for more advantageous solutions, reporting one's own suggestions, sharing one's specialized knowledge and using it for the client's activities optimization.

Owing to agile project management, both the client and the provider are less trustful and want to achieve success together. The final result of the project depends largely on how much the parties trust each other, and therefore – cooperate with each other.

The traditional project management may in turn lead to the situation in which the client and provider are less trustful towards each other, while every change and not quite specified requirements are perceived as an obstacle.

Educating the clients within social cooperation on the contracting authority line is inscribed into the Agile principles. In practice, the ICT sector contractors help the public sector clients in the process of acquiring experience and understanding their role in the project. The exemplary support forms may be as follows:

- training courses organized by the provider personally or by external consultants,
- close cooperation of leaders in the role of the Scrum Master on the provider's side with the Product Owner on the client's side,
- supporting the Product Owner by the Proxy's role on the provider's side.

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