

	Case Name: <b>Organizational Development</b>	Sector	Education
	<b>OR-AS</b> Operations Research - Applications and Solutions <a href="http://www.or-as.be">www.or-as.be</a> <a href="mailto:info@or-as.be">info@or-as.be</a>	<b>Baseline Schedule</b> Schedule with resources Schedule with costs	<b>Risk Analysis</b> Random simulation One of nine std. scenarios User defined distributions
Submitted by	N/A		
Date	February 9, 2014	<b>Project Control</b> Automatic tracking Tracking based on user input	
File Name	C2014-03 Organizational Development.p2x		

## 1. Project description

Project authenticity

The implementation of a new organizational system at several service departments of a Belgian city.

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

## 2. Project properties

### 2.1. Baseline Schedule

General	
# Activities	112
Planned Duration (PD)	229 days*
Budget At Completion (BAC)	43,170 €
Renewable Resources	1
Consumable Resources	-

\* standard eight-hour working days

Network topology	
Serial/Parallel (SP)	9%
Activity Distribution (AD)	31%
Length of Arcs (LA)	0%
Topological Float (TF)	36%

### 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	6.4	9.0	1.4
CRI-rho	31.5	19.0	-0.2
CRI-tau	58.8	42.5	-0.2

	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	7.2	4.2	-0.2
SI	37.0	32.6	0.4
SSI	3.3	5.2	1.8
CRI-r	5.2	7.4	1.4
CRI-rho	29.7	20.5	-0.1
CRI-tau	53.2	46.1	0.0

## 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	38.7	-31.7	1	0.4	0.0
PV - SPI	38.3	36.5	CPI	0.5	0.2
PV - SCI	38.6	37.0	SPI	25.7	25.7
ED - 1	37.4	6.7	SPI(t)	22.4	22.4
ED - SPI	38.3	36.5	SCI	25.8	25.8
ED - SCI	38.3	36.6	SCI(t)	22.5	22.5
ES - 1	53.4	-53.3	0.8 CPI + 0.2 SPI	15.8	15.8
ES - SPI(t)	16.2	15.1	0.8 CPI + 0.2 SPI(t)	11.0	11.0
ES - SCI(t)	16.4	15.3			

According to the MAPE values<sup>1</sup> the best performance for time forecasting can be expected from the SPI(t)- and SCI(t)-weighted Earned Schedule methods. 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 13 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.

<sup>1</sup> 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	-21,612	-6,003	-33.63	0.52	0.78	0.78	0.84
std dev	14,984	4,214	21.82	0.07	0.11	0.09	0.08
final	-40,542	0	-31.25	0.52	1.00	0.88	1.00

#### 2.3.3.2. Time forecasting

PD	229 days
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Real Duration	260 days
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Late	13.54%
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EAC(t)		Real Accuracy		
method - PF	avg [d]	std dev [d]	MAPE [%]	MPE [%]
PV - 1	260.55	22.34	7.1	0.2
PV - SPI	300.15	41.19	18.7	15.4
PV - SCI	584.33	106.37	124.7	124.7
ED - 1	261.28	16.98	5.2	0.5
ED - SPI	303.54	36.69	18.0	16.7
ED - SCI	449.32	102.01	72.8	72.8
ES - 1	262.38	21.82	6.7	0.9
ES - SPI(t)	297.63	29.99	16.1	14.5
ES - SCI(t)	439.99	72.78	69.2	69.2

#### 2.3.3.3. Cost forecasting

BAC	43,170 €
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Real Cost	83,712 €
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Over Budget	93.91%
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EAC		Real Accuracy		
method (PF)	avg [€]	std dev [€]	MAPE [%]	MPE [%]
1	64,782	14,984	23.0	-22.6
CPI	84,124	10,881	10.5	0.5
SPI	72,257	12,321	15.3	-13.7
SPI(t)	70,826	13,283	17.6	-15.4
SCI	98,151	13,456	20.2	17.2
SCI(t)	95,513	11,955	17.2	14.1
0.8 CPI + 0.2 SPI	80,711	9,858	9.8	-3.6
0.8 CPI + 0.2 SPI(t)	80,265	10,117	10.4	-4.1