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Individual Sailor Assignment Model (ISAM)

75th MORSS
WG 20
12 June 2007
Background

• Typical Sailors alternate between 4-5 years on sea duty and 2-3 years on shore duty
  – Sea duty – make routine 6-8 month deployments assigned to ships, submarines and aviation squadrons
  – Shore duty – “9 to 5” with relatively little weekend work

• Navy is considering alternatives to traditional deployment plans and sea-shore rotation policy to provide a surge capacity with greater flexibility and constant readiness
  – Fleet Response Plan (FRP)
  – Flexible Deployment Concept (FDC)

• Tasker from Chief of Naval Personnel: assess the impact of alternative sea/shore rotation schemes on a sailors professional development, career progression and quality of life
  – Issue: what can an individual sailor expect over an extended period of sea/shore rotation or extended sea duty?
    • How much time at sea and away from family?
    • How much time off?
    • Impact on career development and advancement?
Scope

- Model impact of alternative sea/shore rotation schemes on individual sailors

- “Standard”, “Extended” and “Alternative” rotation schemes
  - Standard: 4-6 years at sea followed by 2-3 on shore
  - Extended: 5-10 years at sea followed by 3 years on shore
  - Alternative schemes:
    - Pooling – Sailors on sea duty rotate into a “respite” pool (e.g. 4 months out every 18) – applied at squadron or wing level
    - Multi-crewing – Blue/Gold, 4/3 (4 crews for 3 ships)
    - Others

- Alternatives to be compared on the basis of metrics
  - OPTEMPO
  - QOL
  - Career progression
Methodology

Modeling approach …

• Initially model ship/sailor activity over a 9-year period

• Each week, identify the unique sailor/assignment “state”
  – Example of “states”:
    • Ship underway with sailor assigned to ship
    • Ship pier side, sailor at a formal school
  – Unique standard “work week” for each “state” which defines hours for work, rest, off duty, etc

• Compare:
  – Relevant metrics based on cumulative time in respective “states”
  – How long it takes to complete career requirements versus how much time is available

Discrete Event Simulation” …

• Collects data for diverse attributes on individuals as they “flow” through the system

• Individual in the system represents an individual that would follow policy rules as written
  – Takes into account advancement and unit’s operational employment
  – Adaptable to multiple rotation schemes and time intervals
  – Receptive to business rules and policy excursions
  – Allows for “what if” analysis
Model Architecture

**Inputs**

- **Ship’s weekly schedule & activity**
  - Homeport, underway, SRA, others
  - Upkeep, Exercise, Deployment …

- **Sailor’s assignment & activity**
  - Ship, Shore, Shore Detachment
  - Duty, Leave, School, Transit, others

- **Scheduled training courses**
  - A and C schools, rate specific schools (CANTRAC), shipboard firefighting, etc.

- **Career progression requirements**
  - OJT, distance learning, certifications, exams, others

- **Perquisites for each skill object and estimated completion time**
  - Well defined for some rates, less so for others

**Parameters & Business Rules**

- **OPTEMPO**
  - Sea/Shore ratio

- **ITEMPO**
  - Time on watch
  - Time avail to train
  - Others

- **QOL**
  - Off duty hrs
  - Holidays
  - Leave
  - Others

- **CAREER**
  - Time to complete skill objects
  - Time to make rate
  - Off-duty education
  - Others
# Model Parameters

## SHIP

<table>
<thead>
<tr>
<th>Status</th>
<th>Pierside</th>
<th>Underway</th>
<th>At Anchor</th>
<th>Drydock</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Activity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## SHORE ACTIVITY

<table>
<thead>
<tr>
<th>Location</th>
<th>FCA</th>
<th>CONUS Non-FCA</th>
<th>OCONUS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Activity</td>
<td>Ship support</td>
<td>Shore support</td>
<td>Standdown</td>
</tr>
</tbody>
</table>

## SKILL OBJECTS

<table>
<thead>
<tr>
<th>Professional Dev</th>
<th>Courses</th>
<th>Schools</th>
<th>Proficiency</th>
<th>Skill Sets</th>
<th>Assessments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personnel Dev</td>
<td>Courses</td>
<td>Schools</td>
<td>OJT</td>
<td>Leadership</td>
<td>Courses</td>
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<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>Schools</td>
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<td></td>
<td></td>
<td></td>
<td>Assignments</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Cert &amp; Qual</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Certificate date</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
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<td>Qual date</td>
</tr>
<tr>
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<td>Performance</td>
</tr>
<tr>
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<td></td>
<td></td>
<td>Tests</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Evals</td>
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</table>

## WEEKLY HOURS

<table>
<thead>
<tr>
<th>On Duty</th>
<th>On watch</th>
<th>Training</th>
<th>Service diversions</th>
<th>Maintenance</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off Duty</td>
<td>Sleeping</td>
<td>Messing</td>
<td>Personnel Needs</td>
<td>Free Time</td>
<td>Leave</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Holiday</td>
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</table>

## SAILOR

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Ship</th>
<th>Shore Det</th>
<th>Shore Duty</th>
<th>Training</th>
<th>TPPH</th>
<th>Others</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rate</td>
<td>E1-3</td>
<td>E4</td>
<td>E5</td>
<td>E6</td>
<td>E7</td>
<td></td>
</tr>
</tbody>
</table>

From Ship Schedule | From Sea/Shore Rotation Plan | From 5VM, ECM, Fleet SMEs, other | From Standard Workweek
## 9 Year DDG Schedule

<table>
<thead>
<tr>
<th>Year</th>
<th>Pierside or Local Ops</th>
<th>U/W Local Ops</th>
<th>Deployed OCONUS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>PDL+U</td>
<td>SRA</td>
<td>COM2X</td>
</tr>
<tr>
<td>2</td>
<td>JTFEX</td>
<td>POM</td>
<td>DEPLOYED</td>
</tr>
<tr>
<td>3</td>
<td>SRA</td>
<td>COM2X</td>
<td>JTFEX</td>
</tr>
<tr>
<td>4</td>
<td>DEPLOYED</td>
<td>PDL+U</td>
<td>DSRA</td>
</tr>
<tr>
<td>5</td>
<td>COM2X</td>
<td>JTFEX</td>
<td>POM</td>
</tr>
<tr>
<td>6</td>
<td>DEPLOYED</td>
<td>PDL+U</td>
<td>SRA</td>
</tr>
<tr>
<td>7</td>
<td>JTFEX</td>
<td>POM</td>
<td>DEPLOYED</td>
</tr>
<tr>
<td>8</td>
<td>SRA</td>
<td>COM2X</td>
<td>JTFEX</td>
</tr>
<tr>
<td>9</td>
<td>DEPLOYED</td>
<td>PDL+U</td>
<td>SRA</td>
</tr>
</tbody>
</table>

*Note: The schedule details the deployment and operational assignments for a 9-year period.*
4-3-4 Rotation versus Over-Manning

4-3-4 (Baseline)

- Sailor checks into ship immediately after completion of A-school (as E3).
- Sailor schedule is tied to ship during 4 year sea duty assignment.
- When assigned to ship, sailors attend formal training (schools) as operational schedule allows. Sailors do not attend formal schools on shore duty.
- Sailor rotates to shore duty after 4 years, then back to ship.
- Shore duty assignment may or may not be in CONUS.

Over-Manning Concept

- Sailor checks into ship immediately after boot camp.
- Sailor is assigned to the ship for extended period (9 years) but periodically rotates into 30% “shore detachment”.
- Shore detachment supports ship but primarily serves as a “training cycle” for the sailor. Sailors typically attend formal schools when assigned to the shore detachment.
- Sailor does not rotate on to a conventional shore duty but remains attached to the ship or the associated shore detachment.
Cumulative Underway Days

Results shown are for ET and DDG

- More initial underway days under baseline rotation cycle
- Similar at 5-year point
- Over-manning rotation resulted in 35% more underway time over 9-year period

9-year Cumulative
994 (31%)
735 (23%)

Shore duty for sailor rotating under Baseline cycle
ITEMPO remains generally below 200 for both rotation cycles.

Overall 9-year sea/shore ratio:
- Baseline: 1.53
- Over-manning: 3.33

*ITEMPO defined as # days away from homeport in last 365.
Formal Schools

- Cum Baseline
- Cum Over-manning
- Poly. (Cum Baseline)
- Poly. (Cum Over-manning)

* Formal schools could be scheduled during sea detachment periods (Over-manning) or when ship was not underway for Intermediate or Advanced training or deployed. Schools were not scheduled for sailors on shore duty.

95% Sailor under Over-manning was able to be scheduled for 95% of available formal schools over a 9-year period. Baseline sailor could be scheduled for 73%
Baseline college progress

Over-manning college progress

Nominal college credit requirement for AA Degree

- Over-manning sailor initially accumulated college credit faster than baseline sailor – result: 20 hrs of credit 4 months earlier.
- Baseline sailor caught up and surpassed Over-manning sailor for college credits – result: AA degree 1.5 years sooner.
Advancement

- Advancement for the Over-manning sailor was initially slower than the baseline sailor – due mainly to A-school schedule.
- Time to E6 was comparable.
Summary

Sailor under Over-manning rotation experienced...

- 42% more underway days
- 40% less shore duty
- 48% more time away from homeport
- Higher average ITEMPQ (but did not exceed 200 days)
- 18% fewer college credits (however did earn a AA degree)
- Overall 12% longer to make rates but made E6 slightly faster
- 30% more training time
- 33% more formal school attendance (95% of all available schools)
- Comparable leave and holidays

Bottom Line:
- When compared to 4-3-4 rotation, Over-manning concept resulted in a sailor that spent more time at sea, attended more formal schools, had less time for off duty college and initially advanced somewhat slower.
Capabilities & Limitations:

- Very adaptable
- Quick turnaround of results
- Not a flow model – single sailor
- Dependent on 5VM content
- Dependent on business rules

Potential Applications:

- Army deployment/assignment alternatives
- IA rotation alternatives
- Rotation of Field Operatives (FBI, CIA, etc.)
- Shift rotation (Police and Fire Departments)
- Any situation involving a rotating work force
Questions?
Individual Sailor Assignment Model (ISAM)

Backups
# Metrics

<table>
<thead>
<tr>
<th>Metric</th>
<th>Weekly</th>
<th>9 years</th>
<th>Measure of:</th>
<th>CAT</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cum hrs on watch</td>
<td>x</td>
<td>x</td>
<td>Direct workload</td>
<td>OPS</td>
<td>Driven by ship sked and sailor assignment</td>
</tr>
<tr>
<td>Avg weekly hrs on watch</td>
<td>x</td>
<td>x</td>
<td>Direct workload distribution &amp; variation</td>
<td>OPS</td>
<td></td>
</tr>
<tr>
<td>Variance of weekly hrs on watch</td>
<td>x</td>
<td></td>
<td>Direct workload variation</td>
<td>OPS</td>
<td></td>
</tr>
<tr>
<td>Cum days on SEA DUTY</td>
<td>x</td>
<td>x</td>
<td>OPTEMPO</td>
<td>TEMPO</td>
<td>Driven by ship sked and sailor assignment</td>
</tr>
<tr>
<td>Cum days on SHORE DUTY</td>
<td>x</td>
<td>x</td>
<td>PERSTEMPO</td>
<td>TEMPO</td>
<td></td>
</tr>
<tr>
<td>SEA/SHORE DUTY ratio</td>
<td>x</td>
<td>x</td>
<td>OPTEMPO/PERSTEMPO</td>
<td>TEMPO</td>
<td></td>
</tr>
<tr>
<td>Cum underway days</td>
<td>x</td>
<td>x</td>
<td>OPTEMPO</td>
<td>TEMPO</td>
<td></td>
</tr>
<tr>
<td>Cum days out of homeport</td>
<td>x</td>
<td>x</td>
<td>ITEMPO</td>
<td>TEMPO</td>
<td></td>
</tr>
<tr>
<td>Days out of homeport in last 365 days</td>
<td>x</td>
<td>x</td>
<td>ITEMPO</td>
<td>TEMPO</td>
<td></td>
</tr>
<tr>
<td>Cum off-duty hours</td>
<td>x</td>
<td>x</td>
<td>Quality of Life</td>
<td>QOL</td>
<td>Driven by ship sked and sailor assignment</td>
</tr>
<tr>
<td>Avg weekly off-duty hours</td>
<td>x</td>
<td>x</td>
<td>Quality of Life</td>
<td>QOL</td>
<td></td>
</tr>
<tr>
<td>Variance of weekly off-duty hours</td>
<td>x</td>
<td></td>
<td>Quality of Life</td>
<td>QOL</td>
<td></td>
</tr>
<tr>
<td>Cum holidays off</td>
<td>x</td>
<td>x</td>
<td>Quality of Life</td>
<td>QOL</td>
<td>Driven by ship sked and sailor assignment</td>
</tr>
<tr>
<td>Avg number of holidays off</td>
<td>x</td>
<td>x</td>
<td>Quality of Life</td>
<td>QOL</td>
<td>RULE: Holidays not observed underway</td>
</tr>
<tr>
<td>Cum days of leave taken</td>
<td>x</td>
<td>x</td>
<td>Quality of Life</td>
<td>QOL</td>
<td>RULE: No leave when ship is deployed</td>
</tr>
<tr>
<td>Avg number of leave days taken</td>
<td>x</td>
<td>x</td>
<td>Quality of Life</td>
<td>QOL</td>
<td>RULE: Leave can not interfere with required training</td>
</tr>
<tr>
<td>Variance of leave days taken</td>
<td>x</td>
<td>x</td>
<td>Quality of Life</td>
<td>QOL</td>
<td>RULE: Can not go into leave hole</td>
</tr>
<tr>
<td>Cum On-duty/Off-duty ratio</td>
<td>x</td>
<td>x</td>
<td>Sea-centric measure</td>
<td>QOS</td>
<td>Driven by ship sked and sailor assignment</td>
</tr>
<tr>
<td>Avg On-duty/Off-duty ratio</td>
<td>x</td>
<td>x</td>
<td>Sea-centric measure</td>
<td>QOS</td>
<td></td>
</tr>
<tr>
<td>Cum training hrs avail</td>
<td>x</td>
<td>x</td>
<td>Career development resource</td>
<td>CAREER</td>
<td>Driven by ship sked and sailor assignment</td>
</tr>
<tr>
<td>Avg weekly training hrs available</td>
<td>x</td>
<td>x</td>
<td>Career development resource</td>
<td>CAREER</td>
<td></td>
</tr>
<tr>
<td>Variance of weekly trng hrs available</td>
<td>x</td>
<td></td>
<td>Career dev resource variation/risk</td>
<td>CAREER</td>
<td></td>
</tr>
<tr>
<td>Cum training hrs required for progress</td>
<td>x</td>
<td>x</td>
<td>Professional/Personnel development</td>
<td>CAREER</td>
<td>Dependent on skill objects and how they are scheduled</td>
</tr>
<tr>
<td>Avg weekly trng hrs rqd for progress</td>
<td>x</td>
<td>x</td>
<td>Professional/Personnel development</td>
<td>CAREER</td>
<td>Somewhat subjective but will consistent schedules</td>
</tr>
<tr>
<td>Cum rqd vs avail training hrs delta</td>
<td>x</td>
<td>x</td>
<td>Professional/Personnel development</td>
<td>CAREER</td>
<td></td>
</tr>
<tr>
<td>Cum hrs avail for off-duty education</td>
<td>x</td>
<td>x</td>
<td>Professional/Personnel development</td>
<td>CAREER</td>
<td>RULE: Up to a max of 10hrs/week - counts against off-duty hours</td>
</tr>
<tr>
<td>Weeks with AA degree</td>
<td>x</td>
<td></td>
<td></td>
<td>CAREER</td>
<td></td>
</tr>
<tr>
<td>Weeks with BA/BS degree</td>
<td>x</td>
<td></td>
<td></td>
<td>CAREER</td>
<td></td>
</tr>
<tr>
<td>Weeks with MA/MS degree</td>
<td>x</td>
<td></td>
<td></td>
<td>CAREER</td>
<td></td>
</tr>
<tr>
<td>Cum weeks an E4/E5/E6</td>
<td>x</td>
<td>x</td>
<td>Professional/Personnel development</td>
<td>CAREER</td>
<td>RULE: Sailor makes rate at next exam cycle after all requirements are met</td>
</tr>
<tr>
<td>Weeks to make E4/E5/E6</td>
<td>x</td>
<td>x</td>
<td>Professional/Personnel development</td>
<td>CAREER</td>
<td>RULE: Sailor is qualified when all rqmts are met</td>
</tr>
<tr>
<td>Weeks certified/qualified</td>
<td>x</td>
<td>x</td>
<td>Professional/Personnel development</td>
<td>CAREER</td>
<td></td>
</tr>
<tr>
<td>Cum Human Capital Index</td>
<td>x</td>
<td>x</td>
<td>Professional/Personnel development</td>
<td>CAREER</td>
<td>TBD</td>
</tr>
</tbody>
</table>
Cumm Time Off Duty Educ

Cumulative Days

Standard  Extended  Pooling  Multicrewing  Multicrewing  Multicrewing  Multicrewing  Multicrewing  Multicrewing  Multicrewing
Sea       Sea       4:3  7:5  2:1  5:4  5:3  5:4  9:7

803.88  754.51  776.81  842.70  729.01  705.75  678.42
Comparison for personnel arriving at different times of the unit’s employment cycle
Comparison for personnel arriving at different times of the unit’s employment cycle
% Time Avail To Go Home

Depending on Rotation Policy, some individuals miss portions of deployments.

Pooling Policy

- Deployment
- 18:3
- 18:6
- 18:12
- 24:3
- 24:6
- 24:12
% Time Avail To Go Home

Days

Percentage

Deployment 5:2 5:2.5 5:3 6:2 6:2.5 6:3

7-5 Multicrewing Policy

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