

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-Davidson¹. During an earlier feasibility study the project's benefits and potential costs were itemized².

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 COSYSMO³ 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 Rehwaltdt, February 2012

³ COSYSMO is part of **Constructive Cost Model 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:

$$effort = (38.55 * 58.5^{1.06} * 0.43) / 152 = (38.55 * 74.67 * 0.43) / 152 = 1237.88 / 152 \approx 8.14$$

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 Plan⁶ 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

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 levels¹⁰ and refer to for those positions dedicated employees as presented in the Organizational Plan¹¹.

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.

Table 3.2: Total cost of labor, all costs 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

Activity	Project manager	Process analyst	System designer	Legal dept.	Finance dept.	Stakeholders	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 is a probability 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	= 18 000
Vacation	Medium	2 780	x 1	= 2 780
Illness	Medium	11 080	x 0,035 ¹³	= 3 528
Workspace	-	8	x 2.314 ¹⁴	= 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: 63 520 EUR

Additional salary and travel costs are itemized as follows:

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

¹³ expected person-month of illness in total

¹⁴ Accumulated person-hours as introduced in section 2.1

For employees working abroad at different sites of Harley-Davidson or for external consultants housing, either in a hotel or an apartment has to be covered. Additionally, fare as well as travel tickets for train or plane and gasoline for cars have to be considered. As basis for *traveling* 600 EUR x 30 amounts have been chosen. For transportation costs 200 EUR are reserved, fare is considered to be around 70 EUR and accommodation is 330 EUR with an average staying time of two weeks per person (33 EUR per room per night for eight to ten stays). In total 30 such trips are expected to happen during the project runtime.

As shown in section 3.1, the total project time is aggregated to 4.28 person-month distributed to 9.99 person-months for different resources working in parallel. During those ten month, only the Project manager (3.65), process analyst (2.40) and system designer (2.65) are heavily involved into the project (8.70 person-month) and may not be able to plan vacation times outside the project. As each of them has 28 holidays per year, they will in average spend 2.1 days per month in vacation (25 days / 12 month). As seen in table 4.2 this leads to eight to six vacation days per role. Compliant with Harley-Davidson's wages rules we assume that during vacation 85% of the normal salary is paid. Vacation cost is therefore summed up to 1 853 EUR.

Table 4.2: Estimated vacation costs

Role	Person-month ¹⁵ (pm)	Salary ¹⁶ (s)	Member count (c)	Vocation days ¹⁷ (vd = pm x 2.1 days)	Vocation costs ¹⁸ (vc = vd x s x c x 85%)
Project Manager	3.65	70	1	3.65 x 2.1 = 8	8 x 70 x 1 x 85% = 476
Process Analyst	2.40	50	3	2.40 x 2.1 = 6	6 x 50 x 3 x 85% = 765
System Designer	2.65	60	2	2.65 x 2.1 = 6	6 x 60 x 2 x 85% = 612
					Total: 1853

Vacation costs: 1 853 EUR

Additionally we assume 50% of the vacation to not influence the overall project plan. For the other 50% a replacing employee may be found and paid.

Vacation costs with replacement: 2 780 EUR Vacation costs x 1.5 as of replacement salaries

¹⁵ person-month distributed to three main contributing roles as defined in section 3.1 of this document

¹⁶ salary for each group as defined in section 3.2, in EUR

¹⁷ 2.1 vacation days are estimated per month; results are rounded up to full decimal, in days

¹⁸ vocation costs are 85% of the regular salary per vacation day as per Harley-Davidson's rules, in EUR

According to general illness statistics as by Statistisches Bundesamt¹⁹ 3.5% of employees are in average recognized as being ill. As those have to be replaced during project runtime, which consists of 9.99 person-month as elaborated on in table 3.1, 0.35 person-month (3.5% x 9.99 person-month) have to be run by replacing employers. With an average salary of 60 EUR per hour assumed (480 EUR / day and 10 080 EUR / person-month) 3 528 EUR of additional illness salary costs are expected.

Illness salary costs: 3 528 EUR

Workspace cost is accumulated by person-month as itemized in table 2.1 and a total cost per hour of workspace of 8 EUR. Included in this cost is heating, power, water, cleaning and furniture of the provided workspace. The value is derived from the average house management costs of Harley-Davidson's headquarters.

Office equipment and communication include mobile phone contracts and mobile phones as well as laptop equipment required during the project run. For 30 employers an average mobile phone contract of 70 EUR is expected, leading to costs of 2 100 EUR for communication. Office equipment is generally provided within Harley-Davidson. For further requirements, such as beamer or software tools, 1 200 EUR in six chunks is allocated during the project runtime (7 200 EUR).

5. Profit margins

This part of the budget plan analysis the financial case with respect to final profit margins. Therefore costs as defined in previous sections and following section 5.1. are aggregated and contrasted with the expected income, which is itemized in section 5.2 and the document's related feasibility study²⁰.

5.1. Software cost

The project's goal is to purchase a suitable software product for long-term planning and operating of supply management within Harley-Davidson's organizations. The final cost should be negotiated with selected vendor. At this stage we allocate maximum budget for this kind of software. The estimated price is based on market research²¹.

Estimated software costs: 2 000 000 EUR

5.2. Expected income

Centralized procurement systems helps to consolidate buying transactions and allows for greater discounts. After successful integration of resource planning software working time dedicated to supply management will be used more efficiently by raising the overall amount of supplier relationship-related

¹⁹ Statistisches Bundesamt, <https://www.destatis.de/>

²⁰ Feasibility Study: *Enterprise Software Selection supporting new Supply Management Strategy at Harley-Davidson*, Viktor Karabut and Jan Rehwaldt, February 2012

²¹ <http://erp.ittoolbox.com/groups/vendor-selection/erp-select/price-of-erp-software-438616>

activities from 10% to 70%²². So within 6 years will be released at least 15% of labor capacity (12 400 EUR to 10 540 EUR after six years). Labor cost, office rent and other operating expenses will be reduced proportionally. Current operating expenses are taken from Harley-Davidson Motor Company Annual report 2010.

Warehouse expenses are currently announced as 27 100 000 EUR per year including management, employee and administration costs as of Harley-Davidson Annual Report 2010. Within this amount also storage costs and logistic tasks in general are covered. After introduction of the new system an overall reduction of storage time is expected to be 5 % in average. For being able to manage peaks in storage amount a buffer of 2 % is calculated leading to a reduction of 3 % storage capacity in total. Therefore rents and administrative costs are reduced and some locations fully discarded. On the other hand some warehouses may not be scaled-down, so a total reduction of warehouse expenses is expected to be 2.5 % of 27 100 000 EUR leading to 26 440 000 EUR after six years of adaptation and introduction time.

Table 1: Expected productivity of purchasing organization after integration of new ERP system.

Year	Projected number of employees	Purchasing organization operating expenses ²³	Warehouse expenses ²³	Income ²³
2012	100%	12 400	27 100	0
2013	95%	11 780 (-620)	26 700 (-400)	+1 020
2014	95%	11 780 (-620)	26 640 (-460)	+1 080
2015	90%	11 160 (-1 240)	26 580 (-520)	+1 760
2016	90%	11 160 (-1 240)	26 530 (-570)	+1 810
2017	85%	10 540 (-1 240)	26 480 (-620)	+1 860
2018	85%	10 540 (-1 260)	26 440 (-660)	+1 920

Estimated income: 9 450 000 EUR

5.3. Summary

Total workforce costs:	94 256 EUR	cf. section 2 and 3
Total additional costs:	63 520 EUR	cf. section 4
Estimated software cost:	2 000 000 EUR	cf. section 5

Total costs: 2 157 776 EUR

Estimated income: 9 450 000 EUR based on six year estimation, cf. section 6

²² Exhibit 5, Case Study "Harley-Davidson Motor Company: Enterprise Software Selection", Harvard Business School 9-600-006, Revision January 22, 2003

²³ in thousands, EUR

Profit:

7 292 224 EUR

within six years after project finalization