

	Case Name: <b>Telecom System Agnes</b>	Sector	IT (Medical)
	<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	
Submitted by	Pieter Van Schoors	<b>Risk Analysis</b> Random simulation One of nine std. scenarios User defined distributions	
Date	December 21, 2011		
File Name	C2011-05 Telecom System Agnes.p2x	<b>Project Control</b> Automatic tracking Tracking based on user input	

## 1. Project description

Project authenticity

The installation and implementation of a modern telecommunication system in nursing care center Agnes in Egmond aan Zee (The Netherlands).

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	21
Planned Duration (PD)	43 days*
Budget At Completion (BAC)	180.485 €
Renewable Resources	6
Consumable Resources	-

\* standard eight-hour working days

Network topology	
Serial/Parallel (SP)	60%
Activity Distribution (AD)	58%
Length of Arcs (LA)	38%
Topological Float (TF)	9%

### 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	17.7	13.8	0.9
CRI-rho	22.8	14.9	0.7
CRI-tau	30.5	26.4	1.6

	Resource sensitivity		
	avg [%]	std dev [%]	skew [-]
CRI-r	28.5	27.9	1.0
CRI-rho	35.0	26.3	0.0
CRI-tau	43.5	30.3	0.9

	Time sensitivity		
	avg [%]	std dev [%]	skew [-]
CI	58.7	44.4	-0.4
SI	28.7	37.4	1.0
SSI	12.5	17.3	1.6
CRI-r	17.1	13.9	0.6
CRI-rho	21.4	16.0	0.3
CRI-tau	29.5	25.8	1.9

### 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		
method - PF	MAPE [%]	MPE [%]
PV - 1	4.6	4.2
PV - SPI	9.0	8.4
PV - SCI	9.8	8.8
ED - 1	5.1	4.7
ED - SPI	8.9	8.3
ED - SCI	9.4	8.4
ES - 1	3.6	3.4
ES - SPI(t)	7.1	6.7
ES - SCI(t)	7.6	6.8

Simulated EAC accuracy		
method (PF)	MAPE [%]	MPE [%]
1	0.7	-0.1
CPI	1.2	0.0
SPI	4.7	4.1
SPI(t)	3.8	3.3
SCI	5.3	4.3
SCI(t)	4.5	3.4
0.8 CPI + 0.2 SPI	2.0	1.3
0.8 CPI + 0.2 SPI(t)	1.6	0.8

According to the MAPE values<sup>1</sup> 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

Manual tracking was performed over 5 tracking periods with irregular lengths varying from approximately one week to one month. The Real Duration and Real Cost mentioned in section “2.3.3. Earned Value Management” are based on manual user input.

Tracking authenticity

The tracking information obtained from the project owner and introduced in ProTrack includes actual activity start dates, but no actual activity durations or 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	0	-4.695	-3.35	1.00	0.97	0.92	0.98
std dev	0	5.93	3.66	1.00	0.04	0.07	0.03
final	0	0	-10.00	1.00	1.00	0.81	1.00

#### 2.3.3.2. Time forecasting

PD	43 days
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Real Duration	53 days
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Late	23.26%
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EAC(t)		Real Accuracy		
method - PF	avg [d]	std dev [d]	MAPE [%]	MPE [%]
PV - 1	44.12	1.42	16.8	-16.8
PV - SPI	44.43	1.87	16.2	-16.2
PV - SCI	44.43	1.87	16.2	-16.2
ED - 1	46.00	3.68	13.2	-13.2
ED - SPI	46.43	3.71	12.4	-12.4
ED - SCI	46.43	3.71	12.4	-12.4
ES - 1	46.53	3.66	12.2	-12.2
ES - SPI(t)	47.18	3.82	11.0	-11.0
ES - SCI(t)	47.18	3.82	11.0	-11.0

#### 2.3.3.3. Cost forecasting

BAC	180.485 €
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Real Cost	180.485 €
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On Budget	0.00%
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EAC		Real Accuracy		
method (PF)	avg [€]	std dev [€]	MAPE [%]	MPE [%]
1	180.485	0	0.0	0.0
CPI	180.485	0	0.0	0.0
SPI	181.75	2.158	0.7	0.7
SPI(t)	182.253	2.828	1.0	1.0
SCI	181.75	2.158	0.7	0.7
SCI(t)	182.253	2.828	1.0	1.0
0.8 CPI + 0.2 SPI	180.719	379	0.1	0.1
0.8 CPI + 0.2 SPI(t)	180.804	508	0.2	0.2