

# **Identifying and Addressing User Needs: A Preliminary Report on the Command and Control Requirements for CJTF Staff**

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## **Abstract**

As part of the Navy's Decision Centered Design (DCD) program<sup>1</sup>, preliminary Cognitive Task Analyses (CTA) were performed on Joint Operations Center (JOC) personnel serving aboard command and control ships under the command of a Joint Task Force Commander (CJTF). The initial focus of these efforts was on the Battle Watch Captain (BWC). Members of the DCD project team conducted interviews and observed exercises and actual underway operations onboard USS Coronado (AGF 11) and USS Mount Whitney (LCC 20) as part of the CTA effort.

As data from these exercises and interviews were compiled, experienced cognitive task analysts examined the data to determine decision requirements, information flow patterns, training and organizational requirements, and common operational problems.

The initial observations, analyses, and interviews quickly revealed that the CJTF, Battle Watch Captain, and the supporting personnel are not well served by current JOC information systems and workspaces. Independently, C2F and C3F are continuing to experiment with JOC layouts, displays, organizations, and decision support systems as they evolve toward an adequate configuration. Clearly, help for CJTF is urgently needed. Expected products from the DCD program include improved information management and display systems, and recommendations for changes to JOC policies and procedures.

## **1. Introduction**

This paper discusses lessons learned from preliminary CTA conducted on JOC personnel aboard US Navy command and control ships. Based on lessons learned, recommendations for change are provided. The CTA was performed as part of the Navy's DCD project. *The information and recommendations contained herein are preliminary in nature and subject to change as DCD project efforts continue.*

## **2. Background**

Thanks to ongoing advances in Information Systems technology, today's military tactical decision-makers have available to them enormous quantities of data. Unfortunately, having

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<sup>1</sup> The DCD program was sponsored by OPNAV N6, and managed by SPAWAR PMW-133 and SSC-SD Code 44 during the 1998 fiscal year. Currently in hiatus due to funding constraints, the DCD program is expected to resume activity in FY 00.

# Report Documentation Page

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access to *more* data does not always help decision-makers perform their duties. Instead, what is needed is readily available, accurate, easy-to-understand *information*.

Current-generation information systems and displays are often not adequate for conveying tactical information to Navy decision-makers – especially during high workload, uncertain, ambiguous, and time compressed situations. In situations like these, stress can have very serious effects on human performance and decision making [Hutchins and Kowalski, 1993]. Inadequate information and display systems can hinder the decision making process, increase the potential for blue-on-blue and blue-on-white engagements, and negatively impact a commander’s ability to operate within the Rules Of Engagement (ROE). A number of factors further exacerbate the problem [Kelly and Moore, 1996]. These factors include:

- Complex and sometimes conflicting mission requirements, often in Joint or Coalition settings.
- Situations where there are many tracks of diverse types whose status as friendly, hostile or neutral is ambiguous, e.g., littoral regions.
- Complex and ever-changing orders of battle and ROE associated with today’s peace keeping missions.
- Reduced manning requirements.

Clearly, improvements are needed in display systems, information management tools, and human-computer interfaces (HCI). Improved systems must support error-free decision processes, improve situation awareness, improve combat team interactions, and buy time for the tactical team to recognize critical events and operate within the rules of engagement. The DCD project is working toward providing such improvements.

### **3. A Proven Approach: Decision Centered Design**

One method for improving systems and displays that has proven quite successful in the past is Decision Centered Design (DCD). Under SSC-SD’s current DCD efforts, researchers are working to develop, document, and refine a rigorous, formal process for developing information systems tailored to the requirements of decision makers. This process will specify necessary changes in system development and acquisition processes, personnel training, and doctrine and procedures. One of the first steps in the DCD process is to develop a *comprehensive* understanding of all aspects of a particular task or job. To do this, researchers use a variety of diverse methods.

#### **3.1 *Cognitive Task Analysis (CTA)***

Conducting a Cognitive Task Analysis (CTA) [Klein Associates Inc., 1997] is one method used to develop a greater understanding of a particular job or task. This type of analysis attempts to identify, and clearly describe the cognitive tasks performed by a decision-maker performing a specific task. One especially useful tool employed in CTA is an interview-based “knowledge audit.” Knowledge audits – a specialized form of structured interview – can be performed in formal interviews settings, or adapted as an adjunct to other knowledge elicitation / data collection methods.

### 3.2 *Structured Observations*

Another method used to collect information about a particular job or task is carefully structured observations [Moore, 1997]. Sometimes time sampling techniques are applied to quantify the data collected through observations. Other times, observations are made on an occasional or one-time basis, and then validated through additional observations and discussions with knowledgeable persons such as the actual job performer or subject matter experts (SME). Researchers carefully observe personnel performing specific tasks. During the observations, actions are recorded, workspace layouts are sketched, and supplementary task information is collected.

### 3.3 *Findings and Recommendations*

This report provides initial findings – and recommendations based on these findings – from a partially completed CTA conducted on the Commander, Joint Task Force (CJTF) Battle Watch Captain (BWC). These findings and recommendations will be used in later phases of the DCD process to guide researchers and engineers in the development, testing, and evaluation of improved information management and display systems.

## 4. **Preliminary Lessons Learned from the Joint Operations Center (JOC) Workspace and Personnel**

The following information is compiled from discussions, observations, and interviews performed aboard USS Coronado and USS Mount Whitney during the period of May 1998 to January 1999. Additional DCD CTA data collection is planned, and results from these efforts will be published separately.

### 4.1 *Cognitive Task Analysis (CTA) Interviews*

The CTA data provided below was collected in both formal and informal settings. Formal interviews were usually conducted while in port or during periods of low-tempo operations while underway. Unfortunately, formal interviews were often difficult to obtain because BWC / JOC personnel were unavailable for formal interviews during underway periods due to exercise tempo, watch schedules, and meeting requirements. Fortunately, during these periods the BWC / JOC personnel were often willing to be interviewed informally (i.e., briefly, for a couple of minutes at a time - usually during meals or after evening meetings). Therefore, the majority of CTA data represented here was collected *informally*. Interviewees included senior CJTF staff, actual BWC watch standers, and senior and junior level BWC support staff. Questions asked by the researcher during these interviews included:

- What is the job / role / function being performed?
- What “products” are produced in association with the job?
- What “job smarts” have you developed to aid you in your job?
- What essential “tipper” information do you notice while performing your duties?

- What efforts can you “off-load” to other personnel? What efforts are just too important to let someone else do?
- What is difficult about the job / role / function?
- With regard to the job, where does the most valuable information come from?
- If you could change your display / system in any way you want, what would you change?
- When on the job, who do you communicate most with? What information do you exchange with this person?
- What distracts you when the workload is high?
- What is the most difficult aspect of your job, especially with respect to decision-making?

The following section provides representative responses these interview questions. These responses are provided for informational purposes only. Due to the preliminary nature of the findings detailed in this report, and the fact that additional information collection and analysis are ongoing, the following information should be considered – and acted upon – with prudence.

#### 4.1.1 *What is the BWC’s job / role / function?*

There was a great deal of consensus among interviewees with regard to the role of the BWC. Interviewees felt that the primary roles of a BWC were to act as Joint Task Force “facilitator” and represent the CJTF in day-to-day operations. They agreed that the BWC was responsible for making sure that all of the diverse Task Force resources and activities were coordinated, monitored, and reported to higher authority. Individual responses to this question included:

- “Represent the Admiral” during day-to-day operations...
- Advise the Admiral on operational issues (as operational plans and courses of action were developed and put into place, advise the admiral with regard to their impact on mission goals and timelines).
- “Work the seams” between Component Commanders (make sure that the Component Commanders were coordinating / communicating with each other, and that their activities did not conflict with each other’s activities and other ongoing events).
- Assist Component Commanders with resource conflicts, etc. (work to resolve conflicts with regard to Task Force resource management).
- Monitor the tempo of the campaign (monitor all ongoing and future activities as they relate to the overall plan).
- Gather, analyze, fuse, and disseminate operational / tactical data (build, maintain, and disseminate a common “situation awareness” so that everyone in the Task Force shares a common understanding of operational / tactical issues).

#### 4.1.2 *What does the CJTF need / expect from the BWC and his or her staff?*

Responses regarding the actions and products expected from the BWCs and their staff indicate a wide range of tasking – from mundane administrative duties to mission-critical mission planning and monitoring. “Products” expected from the BWCs and their staff include:

- Immediate alerts and advise regarding any of the CJTF’s numerous CCIRs or non-compliance with operational guidance (Commander’s Intentions, etc.)

- An up-to-date situation awareness.
- A clear understanding of past, current, and future ops.
- A “concept of ops” / recommendations regarding how to proceed on various matters.

#### 4.1.3 *What “job smarts” have you developed to aid you in your duties as BWC?*

Due to widely diverse mission tasking and a constantly evolving concept of operations, respondents stated that long-term “job smarts” were difficult to develop. In spite of this, three general “job smart” themes emerged from these discussions.

- Conduct formal watch turnover briefs starting 30 minutes prior to the watch to ensure that off-going and on-coming watch personnel (and any other interested personnel) have a common understanding of the situation and the Commander’s intent.
- Maintain close working relationships with other JOC personnel and embarked Component Commander staff.
- Make effective use of MS Office. (Few JOC staff seemed proficient with the software suite)

#### 4.1.4 *What key “tipper” information do you notice while performing your duties?*

Key “tipper” information used by BWCs (i.e., information that suggests to the BWC an upcoming change or significant event) tended to be somewhat general in nature. Changes in established track behavioral trends, and significant changes in communications between own-force and/or enemy units are examples of information that alert the BWC to impending significant events. As reported by respondents, key “tipper” information included:

- “Everything...” (i.e, the BWC attempted to consider *all* incoming information in terms of what future activity it might suggest).
- Reports from other ships
- Input from Intelligence personnel
- Reports from other ship’s assets (e.g., lookouts, bridge personnel, sensor operators, etc.)
- Voice traffic on the command circuit
- J7 (white cell) personnel comments (for exercise operations)
- Significant air activity (enemy, neutral, and friendly activity were all monitored)

#### 4.1.5 *What efforts can you “off-load” to other watch personnel? and What efforts are just too important to let someone else do?*

Most BWC watch-standers stated that the current watch structure and Standard Operating Procedures (SOP) had allocated job tasking appropriately. In other words, the tasks that they were assigned *should* be performed by the BWC. They thought that it was inappropriate to off-load tasks to junior personnel. The only exception to this was that the BWC and Assistant BWC often task-shared as necessitated by operational tasking and tempo.

#### 4.1.6 *What is difficult about being a BWC?*

Interviewees indicated that there were a number of difficulties associated with performing the job of BWC. Most of the comments related to the timeliness, completeness, quantity, and quality of exchanged information. Responses included:

- Working with time-late information. (Some information in their data systems was three or more hours old!)
- Being informed of important information by tactical units “after-the-fact.” (They weren’t being kept in the loop...)
- Too many communications “circuits” to handle (secure and unsecure radio channels, secure and unsecure telephones, e-mail, required face-to-face communications, etc.)
- Developing and maintaining situation assessment.
- Information “disconnects” with Component Commander cells aboard ship and on other units.
- Training new watch personnel and “ramping-up” staff augmentees from other units.

#### 4.1.7 *Where does your most valuable information come from?*

While the responses to this question varied extensively, the underlying theme was that the BWC considered verbal communications with support staff and other units in the area to be extremely valuable. Specific responses to this question included:

- JAC (Joint Analysis Center, i.e., the Intell LNO)
- Air and Ground LNOs (Liaison Officers)
- Voice traffic across the command nets and secure phones
- JAG (Judge Advocate General, i.e., Legal LNO)

#### 4.1.8 *If you could change your display to display anything you want, what would it be?*

Interviewees were given the opportunity to provide recommendations for improved displays. This question often generated extensive discussions on the advantages and disadvantages of various systems, however, the consistent desire was for more (and more timely) *processed information*, and less *raw data*. Representative responses included:

- Current information... (there is an ongoing issue with the timeliness of data presented by some data systems used by the BWC)
- More information... (Many respondents felt the need for “more information,” however, they weren’t sure what exactly they would want...)
- Composite “cartoon” / Operational Graphic representing S.A.

#### 4.1.9 *Who do you communicate most with (on-ship or off-ship)? and What information do you exchange with this person?*

As evidenced by the responses to the question “Where does your most valuable information come from?” BWC personnel indicated that communications with their support staff and other

units in the area were extremely important. As a result, they communicated with these entities on a regular basis. Listed below are the most common responses regarding the entities communicated with, and the types of information exchanged with them.

- LNOs (Liaison Officers) within the JOC
  - New information, recommendations, updates, etc.
  - Representatives from other component commanders
  - Updates regarding current and future operations
  
- Other units in the area.
  - Information regarding ongoing and past events
  - Requests for direction / authorization regarding various actions

#### 4.1.10 *What distracts you when the workload is high?*

Responses to queries regarding distractions to the BWC varied along a number of dimensions. Some distractions were operationally relevant (e.g., the need to monitor numerous communications nets simultaneously), while others were more mundane (e.g., the heating / air conditioning system not adequately controlling the ambient air temperature in the JOC). Examples of observed and stated distractions within the JOC are included below.

- The need to get the next briefing ready... (There were five major briefings per day!)
- Ambient noise within the JOC
- C2F JOC is co-located with a VTC center and a primary meeting area, thus ambient noise level is regularly quite excessive.
- Ambient temperature within the JOC
- A less-than-optimized A/C system resulted in a work space that was often too hot, or too cold.
- The need to monitor numerous communications circuits simultaneously
- Constant interruptions by C2F non-watch standing staff

#### 4.1.11 *What is the most difficult aspect of your job, especially with respect to decision-making?*

There seemed to be a great deal of consensus regarding to the most difficult aspect of acting as BWC. Specifically, gathering, analyzing, fusing, and disseminating all operational information available; and using this information to develop and maintain an accurate, up-to-date Situation Awareness was considered by far the most difficult aspect of the job.

## 4.2 *Observations*

Observations of BWC personnel and their workspaces were made during several visits to the USS Coronado (AGF 11) (see Figure 1.), and USS Mt Whitney (LCC 20) (see figure 2.). These visits occurred while the ships were underway and in port. As observations were made, comments were captured and drawings / sketches created. This information has been reduced and combined, and is presented below in “bulletized” summary form.

#### 4.2.1 Observations from USS Coronado (AGF 11)

- Anchor Desks need to provide “value added” information to the BWC (i.e., graphical representations of relevant data)
- Anchor Desks need ability to effectively monitor tactical / operational displays
- BWC needs assistance defining and displaying information dealing with operational issues
- Augmentee roles & responsibilities need to be better defined and promulgated
- Augmentee staff need to understand their roles
- Focus needs to be on relevant tasks
- Watch standers need to have a common understanding of assigned tasks
- Large displays used for sharing information unreadable / difficult to use
  1. Difficult to read from a distance (inadequate resolution & font size)
  2. Screen format / layout not optimized for intended task
- Number of communications circuits (and the need to monitor and interact on them) sometimes interfered with other duties.
- Number of non-watch standing personnel in (or passing through) the JOC sometimes negatively effected BWC duties

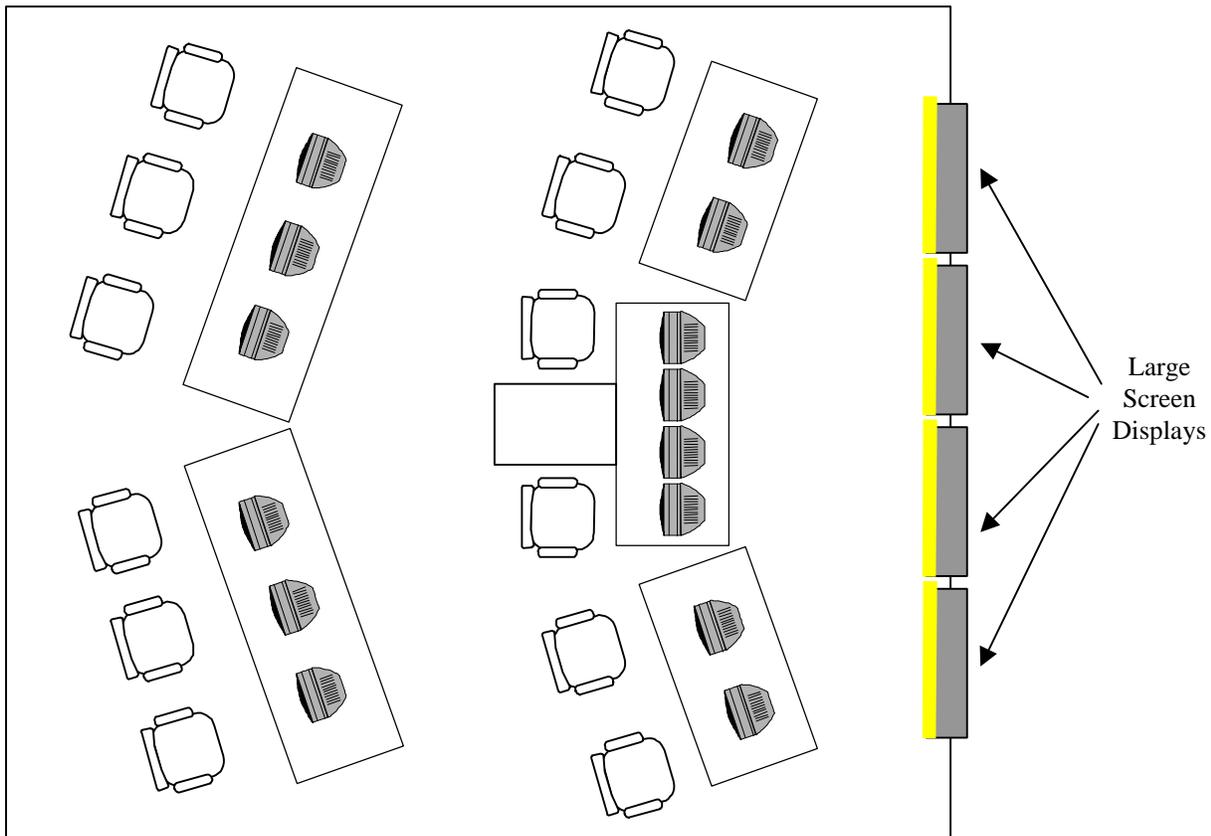


Figure 1. USS Coronado JOC - after recent re-design

#### 4.2.2 *Observations from USS Mount Whitney (LCC 20)*

- Most JOC personnel spend the vast majority of their time (perhaps as much as 50%) using MS Office to perform various functions (though few seem to have adequate training with the software suite...)
- Tactical / operational display use (ADSI, JMCIS, and MCCIS) was sometimes not optimal
- Need to “sanitize” information for use by multi-national staff was a significant burden; manual “sanitation” often delayed data by as much as three or more hours
- Air Defense Systems Integrator (ADSI) system in the JOC sometimes displayed incomplete data, however, ADSI in JFACC Current Ops was extremely accurate and timely. The disparity between the JOC ADSI picture and other ADSI pictures was apparently the result of inadequate training of the ADSI operators within the JOC (LINK/comms problems also contributed)
- SATCOM circuits (the primary means of secure communications for the JOC) were often unavailable or unreliable
- Important information was routinely transferred by floppy disk due to the need to keep the US SECRET (SIPRNET), NATO SECRET, NATOLAN, and US Unclassified (NIPRNET) LANs separate
- There seemed to be occasional “information disconnects” between the JOC and component commanders aboard ship and on other units
- A new (and very expensive) air conditioning system dramatically reduced one source of ambient noise in the JOC.
- MCCIS, ADSI, and JMCIS offer user definable color settings. As a result, each system had different color coding conventions, therefore users could not easily use each other’s displays...
- The large screen displays (LSDs) (in USS Mt. Whitney’s case, 37” television monitors) could be programmed to show any display within (or outside) the JOC. There was no standard set-up for what information was to be presented where. As a result, the LSDs presented different information literally every few minutes...
- VTC communications ranged from “rock solid” to completely unusable...

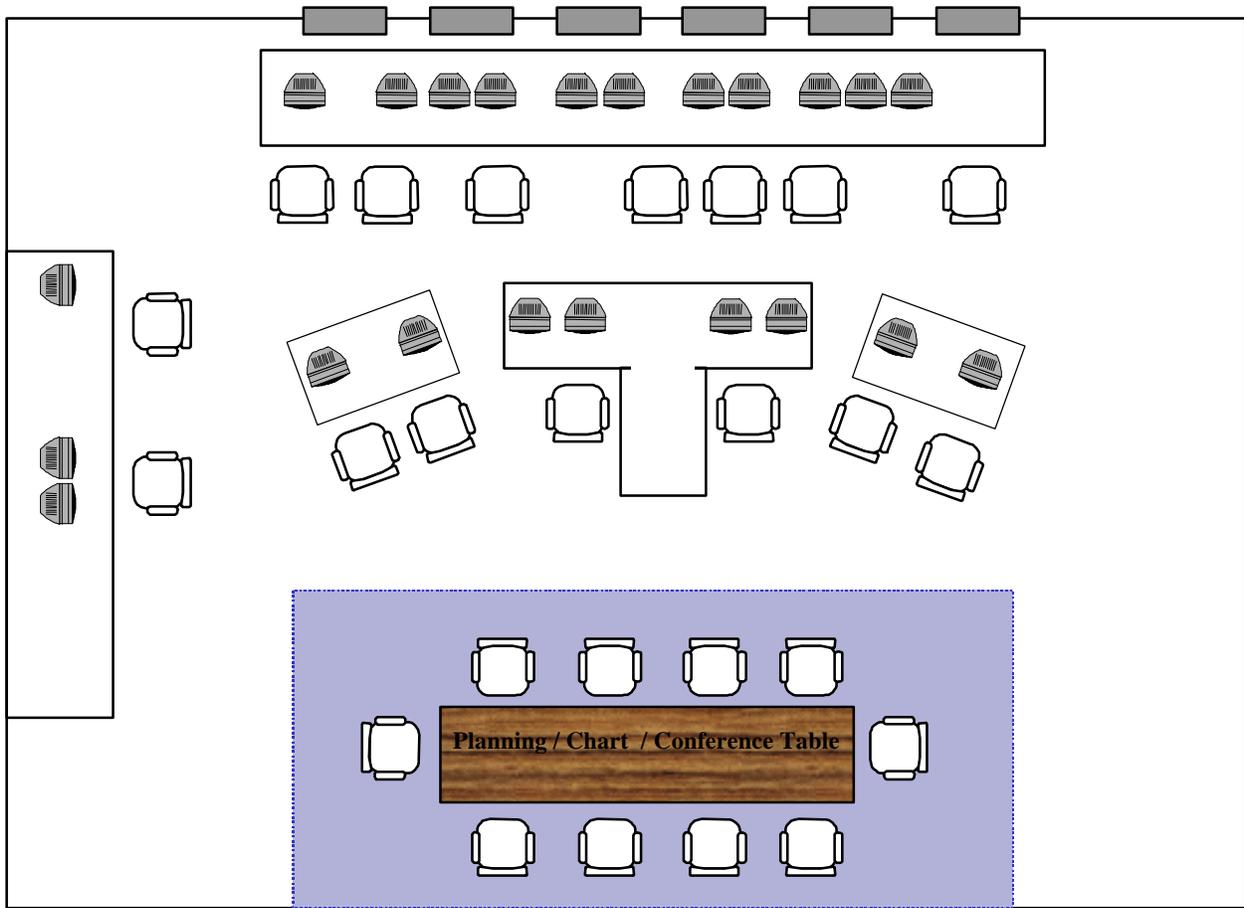


Figure 2. USS Mt. Whitney JOC - after recent re-design

## 5. Preliminary Recommendations Based on Lessons Learned

Preliminary analyses indicated problems in preparing and disseminating coordinated action plans, in developing shared awareness of the tactical situation, in maintaining communications connectivity, in managing tactical responses and battle force assets, and even in understanding the roles and responsibilities of the CJTF/JOC staff. Areas for improvement in CJTF/JOC operations were prepared as general recommendations for system improvements (i.e., not as finger-pointing evaluations) and discussed with key personnel at OPNAV and fleet commands. The areas for improvement were acknowledged, and our recommendations were greeted favorably by the admirals. These, then, will become the basis for the development of enhanced decision support display concepts that are to be prototyped and tested in the DCD laboratory under realistic, demanding CJTF scenarios. Storyboards for preliminary designs were developed, leading to a "data wall" concept as a means for collaborative problem solving in the JOC. In addition, suggestions were made for "quick fixes" that could be easily made within the command ship JOCs that would address some aspects of fundamental information management problems revealed by the cognitive task analysis process. Problem areas and associated recommendations are discussed below in "bulletized" form.

## 5.1 “Service” Related Issues

### 5.1.1 Product Focus

- Need to make watch turnover and daily briefings more focused (operationally relevant) - emphasis on “future focus”!!!

**Recommendation:**

- Develop PowerPoint and Word “templates” to aid BWC create operationally relevant presentations and pass down logs.
  - *Recent Events as they relate to current and future ops*
  - *Conflicts / problems that must be resolved*
  - *Planned / upcoming events*

### 5.1.2 “Customer Service”

- Different “customers” need different levels of detail / fidelity / depth of information

**Recommendation:**

- Conduct analysis of customer base and identify similar and different information requirements (e.g., the Admiral, Component Commanders, and operational units)
  - Some customers need concise “overview data” and recommendations for action*
  - Some customers need extremely detailed, “give-and-take” discussion of issues*
  - Some customers need orders / directions*

### **Information Display / Visualization**

#### 5.2.1

- BWC’s need a way to visualize the “whole mission.” Goals, resources, plans, actions, timelines, etc. must be represented so that a BWC / CJTF can tell where they are in the “Grand Plan” and answer questions like “How are we doing?” and “What is our status?”

**Recommendation:**

- Develop a composite display (data wall?) that brings together relevant mission details
- Develop “intelligent agents” to identify conflicts / problems and alert user
- Develop “Summary Displays” for BWC

#### 5.2.2 Tower of Babel...

- Sharing a “common picture” across systems and units is difficult to achieve, and it is difficult to determine whether it is truly “common”

**Recommendation:**

- Ensure all units have similar-capability data systems and compatible display systems (easier said than done!!)

### 5.2.3 *Data Reduction, Organization, Presentation*

- During watch, need to distill huge amounts of data into focused, *operationally relevant* S.A.

#### **Recommendation:**

- Develop “intelligent agents” that aid the user in reducing / de-emphasizing extraneous data and optimizing the presentation of needed information
- Augment existing displays with graphically represented information (e.g., overlays, future states, resource conflicts, etc.)

### 5.2.4 “*A picture is worth a thousand words...*”

- Need to build and maintain easily understood “cartoon” graphics (using PowerPoint) to convey S.A.

#### **Recommendation:**

- Develop, and/or provide tools to aid BWC in the rapid creation of operationally relevant, easy-to-understand, composite / summary graphics that incorporate multiple information domains (e.g., include integrated METOC *and* air operations *and* ground operations *and* Intelligence information)
  - PowerPoint “templates”
  - map, chart, and icon libraries
  - easy-to-use graphic tools (perhaps COTS?)

### 5.2.5 *Putting the Picture Together*

- Reliance on PowerPoint slides is a little bit of a “too much of a good thing” situation... It is an extremely valuable asset but consumes far too much of their time! (viewing, creating, editing)

#### **Recommendation:**

- Create clear guidelines for briefings (e.g., no more than X number of slides, font size should be Y, use template Z, etc.)
- Address perception that every brief is a full-scale “command performance” requiring hours of preparation - instead, focus on *What has changed?* and *What are the implications to future events / plans?*

### 5.2.6 “*What color is...?*”

- MCCIS, ADSI, and JMCIS offer user definable color settings. As a result, each system often has different color coding conventions, thus users can often not use or understand each other’s displays...

#### **Recommendation:**

- Adopt standard Human Factors guidelines and principles with regard to color selection
- Enforce common use of colors across all systems
- Develop and implement training with regard to adopted color sets

*“Where do I look for...?”*

- The large screen displays (LSDs) could be programmed to show any display within (or where. As a result, the LSDs often presented different information at various points

***Recommendation:***

- Standardize use of LSDs (e.g., METOC is always on Display X) so that users always know where to look for desired information
- Develop and promulgate ship’s doctrine dictating LSD use

***LSD Problems***

- Large displays used for sharing information unreadable from a distance (inadequate resolution & font size)
  - 
  - 
  - 
  - displays (Data Wall?)
  - Re-arrange JOC layout so that users are closer to displays

5.2.9

*?!”*

- Anchor Desks need ability to effectively monitor tactical / operational displays (i.e., keep them in the loop...)
  - 
  - their use
  - Encourage use of composite “cartoon” graphics that integrate information from multiple domains
  - Use single display as focal point for discussion and resolution of mission-relevant
  -

5.2.10 ***ADSI Display Use***

Air Defense Systems Integrator (ADSI) display in the JOC sometimes displayed

Whitney)) was extremely

***Recommendation:***

- Consider ADSI for use as primary tactical display
- Ensure users are fully trained on its capabilities and limitations

### 5.3 *Hardware / Software*

#### 5.3.1 *Technology*

- There is a perception by some that there are too many “gadgets” in the JOC!!!! Chronic problems with various technologies require a dedicated “technology” watch stander in the JOC at all times (which they currently lack...) *COUNTERPOINT*: There are too many people in the JOC already...

***Recommendation:***

- Use reliable “tested and approved” HW / SW
- Ensure users are fully trained
- Designate a “technology” watch-stander - outside the JOC - to handle problems as they arise

#### 5.3.2 *Microsoft Office*

- Most JOC personnel spend the vast majority of their time (*sometimes upwards of 50 to 60%*) using MS Office to perform various functions. Surprisingly, few JOC personnel seem to have adequate training with the software suite...

***Recommendation:***

- Encourage the use of Command-approved templates to facilitate application use
- Ensure personnel are fully trained on MS Office capabilities and limitations

### 5.4 *“Where is the Value Added?”*

- Anchor Desk / Liaison personnel must provide “value added” information to the BWC (i.e., useful / graphical representations of relevant data)

***Recommendation:***

- Conduct analysis to determine BWC information requirements (vs. data requirements...)
- Conduct training to ensure support personnel understand BWC needs, goals, tasking, etc.
- Develop / Provide tools to help the Anchor Desk / Liaison personnel portray the information they share in the context of the whole mission, i.e., help “connect the dots”

### 5.5 *Communications & Information Exchange*

#### 5.5.1 *Reliance on the Unreliable*

- SATCOM circuits (the primary means of secure communications for the JOC) were often unavailable or unreliable

**Recommendation:**

- Explore other secure means of communicating
  - *e-mail*
  - *COMPASS*
  - *NetMeeting*
- Develop guidelines for controlled use of SATCOM (instead of using it to discuss non-sensitive topics / issues)

5.5.2 “Who’s on First?”

- There seemed to be regular “information disconnects” between the JOC and Ship / Component Commanders aboard ship and on other units

**Recommendation:**

- Conduct analysis to determine causes of information disconnects
- Establish and promulgate guidelines to ensure that vital information is shared in a timely manner

5.5.3 *Communication - at what cost?*

- Number of communications circuits (and the need to monitor and interact on them) sometimes competed with / conflicted with other tasks and duties.

**Recommendation:**

- Consolidate communications circuits within JOC (i.e., instead of multiple secure channels, use one)
- Delegate communications duties to subordinate personnel
- Re-direct non-essential communications to other “channels” (e.g., e-mail, standard message traffic, etc.)

5.5.4 *VTC: Cutting Edge Technology*

- VTC communications ranged from “rock solid” to completely unusable...

**Recommendation:**

- Use VTC for non-essential communications only until reliability is improved
- Transmit PowerPoint presentations via e-mail *before* briefing, then use standard voice comms to talk thru slides (instead of using VTC to simply display slides)

5.5.5 *Headset Pros and Cons*

- Headsets might help with certain communication problems in the JOC  
*COUNTERPOINT:* Headsets would negatively impact verbal communications between JOC personnel

**Recommendation:**

- Explore use of COTS “low-profile,” “non-exclusive” headset technology that allows user to hear ambient sounds normally, yet still hear communications through headset

### 5.5.6 *AT&T Phone Operator?*

- Too many people call the JOC for non-operation related reasons!! (*for example, during one watch, an Ensign was called from the beach by his wife/ girlfriend to talk... and the Ensign was not even assigned as a JOC watch-stander*)

**Recommendation:**

- Do not allow non-JOC-related calls to be taken in the JOC
- Do not publish JOC phone numbers for general use

## 5.6 *Miscellaneous (Policies / Procedures / Training / etc.)*

### 5.6.1 *Roles and Responsibilities*

- Staff (especially augmentees) roles & responsibilities need to be better defined and promulgated
- The focus needs to be on relevant tasks
- Watch standers need to have a common understanding of assigned tasks

**Recommendation:**

- Develop and implement training

### 5.6.2 *Access Control*

- Number of non-watch standing personnel in (or just passing through) the JOC sometimes had a negative effect on BWC duties

**Recommendation:**

- Reduce access to JOC
- Implement procedures to control access

### 5.6.3 *Blessing and Burden: Multi-National Staff (Mt Whitney)*

- Need to “sanitize” information for use by multi-national staff was a significant burden - manual “sanitation” often delayed data transfer of data
- Important information was routinely transferred via floppy disk due to the need to keep classified and unclassified LANs separate (MT Whitney)

**Recommendation:**

- Develop and implement automated information sanitation agents
- Develop “traffic cop” software to allow classified and unclassified material to reside on the same network

### 5.6.4 *Simple Matter of Perception Management - Or a Real Problem?*

- There is a perception by some that BWCs should be O-6 level officers (currently they are O-4s and O-5s)

**Recommendation:**

- Conduct analysis to determine actual task requirements

### 5.6.5

- containing non-operationally relevant information regarding the day's events)

**Recommendation:**

Develop / Adapt voice activated log entry technologies (e.g.,

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## 6. Summary

Military decision makers are now routinely able to communicate instantly in several media with others around the globe, locate and combine huge amounts of data from diverse sources, and

these technical advances have been substantial, the corresponding expected improvement in decision-making performance has been disappointing. One reason for this is that new C ISR systems tend to be developed based on the latest technology with little regard for the decision-

In contrast, decision-centered design (DCD) focuses on the cognitive functions and tasks that experienced decision-makers perform in real situations. Information support and communication

capabilities can then be assembled to meet the decision requirements that have been identified. The DCD process focuses advanced technology on serving the than forcing decision makers to adapt to the capabilities and procedures of new systems.

As a result of the preliminary CTA efforts described in this paper, SSC-SD researchers now have display systems to aid the decision-maker in difficult decision-making domains.

7.

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