OR-AS Operations Research Applications and Solutions	Case Name: **Railway Station Sint-Joost**	Sector	Construction (Civil)	
	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	
Submitted by	Frederiek Vanhessche		User defined distributions	
Date	December 27, 2011	Project Control	Automatic tracking	
File Name	C2011-04 Railway Station Sint-Joost.p2x		Tracking based on user input	

1. Project description

Project authenticity

The renovation of the stairs and the supporting walls of the railway station of Sint-Joost-Ten-Node (Belgium).

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

2. Project properties

2.1. Baseline Schedule

General	
# Activities	18
Planned Duration (PD)	125 days*
Budget At Completion (BAC)	59.831 €
Renewable Resources	2
Consumable Resources	-

Network topology	
Serial/Parallel (SP)	47%
Activity Distribution (AD)	62%
Length of Arcs (LA)	45%
Topological Float (TF)	19%

* standard eight-hour working days

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	13.4	18.9	2.5
CRI-rho	13.3	18.7	2.4
CRI-tau	13.4	13.4	1.8

	Resource sensitivity		
	avg [%]	std dev [%]	skew [-]
CRI-r	96.5	2.5	N/A
CRI-rho	96.5	2.5	N/A
CRI-tau	85.0	7.0	N/A

	Time sensitivity		
	avg [%]	std dev [%]	skew [-]
CI	33.3	47.1	0.8
SI	15.8	20.1	1.3
SSI	7.1	20.9	4.1
CRI-r	11.3	20.3	3.7
CRI-rho	11.0	20.3	3.7
CRI-tau	13.2	16.3	2.9

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	5.1	2.2
PV - SPI	18.5	-13.7
PV - SCI	18.7	-12.8
ED - 1	4.2	3.2
ED - SPI	17.5	-14.8
ED - SCI	17.4	-14.3
ES - 1	2.8	0.8
ES - SPI(t)	20.3	-19.6
ES - SCI(t)	20.0	-19.1

Simulated EAC accuracy		
method (PF)	MAPE [%]	MPE [%]
1	1.6	-0.4
CPI	2.1	0.0
SPI	18.7	-18.5
SPI(t)	20.1	-20.0
SCI	18.6	-18.1
SCI(t)	19.9	-19.6
0.8 CPI + 0.2 SPI	3.2	-2.6
0.8 CPI + 0.2 SPI(t)	3.3	-2.8

According to the MAPE values[1] 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

The user has not performed any project control and therefore no tracking periods have been defined. Tracking periods can now be generated automatically by ProTrack or by manually inputting tracking data period by period.

[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)?