

	Case Name: MetaBOF	Sector	IT
	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	Sven Cousaert, Jeroen De Cocker and others		User defined distributions
Date	December 08, 2020	Project Control	Automatic tracking
File Name	C2023-03		Tracking based on user input

1. Project description

Project authenticity

The development of a violation and ANPR (automatic number plate recognition) data processing software called MetaBOF, which can read the license plates of vehicles. This system is used intensively by several government agencies to map and solve crimes, detect and prevent smuggling, stop unsafe vehicles and prevent intoxicated drivers to use the roads. The main purpose of MetaBOF is to create safer roads and regions, while there is a minimal impact on the users of the infrastructure, and optimal utilization of the governmental investment.

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

2. Project properties

2.1. Baseline Schedule

General	
# Activities	109
Planned Duration (PD)	230 days*
Budget At Completion (BAC)	-
Renewable Resources	43
Consumable Resources	-

* standard eight-hour working days

Network topology	
Serial/Parallel (SP)	15%
Activity Distribution (AD)	39%
Length of Arcs (LA)	0%
Topological Float (TF)	62%

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	-
CRI-rho	100	0	-
CRI-tau	100	0	-

	Resource sensitivity		
	avg [%]	std dev [%]	skew [-]
CRI-r	-	-	-
CRI-rho	-	-	-
CRI-tau	-	-	-

	Time sensitivity		
	avg [%]	std dev [%]	skew [-]
CI	13	29	1,93
SI	30	31,08	1,08
SSI	4	9,64	2,84
CRI-r	5	8,99	2,78
CRI-rho	10	16,21	1,74
CRI-tau	14	30,15	2,45

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	-	-	1	-	-
PV - SPI	-	-	CPI	-	-
PV - SCI	-	-	SPI	-	-
ED - 1	-	-	SPI(t)	-	-
ED - SPI	-	-	SCI	-	-
ED - SCI	-	-	SCI(t)	-	-
ES - 1	-	-	0.8 CPI + 0.2 SPI	-	-
ES - SPI(t)	-	-	0.8 CPI + 0.2 SPI(t)	-	-
ES - SCI(t)	-	-			

According to the MAPE values¹ 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

Tracking authenticity

Manual tracking was performed over 28 tracking periods with a length of approximately one week. 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.

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)?

2.3.3. Earned Value Management

2.3.3.1. Performance metrics

	CV [€]	SV [€]	SV(t) [d]	CPI [-]	SPI [-]	SPI(t) [-]	p-factor [-]
avg	-	-	-	-	-	-	-
std dev	-	-	-	-	-	-	-
final	-	-	-	-	-	-	-

2.3.3.2. Time forecasting

PD	-	Real Duration	-		-
----	---	---------------	---	--	---

EAC(t)	Real Accuracy			
method - PF	avg [d]	std dev [d]	MAPE [%]	MPE [%]
PV - 1	-	-	-	-
PV - SPI	-	-	-	-
PV - SCI	-	-	-	-
ED - 1	-	-	-	-
ED - SPI	-	-	-	-
ED - SCI	-	-	-	-
ES - 1	-	-	-	-
ES - SPI(t)	-	-	-	-
ES - SCI(t)	-	-	-	-

2.3.3.3. Cost forecasting

BAC	-	Real Cost	-		-
-----	---	-----------	---	--	---

EAC	Real Accuracy			
method (PF)	avg [€]	std dev [€]	MAPE [%]	MPE [%]
1	-	-	-	-
CPI	-	-	-	-
SPI	-	-	-	-
SPI(t)	-	-	-	-
SCI	-	-	-	-
SCI(t)	-	-	-	-
0.8 CPI + 0.2 SPI	-	-	-	-
0.8 CPI + 0.2 SPI(t)	-	-	-	-