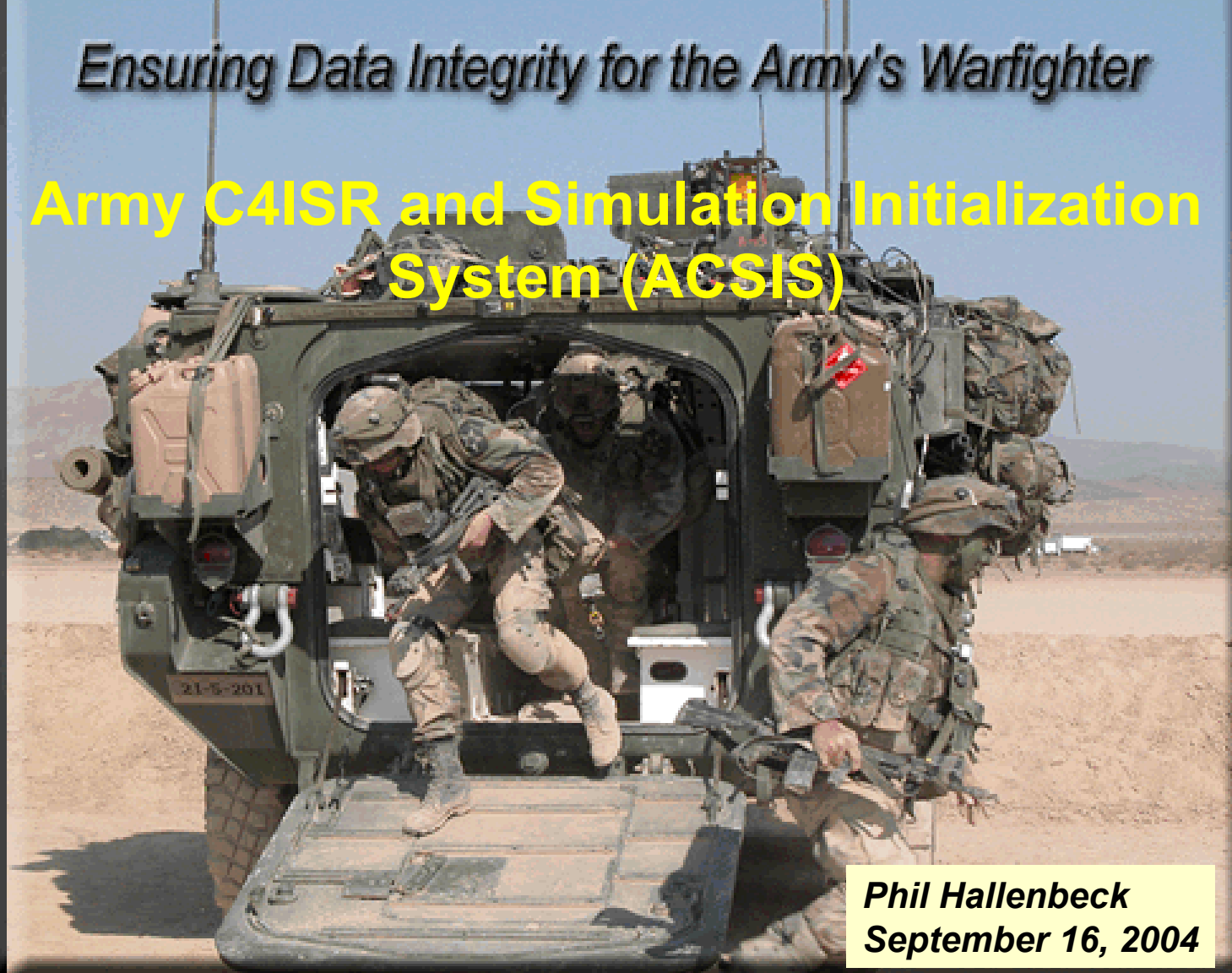


SHSOCA

*Ensuring Data Integrity for the Army's Warfighter*

# Army C4ISR and Simulation Initialization System (ACSIS)



*Phil Hallenbeck  
September 16, 2004*





## Introduction

- Initializing any software-based system can be a challenge... initializing thousands is a **BIG** challenge!
- ACSIS—(US) Army C4ISR\* and Simulation Initialization System—a successful working prototype of an Initialization Capability (IC) Repository and Tool Set
- Emphasis: A Prototype ...enormous challenges lie ahead

\*C4ISR: Command, Control, Communications, Computers, Intelligence, Surveillance, Reconnaissance  
– only the Americans could make an abbreviation like this!



# A Bit of IC History

CTSF

Relevant and Ready

**“Those who cannot remember the past...”**

- US Army “grew up” in digital systems from the bottom up—platoons and companies
  - Initialization “grew up” with platoons and companies
  - Based on a very-low-bandwidth network→placed much of the information exchange burden on the database
- Initialization process was very slow to mature--highly complicated, manual and labor intensive, and error prone
- Numerous problems with accuracy and completeness of data, such as:
  - Different Entity Names in different data sources
  - No common data content (FBCB2 DB does not include all upper TI hosts--therefore FBCB2 cannot communicate with them; these hosts lose multicast group memberships upon UTR)
- Impacts of data problems on operations included:
  - Two “copies” of a unit shown on map displays...*not always in same location*
  - Lack of common identifiers **prevented communication** between units and between systems
- Not Timely
- Not Scalable
- Reliant on Contractors to perform IC tasks at Sustaining Base

**Designed for Companies and Battalions...**  
**Pressed into service for Corps and Theaters**



## The Four Challenges of IC

CTSF

Relevant and Ready

- **Data Synchronization** (between ‘Authoritative’ sources)
  - US Army alone is a challenge
  - Joint and multilateral will be a bigger challenge!
- **Data Standardization** (between Systems) and **Repository**
  - A C4ISR and a Simulation challenge
  - Once again, multilateral operations increase the challenge
- **Tool Development and Maintenance**
  - Hundreds if not thousands of C4ISR and Sim systems exist
  - We can currently initialize a few
- **Transition to Warfighter**—
  - ACSIS is an engineers’ tool
  - *Warfighter* must Initialize his systems as task org and status changes
  - ‘10,000 km screwdriver’ will not work



*If data is not interoperable, systems are not interoperable*



# Data Synchronization

## *Examples in US Department of Defense*

- **What makes a source 'Authoritative'?**
  - US examples: ASORTS—GSORTS—USAFMSA—SB 700-20—OCE Systems Architecture...
  - Fielded products: JMUL—FBCB2 DBs—JSID—I MEF—II MEF—Other Unit ABs--...
  - Synchronization of release dates is a problem
    - Example: GSORTS updates daily...USAFMSA on six-month cycle...OCE SA is built from USAFMSA (MTOE)...and they contain many of the same fields (in different formats, of course)
    - Synchronization is logical and easy—for one record
    - But most sources typically release 40,000+ records!
  
- **Data Sources—The Case of the Missing Key:**
  - Example—US DoD GSORTS Basic Identity Data Element (BIDE): Entry is UIC plus--

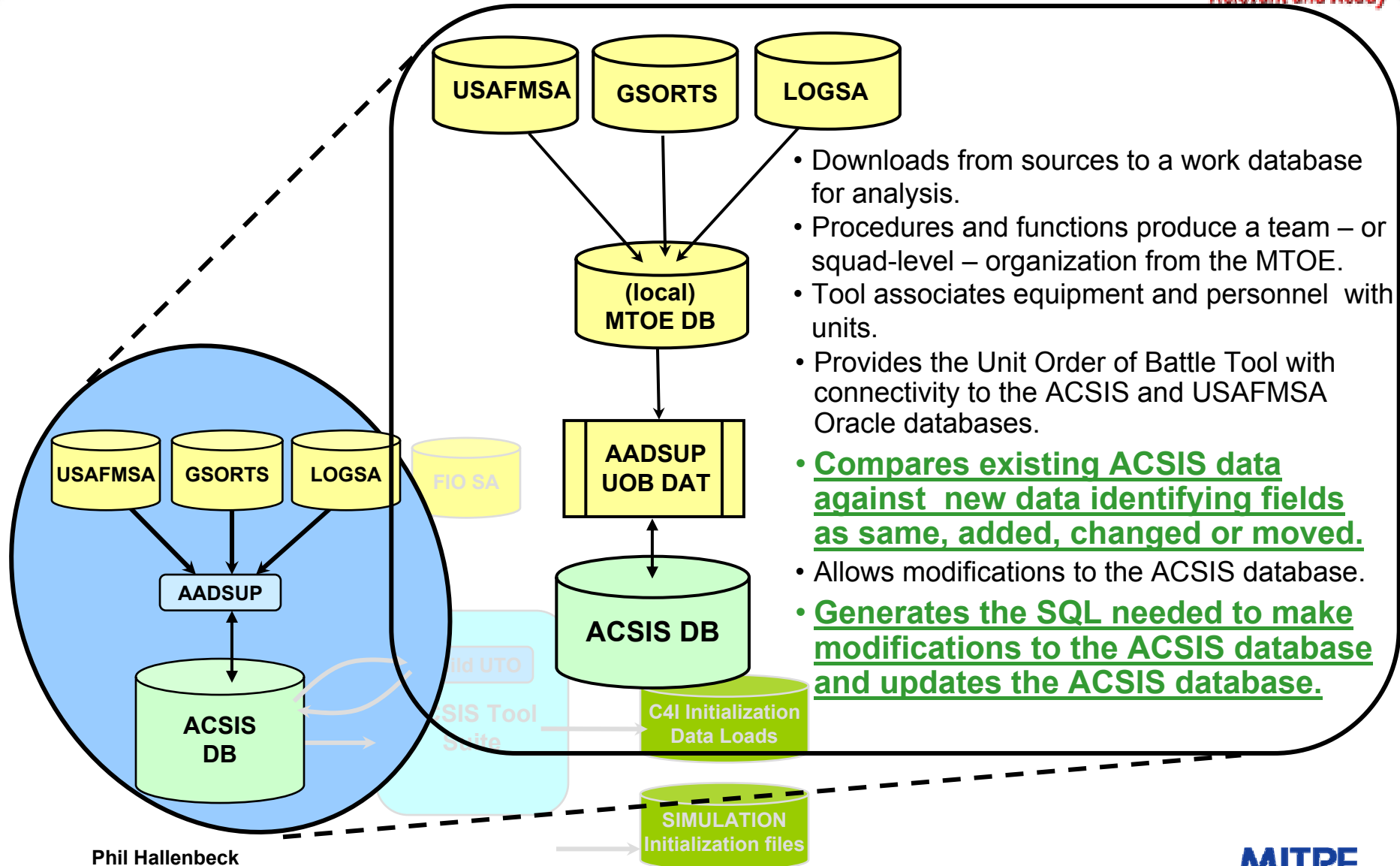
SECUR	--	COAFF	UDC	ANAME	UTC	ULC
MJCOM	MONOR	MAJOR	REVAL	LNAME	SCLAS	TPSN

*How can we handle this problem?*





# ACSIS Authoritative Data Source Update Process (AADSUP)...a Work in Progress!



- Downloads from sources to a work database for analysis.
- Procedures and functions produce a team – or squad-level – organization from the MTOE.
- Tool associates equipment and personnel with units.
- Provides the Unit Order of Battle Tool with connectivity to the ACSIS and USAFMSA Oracle databases.
- **Compares existing ACSIS data against new data identifying fields as same, added, changed or moved.**
- Allows modifications to the ACSIS database.
- **Generates the SQL needed to make modifications to the ACSIS database and updates the ACSIS database.**



# Data Standardization and The Repository

CTSF

Relevant and Ready

- Data Standardization: C2IEDM is a good start!!
  - Not detailed enough for system initialization, but a good start
  - Some examples of the current initialization problem (US Army systems):
    - Echelon Code versus Mission Code
    - Mission Specialty Code versus Role Code
    - ULP O-R Name versus FCB2 Host Description (55 characters) versus ABCS Host Description (30 Characters) versus 'ABCS 4.3' Host Description (20 Characters) versus Machine Name (7 or 8 Characters, depending on BFA)
    - Often an interoperability issue (example: Variable Message Format (VMF) requires Unit Reference Number (URN) or name—not both)...always a cost issue
  - Database keys and message fields: More challenges!
    - Name (“Long\_name”? “AName”? “PLAD”?)
    - Descriptive? Readable? Standardized? [See the following example](#)
    - EID or EWID—very promising!
    - **Lack of a Key Means Both Interoperability and Cost Issues**



# Data Standardization: Example Identifiers

UNIT_NAME	URN	PLAT_DESCR
15SIGBDE / TRADOC	8000001	MED1-15SIGBDE-TRADOC
TRADOC	8000204	CGSC2-TRADOC
30REG / TRADOC	8000226	FA8-30REG-TRADOC
1AVNBDE / TRADOC	8000249	AVN7-1AVNBDE-TRADOC
59ORDBDE / TRADOC	8000321	OMMS2-59ORDBDE-TRADOC
TRADOC	8000331	CH1-TRADOC
3 / A / 1BN / 1BDE / TRADOC	8000337	PSG-3-A-1BN-1BDE-TRADOC
RTRP / 1BDE / TRADOC	8000375	CP-RTRP-1BDE-TRADOC
FORSCOM	8000431	NTC12-FORSCOM
FBCB2	8000544	FBCB2CMD5-FBCB2
FBCB2	8000545	FBCB2OPS1-FBCB2
TEST / FBCB2	8000596	FBCB2CGOHEL2-TEST-FBCB2
TEST / FBCB2	8000597	FBCB2GSHEL1-TEST-FBCB2
FBCB2	8000601	FBCB2DEMO1-FBCB2
HNTSVL	8000714	FBCB2SCTHEL4-HNTSVL
HNTSVL	8000715	FBCB2COBRA1-HNTSVL
HNTSVL	8000715	FBCB2STALLION5-HNTSVL
HNTSVL	8000718	FBCB2JSTARS3-HNTSVL
TOBY	8000719	TOBYDEMO1-TOBY
RAYTHEON	8000729	RAYTEST6-RAYTHEON
NGMS	8000730	NGMSTEST5-NGMS

MCG Assignments?  
AVN MCG?

What are these?  
Symbol? Echelon?

What are these units?  
UIC? SRC? ...?

21 Entries...  
50++ RFIs





# ***Data Standardization and The Repository***

***...Now write the code to automate that!***



# Data Standardization and The Repository

*“...and (n?)ever the twain shall meet.”*

## • Repository and Data Sharing

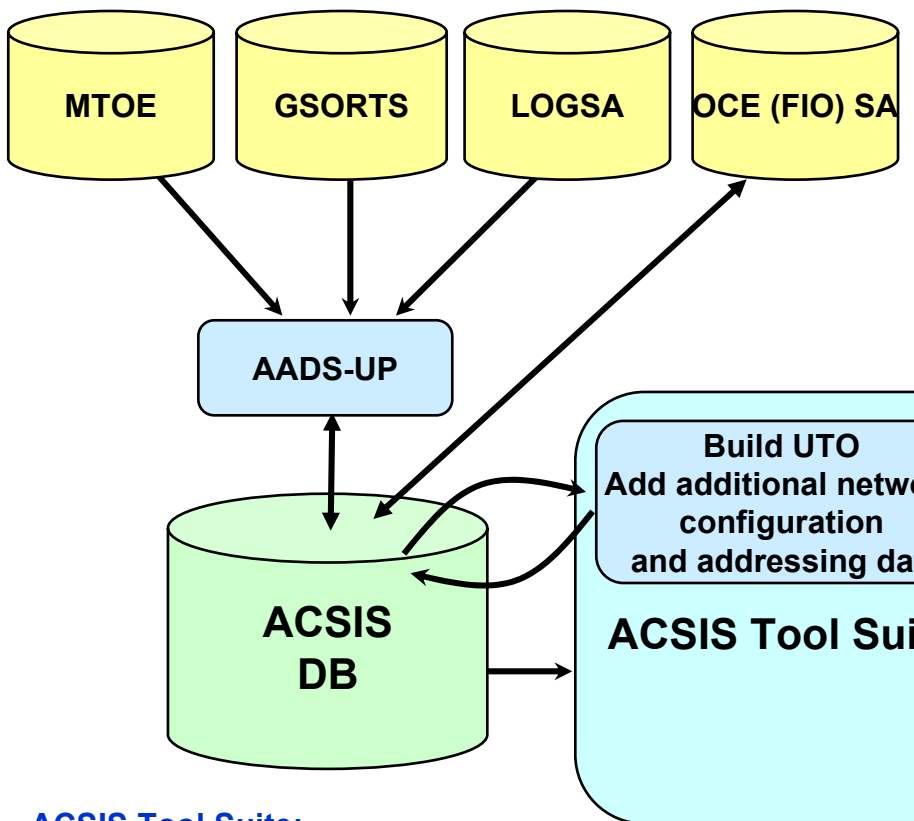
- A Joint and a Multilateral challenge
  - ACSIS currently accommodates US Army and Marines
  - Other US Services: ??? MIP members: ???
- C4ISR and Simulation challenge
  - Similar technically (Org, Notional\_Org tables in data model)
  - **Very** different organizationally (different acquisition and combat developments organizations)
- Scope of repository is TBD
  - ACSIS supports network, organizations (down to billet level), personnel at the summary level (name, rank, MOS, billet)
  - Hence: Issue is not data model--but data maintenance



# Army C4ISR and Simulation Initialization System (ACSIS)



## Authoritative Data Sources



### DMSO's ACSIS Authoritative Data Source Update Process (AADS-UP):

- Provides and updates organization, UOB, and MTOE data to the ACSIS DB from DoD authoritative data sources.

**DATAMRI®**  
Third-Party  
Analysis of  
Product Set  
for  
Consistency,  
Rule Following

### ACSIS Tool Suite:

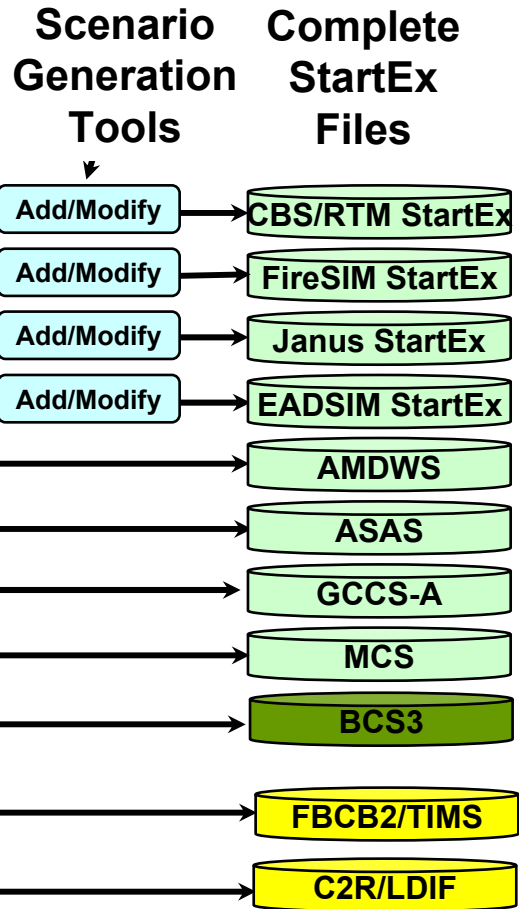
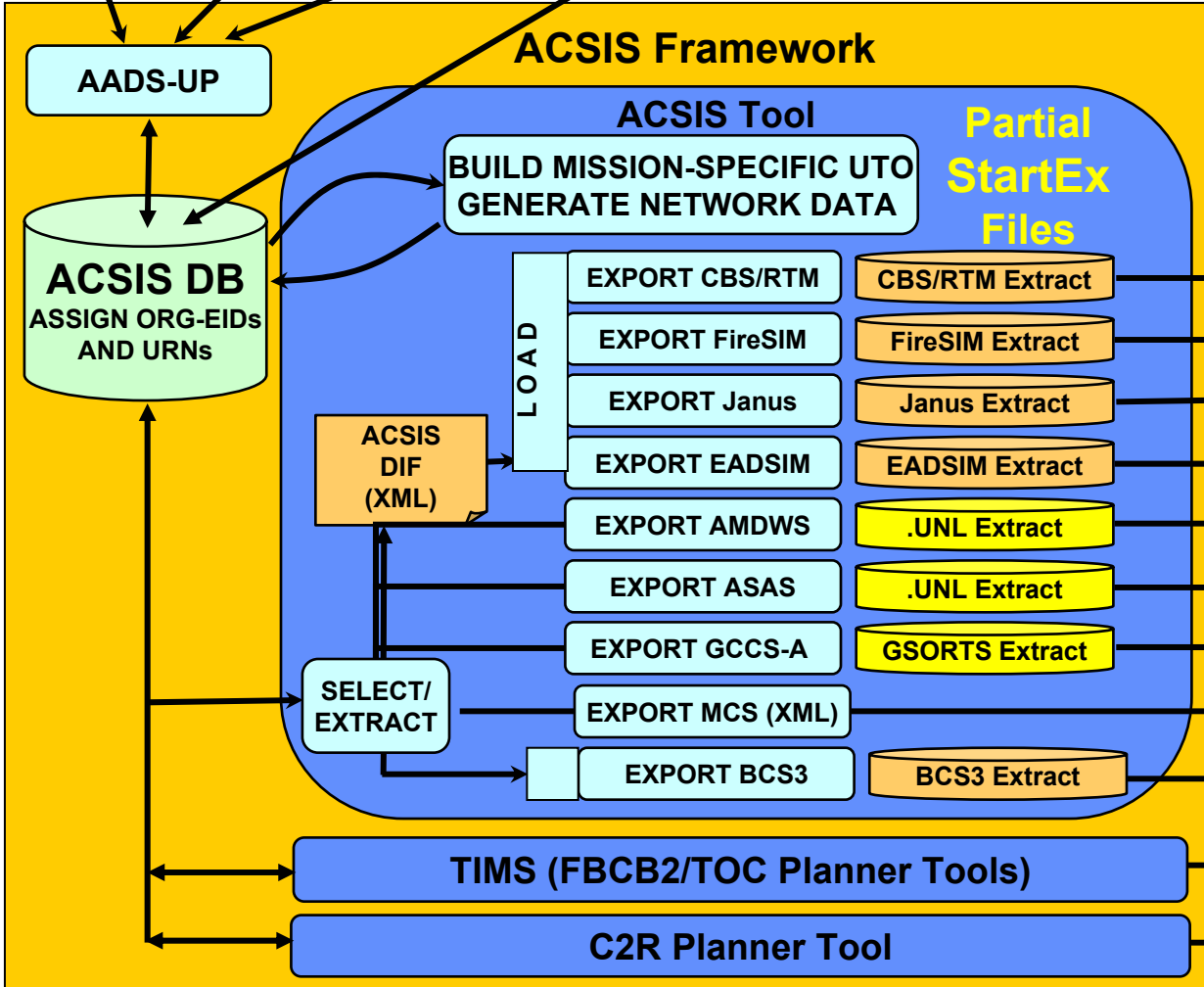
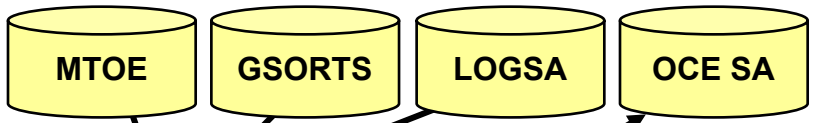
- Builds operational and exercise-specific Unit Task Organizations (UTO).
- Extracts ACSIS data and generates additional network configuration and addressing data.
- Identifies and fixes data integrity problems.
- Produces accurate and synchronized C4ISR and Simulation Initialization data products from a single data set based on a particular mission-specific UTO.



# Current ACSIS Schematic

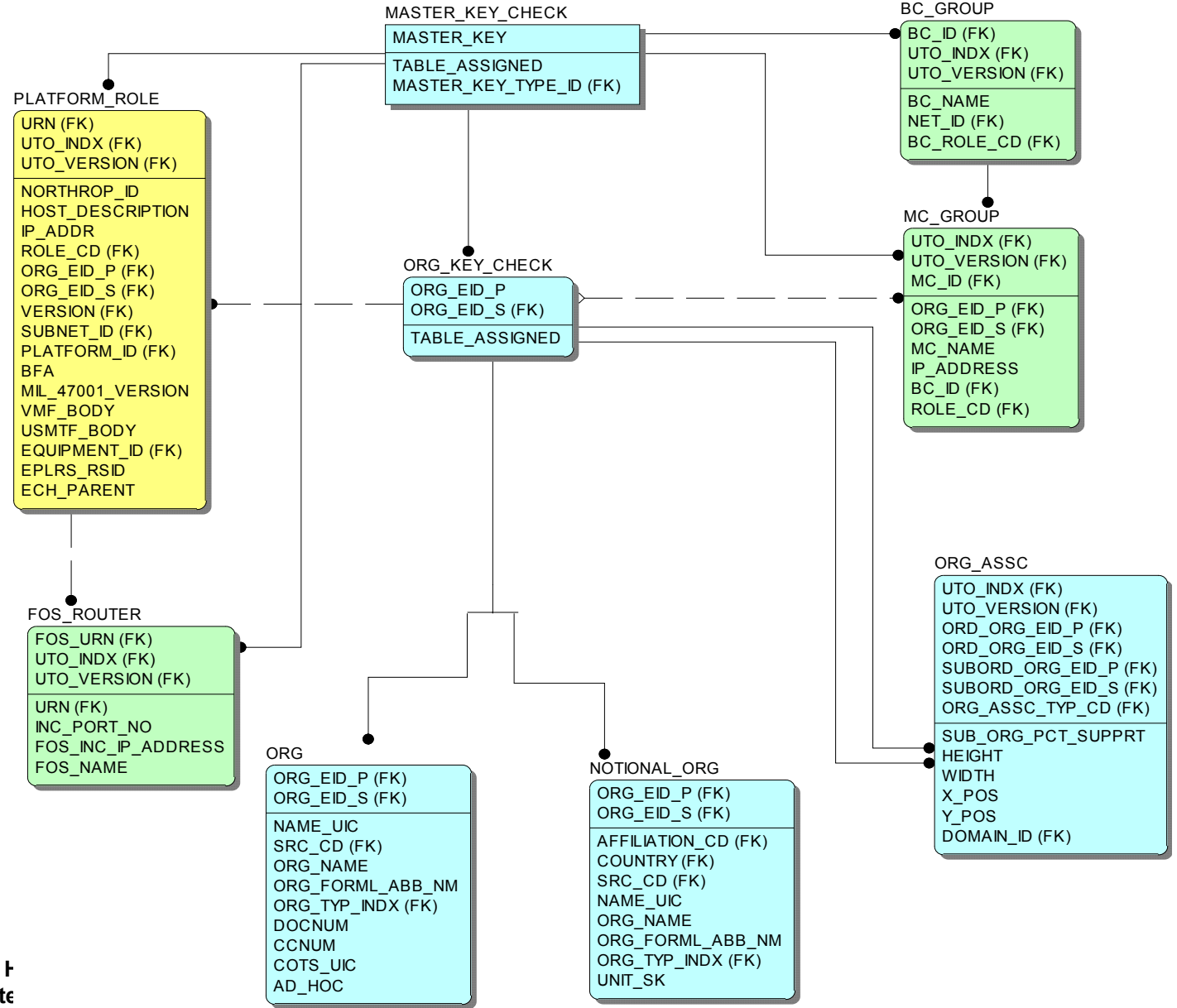


## Authoritative Data Sources





# ACSIS Data Model: Overview



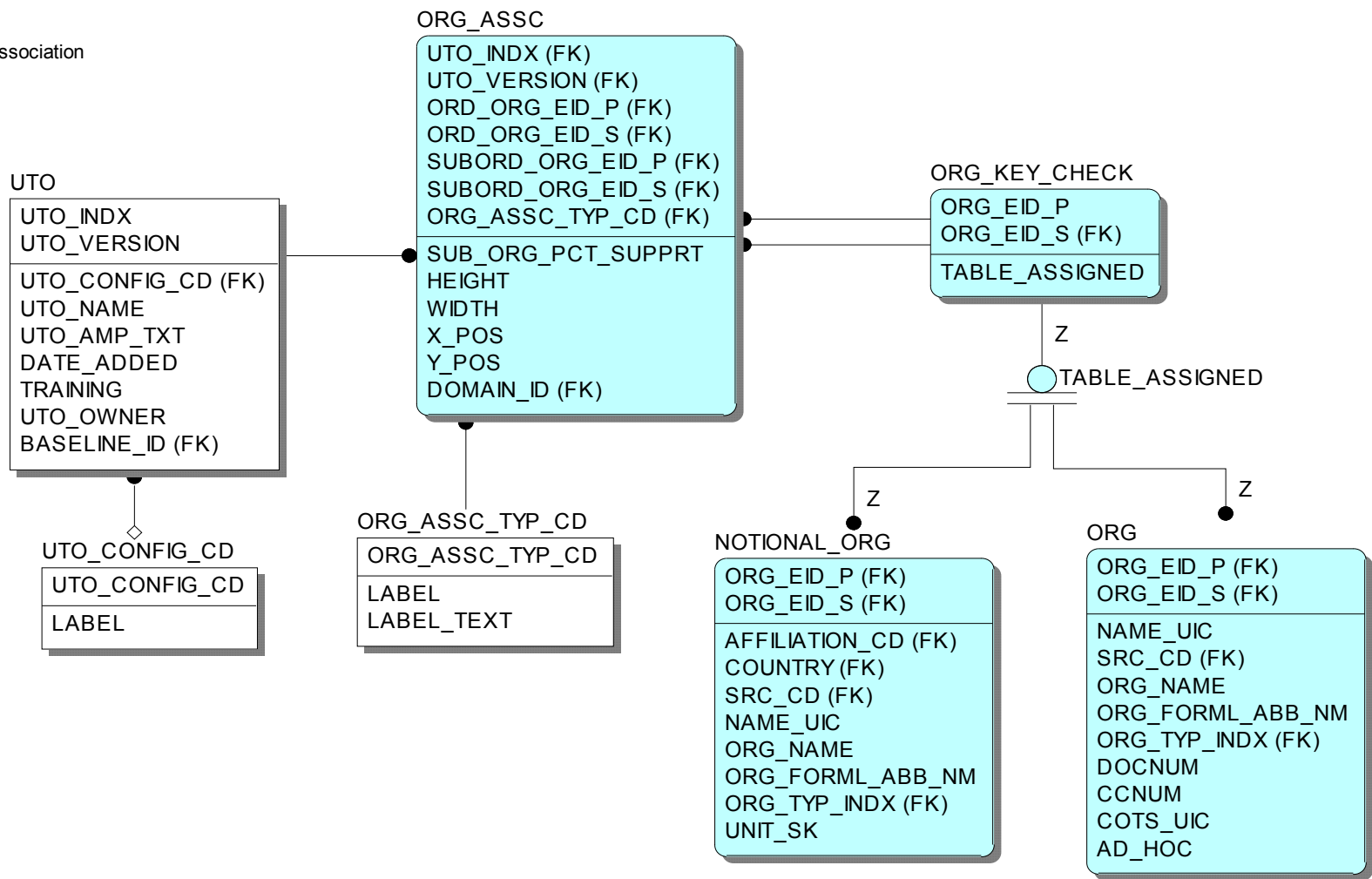


# ACSIS Data Model: Organizations and Their Associations (UTO)



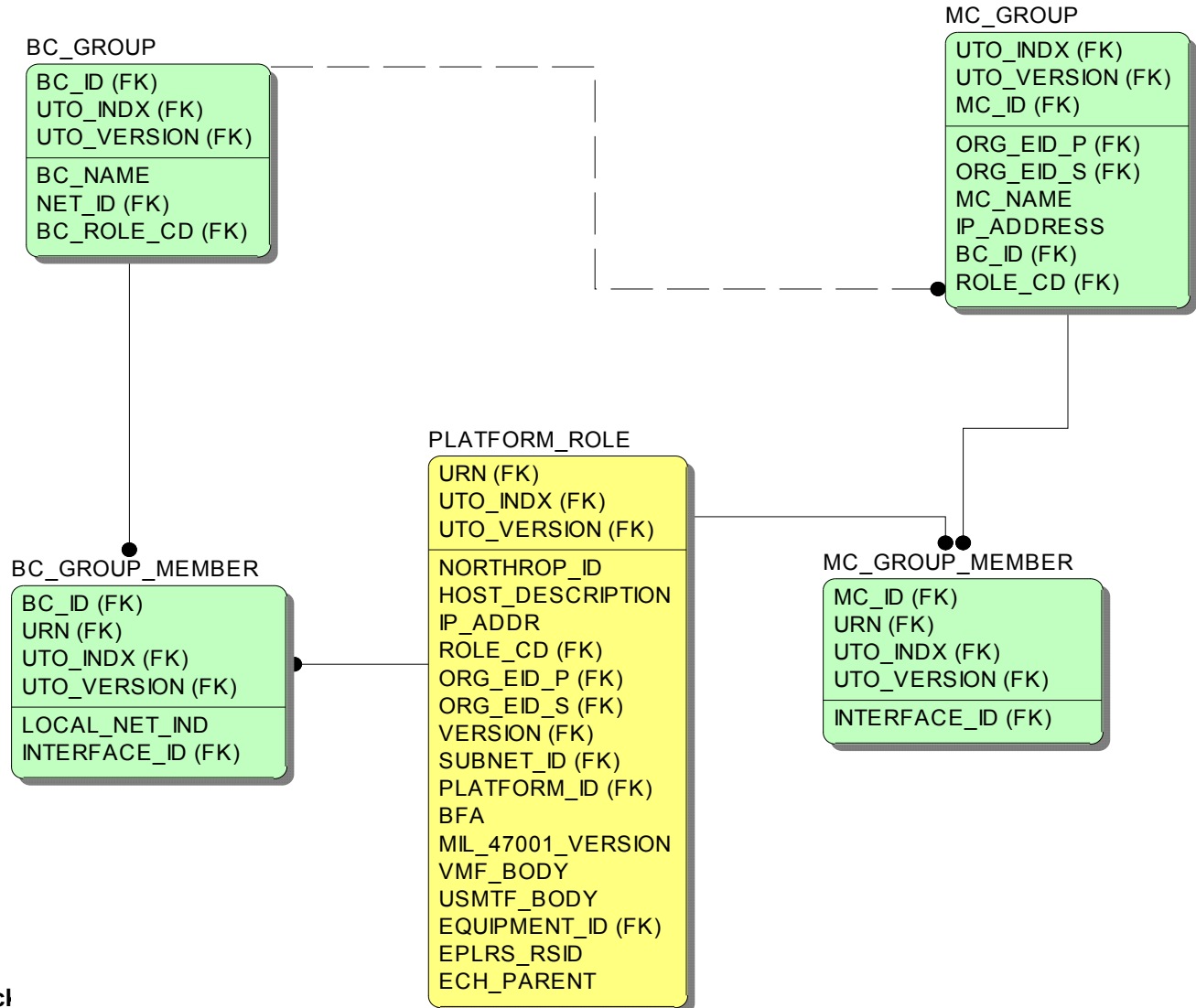
ACSIS Implementation Data Model:

Organization Association



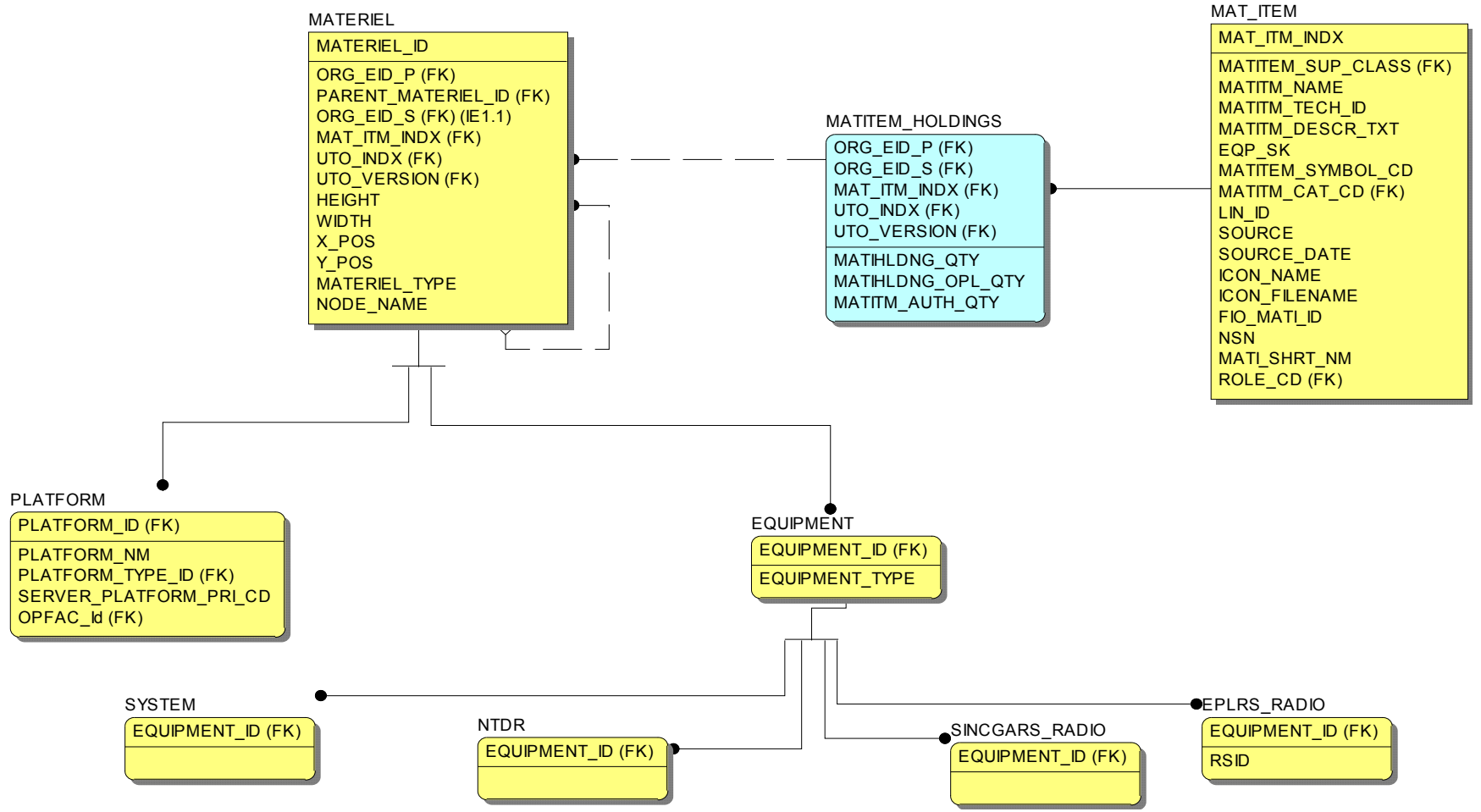


# ACSYS Data Model: 'Platforms' and Group Associations





# ACSIS Data Model: Materiel and Materiel Holdings





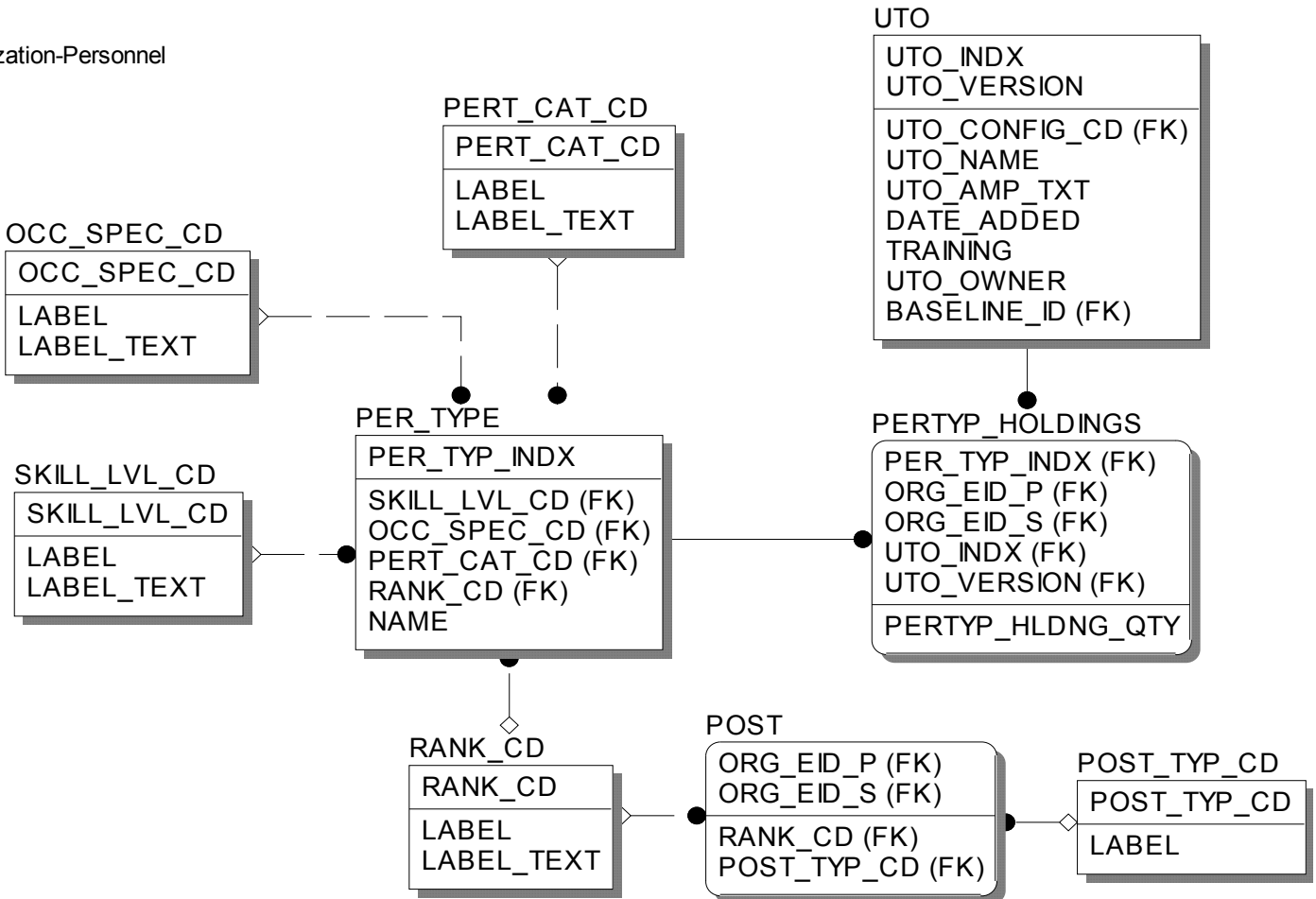


# ACSIS Data Model: Personnel and Personnel Holdings



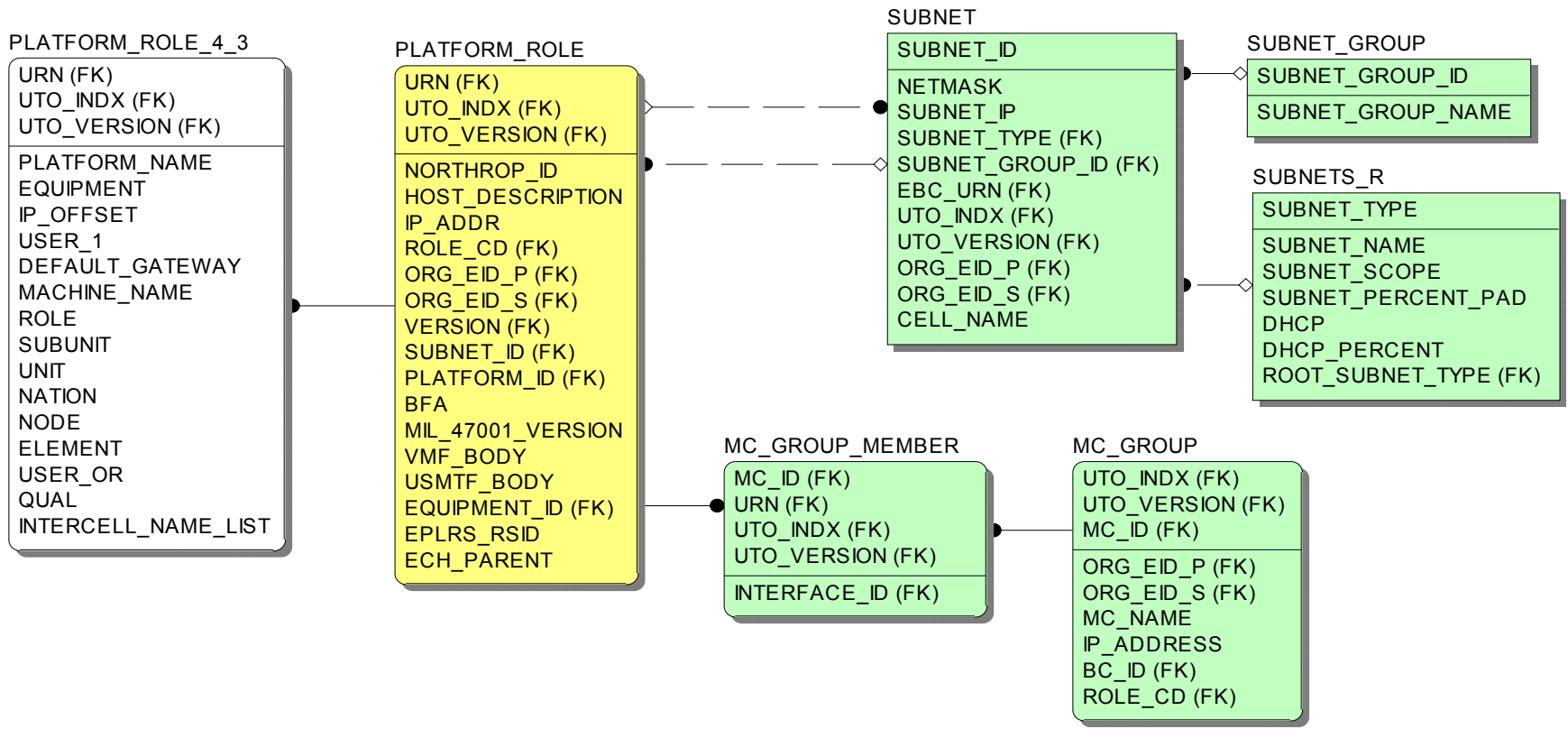
ACSIS Implementation Data Model:

Organization-Personnel





# ACSYS Data Model: Networks and Comms (1)





# ACSYS Data Model: Networks and Comms (2)



ACSYS Implementation Data Model:

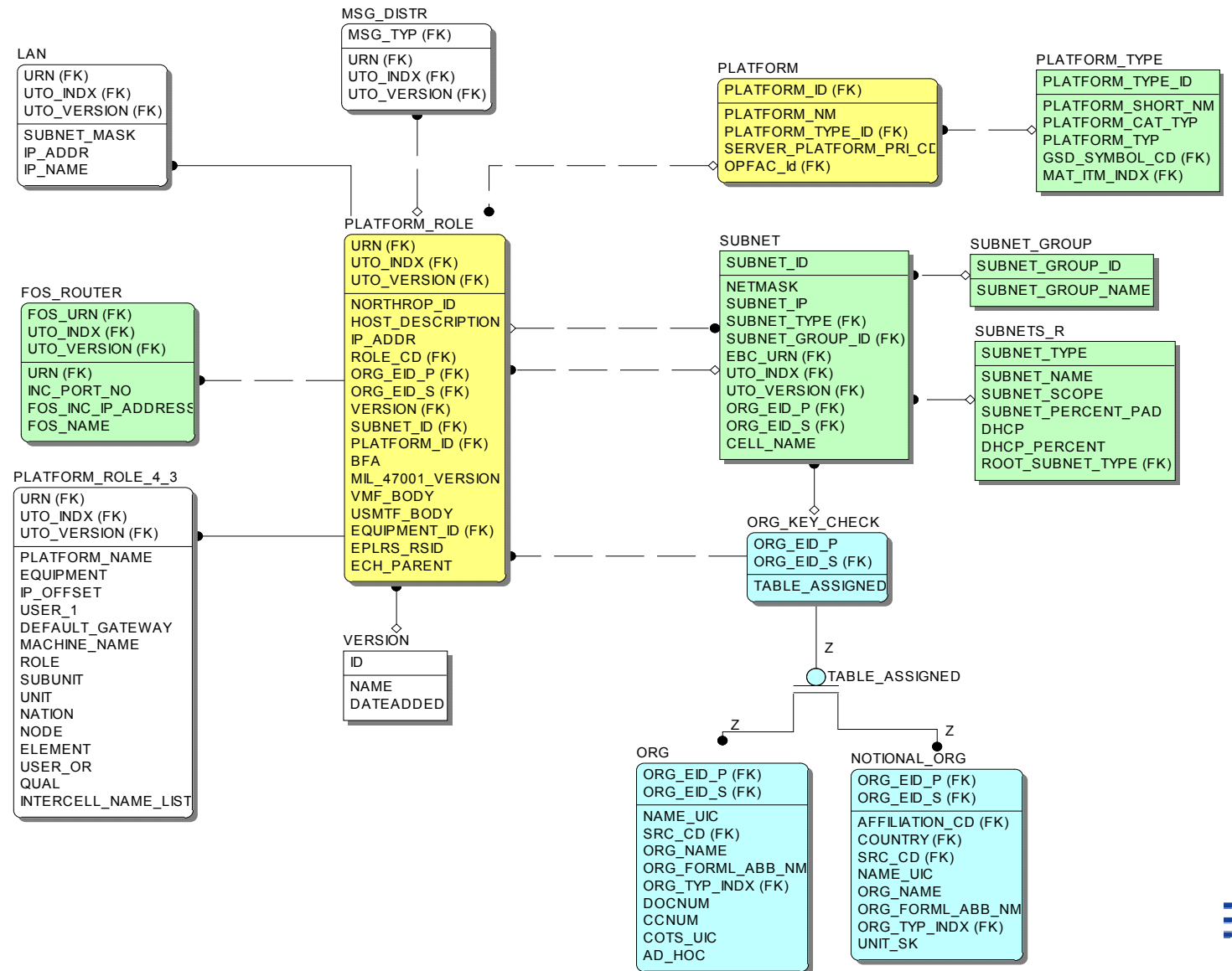
Platform

README\_4\_3

BFA
MEMO

CRIT\_ACCESS

USER_ID
LONG_NAME
MODIFIED_BY
DATE_MODIFIED
ACCESS_LEVEL





CTSF

Relevant and Ready

## Tool Development and Maintenance

- Hundreds if not thousands of C4ISR and Sim systems exist
  - We can currently initialize a few
  - **Key: Standard API set, PM initializes “his” system**
  - **But: What about network initialization of common resources?**
    - **Multicast groups; IP addresses; netmasks; frequencies**
    - **C2IEDM does not address these things!**
    - One example in US Army:
      - FBCB2 (an application) assigns IPs, populates subnets, radio nets
      - TIMS (another application) assigns members to subnets
    - Advantage: Subject Matter Expertise → functionality and efficiency in product
    - Disadvantage: More complexity—at the interface and in the data model
    - Recommendation: Use tools to initialize network parameters—then build application databases



# The Four Challenges of IC

CTSF

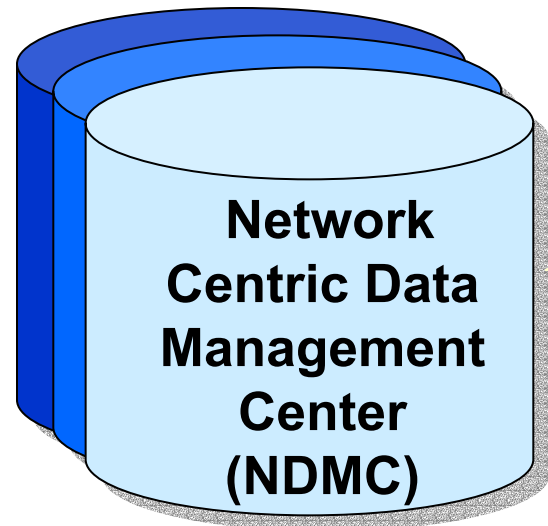
Relevant and Ready

***“One look at the battlefield saves thousands of hours of staff work”***

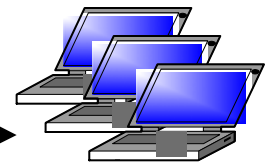
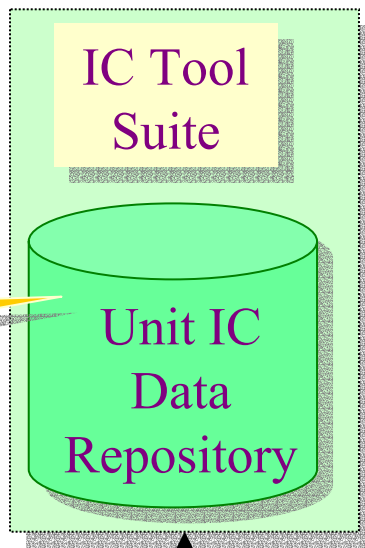
- **Provide a Tool for the Warfighter—**
  - ACSIS is an engineers’ tool, centrally administered
  - *Warfighter* must Initialize his systems as task organization and status change
  - Possible: Network-based access to initialization repository and tools
    - The issue (of course)—immediacy versus currency
    - The question: ‘From where’ does the soldier initialize?
      - We thought: Brigade (UA)...but note (for example) new US division Satellite Communications Hub-and-Spoke Architecture
    - Another question: Bandwidth demand versus tailored DB replication
      - Current Experience Helps—‘prototype’ DB replication
    - Yet another question: Product and service delivery (again, bandwidth)
      - Service and product location protocols remain TBD (SOAP is one example in use by US)



# Where This is Going: IC Core Framework (ICCF)



Data Management



Planning & Training Tools

Data Generation



operations

training

planning



*Sustaining Base*

*Deployment*



# Advantages: A Single Integrated CTSF Initialization Database

Relevant and Ready

- Synchronizes and Quality Checks Data--
  - To Established Standards
  - From a Number of different Authoritative Data Sources (ADS).
  - Feeds Back to ADS on Accuracy and Adequacy of Data Based on Warfighter's Needs.
  
- Relational Database with Standard--
  - Data element constraints,
  - Semantics and syntax,
  - Naming conventions
  - Business rules

...to enforce data integrity across both C4ISR and simulation domains.
  
- Coordinates with Authoritative Data Sources
  - Assigns primary keys such as ORG\_EIDs, URNs,
  - Assigns other materiel, personnel, and network identification, configuration and addressing data.

...So primary keys are not duplicated and confusion is reduced or eliminated
  
- Establishes Triggers and Stored Procedures as the Application Program Interfaces (APIs) for IC Tools
  - Helps maintain data integrity across domains

Programmer only worries about the call and its parameters  
...not the details of implementation.

**Understandable – Trusted – Interoperable – Accessible - Responsive**



# The Path Forward...

CTSF

Relevant and Ready

## “IC” May Need Better-Defined Scope:

- **Terrain database**
- ✓ **Unit Task Organization (UTO)**
- ✓ **C2 & Support Relationships**
- ✓ **Entity Identification - weapon systems, vehicles, personnel, sensors, equipment**
- ✓ **Entity position/location and orientation**
- **OPORDs, Annexes, overlays, matrixes**
- **Communications structures, nodes, networks**
- **URNs, IP addresses, frequencies, aliases**
- **Unit specific TTPs, Tactical SOPs**
- **Man-made obstacles and fighting positions**
- **Entity/Unit logistical status**
- **Enemy information**
- **Weather conditions**

### Key:

In ACSIS

In Data Model, not Populated

Not in ACSIS





## In Conclusion...

- **ACSIS is a Good Start:**
  - Strong Data Model
  - Good Initial Tool Set
- **ACSIS is a First Step:**
  - Initializes a few of many systems
  - Data Standardization Will be a Growing Challenge
- **Many Lessons Have been Learned**
- **Tremendous Challenges Lie Ahead ...especially in the Multilateral arena**
- **For More Information:**
  - **Phil Hallenbeck: Phil.Hallenbeck@ctsf.army.mil**
  - **Randy Shane: Randy.Shane@ctsf.army.mil**