

	Case Name: Brussels Finance Tower	Sector	Construction (Institutional 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	Tim Vandenbussche		
Date	February 2, 2013		
File Name	C2013-03 Brussels Finance Tower.p2x	Project Control Automatic tracking Tracking based on user input	

1. Project description

Project authenticity

The Finance Tower is situated in the Brussels business district, accommodating close to five thousand finance officials. The project consists of two parts: the renovation of the existing tower and the construction of a new office building next to it.

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	55
Planned Duration (PD)	425 days*
Budget At Completion (BAC)	15,440,865 €
Renewable Resources	-
Consumable Resources	-

* standard eight-hour working days

Network topology	
Serial/Parallel (SP)	3%
Activity Distribution (AD)	82%
Length of Arcs (LA)	0%
Topological Float (TF)	87%

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	9.1	10.6	3.2
CRI-rho	11.0	12.7	2.5
CRI-tau	9.6	18.9	4.2

	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	1.8	13.4	7.4
SI	18.7	23.4	1.5
SSI	1.8	13.4	7.4
CRI-r	7.3	5.1	0.5
CRI-rho	9.4	13.4	5.7
CRI-tau	6.6	13.3	6.5

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	33.6	32.9	1	0.5	0.0
PV - SPI	47.9	47.2	CPI	0.4	0.1
PV - SCI	48.3	47.8	SPI	14.0	14.0
ED - 1	64.0	63.2	SPI(t)	11.6	11.6
ED - SPI	47.7	47.0	SCI	14.0	14.0
ED - SCI	47.7	47.0	SCI(t)	11.6	11.6
ES - 1	25.6	25.5	0.8 CPI + 0.2 SPI	9.6	9.5
ES - SPI(t)	37.9	37.8	0.8 CPI + 0.2 SPI(t)	6.0	6.0
ES - SCI(t)	38.0	37.9			

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

2.3.2. Tracking description

Tracking authenticity

Manual tracking was performed over 18 tracking periods with a length of approximately one month. 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	-143.841	-632.909	-13.51	0.99	1.00	0.99	0.85
std dev	306.369	718.187	19.62	0.02	0.18	0.11	0.10
final	-897.162	0	-1.00	0.95	1.00	1.00	1.00

2.3.3.2. Time forecasting

PD	425 days
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Real Duration	426 days
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Late	0.24%
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EAC(t)			Real Accuracy	
method - PF	avg [d]	std dev [d]	MAPE [%]	MPE [%]
PV - 1	442.42	19.77	4.9	3.9
PV - SPI	436.30	61.99	12.5	2.4
PV - SCI	440.81	65.84	13.8	3.5
ED - 1	440.06	21.95	5.4	3.3
ED - SPI	436.35	61.98	12.5	2.4
ED - SCI	436.81	63.41	12.8	2.5
ES - 1	438.51	19.62	4.3	2.9
ES - SPI(t)	435.42	43.88	8.9	2.2
ES - SCI(t)	435.91	45.81	9.2	2.3

2.3.3.3. Cost forecasting

BAC	15,440,865 €
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Real Cost	16,338,027 €
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Over Budget	5.81%
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EAC			Real Accuracy	
method (PF)	avg [€]	std dev [€]	MAPE [%]	MPE [%]
1	15,584,703	306.369	4.6	-4.6
CPI	15,585,751	383.96	4.6	-4.6
SPI	15,362,090	1,803,580	7.2	-6.0
SPI(t)	15,411,252	1,201,567	5.9	-5.7
SCI	15,371,585	1,864,134	7.5	-5.9
SCI(t)	15,418,910	1,271,844	6.1	-5.6
0.8 CPI + 0.2 SPI	15,497,964	626.518	5.1	-5.1
0.8 CPI + 0.2 SPI(t)	15,534,538	502.114	4.9	-4.9