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Knowledge Web (K-Web)

Increasing Speed of Command Using Web-Enabled Technologies

www.pacific-science.com/kmds
www-tadmus.spawar.navy.mil

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Military Command Centers:

– Research conducted, lessons learned, and evolving needs of Navy have revealed requirement for tools to support:

- » **Improved Situation Awareness / Assessment**
 - ◆ Perception of Data Patterns
 - ◆ Alerting / Attention Management
 - ◆ Memory augmentation for Dynamic Events
 - ◆ Situation-based Data Fusion
- » **Dynamic, synchronous and asynchronous collaboration**
 - ◆ Distributed Cognition
 - ◆ Adaptive information flow and team structure
- » **Adaptive, real-time resource and action management and planning support**



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Related Cognitive Tasks Analyses: Common Information Requirements



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Tactical data (multiple views if possible!)

- Map-based and highly graphical views / context

Mission Summaries and Commander's Intent

Real-time info! (or close to it)

Alerts / Advisories / Recommendations

- What isn't working according to plan? & What do we do to fix it?

Impacts & Indications

- "X" happened; how does it affect everything else?

Plans (and alternate COAs)

- Response & Timeline Management

Effects Summaries

- Various formats preferred

Asset / Resource Management

Collaboration Tools (including VTC)



Common Processes / Tasks Observed in Command Centers

Develop / share “Situation Awareness”

- Monitor tactical picture and other mission-relevant information
- Extract / filter relevant information
- Develop summary graphics & presentations
- Communicate / disseminate mission-relevant information

Collaborate within and across echelons

- Synchronous and asynchronous
- Face-to-face and distributed
- Common and relatively unrelated goals / objectives

Make Mission-Related Decisions

- Time- or mission-critical
- Based on incomplete and/or ambiguous information

Problem: Available tools don't adequately support above processes / tasks!!

A Common Theme...

The sharing of knowledge in distributed, asynchronous, multi-echelon and coalition environments to enhance:

- Shared relevant Knowledge (vice shared data)**
- Shared Awareness**
- Speed of Command**

What is the Knowledge Web?

A Concept of Operations for using the web to improve effectiveness of command & control.

Objective is to:

- Increase Speed of Command
- Facilitate Collaboration & Information Sharing

Basic Concept:

- Capture the value-added information (i.e., *Knowledge*) already being created by the command staff.

Knowledge Web can be organized dynamically to meet warfighter needs

Store and present this Knowledge in an easily accessible environment – a *Knowledge Web*



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What Knowledge Web is NOT!



Not a specific technology (*Prototyped on an Microsoft IIS-based web server, deployed with “Collaboration At Sea” / Lotus Domino servers*)

Not yet widely deployed (*currently, deployed to five Battle Groups – prototype systems elsewhere*)

Not yet a “finished” product (*R&D, and transition efforts are still underway...*)

Not a “real-time” tactical tool (*The K-Web is a “dynamic status board” where you are trying to share the “best available” information at all times across the entire command.*)

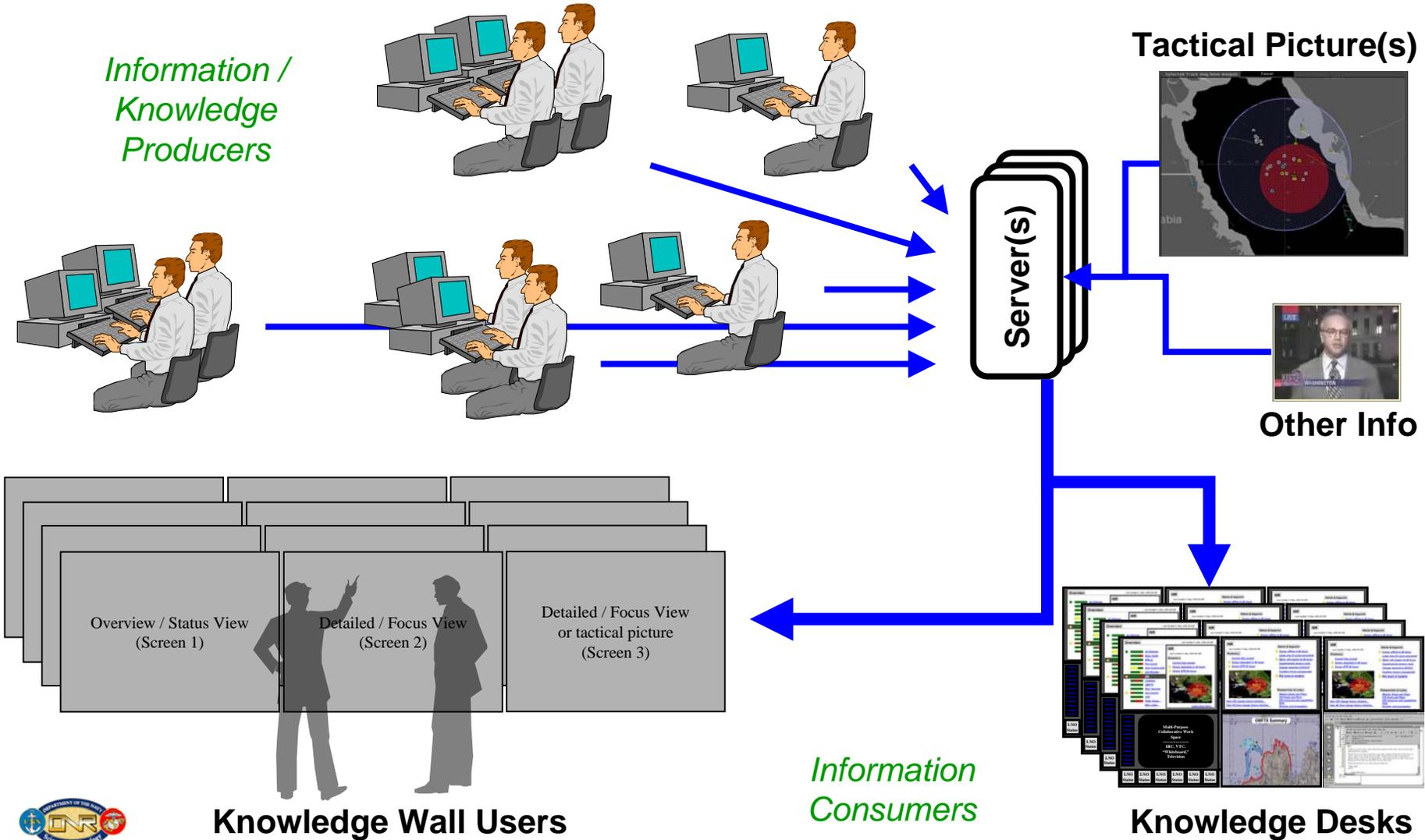
Not just a library of links to files (*The K-Web is part of your collaboration space – it is the table in a library.*)





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Knowledge Web Concept



Knowledge Wall Users

Information
Consumers

Knowledge Desks



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USS Carl Vinson's TFCC as used by CARGRU THREE during OEF

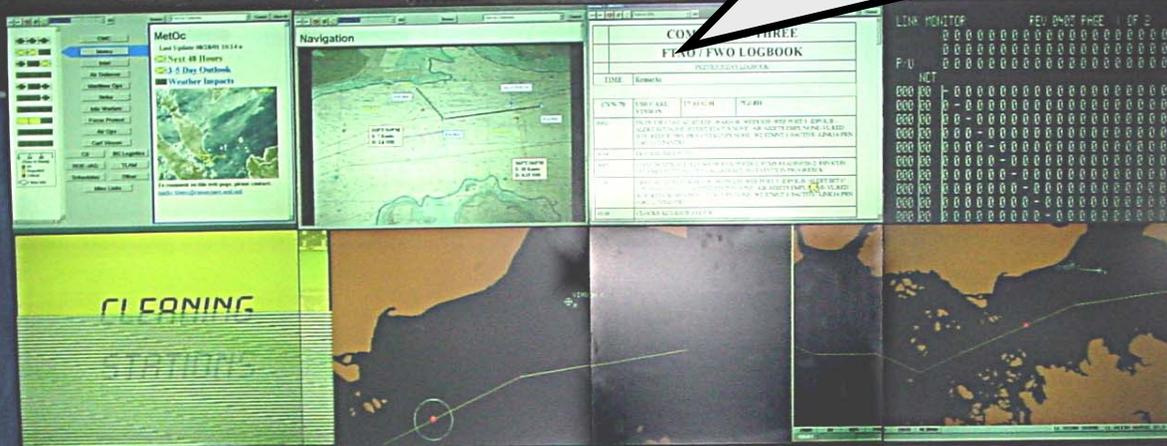


CNAP
Video Wall
(Integrating SSC-SD
Knowledge Wall concepts
and technologies)

SSC-SD provided
3 Knowledge Desks



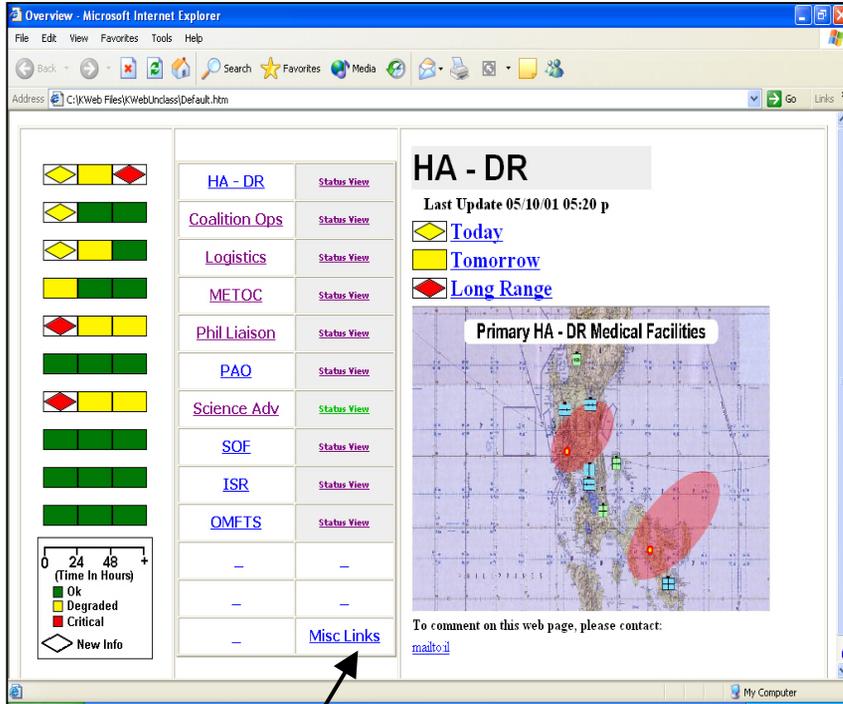
Video Wall
2x4 Matrix of Projector Cubes



K-Desks (3)
2x3 Matrix of LCDs



Typical K-Web Products



Overview - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Address: C:\Web Files\KWeb\Unclass\Default.htm

	HA - DR	Status View
	Coalition Ops	Status View
	Logistics	Status View
	METOC	Status View
	Phil Liaison	Status View
	PAO	Status View
	Science Adv	Status View
	SOF	Status View
	ISR	Status View
	QMETS	Status View
	Misc Links	

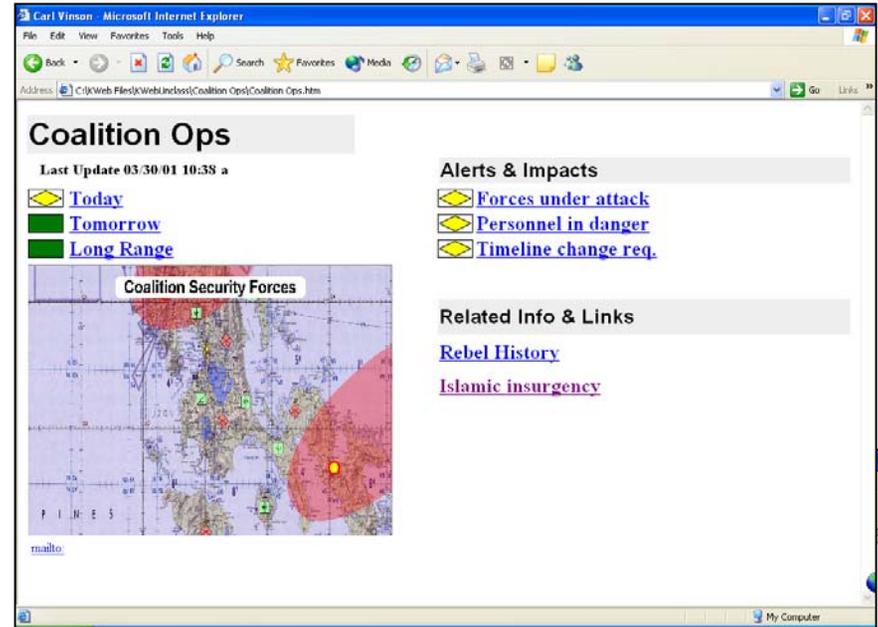
HA - DR
Last Update 05/10/01 05:20 p

- Today
- Tomorrow
- Long Range

Primary HA - DR Medical Facilities

To comment on this web page, please contact: mailto:il

K-Web Overview Page



Carl Vinson - Microsoft Internet Explorer

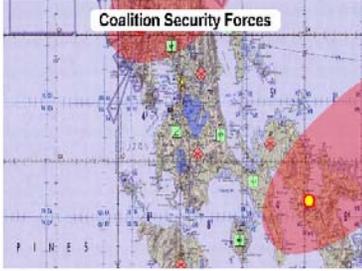
File Edit View Favorites Tools Help

Address: C:\Web Files\KWeb\Unclass\Coalition Ops\Coalition Ops.htm

Coalition Ops
Last Update 05/30/01 10:38 a

- Today
- Tomorrow
- Long Range

Coalition Security Forces



Alerts & Impacts

- Forces under attack
- Personnel in danger
- Timeline change req.

Related Info & Links

- [Rebel History](#)
- [Islamic insurgency](#)

Helicopter delivery of medical supplies has been suspended until further notice in the area west of **Mt. Mayon**.

Summary and Lower-level Content Pages



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CCG-3 K-Web Overview Page



0 24 48 +
(Time In Hours)

■ Ok
■ Degraded
■ Critical

◇ New Info

CWC	Status View
Metoc	Status View
Intel	Status View
Air Defense	Status View
Maritime Ops	Status View
Strike	Status View
Info Warfare	Status View
Force Protect	Status View
Air Ops	Status View
Carl Vinson	Status View
C3	BG Logistics
ROE-JAG	TLAM
Schedules	Other

CWC

Last Update 01/02/02 07:13 p

◇ [Last 24 hrs](#)

◇ [Today's CDR's Intent](#)

◇ [Future OPS and Plans](#)

TF 30 MAG KAS OPAREAS
30 NOV 01 / 0603D

To comment on this web page, please contact:
<mailto:>

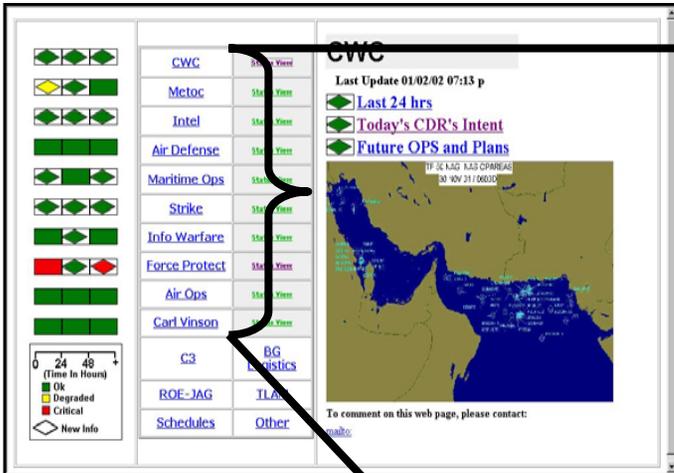


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Functional Area Organization



Overview Page



Functional Areas represented on Carl Vinson K-Web

PAGE TITLES	FUNCTIONAL AREA REPRESENTED
(CWC)	Composite Warfare Commander (the overall summary page for RADM Zelibor)
METOC	Meteorology and Oceanography
INTEL	Intelligence
AIR DEFENSE	Air Defense
MARITIME OPS	Maritime Operations
STRIKE	Strike
INFO WARFARE	Information Warfare
FORCE PROTECT	Force Protect
AIR OPS	Air Operations
CARL VINSON	USS Carl Vinson
C3	Command, Control and Communications
ROE-JAG	Rules of Engagement / Judge Advocate General
SCHEDULES	Schedules
BG LOGISITICS	Battle Group Logistics
TLAM	Tomahawk Land Attack Missile

“Other” was a hyperlink to numerous lower-level Summary Pages and information available within the K-Web





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Typical CCG-3 K-Web Summary Page



Intel

Last Update 11/25/01 09:49 a

-  [Intel SITREP](#)
-  [Indications and Warning Log](#)
-  [Collections/Systems](#)

INN DELHI DDG



UNCLASSIFIED

To comment on this web page, please contact:

maltc

Alerts & Impacts

-  [Atta's Post-War Plans](#)
-  [Anti-Taliban Primer](#)
-  [Kandahar Situation](#)
-  [Arabs Flee Afghan in Disguise](#)
-  [Small Boat Interdiction](#)
-  [Messages of Interest](#)
-  [Current OPINTEL](#)

Related Info & Links

[USS CARL VINSON CVIC Homepage](#)

[BF 50 BDA](#)

[Return to Intel Brief](#)

[Return to Sample KWEB](#)



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Sample Underlying Content Page



OPINTEL Pakistan

GEOPOL

Naval Activity

MARPAT Activity

Air Activity

Air Defense Activity

Emitter Activity

Ground Activity

Terrorist Activity



- PK Protest Page
- JICPAC Pakistan PTMIG page
- Pakistan Recent Nuclear Activity as of 28JUL
- Tactical Activity Log
- PK Plotsheets
- Pakistan INTEL BRIEF
- Pakistan's Intelligence and Security Services
- Afghanistan Page
- PK AOB.jpg

Page Maintained By Supplementary Plot (SUPPLOT) Knowledge Manager (SKM)

- e-mail: SKM@ccq3.navy.smil.mil
- Chat name: CVIN_RDBM
- J-dial: 6220





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CCG3 INTEL - BDA Spreadsheet



DATE (MISREP)	FACILITY NAME (Pre-strike imagery)	BHA (WSV)	BDA (Post-strike imagery)	WEAPON	ACFT	PKG	DMPI DESCRIPTIO	DMPI	BE NUMBER	PILOTS' COMMENTS/	MSN NUM
11/25/01	12P	N/A	N/A	N/A	N/A	CAS 3	COMPOUND	CMPND	12P	MES gun fight, missile shot	
11/17/01	10G	HIT	Pending	Bomb1	Fighter1	SCR 2	VEHICLE	VEH	10G	No luck for guys that get out of vehicle and	
11/17/01	17P	HIT	Pending	Bomb1	Fighter1	XCAS 4	TRUCK	TRUCK	17P		2543
11/16/01	17P	HIT	Pending	Bomb1	Fighter1	XCAS 3	TROOPS IN BLDG	TROOPS	17P		
11/14/01	16P	HIT	Pending	Bomb3	Fighter2	INT 4	BARRACKS	BKS	16P	Entire area lit up	
11/12/01	17L	HIT	Pending	Bomb5	Fighter1	SCR 5	VEHICLE	VEH	17L		2605
11/10/01	16P	HIT	Pending	Bomb5	Fighter1	SCR 2	VEHICLE	VEH	16P		
11/8/01	QANDAHAR MOTOR TRANS FAC	HIT	DESTROYED	Bomb4	Fighter1	SCR 2	POL STORAGE	AQM499	0442CA0035	Continuing explosion	
11/6/01	KESHEND YA PAIN DSA	HIT	Pending	Bomb1	Fighter1	FAC 4	VEHICLE	VEH	0337ST0008		2705
11/5/01	130	HIT	Pending	Bomb1	Fighter1	FAC 2	TROOPS	TROOPS	130		2703
11/1/01	120	HIT	Pending	Bomb1	Fighter1	SCR 4	VEHICLE	VEH	120		2605
10/29/01	17L	HIT	Pending	Bomb1	Fighter1	SCR 3	VEHICLE	VEH	17L		
10/27/01	HOSEYN KUT ARMY BKS	HIT	PROB DESTROY	Bomb5x2	Fighter1	FAC 7	BUILDING	BLDG	0431-00160		2703
10/7/01	FARAH EW RADAR FAC	HIT	DESTROYED	Bomb1	Fighter1	B	CTR OF SPT BLDG	AQG475	0430CA0085		
10/7/01	HERAT AFLD	HIT	DESTROYED	Bomb1	Fighter1	B	CTR RWY	A20306	0430-08400	Hit one MIG-21	





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Evolution of Data to Information to Knowledge: METOC Example



```

METOC Text.txt - Notepad
Document: 6420 | Created: 2011 10/15/2002 UTC | Help#11-877-280-2811 | Page: 03
Description: SIGMET Text | North Atlantic Oceanic FIRs

WSHT11 KNCI 151827
SIGADK
KDMA KZHU SIGMET KSLD 6 CNL WEF 1828 UTC.
CONVECTION HAS WIND AND BECOME WIDELY SCT.
J.HENDERSON

WSHT12 KNCI 151651
SIGADK
KDMA KZHU SIGMET LIMA 4 VALID 151655/152055 KNCI-
HOUSTON OCEANIC FIR WADMI OCEANIC FIR FRQ TS W/ 50 NM EITHER SIDE
OF LINE 2727N0840W 2404N08617W. TOPS TO FL450. MOV E 20KT.
IMFSL
J.HENDERSON

WSHT12 KNCI 151949
SIGADK
KDMA KZHU SIGMET LIMA 3 CNL WEF 1949 UTC.
CONVECTION HAS MOV INTO DOMESTIC WTRS AND CONVECTIVE SIGMET UNIT
NOW ISSUING BULLETINS ON GLEPWX TS.
J.HENDERSON

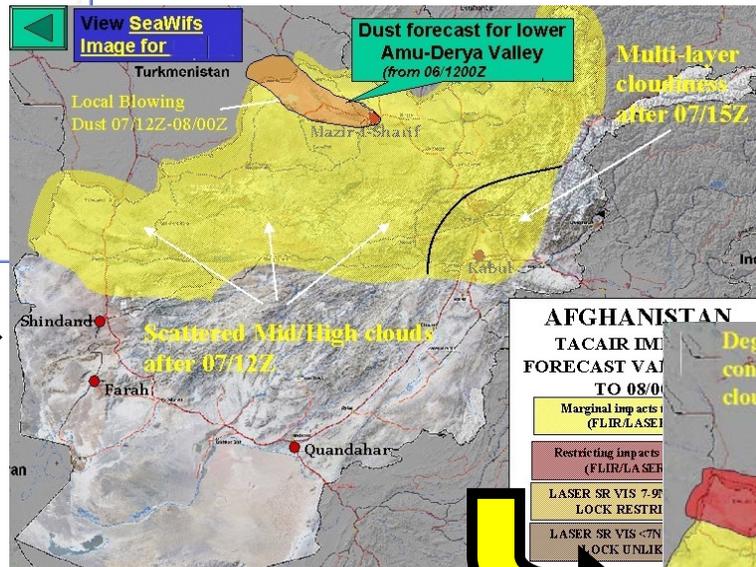
WSHT12 KNCI 152008
SIGADK
KDMA KZHU SIGMET LIMA 4 CNL WEF 2008 UTC.
CONVECTION HAS MOV INTO DOMESTIC WTRS AND CONVECTIVE SIGMET UNIT
NOW ISSUING BULLETINS ON GLEPWX TS.
STOUT

WSHT13 KNCI 151915
SIGADK
KZHU SIGMET MIKE 3 VALID 151915/152315 KNCI-
NEW YORK OCEANIC FIR FRQ TS W/ 50 NM OF 1851N03327W. TOPS TO
FL440. MOV ESE 15KT. NC. BASED ON SAT AND LTG OBS.
J.HENDERSON

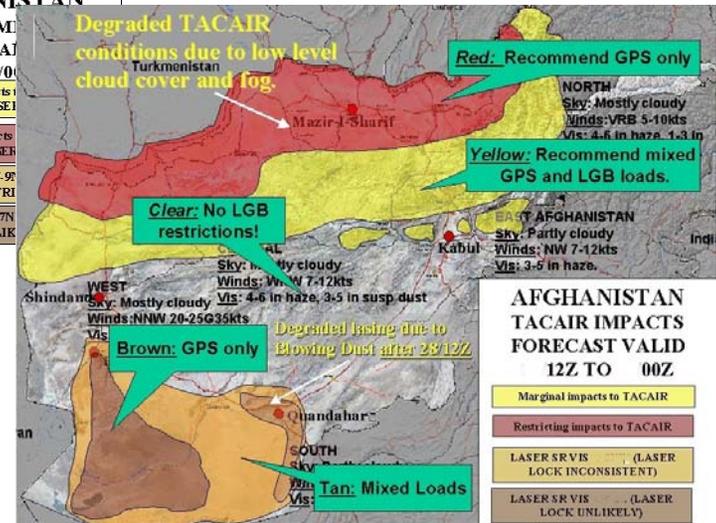
NO reports are currently available for WSAZ LPWG
NO reports are currently available for WSAZ LEST
NO reports are currently available for WSGJ BQGF
NO reports are currently available for WSLI BQCC
NO reports are currently available for WSWT BQGT
NO reports are currently available for WWSL BQCC
NO reports are currently available for WWSL BQCC

```

← **Data:** Typical Text-based weather product



← **Information:** raw and semi-processed data represented graphically



Knowledge: weather data and info translated into usable, understandable Knowledge of immediate value to planners and pilots



Degraded TACAIR conditions due to low level cloud cover and fog.

Turkmenistan

Mazar-i-Sharif

Red: Recommend GPS only

NORTH
Sky: Mostly cloudy
Winds: VRB 5-10kts
Vis: 4-6 in haze, 1-3 in

Yellow: Recommend mixed GPS and LGB loads.

Clear: No LGB restrictions!

EAST AFGHANISTAN
Sky: Partly cloudy
Winds: NW 7-12kts
Vis: 3-5 in haze.

Kabul

Sky: Mostly cloudy
Winds: WNW 7-12kts
Vis: 4-6 in haze, 3-5 in susp dust

WEST
Shindand

Sky: Mostly cloudy
Winds: NNW 20-25G35kts
Vis:

Brown: GPS only

Degraded lasing due to Blowing Dust after 28/12Z

Quandahar

SOUTH

Tan: Mixed Loads

AFGHANISTAN TACAIR IMPACTS FORECAST VALID 12Z TO 00Z

Marginal impacts to TACAIR

Restricting impacts to TACAIR

LASER SR VIS (LASER LOCK INCONSISTENT)

LASER SR VIS (LASER LOCK UNLIKELY)



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Important K-Web Principles

Flexibility

- **K-Web must be easily and rapidly adaptable to warfighters' changing needs**
 - » Form
 - » Content
 - » Web / knowledge structure

Ease of Use

- **Intuitive and easy-to-use**
 - » Information production
 - » Information consumption
 - ◆ Limit required user interaction to the extent possible

Economy of Effort

- **Leverage off of information tools and products already being used / produced**
 - » Outlook / Exchange, Word, Excel, PowerPoint, Access, various graphics, multimedia, others' web sites / content, etc.
 - » Limit production of specialty products
- **Require little or no maintenance by IT personnel**



Warfighters shouldn't be Web Masters!!
Tools have been developed to do the “web work”

- [Summary Maker](#) is a template-based tool to build Summary Pages
- [TacGraph](#) facilitates development of map-based summary graphics with imbedded, web-accessible information

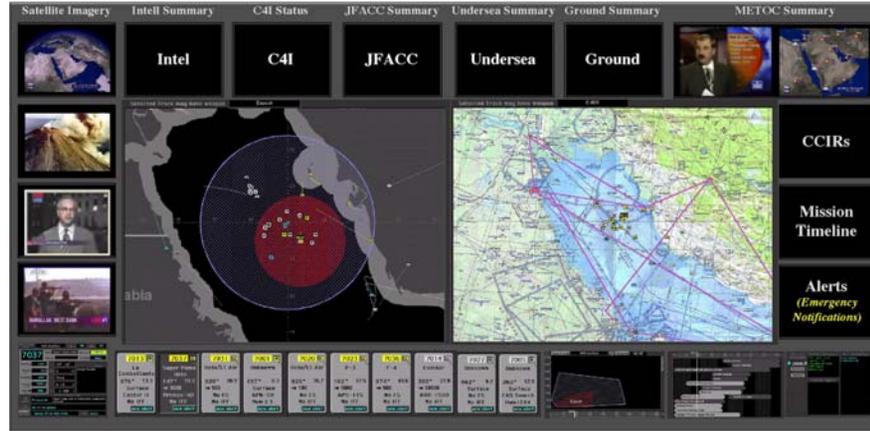
The ***hardest part of information production remains unchanged*** – figuring out how to create and present value-added information (i.e., *Knowledge*) that tells the right story



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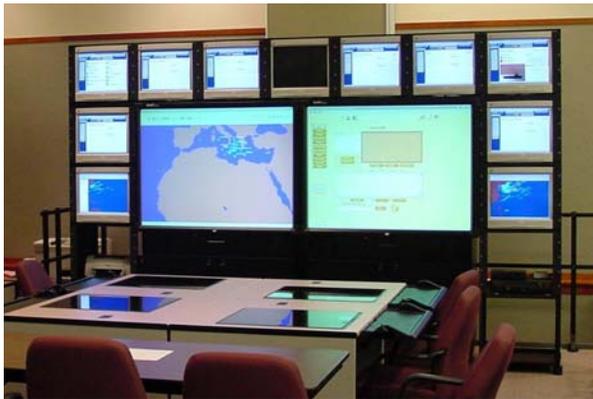
Knowledge Walls (K-Wall)

as installed at the Naval War College



**Command 21
Knowledge Wall
Conceptual Design
(ca 1999)**

**Global 2000
Knowledge Wall**



**Global 2001
Knowledge Wall**





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Knowledge Web (K-Web): Use by CARGRU THREE aboard the USS Carl Vinson During Operation Enduring Freedom



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USS Carl Vinson / CCG-3 K-Web Timeline



Oct 1999	K-Web development begins – C3F Requests accelerated development for Global 2000
Aug 2000	CCG-3 participates in Global 2000 War Game
Oct 2000	CCG-3 requests K-Web installation
Apr 2001	K-Web tools approved for use aboard ship
May 2001	K-Web / K-Desk installed onboard USS Carl Vinson
Jul 2001	USS Carl Vinson / CCG-3 deploys
Sep 2001	Terrorist attack on World Trade Center / Operation Enduring Freedom begins
Jan 2002	USS Carl Vinson / CCG-3 returns from deployment





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K-Web Assessment Goals Aboard USS Carl Vinson



Use

- How was it being used?
- Who was using it and where?
- How often was it used?

Utility

- Did it meet users' needs?
 - » If so, did it do so adequately?

Usability

- Were there usability problems?

What improvements are needed?
What are the "hard" issues?



Automated data collection

- SumMaker and TacGraph tools record use (Producers)
- Microsoft IIS web server tracks use (Consumers)

Interviews and discussions

- Post workup
- Early deployment
- Late deployment
- Post deployment

Anecdotal reports



K-Web Highlights

K-Web Experienced Significant Use
During Operation Enduring Freedom!



Access during period 28 Sep 01 – 29 Nov 01:

- 2684 unique IP addresses* accessed K-Web server during analysis period (2 Months)
- 1322 visitors* visited K-Web more than once
- 1755 visitors* bookmarked K-Web content for future access

Activity per day:

- Average of 482 visitors* per day
 - » Ranged from 340 – 676 per day.
- Info flow / data transfer
 - » Average data transferred per day (444.45 MB)
 - » Vast majority of data transfers took place “in-house” (over ship’s internal network)
 - ♦ Graphics / photos / imagery
 - ♦ Multi-media / movie files
 - » No discernable impact upon the network was reported by users in spite of the large amount of data transferred



* See speaker notes for important information on the terms “IP Address,” “user,” and “visitor.”

**Most K-Web users internal to USS Carl Vinson
(CCG-3 staff)**

**Many other Commands accessed / viewed / provided
links to the K-Web**

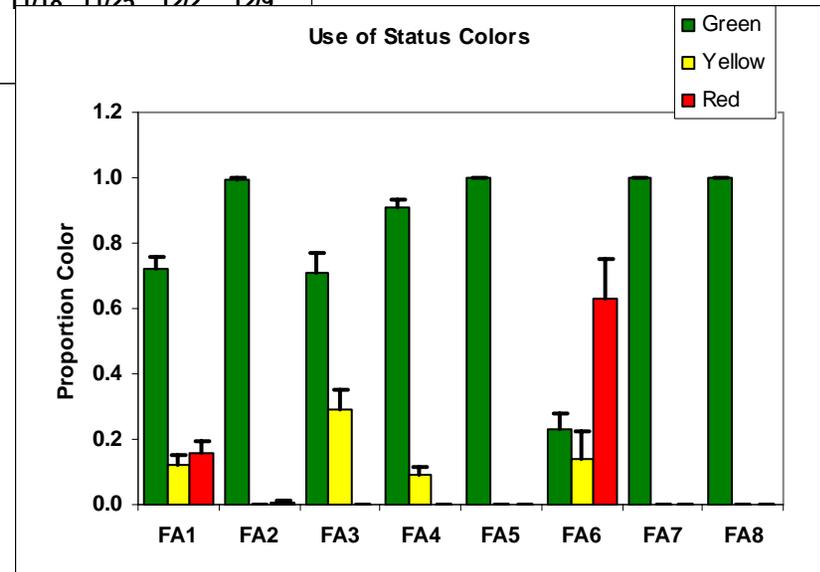
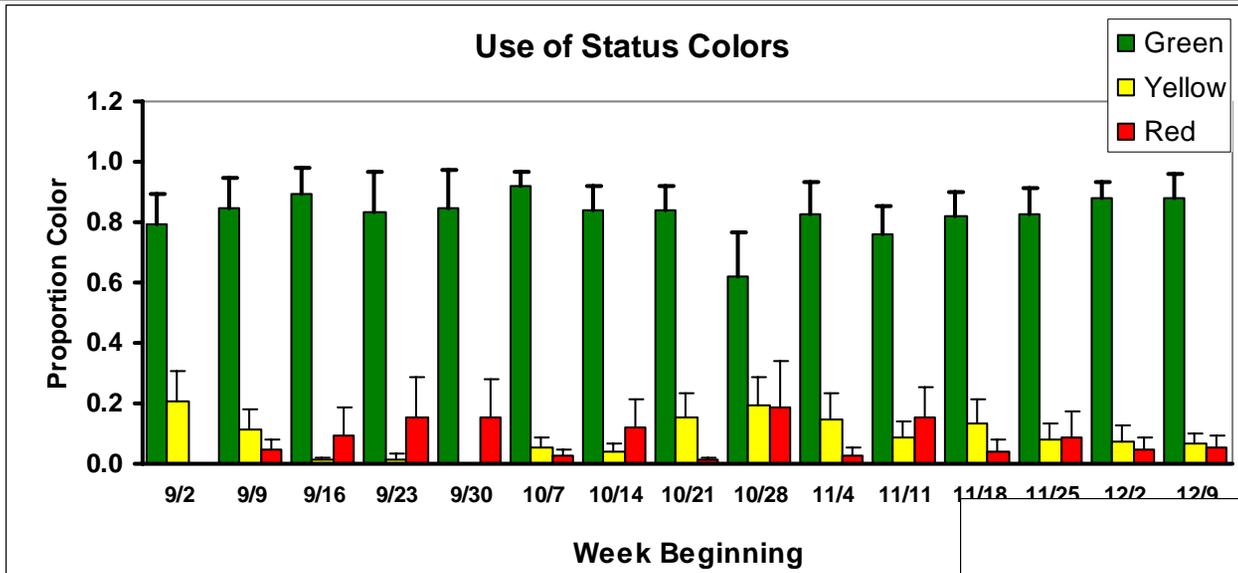
(based on unique Domain names / IP addresses accessing K-Web)

- Carl Vinson BG
- 5th Fleet
- 7th Fleet
- Various METOC commands
- CENTCOM
- Collaboration at Sea systems
- CINCPACFLT
- Peleliu ARG
- Theodore Roosevelt BG
- SOCOM
- NAVCENT
- USS Blue Ridge
- Various Pentagon offices / users, multi-service
- Enterprise BG
- Essex ARG
- DIA
- PACOM
- II MEF
- 15 MEU
- Various Air Force Commands
- *Numerous Commands listed by IP address only...*

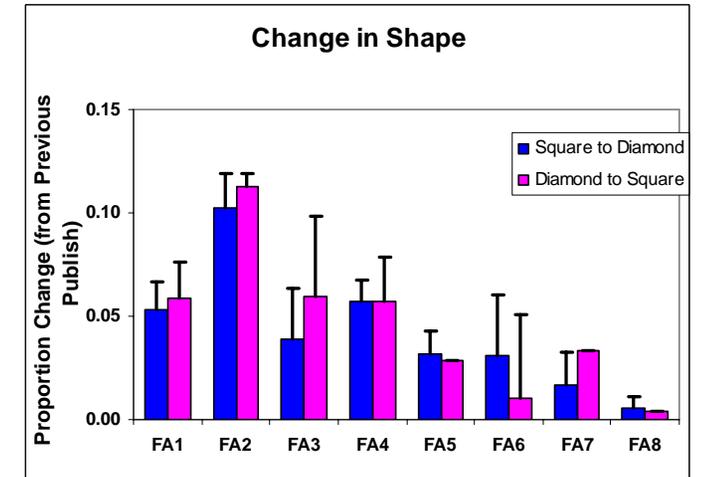
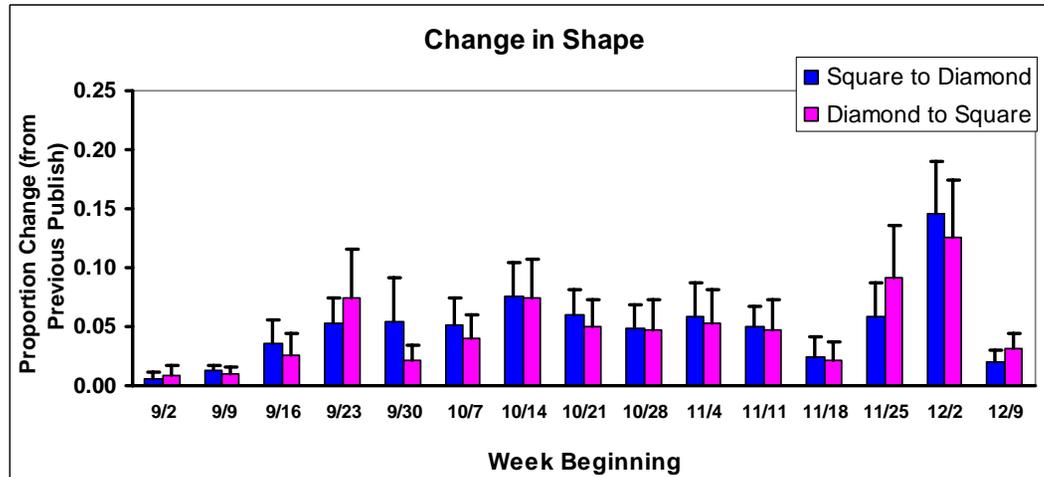
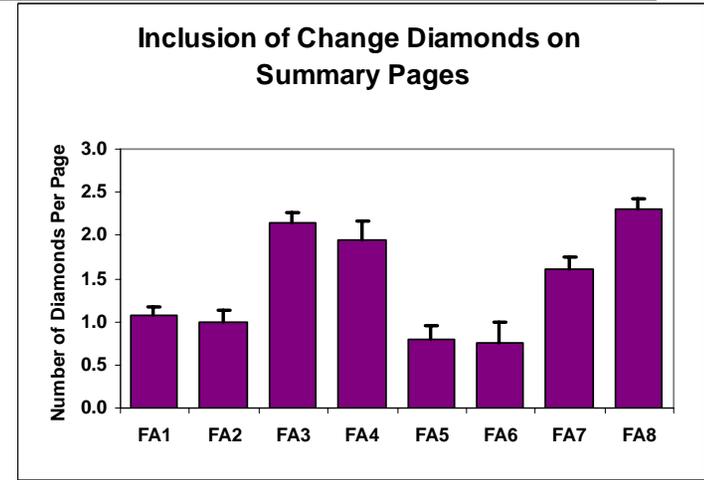
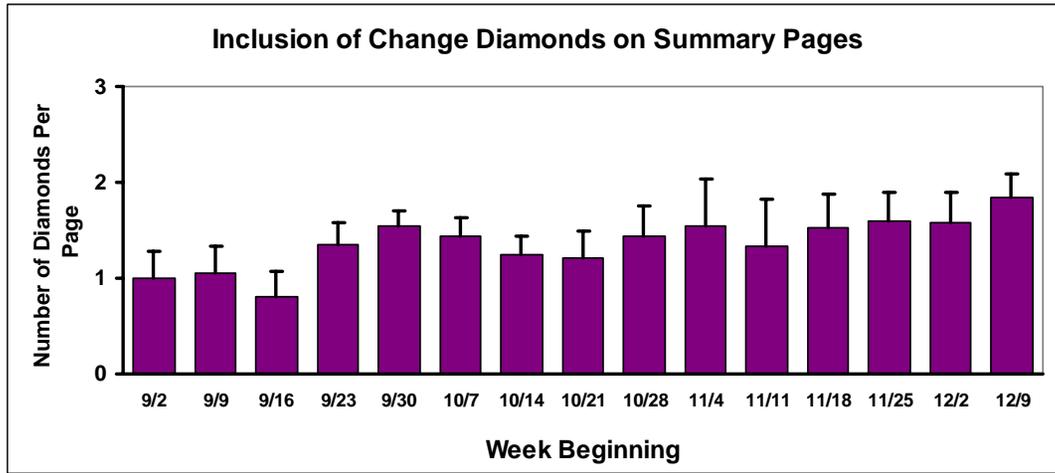


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Use of Colors to Indicate Status in Summary Pages



Alerting Users to Changes



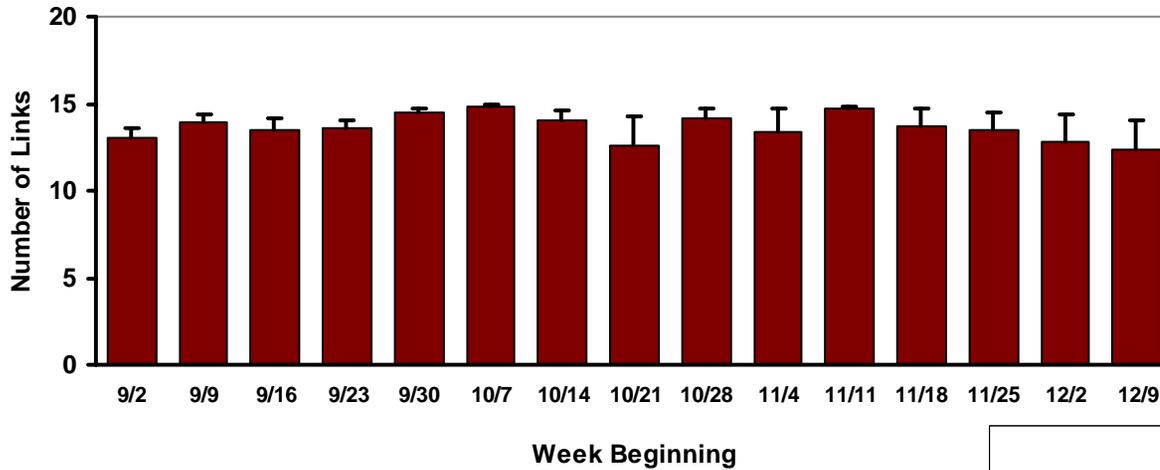


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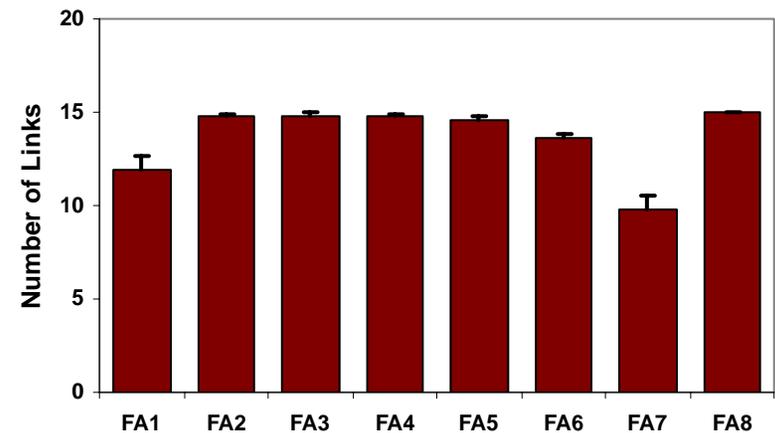
Linking to Mission-Relevant Information



Number of Links Per Page



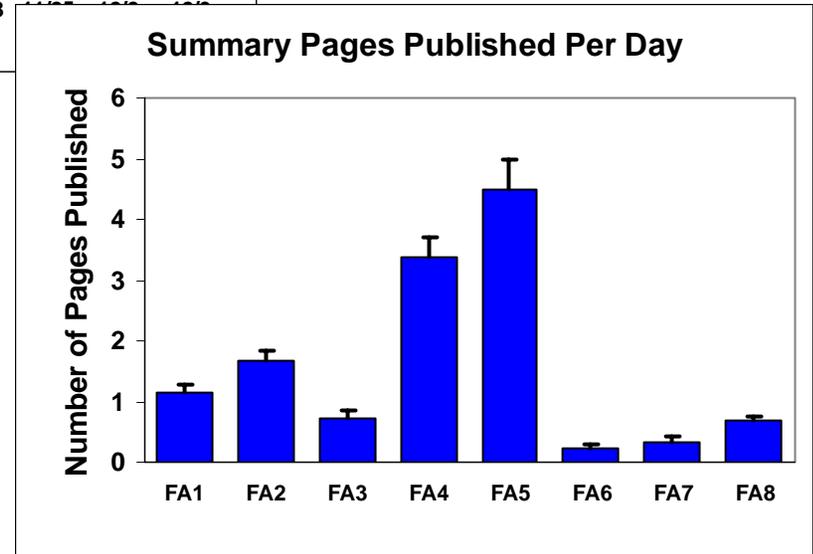
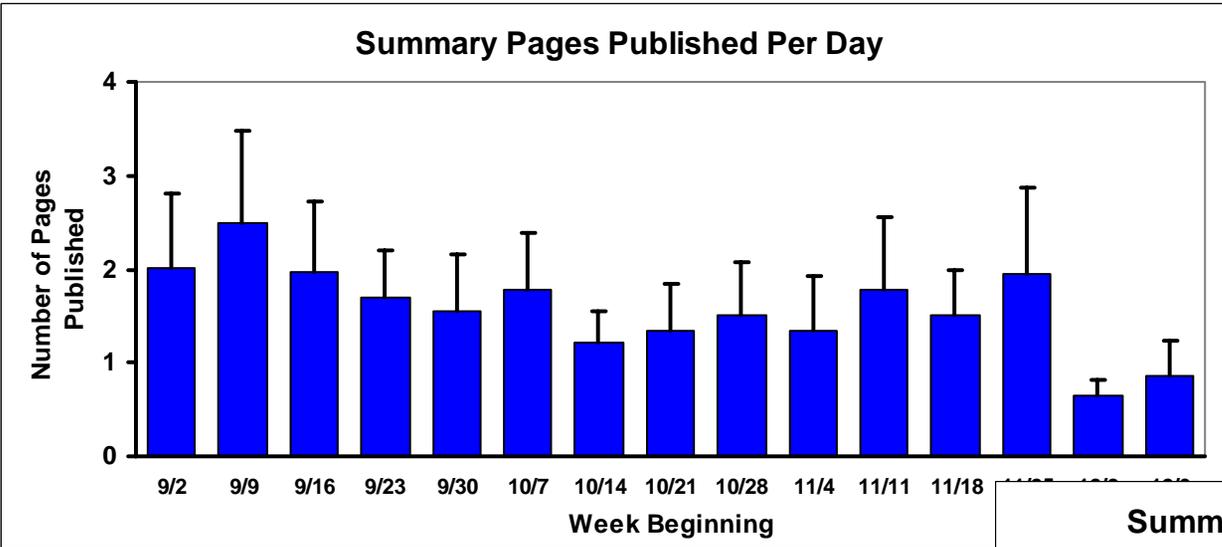
Number of Links Per Page





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Near Real-Time Data Publish Rates of Top-Level Summary Pages



Impact of K-Desks and Wall

Selected Quotes from OEF Users

Multi-head display systems [*K-Desks in TFCC*] were a huge help – key enabler in managing all of the different information sources and multiple chats

- Users reported monitoring up to 8 chat sessions simultaneously on the K-Desks. Users with traditional workstations unable to chat effectively and do any other tasks.
- K-Desks could accommodate simultaneous inputs from multiple tactical and information management systems

“6-headed monsters” (as they were affectionately called) were a huge improvement over old display systems. Command-level watch standers need all the display space they can get...

Fantastic tool – always up – no maintenance – easy to use – we’d never give these up!

Having the K-Web available on the VideoWall side by side with tactical data was powerful. We could see the “big picture” and the fine details at the same time... Really helped us get S.A.



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More Operational Quotes regarding K-Web



**K-Web Tool Training was easy – 15-30 minutes tops!
This was an operator's dream – way better than other
systems I've used...**

**Used K-Web and Chat as primary communications
channel – never did use BG Command (verbal
communications circuit)**

**Using K-Web meant breaking old habits and actually
sharing information with others – K-Web and
SumMaker made that easy...**

**Very little resistance to K-Web – took about one day to
adopt at the Command- and staff-levels**

**Never did a PowerPoint brief during the deployment (per
se). K-Web was a huge time-saver!**



Operational Impact of K-Web

Selected Quotes from OEF K-Web Users

During morning meetings we focused on problem solving rather than reviewing PowerPoint briefs...

K-Web was so powerful because you could find the information you needed with just a click or two – not like other (traditional) systems...

K-Web and chat filled the bill... We didn't even notice when radio circuits went down – because we weren't using them!

Using K-Web meant breaking old habits and actually sharing information with others – K-Web and SumMaker made that easy...

K-Web was up and operational the entire deployment – not a single failure...

Multi-head display systems [*K-Desks in TFCC*] were a huge help – key enabler in managing all of the different information sources and multiple chats

But... Some Issues Remain

Selected Quotes from OEF K-Web Users

K-Web became so useful, so quickly, the entire region became dependent on it... When USS Carl Vinson left, a huge information vacuum resulted.

- Transition and continuity of business rules, content, lessons learned, etc.

Some units couldn't always see the K-Web due to connectivity and bandwidth limitations

Who is content created for and how is access control maintained?

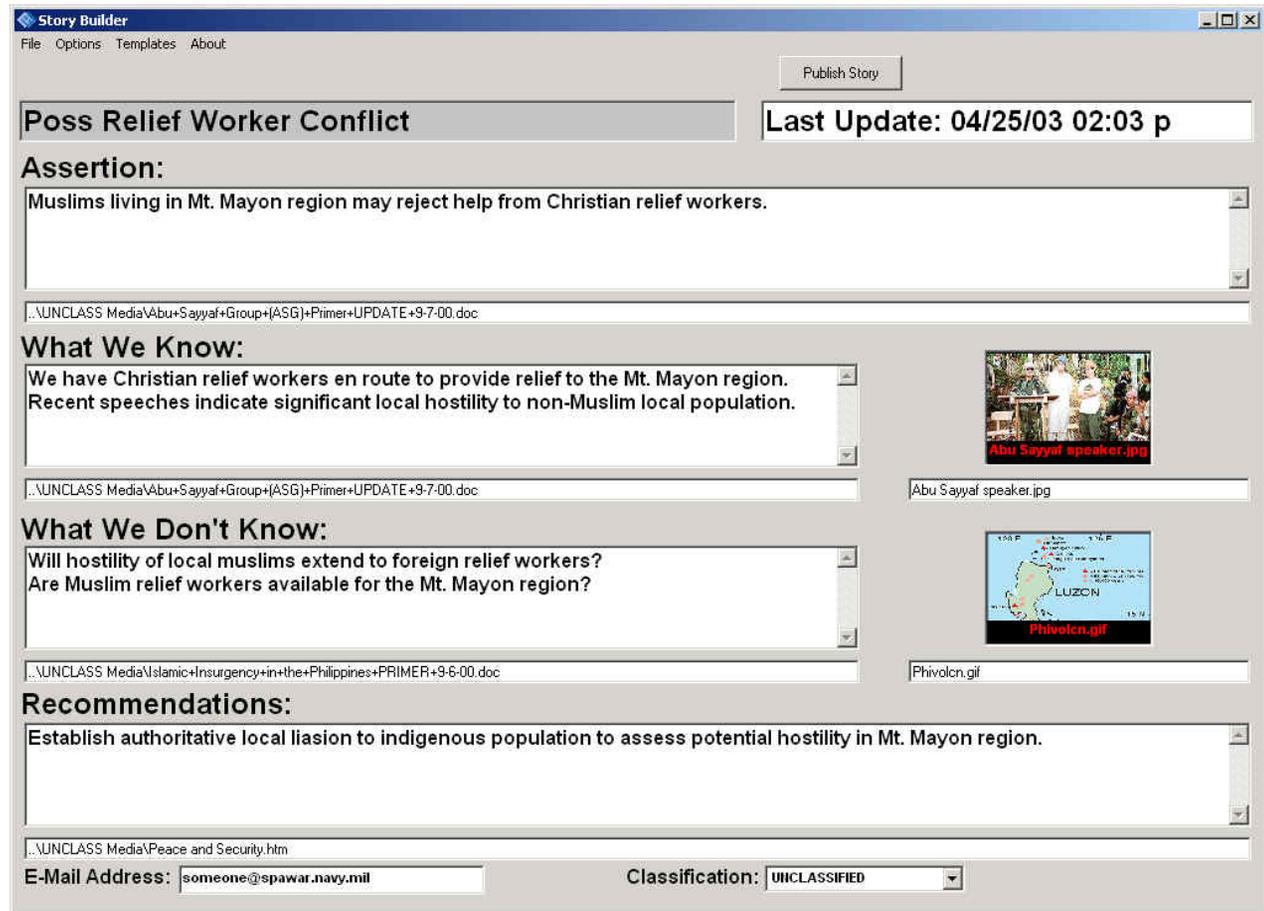
No easy way to share K-Web with the Coalition Forces

- Hardest part is knowing *what* to share and *how* to share it...

Example: “StoryBuilder” Template

Information is structured such that it forms the basis of an “argument” or “story”

Embedded links take the viewer to more detailed information supporting the assertion, facts, and conclusion.



The screenshot shows the Story Builder web application interface. The title bar reads "Story Builder" and the menu includes "File", "Options", "Templates", and "About". A "Publish Story" button is located in the top right corner. The main content area is titled "Poss Relief Worker Conflict" and includes a "Last Update: 04/25/03 02:03 p" timestamp. The "Assertion:" section contains the text: "Muslims living in Mt. Mayon region may reject help from Christian relief workers." Below this is a file path: "...UNCLASS Media\Abu+Sayyaf+Group+(ASG)+Primer+UPDATE+9-7-00.doc". The "What We Know:" section contains the text: "We have Christian relief workers en route to provide relief to the Mt. Mayon region. Recent speeches indicate significant local hostility to non-Muslim local population." To the right of this text is an image of a man speaking, labeled "Abu Sayyaf speaker.jpg". Below this is another file path: "...UNCLASS Media\Abu+Sayyaf+Group+(ASG)+Primer+UPDATE+9-7-00.doc" and a caption "Abu Sayyaf speaker.jpg". The "What We Don't Know:" section contains the text: "Will hostility of local muslims extend to foreign relief workers? Are Muslim relief workers available for the Mt. Mayon region?" To the right of this text is a map of Luzon, labeled "Phivolcn.gif". Below this is another file path: "...UNCLASS Media\Islamic+Insurgency+in+the+Philippines+PRIMER+9-6-00.doc" and a caption "Phivolcn.gif". The "Recommendations:" section contains the text: "Establish authoritative local liasion to indigenous population to assess potential hostility in Mt. Mayon region." Below this is a file path: "...UNCLASS Media\Peace and Security.htm". At the bottom, there is an "E-Mail Address:" field with the value "someone@spawar.navy.mil" and a "Classification:" dropdown menu set to "UNCLASSIFIED".



SPAWAR
Systems Center
San Diego

Knowledge Web Technologies FNC Transition Plans



Deliver to SPAWAR PMW-157 a functional K-Web ready for Program of Record (POR) ASAP.

Exit criteria based on performance metrics established during Enduring Freedom combat operations with the K-Web “IIS Functional Specification”.

Transition occurs when PMW-157 (or their designated agent) begins funding development / deployment.



Emerging K-Webs (FY03)

Fleet – Operational K-Webs for all Fleet users being integrated with Collaboration At Sea (CAS) Fleet Initiative – Formal transition to SPAWAR PD-15 as POR.

- USS Constellation BG: 9/02
- USS Theodore Roosevelt BG: 10/02
- USS Nimitz BG: 10/02
- USS Carl Vinson BG: TBD

EUCOM – Prototype “Operational” K-Web being developed by J6 (SIPR / JWCS)

USTRANSCOM-Developing comprehensive Knowledge Management System

CENTNAV- Prototype IIS-based K-Web for J6 being developed.

OPNAV N6- RFP for IT21-based Program Management K-Web

Singapore Military – Inquired about joint K-Web R&D

DARPA AugCog – Building Program Management K-Web (NIPR).

SECDEF- (Under Discussion)

Consider organizing around mission functions

- Makes command Scaleable, Adaptable
- Works well with web technologies

K-Web works best when:

- Endorsed by Commander: “The Web is the brief”
- There is a recognized Command “Knowledge Manager” vested with authority & responsibility for process & products (N35 or ?)

Know who is using whose information products, for what & when

- Consider different enclaves of users (Coalition, Higher echelon, work groups) Try to accommodate them appropriately in your business model.

Establish processes to work processes & products

- Do it early, Do it periodically
- Look for products that are updated regularly and widely used – then look for ways to streamline
- Look for products that are not being used – assess their value and why
- Look for product redundancy and then ways to combine to reduce task load
- Look for products that are taking too much effort – assess their requirements

Become aware of connectivity & bandwidth issues & educate the staff

Look for tools that are easy to use and share as needed

Develop and distribute business rules for how you want to work as a command

Look for and recognize significance of unintended consequences

Developing a Knowledge Management & Decision Support System

Define Prospective Scope, Tasking and Execution Plan

Conduct Knowledge Engineering

- Identify Key Staff members & Interview
- Identify, Problems, Potential improvements & Costs.
- Document current & Define prospective processes
- Define opportunities for improvements & Implementation Issues
- Identify categories of “users”
- Identify subset(s) of staff as prototype users

Implement Changes

- Define & Engineer Hardware & Physical Environment
- Define & Engineer Software Tools / Processes
- Define CONOP & Validate Processes

Assess Impacts & Utility

- Define Metrics & Exit Criteria

Iterate (add users) & Refine

K-Web & K-Desks were used effectively aboard USS Carl Vinson during Operation Enduring Freedom
Issues were identified for future research and development

- Underlying concepts being further addressed / explored via current and future Office of Naval Research *Command 21* research project
- Transition efforts taking place under ONR's Knowledge Superiority & Assurance Future Naval Capability program

K-Web being transitioned to the Fleet as rapidly as possible through integration with Collaboration At Sea project.

- Sponsored by the Office of Naval Research Future Naval Capabilities Program.
- Working with Space and Naval Warfare System Command as transition partner.



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Fleet K-Web Users



www.pacific-science.com/kmds
www-tadmus.spawar.navy.mil



**USS Carl Vinson
(and Battle Group Units)**



**USS Constellation
(and Battle Group)**

