

## EVALUATION OF DESIGN MATURITY MODELS FOR USABILITY IN THE IT INDUSTRY

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**Purpose:** The ability of an enterprise to execute projects, using the tools appropriate to do so, is called project maturity. On the other hand, at a higher level of detail, it is seen as the appropriate selection of a portfolio of projects, in such a way that the implementation of given projects is directed to support the goals and strategies of the enterprise, as well as the ability to apply appropriate project management tools and techniques. Accelerating changes in the company's environment, cause them to be forced to implement project management, in order to increase flexibility and standardization, so that activities become more professional. In sum, this translates into better financial health of the enterprise, a better position among competitors and, what is related to this, gaining new markets for their products and services. Project maturity models provide a starting point for conducting an analysis of the current state of the enterprise and indicate the direction or directions in which the enterprise should develop. The purpose of this article is to present the results of a usability analysis of project maturity models for an IT enterprise. The following models are presented in it: PMMM (The Kerzner Project Management Maturity Model) - developed by H. Kerzner; P3M3 (Portfolio, Program and Project Management Maturity Model) - developed by the Office of Government Commerce; OPM3 (Organizational Project Management Maturity Model) - developed by the Project Management Institute; P2MM (PRINCE2 Maturity Model) - developed by the Office of Government Commerce. The essence of project maturity, the project approach and its operation and improvement in management systems is also discussed.

**Design/methodology/approach:** The article is exploratory in nature, and the primary research was conducted using the expert interview method.

**Research limitations/implications:** Future research should focus on further analysis of both design and process maturity models.

**Practical implications:** The research discussed in this article can contribute to further empirical research, including, among other things, the initiation of work on the development of a project maturity model aimed at the IT industry.

**Social implications:** The practical implications of the research involve the possibility of using IT to improve existing maturity models and practical implementation in IT companies.

**Originality/value:** The main value of the article is the analysis of models past IT practitioners, and the overview presented is based on existing and used maturity models.

**Keywords:** project management, project maturity, project maturity models, enterprise maturity.

**Category of the paper:** General review, Research paper.

## 1. Introduction

Business processes and, above all, the way in which they are carried out, are today considered critical resources that determine an organization's market value (Seethamraju, 2012). For this reason, companies are looking for opportunities to change and thus enable it to enter a higher level of organizational development. Projects were for a very long time the domain of only the IT and construction industries, but today the project approach dominates many other industries. Companies taking their first steps in project management often do not know where to start, what to invest in, which techniques to use. Ultimately, some of the solutions purchased are not used in practice or are not compatible with other tools (Chrisis, Konrad, Shrum, 2003). There is a risk of discouraging employees from the whole idea of project management, and projects continue to exceed original budgets, are not completed on time or do not meet certain quality requirements (Crawford, Bryce, 2003). When implementing the project approach, often companies focus on the approach itself and not on the product and its quality. Nowadays, on the other hand, in many industries, including IT, the quality of the delivered product and service under individual customer requirements, created right in the organization's manufacturing process, is becoming increasingly important (Wojciechowska, Strojny, 2022). Project management aims to make changes and implement new organizational, technological and market solutions that destabilize the organization in order for it to enter a higher level of organizational development (Duraj, 2004). For this reason, one of the most important elements of improving an enterprise is improving the management system (Bielawa, 2011). Recent economic crises and functioning in a turbulent environment have forced organizations to seek modern management concepts. In such a dynamic and innovative environment, the philosophy of project management, i.e. how to meet customer requirements on time without exceeding the budget, may become not only a fad, but also a necessity (Wittek, 2011). However, this poses many implementation problems. For this reason, the purpose of this article is to present the results of a usability analysis of project maturity models for an IT enterprise. In addition, the benefits that the enterprise can achieve by using the models in question to improve the quality management system will be indicated, as well as the most significant criteria and obstacles. The purpose of this article is to present the results of the usability analysis of project maturity models for an IT enterprise. The realization of the above goal requires an explanation of the essence of the project approach and its functioning and improvement in management systems (Gębczynska, Bujak, 2011). The main value of the article is the analysis of models past IT practitioners, and the overview presented is based on existing and used maturity models. The project approach is becoming more and more widely used in Polish and global enterprises, as it leads to high quality project products and repetition and elimination of bottlenecks in subsequent projects (Maylor, 1999). This is because of the need to organize and track tasks within a project to complete the project within the required time, scope and budget (the project

triangle). However, this is one of the formal elements, because in the IT industry often two of the three elements of the project triangle change, while the most important is the fact that the project approach serves to improve the organization, to identify elements that need improvement or change, and to implement good practices tailored to the company in the implementation of projects. This, in turn, causes the impact of project management on other operational activities and affects activities related to organizational structure, processes or motivational systems (Kusyk, 2010). This article focuses on project management issues, is of an overview nature and refers to several project maturity models in relation to IT companies.

## 2. Characteristics of the IT industry

The IT (information technology) sector is engaged in carrying out tasks related to the acquisition, collection, processing and distribution of information, using electronic equipment such as telephones, computers and television (Collin, Glowinski, 1999). The IT sector is divided into three basic segments: hardware, software and IT services. Thus, it includes the production of hardware and software, consulting on its use, sales and service of hardware and software, data processing and database development, as well as education in information technology and telecommunications activities (Kępka, 2010). The sector is internally diversified, with the majority of companies being small businesses, while the most important enterprises are subsidiaries of multinational corporations, which most often set trends in organizations. The last several years in the global economy, there has been a continuous and dynamic growth in demand for information technology products and services. As a result of the changes associated with the development of the IT industry, every enterprise faces new challenges, some of which become threats (e.g. loss of market, bankruptcy of the enterprise, lack of competitiveness of the offer, high operating costs, etc.) and others become opportunities for development (e.g. new product, gaining new customers for products and services) (Strojny, Szmigiel, 2016). The processes of digitization and informatization, including the dynamic development of the IT industry, have led to the creation of thousands of projects around the world (Liebert, 2017). Leading to the dynamic development of the industry and the creation of advanced IT solutions, thereby causing management problems (Kozarkiewicz, Wojcik, 2015). The IT industry is one that influences almost every element of the economy by assessment, encroaching on virtually every area of life, be it banking, e-commerce, manufacturing systems. For this reason, on the one hand, the sector is susceptible to economic factors that have a significant impact on shaping the market for IT services, both in the group of suppliers and in the group of customers (Juchniewicz, 2012). So its operation depends on the general economic situation. On the other hand, however, there is a constant demand for modernization of

IT facilities in enterprises, thus, despite the dynamics of the market, the IT industry has become an integral part of change and has become less susceptible to market changes, compared to the rest of the economy. It has the ability to create solutions and products, even in a moment of economic crisis, it is worth noting that the IT sector has introduced various types of IT services, such as Internet services (Winiarski, 2008).

IT companies, despite their role and importance in the economy, face many challenges and threats such as product development, acquisition of new market segments, loss of customers, and excessive operating costs of the company (Strojny, Szmigiel, 2016). Difficulties associated with IT industry projects, can be solved by spreading project management knowledge and clarifying the project maturity of the enterprise. As noted by J. Kacala, the biggest problem for organizations that need to manage projects is acquiring and maintaining the knowledge flowing from completed projects. This is due to the specificity and originality of each project (Strategist, 1999). In practice, the final outcome is determined by a number of factors that can positively and negatively affect the project and its implementation (Pritchardt, 2001), for example, it can be related to the very nature of the organization, which requires too detailed distribution of tasks, power and information (Spalek, 2004) Evidence of the aforementioned management difficulties in companies is the research conducted by Stadnish Group in 2017, showing that only one out of three projects is successful ([www.productive24.com](http://www.productive24.com)).

Every project should end in success as understood by both the creator and the recipient of the product or service. Success may involve new financial revenues, but also the acquisition of new markets. On the other hand, as a consequence of the fact that IT projects are atypical ventures and rely mainly on the search for new solutions (Spalek, 2014) and the possibility of their implementation, they have an innovative character (Mierzwińska, 2013), but also a high degree of risk (Lasek, Adamus, 2014). However, it has been noted that in the IT industry, the use of methodology alone is not enough to offset these risks, since the most important part of IT projects in particular is the people (Spolsky, 2005). For this reason, regardless of the methodology used, project management is closely related to people management and thus to the project maturity of an organization. Therefore, it is necessary to provide companies with ways to manage both projects and processes (Koszlajda, 2010). Today, projects are an integral part of any growing company with classified and structured processes in the IT industry. (Verband der Automobilindustrie, 2010).

### **3. Methodological assumptions**

The author's work on the article consists of several stages, the first of which is a literature review, followed by the selection of models and characterization of the most popular ones, as well as the conduct of interviews and presentation of research results. The first stage is to

conduct a literature survey, which is an important part of research projects (Silverman, 2009), providing an objective and reliable summary of a given theoretical area. It allows referring to the existing state of knowledge (Anderson et al., 2008), presenting the existing theoretical and research approaches contributing to the expansion and development of a specific research field (Levy, 2006).

The critical literature review process consists of (Czakoń, 2011):

1. Identification of published and unpublished works on the topic of interest to the researcher, i.e. the process of data collection.
2. Evaluation of the identified works in terms of the problem addressed and its solution.
3. The research report, i.e. documenting the research done.

The purpose of the article is to present the results of the usability analysis of project maturity models for IT companies. In pursuit of this goal, a critical review of the literature was carried out, followed by the identification of project maturity models and, as a final step, their analysis. The main criterion for the selection of project maturity models, was their potential analogy to the needs that IT enterprises have. Taking into account the purpose of the work presented above, the main research problem was also defined, which is as follows: What project maturity models can be a key element of the management system in IT enterprises? The main research problem posed was clarified by posing specific research questions:

1. Which project maturity models are best suited to IT enterprises?
2. What elements of the structure of project maturity models are best used in the IT industry?
3. What limitations exist in the use of project maturity models in the IT industry?

The research problem proposed in the article set the direction of the research work. During the work, a qualitative approach to research was applied, based on expert assessments conducted using a structured individual interview technique.

#### **4. The issue of the project maturity**

The term "maturity" in colloquial terms is defined as "a state of reaching full development" or "a state of readiness for certain tasks" (Szymczak, 1978). In such terms, the concept refers to living organisms and psychological and social phenomena resulting from human activities. This means that the very process of reaching maturity is closely related to the improvement of skills in several dimensions: economic, social or biological (Juchniewicz, 2009).

On the other hand, in the scientific context, the meaning of the term "project maturity of the organization" is constantly changing, despite the growing interest in the field of project management, both by practitioners and theoreticians, this definition has not been clearly defined (Lichtarski, 2015). Project maturity of an organization in the most general and simplest

definition is defined as the ability of an organization to develop by mastering the skills of strategic and operational project management (Strojny, habilitation). In broader terms, it can be stated that project maturity is "the ability, readiness of an organization to effectively select a portfolio of projects - supporting the strategy and goals of the organization, and the use of professional techniques and tools, project management methodologies to bring a project to a successful conclusion and translate this success into subsequent projects" (Juchniewicz, 2012). This issue is addressed by leading project management standards like IPMA, PMI and PRINCE2. According to the PMI organization, project maturity should be understood as an enterprise's ability to achieve strategic business goals, which can only be achieved through appropriate project selection and management. This definition focuses attention on linking project management to the achievement of organizational goals, and companies that actually adopt a project approach are likely to achieve competitive advantage (Weidemann, 2017).

One of the fundamental assumptions associated with the level of project maturity is that as maturity increases, the effectiveness of project management increases, which translates into the achievement of strategic goals (Litke, 2005). The organization should grow to memento until it has reached the appropriate level of maturity, moreover, with regard to the systems and processes that support project management, the organization realizes two additional benefits (Korzner, 2005):

- work is performed with minimal changes in scope,
- implemented processes minimally disrupt ongoing operations.

Nowadays, the importance of projects in organizations is so significant that it requires an appropriate adjustment of the internal environment in which the project is implemented. In such a situation, one can speak of adopting a project orientation. Increasing those elements that increase the agility of the enterprise (Jack's habilitation). Enterprises that have introduced a systemic approach to project management have created conditions conducive to project implementation (Brookes, Clark, 2009).

It should be noted that important from the point of view of project maturity is to ensure a balance between its elements, i.e.: processes, structure, people and systems, because only then the result will be measurable benefits in project management (Wiedmann, 2017). Indication of the optimal level of project maturity is extremely difficult, the pursuit of a higher level is associated with costs, barriers of the current staff, technological capabilities and process constraints, so the organization must evaluate the possibilities so that the pursuit of a higher level is profitable (Sońta-Drączkowska, 2012).

Assessing an organization's level of project maturity requires the use of appropriate tools, namely project maturity models. Currently, there are many such models, developed by experts and organizations. In fact, every reputable organization involved in setting project management standards has created its own project maturity model. They define in detail the elements that go into the concept of project management, most of the models measure on the basis of the degree of proficiency in (Halachkiewicz, 2007):

- communication of project team participants,
- maintenance of relationships with stakeholders,
- motivation of team members, integration,
- synchronization and coordination of activities, identification of risks,
- determining the focus, quality, budget and timing of projects.

## 5. The analysis of selected project maturity models

Due to the interest in maturity issues in project management, a number of studies and models have been developed in this area, and they are built according to the philosophy of achieving successive levels of maturity (Kwak, Ibbs, 2000; Turner, Müller, 2003; Andersen, Jessen, 2003; Lianying et al., 2012). It is worth noting that it was first put into the form of a widely available standard by the Software Engineering Institute in the Capability Maturity Model (CMM), or process maturity models (Paulk, 1993). In 2006, K.P. Grant and S. Pennypacker had already identified 30 maturity models relating to the CMM or its individual components. Kosieradzka A. and Smagowicz J. made an analysis of maturity models, where project maturity models were distinguished (Kosieradzka, Smagowicz, 2016):

- PMMM (The Kerzner Project Management Maturity Model) - developed by H. Kerzner.
- P3M3 (Portfolio, Program and Project Management Maturity Model) - developed by the Office of Government Commerce.
- OPM3 (Organizational Project Management Maturity Model) - developed by the Project Management Institute..
- P2MM (PRINCE2 Maturity Model) - developed by the Office of Government Commerce

Most of the models identify dimensions where the manifestations of mature project management can be observed. However, the PMMM model, takes an evolutionary approach it presents the phases of development of an organization or community from a low level of maturity to a high level.

### 5.1. The Kerzner Project Management Maturity Model (PMMM)

Over the past few decades, it has been noted, the aforementioned very dynamic development of the area of project management, both in business and public organizations. The first maturity model created was the Kerzner Project Management Maturity Model, or PMMM for short. The many years of experience of the model's author, Harold Kerzner, made it possible to detail the five levels of maturity an organization can be at, as well as information regarding the actions to be taken in order to reach higher levels. H. Kerzner distinguished five levels of maturity in his model (Kerzner, 2001):

1. Common language - the organization's participants know the importance of projects, the organization has some knowledge of projects, uses the same terms and can distinguish them from day-to-day operations. Wspólne procesy – organizacja rozumie i rozpoznaje procesy w obrębie zarządzania projektami oraz rozumie jak ważne jest ich zdefiniowanie i zmodyfikowanie. Dodatkowo posiada umiejętność powtórzenia tych procesów przy kolejnych projektach.
2. Common processes - the organization understands and recognizes the processes within project management and understands the importance of defining and modifying them. Additionally, it has the ability to repeat these processes on subsequent projects.
3. Unified methodology - the organization understands that the use of synergy in the combination of methodologies is critical and uses a unified methodology for project management. Synergy makes it easier for the organization to control.
4. Benchmarking - the organization understands that improvement is necessary to maintain a competitive advantage, improves the adopted project management methodology and decides what it should learn and from whom.
5. Continuous improvement - the organization constantly evaluates the information obtained from level 4 and decides which information is useful for improvement, the organization provides a model for other organizations to learn from its experience and provides a model in the area of self-improvement.

The PMMM model is a publicly available and free tool, so regardless of the size of the organization, it can be used.

## **5.2. Portfolio, Programme and Project Management Maturity Model (P3M3)**

One of the models mentioned is the Portfolio, Program and Project Management Maturity Model (abbreviated P3M3). It is a model of an organization's maturity in managing not only projects, but also programs and portfolios (Juchniewicz, 2009; The Office of Government 2010), allowing to diagnose how well an organization manages not only its projects, but focuses on higher levels, namely portfolio, program and risk management in the context of corporate governance principles. The model was developed by the PRINCE2 organization. The maturity model is an evolved version of the PMMM, or Project Management Maturity Model, based on the principles of CMM (developed by the Software Engineering Institute), later transformed into the model now known as CMMI, combining elements of both a continuous and an oil-based model (The Office of Government Commerce, 2010). The P3M3 model is based on three tools (Sorychta-Wojaszczyk, 2018):

1. Project Management Maturity Model – PjMMM.
2. Programme Management Maturity Model – PgMMM.
3. Portfolio Management Maturity Model – PfMMM.

Common knowledge domains have been defined for the above-mentioned tools (Juchniewicz, 2016):

- management control defines the degree of control over the organization's day-to-day operations,
- benefit management determines the extent to which the organization's productivity is defined, monitored and ensured,
- financial management determines the degree of investment management and control by the organization,
- stakeholder management describes the extent to which the organization identifies and communicates with project stakeholders to minimize risks and negative impacts,
- strategic management in the organization describes the extent to which the organization controls the correlation of projects with strategy,
- risk management describes the extent to which the organization is aware of negative risks and identifies preventive measures, as well as positive risks and actions that can multiply potential benefits,
- resource management describes the level at which the organization uses its position in the value chain and minimizes the impact of shortages.

In turn, the basis of the model are the maturity levels, according to the PMMM, which are defined for the project, program and portfolio at which the organization may be (Pirannejad, Ingrams, 2022):

- level 1: awareness of processes (awareness of process) - chaotic processes,
- level 2: repeatable processes (repeatable process) - processes used by isolated groups,
- level 3: defined processes (defined process) - processes defined, standardized and implemented,
- level 4: managed processes (managed process) - processes are managed and measured,
- level 5: optimized processes (optimized process) - processes are thoughtfully optimized.

These levels, are the structural elements of the P3M3 model, which can be used in a number of ways in an organization, for example: to identify key practices, to identify practices, or by audit teams during audits. The levels described in the model represent successive states of maturity during their development. An enterprise that is at the lowest level can also implement projects successfully, but managers work in such an organization in a problem-solving mode when problems arise. Schedules and budgets, on the other hand, are most often exceeded or meeting them results in the delivery of much lower quality products (Reiners, 2012). The model allows you to see what stage the organization is at and what steps it needs to take to get to a higher level of maturity, it is an extremely useful model because it not only gives you information on how to change the organization, but also gives you a benchmark.

### 5.3. Organization Project Management Maturity Model (OPM3)

Model The OPM3 model was developed by Project Management Institute (PMI) organizations in 2003. OPM3 is defined as "the consistent, logical application of knowledge, skills, tools and techniques to organizational and project activities to achieve organizational goals through projects" (Kruszewski, 2003). OPM3 is developed on the basis of so-called best practices. It distinguishes 586 best practices, where each practice is assigned to OPM3 dimensions. These dimensions are based on the 4 phases of process management:

- standardization,
- measurement,
- control,
- continuous improvement

and 3 areas of project management:

- projects,
- programs,
- portfolios.

The combination of these two areas makes it possible to formulate 12 OPM3 dimensions related to, among other things, standardization of project management processes or measurement of program management processes. Project maturity assessment with OPM3 is carried out using a special computer program.

The OPM3 model is described in detail, with as many as 586 best practices on the basis of which an organization can assess its activities and the conduct of projects in accordance with the methodology. The broad scope will allow verification of maturity in almost any organization.

### 5.4. PRINCE2 Maturity Model (P2MM)

In 2004, the Office of Government Commerce published a working version of the P2MM maturity model, while the first official version appeared in 2006. It was built on the Project Management Maturity Model (PMMM) developed by OGC, as well as the official PRINCE2 methodology manual "PRINCE2 Effective Project Management" published by OGC.

It is a project management maturity model designed specifically to measure the progress of PRINCE2 project processes in organizations. It is designed for organizations that have adopted and are using the PRINCE2 methodology, as this is the basis on which maturity is measured. Its purpose is to determine to what extent the PRINCE2 methodology is used in an organization to manage projects (Juchniewicz, 2010). However, the model can also be used as an independent component of the more general PMMM model. The P2MM model is based on the first three levels of the PMMM model, having three maturity dimensions (Labuda, 2009):

- level 1 - initial, the organization begins to implement the PRINCE2 methodology,
- level 2 - iterative, the PRINCE2 methodology is used to manage projects, but its use is inconsistent,
- level 3 - defined, the organization's current standard for project implementation is PRINCE2.

The maturity assessment is conducted by an enterprise representative or an accredited Programme and Project Management Registered Consultant in the first stage, while the second stage is conducted only by an accredited consultant based on a structured interview with selected people from the enterprise. This model shows the exact steps on how to verify the introduction of PRINCE2 methodology, it will be extremely useful for an organization that wants to verify its effectiveness.

If we want an organization to be successful in implementing a project management philosophy, the impact of project management on the rest of operations must be defined and communicated, it must be reflected in the organizational structure, processes and incentive systems. The project approach must be anchored in the culture of the entire organization as exemplified by the organization's project maturity models (Kuzyk, 2010).

It is worth noting that it is the IT industry that creates many programs to improve project management in companies. Since it is the forerunner of tools to improve project management in companies, and thus support the development of maturity, it should also be able to manage and create a project management model so that the tool is best suited to existing needs. Verifying and identifying the ideal elements of a project maturity model for an IT company requires analyzing existing models in the literature and comparing their elements with the needs of IT companies (Wojciechowska, Strojny, 2021).

## **6. Evaluation of selected project maturity models based on key criteria proposed for IT companies**

The analysis of project maturity models has made it possible to select those that are the most frequently analyzed by researchers and used by practitioners. However, the most important element is to relate the models to an enterprise operating in the IT industry, since they are general models designed for any industry. All the analyzed models have their own specifics, many areas or elements. Each of the maturity models has tools and a description of how exactly it should be applied and information on what exactly we are analyzing, while not every element, let alone the entire model can be applied 1:1 in the IT industry. Each industry has its own peculiarities of implemented projects, in the IT industry the most important elements are variability and dynamics, and the fact that success is not always the product or service assumed at the start of the project. For this reason, when evaluating models, it is worth focusing on a few

key criteria that will be relevant to any company operating in the IT industry. The evaluation of the models was based on three criteria:

1. The ability to implement the entire project maturity model in an IT company.

The key criterion is from the point of view of the dynamics of change in enterprises and its needs, it was selected for evaluation because the IT industry is one of the fastest growing industries in the global market and enterprises and the organization need a solution to the problem at the time of its occurrence. When a business gap or bottleneck occurs, the IT enterprise should solve the problem relatively quickly. There are many models and approaches to project maturity in the literature and practice, many companies by trial and error method to achieve results, so it is important to verify whether any of the analyzed models can be implemented 1:1 in the IT industry. Meanwhile, importantly, it is not the implementation itself that is key, but also the correct functioning and bringing efficiency.

2. The model includes an IT industry component.

This criterion was chosen because, as its name suggests, it will verify whether the models in question have an area or component dedicated to the IT industry. A component or an entire model designed for the IT industry would be invaluable because it would allow one to understand the fit of a given model or its components for the IT enterprise, without the need for matching. This is so important because many IT companies lack people associated with maturity studies and people who understand the need for change. Such a model would bring the maturity of the enterprise to a higher level with less effort. It is characteristic of the IT industry to deliver working products to customers in a short period of time, i.e. to act agilely. So it is essential to also introduce change dynamically and agilely.

3. Ease of understanding the model for a technical person (a non-managerial person).

The third criterion is to verify that the model is understandable to a person who is not a management person on a daily basis, but an executive employee, in the case of the IT industry this is, for example, a programmer or a business analyst. This criterion centers around the transparency and ease of understanding of the model for any interested person in the organization. The IT industry, in addition to agility and dynamism, is distinguished by the additional language of the industry, most often English words are mixed with Polish and do not always have the same meaning as in a literal translation, the criterion will determine whether a person who usually uses the industry language and has a specific way of communication will also understand the specifics of the project maturity model. Most often, the people who are professionally involved in management, improving project management and increasing the maturity of enterprises are specialists in fields such as finance, economics, psychology or management. For this reason, it is so important that the project maturity model be understood by all internal stakeholders, e.g. the HR and payroll department, the development department, the analytical department, or the sales department. Yes, the model can be implemented by a specialist and such an implementation can be considered 100% done, while the most important thing is what the company's employees will do with this implementation. If the company's

employees do not understand its purpose and benefits, both for the company but also for themselves, the whole implementation will fail.

The models were evaluated using an expert method, otherwise known as a heuristic. They are characterized by the fact that the research is based on a purposive selection of people taking part in the study, and each respondent is selected consciously by the person who conducts the survey. These people are supposed to be experts in their field, related to the research problem at hand. The experts are supposed to answer the questions that are included in the questionnaires that contain the problem under discussion, and they should be people who are highly qualified, experienced and knowledgeable, and those who think independently, perhaps suggesting a new approach to the problem (Sudol, 2016). Three specialists were selected for the study:

1. Project manager in the IT industry (E1).

Gracjan Walczak – Project Manager working at CCC Group. In the IT industry for four and a half years, having started his work from managing projects in a software house to the largest companies in Poland such as Warta, Xplus or the aforementioned CCC.

2. Project manager in the IT industry (E2).

Marcin Drozd – Project Manager with over 3 years of IT experience, implementing projects for both corporate and institutional clients throughout Europe.

3. Project manager i university lecturer (E3).

Krzysztof Witkowski – Project Manager with over 20 years of experience, interim manager. Co-author of project management implementations in IT, mining, engineering industry and local and central public administration, among others. IPMA certifications lev. B, PRINCE2 Practitioner. Academic lecturer at, among others, Rzeszow University of Technology, Silesian University of Technology, Ks. J. Tischner European University.

All specialists referred to each of the three criteria in the given design maturity model. The proposed criteria, along with the assessment relating to them, are presented in Table 1.

**Table 1.**

*Evaluation of project maturity models against IT industry criteria*

Kryteria oceny	PMMM	P3M3	OPM3	P2MM
Możliwość implementacji projektowej w firmie z branży IT	(E1): Tak (E2): Tak (E3): Tak	(E1): Tak (E2): Tak (E3): Tak	(E1): Tak (E2): Tak (E3): Tak	(E1): Nie (E2): Nie (E3): Nie
Model zawiera komponent dotyczący branży IT i zdolności technologicznych IT	(E1): Tak (E2): Tak (E3): -	(E1): Tak (E2): Nie (E3): -	(E1): Tak (E2): Tak (E3): -	(E1): Tak (E2): Tak (E3): -
Łatwość zrozumienia modelu dojrzałości projektowej dla osoby technicznej?	(E1): Tak (E2): Tak (E3): Tak	(E1): Tak (E2): Nie (E3): Nie	(E1): Tak (E2): Tak (E3): Tak	(E1): Tak (E2): Tak (E3): Nie

Source: Own study.

The above table compacts the evaluation of the criteria by specialists, shows the general approach about the evaluation criteria from the perspective of the experience of a particular expert. However, in addition, each of the specialists also referred by elaborating on their

statements about each criterion to detail their answers. All specialists believe that the models: PMMM, P3M3 and P2MM are possible to implement in their entirety in an IT company, while the exception is the P2MM model, because Marcin Drozd believes, as with the other models, that it can be implemented in its entirety, while the exception is the response of Gracjan Walczak and Krzysztof Witkowski, who believe that it is not possible to implement the P2MM model 1:1 in the IT industry. Marcin Drozd stressed that P2MM in the form of "pure PRINCE2" is not the best approach for the IT industry, but with large-scale projects of low complexity it is possible to implement it effectively in the IT industry as well. It is also worth noting that Gracjan Walczak pointed out the practical use of models from his own experience of PMMM, P2M3 and OPM3, among others, in software house companies. Marcin Drozd, on the other hand, decried that P3Me is possible to implement, of course, but seems to focus on higher levels of the organization, so it may not be the most effective option for a smaller IT company, but for corporations like SII or Asseco it would be ideal.

The second criterion, the inclusion of an IT component in the model, showed the greatest divergence in the experts' responses. Gracjan Walczak is of the opinion that every model contains a component aimed strictly at the IT industry. Marcin Drozd, on the other hand, agrees with the first expert on 3 models, namely: PMMM, OPM3 and P2MM. On the other hand, he believes that the P3M3 model is focused on the already mentioned higher levels of the organization, and there are no specified things aimed at IT companies. Meanwhile, Expert 3, i.e. Krzysztof Witkowski, believes that criterion No. 2 should not be evaluated, because the specifics of IT are no different from other creative industries, so it is impossible to assess whether it contains a component aimed strictly at one particular IT industry.

Marcin Drozd points out that the P3M3 model is not aimed at a technical person. Krzysztof Witkowski, on the other hand, believes that the P2MM model is not aimed at a technical person, but added a model not included in the IPMA Delta study that would be understood by a technical person. As for the other criteria and answers, the experts agree that they are understandable to a technical person, Gracjan Walczak believes that any model is possible to be understood by a technical person, Marcin Drozd believes that PMMM, OPM3 and P2MM are understandable, and Krzysztof Witkowski believes that PMMM, P3M3 and OPM3 are easy to understand by a technical person.

## **7. Evaluation of selected project maturity models based on key criteria proposed for IT companies**

The purpose of the article is to present the results of a usability analysis of project maturity models for an IT enterprise. The first part of the work on the article was to perform a critical review of the literature, which was done by analyzing the project maturity models and selecting

from among them, those that are most often analyzed by practitioners and researchers in relation to the IT industry, and then the presented models were evaluated. The project maturity models presented in the article are part of the available models in the literature, while they are the most representative in the area of the IT industry. The literature deals with issues related to the general functioning of businesses or topics of too detailed business management. However, insufficient attempts are made to formulate concepts and models for the management of organizations of a certain type, including organizations in the IT industry. A critical review of the literature made it possible, to identify the existing models, to identify the most popular and widely used ones in the IT industry, while it identified a certain number of them rejecting other less popular concepts.

The main research problem of the article is as follows: What project maturity models can be a key element of the management system in IT companies? The main research problem posed was clarified by posing specific research questions, which are included in the following table along with the answers.

**Table 2**

*Answers to research questions*

Research questions	Answers
Which project maturity models are best suited to IT enterprises?	The most fitting models are: PMMM, P3M3, OPM3.
What elements of the design maturity model structure are best used in the IT industry?	Elements dedicated to the IT industry, taking into account the volatility and dynamics of the industry and the specifics of projects implemented flexibly.
What limitations exist in the use of design maturity models in the IT industry?	<ol style="list-style-type: none"> <li>1. Lack of understanding of the model</li> <li>2. Partial implementation of the model.</li> <li>3. Application of the model in an inappropriate manner, not in accordance with the guidelines.</li> <li>4. Application of a model designed for a different size of enterprise.</li> </ol>

Source: own study.

Further research should focus on analyzing process maturity models aimed at the IT industry, then formulating a holistic concept combining both processes and projects to develop a model designed for an IT company pursuing both.

As the market develops, design maturity models are used and developed, interest in them has existed for several decades. Despite the continued interest in and use of them, there is still scientific and practical research flowing from many industries. This situation is due to market demand and dynamics. In the future, it is expected that the interest in design maturity models will not pass away, because they bring tangible benefits to enterprises. On the other hand, it is becoming increasingly necessary to develop project maturity models to help determine the level of maturity of an enterprise in a given industry. It will be equally necessary to develop implementation methods with respect to the specifics of the industry and the constraints of a given enterprise. Future research should focus primarily on areas of a specific industry, as it will be extremely difficult and labor-intensive to match the specifics, size and culture of an organization. For this reason, it is necessary to create industry-specific models, flexible and with a carefully

described implementation process, so that a manager can fit such a model to his or her industry and company or organization without great difficulty. This would allow, to focus only on the details of the enterprise, separate elements, and the main features of the model would be implemented automatically. This would probably result, a greater willingness to implement such models and interest in them itself, which would be another element for deeper research and realization of more and more detailed models.

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