South African Navy Prioritizing of Munitions for Insensitive Munitions Characterization

Presented by
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South African Navy
Need for Prioritization Method

- Department of Defence Policy Guideline
- Limited IM-budget
- Phased approach
- Prioritize munitions
- No methodology - 100+ munitions items
- Challenge to differentiate priorities
Development of Methodology

Scheduled specialist workgroup
• 2 days at Rheinmetall Denel Munition
• Goal to prioritize SA Navy’s munitions
• No methodology to use at workgroup
  - Brainstorm, subjective argumentation
Development of Methodology

- Challenge of methodology remained
- Spent weeks contemplating
- Realised only objective way was to create a "Value System"
- Took Value System to workgroup
Development of Methodology

• About 80% of SA’s IM specialist present at workgroup
• Buy-in to idea of Value System
• Value System parameters
  - Identify discriminatory Criteria
  - Preferably four to six criteria only
    • Relative Weighting of criteria
  - Objective scoring method
Acknowledgement

- Mr Cedric Brijraj - co-facilitator
- Participants (20+) of workgroup from
  - Rheinmetall Denel Munition
  - Denel Dynamics
  - PMP
  - Armscor
  - SA Navy
  - SSO Mun
Development Process

- Brainstorm Criteria/Factors
  - 30+ factors identified
- Round Table discussion
  - Individual Input by each participant
  - Grouping of certain criteria
- Reduced list to 10 Criteria
  - Individual prioritization
  - Round table discussion
Development Process

• Individual ranking of Criteria
• Reduced to four main Criteria with two having sub-criteria
• Ranking of selected criteria
  - Each participant indicated suggested weighting per criteria
  - Weighting determined through averaging of individual weighting scores
• Objective scoring value for Criteria
Selected Value System Criteria (Weighting)

Service Life Phase (0.19)
Use Profile (0.37)
Severity Of Consequence (0.31)
Current IM Status (0.13)
Service Life Phase

Weighting 0,19

Out of Service by 2010: 2
Out of Service by 2012: 5
Out of Service by 2016: 8
In Service beyond 2016: 10

* Calculation Example: Round 76mm HE
Use Profile

Weighting 0.37

Factor of:

Deployment Exposure Risk \((0.5)\)
and
Quantity Carried Onboard \((0.5)\)
Use Profile: *Sub-criteria 1*

**Deployment Exposure Risk**

<table>
<thead>
<tr>
<th>Always carried onboard</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Always between decks:</td>
<td>8</td>
</tr>
<tr>
<td>Upperdeck routes/stowages:</td>
<td>10</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Only carried onboard during specific exercises:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Always between decks:</td>
<td>4</td>
</tr>
<tr>
<td>Upperdeck routes/stowages:</td>
<td>6</td>
</tr>
</tbody>
</table>
Use Profile: *Sub-criteria 2*

**Quantity Carried Onboard**

<table>
<thead>
<tr>
<th>Range</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 10 items/units</td>
<td>3</td>
</tr>
<tr>
<td>10 - 25 items/units</td>
<td>5</td>
</tr>
<tr>
<td>25 - 75 items/units</td>
<td>7</td>
</tr>
<tr>
<td>&gt; 75 items/units</td>
<td>10</td>
</tr>
</tbody>
</table>
Severity of Consequence

Weighting 0.31

Factor of:
NATO HD Classification \((0.5)\)
and
Net Explosive Content \((0.5)\)
Consequence: Sub-criteria 1
NATO HD Classification

1.1 Mass Explosion : 10
1.2 Projectiles, mass explosion : 8
1.3 Flame & Fire, minor projectile : 5
1.4 No reaction outside packaging : 2
Consequence: Sub-criteria 2

Net Explosive Content

- < 750g : 1
- 750g - 5kg : 3
- 5kg - 12kg : 6
- 12kg - 100kg : 8
- > 100kg : 10
Current IM Status

Weighting 0.13

No THA or IM-testing : 10
THA completed (manual process) : 7
THA completed (Software) : 5
STANAG 4439 tested : 3
THA and STANAG 4439 tested : 1
Calculation Example
Round 76mm HE

**Service Life** (0.19): Out of Service by 2016 = 8

**Use Profile** (0.37):
- **Exposure Risk**: Always between decks = 8
- **Qty Onboard**: >75 items/units = 10

\[(8 \times 0.5) + (10 \times 0.5) = 9\]

**Severity of Consequence** (0.31):
- **HD Class**: 1.1 Projectiles = 10
- **NEC**: 750g - 5kg = 3

\[(10 \times 0.5) + (3 \times 0.5) = 6.5\]

**IM Status** (0.13): THA & IM testing = 1

**Rank Score Calculation (with weighting):**
\[8(0.19) + 9(0.37) + 6.5(0.31) + 1(0.13) = 6.995\]
Sample Rankings of Munitions

<table>
<thead>
<tr>
<th>Rank Score</th>
<th>Ammunition Type</th>
<th>Service Life</th>
<th>Use Profile</th>
<th>Qty</th>
<th>HD</th>
<th>NEC</th>
<th>IM Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.605</td>
<td>Round 35mm HEI</td>
<td>2016 &gt;</td>
<td>Upperdeck</td>
<td>&gt; 75</td>
<td>1.2</td>
<td>750g – 5kg</td>
<td>Nil</td>
</tr>
<tr>
<td>8.325</td>
<td>Missile SSM</td>
<td>&lt; 2016</td>
<td>Upperdeck</td>
<td>&lt; 10</td>
<td>1.1</td>
<td>&gt; 100kg</td>
<td>Nil</td>
</tr>
<tr>
<td>8.140</td>
<td>Round 35mm PracT</td>
<td>2016 &gt;</td>
<td>Upperdeck</td>
<td>&gt; 75</td>
<td>1.3</td>
<td>750g – 5kg</td>
<td>Nil</td>
</tr>
<tr>
<td>8.050</td>
<td>Charge Dems 450g</td>
<td>2016 &gt;</td>
<td>Upperdeck</td>
<td>25&lt; &gt;75</td>
<td>1.1</td>
<td>&lt; 750g</td>
<td>Nil</td>
</tr>
<tr>
<td>8.005</td>
<td>Missile SAM</td>
<td>2016 &gt;</td>
<td>Inboard</td>
<td>10&lt; &gt;25</td>
<td>1.1</td>
<td>12kg–100kg</td>
<td>THA</td>
</tr>
<tr>
<td>7.915</td>
<td>Rnd 20mm HEIT</td>
<td>&lt; 2016</td>
<td>Upperdeck</td>
<td>&gt; 75</td>
<td>1.2</td>
<td>&lt; 750g</td>
<td>Nil</td>
</tr>
<tr>
<td>7.855</td>
<td>Fuze Prox 76mm</td>
<td>&lt; 2016</td>
<td>Inboard</td>
<td>&gt; 75</td>
<td>1.1</td>
<td>&lt; 750g</td>
<td>Nil</td>
</tr>
<tr>
<td>7.855</td>
<td>Rnd 76mm SUPrac</td>
<td>&lt; 2016</td>
<td>Inboard</td>
<td>&gt; 75</td>
<td>1.2</td>
<td>750g – 5kg</td>
<td>Nil</td>
</tr>
<tr>
<td>7.450</td>
<td>Rnd 20mm PracT</td>
<td>&lt; 2016</td>
<td>Upperdeck</td>
<td>&gt; 75</td>
<td>1.3</td>
<td>&lt; 750g</td>
<td>Nil</td>
</tr>
<tr>
<td>7.215</td>
<td>Torpedo Combat</td>
<td>&lt; 2016</td>
<td>Spec- Inboard</td>
<td>&lt; 10</td>
<td>1.1</td>
<td>&gt; 100kg</td>
<td>Nil</td>
</tr>
<tr>
<td>6.995</td>
<td>Rnd 76mm HE</td>
<td>&lt; 2016</td>
<td>Inboard</td>
<td>&gt; 75</td>
<td>1.1</td>
<td>750g – 5kg</td>
<td>IM-t</td>
</tr>
<tr>
<td>6.445</td>
<td>Mine Combat</td>
<td>&lt; 2010</td>
<td>Upperdeck</td>
<td>&lt; 10</td>
<td>1.1</td>
<td>&gt; 100kg</td>
<td>Nil</td>
</tr>
</tbody>
</table>
Conclusion

- Value System proofed very effective
- Other arms of service (Army & Air Force) will adopt and use to prioritize their munitions
- Available for other Armed Forces that may be interested (adopt and adapt)