

# Use of SMS Cost Model

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# The Need for SMS Cost Estimation

- ◆ An SMS is a mandatory and a critical component for every ANSP.
- ◆ The cost of implementing and maintaining a safety management system can be substantial.
- ◆ The expenses involved need to be planned for and budgeted.
- ◆ This is especially important in a financial crisis.

# Estimating the Cost

- ◆ Analyze the SMS and decompose it into simple procedures that can be easily described and modeled.
- ◆ Build a mathematical model that calculates the cost of each procedure.
- ◆ Implement the model.

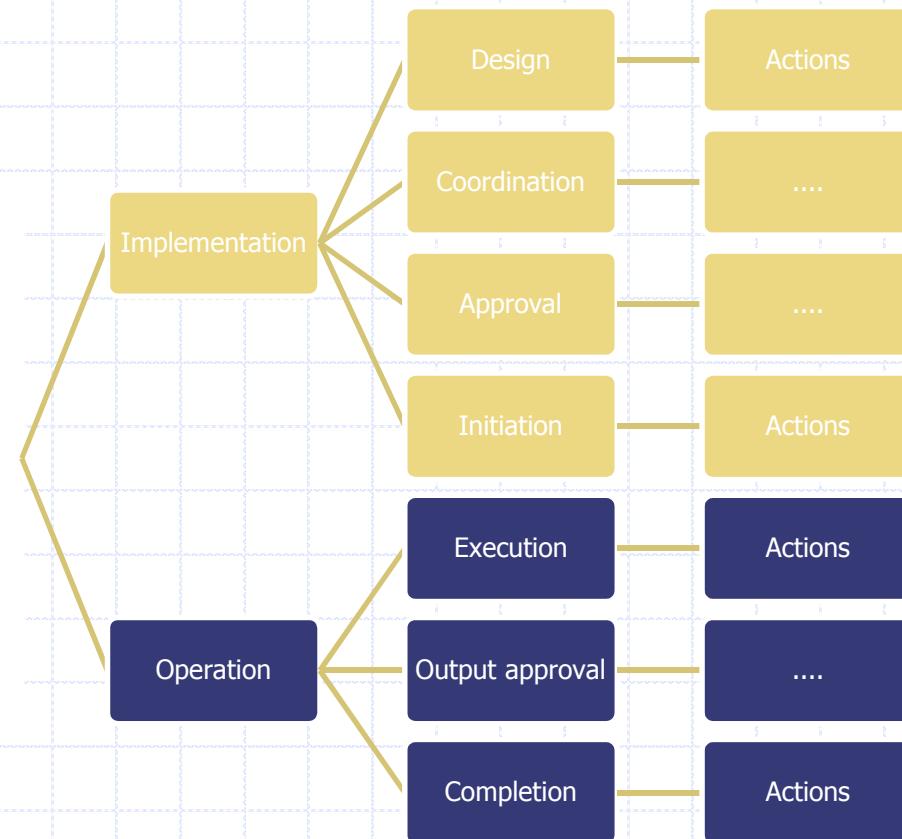
# Decomposing the problem

- ◆ Analyze the SMS and break it down into separate procedures.
- ◆ Separate each procedure into steps/tasks.
- ◆ Identify the activities required to perform each step/task.

# Decomposing the problem

- ◆ Two cost cards per procedure:
  - Implementation
  - Operation
- ◆ Four cost components in each task:
  - Human effort
  - Training
  - Infrastructure and equipment
  - Non-effort elements

# Overview of SMS break down



# The SMS cost model

- ◆ There are different cost models.
- ◆ They were compared in the context of SMS cost modelling.
- ◆ The most appropriate model was selected.
- ◆ Activity based cost accounting method
- ◆ Standard cost model

# Cost model input/output

## ◆ Model Input

- Global variables
- Implementation cost card
- Operation cost card

## ◆ Model Output (results)

- Human effort
- Training
- Infrastructure & equipment
- Non-effort elements

# Global variables

## ◆ Global variables

- Daily rates
  - ◆ SAF
  - ◆ OPS, ENG
  - ◆ MAN, ANC, ADM
  - ◆ INT & EXT Trainers or support
- Inflation
- Weighted average cost of capital
- Annual effort cost increase

# Human effort - implementation

- ◆ Procedure Design
- ◆ Procedure Coordination
- ◆ Procedure Approval
- ◆ Procedure Initiation

# Human effort - operation

- ◆ Procedure Execution
- ◆ Procedure Output Approval
- ◆ Procedure Completion

# Training

## ◆ Input data

- Training courses
- Training infrastructure and equipment e.g. SOE, venue
- Training missions
- Training non-effort elements  
e.g. training materials

## ◆ Output

- Total training cost

# Infrastructure and equipment

## ◆ Input data

- Gross balance value
- Expected operating life
- % for SMS purposes

## ◆ Output data

- Cost (depreciation and interest) for the whole operating life

# Non-effort elements

- ◆ Input data
  - Unit price
  - Quantity
  - Frequency per year
- ◆ Output data
  - Total cost

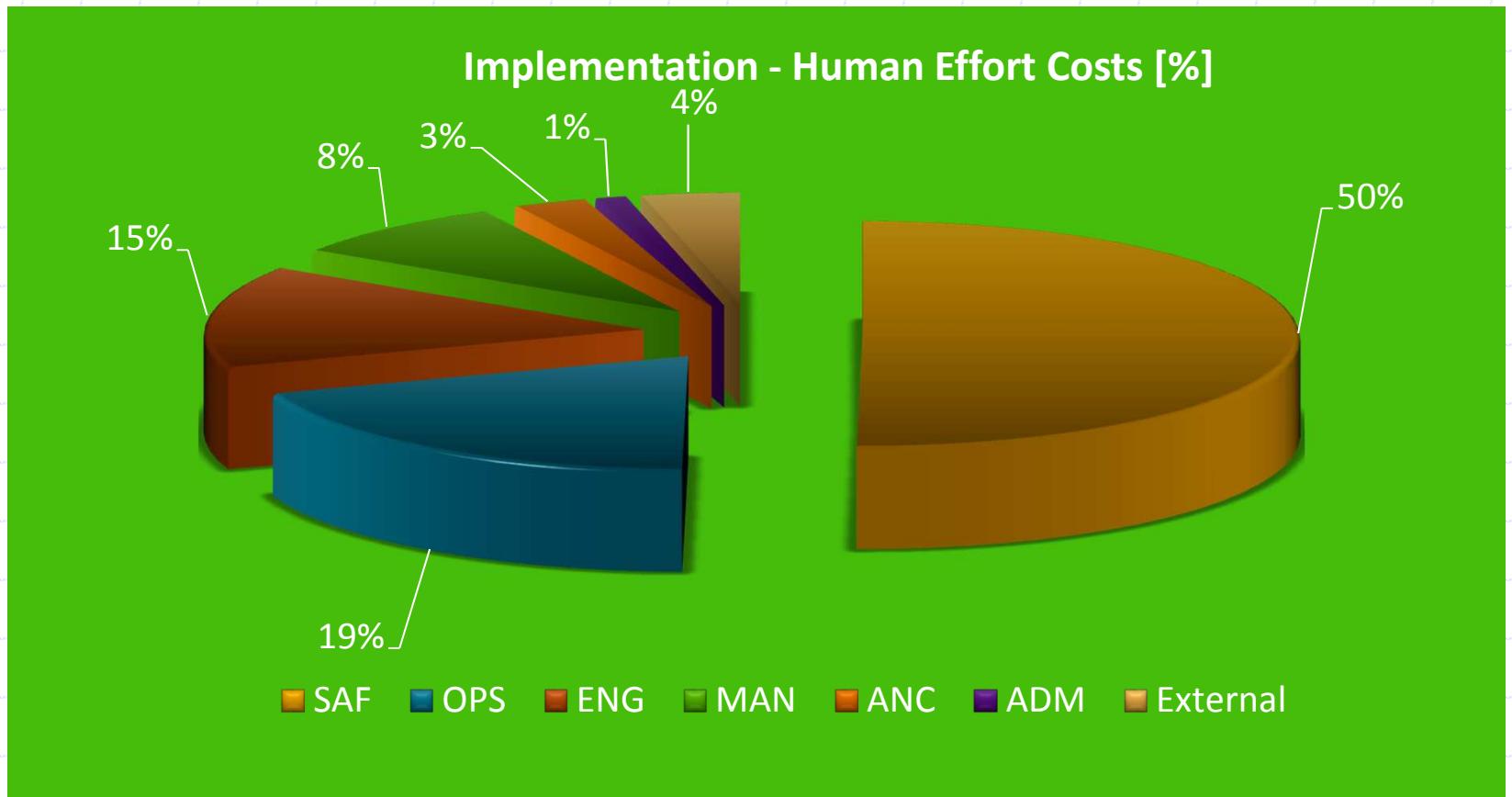
# Results of SMS cost modeling

- ◆ Implementation costs
- ◆ Operation costs
- ◆ For individual procedures and overall
- ◆ Analysis of human effort distribution
- ◆ Overall cost of different SMS elements

# Graphs and reports

Human Effort for Maintenance and day-to-day Operation of SMS							
Procedure Action	Internal						External
	SAF	OPS	ENG	MAN	ANC	ADM	
	[total mandays]	[total amount]					
5-Execution	10.625	0.5	0.25	3	0.25	0	
6-Output approval	0	0	0	2	0	0	
7-Completion	1.5	2	2	1	1	1	
<b>Grand Total Human Effort</b>	<b>121.25</b>	<b>25.00</b>	<b>22.50</b>	<b>60.00</b>	<b>12.50</b>	<b>10.00</b>	
R-Average Rate [per day]	220 €	200 €	150 €	260 €	110 €	90 €	
OH-Overhead [%]	20.00%	20.00%	20.00%	20.00%	20.00%	20.00%	
Rate for estimations	264.00 €	240.00 €	180.00 €	312.00 €	132.00 €	108.00 €	
<b>Total Human Effort Costs</b>	<b>32 010 €</b>	<b>6 000 €</b>	<b>4 050 €</b>	<b>18 720 €</b>	<b>1 650 €</b>	<b>1 080 €</b>	<b>0 €</b>

# Graphs and reports



# Managing expenses in a financial crisis

- ◆ Planning manpower
- ◆ Strategic planning
- ◆ Estimating cost of individual SMS activities
- ◆ Optimizing SMS procedures

# Demonstration

Microsoft Excel - CM\_DEMO\_V1.0\_DATA\_2003.xls

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**Human Effort for Development and Implementation of SMS**

Procedure Action	Internal						External
	SAF	OPS	ENG	MAN	ANC	ADM	
	[total man/day]						
1-Design	41	0	0	0	0	0	
2-Coordination	12	20	20	0	0	0	
3-Approval	2	0	0	1.25	0	0	
4-Initiation	39	20	20	12	10	5	
<b>Grand Total Human Effort</b>	<b>94</b>	<b>40</b>	<b>40</b>	<b>13.25</b>	<b>10</b>	<b>5</b>	
R-Average Rate [per day]	220 €	200 €	150 €	260 €	110 €	90 €	
OH-Overhead [%]	20.00%	20.00%	20.00%	20.00%	20.00%	20.00%	
<b>Rate for estimations</b>	<b>264.00 €</b>	<b>240.00 €</b>	<b>180.00 €</b>	<b>312.00 €</b>	<b>132.00 €</b>	<b>108.00 €</b>	
<b>Total Human Effort Costs</b>	<b>24,816 €</b>	<b>9,600 €</b>	<b>7,200 €</b>	<b>4,134 €</b>	<b>1,320 €</b>	<b>540 €</b>	<b>1,800 €</b>

**Human Effort for Maintenance and day-to-day Operation of SMS**

Procedure Action	Internal						External
	SAF	OPS	ENG	MAN	ANC	ADM	
R - Human effort							

Help / Global Variables / ISO-I / ISO-O / R - Human effort / R - Training / R - Infrastructure & E

Ready

# Q&A

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