



RISK MANAGEMENT IN E-LEARNING PROJECTS OF COURSES DEVELOPMENT AND IMPLEMENTATION

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Summary

The aim of the article is to present elaborated risk management model in project management of e-learning courses development and implementation. Showed model of risk management is a part of a complex, integrated model for e-learning projects' processes management. The starting point of the article is an analysis of the current state of scientific literature in the field of project management for e-learning courses with a thesis that there are no suitable models adapted to the specifics of e-learning. For the thesis confirmation a case studies of four e-learning institutions with significant experience in e-learning field is being shown. Developed risk management model is presented in the third part of the article. It starts from showing elaborated general processes map, with integrated risk management. Finally detailed risk management models for distinguished processes are being presented. The article is based on case studies of European institutions with significant e-learning projects realization experience, like: Oncampus, Lübeck University of Applied Science from Germany; Distance Education Centre, Kaunas University of Technology from Lithuania; Center of Distance Education Development, Higher Banking School and Educational Portal of University of Gdansk, University of Gdansk. It also includes author's six years experience gained by participation in e-learning projects, like international Baltic Sea Virtual Campus and national POKL as courses' author, instructional designer and it coordinator.

Keywords: e-learning, risk management, project management

1. Risk management in general models for developing e-learning courses

Experts generally agree that the ADDIE model (fig. 1) is a good illustration of the essential steps in the instructional design and development process of e-learning courses [14].

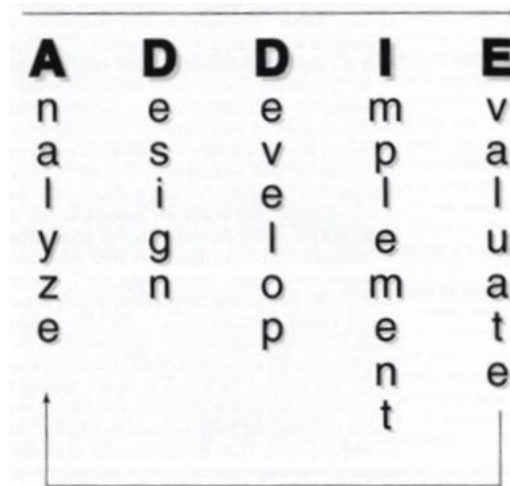


Fig. 1. ADDIE Process [12]

ADDIE is an acronym of Analyze, Design, Develop, Implement and Evaluate, and the process itself is a model very similar to the cascading life cycle of systems. It does not contain any elements corresponding to the specifics of e-learning projects in course development and implementation field. Thus the main role of the ADDIE process is as a framework for creating more formally and fully developed project management models for e-learning [2].

Other models, more adjusted to the implementation of course development processes in e-learning projects are: Kemp, Morrison, and Ross's Instructional Design Plan and Dick and Carey's Systems Approach Model for Designing Instruction (fig. 2). Both have a very general manner and are restricted to the processes involved in designing e-learning courses and only connections between the main processes have been modeled without integrating workflow and document flow management and important economic categories like time or costs management. Risk management is not taken into consideration at all.

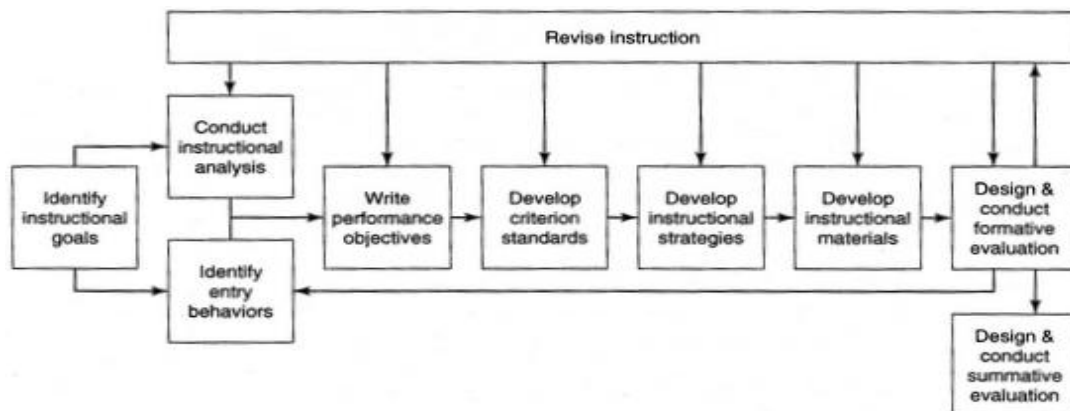


Fig. 2. Dick and Carey's Systems Approach Model for Designing Instruction [6]

2. Case study of project management models for e-learning courses development

To confirm weaknesses in the general models presented in the first part of this article a case study analysis was conducted. Management models were studied for the course development process in four e-learning institutions:

- Oncampus, Lübeck University of Applied Science, Germany

- DEC (Distance Education Centre), Kaunas University of Technology, Lithuania (fig. 3)
- CERO (The Center for Distance Learning Development), Higher Schools of Banking, Poland
- PEUG (Education Platform of University of Gdansk), University of Gdansk, Poland

A detailed analysis of models adapted by these institutions for the process of managing course development was conducted in the fields of:

- process modeling (fig. 3),
- risk management,
- workflow management,
- document flow management (fig. 4),
- control management,
- quality management,
- time management,
- costs management,
- resources management,
- communication management.

Research showed that none of analyzed institutions elaborated a project management model of e-learning courses development on any of the general concepts described in the first part of this article. Analysis confirmed the main research hypothesis that management models are characterized by over-generalization and lack of adjustment to the specifics of e-learning projects, with the result that educational and training institutions do not use any of the given models, even as a basis for their own management system elaboration.

Fig. 3 presents an example model - the model used by DEC for managing the process of course development. It is adapted to e-learning specificity and contains a DEC project management assumption to delegate to the author the implementation of many of the processes involved. Thus the model distinguishes processes in the development of didactic personnel's competencies (fig. 3).

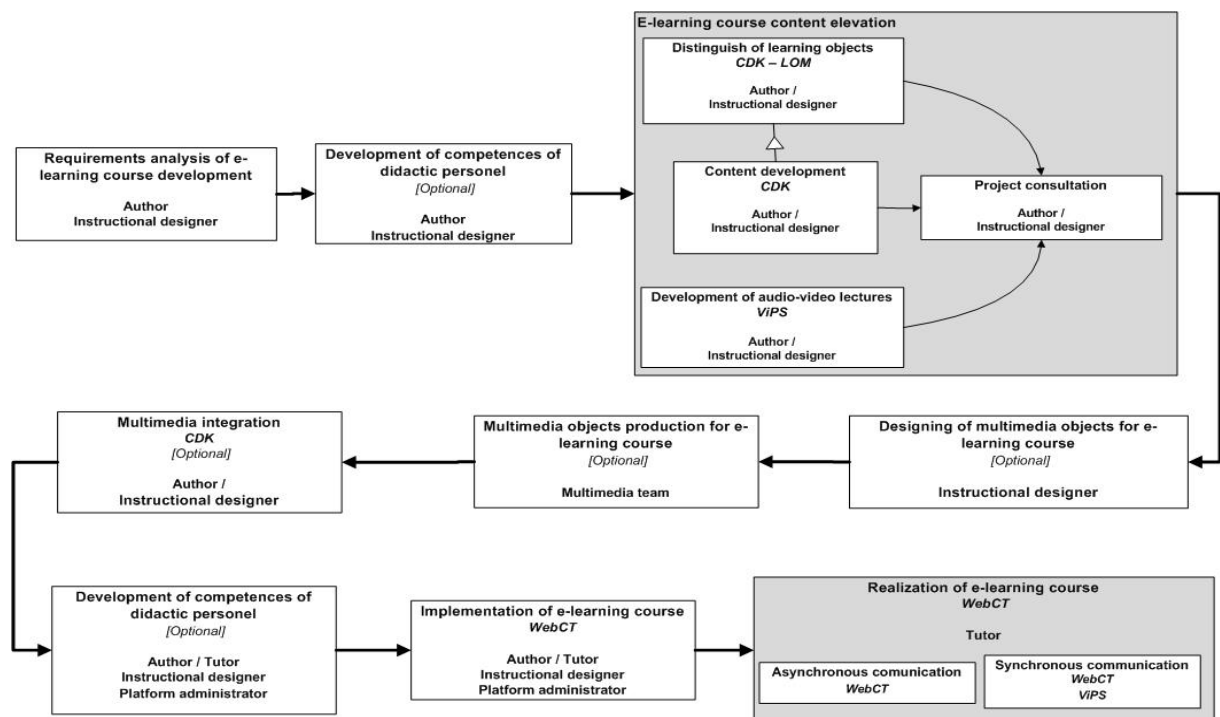


Fig. 3. Example of model for managing process of course development – DEC

Institutions like Oncampus, DEC, CERO and PEUG model their course development process adjusted to specific needs. In spite of this, extensive research has shown many common elements, important faults and inquisitive processes (table 1).

Table 1. Similarities and differences between course project management models: Oncampus, DEC, CERO, PEUG.

Common elements	Missing elements	Inquisitive integrated processes
1. management not based on standard models for e-learning course development	8. lack of formalization in many processes	11. requirements analysis process (Oncampus, DEC)
2. process approach dominates	9. lack of elaboration processes for lower levels of model	12. quality management process (CERO)
3. models have general view based on main processes distinction,	10. lack of precise integration within process modeling important project management categories like: risk, control, quality, time, costs, resources, workflow, document flow and team communication.	13. evaluation and consulting processes (CERO and PEUG),
4. modeling concentrates mainly on design processes		14. development of competencies of didactic personnel (DEC),
5. instructional designer is main coordinator of processes		15. outsourcing of processes (CERO and PEUG).
6. precise definition of project members' roles,		
7. strong process support with authoring tools for reducing number of programmers.		

The standard models presented in the first part of this article do not take any important project management categories into consideration. All analyzed institutions' models are general, concentrate on process modeling and miss project management categories like: risk, control, quality, time, costs, resources, workflow, document flow and communication. Proper e-learning projects management is mainly based on individual instructional designers experience with general guidelines on institutional level. Analysis showed that risk management is not formalized at all on institutional level and that instructional designers manage it only with a use of personal experience, with no models, checklists or tools support.

The lack of models for e-learning projects management categories like risk management is also confirmed by used documents analysis. Many different documents are used by particular institutions, and as in the case of processes, many common elements, important faults and inquisitive processes can be distinguished (table 2). None of institutions elaborated documents templates assigned for risk management.

Table 2. Similarities and differences between course project management documents: Oncampus, DEC, CERO, PEUG.

Common elements	Missing elements	Inquisitive documents
– design process strongly based on templates,	– only main processes have formal documentation;	– learning units design/development template (DEC),
– formalized e-learning course component sequencing,	– documents missing for many processes of production, implementation and evaluation;	– diagram of e-learning course implementation (Oncampus),
– web pages of components designed and developed with authoring tool templates;	– lack of documents for project management categories like: risk, control, quality, time, costs, resources, workflow, document flow and team communication..	– naming system for sequencing (Oncampus, PEUG),
– multimedia object specifications created based on word processing templates (except for DEC which does not use templates for designing multimedia objects),		– sequencing activities template (DEC),
– final modules in SCORM format.		– learning objects taxonomy (Oncampus, PEUG).

3. Model for risk management in e-learning projects of courses development and implementation

General character of analyzed models with lack of integration of many management categories showed the need of elaboration of proper e-learning project management model [13]. Such formalized and integrated system with risk management for e-learning projects realization contributes to development and implementation of high quality of e-learning courses supporting building society based on knowledge. Risk management integration in models for processes management of e-learning courses development and implementation supports punctual projects completion [11] by prior risk identification and assisting in fast implementation of correcting activities.

The project management model for developing e-learning courses with risk management integration was elaborated on the basis of a number of elements, i.e.:

- analysis of specialist literature in the field of e-learning courses development, project management, instructional design and Web 2.0 technologies;
- case studies (documentation and interviews) of management of e-learning project by the following institutions: Oncampus, DEC, CERO and PEUG (as presented in the second part of this article);
- the author's own experience in the process: participation in national e-learning projects and one international project - BSVC (Baltic Sea Virtual Campus).

Risk management is one of the project management categories integrated into model for e-learning course development and implementation [10]. It is strictly connected to activities realized during processes flow. Such modeling system enables to easily identify key activities from risk management view.

The general model consists of 4 stages with 6 related processes (fig. 4) that have risk management integrated. Between processes there are three types of connections: information flow (marked as arrow with letter i), document flow (marked as arrow with letter m) and control flow (marked as arrow with letter k), where control flow means delegating the management of process realization outside the organization itself and is connected with Evaluation and revision of the implementation process [10] (fig. 4).

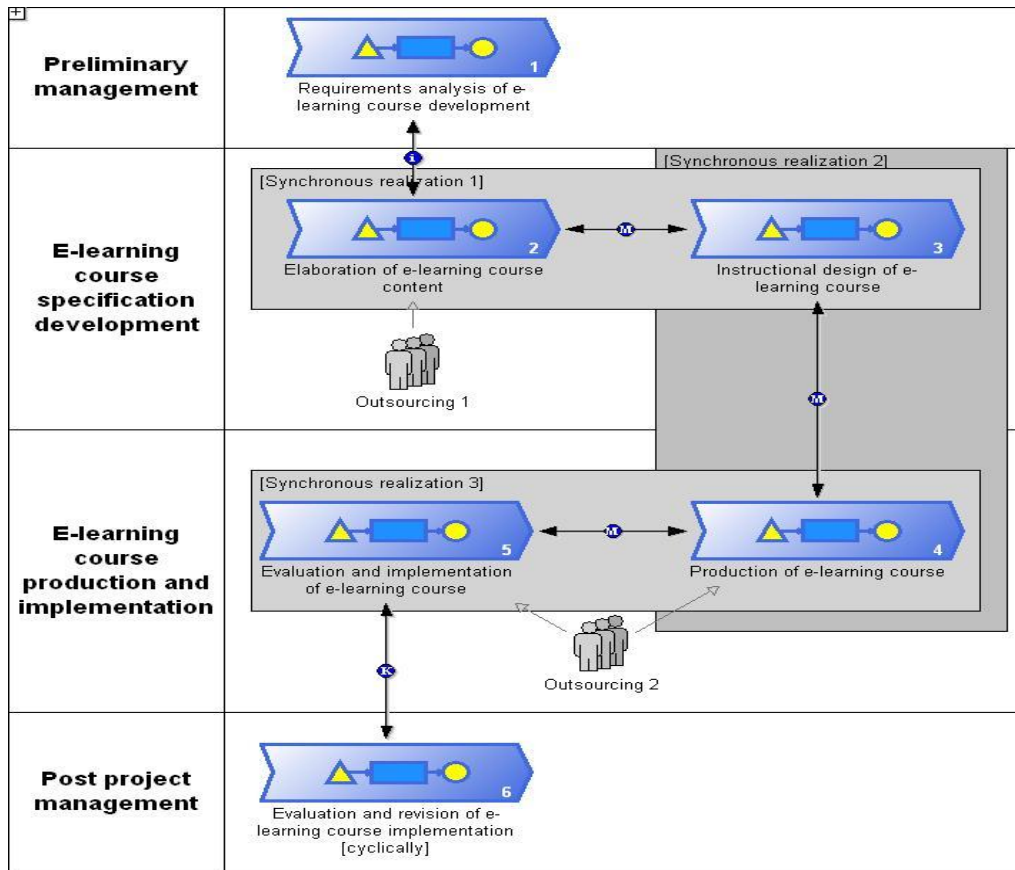










Fig. 4. Map of processes for project management of e-learning courses

Risk management is included in all main processes of the processes map that are modeled on individual diagrams (fig. 5). Process activities encumbered with the need of risk management have proper indication by special symbol (table 3) from the notation system elaborated by the author of model.

Table 3. Notation symbols used for identifying management categories

Symbol	Description
	risk management
	document flow management
	quality management
	communication management
	costs management
	time management
	control management
	resources management

Activity that has risk management defined on a separate diagram has a proper symbol localized in the right corner of itself (fig. 5).

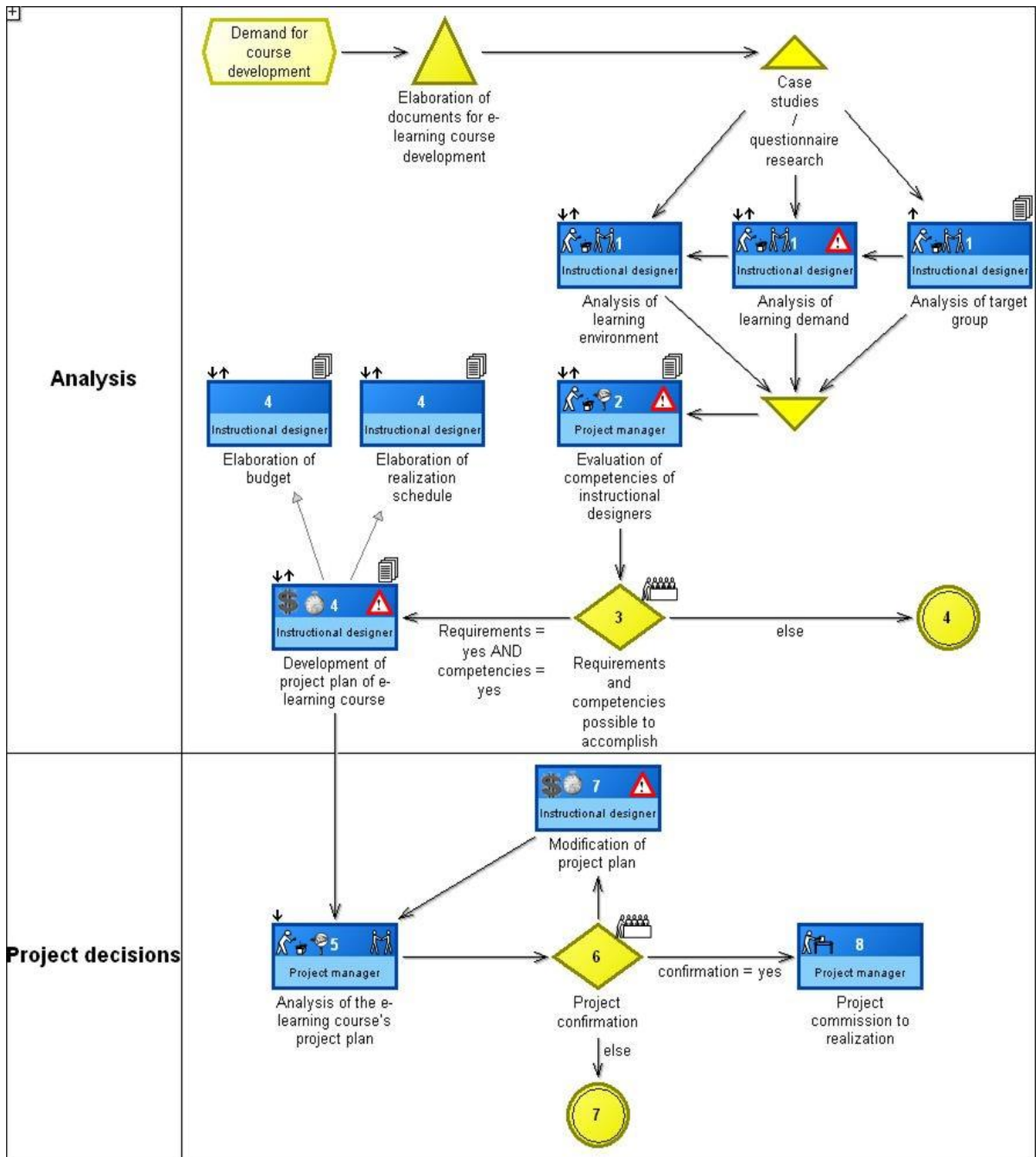



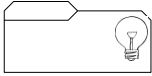


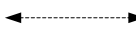


Fig. 5. Example of process model - Requirement analysis of e-learning course development

Each of processes models contains ascribed model for risk management category (fig. 6). Proper diagrams exist for processes: Requirements analysis of course development, Elaboration of e-learning course content, Evaluation and implementation of e-learning course, Evaluation and revision of e-learning course implementation. Due to complexity for processes of Instructional design of e-learning course and Production of e-learning course diagrams maps were also prepared.






For modeling dedicated, elaborated notation was used not connected to languages like UML or BPML.(table 4).

Table 4. Notation used for risk management for e-learning courses development and implementation

Symbol	Name	Description
	activity	Activity that requires risk management. Has the same name as activity name on a process diagram.
	risk	Risk that exists for distinguished activity.
	risk factor	Factor for distinguished risk. Table on the right side of the symbol contains information about: <ul style="list-style-type: none"> • risk factor type, • risk factor probability - 1 (lowest) – 5 (highest) • risk factor impact - 1 (very low) – 5 (critical) One risk may have many risk factors. One risk factor may have more than one connected risk types.
	risk factor solution	Solution for risk factor. One risk factor may have many solutions. One solution may be ascribed to many risk factors.
	risk flow	Connector that shows flow of risks connected to process activities. Risk flow is analogical to activities flow.
	risk factor connector	Connector between risk and risk factors. Shows relations between risk and risk factors.
	solution connector	Connector between risk factor and solutions. Shows relations between risk factor and solutions.

Probabilities and impacts values have empirical character and are based on authors' e-learning projects management experience. There is no data in literature and also there was no possibility to get proper data during case study analysis. Types of possible to be found risk factors were also identified on the basis of author experience (table 5).

Table 5. Notation symbols used for identifying types of risk factors

Symbol	Description
	time
	finances
	resources
	human resources (for example skills or specialists availability)
	communication (for example different opinions)

Risk management model diagrams contain risk flow analogical to flow of activities for processes (fig. 6). Diagram below presents risk management for the least complicated process of Requirements analysis of course development.

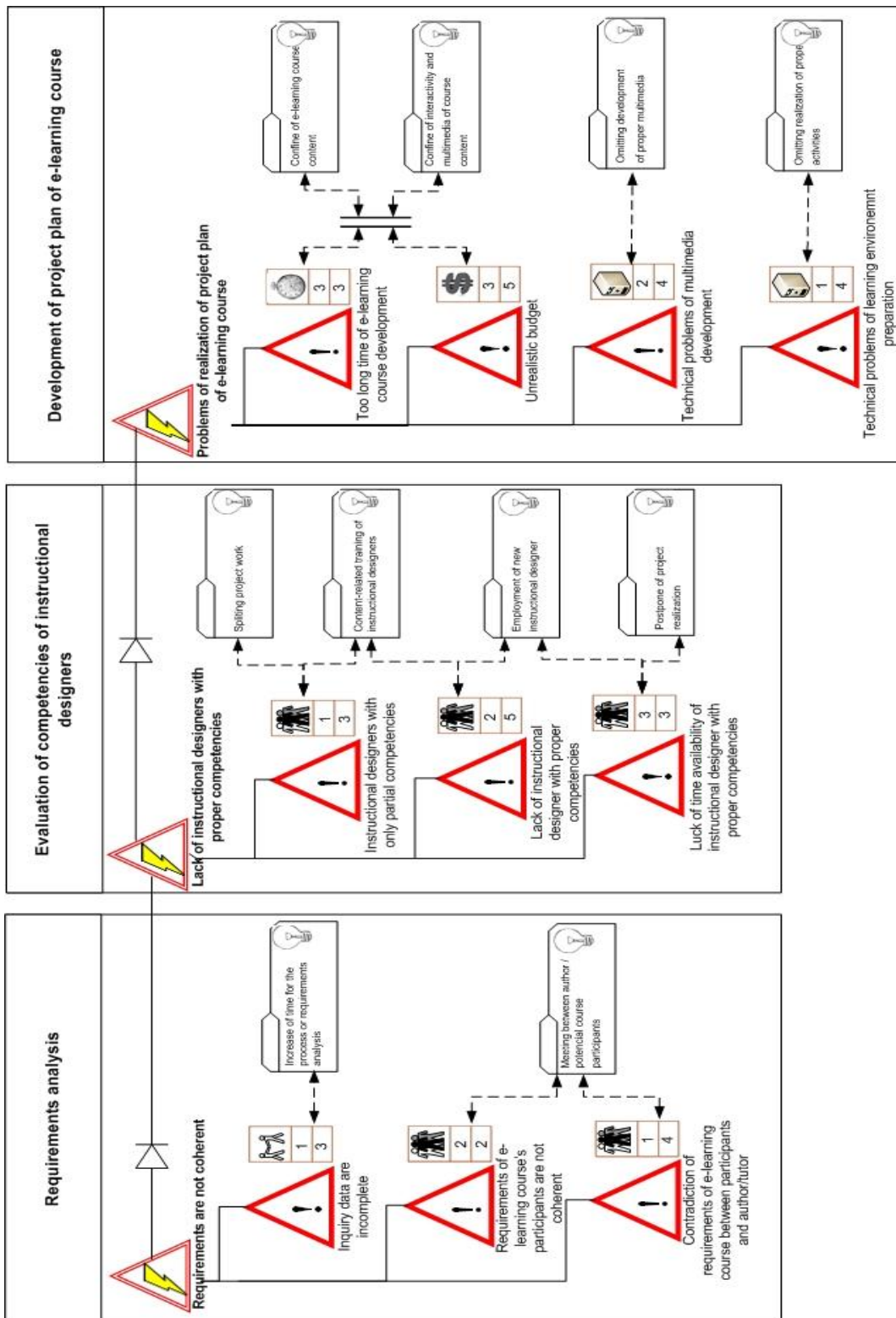


Fig. 6. Example of risk management model – Requirements analysis of course development

Analogical to diagram on fig. 6 risk management is modeled for the rest of processes. Such a group of diagrams connected with processes models creates a complex, global model for risk management in e-learning projects.

Integral part for risk management have documents ascribed for particular activities. Integration with processes model is on the basis of showing input, output documents and connected with them templates (fig. 7).

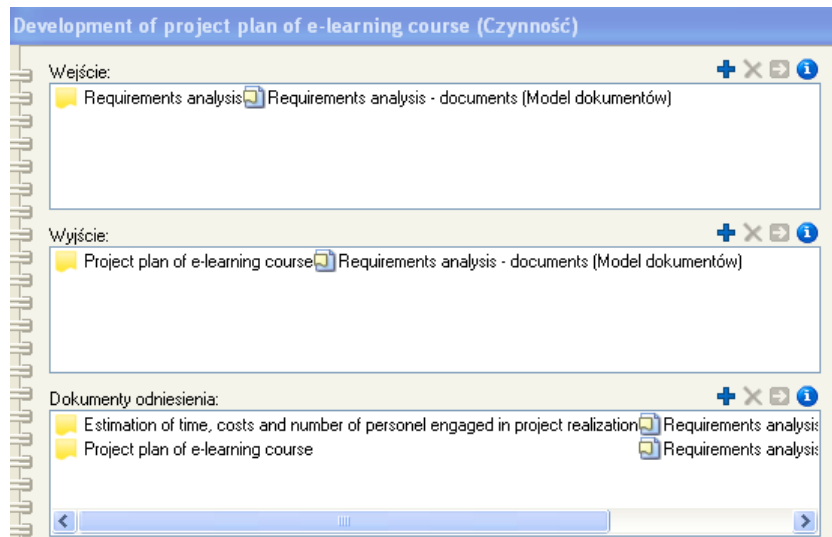


Fig. 7. Example of documents connection to activity – process of Requirements analysis of course development

Risk management documents are connected with other project management documents and modeled on documents flow diagram (fig. 8). Their connection to activities ascribed for risk management helps in preventing and dealing with risk. Documents flow model for the process of Requirements analysis of course development contains three documents for risk management:

- Requirement analysis – important for proper project initialization without risk of inappropriate course development from the side of content, target group and environment;
- Evaluation of competencies of instructional designers – useful for analyzing compatibility of instructional designers skills with requirements;
- Estimation of time, costs and number of personnel engaged in project realization – proper for estimating values needed in elaboration of budget, schedule and project plan.

Pointed out document are also used for other project management categories like quality management.

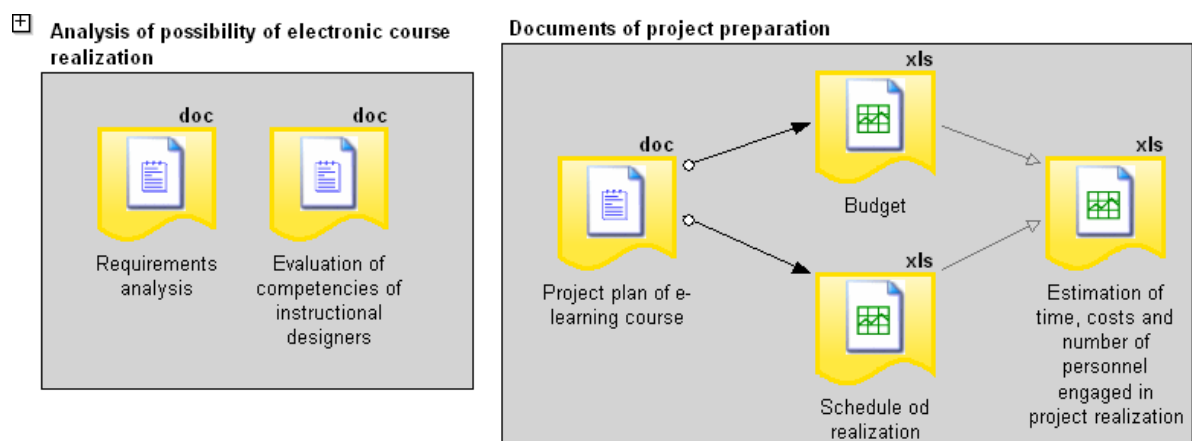


Fig. 8. Example of documents flow model – Requirements analysis of course development

All the distinguished documents for processes' activities (input, output and connected) have templates prepared, e.g., Requirements analysis, Evaluation of the competencies of instructional designers or Estimation of time, costs and number of personnel engaged in project realization. This also applies to all documents connected with risk management (fig. 9).

Processes	Estimation of time and costs and number of engaged personnel in project realization										Remarks		
	Unit	Quantity	Parameters ¹			Cost per unit	Total cost ⁴	Time per unit (hours)	Total time				
Process of requirements analysis of e-learning course development and implementation													
Requirements analysis of e-learning course	meeting		Modifier of materials preparations									Total time = quantity * time per unit * modifier Total cost = quantity * cost per unit * modifier	
Process of elaboration of e-learning course's content													
Elaboration of e-learning course's script	page		Level of content complexity									¹ Multiplier Very low Low Average High Very high 0,8 0,9 1 1,1-1,5 1,5-2,0	
Elaboration of basic concept of e-learning course's form of presentation	object		Level of presentation form complexity		Level of interactivity and multimedia								
Process of e-learning course design													
Design of e-learning course components templates for website	template		Level of graphical complexity		Level of functional complexity								
Design of e-learning course's content structure: didactic, formal and operational	structure		Amount of course' content ²		Level of material complexity ³							² According to elaboration of e-learning course's script	
Design of multimedia objects:	object		Level of development complexity		Level of functional complexity							³ Wartość analogiczna jak dla "Przygotowanie wstępnej koncepcji prezentacji i realizacji"	
Non-interactive graphics													
Interactive graphics													
Multimedia presentations													
Web 2.0 multimedias			Level of development complexity		Modifier of use of Web 2.0 technologies ⁴							⁴ According to multiplier table	
Design of activities	activity		Level of development complexity ⁴		Modifier of use of Web 2.0 technologies ⁴								
Designed components integration	learning unit		Complexity of e-learning units ⁵									⁵ Number of learning units' components	
Inserting corrections	object	⁶	Complexity of modifications									⁶ ~number of projects with changes = number of objects / 6	
Process of e-learning course production													
Production of pages templates	template		Level of graphical complexity ⁷		Level of functional complexity ⁷							⁷ According to design of e-learning course components templates for website	
Production of multimedia	object		Level of graphical complexity ⁸		Level of functional complexity ⁸							⁸ According to design of multimedia objects	
Inserting corrections	object		Complexity of modifications ⁹									⁹ ~number of objects with changes = number of objects / 6	
Components integration and installation packages development	learning unit		Complexity of learning units ¹⁰									¹⁰ According to designed components integration	

Fig. 9. Example of template for risk management in e-learning project – Estimation of time, costs and number of personnel engaged in project realization

Summary and conclusions

The present study presented the concept of a model of risk management for e-learning projects. As a starting point, a review of e-learning courses development models in literature was given with an outline of their weaknesses in risk management field. A description of case studies analyses of e-learning courses development models elaborated by e-learning higher education institutions was provided in the second section. The research itself focused on process connections and project management categories: risk, control, quality, time, costs, resources, workflow, document flow and communication. Analysis proved that the management processes are not based on standard projects management models for e-learning. The second part of the article also highlighted similarities and differences in processes proving their general view on project management and lack of integration of many important categories with risk management as the most important one. The article concluded with a presentation of a risk management model for e-learning projects management, elaborated on the basis of literature, case studies and the author's personal experience. The model consists of many risk management diagrams connected with modeled processes. It also provides proper risk management documents' templates for distinguished activities.

Further research is currently being conducted in the field of model implementation during a national e-learning project run by the University of Gdansk, connected with the development of six e-learning courses. The research taken from September 2009 to July 2010 will permit model evaluation and revision in many areas, also from risk management perspective:

- analysis of missing risks and connected with them management documents;

- analysis of the complexity of risk management flow for processes and the connectivity between them;
- analysis of completeness of risk management solutions ascribed for risk factors;
- assessment of developed risk management model impact for e-learning project punctual realization.

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ZARZĄDZANIE RYZYKIEM W ROZWOJU I WDRAŻANIU PROJEKTÓW KURSÓW E-LEARNINGOWYCH

Streszczenie

Celem artykułu jest przedstawienie autorskiego modelu zarządzania ryzykiem w zakresie gospodarowania projektami kursów e-learningowych. Autor pokazał model zarządzania ryzykiem jako część zintegrowanego modelu zarządzania projektami procesów e-learningowych. Punktem wyjścia dla prezentowanych treści była analiza obecnego stanu literatury naukowej w dziedzinie zarządzania projektami e-learningowymi z tezą, że nie istnieją odpowiednie modele dostosowane do specyfiki ryzyka w e-learningu. Dla potwierdzenia tak sformułowanej tezy zostały zaprezentowane studia przypadków czterech instytucji posiadających znaczące doświadczenie w dziedzinie e-learningu.

Słowa kluczowe: nauczanie na odległość, zarządzania ryzykiem, zarządzanie projektem

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