

# Procedural Model for Selecting Enterprise Systems Based on Project Management Software

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**Abstract - Project management software helps companies plan, execute and control projects. The simpler and more efficient the processes for projects are executed, the more profitable and more successful the projects are for companies. Therefore, the process of defining and selecting requirements for a project management software is an important success factor for any company in any industry and company size. Based on a qualitative analysis of existing procedural models for the selection of project management software, a procedural model for the selection of project management software is developed and validated with two user cases. So companies can execute and support projects for the selection, implementation and continuous development of project management software even more efficiently.**

**Keywords – activities, analysis, enterprise systems evaluation, model, provider, procedural model, requirements, requirements management, project, project management software, selection, software, tasks**

## I. INTRODUCTION

Project management software is a type of software in the family of enterprise systems. The term Enterprise Systems subsumes for example Business Intelligence, Customer Relationship Management, Enterprise Resource Planning, Product Lifecycle Management, Production Planning System and many more. Enterprise systems therefore subsumes all software systems that are used to conduct and execute business processes in a company [1].

Project management software is used for a wide variety of projects in a company including enterprise systems projects to select, introduce and continuously develop them.

Project management software is usually modular and consists of various modules or components such as multi project management, project controlling, portfolio management, resource management, and so on. [2]. These modules, with a variety of functions, are usually found in the original project management software but also in other enterprise systems types such as Enterprise Resource Planning. They are sold and implemented by different vendors (manufacturers and implementation partners) [3].

In contrast to Enterprise Resource Planning, there are less scientific publications for the selection and evaluation of project management software [4]. In recent years (publication year: between 2009 and 2016) different consulting companies and consultants have dealt with the domain of selection and introduction of project management software and have developed their own process models with different phases and sequences as well as tasks and activities (see table 5 in annex). These models can be found mainly on their websites or in special journals.

Many authors offer selecting consulting services, tools or platforms (see table 6 in annex). The consultancy service often consists of requirement assessment and requirement definition for the selection of project management software.

The aim is to develop a procedural model for selecting project management software from existing process models and to validate it with two user cases. The introduction or implementation of the project management software is excluded (Implementation phase included in five analyzed procedural models (see Table 6 in annex).

## II. METHODOLOGY

The analysis of different process models for selecting project management software takes place in two successive phases:

- In the first phase, a literature analysis (see list of literature) is carried out in order to find and identify possible procedural models for the selection of project management software.
- In the second phase, a detailed word analysis [5] is performed. Sources, phases, activities and tasks are coded, analyzed and finally summarized. As an example, the condensation of the term "define" is mentioned here:

Define: appoint, define, establish, form, etc.

Based on the literature and word analysis, a sequence of identified and summarized phases for the new procedural model for the selection of project management software is determined. Three different calculation methods are used to find a new procedural model for selecting project management software [6]:

- Mean from the first and last identified phase digit (see column heading A in Table 1)
- Average valuation with sum of the multiplication per phase location in the order and number of phase designations (see column heading B in Table 2)
- Normalize (scaling to "one", see Table 7 in annex) of phases per procedural model and average valuation (see column heading C in Table 2)

#	Phase	Nomination in phase	$\Sigma$	A	R1
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Tab. 1: Grid to order the phases of the procedural model for selecting project management software I

$\Sigma$ : Number of entries in the eleven previous models analyzed

R1: Order Column A

#	B	R2	C	R3	D	R4
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Tab. 2: Grid to order the phases for procedural model for selecting project management software II

R2: Order column B

R3: Order column C

R4: Order column D

### III. ANALYSIS

#### A. Selection phases of the procedural model for selecting project management software

The analysis and subsequent formation of an order of the eleven procedural models for selecting project management software results in a new procedural model for selecting project management software with seven selection phases (see Figure 1, Table 3 and 4). Only phases are included, which are used at least in four existing procedural models for the selection of project management software.

The present and analyzed procedural models for selecting project management software have a minimum of two phases and a maximum of nine phases. Looking at all eleven procedural models (see Annex) for selecting project management software, the average is 4.72 phases compared to the seven phases of the new project management software selection process.

#	Phase	Nomination in phase	$\Sigma$	A	R1
3	Analyze	1, 2, 4	5	2,50	2
4	Decision	5, 6, 8	4	6,50	7
5	Presentation	4	4	4,00	4
6	Project initialization	1, 2	4	1,50	1
<b>1</b>	<b>Requirement definition</b>	<b>1, 2, 3, 5</b>	<b>10</b>	<b>3,00</b>	<b>3</b>
2	Selection	2, 3, 4, 6	9	4,00	4
7	Test	5, 7	4	6,00	6

Tab. 3: Phases of the new procedural model for selecting project management software I (in alphabetical order)

#	B	R2	C	R3	D	R4
3	2,40	3	0,19	3	<b>2,67</b>	3
4	6,25	7	0,97	7	<b>7,00</b>	7
5	4,00	5	0,64	4	<b>4,33</b>	4
6	1,25	1	0,05	1	<b>1,00</b>	1
1	2,10	2	0,18	2	<b>2,33</b>	2
2	3,33	4	0,85	6	<b>4,67</b>	6
7	5,50	6	0,79	5	<b>5,67</b>	5

Tab. 4: Phases of the new procedural model for selecting project management software II (in alphabetical order)

D: Mean A+B+C

P1 Project initialization phase	P2 Requirement definition phase	P3 Analyze phase	P4 Presentation phase
P5 Test phase	P6 Selection phase	P7 Decision phase	

Figure 1: Seven phase procedural model for selecting project management software (R4)

The analysis of the results shows that the phase of the requirement definition is the most important, since with ten mentions in eleven models it is most common in all models. It can be concluded that you cannot get passed the requirement management. The second most important phase besides the requirement definition is the selection phase with nine responses followed by the analysis phase with five responses in the eleven models.

#### B. Selection activities of the procedural model for selecting project management software

Different tasks and activities are performed at each stage of the calculated project management software selection process. The analysis of eleven procedural models for the selection of project management software presents those tasks and activities that are mentioned at least twice in the procedural models (each in alphabetical order).

##### Project initialization phase

- Define goals
- Describe degree of maturity of the project
- Nominate project team
- Start project

##### Requirement definition phase

- Analyze processes
- Analyze requirements
- Capture processes
- Conduct interviews
- Conduct workshops
- Create request catalog
- Document requirements
- Identify requirements
- Prioritize requirements
- Structure requirements

##### Analyze phase

- Analyze benefits
- Analyze costs

- Define demand
- Define stakeholders
- Define target
- Perform actual analysis

#### Presentation phase

- Assess evaluation
- Comment presentations
- Design evaluation
- Evaluate presentations
- Moderate presentations
- Perform presentations

#### Test phase

- Document tests
- Obtain test positions
- Perform tests
- Schedule tests

#### Selection phase

- Analyze software favorite
- Carry out test positions
- Decision
- Compare requirements
- Conduct call for proposals
- Create evaluation
- Create longlist
- Create shortlist
- Finalize software favorite
- Interview reference customers
- Make presentations
- Make selection
- Negotiate contracts
- Obtain test positions
- Perform feasibility analysis
- Perform fine selection
- Pre-selection
- Visit reference customers

#### Decision phase

- Decision
- Document presentations
- Evaluate presentations
- Perform presentations

## IV. USE CASES

The analyzed and calculated procedural model for selecting project management software has been validated in two user cases.

In the first company, a service company in Austria, the application of the procedural model for the selection of a new project management software was applied as part of a consulting project.

The second company, a large company in the industry of plant engineering and construction with its headquarters in Germany and several subsidiaries all over Europe, the new procedural model for selecting project management software was used in the evaluation of the existing project management software in the course of evaluating the entire enterprise systems landscape.

In the planning phase of both projects for the selection of project management software, the companies identified two gaps in the procedural model for selecting project management software in form of the evaluation phase and the contract phase, as these are two common phases in each selection project for both companies. Therefore, these two phases for the implementation of the selection project were additionally added in the procedural model for the selection of project management software.

In the course of the project initialization phase, it was apparent, that the analysis phase had to be carried out before the requirement definition phase and not the other way around to the service company at the beginning and to the plant engineering company at the end of the project initiation phase. Therefore, this should be taken into account in the new procedural model for selecting project management software. In certain cases, from the point of view of both companies, these two phases could also be conducted in parallel.

Furthermore, in the course of the two selection projects, it was apparent that a specific tendering phase is necessary and should not be included in the selection phase. Therefore, this further phase has been added in the procedural model for selecting project management software.

From the point of view of the two companies, possible reductions of different phases from the proposed procedural model for the selection of project management software were not necessary, as all planned phases are considered indispensable.

## V. EXPERIENCED MODEL FOR THE SELECTION OF PROJECT MANAGEMENT SOFTWARE

The ten phase process model for selecting project management software, derived from qualitative analysis and validation by two use cases, is shown in Figure 2. The calculated procedural model with seven phases for selecting project management software was supplemented by three phases (marked gray) and the order of two phases were changed (analysis phase follows requirement definition phase).

P1 Project initialization phase	P2 Analyze phase	P3 Requirement definition phase	P4 Tendering phase	P5 Presentation phase
P6 Test phase	P7 Selection phase	P8 Evaluation phase	P9 Decision phase	P10 Contract phase

Figure 2: Ten phase procedural model for selecting project management software

From the two use cases, the tasks and activities for the three complementary phases (contract, evaluation and tendering) that were used in both user cases were determined. This also applies to the additions to the requirement phase (each in alphabetical order).

**Requirement definition phase (supplements)**

- Analyze vulnerabilities
- Analyze potentials
- Create specifications
- Define technical requirements
- Define data management
- Document procedural requirements
- Weight requirements

**Tendering phase**

- Get initial offers
- Market research (providers)
- Market research (systems)

**Evaluation phase**

- Carry out evaluation
- Create evaluation criteria

**Contract phase**

- Negotiate project management provider and/or implementation partner
- Negotiate project management software contracts
- Obtain final offers
- Review contracts

**VI. FURTHER RESEARCH**

The two user cases have shown that the calculated order of the determined phases for the new procedural model for selecting project management software is a basis for practical application in companies. It is worth mentioning whether so many phases are really necessary for the selection of a project management software. This depends on the size of the company and the specific requirements or affinity of stakeholders in relation to project management software. The new ten phase model for selecting project management software should therefore be confirmed in a broad and deep analysis. This can be qualitatively verified either by a quantitative survey or by expert interviews. Further use cases can certainly support the results.

**VII. ANNEX**

Author	Selection model name	Number of phases	Procedure	Document type
[7]	Parameta procedural model for software	2	Phases	White paper

	selection			
[8]	Selection help for PPM software	4	Steps	Company folder
[2]	The six steps to the right project management software	6	Steps	Journal
[9]	Project process	4	Phases	Book
[10]	Concept for selecting a project management software	2	Steps	Slides
[11]	Selection and introduction process	6	Steps	Website consultant
[12]	Selection process for project management software	9	Process	Journal
[13]	Selection of project management software	5	Levels	Website consultant
[14]	Software Launch Procedural Model	2	Phases	Website consultant
[15]	Procedural model pmcc consulting PPM software selection	6	Steps	Presentation
[16]	Expiration of a PM software selection	6	Phases	Lecture document

Tab. 5: Investigated procedural models for selecting project management software I

Author	Implementation phase	Selection consultation	Evaluation platform	Evaluation tools
[7]	X	X		X
[8]				
[2]		X		
[9]	X	X		
[10]	X	X		
[11]	X	X		X
[12]		X	X	
[13]		X	X	X
[14]	X	X	X	X
[15]		X		

[16]	X			
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Tab. 6: Investigated procedural models for selecting project management software II

# phase	Division	# phase	Division	# phase	Division	# phase	Division
1	0,0000	1	0,0000	1	0,0000	1	0,0000
2	1,0000	2	0,5000	2	0,3333	2	0,2500
		3	1,0000	3	0,6667	3	0,5000
				4	1,0000	4	0,7500
						5	1,0000

# phase	Division	# phase	Division	# phase	Division	# phase	Division
1	0,0000	1	0,0000	1	0,0000	1	0,0000
2	0,2000	2	0,1667	2	0,1429	2	0,1250
3	0,4000	3	0,3333	3	0,2857	3	0,2500
4	0,6000	4	0,5000	4	0,4286	4	0,3750
5	0,8000	5	0,6667	5	0,5714	5	0,5000
6	1,0000	6	0,8333	6	0,7143	6	0,6250
		7	1,0000	7	0,8571	7	0,7500
				8	1,0000	8	0,8750
						9	1,0000

Tab. 7: Normalization table

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