ES2 – WS02-10

30 June – 01 July 2010 – Bucharest

SMS COST Model Working Session
The need for an SMS cost model

Decomposing SMS into “tasks”

Building a mathematical model

Model input

Model output

SMS COST MODEL
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
### Human Effort for Maintenance and day-to-day Operation of SMS

<table>
<thead>
<tr>
<th>Procedure Action</th>
<th>Internal</th>
<th>External</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SAF</td>
<td>OPS</td>
</tr>
<tr>
<td></td>
<td>[total mandays]</td>
<td>[total mandays]</td>
</tr>
<tr>
<td>5-Execution</td>
<td>10.625</td>
<td>0.5</td>
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<td>6-Output approval</td>
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<tr>
<td>7-Completion</td>
<td>1.5</td>
<td>2</td>
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<tr>
<td><strong>Grand Total Human Effort</strong></td>
<td><strong>121.25</strong></td>
<td><strong>25.00</strong></td>
</tr>
<tr>
<td>R-Average Rate [per day]</td>
<td>220 €</td>
<td>200 €</td>
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<tr>
<td>OH-Overhead [%]</td>
<td>20.00%</td>
<td>20.00%</td>
</tr>
<tr>
<td>Rate for estimations</td>
<td>264.00 €</td>
<td>240.00 €</td>
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<tr>
<td><strong>Total Human Effort Costs</strong></td>
<td><strong>32 010 €</strong></td>
<td><strong>6 000 €</strong></td>
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</tbody>
</table>
Graphs and reports

Implementation - Human Effort Costs [%]

- SAF: 19%
- OPS: 8%
- ENG: 3%
- MAN: 1%
- ANC: 4%
- ADM: 15%
- External: 50%
Managing expenses in a financial crisis

- Planning manpower
- Strategic planning
- Estimating cost of individual SMS activities
- Optimizing SMS procedures
## Human Effort for Development and Implementation of SMS

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<tr>
<td>1-Design</td>
<td>41</td>
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<td>0</td>
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<td>94</td>
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<td>4-Initiation</td>
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### Average Rate [per day]

<table>
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<tr>
<th>Equipment</th>
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<tr>
<td></td>
<td>220</td>
<td>200</td>
<td>150</td>
<td>260</td>
<td>110</td>
<td>90</td>
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### Hourly Wages [per day]

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<th>Rate Description</th>
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<td>24.00</td>
<td>240.00</td>
<td>180.00</td>
<td>312.00</td>
<td>122.00</td>
<td>104.00</td>
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### Total Human Effort Costs

| Total Human Effort Costs | 24,816 € | 9,600 € | 7,200 € | 4,134 € | 1,320 € | 540 € | 1,800 € |

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SMS COST Model Working Session
Bucharest 2010 July

Contact

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