Budget Plan

Enterprise Software Selection supporting new Supply Management Strategy at Harley-Davidson

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1. Document introduction

This document provides the budget plan for the project internally called *Enterprise Software Selection supporting new Supply Management Strategy at Harley-Davidson* aiming at introducing a centralized procurement software for Harley-Davidson[1]. During an earlier feasibility study the project's benefits and potential costs were itemized[2].

This documents aims to concrete the expected efforts in part 2 followed by a deep analysis of the project's labor and additional costs in section 3 and 4, respectively. Project margins are finally outlined in part 5 showing the importance of this project to be run.

2. Effort estimation

Effort estimation is based on COSYSMO[3] and calculated as follows. An in-depth analysis of person-hours and labor costs is done in section 2 breaking down the effort expected for each activity.

Project system complexity and size is determined as shown in table 2.1.

The majority of the system requirements are *nominal* procurement process' features and do not cause exceptional development costs. Only processes concerning the integration of Harley-Davidson's suppliers require bigger efforts and are therefore expected as being *difficult*.

The resulting system needs to be integrated into Harley-Davidson's existing infrastructure. It must provide suitable interfaces. Among those is an interface for integrating legacy supplier systems, which is rated as *difficult*.

Only standard algorithms are required. No special work is needed here.

Basic process to be integrated are: *procurement management*, *supplier integration*, *warehouse optimization*. None of those is considered as being notably complex.

Table 2.1: System size according COSYSMO

[1] Case Study *"Harley-Davidson Motor Company: Enterprise Software Selection"*, Harvard Business School 9-600-006, Revision January 22, 2003

[2] Feasibility Study and Project Selection: *Enterprise Software Selection supporting new Supply Management Strategy at Harley-Davidson*, Viktor Karabut and Jan Rehwaldt, February 2012

[3] COSYSMO is part of **Co**nstructive **Co**st **Mo**del II (COCOMO II) and is designed for effort estimation in software projects, http://cosysmo.mit.edu/ and http://diana.nps.edu/~madachy/tools/COSYSMO.php

System size	Easy	Nominal	Difficult	Accumulated factor[4]
# of System Requirements		5	2	**= 15.0**
# of System Interfaces	2		1	**= 8.5**
# of Algorithms				**= 0.0**
# of Operational Scenarios	1	2		**= 35.0**
Composite system size:				**= 58.5** (total sum)

The overall system size is estimated with **58.5** according Constructive System Engineering Cost Model. This project size estimation is configured based on the following scale factors, which are results of industry studies and long-term experiences and part of the COSYS model.

Table 2.2: System cost driver according COSYSMO

System Cost Drivers	Level	Scale factor[5]
Requirements Understanding	High	0.77
Architecture Understanding	Nominal	1.00
Level of Service Requirements	Nominal	1.00
Migration Complexity	Very high	1.54
Technology Risk	Low	0.84
Documentation	Low	0.91
# and Diversity of Installations/Platforms	Nominal	1.00
# of Recursive Levels in the Design	Low	0.89
Stakeholder Team Cohesion	Very high	0.66
Personnel/Team Capability	High	0.81
Personnel Experience/Continuity	Nominal	1.00

[4] System sizes are accumulated based on COSYSMO, which specifies different best-fit factors:

# of System Requirements	=> E: 0.5,	N: 1.0,	D: 5.0
# of System Interfaces	=> E: 1.1,	N: 2.8,	D: 6.3
# of Algorithms	=> E: 2.2,	N: 4.1,	D: 11.5
# of Operational Scenarios	=> E: 6.2,	N: 14.4,	D: 30.0

[5] Scale factors are based on expert's recommendations as defined in COSYSMO

Process Capability	Nominal	1.00
Multisite Coordination	Nominal	1.00
Tool Support	Nominal	1.00
Composite effort multiplier:		**0.43**

On basis of those scale factors (table 2.2) and the specified system size (table 2.1) is the equation $effort = (38.55 * system\ size^{1.06} * scale\ factors)/152$ solved as follows:

$$effort = (38.55 * 58.5^{1.06} * 0.43)/152 = (38.55 * 74.\overline{67} * 0.43)/152 = 1237.88/152 \approx 8.14$$

Therefore the COSYS model estimates an **effort of 8.14 person-month** to run the project. Table 2.3 illustrates the effort distribution among the project lifetime.

Estimated effort: **8.14 person-months**
Estimated cost: **91 689 EUR** based on average 11 264 EUR per person-month / 64 EUR per person-hour

Table 2.3: Effort distribution (person-month) according COSYSMO

Phase / Activity	**Conceptualize**	**Develop**	**Operational Test and Evaluation**	**Transition to Operation**
Acquisition and Supply	0.2	0.3	0.1	0.0
Technical Management	0.3	0.5	0.3	0.2
System Design	0.8	1.0	0.4	0.2
Product Realization	0.2	0.4	0.4	0.3
Product Evaluation	0.5	0.7	1.0	0.4

3. Workforce costs

Based on current salary rates, which are introduced in section 3.2, and the projected activity durations defined in the Organizational Plan[6] and allocated in section 3.1 are the labor costs calculated and elaborated on in section 3.3. Additional costs are covered later in part 4.

3.1. Working hours

[6] Organizational Plan: *Enterprise Software Selection supporting new Supply Management Strategy at Harley-Davidson*, Viktor Karabut and Jan Rehwaldt, March 2012

Table 3.1 projects the expected activity duration to the assigned roles and allocates working month for them based on the calculated efforts from previous chapter.

Table 3.1: Person-month estimation

Activity	**Dur.**[7]	**Project manager**	**Process analyst**	**System designer**	**Legal dept.**	**Finance dept.**	**Stake-holders**	**Executive board**
1. Create expert groups	0.15	0.15						
2. Perform survey with stakeholders	0.50	0.50	0.50				0.50	
3. Prepare checklists	0.25	0.25	0.06	0.25			0.25	
4. Feedback from internal stakeholders	0.25	0.25	0.25					
5. Develop project specification	1.00	0.75		1.00				
6. Create potential vendor list	0.15	0.15						
7. Send invitations to tender	0.10	0.10						
8. Organize provider software conference and presentation	0.45	0.40	0.45				0.75 = 0.25*3[8]	
9. Select top four vendors	0.50	0.50	0.50					
10. Invite potential vendors for interview	0.15	0.11	0.10	0.15				
11. Prepare product demo test cases	0.30	0.05	0.30					
12. Invite potential vendors for product demo	0.05	0.04	0.05				0.05	

[7] in person-month, 1 person-month is 160 working hours

[8] Stakeholders also participate at providers conference

13. Discuss details and prepare decision	0.15	0.15	0.15	0.15			0.38 = 0.125*3 [9]	
14. Select final vendor	0.10	0.10	0.10	0.10				
15. Negotiate contract	0.15	0.15			0.15	0.15		
16. Sign up contract	0.03				0.03			0.03
Total:	4.28	3.65	2.40	1.65	0.18	0.15	1.93	0.03

Total effort: $3.65 + 2.40 + 1.66 + 0.18 + 0.15 + 1.93 + 0.03 = 10.00$ What is that for? 4.28 is missing. This makes no sense, because each role has different saleries...

3.2. Salary rates

All prices includes taxes and insurance. Costs for workspaces, office equipment and additional resources including illness costs and project-related travel requirements are not considered within salary rates and will be further elaborated on in section 4. Salaries are based on industry standard wage levels[10] and refer to for those positions dedicated employees as presented in the Organizational Plan[11].

Project manager:	**70 EUR/hour**	This is Bill Moyles's current salary.
Process analyst:	**50 EUR/hour**	This is Joh Gazianos's current salary.
System designer:	**60 EUR/hour**	Average salary on this position.
Bookkeeper:	**45 EUR/hour**	Average salary on this position.
Lawyer:	**62 EUR/hour**	This is Bin Anderson's current salary.
Stakeholders:	**45 EUR/hour**	Average salary of engineers at Harley-Davidson.
Executive board:	**100 EUR/hour**	Average salary of executive board members.

3.3. Total cost of labor

In the following table 3.2 are the expected labor costs broken down per activity and participating resources. All values are in EUR.

[9] During finalist selection we will hold a meeting within stakeholders

[10] Average salaries in the EU, http://www.averagesalarysurvey.com/article/average-salary-in-eu/26025059.aspx, March 2012

[11] Organizational Plan: *Enterprise Software Selection supporting new Supply Management Strategy at Harley-Davidson*, Viktor Karabut and Jan Rehwaldt, March 2012

Table 3.2: Total cost of labor, all costs in EUR

Activity	**Project manager**	**Process analyst**	**System designer**	**Legal dept.**	**Finance dept.**	**Stake-holders**	**Executive board**
1. Create expert groups	1680						
2. Perform survey with stakeholders	5600	4000				3600	
3. Prepare checklists	2800	500	2400			1800	
4. Feedback from internal stakeholders	2800	2000					
5. Develop project specification	840		9600				
6. Create potential vendor list	1680						
7. Send invitations to tender	1680						
8. Organize provider software conference and presentation	4480	3600				5400	
9. Select top four vendors	5600	4000					
10. Invite potential vendors for interview	1260	800	1440				
11. Prepare product demo test cases	560	2400					
12. Invite potential vendors for product demo	420	400				360	
13. Discuss details and prepare decision	1680	120	1440			2700	
14. Select final vendor	1120	800	96				
15. Negotiate contract	1680			1488	24		
16. Sign up contract				248			400
Total:	**42000**	**19700**	**15840**	**1736**	**1080**	**13500**	**400**

Total workforce costs: **94 256 EUR**

Only a small difference to the estimated effort based on COSYSMO calculated in section 2 (91 689 EUR) could be recognized. This is most likely due to rounding issues, because COSYSMO works with average salaries, whereas this detailed plan takes the current Harley-Davidson salaries into account.

Based on those two numbers a relatively accurate estimation **between 92 000 to 94 000 EUR** may be given.

4. Additional costs

This section covers additional costs for workspace, office equipment as well as illness cost predictions and project-related travel requirements. Salary rates and workforce costs are not included.

For some costs a probability is given, which indicates how likely it is that those costs may be necessary. This is due to unpredictable events like illness or group members from different company's sites, which need to get a hotel as well as travel cost refunds.

Other costs, such as workspace or office costs, will be incurred for employees anyway and are only included for completeness.

Table 4.1: Non-labor costs estimated for the project

Type of cost	Probability	Cost in EUR	Amount	Total in EUR
Travel[12]	High	600	x 30[13]	= 18 000
Vacation	Low	3 000	x 2	= 6 000
Illness	Medium	900	x 15[14]	= 13 500
Workspace[15]	-	8	x 2.314	= 18 512
Conference room rental	-	2 400	x 1	= 2 400
Office equipment	-	1 200	x 6	= 7 200
Communication	-	70	x 30	= 2 100
Management	-	9 000	x 1	= 9 000

Total additional costs: **76 712 EUR**

[12] Costs for employees working at different company's locations during this project

[13] expected number of trips

[14] expected number of illness days

[15] Accumulated person-hours as introduced in section 2.1

5. Profit margins

Total workforce costs:	94 256 EUR
Total additional costs:	76 712 EUR
Total costs:	**170 968 EUR**

profit = income - cost