Development of a Prototype Behavioral Marker System for Assessing and Training Officers of the Deck

▼ W. Max Long, LT, USN

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Agenda

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- Nontechnical Skills
- Behavioral Marker Systems

▼ Methodology

- Literature Review
- Focus Group
- Interviews
- Inter-Rater Reliability Testing

▼ Results

Introduction

▼ The Officer of the Deck

- "The Officer of the Deck (OOD) occupies a unique position in a naval ship. Nowhere in military or civilian life is there a parallel to the range and degree of responsibility that is placed in the hands of the OOD. As direct representative of the Captain, he or she acts with all the authority of command and, next to the Captain and the Executive Officer (XO), is the most important person on the ship" (Stavridis & Girrier, 2007).

- Qualification process involves Personnel Qualification Standards (PQS) that primary concentrate on technical skills and knowledge.

Definitions

▼ Nontechnical Skills

- "Cognitive, social, and personal resource skills that complement technical skills, and contribute to safe and efficient task performance"

▼ Behavioral Markers

- "Observable, nontechnical behaviors that contribute to superior or substandard performance within a work environment"

Example Behavioral Marker Systems

Categories	Elements	Example Behaviours
COOPERATION	Team building and maintaining	- Establishes atmosphere for open communication and participation
	Considering others	- Takes Condition of other crew members into account
	Supporting others	- Helps other crew members in demanding situation
	Conflict solving	- Concentrates on what is right rather than who is right
LEADERSHIP & MANAGERIAL SKILLS	Use of authory and assertiveness	- Takes initiative to ensure involvement and task completion
	Maintaining Standards	- Intervenes if task completion deviates from standards
	Planning and co-ordinating	- Clearly states intensions and goals
	Workload management	- Allocates enough time to complete tasks
SITUATION AWARENESS	System awareness	- Monitors and reports changes in system states
	Environmental awareness	- Collect information about the environment
	Anticipation	- Identifies possible / future problems
DECISION MAKING	Problem definition / diagnosis	- Reviews casual factors with other crew members
	Option generation	- States alternative courses of action - Asks other crew member for options
	Risk assessment / Option choice	- Considers and shares risks of alternative courses of action
	Outcome review	- Checks outcome against plan

Very Poor	Poor	Acceptable	Good	Very Good
Observed behaviour directly endangers flight safety	Observed behaviour in other conditions could endanger flight safety	Observed behaviour does not endanger flight safety but needs improvement	Observed behaviour enhances flight safety	Observed behaviour optimally enhances flight safety and could serve as an example for other pilots

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Example Behavioral Marker Systems

Hospital .... Trainer name .... Date ....

Trainee name .... Operation ....

Category	Category rating*	Element	Element rating*	Feedback on performance and debriefing notes
Situation Awareness		Gathering information		
		Understanding information		
		Projecting and anticipating future state		
Decision Making		Considering options		
		Selecting and communicating option		
		Implementing and reviewing decisions		
Communication and Teamwork		Exchanging information		
		Establishing a shared understanding		
		Co-ordinating team activities		
Leadership		Setting and maintaining standards		
		Supporting others		
		Coping with pressure		

* 1 Poor; 2 Marginal; 3 Acceptable; 4 Good; N/A Not Applicable

1 Poor   Performance endangered or potentially endangered patient safety, serious remediation is required
2 Marginal   Performance indicated cause for concern, considerable improvement is needed
3 Acceptable Performance was of a satisfactory standard but could be improved
4 Good   Performance was of a consistently high standard, enhancing patient safety; it could be used as a positive example for others
N/A   Not Applicable

Method

▼ Literature Review

- Create an exhaustive list of nontechnical skills

▼ Focus Group

- Refine the list of nontechnical skills and identify individual elements

▼ Interviews

- Gather real-life data to test the reliability

▼ Inter-Rater Reliability Testing

- Test the reliability of the taxonomy

Literature Review

Assertiveness	Leadership
Communication	Management skills
Co-operation	Managing stress
Coping with fatigue	Situational awareness
Decision making	Task management
Energy	Team working
Forehandedness	Vigilance
Intuition/experience	Workload management
Judgment	

Focus Group

Nontechnical Skill Category	Elements
Leadership	Establishing Authority
	Managing Workload
	Maintaining the Standards of the Watch
Decision Making	Defining the Problem
	Generating Possible Solutions
	Implementing Best Solution
Situational Awareness	Actively Gathering Information
	Responding to Changes in Information
	Anticipating Future Events
Communication	Selecting Correct Medium
	Sending Information Clearly and Concisely
	Effectively Receiving Information
Managing Stress	Maintaining Concentration
	Coping with Stressors

Interviews

▼ The OOD went back to the bridge wing to look at the contact again.

▼ The OOD reported both contacts to the CO prior to being relieved.

▼ Once the ship was officially called into its waiting station, the OOD gave the order to proceed.

▼ The OOD never called the oiler to state his intentions.

▼ Once the ship was only 500 yards off the oiler's bow, the OOD ordered the Conning Officer to match the oiler's course and speed to avoid a collision.

▼ The OOD did not use the wind envelope manual to prepare for helicopter operations.

▼ The OOD continued to look at the radar scope instead of looking out the windows to see if they were approaching the oiler too fast.

▼ The OOD did not know that the ship was four miles left of track.

▼ The OOD ordered the bridge team to stop approaching the other vessel.

▼ The OOD told the XO that they were not approaching the correct vessel.

Inter-Rater Reliability Testing

Nontechnical Skill Category	Elements
Leadership	Establishing Authority
	Managing Workload
	Maintaining the Standards of the Watch
Decision Making	Defining the Problem
	Generating Possible Solutions
	Implementing Best Solution
Situational Awareness	Actively Gathering Information
	Responding to Changes in Information
	Anticipating Future Events
Communication	Selecting Correct Medium
	Sending Information Clearly and Concisely
	Effectively Receiving Information
Managing Stress	Maintaining Concentration
	Coping with Stressors

$$\kappa = .43$$

Inter-Rater Reliability Testing

Nontechnical Skill Category	Elements
Leadership	Managing Workload
	Managing Stress
Decision Making	Considering Options
	Balancing Risks
	Implementing and Reviewing Decisions
Situational Awareness	Actively Gathering Information
	Responding to Changes in Information
	Anticipating Future Events
Communication	Issuing Orders
	Following Orders and Procedures
	Providing Information

$$\kappa = .65$$

Inter-Rater Reliability Testing

Nontechnical Skill Category	Elements
Leadership	Managing Workload
	Managing Stress
Decision Making	Analytical Decision Making
	Following Orders and Procedures
	Intuitive Decision Making
Situational Awareness	Actively Gathering Information
	Responding to Changes in Information
	Anticipating Future Events
Communication	Issuing Orders
	Providing Information
	Receiving Information

$$\kappa = .70$$

Inter-Rater Reliability Testing

Nontechnical Skill Category	Elements
Leadership	Managing Workload
	Managing Stress
Decision Making	Analytical Decision Making
	Following Orders and Procedures
	Intuitive Decision Making
Situational Awareness	Gathering Awareness
	Understanding Awareness
	Anticipating Future Events
Communication	Issuing Orders
	Providing Information

$$\kappa = .91$$

The Nontechnical Skills for Officers of the Deck (NTSOD) System

Ship_____   Trainee _____   Watch _____

Date_____   Assessor_____   Evolution _____

Category	Category Rating*	Element	Element Rating*	Notes
Leadership		Managing Watch Team		
		Coping with Stress		
Communications		Providing Information		
		Issuing Orders		
Situational Awareness		Gathering Awareness		
		Understanding Awareness		
		Anticipating Future Events		
Decision Making		Analytical Decision Making		
		Following Orders & Procedures		
		Intuitive Decision Making		

* 1 – Unsatisfactory; 2 – Marginal; 3 – Satisfactory; 4 – Outstanding; N/O – Not Observed

1 – Unsatisfactory: Watchstander could endanger ship and crew without considerable improvement.
2 – Marginal: Watchstander requires improvement.
3 – Satisfactory: Watchstander performed at an acceptable level, but room for improvement exists.
4 – Outstanding: Watchstander performed at a consistently high level.
N/O – Not Observed: Element or skill was not observed during this evolution.

Statement Distribution

Nontechnical Skill	Skill Percentage	Element	Element Percentage Inside Skill	Element Overall Percentage
Leadership	12.1%	Managing Watch Team	44.4%	5.4%
		Coping with Stress	55.6%	6.7%
Communications	28.2%	Providing Information	33.3%	9.4%
		Issuing Orders	66.7%	18.8%
Situational Awareness	39.6%	Gathering Awareness	66.1%	26.2%
		Understanding Awareness	25.4%	10.1%
		Anticipating Future Events	8.5%	3.4%
Decision Making	20.1%	Analytical Decision Making	53.3%	10.7%
		Following Orders and Procedures	40.0%	8.1%
		Intuitive Decision Making	6.7%	1.3%