

	Case Name: Office Finishing Works (2)	Sector	Construction (Commercial Building)
	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	N/A		
Date	August 7, 2013		
File Name	C2013-14 Office Finishing Works (2).p2x	Project Control Automatic tracking Tracking based on user input	

1. Project description

Project authenticity

The finishing works inside an office building, comprising the placement of partition walls (also acoustic) and suspended ceilings.

The project consists of activity and cost data that were obtained directly from the actual project owner.

2. Project properties

2.1. Baseline Schedule

General	
# Activities	9
Planned Duration (PD)	80 days*
Budget At Completion (BAC)	85.848 €
Renewable Resources	-
Consumable Resources	-

* standard eight-hour working days

Network topology	
Serial/Parallel (SP)	62%
Activity Distribution (AD)	80%
Length of Arcs (LA)	66%
Topological Float (TF)	47%

2.2. Risk Analysis

Random simulation by ProTrack was performed using the default symmetric triangular risk distribution profiles.

	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	N/A	N/A	N/A
CRI-rho	N/A	N/A	N/A
CRI-tau	N/A	N/A	N/A

	Time sensitivity		
	avg [%]	std dev [%]	skew [-]
CI	22.2	41.6	1.6
SI	17.8	30.4	2.6
SSI	13.9	30.7	2.6
CRI-r	20.6	27.6	2.6
CRI-rho	19.2	28.1	2.6
CRI-tau	29.4	23.7	1.0

The remarkable results for cost sensitivity can be explained by the absence of variable activity 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) has 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	31.3	28.3	1	N/A	N/A
PV - SPI	32.9	30.1	CPI	N/A	N/A
PV - SCI	32.9	30.1	SPI	N/A	N/A
ED - 1	27.7	24.6	SPI(t)	N/A	N/A
ED - SPI	32.7	29.9	SCI	N/A	N/A
ED - SCI	32.7	29.9	SCI(t)	N/A	N/A
ES - 1	19.5	9.8	0.8 CPI + 0.2 SPI	N/A	N/A
ES - SPI(t)	33.1	20.1	0.8 CPI + 0.2 SPI(t)	N/A	N/A
ES - SCI(t)	33.1	20.1			

According to the MAPE values¹ the best performance for time forecasting can be expected from the unweighted Earned Schedule method. Cost forecasting is not relevant since there are only fixed activity costs in this project.

2.3.2. Tracking description

Tracking authenticity

Manual tracking was performed over 2 tracking periods with irregular lengths varying from approximately six weeks to three months. The Real Duration and Real Cost mentioned in section “2.3.3. Earned Value Management” are based on manual user input.

The tracking information obtained from the project owner and introduced in ProTrack includes actual activity start dates, durations and costs.

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	5.6	-12.334	-26.50	1.14	0.62	0.41	1.00
std dev	4.779	12.334	7.50	0.01	0.39	0.41	0.00
final	10.38	0	-19.00	1.14	1.00	0.81	1.00

2.3.3.2. Time forecasting

PD	80 days
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Real Duration	99 days
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Late	23.75%
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EAC(t)		Real Accuracy		
method - PF	avg [d]	std dev [d]	MAPE [%]	MPE [%]
PV - 1	91.50	11.50	11.6	-7.6
PV - SPI	216.31	136.31	137.7	118.5
PV - SCI	191.50	121.13	122.3	93.4
ED - 1	102.63	3.62	3.7	3.7
ED - SPI	225.81	126.81	128.1	128.1
ED - SCI	207.69	108.69	109.8	109.8
ES - 1	106.50	7.50	7.6	7.6
ES - SPI(t)	106.50	7.50	7.6	7.6
ES - SCI(t)	106.50	7.50	7.6	7.6

2.3.3.3. Cost forecasting

BAC	85.848 €
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Real Cost	75.468 €
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Under Budget	12.09%
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EAC		Real Accuracy		
method (PF)	avg [€]	std dev [€]	MAPE [%]	MPE [%]
1	80.247	4.779	6.3	6.3
CPI	75.789	321	0.4	0.4
SPI	214.159	138.69	183.8	183.8
SPI(t)	80.247	4.779	6.3	6.3
SCI	194.511	119.042	157.7	157.7
SCI(t)	75.789	321	0.4	0.4
0.8 CPI + 0.2 SPI	82.415	6.947	9.2	9.2
0.8 CPI + 0.2 SPI(t)	76.598	1.13	1.5	1.5