



# Using Data Integration and Data Governance to Extend the Life of USMC Logistics Applications During Migration to GCSS-MC

*Keeping Legacy Systems Viable*



Mary D. Hiles

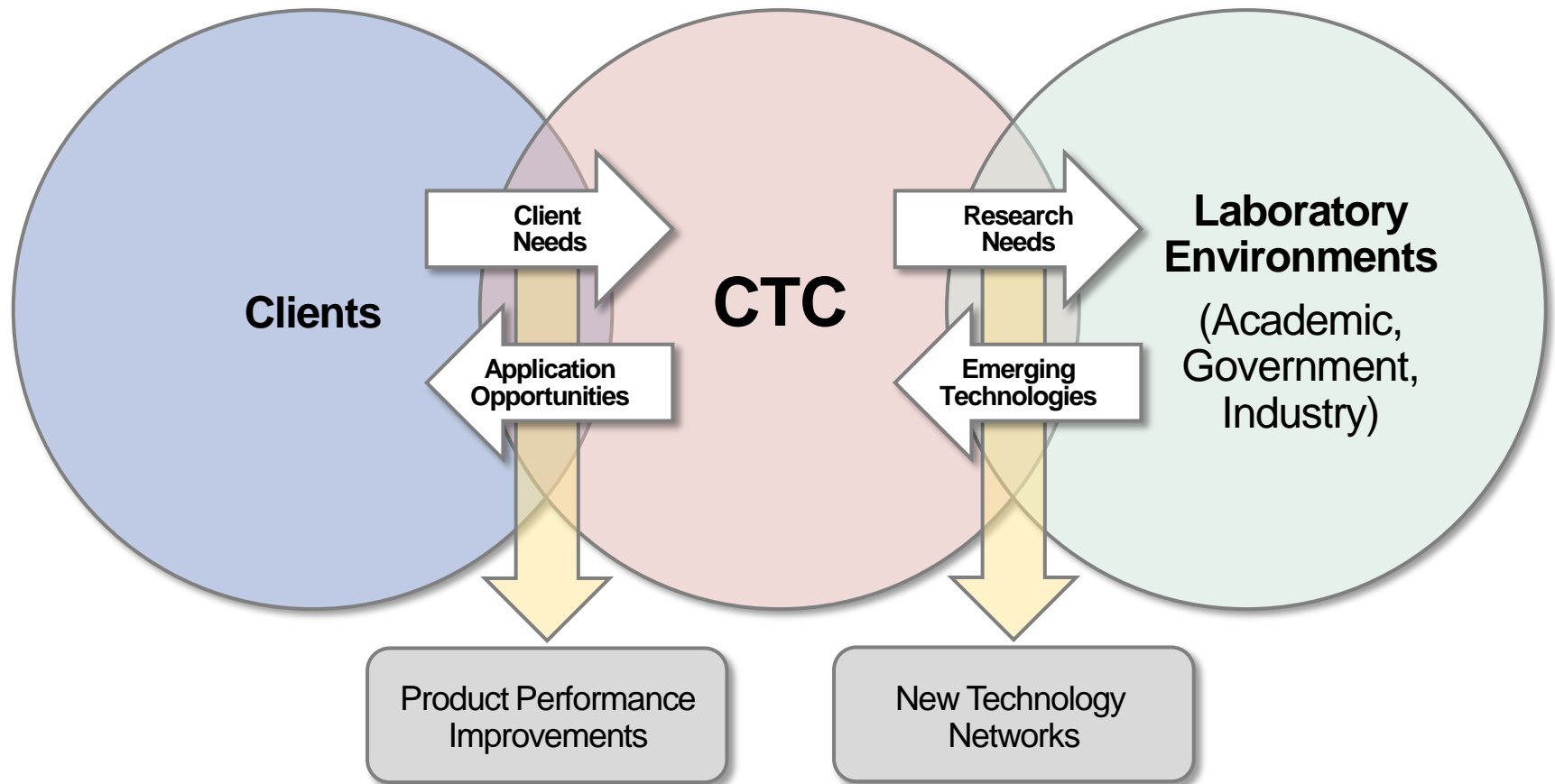


Concurrent Technologies Corporation  
*Systems Engineering Conference 2012 - Session 14665*



# Who is CTC?

CTC is an independent, nonprofit, applied scientific research and development professional services organization.



# What is the Problem?

- USMC needed to migrate legacy mainframe supply (SASSY) and maintenance (MIMMS) systems to the Oracle based GCSS-MC system in order to modernize and streamline its systems
- The migration period was planned in stages and the cutover would take more than 1 year as units were moved over in groups
- USMC still had the requirement to rollup their Readiness values at the USMC level and report to OSD
- Data Quality problems in the legacy system would further delay the migration

# Requirements

- Need to have consistent, repeatable methods for reporting equipment readiness values during migration
- Need to help identify issues with the data and assist in cleansing the data prior to and during the migration
- Need to ease the transition to new system by managing reporting externally

# GCSS-MC



- GCSS-MC is a multi-block program for Logistics Chain Management (LCM) that will modernize the entire United States Marine Corps (USMC) Logistics Architecture and Management across retail supply, wholesale supply, equipment maintenance, and repair functions.
- GCSS-MC will eliminate antiquated and unsupported hardware and software and retire Supported Activities Supply System (SASSY), Marine Corps Integrated Maintenance Management System (MIMMS), among others.
- Oracle is the Systems Integrator (SI) using the Oracle E-Business Suite 11i as the core software package.

# GCSS-MC Migration

- Migration was planned in stages beginning July, 2011 and running through December, 2012 for a majority of units
- There will still be pockets of units that do not cut over fully due to unique requirements, remote locations, etc...

# Approach

- Leverage the existing Data Warehouse to store the “blended” information from the legacy systems and GCSS-MC in the Master Data Model (MDM) during the transition period
  - Master Data Repository (MDR)
- Enhance / Extend Total Life Cycle Management - Operational Support Tool (TLCM-OST) to create a system-independent Decision Support Tool
  - Provide a system-agnostic reporting environment that shields the user from having to know which system provided the data
  - Support Readiness Reporting
  - Support Discrepancy Reporting
    - Incorporate metrics and trends
    - Identify responsible organization and measurable values for deviation

# TLCMOST

TOTAL LIFE CYCLE MANAGEMENT - OPERATIONAL SUPPORT TOOL

- is a Web-based decision support tools that:
  - Integrates usage, maintenance, and supply data
  - Provides one system for readiness visibility
  - Provides cost of maintenance data
  - Provides reliability, availability, and maintainability data
  - Facilitates trend analysis and decision formulation
  - Integrates earlier generations of targeted tools into a single decision support dashboard



*Several of these tools won Defense Logistics Technology Implementation of the Year Award*



# TLCM-OST Home Page

**TLCM-OST**
Welcome: Brent Christie
TAMCN
Summary Search...
Go

Fleet Readiness Reporting	Retail			Enterprise		
	S Rating	R Rating	MR Rating	S Rating	R Rating	MR Rating
USMC	82%	96%	80%	79%	86%	72%
MARFORPAC	69%	95%	66%	69%	95%	66%
I MEF	69%	95%	66%	69%	95%	66%
III MEF	68%	95%	66%	68%	95%	66%
MARFORCOM	69%	96%	67%	69%	96%	67%
II MEF	69%	96%	67%	69%	96%	67%
MARFORRES	77%	98%	75%	76%	92%	70%



**ENTERPRISE ASSET EMPLOYMENT**



**ENTERPRISE ASSET MANAGEMENT**



**ENTERPRISE ASSET PLANNING**

LogPlanning
Supply
Maintenance
Transportation
Engineering
HealthServices
Services



**EQUIPMENT ACCOUNTABILITY TRENDING FOR USMC**



**PEI IDENTIFICATION DASHBOARD**



**ENTERPRISE LOGISTICS REPORTING DASHBOARD**

**My Applications\***

◀

Favorites  
EAM - TAMCN



Favorites  
EAE - TAMCN



MARFORPAC



I MEF



III MEF



MARFORCOM



II MEF



MARFORRES



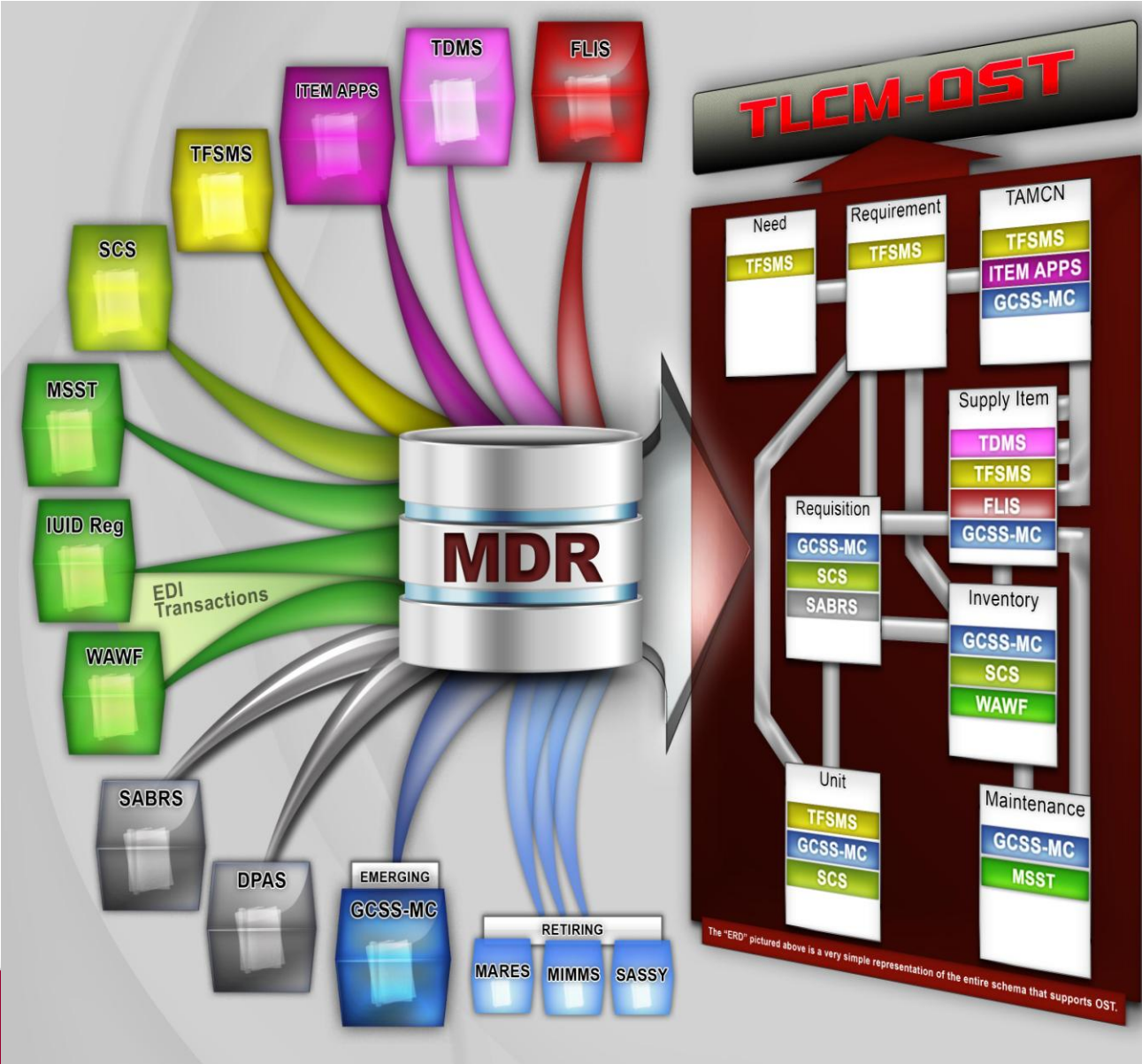
▶

Identification	Requirements	Funding	Accountability	Sustainment	Disposals	Current Measures
A00907G	118	\$17,271,607.00	89	33	1	64%
	79 / 16 / 23	\$194,063.00	77 / 11 / 1	11 / 8 / 14	1	90% / 58%

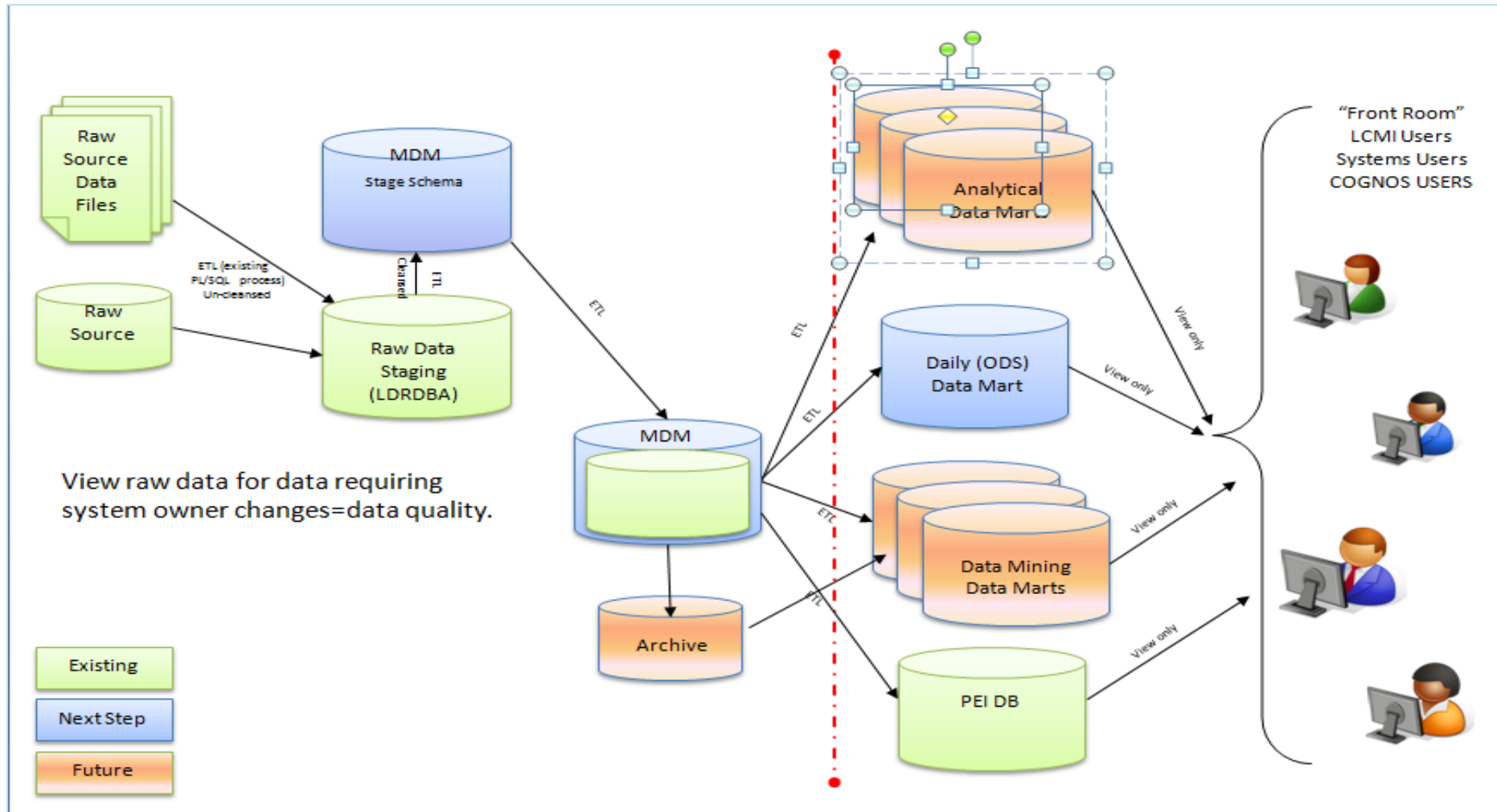
# Out of Many – One Answer

**MDR :**

- Loads data from 31 source systems
- Supports 23 applications
- Has 8 exports to other systems
- 1.2 Terabytes of data
- Imports 164 datasets / ~53 million records daily.
- Stores data in “layers”, from raw source system data to functional layout to data marts



# The Need for a Systems Engineering Approach



# Blended Warehouse

Early Stage Migration

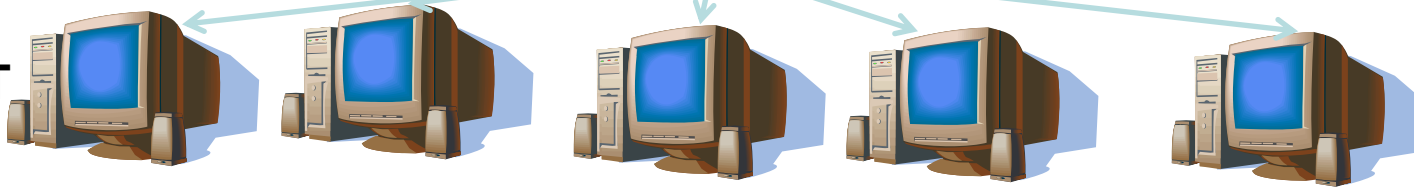


Late Stage Migration

Data Warehouse

Supply / Maintenance Data

TLCM-OST



No change to apps during migration

# Approach

- Implement full complement of data quality reports and discrepancy reports prior to and during migration
- Apply Data Governance to Data Sources during migration
  - Define standard terminology and business rules
  - Communication of Business Rules / Calculations
  - Assign responsibility for Discrepancies
  - Provide Measurable metrics monthly – loop back to data owners
- Provide full disclosure of Data Pedigree throughout
  - Transparency of Source
  - Where did this piece of data come from?

# Data Quality

Prime and Preferred are the same, right?

This field looks similar, lets join on it



That number looks high, lets sort and rank

That number looks low, lets sum the group

# Enterprise Logistics Reporting Dashboard

TLCM-OST
Welcome: Brent Christie

TAMCN Summary Search... Go

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Home Enterprise Asset Pillars Enterprise Logistics Reporting Logistics Functional Areas

## Enterprise Logistics Reporting Dashboard

Select a report below or use the navigation icons to the left to drill down to a selected report

**Supply**

**Requirements**

- 🔴 AAO Validation Date Has Been Exceeded
- 🔴 Item Exit Date Has Been Exceeded
- TFSMS AAO Not Equal to Supply Allowance

**Small Arms Crane Reporting**

- 🟢 Small Arms Duplicate Serial Numbers
- 🔵 Small Arms Serial Count Reconciliation
- 🟢 Small Arms Crane Serial Numbers not Accounted for in USMC Systems
- 🟢 Small Arms Serial Numbers Accounted for in USMC Systems but not Reported in Crane
- 🟢 Small Arms Serial Numbers with AAC Mismatches between Crane and USMC
- 🔵 Small Arms EA Trending (On Hand Qty vs. Serial Number Accuracy)
- 🟢 Aged Small Arms in Transit
- 🔴 Missing, Lost, Stolen or Recovered (MLSR)
- Small Arms Back Order Validation
- 🔵 Small Arms Local Stock Numbers
- Crane AACs not listed in SASSY

**Acquisitions**

- TFSMS Planned Quantity with no MCPC defined
- 🔴 On Hand is Greater than AAO
- Capability Alert - USMC Total OH Quantities Have Fallen Below 80% of the UTR
- Sustainment Alert - Enterprise Net Asset Posture Has Exceeded the UTR

**Equipment Accountability Net Asset Posture**

- 🔵 EA Trending (On Hand Qty vs. Serial Number Accuracy)

**Equipment Accountability Serial**

**Maintenance**

**Readiness Reporting**

- LM2 Deadlines Greater than On Hand
- UICs that reported yesterday but did not report today
- Units Reporting the Same Item as Deadlined in MARES
- Duplicate MARES records
- Readiness Reportable Flag Discrepancies between MCBUL 3000 and TFSMS

**Maintenance Production**

- Duplicate EROs

**Org Hierarchy Management**

**TFSMS Hierarchy**

- Type Support Code Issues
- AACs Found in SASSY (Crane) but not in TFSMS

**Item Identification**

**PEI Identification**

- PEI Identification Dashboard
- 🟢 IDN Mismatches - TFSMS vs IA
- 🟢 TAMCN Mismatches - IA vs TFSMS
- 🔵 IA NSN Issues - IA vs TDMS
- 🔴 TFSMS NSN Issues - TFSMS vs TDMS

**NSN**

- TFSMS TAMCNs with no preferred NSN

**Other**

**Miscellaneous**

- In Transit Visibility (ITV)

TLCM-OST
Welcome: Mary Hiles

TAMCN Summary Search... Go

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Home Enterprise Asset Pillars Enterprise Logistics Reporting Logistics Functional Areas

## Item Exit Date Has Been Exceeded

**77**

Click to drill in:

Program Office	Count
MCSC-PG-IWS	1
MCSC-PMM-092	3
MCSC-PMM-101	2
MCSC-PMM-111	1
MCSC-PMM-112	1
MCSC-PMM-113	1
MCSC-PMM-121	2
MCSC-PMM-122-CMS	12

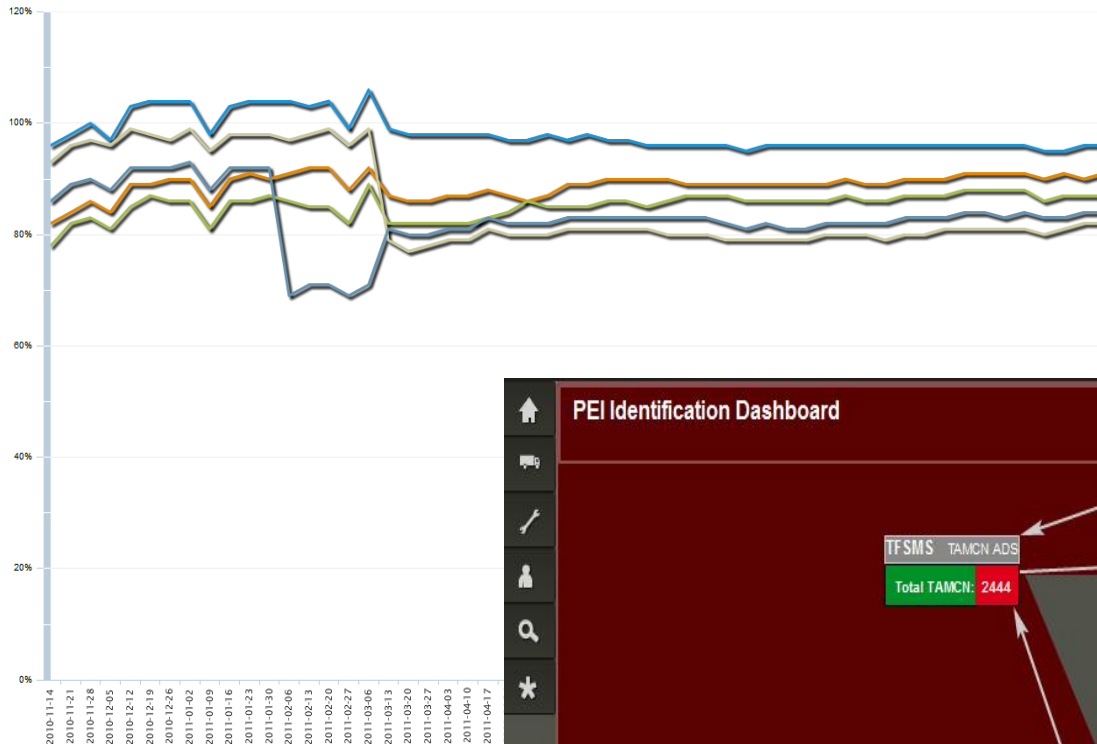
Product Group	Program Office	Integration Division	TAMCN	Nomenclature	TAMCN Status	NSN	ITM Designator	OH Qty	Item Apps Exit...	Item Apps Date Diff	TFSMS Exit Date	TFSMS Date Diff	Related TAMCN	Related OH Qty
L_PM	MCSC-PG-IWS	Fires and Man	A0049	ULTIMA 100MM	IS	12400153291		14			8/1/2006	2106		
L_PM	MCSC-PMM-L	Fires and Man	A0617	TEST SET, ELE	IS	66250137988	10262A	16	12/1/2015	-1303	10/1/2011	219		
L_PM	MCSC-PMM-L	Logistics Integ	E2810	TOOL KIT, FUL	IS	51800001832					12/1/1999	4541		
L_PM	MCSC-PMM-M	Logistics Integ	D0014	TRUCK, TRAC	IS	23200155203	11444A		5/1/2027	-5472	11/1/2010	553		
L_PM	MCSC-PMM-M	Logistics Integ	D1213	TRUCK, RTAA	IS	23200155354	11471A	0	10/1/2026	-5260	10/1/2010	584	D1212	68
PG-09	MCSC-PMM-0	Fires and Man	A0018	SURVEILLANC	IS	58550145822					12/1/2010	523		
PG-09	MCSC-PMM-0	Fires and Man	A0036	NIGHT SIGHT	IS	58550153146		7			12/1/2009	888		

# Enterprise Asset Trending / PEI Iron Triangle

Data Pedigree  
Help On This Page

EA Trending for USMC rollup (USMC)

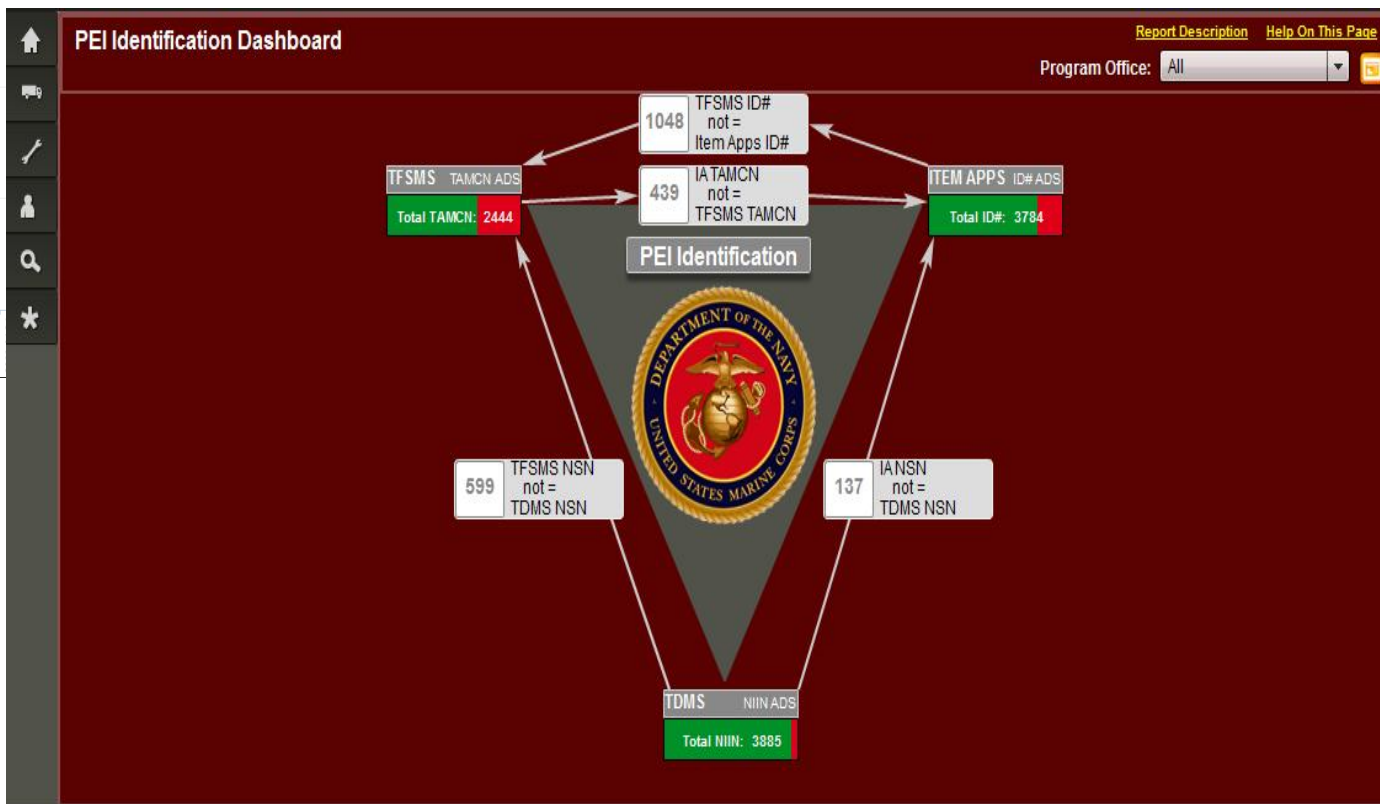
Export as:



Serial Count / On Hand, by Commodity Code

- A - Type 1 Communications-Electronics
- B - Type 1 Engineer
- D - Type 1 Motor Transport
- E - Type 1 Ordnance
- Total

Percentage	Description
= 100%	Serial Number Count = On Hand
> 100%	Serial Number Count > On Hand
< 100%	Serial Number Count < On Hand





# Data Pedigree

## Data Pedigree for TLCMOST.EAE Operation Status Details

Basic View		Detailed Tree View			
Data Element Title	Definition	Business Rules	USMC Data Source	MDR Table	MDR Column
UIC-Org (DODAAC)	Combination of UIC, Unit Name, and DODAAC	The DODAAC will be shown if TFSMS has the UIC/DODAAC association	TFSMS	TFSMS_UNIT	UNIT_NAME
TAMCN	Table of Authorized Material Control Number	A seven position alphanumeric control number assigned to an end	TFSMS	TFSMS_EQUIP	TAMCN
Nomenclature	The combination of approved item name and military type designation as	Refer to MIL-HDBK-1812	TFSMS	TFSMS_EQUIP	ITEM_NAME
Service Req/ERO	Count of Service Requests or Equipment Repair Orders (EROs) for the Maintenance Type shown	Maintenance type is determined by the category code (N, P, X or M) or in the case of Supply-Service the Job Status code (40 or 25)	MIMMS, GCSS-MC	GCSS_IB_ASSET_MAINT	EQUIP_REPAIR_ORDER_NUM
EOM	Tells what Echelon of Maintenance is associated with the given Service Request/ERO	This will always reflect the highest EOM that is active for a given Serial Number.	MIMMS, GCSS-MC	LDR_MIMMS_HIST_EROS	DATE_CLOSED
BDI 2nd EOM	Battle Damage Indicator on the 2nd EOM Service Request/ERO per MCO	Per MCO, the BDI flag on the 2nd EOM is the flag that reflects the BDI status.	MIMMS	LDR_MIMMS_HIST_EROS	EQUIP_REPAIR_ORDER_NUM
DCD	Deadline Control Date		MIMMS, GCSS-MC	GCSS_IB_ASSET_MAINT	ECHELON_OF_MAINT
RDD	Requested Delivery Date		MIMMS	LDR_MIMMS_HIST_EROS	ECHELON_OF_MAINT
Days Deadlined	Days Deadlined	Calculated as the number of days from Today minus Deadline Control Date (if still open) or Date Closed	MIMMS	LDR_MIMMS_HIST_EROS	TYPE_LAST_PREV_MAINT
				LDR_MIMMS_HIST_EROS	LM2_DATE
				LDR_MIMMS_HIST_EROS	DEADLINE_CONTROL_DATE
				LDR_MIMMS_HIST_EROS	REQ_DELIVERY_DATE
				LDR_MIMMS_HIST_EROS	DATE_CLOSED
				LDR_MIMMS_HIST_EROS	DEADLINE_CONTROL_DATE

- Integrated an innovative Data Pedigree solution into its Software Development Lifecycle (SDLC) process at every data transformation step to capture the migration meta data
- The data was then chained together in both a basic and detailed tree view to allow the user to view field definition, source systems, and business rules at each step

# Data Pedigree – Detailed Tree View

Basic View Detailed Tree View

- [-] TLCMOST, EAE Operation Status Details, UIC-Org (DODAAC)
- [-] TLCMOST, EAE Operation Status Details, TAMCN
- [-] TLCMOST, EAE Operation Status Details, Nomenclature
  - [-] ETLCMCOPDDBA, EAE\_PKG.GET\_SERVICE\_DETAILS, NOMEN
    - [-] ETLCMCOPDDBA, TAMCN, NOMEN
      - [-] LDRDBA, TFSMS\_EQUIP, ITEM\_NAME
- [-] TLCMOST, EAE Operation Status Details, Service Req/ERO
- [-] TLCMOST, EAE Operation Status Details, EOM
- [-] TLCMOST, EAE Operation Status Details, BDI 2nd EOM
- [-] TLCMOST, EAE Operation Status Details, DCD
- [-] TLCMOST, EAE Operation Status Details, RDD
- [-] TLCMOST, EAE Operation Status Details, Days Deadlined
- [-] TLCMOST, EAE Operation Status Details, Serial Number
- [-] TLCMOST, EAE Operation Status Details, UUI
- [-] TLCMOST, EAE Operation Status Details, Severity
- [-] TLCMOST, EAE Operation Status Details, Status Code
- [-] TLCMOST, EAE Operation Status Details, Days in Status
- [-] TLCMOST, EAE Operation Status Details, Parts on Order
- [-] TLCMOST, EAE Operation Status Details, Problem Code

Application:	LDRDBA
Table:	TFSMS_EQUIP
Column:	ITEM_NAME
Relation to parent action:	Copy
Relation to parent description:	First 200 characters
Application description:	Import area for LCMI data
Table short description:	
Table long description:	TFSMS_EQUIP - (TFSMS Equipment) - This table contains equipment table from TFSMS by TAMCN/NSN. This table is being replaced by TFSMS_TAM_CDTS, TFSMS_TAM_ACQ_POCS, TFSMS_TAM_ATTRIBUTES, TFSMS_TAM_CONTRACTS, TFSMS_TAM_CAGES, and TFSMS_CAR_RELATIONS.
Column short description:	
Column long description:	The name of an item that is approved for use by the Defense Logistics Service Center or that name selected by the requesting department or DOD agency by being consistent with federal cataloging policies.
Date Last Updated:	10/1/2012 Source Data As Of: 9/17/2012

# Data Pedigree Comment Blocks in PL/SQL

```
/*<DP_COMMENTS>
```

```
<DPH> SCHEMA NAME:   TLCMCOP
<DPH> SCHEMA TYPE:   APP
<DPH> ENT NAME:      Sum Tam Summary Row
<DPH> Ent Package:
<DPH> Ent Desc Short:
<DPH> Ent Desc Abbrev:
<DPH> Ent Desc Long:
```

8	9	10	11	12	13	14	15
ELEMENT NAME	RELATED SCHEMA NAME	REL SCH TYP	RELATED ENTITY NAME	Related Package Name	RELATED ELEMENT NAME	Relation Action	Relation Desc
<DPR> TAMCN ID	COP	DB	GET_TAM_DSHBRD_LIST	EAM_PKG	TAMCN_ID		
<DPR> TAMCN	COP	DB	GET_TAM_DSHBRD_LIST	EAM_PKG	TAMCN		
<DPR> TAMCN Image	COP	DB	GET_TAM_DSHBRD_LIST	EAM_PKG	FILE_NM		
<DPR> Nomenclature	COP	DB	GET_TAM_DSHBRD_LIST	EAM_PKG	NOMEN		
<DPR> AAO	COP	DB	GET_TAM_DSHBRD_LIST	EAM_PKG	AAO_QY	Calc	
<DPR> Shipped Qy	COP	DB	GET_TAM_DSHBRD_LIST	EAM_PKG	SHIP_QY	Calc	
<DPR> Planned Qy	COP	DB	GET_TAM_DSHBRD_LIST	EAM_PKG	PLAN_QY	Calc	
<DPR> Unfunded Qy	COP	DB	GET_TAM_DSHBRD_LIST	EAM_PKG	UNFUND_QY	Calc	
<DPR> Total Value	COP	DB	GET_TAM_DSHBRD_LIST	EAM_PKG	TOTAL_VALUE	Calc	
<DPR> Net Asset Posture	COP	DB	GET_TAM_DSHBRD_LIST	EAM_PKG	NET_ASSET_POS	Calc	
<DPR> Accountable Assets	COP	DB	GET_TAM_DSHBRD_LIST	EAM_PKG	NAP_ACCNTBLE_ASSETS	Calc	
<DPR> In Transit	COP	DB	GET_TAM_DSHBRD_LIST	EAM_PKG	NAP_IN_TRANS	Calc	
<DPR> Maintenance Qy	COP	DB	GET_TAM_DSHBRD_LIST	EAM_PKG	MAINT_QY	Calc	
<DPR> Depot Maintenance Count	COP	DB	GET_TAM_DSHBRD_LIST	EAM_PKG	MAINT_DEP_QY	Calc	
<DPR> Deadlined Count	COP	DB	GET_TAM_DSHBRD_LIST	EAM_PKG	MAINT_DEAD_QY	Calc	
<DPR> Other Maintenance Count	COP	DB	GET_TAM_DSHBRD_LIST	EAM_PKG	MAINT_OTH_QY	Calc	

# Comment Block - continued

Optional Element Info	
<DPE> TAMCN ID	Desc Short: Unique internal identifier assigned to this TAMCN
<DPE> TAMCN	Desc Short: Table of Authorized Material Control Number - unique identifier for this equipment
<DPE> TAMCN Image	Desc Short: Picture of this TAMCN (if available).
<DPE> TAMCN Image	Desc Long: If no image exists, feel free to submit one for system wide use by clicking on icon on TAMCN Summary
<DPE> Nomenclature	Desc Short: Description of the equipment
<DPE> AAO	Desc Short: Total AAO for this TAMCN
<DPE> AAO	Desc Long: Sum of Unit's T/E for this TAMCN rolled up to USMC level
<DPE> Shipped Qty	Desc Short: Total Shipped AAO Quantity for this TAMCN
<DPE> Shipped Qty	Desc Long: Sum of Unit's Shipped Quantity for this TAMCN rolled up to USMC level
<DPE> Planned Qty	Desc Short: Total Planned AAO Quantity for this TAMCN
<DPE> Planned Qty	Desc Long: Sum of Unit's Planned Quantity for this TAMCN rolled up to USMC level
<DPE> Unfunded Qty	Desc Short: Total Unfunded AAO Quantity for this TAMCN
<DPE> Unfunded Qty	Desc Long: Sum of Unit's Unfunded Quantity for this TAMCN rolled up to USMC level
<DPE> Total Value	Desc Short: Total Dollar Value of this TAMCN
<DPE> Total Value	Desc Long: Net Asset Posture X Unit Price for this TAMCN
<DPE> Net Asset Posture	Desc Short: Total Asset Quantities for this TAMCN
<DPE> Net Asset Posture	Desc Long: Includes the Accountable Assets Qty + In Transit Qty + Depot Maintenance Count as reported for this item
<DPE> Accountable Assets Qty	Desc Short: On Hand Quantities for this TAMCN Wholesale + Retail + GFP

# Data Governance

- ▼ folder TLCMOST, ELRD WSSP Tabular, PREF NSN
- ▼ folder ETLCMCOPDDBA, GET\_WSSP\_TABULAR, NSN
- ▼ folder ETLCMCOPDDBA, REP\_WSSP\_1\_DET, NSN
- file LDRDBA, TFSMS\_EQUIP, NATIONAL\_STOCK\_NUMBER

## Data Pedigree

*Exposes the lineage of a piece of data from it's initial source through to end application*

*Is the value shown in this particular field correct?*

## Data Quality

*Does the number that is being shown for this field in relation to the other fields make sense?*

## Data Validation

TAMCN	TAMCN Status	AAO	MCBUL 3000 Reportable	Program Office	P
A0003	IS	557	N	MCSC-PMM-123	6
A0004		0	N	UNKNOWN	5
A0009	IS	347	N	MCSC-PMM-122-NET	5
A0010		0	N	UNKNOWN	
A0012	IS	2,745	N	MCSC-PMM-153	6
A0013	IS	14	Y	PEOLS-CAC2S	7
A0014	DP	0	N	MCSC-PMM-122-ADM	5

**Supply**

- ✔ Aged Small Arms in Transit
- ✔ Missing, Lost, Stolen or Recovered (MLSR)
- Small Arms Back Order Validation
- Small Arms Local Stock Numbers
- Crane AACs not listed in SASSY

**Acquisitions**

- TFSMS Planned Quantity with no MCPC defined

# Lessons Learned / Next Steps

- Creating external reports/dashboard away from systems via data warehouse is a very affordable way to provide this capability and shield end users from migrations
- Need to treat Data Warehouse projects as Complex Systems Engineering problems
- Data Governance helps provide structure/responsibility
- Data Pedigree
  - “Ghost” Tables to track lineage of each data instance
  - Very time intensive to document Pedigree but valuable
- Historical data is kept forever so have to “get it right”
  - Have to maintain history and historical calculations as new orders are adopted to historical and current using same rules

# Questions?

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