

	Case Name: C2019-01	Sector	Construction	
	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	
Submitted by	Mayté & Thymo		One of nine std. scenarios	
Date	2019		User defined distributions	
File Name	C2019-01	Project Control	Automatic tracking	
			Tracking based on user input	

## 1. Project description

Project Authenticity

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	41
Planned Duration (PD)	215 days*
Budget at Completion (BAC)	€ 267.500,00
Renewable Resources	2
Consumable Resources	-

Network Topology	
Serial/Parallel (SP)	56%
Activity Distribution (AD)	60%
Length of Arcs (LA)	64%
Topological Float (TF)	8%

\* 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	0,00	0,00	N/A
CRI-rho	100,00	0,00	N/A
CRI-thau	100,00	0,00	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-thau	N/A	N/A	N/A

	Time sensitivity		
	avg (%)	std dev (%)	skew (-)
CI	59,0	37,7	-0,2
SI	38,2	34,7	0,1
SSI	17,0	46,1	5,8
CRI-r	14,0	11,9	1,1
CRI-rho	13,7	11,4	1,2
CRI-thau	10,0	7,5	1,2

## 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		
Method - PF	MAPE (%)	MPE (%)
PV - 1	50,23%	-36,69%
PV - SPI	38,94%	24,23%
PV - SCI	38,94%	24,23%
ED - 1	79,60%	30,96%
ED - SPI	38,94%	24,23%
ED - SCI	38,94%	24,23%
ES- 1	32,88%	-32,79%
ES- SPI(t)	13,70%	10,11%
ES - SCI(t)	13,70%	10,11%

simulated EAC accuracy		
Method - PF	MAPE (%)	MPE (%)
1	0,00%	0,00%
CPI	0,00%	0,00%
SPI	31,11%	31,11%
SPI (t)	29,79%	29,79%
SCI	31,11%	31,11%
SCI (t)	29,79%	29,79%
0.8 CPI + 0.2 SPI	16,10%	16,10%
0.8 CPI + 0.2 SPI (t)	11,41%	11,41%

According to the MAPE values the best performance for time forecasting can be expected from the SPI(t)-1 weighted and SCI(t)-1 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 3 tracking periods with regular lengths of approximately two 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.

### 2.3.3. Earned Value Management

#### 2.3.3.1. Performance metrics

	CV (€)	SV (€)	SV(t) (d)	CPI(-)	SPI (-)	SPI(t) (-)	p-factor (-)
avg	-8500,00	-5000,00	-122,67	0,90	0,92	0,83	0,90
std dev	7788,88	0,00	81,67	0,05	0,03	0,11	0,02
final	-19500,00	-5000,00	-120,00	0,83	0,95	0,88	0,93

#### 2.3.3.2. Time forecasting

PD	215 days	Real duration	215 days	Late	0%
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EAC (t)	Real Accuracy				
Method - PF	avg (d)	std dev (d)	MAPE (%)	MPE (%)	
PV - 1	215,00	0,00	0,0	0,0	
PV - SPI	215,00	0,00	0,0	0,0	
PV - SCI	239,33	17,90	11,3	11,3	
ED - 1	215,00	0,00	0,0	0,0	
ED - SPI	215,00	0,00	0,0	0,0	
ED - SCI	227,33	5,13	5,7	5,7	
ES - 1	215,00	0,00	0,0	0,0	
ES - SPI(t)	215,00	0,00	0,0	0,0	
ES - SCI(t)	227,33	5,13	5,7	5,7	

#### 2.3.3.3 Cost forecasting

BAC (€)	€ 267.500,00	Real cost	€ 316.954,79	Over Budget	18,48%
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EAC	Real Accuracy				
Method - PF	avg (€)	std dev (€)	MAPE (%)	MPE (%)	
1	276000,00	7788,88	17,1	-17,1	
CPI	297286,07	18177,70	9,0	-9,0	
SPI	295135,84	3918,95	17,1	-17,1	
SPI (t)	323290,46	36400,39	17,1	-17,1	
SCI	318079,45	12291,40	9,0	-9,0	
SCI (t)	348634,74	36688,22	9,0	-9,0	
0.8 CPI + 0.2 SPI	296600,55	14471,55	10,7	-10,7	
0.8 CPI + 0.2 SPI (t)	301013,36	14490,87	10,7	-10,7	