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Model of mapping activities and competence in ICT projects

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Abstract

This paper concerns a proposal for efficient increase methodology of ICT projects development, mainly shortening of projects completion, decreasing the costs as well as reducing the risk through project decomposition into activities in the form of their matrices. A project team, which is expected to carry out a particular project, goes through an identification process that includes description of the competences it has in the form of competence matrices. In order to estimate whether the chosen team will be able to carry out the project successfully, PM maps the planned project activities with competences. Lacking or insufficient team's competences, which do not cover the specific activities, may indicate the area for outsourcing of the project activities.

1. Introduction

The search that leads to the increase of the efficiency on the Information and Communication Technologies (ICT) market, stimulates activities in many fields and in software engineering competence, including project management methodologies. Growing competition of ICT corporation, time pressure concerning completing of new projects, and globalization of this market stimulate organizations not only to build their own competences but also to use them effectively. Thus, the following question must be answered: how, when and on the basis of what information should it be decided whether the expected products and desired activities of the accepted or planned project should be carried out in our organization. There are many kinds of methodologies in the field of effective method searching, for example Model Driven Architecture (MDA). This approach to the process of business software development is based on automated tools, aiming at designing models which are independent of technologies as well as transforming them into effective implementations. In the case of MDA, the term "model driven" means that this architecture provides means which allow using models for steering way of understanding, system designing, developing, implementing, which are created by means of it. This

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architecture increases, to a larger extent than ever, the meaning of models in the software development process, it provides guidelines concerning the way in which specifications expressed in the form of models, should be structured [1]. It has been acknowledged, based on the project decomposition in the area of the management of the whole life of a project, that the software code development may constitute only a minor part of the whole project costs, depending on the project character and on the sector where it will be used. [2]. The subject matter of this article is a discussion of selected aspects of ICT projects that will facilitate development of projects within specified time limits, expected scope and at a cost not exceeding the budget.

2. Project costs monitoring

Seeking efficient methods and tools for estimating costs and monitoring all projects in the company at various stages of their accomplishment (*initiating* – projects X_1, $X_2 \ldots X_{m,,}$ *carrying out* – projects P_1, $P_2 \ldots P_{n\,,}$ closing – projects Z_1, $Z_2 ... Z_k$) is a competitive factor. It is search for the effective methods and tools of estimating as well as monitoring in firm costs of all projects factor competition, i.e. those monitored in different stages of realization (*initation* – projects X_1, $X_2 \ldots X_m$, *ralization* – projcts P_1, $P_2 \ldots P_n$, *closing* – projects Z_1, $Z_2 ... Z_k$). A company wants to know which projects are profitable and which will make loss (unprofitable); which (class, specificity, trade etc.) are within company's core business, i.e. are carried out better and cheaper than the competitors do, and which elements of the project should be outsourced? These questions are answered during the management of numerous projects. The following issues are connected with the project management:

- Organization of work on projects, using the resources and project costs.
- Monitoring of earned value.
- Monitoring of work costs and resources use.
- Activity based costing in IT projects.
- Allocation of company's fixed and indirect costs to the particular projects.
- Determination of the profitability of particular projects completion by the same company.
- Determination of the tools which support PM work in estimating project costs carried out in one company.

The above specified theses are generally the basis for tools and methodology analysis as well as selection necessary for the solution of the above described issues.

3. Activity based costing in IT projects

ABC method (Activity Based Costing) – has been considered as one of the most significant innovations in management in the last decade of 20th century [3].

Contrary to the traditional costs estimation methods, ABC allows to view costs from a different perspective – from the perspective of activities connected with production, which makes the estimated costs of activities more precise.

The implementation of the ABC method in the companies and its integration with reporting system requires the work of specialists as well as iterative activity. Specifying, it is in the system of ABC that the projects – activities system of proposed ways in computer projects makes use of the method of ABC [4,5].

Before a company undertakes to carry out a project, even if it is its *core business,* it has to analyze the costs of resources as well as activities that are indispensable for its completion.

The analysis with the use of the ABC method gives a clear answer to the following question: „Is the cost of carrying out a project with the use of required resources, time, additional trainings, brakes and disturbances in the current projects commensurate with the predictable benefits?"

Figure 1 presents a diagram of the ABC method which provides a PM with useful information required to specify the participation of particular projects with an already determined general income. The ABC method enables to implement solutions that maximize income from particular projects, emphasizes an integration of costs and resources essential for the project completion, and in this way exposes its participation in income as compared to other projects.

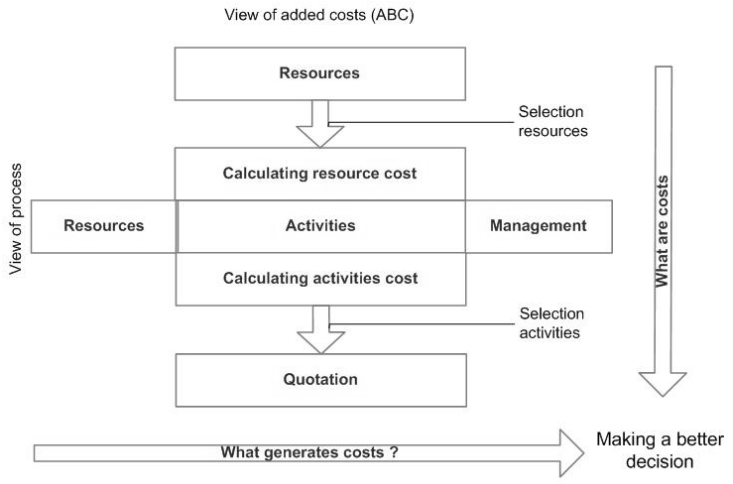

Fig. 1. Method of ABC project cost analysis [2]

It is estimated that 20% of company's customers generate its income, 60% do not bring in loss or profit, and the service of 20% of customers causes more troubles than yields profit. The ABC method helps divide theses groups in such a way as to make the project profitability analysis unambiguous.

In order to determine the final actual cost of selected projects, all activities and resources indispensable for each of them must first of all be identified. What should also be analysed is the degree to which groups of these activities as well as invested resources, selected (often shared) from all available resources and activities, are to be invested in particular projects. One of the most important reasons for application of the ABC method is distribution of resources and activities between particular projects. Then, one has to analyze the participation of particular projects in costs and income as compared to all other projects. If one treats a project as a set of subprojects, i.e. if one selects activities, the comparison of costs of these activities with those of outsourcing will be possible.

3.1. Project decomposition – separation of project activities

The ABC method aims at the analysis of the realization costs of particular products of an enterprise. Selection of activities and resources as well as the relationships between them is made by decomposition with the use of the WBS (Work Breakdown Structure) chart. Products obtained by means of resources of a fixed level and structure may be considered as components.

Project function decomposition enables hermetic separation of activities that may be treated and carried out as an independent subproject. Therefore, it is possible to assign a project to a separate team, to carry out the component at any other time or to commission a task to an exterior subject. Encapsulation is the factor which reduces a risk of incompatibility of solutions and components cooperating with each other within a whole project. It decreases costs of synchronization of particular solutions carried out in technologies available to subcontractors.

Project decomposition reduces its complexity. It is easier to focus on the production of one component than to grip the whole realization process of all project functions.

3.2. Team competences as one of the decision – making stage

In modern IT companies the IT Projects are carried out by teams consisting of specialists with different competences. The range of issues to be dealt with by a team requires various kinds of competences which should complement each other. Nevertheless, the way to build competence management model is long and arduous. Competence management conception, in the present form, was developed at the beginning of the 90s. The first professional competence models were developed as the answer to the needs of huge, multinational corporations in

industries connected new technologies. Managers have already accepted the fact that the scope of activities, technological changes, muliticulturalism are a significant challenge to be faced by a company. Thus, the first steps were directed at seeking a new model of a manager and, consequently, an employee in order to provide a coherent organizational culture and management.

Fig. 2. Model building of competence

So as to gain required competences (fig. 3) one must acquire knowledge as it is shown in the competence building model in fig. 2. After John Gutenberg invented printing, knowledge has been acquired not only through oral tradition but through reading, literature and recently also through the Internet. The application of knowledge to practical activities, work and creative work provides a possibility to acquire skills in a given knowledge area that is confronted with practical activities generally supervised by someone more experienced. Finally, one reaches a moment when one can independently undertake complex activities, i.e. gain competences.

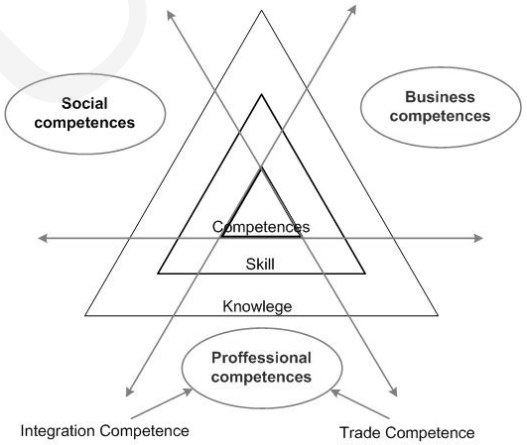

Fig. 3. General scheme classification of competence [6]

Competences – the ability to use practically skills and knowledge to carry out independently a given task in a project. Fig. 3 presents division of competences and illustrates how competences are included into skills which, in turn, are included into knowledge. Professional competences in the area of industrial and integration products are of particular importance for a PM.

The attitudes of partners, a PM's personality as well as broader knowledge exceeding that of the project is extremely important in the integration enterprises due to the necessity of carrying on discussions and reaching agreements not only in the scope of business but also the project environment. Interpersonal skills as well as interests shared with business partners are key elements essential for establishing relation, gaining confidence and positive cooperation.

Competences in projects may be divided into the following groups: professional, business and social.

1. The list of desired competences for carrying out a particular project should be included in the description of project resources.
2. Competences are to be assessed continuously. They are a starting point for decisions and activities undertaken by an employee and with relation to him/her.
3. Activities and decisions may be connected with works on projects at a customer's place or with internal works (internal projects concerning building of competence).
4. The application of competences to the above mentioned activities results in the extent to which the assigned person achieves his/her goals in the project.
5. The extent to which a person achieves his/her goals translates into the extent to which a team achieves its goals.
6. The extent to which a team reaches its goals translates into the extent to which a project is carried out.

While planning a strategy, one has to take into consideration each of the above specified resources and define their limitations. Some of the resources are sometimes obscure or difficult to define (business, social, technical, environmental, ethical, political), nevertheless they may have crucial importance in successful project completion [6-9]. Whether a project will be successfully completed depends on the competences of the whole team. The difficulty in building competences in a company results form the fact that PMs whose primary competence is usually that of technology development or implementation of IT projects approach assigned tasks from their own perspective. It is crucial for a project management process. It is a project manager who almost always subjectively estimates parameters that form the whole project. The accuracy of estimation may differ, and the character of the project may exceed the PM's knowledge and experience. A careful selection of result oriented team members as well as the improvement of PM's own qualifications (competences) leads to the implementation of a system of specialist estimate, where each member of a team directly participates in drawing up a schedule and project monitoring. It helps reduce significantly the risk connected with inaccurate estimate of project's parameters when they are defined only by a project manager.

3.3. What is a competence model?

The ability to act and behave in an appropriate way is a sum of many elements which determine competences. The level of competences is influenced by the internal environment in which a person functions, culture and values adopted by companies.

The development of competence model and adjusting it to the company needs supports the optimization of work division structure where tasks are adequately fitted to the competences of project team members. It helps to lower the risk of exceeding time and budget.

One has to determine precisely three main areas in a competence model:

1. What skills and competences an employee must possess.
2. When an employee should acquire given skills and competences within a determined scope.
3. How an employee should display skills and competences

To measure the above values, suitable competence assessment tools must be in place.

4. Competence assessment tool

In order to be able to use the competence model, a common 'ground' needs to be developed. This will allow to define, assess and compare in a uniform way skills which an employee is required to display. An example of such standardizing tool may be a matrix of competences. The matrix of competences is a language which allows for a uniform identification of common skills, knowledge and behaviour. These features are essential while reviewing what qualifications an employee has and how he/she performs specific tasks or when determining their professional development. Additionally, this tool also provides information on possible loops in the studied competences and indicates precisely which of them require reinforcement. The assessment of competences may be applied in all areas of the functioning of a company.

Key competences, once they have been defined, become a very useful tool. An unquestionable advantage of the model is that it may be applied in the complex system of Human Resources Management (HRM): beginning with hiring an employee, through the review of his/her performance and remuneration to the planning of his professional development and career path. Competence matrix together with a suitable set of technical and professional skills should be designed in a way allowing for its wide use. It may be applied to groups or an individual employee so as to model a work station, analyze traineeship needs, choose the most appropriate trainings for the employees, plan a professional development, recruit, develop team and individual skills.

Fig. 4. Management HRM model

Technical and professional skills are in line with the type of work or provided services (analyst, programmer, design engineer, administrator). However, some skills may be common for several areas of the functioning of a company. Managers responsible for a given area should possess technical and professional skills and make sure that the language depicting these skills is comprehensive for his/her subordinates. Business aptitude and appropriate conduct are the absolute basics for every work post, beginning with the administrative sector to an implementation specialist. Leadership qualities are subject to a review under the requirement that these qualities are to be displayed by CEOs and top level executives. Detailed requirements concerning these qualities depend on a specific work position.

The measurement and management of team competences contribute to a more relevant assignment of roles for individual employees and is the basic tool of the HRM. It directly affects the level of risk connected with the allocation of resources (and their productivity) in the accomplishment of tasks. The introduction of the competence model will facilitate reallocation and introduction of amendments to the organization of a company. However, there is some risk involved – the preservation of the previous structures of allocating resources to the tasks. If these tasks are too numerous, any changes to the allocation of the employees may have an immense influence on the success of the already commenced tasks. That is why, the identification of critical resources, the allocation of which may in effect be too costly, may prevent any serious consequences of such changes.

A corporate management of competences promotes a quick identification of the sources of elevated risk during the realization of particular components of a project. Clearly specified and measured level of competences will allow for extracting those elements of a project, the realization of which may be too costly or risky. Such elements may be forwarded to be accomplished by other team (outsourcing) or the risk may be shared with another partner. It may also be the

basis for taking up any effective actions aiming at the development and perfection of the executive competences of a team.

5. General model of mapping project activities into executive competences

Due to the elevated level of complexity and volume, contemporary projects are developed in stages. They also engage resources required for particular activities that will aid in the achievement of a desired outcome. These activities are more and more often undertaken by teams consisting of numerous members. It is possible due to decomposition of a project into elements that require a series of activities in order to be carried out. The components of a project may have various volume and are characterized by such factors as: time necessary to their accomplishment, cost activity performace, etc. Additionally, the significance of the performance of an activity may be specified from the point of view of a successful accomplishment of the whole project.

5.1. Project activities mapping

Every project may be divided into activities A1, A2,…, An of different volume that applied to build a planned component. The list of activities of an enterprise available in time and space builds a map of project's activities (fig.5). To develop a project, it is necessary to accomplish all activities.

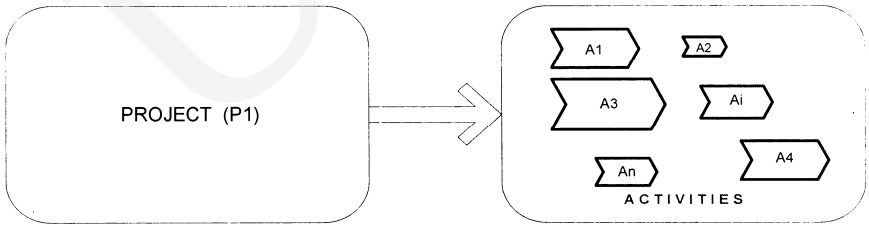

Fig. 5. Decomposition of project into activities

5.2. Mapping competences of a project team

Any organization which develops Z1 projects has its own specialists I1, I2, ... In, whose competences cover various fields of the business and professional activities (fig.5). A team of specialists assigned to a project should develop it as effectively as possible. Contribution of an individual member of the team to particular tasks development (activities) of a project may vary, however, the members should all exhibit a set of competences, such as: skills, knowledge, abilities, experience, etc. A list of competences in the space of a company and the time of their active participation in the project constitute a map of the competences used in the project (fig.6)

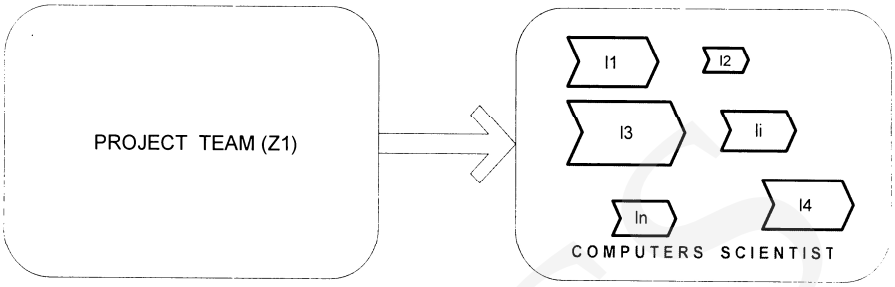

Fig. 6. Decomposition activated of organization

5.3. Mapping activities with competences

Activity – a set of activities selected within a project promoting the allocation of resources in a project; it is a unit that is easily managed and measured on the adequate level of particularity based on the ABC model (see Section 2). Since the attributes of activities need to be measured, each activity should be characterized by means of a chain of qualities A1 (a1, a2, ... an) which will create the matrix of activities..(the activity matrix consists of particular boxes placed in the two dimensional space.) Particular boxes signify relevant qualities of the activities depending on the location of the matrix The quality of an activity is understood as a property necessary for its development. The values displayed in particular boxes of the matrix signify the importance of the quality with a view to how it will facilitate carrying out of a given activity most optimally.

Competence – specific, identified, definable and measurable knowledge, skill, ability or behaviour which may be exhibited by a human resource within a range of activities performed by him/her. An example of such competence may be independence/fluency in a certain field gained through completed and developed tasks and thanks to the support given to others and which, additionally, is significant from the point of view of effectiveness of carrying out of a specific task in a specific context (see Section 2.2 and table 1). With the view to the necessity of measuring the attributes of competences, each activity needs to be characterized by means of a chain of qualities I1 (i1, i2, ..., in), which will form a matrix of competences. The matrix of competences is a set of competences exhibited by an entity. A particular competence is represented by a box in the matrix. The value displayed in a given box signifies the level of competence exhibited by an entity to which the matrix refers.

So as to assess if the assigned team ‘described’ by competence matrix is ‘adequate’ to develop a project which is ‘described’ by activity matrix, it is necessary to check the cover of competences with the activities by means of mapping, fig. 7.

Table 1. Scale of the assessment of the level of independence/fluency in a particular field on the basis of a complexity of tasks and assistance given to others

Quality/description of a particular competence	**evaluation**
I do not have any knowledge in this field	0
I have some knowledge but little or no practice	1
I have the experience and can work, however consultations with colleagues or superiors will be necessary	2
I have experience and I am able to undertake any tasks independently	3 YES
I have extensive experience that I efficiently make use of in complex situations; I offer my advice to my colleagues	4
I am an acclaimed leader in this field; my comments contribute to enhancing the state of expertise in the company	5

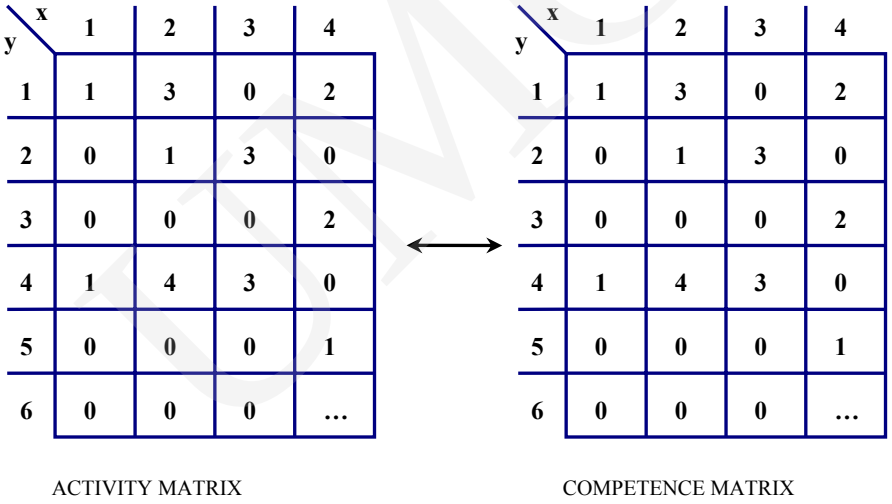

Fig. 7. Mapping activities and competences

The matrix of mapping is a function of assigning applicable competences to the qualities of certain activities while specifying their minimum level. Let us consider the box (x;y) = (1;1) in the matrix of mapping. It should be interpreted in the following way: for the quality of an activity marked by the box (x;y) = (1;1) in the matrix of activities the corresponding competence is marked by the box (x;y) = (1;3) in the matrix of competences, provided that the level of the exhibition of the competence is at least 5 because only then can the quality be covered by the competence in 100%. If the level is lower, the quality is covered by a proportionally lower fraction. The total of significance of all qualities characterizing particular activities equals 100% of its cover. So as to calculate the total cover of an activity it is necessary to sum up the products of cover of each quality and the percentage of significance within one activity.

y \ x	1	2	3	4
1	(1;3), 5	(1;4), 4	(1;1), 3	(1;2), 5
2	(3;2), 2	(4;1), 3	(5;1), 3	(6;2), 4
3	(5;4), 3	(3;1), 2	(3;3), 2	(4;2), 3
4	(6;1), 4	(6;3), 5	(2;1), 5	(5;2), 5
5	(2;4), 5	(2;2), 4	(4;3), 5	(5;3), 5
6	(2;3), 5	(3;4), 5	(4;4), 4	…..

Fig. 8. Mapping matrix

Example:

y \ x	1	2
1	5	4
2	5	2

ACTIVITY MATRIX

y \ x	1	2
1	2	5
2	0	4

COMPETENCE MATRIX

y \ x	1	2
1	(1;1),3	(2;1),5
2	(2;2),4	(1;2),4

MAPPING MATRIX

Fig. 9**.** The investigation of covering the competences of the project – activities

Table 2.Analysis of the cover of activities and competences

Qualities (x;y)	Significance of a quality in an activity	Cover of quality with competences
(1;1)	$\frac{5}{5+4+5+2} * 100\% = 31.25\%$	For quality (1;1) the required competence is (1;1) on the level of at least 3. Since the level of exhibition of the competence is 2, the cover of the quality by the competence will not equal 100% but will be proportionally lower, i.e.: 66.67%
(1;2)	25%	100%
(2;1)	31.25%	100%
(2;2)	12.5%	0%

The cover of an activity is a sum of products of significance of a quality in an activity and of the cover of a quality with the competences for all qualities describing an activity.

The cover of an activity $= 31.25 * 66.67 + 25 * 100 + 31.25 * 100 + 12.5 * 0 = 77.08\%$

But how can competences corresponding to the applicable qualities of activities and their minimum level be specified? At a primary level an intuitive mapping matrix is built which defines the relation between a quality and a competence. The level of exhibiting a competence is established at the highest possible. The mapping matrix, however, is not constant and is modified on the basis of experience gained through already developed projects, which are stored in post-mortem metrics (see point 4.5. Post-mortem metrics).

5.4 Covering projects

Since a project may be decomposed into activities, the cover of a project may be understood as a possibility of a cover of all the activities, with a view to their significance in the realization thereof. Hence, a project, like an activity of a team member, may be described by means of a matrix. A project's matrix is similar to that of the activity's except that the box of the former represents an activity and the value in the box stands for the significance of the activity from the point of view of the realization of a project. Zero value means that the activity is not used in the project.

This approach, however, has a certain limitation, i.e the set of the possible activities must be finite and predetermined.

y \ x	1	2	3	4
1	1	3	0	2
2	0	1	3	0
3	0	0	0	2
4	1	4	3	0
5	0	0	0	1
6	0	0	0	…

PROJECT'S MATRIX

y \ x	1	2
1	3	3
2	1	5

PROJECT'S MATRIX

Example:

Table 3. The cover of an activity in a project

Activities (x;y)	Significance of activity in a project	Cover of activity
(1;1)	$\frac{3}{3+3+1+5} * 100\% = 25\%$	70%
(1;2)	25%	89%
(2;1)	8.33%	95%
(2;2)	41.67%	57%

The cover of activity is a total of products of activity significance in a project and its cover for all activities performed within a project.

Cover of project $= 25 * 70 + 25 * 89 + 8.33 * 95 + 41.67 * 57 = 71.42\%$

The coefficient of cover is understood as the accessible resources whose competences allow for the realization of the required activities in a project at the level of 71.42%.

5.5. Post-mortem metrics

The post-mortem metrics in the above discussed approach to project management have two applications. Firstly, they may be used to model the competence matrix through determining the minimum level of exhibition of competences and modifying the quality-competence relation. Secondly, they may facilitate the estimation of the cost of project's cost evaluation.

6. Analysis of risk of particular project's activities

The analysis of cover of particular activities (selected components of a project) facilitates the decision on outsourcing. Uniform metrics, which allow for the assessment of risk relating to the competences of a team designated to develop a component, aids in comparing the costs of outsourcing or expanding the competences of the assigned team. Fig. 10 illustrates a structure of a process which supports the building of competence metrics for selected components. The input data is projects that contain information on the required level of competences and the organizational structure of the project team.

When using the competence model, the teams are mapped into the particular project's components. The output assignment is optimal with relation to the available resources. The metrics of evaluation of risk associated with competences for particular components promote a PM's decision of ICT project concerning outsourcing.

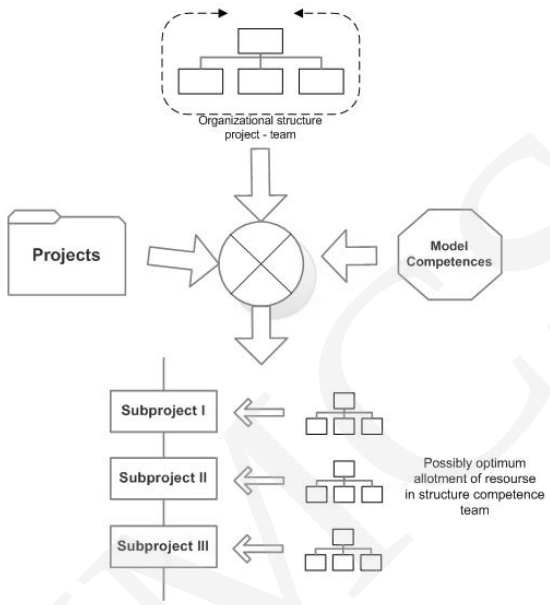

Fig. 10. Model of minimizing risk by streamlining usage of possessed resources

6.1. Outsourcing as a tool of minimizing the risk of project developing

A substantial significance in the development of the outsourcing services market has the increase of IT awareness of project managers and the ability to select those activities which will be effectively realized by specialist outsourcing companies. The use of outsourcing allows to concentrate on key areas of the functioning of an enterprise and promotes effectiveness of designing IT systems. An enormous advantage of outsourcing is the reduction of risk associated with particular components of a project due to the fact that the risk is shared with an outsourcer (who is financially liable for any faults or failure to comply with the conditions of a contract). Outsourcing facilitates the access to top specialists and technologies while eliminating the need to upgrade competences of the employees – it is especially important in the case of projects of highly specialized and narrow range of application.

However, it would be difficult to determine definite criteria which could be applied whenever a decision must be made concerning the use of an outsourcing company. The ICT managers must thoroughly analyze not only the projects under development but also the level of competences of the team, its ability to perform the functions that could be outsourced and the costs of the minimization of risk connected with it within the enterprise.

Figure 11 is a suggestion of a decision supporting process of an ICT manager relating to outsourcing. The first step is the analysis of projects under development and their decomposition into hermetic components which may be

outsourced in full. On the basis of database of the post-mortem metrics that relate to the projects developed within the enterprise and the current structure of the competences, particular components will be selected that are encumbered with the highest organizational and technological risk. Any such components are potential candidates to outsourcing. In the case of the post-mortem metrics, the aspects connected with outsourcing companies which have already been used to develop projects should also be taken into account. One of the criteria of choice of an outsourcer is its accountability, precision and skillful realization of tasks. These qualities may be assessed based on the review of already performed contractual tasks, visits and reference letters. Taking into account the core business of the enterprise, a PM of an ICT project shall decide whether a supplementary insurance is necessary against any undesirable events connected with a high risk of the selected functions.

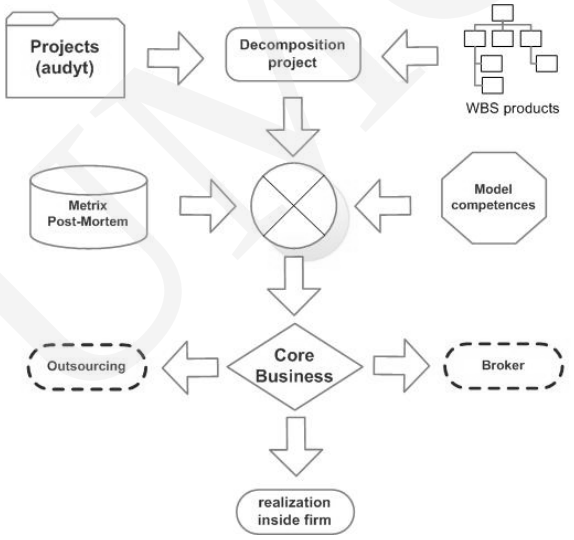

Fig. 11. Minimizing project risk – outsourcing

Another choice is to order the performance of all tasks to the internal team, which may frequently entail the necessity to upgrade the level of competences and pass a budget that will allow to lower adequately the level of risk. A PM may also refer selected components to external companies and share the risks with an outsourcing company.

7. Conclusions

Joining the leaders of the ICT sector is a challenge for many companies and corporations in the IT market. It has also been a challenge for countries since 1999 when 17 of them reached the level 82% of the total share in the world

export of IT goods[1]. The sector of ICT services and IT equipment is highly international. Hence, a large percentage of production and sales is performed by an overseas subsidiaries of corporations. Such trends may also be observed in Poland, where the production costs are significantly lower than in other, well developed parts of the world (USA, UK, Germany vs. Poland, Ukraine, India). However, lower costs of production will soon cease to be a decisive factor in attracting foreign IT companies, mostly due to globalization. Therefore, the search for and implementation of good practice in project management is of the highest importance for the Polish ICT market. Nowadays, the core of interest of project managers lies in the development of tools that would prevent from exceeding the budget or time as well as in the compliance with the customers' needs and expectations relating to the scope and quality of the developed projects. To build a competitive ICT enterprise entails the increase of safety of developing IT projects by upgrading the competences of the team responsible for their completion. The implementation of the competence model and management of knowledge through designing development paths for employees is very costly, it may therefore be introduced only in large ICT companies. The most considerable improvement of indices: the percentage of successfully completed projects against the cost of production was reported in large size companies. Whereas in small size enterprises a significant increase (50%) of costs was observed with only a small increase of the index of successfully completed projects. According to Standish Group, there are three main factors which condition a successful completion of a project and these are:

1. The current trend of decomposing projects into smaller applications.
2. A general increase of the skills and competences of project managers (certificates for Project Managers) and the development of project management.
3. Popularization of the standards and tools facilitating project management, including cost monitoring.

In my opinion, the fourth factor which will enhance the effectiveness of ICT projects, i.e. reduction of costs, is the necessity to:

4. Increase of the automation of production processes and better application of ready components.

The first three recommendations – factors which influence the increase in number of successfully accomplished projects have been established thanks to the more and more powerful authority of PM associations and organizations as well as popularizing the standards [10,11]. We may thus expect that the further

[1]These were: USA, Japan, Taiwan, Germany, Malesia, Great Britain, Singapur, Korea, Mexico, France, Holland, Phillipines, Thailand, Canada, Hongkong, Hungary.
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consolidation of the ICT market and the strengthening of the discussed tendencies will turn the death march into success march [12].

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