



ADMACS & ISIS



AVIATION DATA MANAGEMENT & CONTROL SYSTEM INTEGRATED SHIPBOARD INFORMATION SYSTEM



John Kovacs
(732)323-2891

ADMACS Systems Engineer
kovacsjt@navair.navy.mil

NAWCAD Lakehurst
Code 4.8.1.2

ADMACS Brief

- **Overview / Description**
- **Operational Data Flow**
- **Components**
- **Development Approach**
- **IT-21 and Current Configuration**



ADMACS Description

Aviation Data Management and Control System

- **A tactical, real-time Information Management System maintaining data integrity throughout various ship spaces that manage Aircraft Launch and Recovery operations on CV / CVN and LHA / LHD class ships.**
 - **Launch and Recovery Equipment**
 - **Air Traffic Control**
 - **Aviation Maintenance**
 - **Mission Execution (Air / Load Plan)**
 - **Aviation Weapons Stowage and Handling**
 - **Landing Signaling Officer (LSO)**
 - **Ship to Shore Movement & Tactical Aircraft Control (Amphib)**
- **Interface with other shipboard systems**





ADMACS Description

Aviation Data Management and Control System

- **The program is comprised of the following elements:**
 - **Physical Infrastructure - Data Distribution, Processing, Integrity between Command Centers, Component Systems, and External Interfaces through a resilient open architecture.**
 - **Component Systems - ORD identifies other systems towards the preparation and execution for launch & recovery operations**
 - **Configuration Management - Insure proper installation and availability of functions for multiple Navy platforms and external interfaces supported.**
 - **Multi-User Flight Operations Database supporting ship / BG community.**



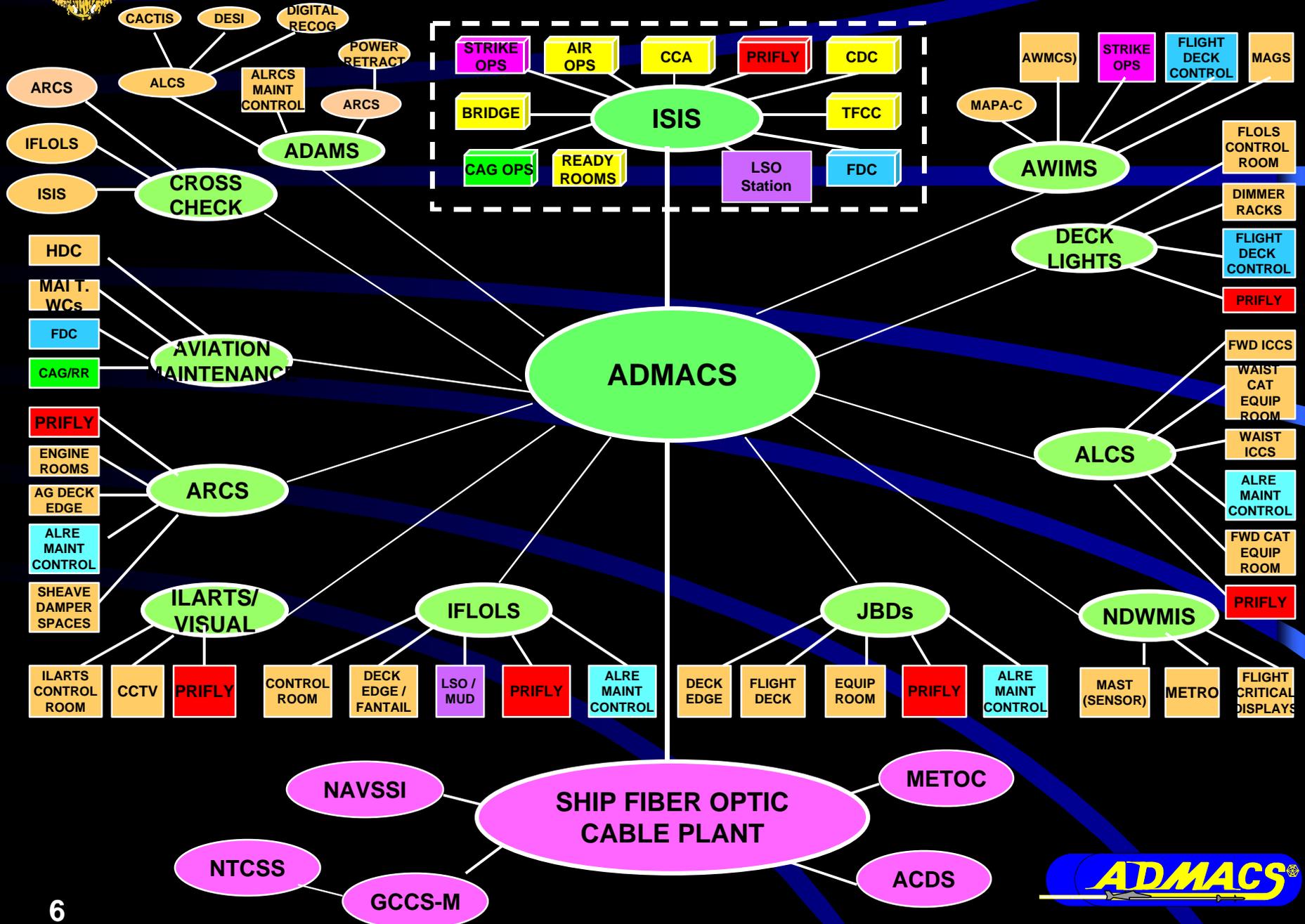


System Characteristics

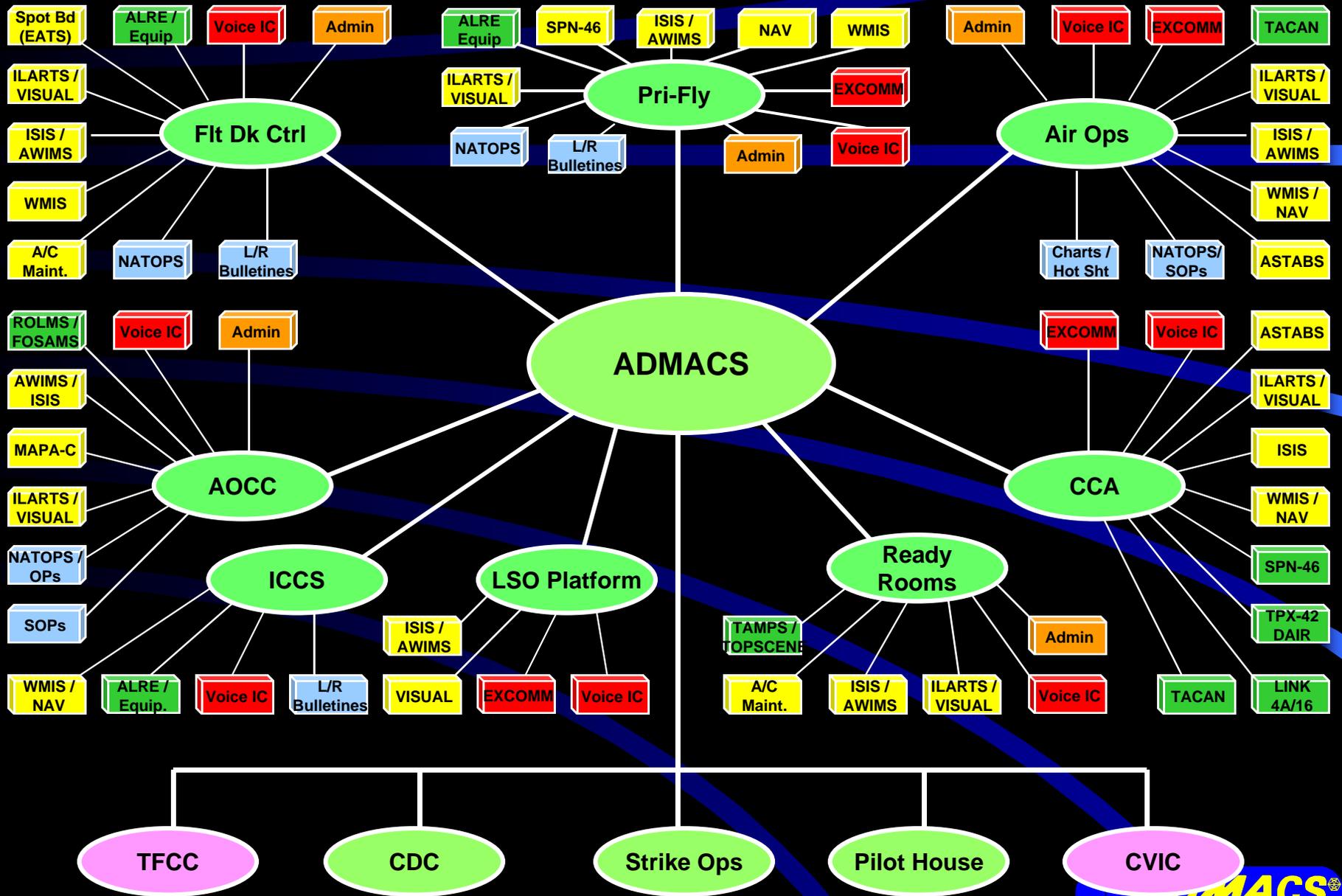
ADMACS Description

- **Supports Tactical Operations ⇒ Redundancy**
- **Common Flight Operational Picture**
- **Streamlines Process from Planning through execution**
- **Reduces workload for Support Personnel**
- **Data Integrity (Collect Information from its Source)**
- **Reduces Need on Voice Communications**
- **Distributes Information to Other Operators / Users**
- **Allows Work Centers to Operate through System failure**
- **Human System Integration**
 - **Inter & Intra Work Center Work Flow**
 - **Operator Needs**

ADMACS Structure

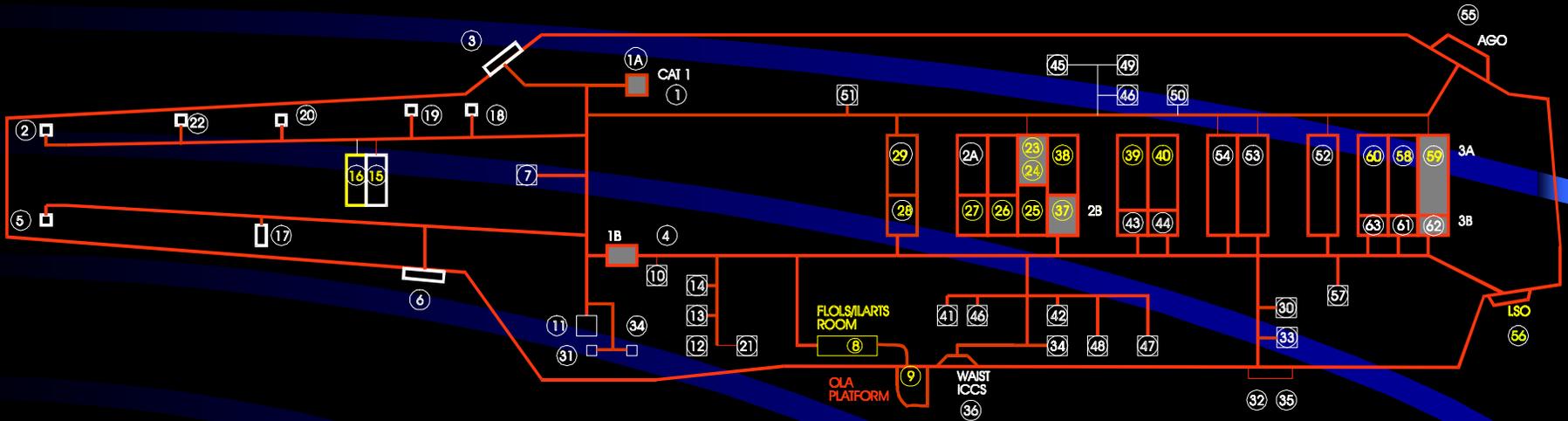


Flight Operations Work Centers





Projected Configuration for Gallery Deck (03 Level)



Yellow -- Block 0

White -- Block 2





Cyclic

- Commander's Intent
- Begin ATO
- High Level Tasking

Receive Tasking

- Strike Team Develops Mission to Satisfy Tasking
- Aircraft, Fuel, Munitions etc. are determined

- Intel Debrief
- Air Crew Debrief

Debrief

Mission Planning

Carrier Flight Operations

Mission Execution

Carrier "Deck" Operations

- Prepare Aircraft
- Weapons Movement
- Fuel Pods

- Mission Operations
- CAP
- Real Time Re-tasking





Flight Operations Data Flow

Tasking Functions Performed \longrightarrow Depts./WCs $\xrightarrow{\text{Allocated to:}}$ Wk St. \longrightarrow Data

- ATO
- Strike Planning
 - Preparation (Pre-Flight Quarters)
 - Launch Aircraft
 - Mission Execution
 - Recover Aircraft
 - Post Recovery
 - Maintenance Actions
 - Aircraft Related
 - Ship Related (ALRE, SE)
 - Debrief

Tiered Approach to Realizing
Knowledge Based Work Centers
Process - Data / Information - Product Modeling

(Distributed Autonomous Agents) \longleftarrow

(Rules Based Processing)

ADMACS



Aviation C⁴I Systems - Work Centers

Functions

Work Centers

Knowledge Domains

Data Requirements

Tasking



Planning



CV Air
Operations



Execution

CATCC

Pri Fly

Flight Deck

FDC

AOCC

Bridge

SRRs

Etc.

ATC
Flight Safety
Flight Schedule Coordination
Recovery Fuel Management

Air Space Management
Flight Safety
Flight Deck Scheduling

Launch / Recovery Execution
Aircraft Maintenance Execution

Aircraft Spotting
Maintenance Coordination
Flight Deck Resource Management

Ordnance Availability
Bomb Buildup Management
Strike-up Coordination

Sea Space Management
Sea Keeping
Wind Over Deck Requirements

Pilot Qualifications
Mission Briefing

- Flight Schedule Launch and Recovery
- L/R Times
- Early / Late Launches
- Order to Launch Aircraft
- Number / Type of Aircraft Involved
- Aircraft Mission Requirements
- Aircraft Operational Status
- Mission Capability
- Maintenance Requirements
- Accessibility of Aircraft (spotting)
- Flight Deck Equipment Status
- Aircraft Elevators
- Weapons Elevators
- Fueling Stations
- Power Stations
- SINS Stations
- Yellow Gear Status
- Tractors
- Huffers
- P51
- Scheduled Elevator Movements
- Wind Over Deck
- FOD Walkdowns
- Crew Training Requirements

Aviation C⁴I Systems



Initial inroads into developing Knowledge based systems involves converting current systems composed of sound powered phones and grease boards into distributed information management systems.

This captures the data necessary for future information integration and the deployment of Knowledge Based Decision Aids.





Integrated Shipboard Information System (ISIS)

- **ISIS is the user interface system providing the data display and entry used to manage flight operations data integrated into the work flow of the space**
 - **System engineering application integrated environment collects data utilizing simple point/click functions from Air Operations, Carrier Control Approach, Primary Flight Control & Flight Deck Control**
 - **Information Distribution to the Bridge, LSO, CDC & Ready Rooms**
 - **Historical information is stored and required data logs and historical reports are automatically generated.**
- **ISIS consists of reconfigurable data entry work stations and large screen displays replacing the existing plexi-glass status boards**



Integrated Shipboard Information System (ISIS)

“Rules Based” Data Entry

- Who
- What
- When
- Flags
- Triggers

AD EVENT BOARD														
EVENT: 1		LAUN	100	RECOVERY: 0730	SUNRISE: 0700	SUNSET: 1650	MAGV	1111	MP: +4R					
CASE 1	LAUN	100	RECOVERY	CVI	APP	DRR:	EFB:	FB:	quit	F	MP: 0910			
EVT	SIDE	MSN	ATD	BN	SIDE	ST/TM	B/T	PR	ATA					
1A1	100	MOD	CAP	0600	14	100	23.4 / 48	5.8	TC					
1A1	105	CAP	CAP	0601	15	105	6.6 / 46	5.4					0740	
1A1	103	MOD	GUNEX	0600	14	103	13.6 / 34	5.8						
1B1	202	MAS	SUCAP	0611	14	202	/	5.8						
1B2	205	LINK	SUCASP	0601	15	205	4.4 / 17	5.8					0743	
1C1	300	SMI	BMBEX	0602	14	300	/	4.6						
1C1	301	GRE	BMBEX	0605	14	301	/	4.6						
1D1	404	MUL	MINEX	0604	14	404	/	4.6					0742	
1D2	403	BUCKLEY	BMBEX	0607	14	403	/	4.6					0741	
1E1	506	JOHNSON	BMB	0607	15	506	/	5.3						
1H1	604	KOTICK	AAW	0555	15	604	/	3.6						
1F1	623	BOWLEY	AEW	0609		623	/	5.4						
1I1	763	RAYFORD	AEW	0610		763	/	0.6						
1G1	704	SPRADLIN	RECTNK	0555	14	704	/	3.6						
▲	706	STEWART	RECTNK		16	706	/	3.7						
1J1	613	GEHRSTZ	PG	0545	14	613	/							

R/C
TO GO
0





Ship's Air Plan

SUNRISE: 0630
 SUNSET: 1925
 MOONRISE: 1405
 MOONSET: (1)0307
 MOONPHASE: WAXING GIBBOUS

USS THEODORE ROOSEVELT CVN-71
 ATO FLOW SHEET

DATE: 06-APR-95 (THU)
 FLIGHT QUARTERS: 0730 VARIATION: 10W
 HELO QUARTERS: 0700 TIME ZONE: -4
 SORTIES- D: 24 N: 5 TOTAL: 29
 HOURS- D: 23.0 N: 7.5 TOTAL: 30.5

		FOD WALKDOWN 1030					FOD WALKDOWN 1900						
AH/SQUADRON		0900	1200	1300	1400	1445	1530	1630	1730	2030	2200	2330	D/N
NAWC F-18C RR4 4774	B		1B1 1 CQ/FLY OFF NHK	1B2 1 CQ/FLY OFF NHK									2 / 0
VFA-136 GUNSTAR FA-18C 300 RR9 4779	C						NZC 4C1 2 CQ NHC						7 / 0
VF-101 F-14A RR8 4778	D							NTU 5D1 2 CQ NTU 5D2 2 CQ NTU 5D3 1 CQ		6D1 2 CQ 6D2 2 CQ 6D3 1 CQ			5 / 5
VS-31 LONGHORN S-3B 700 RR4 4774	G			NZC 2G1 2 CQ NGU	3G1 2 CQ NGU								4 / 0
VAW-121 BLUETAIL E-2C 600 RR2 4772	H		NGU 1H1 2 CQ	2H1 2 CQ	3H1 2 CQ NGU								6 / 0
HS-15 RED LION SH60F/HH60H 610 RR5 4775	J	← 1 ALERT 30 SAR	1J1 1 PG/ASH/CQ (1) 1145						ALERT 30 SAR 1745	6J1 1 PG/CCA (2) 2015		1 ALERT 30 SAR →	1 / 2
VRC-40 RAWWHITE SH60F/HH60H 040 RR2 4772	X		NGU 1X1 2 CQ	2X1 2 CQ	3X1 2 CQ NGU								6 / 0
LOG HELO CH46/CH53 RR0	Y	NTU 0915 1 HH14 CH53 NGU	1 VIF HELO NGU UH-3 1100 NGU		NGU 1 VH-3XXX				1 VH-3XXX NGU				4 / 0
LAUNCH/LAND		2 / 0	4 / 4	6 / 6	0 / 1	0 / 0	2 / 2	0 / 5	6 / 0	0 / 4			24 / 5





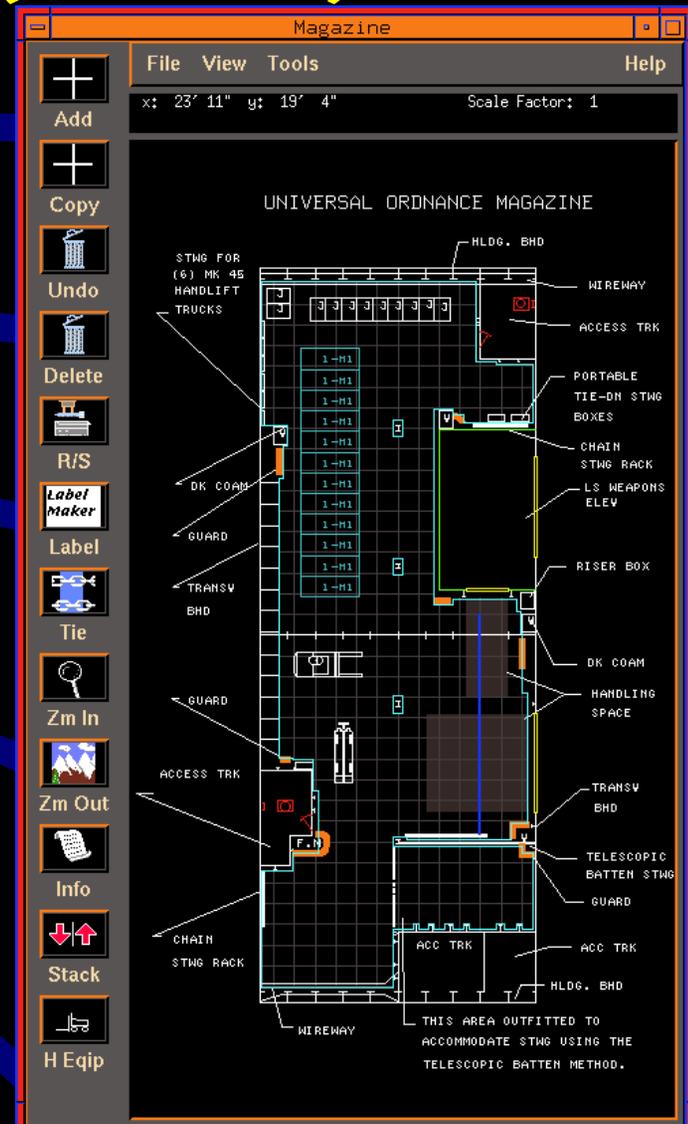
Aviation Weapons Information Management System

- **The AWIMS is a system designed to streamline the communication processes required to support weapons planning, movement, stowage, and status.**
 - **Data is managed through several different mediums between its source and the user (i.e.. Voice IC, digital, grease boards, paper, etc.) which contributes to data latency and errors, thus having a direct impact on ship mission capability and safety.**
 - **AWIMS avoids this creation/ recreation methodology of data handling by utilizing a systems approach to define data sources, their sinks (users), and a single fault tolerant medium to support the communication requirement.**
- **Capability to import/ export data to other tactical type systems aboard the ship in support of strike/ flight operations, thus providing a fully comprehensive/ integrated data information management capability.**



Magazine Arrangement Planning Aid (MAPA-C)

- As part of AWIMS systems in support of advanced mission planning and operations.
- Used by Weapons Department for ordnance movement and stowage aboard CV/CVN and LHD class ships.
- Built in Weapons compatibility checks based on NAVSEA OP 4
- Automatic container / FIUL stack height limitation (based on magazine grid height and forklift mast extension).
- On-Line Help system
- Built in arrangement checks.
- Choice of weapon entry by NALC or weapon selection menu
- Handling equipment, aircraft, and boat templates are available for magazine, hangar bay, and flight deck arrangements



ALRCS Description

- **Uses available sensor and control technologies to modernize launch and recovery control systems**
- **Improve launch and recovery processes**
 - **Automation (Launch / Recovery Parameters)**
 - **Enhance communication**
 - **Modernize human interface**
- **Provide condition based maintenance**
 - **Reduce required maintenance hours**
 - **Reach back maintenance capability**
 - **Embedded Training**



Arresting Gear IFLOLS Cross Check

Goals

- **Reduced Cost of Maintenance**
 - Reduce number of Individual Systems and Improved Maintainability
- **Improved Recovery Operations Safety**
 - Provide Air Boss / LSO with True Closed Loop Cross Check System
- **Reduce Workload in Primary**
 - Automate Cross Check System and Eliminate One Work Station in PriFly





VISUAL PROGRAM DESCRIPTION

- **Virtual Imaging Systems for Approach & Landing**
VISUAL
- **Integrated Electro-Optical Sensor & Display System**
- **Provide LSO/Ship's Company:**
 - **Enhanced Images of Approaching Aircraft**
 - **Critical Recovery Information**
 - **Track/Ident Aircraft Independent of Radars**
- **Provide the LSO with an Integrated Workstation**
- **Growth Potential for 2-Way Comm Link & HMD**
- **COTS/GOTS/NDI Hardware/Software/Firmware**





Automated Spotting Board / EATs

- **New system will be installed in Flight Deck Control and will support advanced planning, current ops picture, and training scenarios**
- **System will be comprised of sensor inputs (Embarked Aircraft Tracking System (EATS)), a main processor (EATS/ADMACS), large screen display (spotting board), and distribution system supporting external interfaces (ADMACS).**
- **Future P3I will include integration of ISIS, AWIMS, CASEE, and Aircraft Maintenance databases to present a more comprehensive situational picture on the large screen display.**
- **Lack of training for Aircraft Handler, Air Boss, and “Shooter” were identified as a priority at the last tow OAGsCV(N) OAG (February 98/99).**
- **Training is the number one priority for CV(N) OAG ESC.**





Aviation Maintenance Information Management

- **Interface with NALCOMIS / AMIDD.**
- **Combine Aircraft Operational Data with Aircraft Maintenance Data.**
- **Support EXCOMM Data Interface (fuel, maintenance, etc.)**
- **Link Squadron Maintenance WCs with Flight Deck Control (CAG MC) and Hangar Deck Control.**
- **Improve O-Level Maintenance Turn Around.**
- **Automate Data Entry, Log Requirements.**
- **Work from a single, distributed database .**
- **CASEE Model used for planning maintenance evolutions.**





New Digital Wind Measuring and Indicating System (NDWMIS)

Dynamic Interface Envelopes Integrated with Wind Display



Summary of Information

Planning

- **Ship's Air Plan / Load Plan**
- **Weapons Inventory/Stowage/Movement/Accounting**
- **ATO (Read)**

Flight Operations (Reference / Preparation)

- **Aircraft Launch and Recovery Bulletins**
- **ALRE Status/Information (incl Launch / Recovery Req'ts)**
- **Pre-Launch Brief (Divert Fields, L/R PIMs, NAVAIDS)**
- **Pilot Qualifications**
- **Aircraft Bingo Fuels (Distance, winds, ...)**
- **Communication Plan Information**
- **Alert Aircraft Status (Aircraft, mission, pilot, posture)**
- **Equipment status (radar, yellow gear, elevators, ...)**



Summary of Information

(cont.)

Flight Operations (Execution)

- Airborne Aircraft Status (Aircraft, pilot, mission, fuel (give), ATD, ATA, Traps, Bolters, Wave offs, T&G, ...)
- Aircraft Status (Deck) (incl. Location, gripes, weapons load, ...)
- Diverted Aircraft Status
- Divert Fields
- Wind Information (angled/straight/general)
- Aircraft approach parameters (speed, sink rate, line up, ...)
- Strike Control (CDC) (Call sign, Controller, Mode 4 status, ...)

Reports

- Daily Air Ops Summary
- Master Flight Log
- Pilot Summary



Development Approach

- **Fleet Project Teams provide support for:**
 - **User Community**
 - **Deficiencies of existing system**
 - **Characterize Space / Environment / Data Requirements**
 - **Approve Automation Features**
 - **Work with HSI Team on Workload / Manning / Training**
 - **Involvement throughout Development**
- **Mock Ups**
- **Ship Transition**
- **Working Groups / Fleet Initiatives / Trends**



IT-21 & Current Configuration

ISIS 1st Install Jan 1995 - CVN 73

2nd Install Jul 1998 - CVN 71

Current Configuration (for ISIS)

- **Utilization of shipboard fiber (Level 1 compliance)**
- **Use of TAC 4 equipment**
- **ATM Switches (Nortel)**
- **Unix based Servers, HP-UX OS**
- **Limited Function end stations**
- **Client Server Applications**

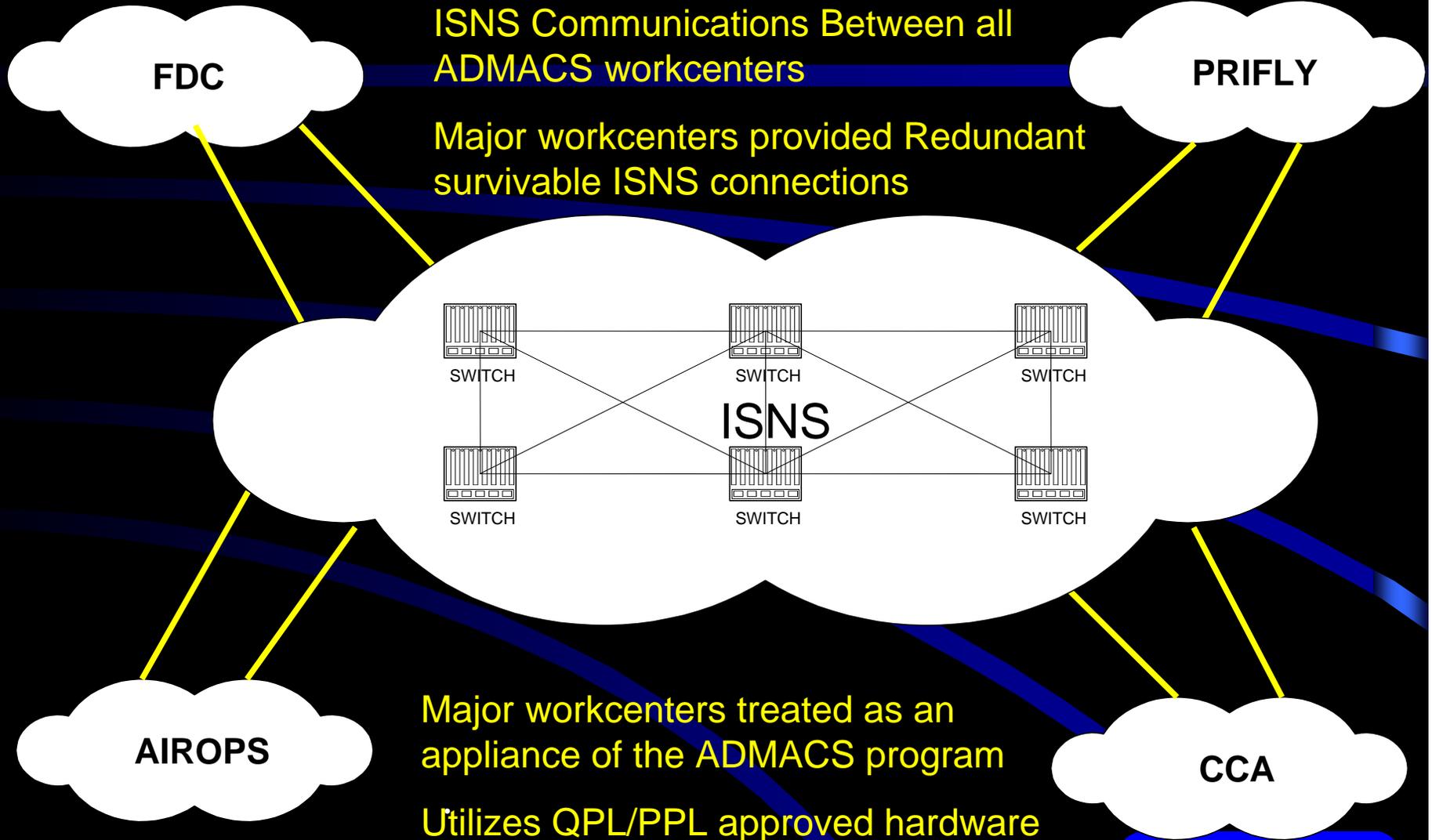


ADMACS - IT21 (ISNS) Efforts

- Began Investigating incorporation of IT21 network switch (Xylan)
- Feb 00: Began Network Integration discussions w/ ISNS team:
 - Gained concurrence on our IT-21 migration plan
 - Established working group between ADMACS-ISNS (1st meeting 18 Apr 2000) to integrate ADMACS into ISNS
- Following Execution Guidance Plan For ISNS Integration
 - Submitted NCR (NIN-OO-021) To SPAWAR: 3 Mar 00
- Established ADMACS & ISIS working group to analyze and define ADMACS IT21 level 3 solution
 - Convert Air Plan, SRR, non-mission critical functions to NT
- 4th Qtr FY03: Level 3 Compliance



IT-21 Level 3 Migration Plan Concept





Summary

- **ADMACS & ISIS is IT-21 Level 1 compliant**
- **Migrating to Level 2 / 3 compliance**
- **Working closely with SPAWAR (ISNS Program)**

