

	Case Name: The Master Project	Sector	Education
	OR-AS Operations Research - Applications and Solutions www.or-as.be info@or-as.be	Baseline Schedule Schedule with resources Schedule with costs	Risk Analysis Random simulation One of nine std. scenarios User defined distributions
Submitted by	Eline Van Lombeek	Project Control	Automatic tracking
Date	December 12, 2012		Tracking based on user input
File Name	C2012-15 The Master Project.p2x		

1. Project description

Project authenticity

The first semester group works that have to be carried out by the students of the first Master in Business Engineering and Applied Economic Sciences of Ghent University (Belgium) are tackled as a project.

The project consists of activity, resource and cost data that were created by the user.

2. Project properties

2.1. Baseline Schedule

General	
# Activities	134
Planned Duration (PD)	32 days*
Budget At Completion (BAC)	185.472 €
Renewable Resources	3
Consumable Resources	-

* standard eight-hour working days

Network topology	
Serial/Parallel (SP)	17%
Activity Distribution (AD)	66%
Length of Arcs (LA)	0%
Topological Float (TF)	84%

2.2. Risk Analysis

Use of all predefined distribution profiles: symmetrical, skewed (all to the left) and risk-free.

	Cost sensitivity		
	avg [%]	std dev [%]	skew [-]
CRI-r	0.0	0.0	N/A
CRI-rho	100.0	0.0	N/A
CRI-tau	100.0	0.0	N/A

	Resource sensitivity		
	avg [%]	std dev [%]	skew [-]
CRI-r	0.0	0.0	N/A
CRI-rho	100.0	0.0	N/A
CRI-tau	100.0	0.0	N/A

	Time sensitivity		
	avg [%]	std dev [%]	skew [-]
CI	49.3	50.0	0.0
SI	40.8	47.9	0.4
SSI	0.0	0.0	N/A
CRI-r	0.0	0.0	N/A
CRI-rho	100.0	0.0	N/A
CRI-tau	100.0	0.0	N/A

The remarkable results for cost and resource sensitivity can be explained by the absence of significant variable activity costs (very small values in comparison with the fixed activity costs) and resource costs.

2.3. Project Control

2.3.1. Simulated forecasting accuracy

The accuracy of time and cost forecasting methods has been evaluated based on Monte Carlo simulation runs using the risk profiles described in section “2.2. Risk Analysis”. Based on these risk profiles, the Mean Absolute Percentage Error (MAPE) and Mean Percentage Error (MPE) have been calculated to evaluate the expected accuracy of the time and cost predictions, EAC(t) and EAC, respectively.

Simulated EAC(t) accuracy			Simulated EAC accuracy		
method - PF	MAPE [%]	MPE [%]	method (PF)	MAPE [%]	MPE [%]
PV - 1	1.2	1.2	1	0.0	0.0
PV - SPI	3.3	3.3	CPI	0.0	0.0
PV - SCI	3.3	3.3	SPI	2.2	2.2
ED - 1	1.4	1.4	SPI(t)	4.6	4.6
ED - SPI	3.3	3.3	SCI	2.2	2.2
ED - SCI	3.3	3.3	SCI(t)	4.6	4.6
ES - 1	1.9	1.9	0.8 CPI + 0.2 SPI	0.5	0.5
ES - SPI(t)	6.2	6.2	0.8 CPI + 0.2 SPI(t)	1.3	1.3
ES - SCI(t)	6.2	6.2			

According to the MAPE values¹ the best performance for time forecasting can be expected from the unweighted Planned Value and Earned Duration methods. For cost forecasting the unweighted and CPI-weighted methods should yield the best results.

2.3.2. Tracking description

Tracking authenticity

Automatic tracking by ProTrack was performed over 7 tracking periods with a length of approximately one week. The Real Duration and Real Cost mentioned in section “2.3.3. Earned Value Management” are based on simulation results.

Authenticity assessment is not relevant here as it is not possible to introduce any kind of tracking information obtained from the actual project owner when performing automatic tracking. Activity durations and corresponding costs were generated based on the distribution profiles described in section “2.2. Risk Analysis”.

¹ The MAPE gives the best indication for the forecast accuracy (the lower the MAPE, the more accurate the method) since all deviations from the targeted real duration (real cost) are cumulated, whereas for the MPE underestimates can be compensated by overestimates and vice versa, possibly leading to an overly positive evaluation of a certain method. However, the MPE can provide useful information about the nature of the deviations, i.e. does the method rather underestimate or overestimate the real duration (real cost)?

2.3.3. Earned Value Management

2.3.3.1. Performance metrics

	CV [€]	SV [€]	SV(t) [d]	CPI [-]	SPI [-]	SPI(t) [-]	p-factor [-]
avg	329	255	0.20	1.00	1.01	1.06	0.93
std dev	74	422	1.10	0.00	0.01	0.14	0.09
final	359	0	-2.00	1.00	1.00	0.91	1.00

2.3.3.2. Time forecasting

PD	32 days
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Real Duration	34 days
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Late	6.25%
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EAC(t)			Real Accuracy	
method - PF	avg [d]	std dev [d]	MAPE [%]	MPE [%]
PV - 1	31.96	0.07	6.0	-6.0
PV - SPI	31.79	0.40	6.5	-6.5
PV - SCI	31.65	0.42	6.9	-6.9
ED - 1	32.39	1.07	5.6	-4.7
ED - SPI	32.36	1.08	5.7	-4.8
ED - SCI	32.16	1.24	6.3	-5.4
ES - 1	31.95	1.40	6.9	-6.0
ES - SPI(t)	30.64	3.42	10.7	-9.9
ES - SCI(t)	30.58	3.45	10.9	-10.1

2.3.3.3. Cost forecasting

BAC	185.472 €
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Real Cost	185.113 €
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Under Budget	0.19%
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EAC			Real Accuracy	
method (PF)	avg [€]	std dev [€]	MAPE [%]	MPE [%]
1	185.143	74	0.0	0.0
CPI	184.735	265	0.0	-0.2
SPI	184.15	1.923	0.5	-0.5
SPI(t)	176.981	14.337	4.4	-4.4
SCI	183.748	2.15	0.7	-0.7
SCI(t)	176.619	14.493	4.6	-4.6
0.8 CPI + 0.2 SPI	184.614	555	0.3	-0.3
0.8 CPI + 0.2 SPI(t)	182.834	3.794	1.2	-1.2