

	Case Name: <b>Timber House</b>	Sector	Construction (Residential Building)
	<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>	Baseline Schedule	Schedule with resources Schedule with costs
Submitted by	N/A	Risk Analysis	Random simulation One of nine std. scenarios User defined distributions
Date	June 28, 2013		Project Control
File Name	C2013-08 Timber House.p2x		

## 1. Project description

Project authenticity

The construction of a luxurious timber house for residential purposes.

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	42
Planned Duration (PD)	216 days*
Budget At Completion (BAC)	501.030 €
Renewable Resources	-
Consumable Resources	-

\* standard eight-hour working days

Network topology	
Serial/Parallel (SP)	29%
Activity Distribution (AD)	42%
Length of Arcs (LA)	0%
Topological Float (TF)	47%

### 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	0.0	0.0	N/A
CRI-rho	100.0	0.0	N/A
CRI-tau	100.0	0.0	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-tau	N/A	N/A	N/A

	Time sensitivity		
	avg [%]	std dev [%]	skew [-]
CI	24.3	34.0	1.2
SI	43.0	39.7	0.3
SSI	5.7	13.8	3.9
CRI-r	12.3	12.5	3.1
CRI-rho	14.7	13.8	2.3
CRI-tau	27.4	17.3	1.5

The remarkable results for cost sensitivity can be explained by the absence of variable activity costs.

## 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	68.2	35.3	1	N/A	N/A
PV - SPI	99.4	99.4	CPI	N/A	N/A
PV - SCI	99.4	99.4	SPI	N/A	N/A
ED - 1	51,398.1	51,398.1	SPI(t)	N/A	N/A
ED - SPI	99.4	99.4	SCI	N/A	N/A
ED - SCI	99.4	99.4	SCI(t)	N/A	N/A
ES - 1	18.1	-17.0	0.8 CPI + 0.2 SPI	N/A	N/A
ES - SPI(t)	32.5	28.7	0.8 CPI + 0.2 SPI(t)	N/A	N/A
ES - SCI(t)	32.5	28.7			

According to the MAPE values<sup>1</sup> the best performance for time forecasting can be expected from the unweighted Earned Schedule method. Cost forecasting is not relevant since there are only fixed activity costs in this project.

### 2.3.2. Tracking description

Tracking authenticity

Manual tracking was performed over 13 tracking periods with irregular lengths varying from approximately a couple of days to four months. 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	-21.913	-26.727	-12.08	0.95	0.94	0.94	0.99
std dev	20.436	36.792	11.19	0.03	0.08	0.05	0.02
final	-75.595	0	-19.00	0.87	1.00	0.92	1.00

#### 2.3.3.2. Time forecasting

PD	216 days
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Real Duration	235 days
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Late	8.80%
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EAC(t)		Real Accuracy		
method - PF	avg [d]	std dev [d]	MAPE [%]	MPE [%]
PV - 1	227.52	15.84	6.8	-3.2
PV - SPI	232.52	23.65	7.7	-1.1
PV - SCI	244.73	26.03	8.6	4.1
ED - 1	229.84	13.88	5.3	-2.2
ED - SPI	235.30	22.59	6.5	0.1
ED - SCI	237.33	23.81	6.7	1.0
ES - 1	228.09	11.20	4.9	-2.9
ES - SPI(t)	230.60	13.81	5.4	-1.9
ES - SCI(t)	232.49	14.29	5.3	-1.1

#### 2.3.3.3. Cost forecasting

BAC	501.030 €
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Real Cost	576.624 €
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Over Budget	15.09%
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EAC		Real Accuracy		
method (PF)	avg [€]	std dev [€]	MAPE [%]	MPE [%]
1	522.943	20.436	9.3	-9.3
CPI	527.432	19.607	8.5	-8.5
SPI	532.748	23.438	7.6	-7.6
SPI(t)	528.47	21.291	8.4	-8.4
SCI	537.738	24.451	6.7	-6.7
SCI(t)	533.243	21.32	7.5	-7.5
0.8 CPI + 0.2 SPI	528.318	19.758	8.4	-8.4
0.8 CPI + 0.2 SPI(t)	527.582	19.715	8.5	-8.5