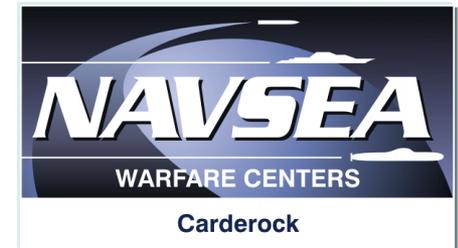


# OSCAM

## Introduction to the Operating & Support Cost Analysis Model



OSCAM Program Office  
Overview to DoNCAS  
8 September 2011





# What is OSCAM?

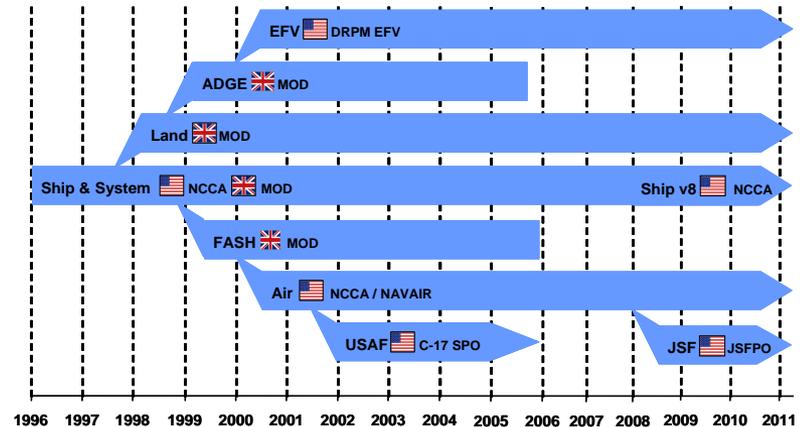


- **OSCAM – Operating and Support Cost Analysis Model**

- OSCAM is a jointly developed, NCCA sponsored, family of software tools used to help develop Operating and Support Cost Estimates that meet a wide range of requirements

- The US Suite of Models is comprised of:

- OSCAM Ship v8.0
- OSCAM Ship v7.0
- OSCAM Shipboard System v7.0
- OSCAM Air v3.0
- OSCAM EFV
- OSCAM USAF
- OSCAM JSF

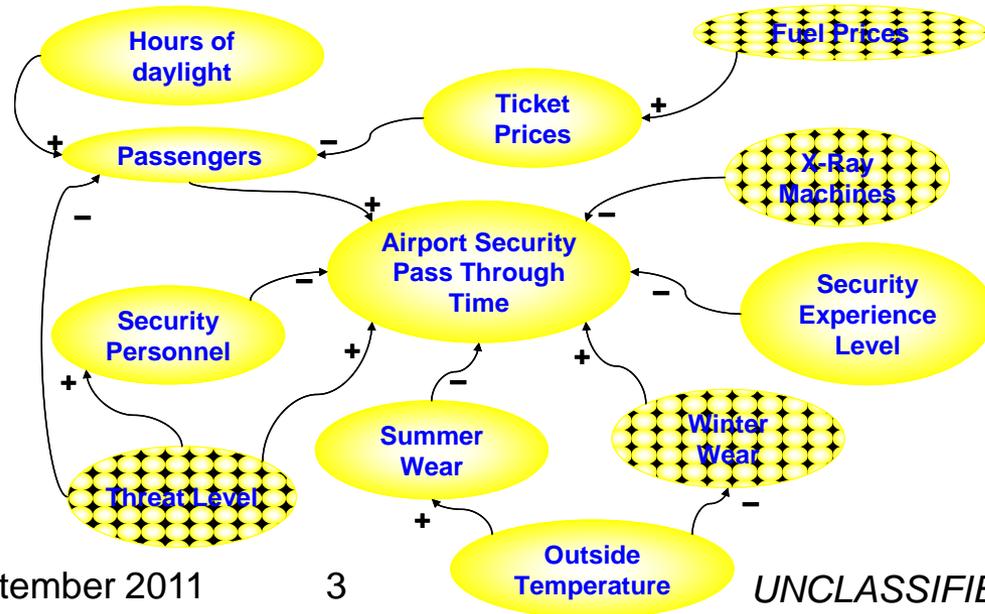


- OSCAM can be used to support life cycle cost estimates, what-if scenarios, trade-off studies, analysis of alternatives, budget drills and taskings related to platform O&S costs

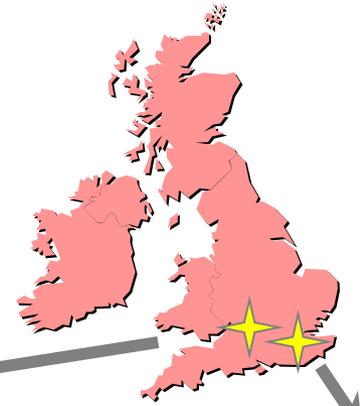
- The OSCAM models are built using System Dynamics

- System Dynamics theory models the relationships, behaviors, and influences of entities in the system being studied
- The OSCAM models use System Dynamics to model each month of the life cycle of the platform
- This provides a more powerful technique than traditional methods like Excel based models
- System Dynamics promotes an understanding of O&S processes, O&S costs, and the interdependencies that exist

*Example: How much time does it take a traveler to get through airport security?*



OSCAM was developed through a strategic partnership between the Naval Center for Cost Analysis (NCCA) and the UK Ministry of Defence (UK MoD) with support from QinetiQ Ltd.



**Ministry of Defence**  
***Bristol, United Kingdom***



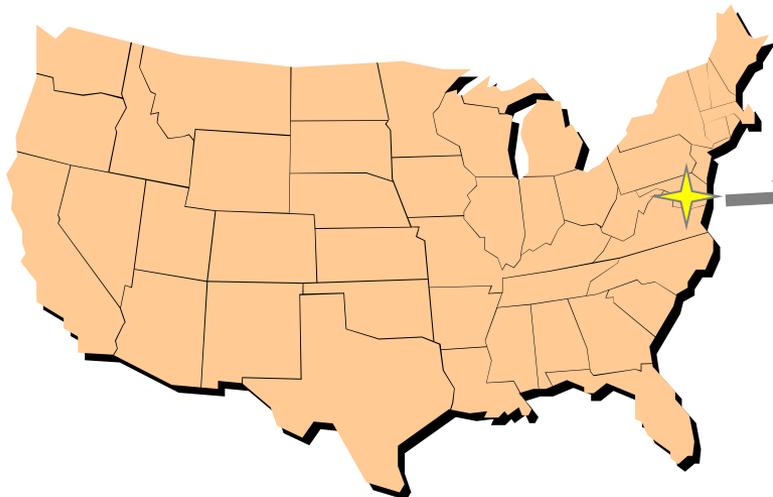
- OSCAM Program Management for UK

**QinetiQ Ltd**

***Farnborough, United Kingdom***



- OSCAM Software Development
- OSCAM Web Site Administration
- UK Help Desk



**Naval Center for Cost Analysis & Naval Surface Warfare Center, Carderock Division**

***Washington DC, United States of America***

- OSCAM Program Management for US
- US Help Desk





# How is OSCAM different?



- **OSCAM models are a time based simulation which makes it more powerful than Excel based models**
  - OSCAM can discretely model depot maintenance periods and account for aging, for example, because of the time based approach
- **Model openness**
  - OSCAM is not a black box model
  - OSCAM users have complete insight into the equations and relationships that are used via the built-in help functions and model structure document
  - The model facilitates understanding of O&S processes, O&S costs, and the interdependencies that exist
- **Historical databases**
  - VAMOS based historical datasets are provided with the OSCAM Ship, OSCAM Sys, and OSCAM Air models. Historical datasets are prepared for most platforms in the Naval VAMOS database
- **Supports a team approach**
  - OSCAM encourages a team approach; it can be used throughout the life cycle by logisticians, cost analysts, engineers, etc., because the results offer both cost and non-cost outputs



# OSCAM Family Common Features



- Simplified or detailed analysis for major cost elements
- Sensitivity and Uncertainty Analysis
- Throughput facility for additional costs or unique requirements
- Ability to compare multiple model runs
- Delta and Aggregation tools
- Automated tracking of data sources



# Additional Potential Model Uses



- **OPTEMPO**
  - OPTEMPO impact on Fuel Consumption
  - OPTEMPO impact on Maintenance Requirements
  - Aircraft Shortfall impact on OPTEMPO
  - Materially Available Vessel Day analysis
- **Aging**
  - Age Impact on Fuel Consumption
  - Age Impact on Maintenance Requirements
- **Maintenance**
  - Impact of Different Maintenance Philosophies
  - Maintenance impact on Personnel Utilization
  - Modernization impact on Aircraft Age and /or Organizational- and Intermediate-Level Maintenance
  - Training Requirements Impact on Maintenance / Availability
  - Overhaul Cycle Impacts on Depot Capacity
  - Overhaul Impacts on System Age
  - Overhaul Requirement Impacts on O / I-Level Maintenance
  - Crewing Level Impacts on Maintenance / Availability

- **OSCAM Ship v8.0**

- Appropriate for all types of ships, boats, and submarines, including nuclear
- Models up to 60 ships at a time
- Allows scheduling of deployments and explicit planning of depot maintenance cycles
- Results mapped to 2007 CAIG structure
- Expanded uncertainty analysis
- 3 level of detail for inputs
- Historical VAMOSC datasets provided for 98 ship classes



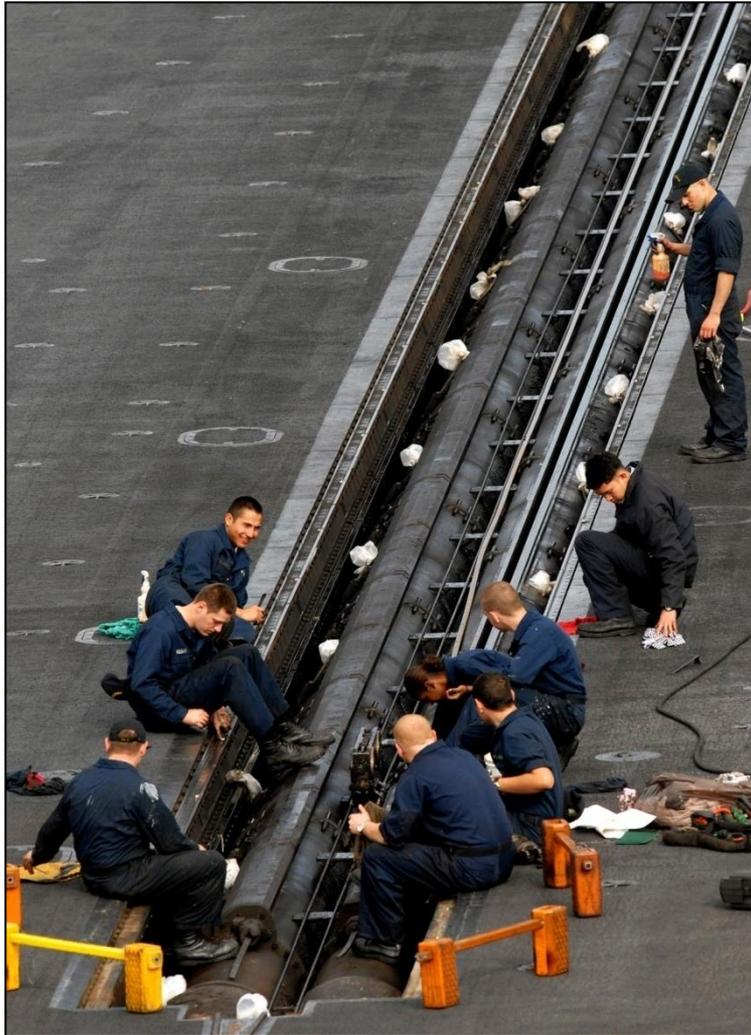
- In service platform
- For budgeting purposes, what are the expected O&S costs for the existing LHD 1 and LHA 1 classes for the remaining years of service life?

*All information and data in the scenario is fictitious and used for demonstration purposes only.*



- Parametric Costing Tool
  - Updated for Ship v8.0
  - Allows for ROM estimates very early in the design process
  - 4 required inputs: ship type, lightship displacement, propulsion type, cost of fuel (per barrel)
  - Uses CERs built from historical VAMOSOC data to project costs for most CAPE O&S cost elements
  - Allows CER values to be overwritten if better information is available





- OSCAM Sys v7.0
  - Developed with the UK MoD
  - Models a specific system that may exist on several ship platforms
  - Software, modernization, and ETS are modeled in greater detail than in the ship model
  - Historical datasets provided for 66 systems

- OSCAM Air v3.0
  - Appropriate for both fixed and rotary wing type/model/series (TMS) as well as UAV programs
  - Models deployed and non-deployed aircraft for Active, Reserve, FRS, and “Other” environments
  - Explicitly models squadron and maintenance personnel
  - Simplified and Detailed inputs in a single database structure
  - Historic databases are provided for 21 TMS



OSCAM Introduction to DoNCAS September 2011



- Data Management Tool
  - Each model has its own Data Management Tool
  - The DMT is a way to model maintenance data to the lowest level applicable
  - DMT is ideal for trade off studies and obsolescence drills
  - Ship and Sys DMTs build a tree structure based on Work Breakdown Structure (WBS); Air builds its tree structure based on Work Unit Code (WUC)
  - Datasets are not provided with the DMTs but assistance in building a DMT dataset is available
    - A dataset generator tool is available for the Air model



- PEO F/A-99 wants to upgrade its weapon control systems. The AN/ASQ-228(V)2 TARGET DESIGNATOR SET has been rendered obsolete and needs replacement. The Program Office has a COTS system, the AN/ASQ-3000, ready to be installed and wants to know how to adjust their operating budgets through the FYDP.
  - The AN/ASQ-3000 has an AVDLR \$/HR of 10/HR
  - The AN/ASQ-3000 has an Consumables \$/HR of \$0.25/HR
- The DMT provides a fast and easy way to evaluate this problem with a bottoms up approach.



*All information and data in the scenario is fictitious and used for demonstration purposes only.*

- **OSCAM EFV**
  - Bespoke model built by the USMC EFV program office
  - Based on the UK Land model
  
- **OSCAM USAF**
  - Built by the C-17 program office but made generic enough for all Air Force programs
  - Based on the Navy Air model
  
- **OSCAM JSF**
  - Currently in v1.0
  - For use by all 9 partner countries as a common O&S tool



*These models are not managed by NCCA but points of contact can be provided upon request.*



# User Support for Navy Models



- US Help Desk – supported by the OSCAM program office
- F1 Help functionality – displays the appropriate influence diagram for each input and/or output which allows the user to trace relationships and interdependencies
- Structure documents – contain the influence diagrams and are available for every model and DMT
- User Guides – provide direction on how to use the model, available for every model and DMT
- Automated Tutorials – “movies” to show how to use the models, available at [www.oscamtools.com](http://www.oscamtools.com)
- Historical dataset guide
  - explain how the datasets are developed and list data processing assumptions and methodologies



- Air
  - Joint Strike Fighter (JSF)
  - Navy Unmanned Combat Air System (N-UCAS)
  - E-2C/D Analysis in Industry
  - EA-18G NCCA Estimates
- Ship
  - Littoral Combat Ship (LCS) PLCCE and BCA
  - Joint High Speed Vessel (JHSV) – used by both the Navy and Contractor teams
  - DDG-1000 for Milestone Reviews
  - DDG 51 for Milestone Reviews and ongoing studies
  - Sea Based Strategic Deterrent (SBSD) AoA – Trident replacement program
  - Virginia Class Submarine (VCS) MS III PLCCE update



# Who has used OSCAM?



- **Ship**

- T-AKE cargo ship source selection – estimate was within 4% of CAIG estimate
- LHA Replacement program MS B PLCCE – estimate was within 6% of CAIG
- Maritime Pre-positioned Force (Future) (MPF(F)) – amphibious ship estimates
- CG(X) Analysis of Alternatives Study – new cruiser program
- Unmanned Naval Surface Combatant
- US Coast Guard Deepwater Program

- **Air**

- Vertical Takeoff Unmanned Aerial Vehicle (VT-UAV) MS C – both program office and ICE team used OSCAM



# OSCAM Demo v8.0/v3.0



- The OSCAM Demonstration Version is intended to raise interest in OSCAM by demonstrating some of its capabilities to potential users and to encourage interested analysts to:
  - Attend OSCAM training
  - Obtain OSCAM Full Version of Ship or Air
  - Learn more about OSCAM
- The OSCAM Demonstration Version has been simplified for untrained users through provision of a pre-loaded demonstration dataset. This dataset is not specific to any particular Ship Class or Type/Model/Series.
- Contact the OSCAM program office if you are interested in a copy.

***The Demonstration Version is not intended for actual program analysis.***



# OSCAM Training Courses



- Three day “hands-on” training courses
  - Includes OSCAM training, the model software, and all subsequent updates as well as access to the US Help Desk
  - **OSCAM Ship and Sys Training Courses**
    - To be held at the Admiral Gooding Center at the Washington Navy Yard
  - **OSCAM Air Training Courses**
    - To be held in Southern MD, near the PAX NAS
  - To register for a course and see the latest training schedule, please visit [www.oscamtools.com](http://www.oscamtools.com)

***The course fee has been waived for the upcoming training courses for government personnel and government sponsored contractors!***



## The OSCAM website is one-stop shopping for:

- Model downloads
- Dataset downloads
- Upcoming training course and conference dates
- Training registration
- Model Tutorials
- OSCAM POCs

**OSCAM** Operating and Support Cost Analysis Model

Home  
Products  
Downloads  
Training  
Help  
Feedback  
Learn More  
Contact Us

**OSCAM Air Training**  
June 2011  
M T W T F S S  
1 2 3 4 5  
6 7 8 9 10 11 12  
13 14 15 16 17 18 19  
20 21 22 23 24 25 26  
27 28 29 30  
14-16 June 2011  
Patuxent River, MD  
[More information](#)

**OSCAM Ship Training**  
March 2011  
M T W T F S S  
1 2 3 4 5 6  
7 8 9 10 11 12 13  
14 15 16 17 18 19 20  
21 22 23 24 25 26 27  
28 29 30 31  
29-31 Mar 2011  
Washington, DC  
[More information](#)

**OSCAM JSF Training**  
May 2011  
M T W T F S S  
1  
2 3 4 5 6 7 8  
9 10 11 12 13 14 15  
16 17 18 19 20 21 22  
23 24 25 26 27 28 29  
30 31  
May 2011 (TBC)  
Location TBC  
[More information](#)

**What Is OSCAM?**  
The Operating and Support Cost Analysis Model (OSCAM) began as a joint program, in 1996, between the US/UK aimed at developing a model that estimated the O&S costs of Ships and Shipboard Systems and captured the interdependencies that exist between the cost elements across the program. Using System Dynamics, OSCAM represents the business processes that drive costs and their relationships to management policies in order to assess the impact of technical, operational, and programmatic decisions on the cost and availability of these assets. Since the inception of OSCAM, there have been subsequent product developments that not only enhanced the Ship and Shipboard Systems model, but established new product lines encompassing both Land and Air Vehicles. To learn more about each specific OSCAM model type, please visit the [Products](#) section of the website.

**OSCAM Updates**



# Points of Contact



## OSCAM US Help Desk

OSCAM.NSWCCD@navy.mil

## QinetiQ Help Desk

oscam@qinetiq.com

### Related Web Sites

[www.oscamtools.com](http://www.oscamtools.com)

[www.ncca.navy.mil](http://www.ncca.navy.mil)

[www.vamosc.navy.mil](http://www.vamosc.navy.mil)

[www.qinetiq.com](http://www.qinetiq.com)



# ***BACKUP***



# OSCAM Air Front Screen



To run the model with the demo dataset, press the simulation button. When the Simulation Control Form appears, you simply press the Run button. After the model has run, the Results Screen will be displayed (see following slide).

To edit the demo dataset, press any of the input form icons. There are separate input forms for:

- Program Profile data
- Personnel data
- Operations data
- Maintenance data
- Training data
- Indirect Support data
- Other data
- Throughput Cost data

**Simulation Control Tool Bar**

Simulation Duration (Years): 40

Current Year: 40

Warp Speed Option

**READY**

Progress: 0%

Powersim Model: AIR\_V3

**OSCAM Air**  
**Demonstration Version**



# OSCAM Air Example Input Screen



OSCAM Air - [Personnel Data Input Form]

File Window Tools Help

Record **Demo Data** Open Save Run Results Profile Personnel Ops Maint Training Indirect Other Thru/put Details Base Year 2007

Personnel Data Input Form

In the input forms, any data field can be edited. By default, the data source is the record name "Demo Data." When a field is modified, the record name is highlighted in red and the data source changes to "User." This is one of OSCAM's audit trail features. New in v3.0 is the ability to set the data source to whatever the user chooses. The example here shows J. Smith.

The Online Help facility can be accessed by pressing the "F1" key when the cursor is in any input cell. This brings up a window that depicts how that input is used within the model.

PS51. Pilot Turnover (%)

PS53. NFO Turnover (%)

PS55. Enlisted Aircrew Turnover (%)  Demo Data

**Maintenance Personnel**

PS56. Officers (Pers/Sqn)  Demo Data

PS57. Enlisted (Pers/Sqn)  User

PS60. SEAOPDET (Pers/Sqn)  Demo Data

i)  J. Smith

n)  Demo Data

As well as its short description, each input field has a long description that provides more information. It is displayed at the bottom of the screen by hovering the mouse over the input field.

OSCAM (Air)

Interactive Help

**User Inputs**

- Mission Personnel (Full-Time)
- Mission Personnel (Part-Time)
- Mission Personnel Salary (Full-Time)
- Mission Personnel Salary (Part-Time)
- Mission Personnel Turnover (Part-Time)
- Support Personnel (Full-Time)
- Support Personnel (Part-Time)
- Support Personnel Salary (Full-Time)
- Support Personnel Salary (Part-Time)
- Maintenance Personnel (Full-Time)
- Maintenance Personnel (Part-Time)
- Maintenance Personnel Salary (Full-Time)
- Maintenance Personnel Salary (Part-Time)
- Maintenance Personnel Turnover (Full-Time)
- Maintenance Personnel Turnover (Part-Time)

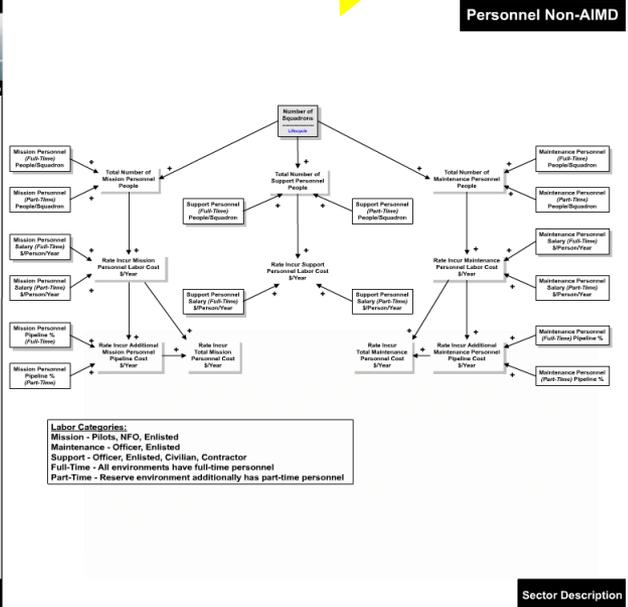
**Variables from Other Sectors**

- Number of Squadrons

**Outputs**

- Total Mission Personnel Cost
- Total Support Personnel Cost
- Total O-Level Maintenance Personnel Cost

Close Window Key Help



The number of Support Officers required per squadron. Historical datasets use VAMOSOC Personnel Universe data for a representative squadron.



# OSCAM Air Example Results Screen



OSCAM Air - [Results Display Form]

File Window Tools Help

Record **Demo Data** Open Save Run Results Profile Personnel Ops Maint

Headings	Totals	1998	1999
01 Quantity of Systems in Service (Systems)	N/A	0	40
* Total Operational and Support Costs + Throughput Costs (\$M)	21,702.704	0.000	128.204
02 Total Operational and Support Costs (\$M)	21,702.704	0.000	128.204
03 Total Personnel Cost (\$M)	7,624.769	0.000	39.888
70 Unit-Level Consumption Cost (\$M)	6,019.750	0.000	37.161
71 Fuel Cost (\$M)	2,002.741	0.000	5.425
72 Consumable/Repair Parts Cost (\$M)	2,277.645	0.000	12.323
79 Unscheduled Depot Maintenance Cost (\$M)	2,016.386	0.000	15.501
80 Aircraft Unscheduled Maintenance Cost (\$M)	2,016.386	0.000	15.501
81 AVDLR (\$M)	2,016.386	0.000	15.501
82 False Removal (\$M)	0.000	0.000	0.000
83 Engine Unscheduled Maintenance Cost (\$M)	0.000	0.000	0.000
86 Ordnance Cost (\$M)	716.243	0.000	3.875
87 Temporary Duty Cost (\$M)	6.752	0.000	0.035
88 Intermediate Maintenance Cost (\$M)	347.566	0.000	1.818
106 Total PDM/Overhaul Cost (\$M)	1,202.801	0.000	6.496

Demo Data Run 1 Demo Data Run 2 Demo Data Run 3

Graph Series Format:  Annual  Cumulative  Show Markers

Total Operational and Support Costs

\$M

Year Ending

Legend: Demo Data Run 1, Demo Data Run 2, Demo Data Run 3

Model results are displayed in both tabular and graphical format. The results table can be expanded and collapsed by clicking the "+" and "-" boxes. Any data line can be displayed in the graph by double-clicking on that line.

Up to 20 result sets can be displayed in the table and graph.

The results can be displayed annually or cumulatively.



# OSCAM Air DMT Input Example



OSCAM Air DMT - [Breakdown Structure Form]

File Window Settings Tools Help

Record **New** Base Year 2007 WBS **Demo DMT Data** Base Year 2007

Profile Personnel Ops Maint Training Indirect Other Thru/put WBS Form Set To DMT Transfer Details

**Breakdown Structure Form**

Study Aircraft Structure Reference Aircraft Structure

- Aircraft
  - Airframe
  - Power Plant Installation
  - Avionics
  - Systems
    - Aux Power Unit
    - Lighting
    - Hydraulics
    - Fuel System
      - Fuel Tank
      - Engine Fuel Supply System
        - Boost Pump**

Simplified Data Events:  MTBR  Action Rate

Data Input Graphical Display

Element Name Engine Part

**Boost Pump**

WUC Quantity

A2 40 2 1 0 1

Element Description

	Aircraft	Engine
MTBR	0	33,333.3
Action Rate/1000 Hrs	0	0.03000
<b>At O-Level</b>		
% Repair at O-Level	0.00	80.00
% Refer to I-Level	0.00	20.00
% To Depot Repair/Replace	0.00	0.00
% False Removal	100.00	0.00
<b>At I-Level</b>		
% Repair at I-Level	0.00	80.00
% To Depot Repair/Replace	0.00	20.00
% False Removal	100.00	0.00

Unscheduled Actions Costs and Labor

The breakdown structure is defined by the user.

Unscheduled maintenance data is entered for components at the lowest level. The DMT then aggregates this data to the aircraft level, where it can be exported to OSCAM for further analysis. Data is entered separately for Aircraft and Engine parts.



# OSCAM Air DMT Output Example



OSCAM Air DMT - [Breakdown Structure Form]

File Window Settings Tools Help

Record **New** Base Year 2007 WBS

Profile Personnel Ops Maint Training Indirect Other Thru'put

**Breakdown Structure Form**

Simplified Data Events:  MTBR  Action Rate

Data Input **Graphical Display**

**Actions (/1000 Hrs)**  
 O-Level Repairs (/1000 Hrs)  
 I-Level Repairs (/1000 Hrs)  
 Depot Repairs (/1000 Hrs)  
 False removals (/1000 Hrs)

Average Cost (\$/Action)  
 O-Level Consumables (\$/Action)  
 I-Level Consumables (\$/Action)  
 Depot Repair (\$/Action)  
 False Removal (\$/Action)

**Sub-Systems of The "Aircraft"**

Sub-System	Color	Value (Approx.)
Airframe	Red	0.09
Power Plant Installation	Green	0.16
Avionics	Red	0.175
Systems	Red (Bottom)	0.095
Systems	Green (Top)	0.075

While the primary function of the DMT is to create OSCAM datasets, it is also an analysis tool. In this example, the user can identify the major maintenance drivers within the "Aircraft" element. This view shows a comparison of Actions/1,000 Flying Hours:

- Green denotes Actions due to Engine parts;
- Red denotes Actions due to Aircraft parts.



# OSCAM Ship Front Screen



The screenshot shows the OSCAM Ship software interface. At the top is a menu bar with 'File', 'Window', 'Tools', and 'Help'. Below it is a toolbar with various icons. A yellow box highlights the 'Simulation' button on the left and a group of input form icons (Profile, Operations, Personnel, Training, O/I Maint, Depot, Indirect, Other, Thru'put, Details) on the right. A yellow callout box points to the 'Simulation' button with the text: 'To run the model with the demo dataset, press the simulation button. When the Simulation Control Form appears, you simply press the Run button. After the model has run, the Results Screen will be displayed (see following slide)'. Another yellow callout box points to the input form icons with the text: 'To edit the demo dataset, press any of the input form icons. There are separate input forms for:'. Below the main window, a 'Simulation Control Form' dialog box is open. It contains a 'Simulation Duration (Yrs)' field with the value '37', an 'Auto' checkbox, a 'Warp Speed' checkbox, and a 'Run' button (represented by a play icon) which is highlighted by a yellow box. A 'READY' button and a 'Progress' indicator showing '0%' are also visible. At the bottom of the dialog, it says 'PowerSim Model : SHIP\_V8'.



# OSCAM Ship Profile Sector



OSCAM Ship - [Program Profile Input Form]

File Window Tools Help

Record **demo data for demo disk** Cost Year **2009**

Simulation Results Undo Redo **Profile** Operations Personnel Training

**Program Profile Input Form**

Introduction & Disposal Operational Profile

**Availability Templates**

1: DMP 2: DSRA 3: SRA 4: 0 5: 0 6: 0 7: 0 8: 0 9: 0 Deployment

**Operational Profile**

Scheduled Availabilities **Detailed** Deployment Option **Enabled**

Percentage of Ship Life in Availabilities 9.05 %

Percentage of Ship Life Deployed 21.43 %

Percentage of Ship Life Non-Deployed 69.52 %

**Operational Profile Validity**

Profile has Errors

Profile has Warnings

Profile is OK

The Operational Profile allows for scheduling of planned depot maintenance and deployment periods.

The "stoplight" lets a user know if there are problems with the operational profile that will stop the simulation from running. Error messages will appear in the white box.



# OSCAM Ship Operations



**OSCAM Ship - [Operations Input Form]**

Record  Cost Year

Simulation Results Undo Redo Profile **Operation** Personnel Training O&I Maint Depot Indirect Other Thru'put Details

**Operations Input Form**

Fuel | Other

**Fuel Costs**

OP1. Direct Fuel Cost (\$K/Bbl)

OP2. Indirect Fuel Cost (\$K/Bbl)

Underway Option  Deployment Option

**Fuel Use - Underway Option**

OP. Age Impact on Fuel Use Underway

OP4. % of IFT Steaming Underway (%)  Demo Data

OP7. Fuel Use Underway (Bbl/Hr)  Demo Data

Speed Category	% of IFT at Speed (%)	Fuel Use at Speed (Bbl/Hr)
1	0.00	0.00
2	0.00	0.00
3	0.00	0.00
4	0.00	0.00
5	0.00	0.00

OP5. % of IFT Steaming Hot Underway (%)  Demo Data

OP8. Fuel Use Steaming Hot UWay (Bbl/Hr)  Demo Data

OP6. % of IFT Cold Iron (%)  Calculated

The Operations data can be entered in Deployment mode (which allows the scheduling of deployment periods) or underway mode. When in underway mode, a speed-state-time profile can be entered as detailed data that will determine the fuel usage of the ship. The detailed inputs are "turned on" through the use of the checkbox.



# OSCAM Ship Personnel



**OSCAM Ship - [Personnel Input Form]**

File Window Tools Help

Record **demo data for demo disk** Cost Year **2009**

Simulation Results Undo Redo Profile Operations **Personnel** Training OI Maint Depot Indirect Other Thru'put Details

**Personnel Input Form**

Crew  Other Unit Level Personnel

**General Crew Data**

PS1. No. of Crews per Ship (Crews/Ship)  Demo Data PS2. Temp Additional Duty (\$K/Psn/Yr)  Demo Data

**Manning**

PS3. Officer Crew (Psn/Crew)  Table Calculation PS9. Avg Officer Pay (\$K/Psn/Mth)  Demo Data

PS4. WO Crew (Psn/Crew)  Demo Data

PS5. Enlisted Crew (Psn/Crew)  Table Calculation

PS6. Civ Cl. 1 Crew (Psn/Crew)  Demo Data

PS7. Civ Cl. 2 Crew (Psn/Crew)  Demo Data PS13. Avg Civ Cl. 2 Pay (\$K/Psn/Mth)  Demo Data

PS8. Other Crew (Psn/Crew)  Demo Data PS14. Avg Other Pay (\$K/Psn/Mth)  Demo Data

Officer Grades	Number Psn/Crew	Crew Pay \$K/Psn/Mth
O-10	0.00	0.000
O-9	0.00	0.000
O-8	0.00	0.000
O-7	0.00	0.000
O-6	1.00	10.000

Warrant Officer Grades	Number Psn/Crew	Crew Pay \$K/Psn/Mth
W-5	0.00	0.000
W-4	0.00	0.000
W-3	0.00	0.000
W-2	0.00	0.000
W-1	0.00	0.000

Enlisted Grades	Number Psn/Crew	Crew Pay \$K/Psn/Mth
E-9	10.00	8.000
E-8	10.00	7.500
E-7	25.00	7.000
E-6	30.00	6.500
E-5	75.00	6.000

Civ Mariner Cl. 1 Grades	Number Psn/Crew	Crew Pay \$K/Psn/Mth
CivMar Pay 1	0.00	0.000
CivMar Pay 2	0.00	0.000
CivMar Pay 3	0.00	0.000
CivMar Pay 4	0.00	0.000
CivMar Pay 5	0.00	0.000

Civ Mariner Cl. 2 Grades	Number Psn/Crew	Crew Pay \$K/Psn/Mth
CivMar Pay 1	0.00	0.000
CivMar Pay 2	0.00	0.000
CivMar Pay 3	0.00	0.000
CivMar Pay 4	0.00	0.000
CivMar Pay 5	0.00	0.000

Other Crew Grades	Number Psn/Crew	Crew Pay \$K/Psn/Mth
Other Pay 1	0.00	0.000
Other Pay 2	0.00	0.000
Other Pay 3	0.00	0.000
Other Pay 4	0.00	0.000
Other Pay 5	0.00	0.000

Personnel data inputs include number of crews per ship and tables that allow input by rank/rate as well as additional crew like Civilian Mariners or contractors. The tables are accessed through the checkbox.



# OSCAM Ship O/I Maintenance



**OSCAM Ship - [O/I Maintenance Input Form]**

File Window Tools Help

Record **demo data for demo disk** Cost Year **2009**

Simulation Results Undo Redo Profile Operations Personnel Training **O/I Maint** Depot Indirect Other Thru/put Details

**O/I Maintenance Input Form**

O-Level Maintenance | **I-Level Maintenance** | O/I Level Factors

**Organizational Level (OL) Contractor Support**

MT1. OL Contractor Support (\$K/Ship/Yr) **0.000** Demo Data

**Organizational Level (OL) Maintenance - Simplified**

MT2. OL Ann Cost (\$K/Ship/Yr) **21,000.000** Demo Data

MT3. OL Cost IFT (\$K/Mth IFT) **0.000** Demo Data

MT4. OL Cost UWay (\$K/Hr UWay) **0.000** Demo Data

Maintenance Actions | Alterations

**Organizational Level (OL) Maintenance Actions - Detailed**

MT5. OL Maint Ann Actions (Act/Ship/Yr) **5,000.00** Demo Data

MT6. OL Maint IFT Actions (Act/Mth IFT) **0.00** Demo Data

MT7. OL Maint UWay Actions (Act/Hr UWay) **0.00** Demo Data

MT8. OL Maint Labor Effort (PnHrs/Act) **25.00** Demo Data

MT10. OL Maint Repair Parts (Parts/Act) **8.0000** Demo Data

MT11. OL Maint Exchanges (Parts/Act) **0.0100** Demo Data

MT12. OL Maint Issues (Parts/Act) **0.2500** Demo Data

O and I level maintenance are combined into a single sector. The different levels are accessed through tabs.

Detailed level inputs exist for O and I level, but simplified inputs are also available. These allow a user to define O and I level maintenance in terms of any combination of the following:

- \$K/ship/year
- \$K/month in fleet time
- \$K/hour underway.

These inputs increase the flexibility of the model. It is possible to use simplified inputs on the O level and detailed inputs on I level (or vice versa).



# OSCAM Ship Depot



**OSCAM Ship - [Depot Maintenance Input Form]**

File Window Tools Help

Record **demo data for demo disk** Cost Year **2009**

Simulation Results Undo Redo Profile Operations Personnel Training OI Maint **Depot** Indirect Other Thru/put Details

**Depot Maintenance Input Form**

Unscheduled Scheduled Continuous Other

Simplified Copy Existing Availability

Type1: DMP Type2: DSRA Type3: SRA Type4: 0 Type5: 0 Type6: 0 Type7: 0 Type8: 0 Type9: 0

Availability Name **DMP**  Government  Contractor  Mixed **DM11. Type 1 Duration (Mths/Av)**  **Demo Data**

Government Impacts

**Type 1 Government Availability Costs - Moderate Detail**

**DM12. Type 1 Gov Mod Cost (\$K/Av)**  **Demo Data** **DM14. Type 1 Gov Repair Cost (\$K/Av)**  **Demo Data**

**DM13. Type 1 Gov Refuel Cost (\$K/Av)**  **Demo Data**

**Type 1 Government Availability Costs - Detailed**

**DM15. Type 1 Gov Design & Plan (\$K/Av)**  **Demo Data**  Use Age Impact on Parts Cost Factor

**DM16. Type 1 Gov Mod Effort (PnMth/Av)**  **Demo Data**

**DM17. Type 1 Gov Mod Labor (\$K/PnMth)**  **Demo Data**

**DM20. Type 1 Gov Refuel Effort (PnMth/Av)**  **Demo Data**

**DM21. Type 1 Gov Refuel Labor (\$K/PnMth)**  **Demo Data**

**DM24. Type 1 Gov Repair Effort (PnMth/Av)**  **Demo Data**

**DM25. Type 1 Gov Repair Labor (\$K/PnMth)**  **Demo Data**

The capabilities of depot maintenance contain 3 levels of detail. Simplified calculates depot \$K/ship/year and is accessed through the checkbox. Moderate level allows scheduling of depot events on the program profile but requires less detailed cost information. Detailed level is the lowest level of depot data available. Detailed level allows specification of government and/or contractor depot costs.



# OSCAM Ship Indirects



**OSCAM Ship - [Indirect Input Form]**

File Window Tools Help

Record **demo data for demo disk** Cost Year **2009**

Simulation Results Undo Redo Profile Operations Personnel Training OI Maint Depot **Indirect** Other Thru/put Details

**Indirect Input Form**

**Installation Support Costs**

III1. Installation Support Cost (\$K/Class/Yr)  Demo Data

III2. Installation Support Cost (\$K/Ship/Yr)  Demo Data

III3. Installation Support Cost (\$K/Psn/Yr)  Demo Data

**III. Installation Support Costs Profiles (\$K/Class/Yr)**

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
<b>Total Annual Cost</b>	<b>0.000</b>											

Right-click on a row to change the description

**Indirect Personnel Costs**

III4. Indirect Personnel Cost (\$K/Class/Yr)  Demo Data

III5. Indirect Personnel Cost (\$K/Ship/Yr)  Demo Data

**III. Indirect Personnel Cost Profiles (\$K/Class/Yr)**

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
health care contributi	100.000	100.000	100.000	100.000	100.000	100.000	95.000	95.000	95.000	95.000	90.000	90.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
<b>Total Annual Cost</b>	<b>100.000</b>	<b>100.000</b>	<b>100.000</b>	<b>100.000</b>	<b>100.000</b>	<b>100.000</b>	<b>95.000</b>	<b>95.000</b>	<b>95.000</b>	<b>95.000</b>	<b>90.000</b>	<b>90.000</b>

Right-click on a row to change the description

Table style exist in several areas. These allow for cost profiles to be entered for costs that may vary by year.



# OSCAM Ship Throughputs



**OSCAM Ship - [Throughput Cost Data Form]**

File Window Tools Help

Record **demo data for demo disk** Cost Year **2009**

Simulation Results Undo Redo Profile Operations Personnel Training OI Maint Depot Indirect Other **Thru'put** Details

**Throughput Cost Data Form**

Description of Throughput Item	Fixed Cost per Class per Year (\$K/Class/Year)	Fixed Cost per Ship per Year (\$K/Ship/Yr)	Cost at 1st In-Service Date (\$K)	Cost at each Ship In-Service Date (\$K/Ship)	Appropriation Category
Item 1: missile load out cost	0.000	0.000	0.000	10,000.000	WPN
Item 2:	0.000	0.000	0.000	0.000	<None>
Item 3:	0.000	0.000	0.000	0.000	<None>
Item 4:	0.000	0.000	0.000	0.000	<None>
Item 5:	0.000	0.000	0.000	0.000	<None>
<b>Totals (\$K)</b>		<b>0.000</b>			

**Annual Throughput**

	2011	2012	2013	2014					
	0.000	0.000	0.000	0.000					
	0.000	0.000	0.000	0.000					
	0.000	0.000	0.000	0.000					
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
<b>Total (\$K)</b>	<b>0.000</b>								

NOTE: Titles for Annual Throughput Costs can be changed via the pop-up menu (right mouse click within the grid to activate)

Throughput costs allow for the choice of appropriation. This means that throughput costs can be escalated when the cost base year is changed or a results set is converted to Then Year \$. The choices reflect current NCCA inflation guidance.



# OSCAM Ship Uncertainty Tool



OSCAM Ship

File Window Tools Help

Record demo data for den

Uncertainty - Data Selection Form

Simulation Results

**Primary Data Inputs:**

- Program Profile
  - Operations
    - Fuel
    - Other
      - General Stores / Supplies and Publications
      - Purchased Services
        - OP22. Purchased Services Cost (\$K/Ship/Yr)
        - OP23. Purchased Serv Not UWay (\$K/Hr)
    - Ordnance
  - Personnel
  - Training
  - O/I Maintenance
  - Depot Maintenance
  - Indirect
  - Other

An input can be selected or de-selected by checking the box associated with that input

**Selected Inputs for Uncertainty Analysis:**

ITEM NAME	CURRENT	DISTRIBUTION
OP22. Purchased Services Cost (\$K/Ship...	1000	Triangular(Min=900,ML=1000,Max=1100)
OP23. Purchased Serv Not UWay (\$K/Hr)	0	Triangular(Min=0,ML=0,Max=0)

**Set Sampling Distribution**

Probability Distribution Definition

Parameters Graph

Input: OP23. Purchased Serv Not UWay (\$K/Hr)

Value: 0

Bounds: Input Min = 0 Input Max = 1000000000000

Distribution: Triangular

- Triangular
- TriGen
- Normal
- BndNormal
- Uniform
- Beta
- LogNormal
- Gamma
- Weibull
- Extreme
- NegExp

Help OK Cancel

Replications 15

READY

Include Throughput Costs

Progress 0%

The Uncertainty tool allows the user to choose from 11 different probability distributions.



# OSCAM Ship DMT



OSCAM Ship DMT - [Work Breakdown Structure Form]

File Window Tools Help

Record **New** Cost Year **2009** WBS **Demo Ship WBS** Cost Year **2007**

Undo Redo Profile Operations Personnel Training Oil Maint Depot Indirect Other Thru/put WBS Transfer Details

**Work Breakdown Structure Form**

Number of Nodes in WBS **2563** Number of Selected Systems on Platform **1**

Study Ship Structure Reference Ship Structure

- New Ship (Q: 1)
  - ADMINISTRATION HABITABILITY, OUTFIT/FURNISHINGS (Q: 3)
    - FITTINGS, HULL (Q: 2)
      - FITTINGS, STRUCTURAL (Q: 3)
      - FITTINGS, SAFETY AND GUARD (Q: 1)
        - STANCHIONS AND BRACES, LIFE LINE (Q: 1)
        - LIFELINES (Q: 2)
        - NETS, FLIGHT DECK SAFETY (Q: 2)
        - RAILINGS, PIPE (Q: 3)
        - TUBES, STUFFING (Q: 3)
        - BOXES, STOWAGE (Q: 2)
      - PROTECTION SYSTEM, CATHODIC (PASSIVE) (Q: 1)
      - PLATFORMS (Q: 2)
      - FITTINGS, MISCELLANEOUS (Q: 2)
      - GREASING AND LUBRICATION, OIL (Q: 2)
      - PROTECTION SYSTEM, CATHODIC (ACTIVE) (Q: 2)
      - WORKSHOP, LABORATORY AND TEST FACILITIES (Q: 2)
      - INSTALLATION (Q: 1)
      - SYSTEM, MAIN-STEAM, CONDENSERS (Q: 2)

Actions:  Per Year  Per Mth IFT  Per SHU

Data Input Graphical Display

Element Name	
New Ship	
Quantity	Part Code
1	
Element Description	
None Yet	

**Organizational Level Maintenance**

OL Maint Ann Actions (Act/Ship/Year)	58,539.48
OL Maint IFT Actions (Act/Mth IFT)	0.00
OL Maint UWay Actions (Act/Hr UWay)	0.00
OL Maint Labor Effort (PnHrs/Act)	0.99
OL Maint Consumables (\$K/Act)	1.024
OL Maint Repair Parts (Parts/Act)	0.9738
OL Maint Exchanges (Parts/Act)	1.0336
OL Maint Issues (Parts/Act)	0.9911
OL Maint Repair Part Cost (\$K/Part)	0.986
OL Maint Exchange Cost (\$K/Part)	1.010
OL Maint Issue Cost (\$K/Part)	1.021

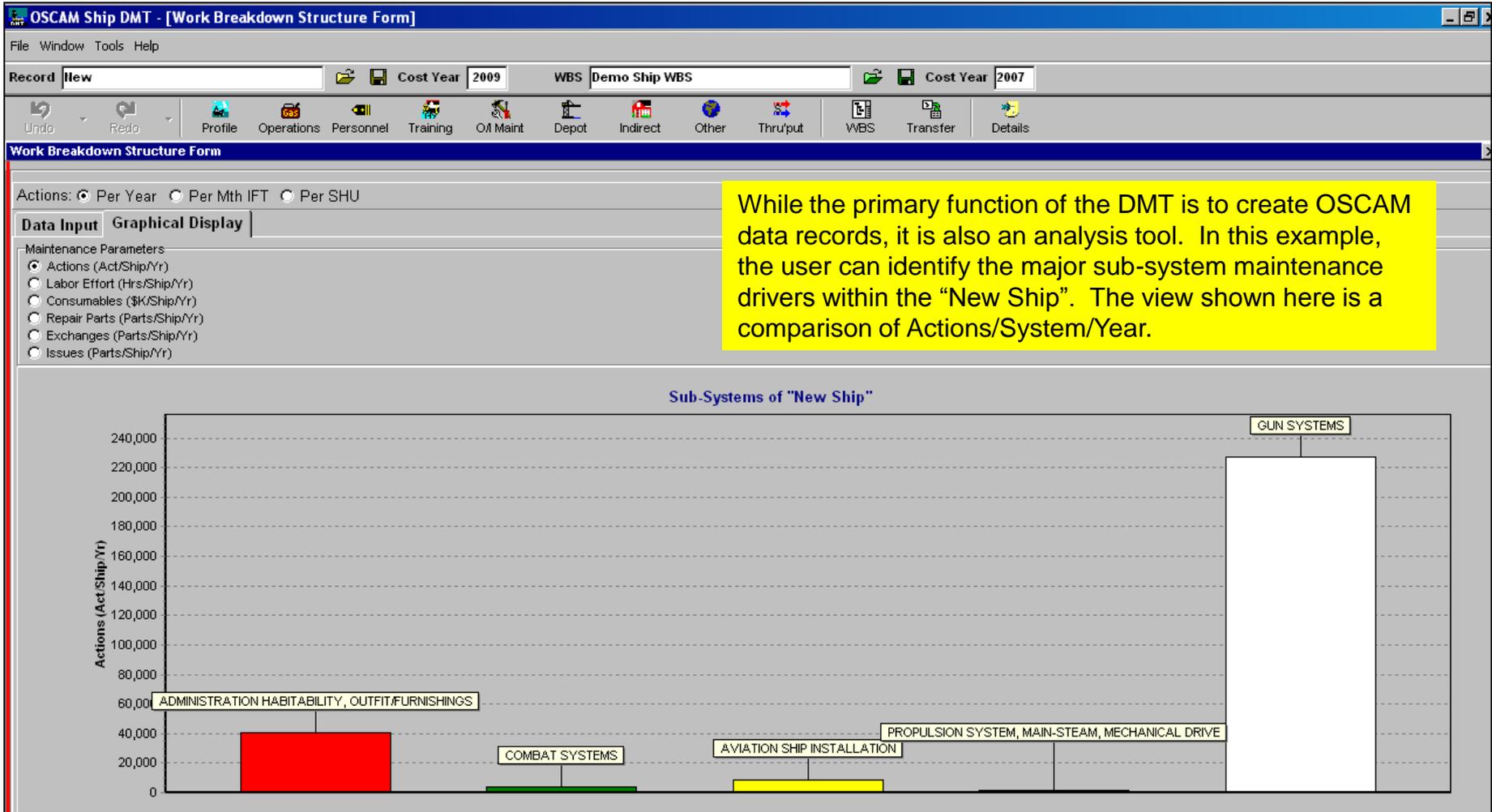
OL Maint OL ARs IL Maint IL ARs Conu Supt

The breakdown structure is defined by the user. Sample structures might be ESWBS or EIC.

Maintenance data is entered for components at the lowest level. The DMT then aggregates this data to the ship level, where it can be exported to OSCAM for further analysis.

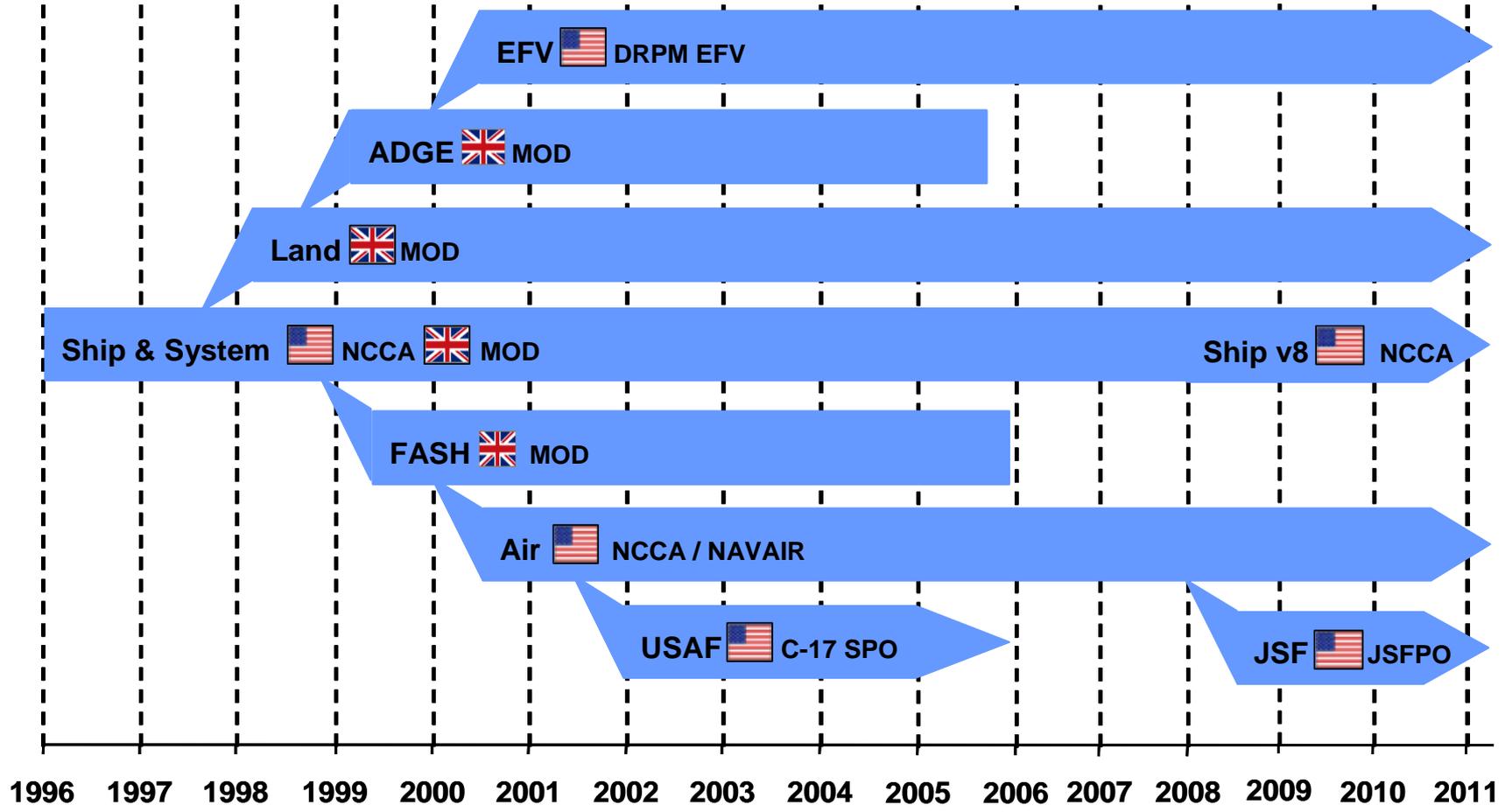


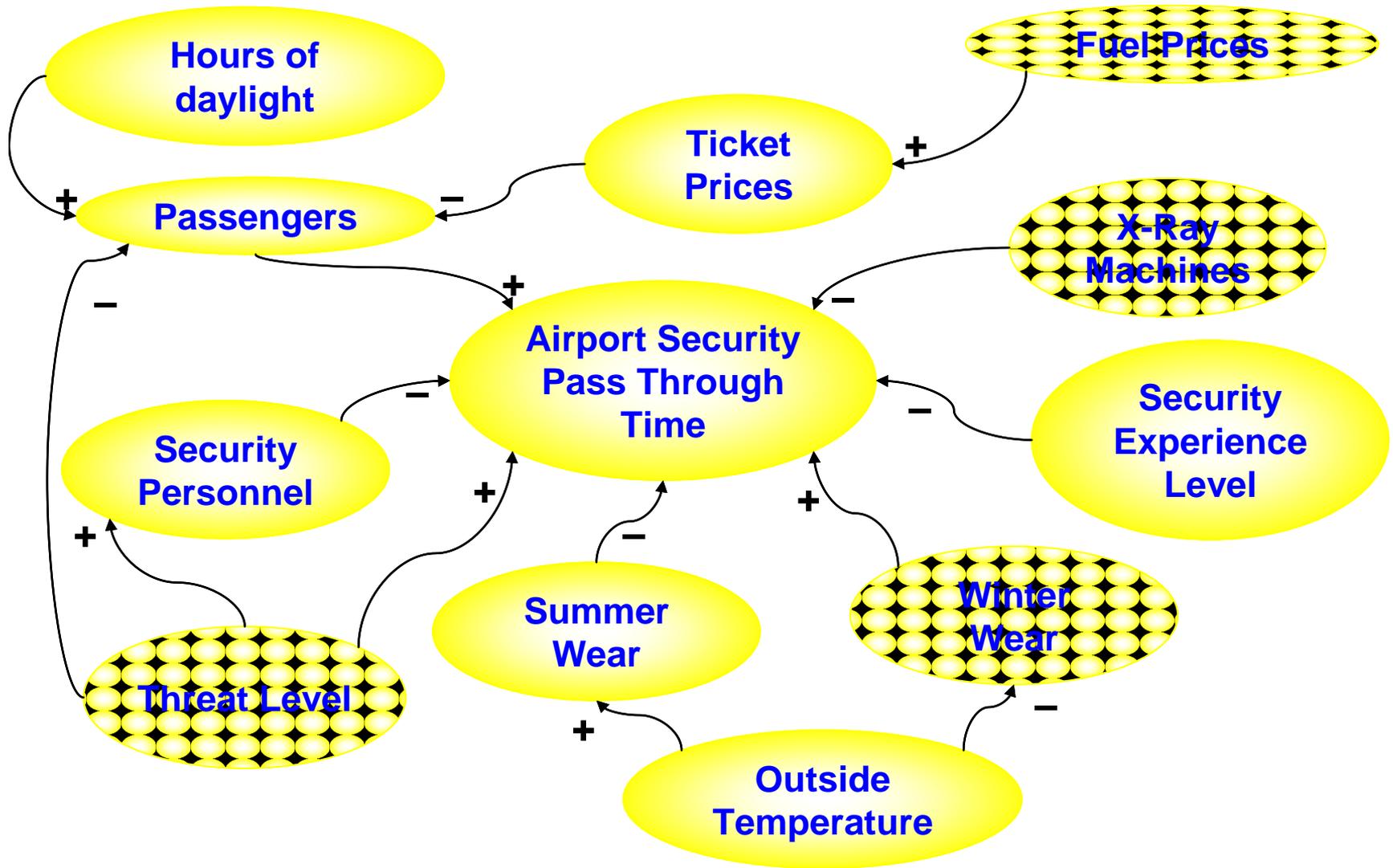
# OSCAM Ship DMT





# OSCAM Family of Models





- Updated platform
- All CIWS systems will undergo a major upgrade in the 10<sup>th</sup> year of service.
  - It will take 5 years to complete all the upgrades
  - 100K SLOC is estimated to be added by the upgrade
  - The upgrade will reduce the effective age of the system by half
  - Estimated cost will not exceed 25% of the original procurement cost
  - After the upgrade the system will require 10% less maintainers
- What are the expected O&S costs for the platform with this anticipated upgrade?

*All information and data in the scenario is fictitious and used for demonstration purposes only.*

- **New platform**
- **The Navy had proposed a new helicopter, the ZZ-10, to replace the current AH-1W.**
  - ZZ-10 will enter service in 2022 with 12 aircraft per year for 12 years (144 total new helos)
  - 50% will go to active squadrons, 25% to reserve, and 25% to FRS
  - Flying hours and squadron manning will remain the same as the current AH-1W
  - The fuel usage will be 15% more efficient than AH-1W, but AVDLR and Consumables costs are estimated to be +20% for unscheduled work
- **What are the estimated O&S costs for the new platform?**



*All information and data in the scenario is fictitious and used for demonstration purposes only.*