

Data Replication over Disadvantaged Links

A Canadian Naval Perspective

By Commander John Bycroft

Report Documentation Page

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The Maritime Imperative

National, Joint or Coalition
Maritime Operational
*Efficiency, Effectiveness and
Timeliness*

The Solution

Network-Centric Information Management
requiring:

- ◆ Access to the shore Information Management Infrastructure;
- ◆ A web-enabled user community; and
- ◆ Seamless communication links.

The Problems

- ◆ Extremely small ‘footprints’
- ◆ Highly unstable platforms
- ◆ Non-continuous Connectivity
- ◆ Small antennas/limited power
- ◆ Mutual interference
- ◆ Disparate systems

= Disadvantaged Users

The Compromise

Collaboration at Sea
(C@S)

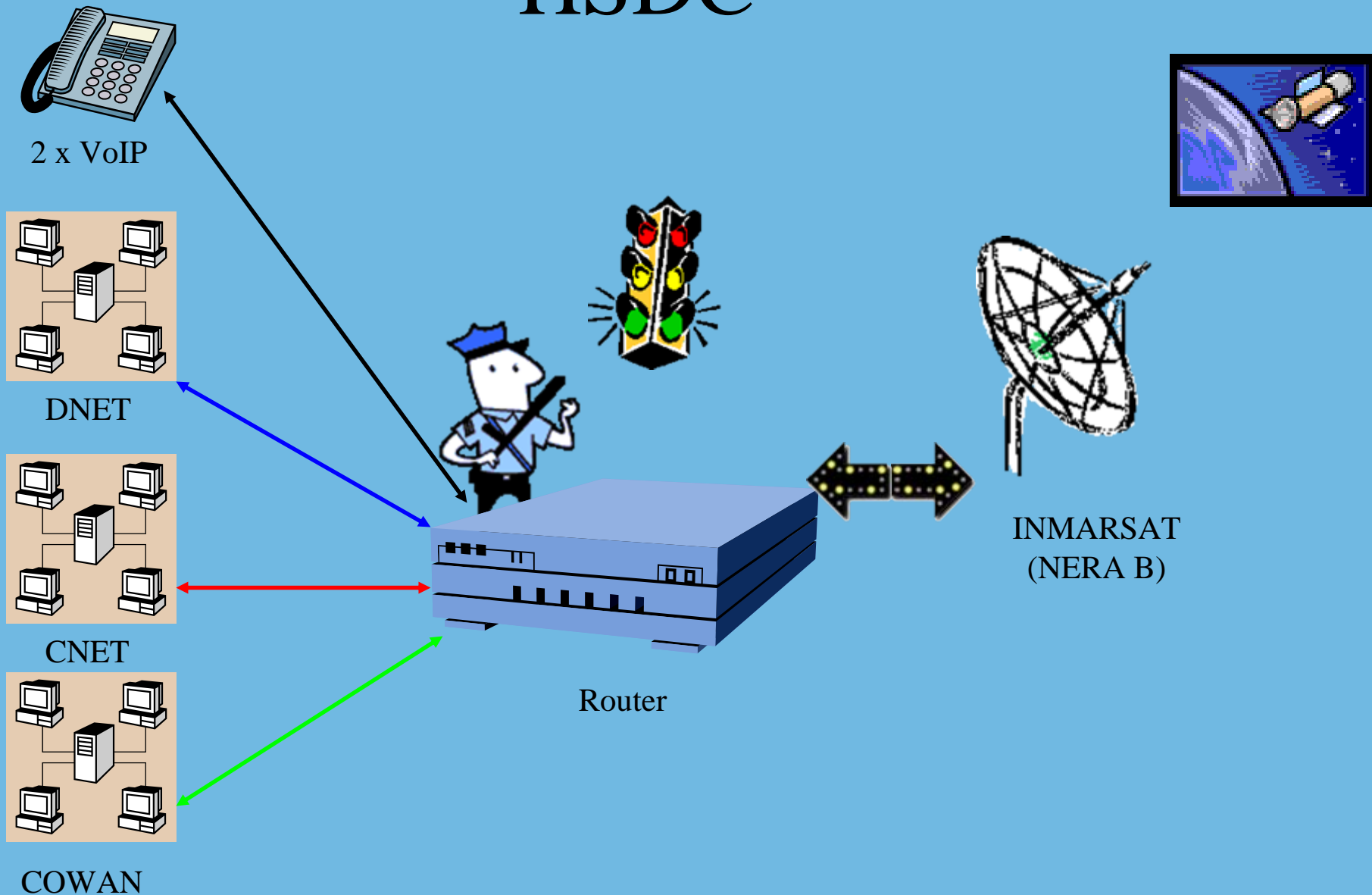
C@S Elements

- ◆ High Speed Data Connectivity (HSDC) Project - technical architecture
- ◆ Connectivity through INMARSAT/SHF SATCOM – Ship/Shore/Ship Pipe
- ◆ IBM/Lotus Software – enabling technology

C@S Elements - HSDC

- ◆ Routers provide access to three separate domains:
 - DNET (Unclas/Protected, including Enterprise applications)
 - CNET (Classified)
 - COWAN (Coalition) (Tactical WAN)
- ◆ Voice over IP (VoIP) telephones
- ◆ Combined Operational Picture (COP)
- ◆ COMSEC encryption (TACLANE/KG-175)
- ◆ Link (TRANSEC) encryption (KIV-7)

HSDC



C@S Connectivity

- ◆ 24/7 Connectivity through commercial provider (INMARSAT)
- ◆ Leased channels
- ◆ 64 kbps ISDN – concurrent 64k up and down
- ◆ 128 kbps with binding (2x64 channels)
- ◆ Packet switching through CISCO routers
- ◆ Reliability (23:40 hours per day = >99%)

C@S Elements – Software

- ◆ Domino Network
 - Standardized Task Group Website
 - Standardized Web Site Design
 - Distributed Web Environment
 - Web Site Data Replication

 - Lotus Sametime
 - Chat and Whiteboard

Collaboration At Sea

Using Information and Web
Technology
for
Tactical Command and Control

Task Group Website

- ◆ Principal means to share data & information
 - Not only a flagship or flag-staff tool
 - Used by all TG units and involved shore commands
 - Common source of information
- ◆ Easy to access/intuitive to use
- ◆ Timely

Secret of Success

Frequent Data Replication

Constraints on Replication

- ◆ Need for an initial ‘Large dump’
- ◆ Need for reliable communications (QoS)
- ◆ Need for standardized TEMPLATES
- ◆ Need for learning (some) web techniques.

Advantages of Replication

- ◆ Significant bandwidth saving
- ◆ Continuous operation
- ◆ Provides a common locally accessible data-base.
- ◆ Ability for units to continue operations during EMCON silence

Domino REPLICATION

- ◆ Monitors data transfer during replication
 - Will restart interrupted replication at point of interruption automatically
- ◆ Website made up of multiple databases – replication can be selective within the Website
- ◆ Replication can be “server” specific vice “network”


Standardized BG Web Site

http://205.0.128.115/Battle_Groups/Constellation/consite.nsf - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Refresh Home Search Favorites History Mail Size Print Edit

Address http://205.0.128.115/Battle_Groups/Constellation/consite.nsf Go Links >>

 **BACK** **HOME**

[ADC](#) [SCC](#) **Operational** [IWC](#) [ROE](#) [N1](#) [N2](#) [N3](#) **Administrative** [N4](#) [N6](#) [JAG](#)
[Flag Plans](#) [Force](#) **ACC** [TLAM](#) [PAO](#) [IM](#)
[Protection](#) **FOTC**

Replication Testing Ongoing

USS Constellation BattleGroup

[Business Rules](#)
[ADMIRAL's BRIEF](#)
[INTEL READ BOARD](#)
[OPREP/OPSUM/UNIT SITREP](#)
[METOC](#)

[CCDG-1](#)
[CDS-7](#)
[CWV-2](#)

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Internet

CTG 307.1 Web Site

CTG 307.1
OP_APOLLO

[Home Page](#)
[Exercise Portal](#)

**You must Login
to create content**
You are currently
logged in as
Anonymous

Information Links

Categories:
[ROE](#)
[Daily Briefs](#)
[CTG's Messages](#)
[Ship's Messages](#)
[Intelligence](#)
[Force Protection](#)
[AAW](#)
[SCC/MIQ](#)
[MPA/HELP DPs](#)
[METOC/AREPs](#)
[Logistics](#)
[Schedule of Events](#)
[Exercises](#)
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CTG 307.1 OP_APOLLO Home Page

[ALG](#) [ATH](#) [CAL](#) [CHA](#) [FRE](#) [HAL](#) [IRO](#) [MON](#) [OTT](#) [PRE](#) [PRO](#) [REG](#) [STJ](#) [VAN](#) [VDQ](#)
[WIN](#) [F1](#) [F2](#) [F3](#) [F4ENG](#) [F4LOG](#) [F6](#) [JAG](#) [MED](#) [PAO](#) [Code Summary](#)

This web site is under the control of Commander Canadian Fleet Pacific (CCFP)

Collaboration At Sea

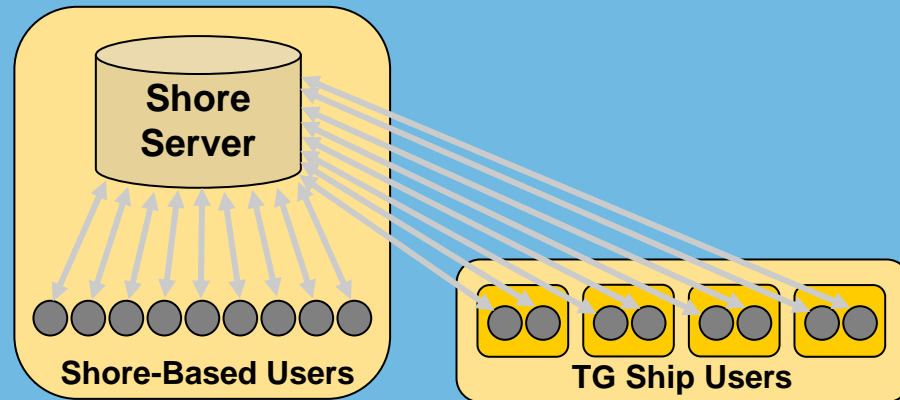
Distributive Web Environment



Traditional Non-Replicated Web Environment

- ◆ **Web site and content managed by centralized (Shore) personnel**
- ◆ **Numerous inefficiencies**
- ◆ **Web pages downloaded with each user visit**
- ◆ **INMARSAT outages degrade site availability**

Non-Replicated TG Web Site



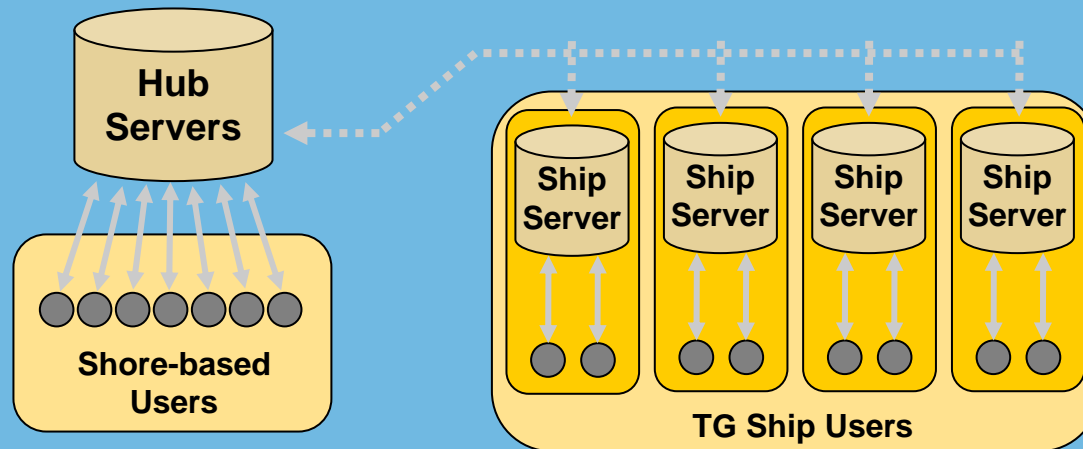
Original Configuration

- Excessive bandwidth needs
- Centralized data posting (bottleneck)
- Connectivity failure = Site data inaccessible

C@S Distributive Web Environment

- ◆ **Web Site centrally controlled by TG Commander**
- ◆ **Standardized**
- ◆ **Sites reside on each ship**
- ◆ **Users visit site via ship's LAN**
- ◆ **Changes to data/info are downloaded to each unit only once:**
 - **Clustered, cyclic, or on demand**
 - **Overall bandwidth demand significantly reduced (huge benefits for the “bandwidth-challenged”)**

C@S TG Web Network



Collaboration at Sea Web Environment

- Replicated (“mirrored”) web sites
- Decreased bandwidth needs (only changes in information are replicated)
- Dispersed content management responsibility
- Connectivity failure = Web site data remains accessible

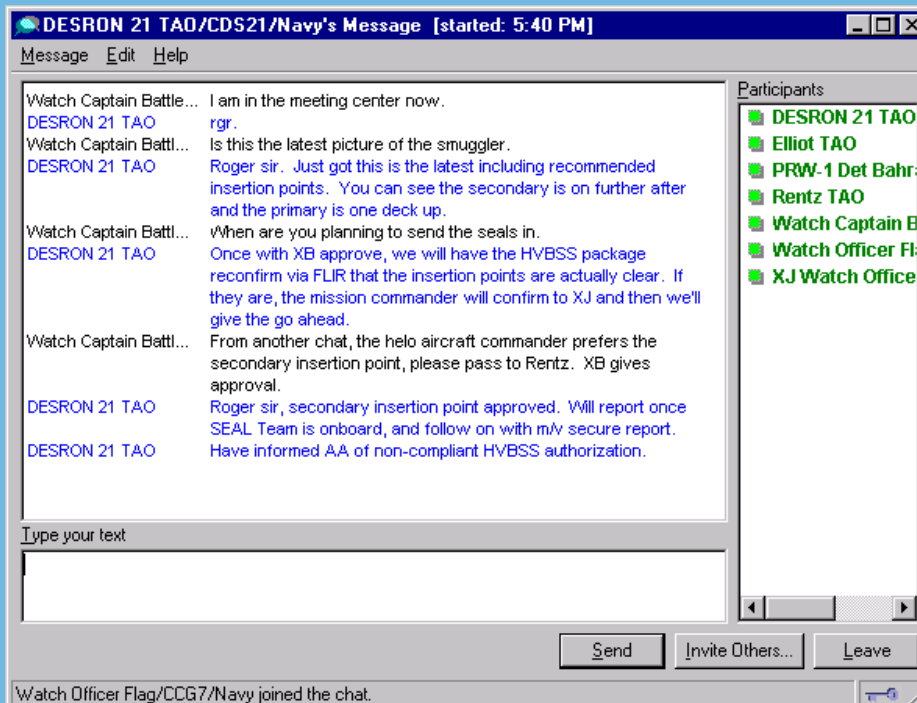
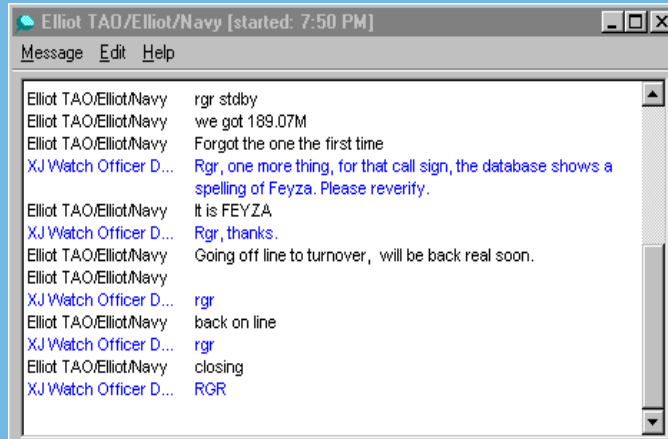
Lotus Sametime

A Robust Tool for Real-Time Distributive Collaborative Planning

Provides:

- ◆ **One-on-one or group chat**
- ◆ **Multi-user whiteboard collaboration**
- ◆ **Live application sharing**

Real-Time Chat



Real-Time Collaboration: MIO

Whiteboard Application Sharing Participant List

Whiteboard Page 1 Fit to Window



PRIMARY

SECONDARY

Font... Width Line Fill

Ready

Signed by Lotus Development Corporation

DESRON 21 TAO/CDS21/Navy's Message [started: 5:40 PM]

Message Edit Help

Watch Captain Battle... I am in the meeting center now.
DESRON 21 TAO rgr.
Watch Captain Battl... Is this the latest picture of the smuggler.
DESRON 21 TAO Roger sir. Just got this is the latest including recommended insertion points. You can see the secondary is on further after and the primary is one deck up.
Watch Captain Battl... When are you planning to send the seals in.
DESRON 21 TAO Once with XB approve, we will have the HVBSS package reconfirm via FLIR that the insertion points are actually clear. If they are, the mission commander will confirm to XJ and then we'll give the go ahead.
Watch Captain Battl... From another chat, the helo aircraft commander prefers the secondary insertion point, please pass to Rentz. XB gives approval.
DESRON 21 TAO Roger sir, secondary insertion point approved. Will report once SEAL Team is onboard, and follow on with m/v secure report.
DESRON 21 TAO Have informed AA of non-compliant HVBSS authorization.

Type your text

Send Invite Others... Leave

Participants

- DESRON 21 TAO
- Elliot TAO
- PRW-1 Det Bahr
- Rentz TAO
- Russell TAO
- Watch Captain B
- Watch Officer FI
- XJ Watch Office

Russell TAO/Russell/Navy joined the chat.

Real-Time Collaboration: Strike

◆ Challenge

- Use of Satellite imagery to evaluate “targets”
- Involving Hawaii, Washington, Ottawa
- Typical >48 hr turn around

◆ Solution

- SAMETIME with whiteboard and text/video chat to enable “real time” collaboration
- Turn around <4 hrs



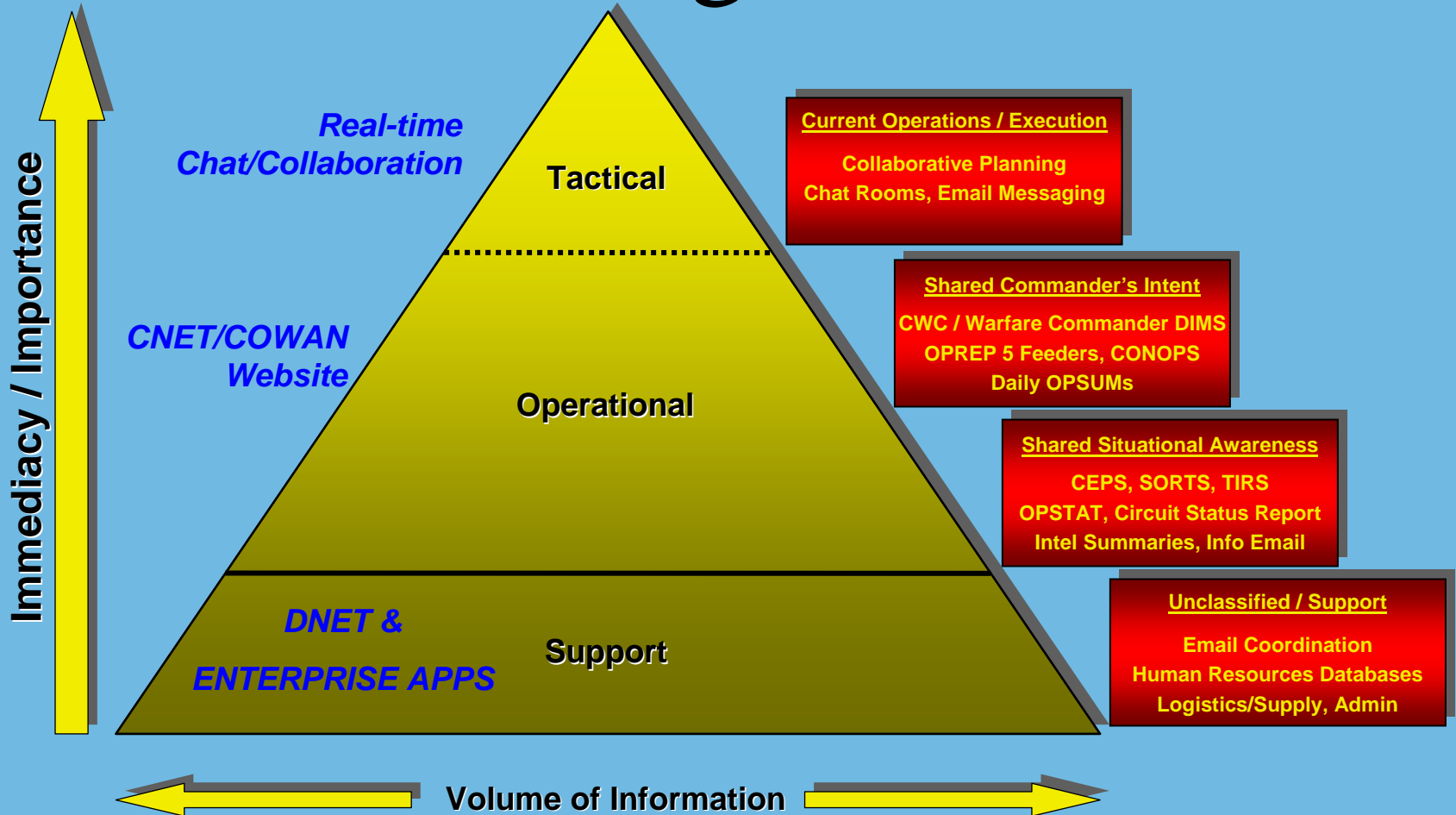
Real-Time Collaboration: Engineering

The screenshot displays a Microsoft Internet Explorer window titled "Sametime Meeting Room - Diesel Problems". The browser's address bar shows "damageClaimsEngine1.jpg". The main content area features a whiteboard with a photograph of a diesel engine block. A yellow circle highlights the third piston from the left. Above the image is a toolbar with options for "Width", "Line", and "Fill". To the right, a participant list shows "FMF(CB) Diesel" and "OTT ENG". At the bottom, a chat window contains the following text:

OTT ENG: OK, we pulled the covers and it looks like we have a major problem
OTT ENG: I just circled the problem...can you make it out?
FMF(CB) Diesel: Yes. It looks like the 3rd piston!
OTT ENG: Can you suggest a way ahead?
FMF(CB) Diesel: Sure thing...let me get Tom over here to take a look...

The bottom of the window shows a Windows taskbar with various application icons and a system clock displaying "11:01 AM".

Implications for the Warfighter



Collaboration at Sea...

- ◆ **Is an evolutionary step towards NCW**
- ◆ **Promotes an IT to KM transition**
- ◆ **Is a distributed web environment**
- ◆ **Demonstrates that replication can provide bandwidth conservation & savings**
- ◆ **Demonstrates that replication can benefit disadvantaged users**
- ◆ **Shows that chat can speed decision-making**

But, one must never forget the
aim.....

Eric Smith

ADMIRAL, WITH ALL
DUE RESPECT —
COULD WE HAVE LESS
NETWORK-CENTRIC
AND MORE ROUNDS
ON TARGET?!

