

JTLS-2017-13199 Remove Combat System Prototype

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1.0 Summary of Model Change Request

A major Engineering Change Proposal (ECP) associated with the release of JTLS-GO Version 5.1 is JTLS-2008-10000, Data Repository. JTLS-2008-10000 has been implemented over the last year incrementally and JTLS 5.1 includes finalizing all of the remaining design goals for the Data Repository concept. One of these design goals is to provide that database builder with an easy method to synchronize the data that exists in two different databases. Synchronizing data involves:

- The identification of similar records
- The identification of differences between these similar records
- The implementation of the database builder's decision to keep the data as is or migrate the data from the repository into the scenario database.

Basically the identification of similar records, and thus the entire synchronization process, is being hindered by the representation of the Combat System Prototype (CSP) structure. The desire of this ECP is to remove the CSP structure from the JTLS-GO database. This is ultimately viewed as helping finalize the full Data Repository concept.

2.0 Design Summary

This design proposal does not completely remove the CSP structure from the JTLS database, but moves the majority of data from the CSP Combat System (CS) structure to the Combat System (CS) structure. In addition, for consistency, the design also proposes to remove portions of the Sustainment Logistics Prototype (SLP) data to the Supply Category (SC) structure.

[Section 3.0 Detailed Design](#) outlines how the existing data will be reorganized to make it easier for building a database and synchronizing databases.

3.0 Detailed Design

3.1 Background

Before discussing the data structure changes that will be made, it is important to understand why JTLS has the concept of a Combat System Prototype in the first place.

When JTLS was first started the amount memory associated with computers was smaller than it is today, and the more memory used resulted in slower computation speeds. This meant that a major design goal of JTLS was to keep memory usage to an absolute minimum. Because of this design goal, the JTLS Design Team came up with the concept of a Combat System Prototype (CSP).

With this initial concept, a database had a limited number of Combat Systems and each unit in the scenario owned an array indicating how many Combat Systems of each type the unit owned. In addition, the unit pointed to a Combat System Prototype which defined the exact capabilities of the combat system.

Consider the following simple example in which a European scenario represented 8 different Combat Systems. Each unit in the scenario used to own a Combat Systems Array that looks like the array shown in [Table 1](#).

Table 1. Example Old Unit Combat System Array

GENERIC NAME	TOE	AVAILABLE	MANNED	MAINT	UNAVAIL
AIRCRAFT	0	0	0	0	0
PERSONNEL	100	100	100	0	0
CREW	55	0	0	0	55
MAIN_BATTLE_TANK	5	5	5	0	0
HOWITZER_SP	8	8	8	0	0
TANKER_TRUCKS	0	0	0	0	0
CARGO_TRUCKS	0	0	0	0	0
AMPHIB_VEHICLES	0	0	0	0	0

So the example unit shown in [Table 1](#), has 8 self-propelled howitzers, but there is no concept of the capability of the howitzers. The actual real-world system that is represented by those 8 self-propelled Howitzers depends on the country to which the unit belongs. The database builder has the ability to indicate that if the unit belongs to:

- United States, the system represents an M109 self-propelled howitzer
- Poland, the system represents an AHS Krab - 155mm self-propelled howitzer
- Russia, the system represents a 2S19 MSTA-S 152 mm self-propelled howitzer
- Germany, the system represents a PzH 2000 155 mm self-propelled howitzer

- France, the system represents a GCT 155mm self-propelled howitzer

This relationship between the generic Combat System called HOWITZER_SP and the real-world system is accomplished by creating a different Combat System Prototype (CSP) for each country. The CSP for the unit indicates the capabilities of each generic Combat System. Thus a portion of the CSP for Russia may look as shown in [Table 2](#).

Table 2. Example CSP Data For RUSSIA_CSP

GENERIC CS NAME	CSP CS NAME	RANGE	WEIGHT	CREW COUNT	FUEL PER KM
AIRCRAFT	AIRCRAFT	0	0	0	0
PERSONNEL	PERSONNEL	0.5	.1	0	0
CREW	CREW	0.5	.1	0	0
MAIN_BATTLE_TANK	T-14.ARMATA	2	48	3	1
HOWITZER_SP	2S19.MSTA-S	29	42	5	1
TANKER_TRUCKS	KAMAZ-6560	0	18.75	0	1
CARGO_TRUCKS	URAL-4320	0	8.1	0	1
AMPHIB_VEHICLES	AMPHIB_VEHICLES	0	0	0	0

If the unit is owned by the United States, then the US CSP would be accessed to determine the exact capabilities of the unit's combat systems and in the case of the HOWITZER_SP system the specific capabilities of the M109 self-propelled howitzer.

The CSP structure allowed JTLS to represent a large number of different Combat Systems within what eventually became the standard 99 different combat systems held by each unit.

After several years of using this concept, JTLS decided to go away from a Combat Systems array for each unit to a list of combat systems owned by each unit. This change significantly saved memory, but the Design Team did not abandon the concept of the CSP.

To visualize this change, consider the unit described in [Table 1](#). Our example represents a database with 8 different Combat Systems, but the unit shown in [Table 1](#) does not own any Cargo Trucks, Tanker Trucks, Aircraft, or Amphib Vehicles, but the array is still reserved as 8 rows long.

A unit structure now looks like the data shown in [Table 3](#). The unit owns a list of Combat Systems which contains only four Combat Systems.

Table 3. Example Current Unit Combat System List

GENERIC NAME	TOE	AVAILABLE	MANNED	MAINT	UNAVAIL
PERSONNEL	100	100	100	0	0
CREW	55	0	0	0	55
MAIN_BATTLE_TANK	5	5	5	0	0
HOWITZER_SP	8	8	8	0	0

3.2 Data Change Basic Concept

The proposal for this design is to significantly alter the use of the CSP concept. Given that a unit now only contains a list of the Combat Systems that it owns, and given that a unit has a fairly limited number of different Combat Systems, the Design Team believes that the unit can point to the exact Combat System that it owns and does not need to go through the CSP to obtain specific Combat System capabilities.

Continuing with the above example, a unit owned by Russia will now have a Combat System list shown in [Table 4](#). This means that JTLS-GO databases will no longer have 99 Combat Systems but presumably hundreds of Combat Systems. When defining a TUP and therefore a Unit, the TUP will specify exactly how many of each Combat System of a specific type the unit owns.

Table 4. Example Proposed Unit Combat System List

GENERIC NAME	TOE	AVAILABLE	MANNED	MAINT	UNAVAIL
PERSONNEL	100	100	100	0	0
CREW	55	0	0	0	55
T-14.ARMATA	5	5	5	0	0
2S19.MSTA-S	8	8	8	0	0

The most basic question is how many different Combat Systems will be defined in the JTLS delivered Data Repository which forms the basis for all JTLS scenarios. The current plan is to define all of the Combat Systems currently defined in the Joint Live Virtual Constructive (JLVC) Master Combat Systems list. Any user can expand on this list or not use undesired systems that are currently on the list.

The entire Data Repository concept will automatically move only those systems that are in the repository that are needed by the Tactical Unit Prototypes (TUPs) used in the scenario database.

The specifics on how the repository accomplish this task is discussed in JTLS-2008-10000. The purpose of this design is to discuss where the data needed by the model now fits into the JTLS-GO database structure.

3.3 Specific Data Changes

The majority of this design is simply identifying the existing data in JTLS and where that data will be moved in the database structure and accessed by the model. This discussion is organized by the Database Development System (DDS) tables that will change. The color coding scheme identified in [Table 5](#) is used within each table discussed

Table 5. Color Coding Scheme Used Define Data Changes

COLOR	DESCRIPTION
Green	The attribute is being added to the table. The description indicates the existing table from which the data is obtained during the conversion process.
Yellow	The attribute is being removed from the table. The description indicates what is happening to the data.
Red	The attribute is being removed from the table and is no longer needed by JTLS.
Blue	The attribute is not impacted by this design. It exists in the current version of JTLS and will continue to be represented in JTLS-GO 5.1 in the specified table.
Brown	The attribute is not changing in the table, but is being filled automatically during the conversion process.

3.4 Combat System Representation Changes

The primary purpose of this ECP is to remove the dependence of the Combat System Prototype (CSP) structure. This section of the design discusses the data changes that will be made to accomplish this goal, and some basic rules that will be used to convert the existing data to this new data structure. The database conversion process uses the concept of the “Baseline CSP” and “Baseline Sustainment Logistics Prototype (SLP)”.

Each database has a data parameter called the Common Operational Picture (COP) side. This side has a Force Side Commander (FS COMMANDER). The FS COMMANDER has a Tactical Unit Prototype, which points to a Combat System Prototype (CSP). This CSP is referred to as the Baseline CSP for the conversion process. Any conversion rule that refers to the “Baseline CSP” is referring this specifically determined CSP.

Similarly, the FS COMMANDER belongs to a Faction and this Faction has a Sustainment Logistics Prototype, (SLP) which defines data for the supplies used by the Faction. Any conversion rule that refers to the “Baseline SLP” is referring this specifically determined SLP.

3.4.1 Combat Arms Type Table

All of the records in the current Combat Arms Type (CAT) Table will be deleted as part of the database conversion process. The table will be repopulated with the current Generic Combat System data. The method used to create the records is described in [Table 6](#). To repopulate the data, the concept of a Baseline CSP is required,

Table 6. Combat Arms Type Table Changes

CAT ATTRIBUTE	DESCRIPTION
CAT NAME	This attribute is filled with the CS GENERIC NAME from the JTLS 5.0 Combat System Table.
CAT RADIUS	This attribute is filled with the CAT RADIUS of the CSP CS COMBAT ARMS EQUIVALENT for the Baseline CSP and the CS which is used to create this record,
CAT REPAIR TIME	This attribute is filled with the CAT REPAIR TIME of the CSP CS COMBAT ARMS EQUIVALENT for the Baseline CSP and the CS which is used to create this record,
CAT DESTROY TIME	This attribute is filled with the CAT DESTROY TIME of the CSP CS COMBAT ARMS EQUIVALENT for the Baseline CSP and the CS which is used to create this record,
CAT CAT CODE	This attribute is filled with the CAT CAT CODE of the CSP CS COMBAT ARMS EQUIVALENT for the Baseline CSP and the CS which is used to create this record,
CAT ICON SYMBOL	This attribute is filled with the CAT ICON SYMBOL of the CSP CS COMBAT ARMS EQUIVALENT for the Baseline CSP and the CS which is used to create this record,
CAT STORAGE FLOOR AREA	This attribute is filled with the CAT STORAGE FLOOR AREA of the CSP CS COMBAT ARMS EQUIVALENT for the Baseline CSP and the CS which is used to create this record,
CAT SHELTER PRIORITY	This attribute is filled with the CAT SHELTER PRIORITY of the CSP CS COMBAT ARMS EQUIVALENT for the Baseline CSP and the CS which is used to create this record,

3.4.2 Combat System Table

[Table 7](#) defines all of the changes that will be made to the current Combat System (CS) table data. The basic concept is that each CSP CS record with a unique CSP CS NAME will become a

CS record in the CS table. Much of the data from the CSP CS table will be moved to the CS table. This movement is reflected in [Table 7](#).

Table 7. Combat System Table Changes

CS ATTRIBUTE	DESCRIPTION
CS.GENERIC.NAME	For each of the existing CS, the database conversion will create a new Combat Arms Type (CAT) entity, The CS GENERIC NAME become the CAT NAME for a Combat Arms Type record. This is described in more detail in Section 3.4.18 .
CS NAME	Obtained from CSP CS NAME and represents the name of the Combat System. The size of the name will be increased from 15 characters to 25 characters, No spaces will be allowed.
CS.PERSONNEL.FLAG	This information will be held in the new attribute called CS SPECIAL CAPABILITY. See the description of this new attribute for more information.
CS.ELS.CARRY.FLAG	This data will be duplicated from the CS ELS CARRY FLAG each time a CSP CS record is used to create a new Combat System.
CS.ELS.LIFT.FLAG	This data will be duplicated from the CS ELS LIFT FLAG each time a CSP CS record is used to create a new Combat System.
CS.ELS.PUBLISH.FLAG	This data will be duplicated from the CS ELS PUBLISH FLAG each time a CSP CS record is used to create a new Combat System.
CS.ELS.PROTECTED.FLAG	This data will be duplicated from the CS ELS PROTECTED FLAG each time a CSP CS record is used to create a new Combat System.
CS WEIGHT EACH	For each CSP CS record that becomes a new CS record, the value of CSP CS WEIGHT EACH is transferred to the CS WEIGHT EACH attribute.
CS RESUPPLY CATEGORY	For each CSP CS record that becomes a new CS record, the value of CSP CS SUPPLY CATEGORY is transferred to the CS SUPPLY CATEGORY attribute.
CS SPECIAL CAPABILITY	The special Combat System variables will be removed from the model. These are the special systems called COMBAT SYSTEM CREW, COMBAT SYSTEM CARGO TRUCK, COMBAT SYSTEM TANKER TRUCK, COMBAT SYSTEM HET, COMBAT SYSTEM UTILITY, COMBAT SYSTEM AMPHIB, COMBAT SYSTEM AIRCRAFT.
	This attribute would hold one of the following values:
	PERSONNEL - If the old CS PERSONNEL FLAG is YES, then this attribute will be specified as a PERSONNEL special capability Combat System.
	CREW - The SVP would insure that only one Combat System would have this designation
	AIRCRAFT - The SVP would insure that only one Combat System would have this designation.

Table 7. Combat System Table Changes

CS ATTRIBUTE	DESCRIPTION
<p>CS SPECIAL CAPABILITY (Con't)</p>	<p>AMPHIB - This indicates that the Combat System is a fighting Combat System that can also be used to move assets owned by the unit ashore or back to the formation. The conversion process will take the definition of CSP CS for the Baseline CSP and the CS labeled as COMBAT SYSTEM AMPHIB and create a Combat System record for each of the SMALL BOAT types labeled as "One Way" Small Boats. Each of these created CS records will have a CS SPECIAL CAPABILITY of AMPHIB</p>
	<p>CARGO - This indicates that the Combat System can be used by a Support Unit to move Dry Supplies as part of a Supply Run, The conversion process will take the definition of CSP CS for the Baseline CSP and the CS labeled as COMBAT SYSTEM CARGO TRUCK and create a Combat System record for each of the TRANSPORTATION CLASS records with TC TYPE set to "CARGO.TRUCK". Each of these created CS records will have a CS SPECIAL CAPABILITY of CARGO</p> <p>Because a unit can now own more than one type of Cargo Truck, there is no longer any need to specify the alternate Utility Truck Combat System.</p>
	<p>TANKER - This indicates that the Combat System can be used by a Support Unit to move WET Supplies as part of a Supply Run, The conversion process will take the definition of CSP CS for the Baseline CSP and the CS labeled as COMBAT SYSTEM TANKER TRUCK and create a Combat System record for each of the TRANSPORTATION CLASS records with TC TYPE set to "TANKER.TRUCK". Each of these created CS records will have a CS SPECIAL CAPABILITY of CARGO.</p> <p>This means that unlike the current version of JTLS, a unit can own more than one type of tanker truck.</p>
	<p>HET - This indicates that the Combat System can be used by a Support Unit to move Self-Propelled Supplies as part of a Supply Run, A HET is considered a specialize type of Cargo Truck. The conversion process, will search through each existing Sustainment Logistics Prototype (SLP) and if it has the attribute SLP HET, the conversion process will find the single CS record with a name equal to the TC NAME for the Transportation Class specified by the SLP HET attribute. That record will have this attribute changed from CARGO to HET.</p> <p>This means that unlike the current version of JTLS, a unit can own more than one type of HET.</p>

Table 7. Combat System Table Changes

CS ATTRIBUTE	DESCRIPTION
CS SPECIAL SUBCATEGORY	<p>This attribute only needs to be filled, if the CS SPECIAL CAPABILITY attribute is set to CARGO, TANKER, HET, or AMPHIB. If this new CS record has a CS SPECIAL CAPABILITY value of:</p> <ul style="list-style-type: none"> • CARGO, this attribute holds the type of Transportation Class that this system represents. • TANKER, this attribute holds the type of Transportation Class that this system represents. • HET, this attribute holds the type of Transportation Class that this system represents. • AMPHIB, this attribute holds the type of Small Boat that this system represents. • AIRCRAFT, the value of this attribute is not filled. Aircraft type will continue to be a unit attribute.
CS EFFECTIVE RANGE	For each CSP CS record that becomes a new CS record, the value of CSP CS EFFECTIVE RANGE is transferred to the CS EFFECTIVE RANGE attribute.
CS ATTRITION TYPE	For each CSP CS record that becomes a new CS record, the value of CSP CS ATTRITION TYPE is transferred to the CS ATTRITION TYPE attribute.
CS NO FUEL EFFICIENCY	For each CSP CS record that becomes a new CS record, the value of CSP CS NO FUEL EFFICIENCY is transferred to the CS NO FUEL EFFICIENCY attribute.
CS SUPPLY CATEGORY TO FIGHT	For each CSP CS record that becomes a new CS record, the value of CSP CS SUPPLY CATEGORY TO FIGHT is transferred to the CS SUPPLY CATEGORY TO FIGHT attribute.
CS AMMUNITION SUPPLY USAGE	For each CSP CS record that becomes a new CS record, the value of CSP CS AMMUNITION SUPPLY USAGE is transferred to the CS AMMUNITION SUPPLY USAGE attribute.
CS CREW COUNT	For each CSP CS record that becomes a new CS record, the value of CSP CS CREW COUNT is transferred to the CS CREW COUNT attribute.
CS KILL PROB	For each CSP CS record that becomes a new CS record, the value of CSP CS KILL PROB is transferred to the CS KILL PROB attribute.
CS WIA PROB	For each CSP CS record that becomes a new CS record, the value of CSP CS WIA PROB is transferred to the CS WIA PROB attribute.
CS COMBAT ARMS EQUIVALENT	For each CSP CS record that becomes a new CS record, the value of CS COMBAT ARMS EQUIVALENT is set to the CS GENERIC NAME of the specific CS since each CS GENERIC NAME has become a record in the Combat Arms Type Table.

Table 7. Combat System Table Changes

CS ATTRIBUTE	DESCRIPTION
CS HIGHRES EXPLICIT TW	For each CSP CS record that becomes a new CS record, the value of CSP CS HIGHRES EXPLICIT TW is transferred to the CS HIGHRES EXPLICIT TW attribute.
CS HIGHRES EXPLICIT ROUND TIME	For each CSP CS record that becomes a new CS record, the value of CSP CS HIGHRES EXPLICIT ROUND TIME is transferred to the CS HIGHRES EXPLICIT ROUND TIME attribute.
CS HIGHRES. AMBUSH ROUND TIME	For each CSP CS record that becomes a new CS record, the value of CSP CS HIGHRES. AMBUSH ROUND TIME is transferred to the CS HIGHRES. AMBUSH ROUND TIME attribute.
CS HIGHRES DISENGAGE ROUND TIME	For each CSP CS record that becomes a new CS record, the value of CSP CS HIGHRES DISENGAGE ROUND TIME is transferred to the CS HIGHRES DISENGAGE ROUND TIME attribute.
CS HIGHRES AMBUSH MODIFIER	For each CSP CS record that becomes a new CS record, the value of CSP CS HIGHRES AMBUSH MODIFIER is transferred to the CS HIGHRES AMBUSH MODIFIER attribute.
CS NON COMBAT FUEL USAGE	For each CSP CS record that becomes a new CS record, the value of CSP CS NON COMBAT FUEL USAGE is transferred to the CS NON COMBAT FUEL USAGE attribute.
CS COMBAT FUEL USAGE	For each CSP CS record that becomes a new CS record, the value of CSP CS COMBAT FUEL USAGE is transferred to the CS COMBAT FUEL USAGE attribute.
CS FUEL PER KM	For each CSP CS record that becomes a new CS record, the value of CSP CS FUEL PER KM is transferred to the CS FUEL PER KM attribute.
CS DIS CODE	For each CSP CS record that becomes a new CS record, the value of CSP CS DIS CODE is transferred to the CS DIS CODE attribute.
CS STORAGE FLOOR AREA	For each CSP CS record that becomes a new CS record, the value of CSP CS STORAGE FLOOR AREA is transferred to the CS STORAGE FLOOR AREA attribute.
CS HIGHRES SPEED	For each CSP CS record that becomes a new CS record, the value of CSP CS HIGHRES SPEED is transferred to the CS HIGHRES SPEED attribute.
CS AGILITY TYPE	For each CSP CS record that becomes a new CS record, the value of CSP CS AGILITY TYPE is transferred to the CS AGILITY TYPE attribute.
CS RIC	For each CSP CS record that becomes a new CS record, the value of CSP CS RIC is transferred to the CS RIC attribute.
CS NIC	For each CSP CS record that becomes a new CS record, the value of CSP CS NIC is transferred to the CS NIC attribute.

3.4.3 Combat System - Terrain Type (CS-TT) Table

This table will be completely removed from JTLS. The data will be transferred to a new table called the Combat Arms Type - Terrain Type Table. The current table has only one attribute, CS TT PERCENT NONVISIBLE. For each Combat System Record that became a Combat Arms Type Record (see [Section 3.4.1](#)), all of the records in the CS-TT table will become a record in the CAT-TT table. The value for CS TT PERCENT NONVISIBLE will be the value used in the new CAT TT PERCENT VISIBLE.

3.4.4 Combat Arms Type - Terrain Type Table

As mentioned in [Section 3.4.3](#), the data currently held in the Combat System - Terrain Type Table will be moved into the new Combat Arms Type - Terrain Type Table.

3.4.5 Child Tables That Reference Combat Systems

There are several additional tables, that currently reference the Generic Combat Systems. Since the Generic Combat Systems are being moved into the Combat Arms Type Table, these child tables can no longer reference Combat Systems must reference the new Combat Arms Types. [Table 8](#) outlines these child table attributes that will be changed.

Table 8. Child Tables For Which Referenced Combat Systems Become Combat Arms Types

TABLE ATTRIBUTE	BECOMES
FLP CSP CS NUMBER STANDARD RESPONSES	FLP CSP CAT NUMBER STANDARD RESPONSES
FLP CS CS ALLOCATION.OF.FIRE	FLP CAT CAT ALLOCATION.OF.FIRE
FLP CS LC WC ATTRITION FACTOR	FLP CAT LC WC ATTRITION FACTOR
SP CS PACKET SIZE	SP CAT PACKET SIZE
SP CS HRU PACKET SIZE	SP CAT HRU PACKET SIZE
SP CS TT ATTRITION MULT IN ATTACK	SP CAT TT ATTRITION MULT IN ATTACK
SP CS TT ATTRITION MULT IN NON ATTACK	SP CAT TT ATTRITION MULT IN NON ATTACK
SP CS TT AREA LETHALITY MULT	SP CAT TT AREA LETHALITY MULT
CCP CS BASE DENSITY	CCP CAT BASE DENSITY
CCP CS UP DENSITY MODIFIER	CCP CAT UP DENSITY MODIFIER
CCP CS TT DENSITY MODIFIER	CCP CAT TT DENSITY MODIFIER
EST CS PRIORITY	EST CAT PRIORITY
CSP CS MFT EXPECTED CASUALTIES	CSP CAT MFT EXPECTED CASUALTIES

3.4.6 Combat System Prototype Table

Only one change is needed to the current Combat System Prototype Table. This table will continue to define a CSP by its CSP NAME and CSP PROB REMAINS RECOVERED, but CSP PRIMARY COUNTRY is no longer needed. When a country code is required, the faction of the object will be accessed to get the country code.

3.4.7 Combat System Prototype - Combat System Table

The entire Combat System Prototype - Combat System (CSP-CS) table will be deleted from the JTLS-GO data structure. [Table 9](#) identifies exactly what will happen to the data current held in the CSP-CS table.

Table 9. Combat System Prototype - Combat System Table Changes

CS ATTRIBUTE NAME	DESCRIPTION
CSP CS NAME	Each CSP CS record can potentially become a CS record in the Combat Systems Table. The value held in the CSP CS NAME attribute will be moved to the CS NAME attribute.
CSP CS WEIGHT EACH	For each CSP CS record that becomes a new CS record, the value of CSP CS WEIGHT EACH is transferred to the CS WEIGHT EACH attribute.
CSP CS RESUPPLY CATEGORY	For each CSP CS record that becomes a new CS record, the value of CSP CS SUPPLY CATEGORY is transferred to the CS SUPPLY CATEGORY attribute.
CSP CS EFFECTIVE RANGE	For each CSP CS record that becomes a new CS record, the value of CSP CS EFFECTIVE RANGE is transferred to the CS EFFECTIVE RANGE attribute.
CSP CS ATTRITION TYPE	For each CSP CS record that becomes a new CS record, the value of CSP CS ATTRITION TYPE is transferred to the CS ATTRITION TYPE attribute.
CSP CS NO FUEL EFFICIENCY	For each CSP CS record that becomes a new CS record, the value of CSP CS NO FUEL EFFICIENCY is transferred to the CS NO FUEL EFFICIENCY attribute.
CSP CS SUPPLY CATEGORY TO FIGHT	For each CSP CS record that becomes a new CS record, the value of CSP CS SUPPLY CATEGORY TO FIGHT is transferred to the CS SUPPLY CATEGORY TO FIGHT attribute.
CSP CS AMMUNITION SUPPLY USAGE	For each CSP CS record that becomes a new CS record, the value of CSP CS AMMUNITION SUPPLY USAGE is transferred to the CS AMMUNITION SUPPLY USAGE attribute.
CSP CS HIGHRES EXPLICIT TW	For each CSP CS record that becomes a new CS record, the value of CSP CS HIGHRES EXPLICIT TW is transferred to the CS HIGHRES EXPLICIT TW attribute.

Table 9. Combat System Prototype - Combat System Table Changes

CS ATTRIBUTE NAME	DESCRIPTION
CSP CS HIGHRES EXPLICIT ROUND TIME	For each CSP CS record that becomes a new CS record, the value of CSP CS HIGHRES EXPLICIT ROUND TIME is transferred to the CS HIGHRES EXPLICIT ROUND TIME attribute.
CSP CS HIGHRES. AMBUSH ROUND TIME	For each CSP CS record that becomes a new CS record, the value of CSP CS HIGHRES. AMBUSH ROUND TIME is transferred to the CS HIGHRES. AMBUSH ROUND TIME attribute.
CSP CS COMBAT ARMS EQUIVALENT	<p>The value held in this attribute may or may not be used.</p> <ul style="list-style-type: none"> • If the Combat System is not one of the Special Combat Systems, this attribute is transferred to the CS EQUIVALENT SUBCATEGORY attribute. • If the CSP CS record is for Special COMBAT SYSTEM CREW, then the value of CSP CS COMBAT.ARMS.EQUIVALENT is transferred to the CS EQUIVALENT SUBCATEGORY attribute. • If the CSP CS record is for Special COMBAT SYSTEM CARGO TRUCK, COMBAT SYSTEM TANKER TRUCK, COMBAT SYSTEM HET, or COMBAT SYSTEM UTILITY, COMBAT SYSTEM AMPHIB, or COMBAT SYSTEM AIRCRAFT, the value of this attribute is not used. as part of the conversion process.
CSP CS HIGHRES DISENGAGE ROUND TIME	For each CSP CS record that becomes a new CS record, the value of CSP CS HIGHRES DISENGAGE ROUND TIME is transferred to the CS HIGHRES DISENGAGE ROUND TIME attribute.
CSP CS HIGHRES AMBUSH MODIFIER	For each CSP CS record that becomes a new CS record, the value of CSP CS HIGHRES AMBUSH MODIFIER is transferred to the CS HIGHRES AMBUSH MODIFIER attribute.
CSP CS CREW COUNT	For each CSP CS record that becomes a new CS record, the value of CSP CS CREW COUNT is transferred to the CS CREW COUNT attribute.
CSP CS KILL PROB	For each CSP CS record that becomes a new CS record, the value of CSP CS KILL PROB is transferred to the CS KILL PROB attribute.
CSP CS WIA PROB	For each CSP CS record that becomes a new CS record, the value of CSP CS WIA PROB is transferred to the CS WIA PROB attribute.
CSP CS NON COMBAT FUEL USAGE	For each CSP CS record that becomes a new CS record, the value of CSP CS NON COMBAT FUEL USAGE is transferred to the CS NON COMBAT FUEL USAGE attribute.
CSP CS COMBAT FUEL USAGE	For each CSP CS record that becomes a new CS record, the value of CSP CS COMBAT FUEL USAGE is transferred to the CS COMBAT FUEL USAGE attribute.

Table 9. Combat System Prototype - Combat System Table Changes

CS ATTRIBUTE NAME	DESCRIPTION
CSP CS FUEL PER KM	For each CSP CS record that becomes a new CS record, the value of CSP CS FUEL PER KM is transferred to the CS FUEL PER KM attribute.
CSP CS DIS CODE	For each CSP CS record that becomes a new CS record, the value of CSP CS DIS CODE is transferred to the CS DIS CODE attribute.
CSP CS STORAGE FLOOR AREA	For each CSP CS record that becomes a new CS record, the value of CSP CS STORAGE FLOOR AREA is transferred to the CS STORAGE FLOOR AREA attribute.
CSP CS HIGHRES SPEED	For each CSP CS record that becomes a new CS record, the value of CSP CS HIGHRES SPEED is transferred to the CS HIGHRES SPEED attribute.
CSP CS AGILITY TYPE	For each CSP CS record that becomes a new CS record, the value of CSP CS AGILITY TYPE is transferred to the CS AGILITY TYPE attribute.
CSP CS RIC	For each CSP CS record that becomes a new CS record, the value of CSP CS RIC is transferred to the CS RIC attribute.
CSP CS NIC	For each CSP CS record that becomes a new CS record, the value of CSP CS NIC is transferred to the CS NIC attribute.
CSP CS MEAN TIME BETWEEN REPAIR	For each CSP CS record, the CS GENERIC NAME has become a Combat Arms Type. This data is moved to the CSP CAT MEAN TIME BETWEEN REPAIR attribute.
CSP CS PROB SYSTEM RECOVERED	For each CSP CS record, the CS GENERIC NAME has become a Combat Arms Type. This data is moved to the CSP CAT PROB SYSTEM RECOVERED attribute.
CSP CS PROB NON COMBAT FAILURE	For each CSP CS record, the CS GENERIC NAME has become a Combat Arms Type. This data is moved to the CSP CAT PROB NON COMBAT FAILURE attribute.
CSP CS MEAN TIME BETWEEN FAILURE	For each CSP CS record, the CS GENERIC NAME has become a Combat Arms Type. This data is moved to the CSP CAT MEAN TIME BETWEEN FAILURE attribute.
CSP CS KILLER FWL MODIFIER	For each CSP CS record, the CS GENERIC NAME has become a Combat Arms Type. This data is moved to the CSP CAT KILLER FWL MODIFIER attribute.
CSP CS VICTIM FWL MODIFIER	For each CSP CS record, the CS GENERIC NAME has become a Combat Arms Type. This data is moved to the CSP CAT VICTIM FWL MODIFIER attribute.
CSP CS SCORE	For each CSP CS record, the CS GENERIC NAME has become a Combat Arms Type. This data is moved to the CSP CAT CS SCORE attribute.

3.4.8 Combat System Prototype - Combat Arms Type Table

This is a new table. As mentioned in [Section 3.4.1](#), each Generic Combat System will become a new record on the Combat Arms Type. For each CSP, this child table will be completely filled with one record for each Combat Arms Type. [Table 10](#) defines where the data for this table will be obtained.

Table 10. Combat System Prototype - Combat Arms Type Table Definition

CSP CAT ATTRIBUTE NAME	DESCRIPTION
CSP CAT MEAN TIME BETWEEN REPAIR	This data is obtained from the CSP CS MEAN TIME BETWEEN REPAIR attribute.
CSP CAT PROB SYSTEM RECOVERED	This data is obtained from the CSP CS PROB SYSTEM RECOVERED attribute.
CSP CAT PROB NON COMBAT FAILURE	This data is obtained from the CSP CS PROB NON COMBAT FAILURE attribute.
CSP CAT MEAN TIME BETWEEN FAILURE	This data is obtained from the CSP CS MEAN TIME BETWEEN FAILURE attribute.
CSP CAT KILLER FWL MODIFIER	This data is obtained from the CSP CS KILLER FWL MODIFIER attribute.
CSP CAT VICTIM FWL MODIFIER	This data is obtained from the CSP CS VICTIM FWL MODIFIER attribute.
CSP CAT SCORE	This data is obtained from the CSP CS SCORE attribute.

3.4.9 Lanchester Data

Current for each Lanchester Case represented in the database, the model holds the combat coefficient for each Killer Combat System versus each Victim Combat System. Given that there will be hundreds of different Combat Systems defined in the Data Repository, this amount of data will tax the database builder and the operation of JTLS.

The Lanchester Case coefficient data will now entered for each Killer Combat Arms Type and each Victim Combat Arms Type. This results in exactly the same amount of Lanchester coefficient data in the converted database because each old Combat System will become a Combat Arms Type during the conversion process.

There will be no change in the data that tells the model which Lanchester case should be used. This will still be determined based on the data held for the posture of the Killing Unit and the posture of the Victim unit.

3.4.10 Unit Prototype Tables

There are three types of unit prototype tables. The changes needed for each if these tables are defined in [Table 11](#).

Table 11. Changes To The Three Unit Prototype Tables

TABLE	CHANGE
Tactical Unit Prototype (TUP) Table	The attribute TUP COMBAT SYSTEMS PROTOTYPE will be removed from the table. If this TUP is used by the Leader Unit of a Faction, the Faction’s new FC COMBAT SYSTEMS PROTOTYPE attribute will be set to this value.
	Since we are now representing each Combat System, there is no reason to represent the concept of Caliber within JTLS. TUP.CALIBER will be removed from the table.
	A single Tactical Unit Prototype can now have several amphibious vehicles specified. There is no longer the need for the single database parameter TUP AMPHIB BOAT TYPE. When determine what amphibious boats to use, the model will determine what amphibious vehicles the unit has by cycling through the specific combat systems owned by the unit.
Ship Unit Prototype (SUP) Table	The attribute SUP COMBAT SYSTEMS PROTOTYPE will be removed from the table. If this SUP is used by the Leader Unit of a Faction, the Faction’s new FC COMBAT SYSTEMS PROTOTYPE attribute will be set to this value.
	Since we are now representing each Combat System, there is no reason to represent the concept of Caliber within JTLS. SUP.CALIBER will be removed from the table.
Highres Unit Prototype (HUP) Table	No changes are required, An HRU will continue to get its CSP from its parent unit.

3.4.11 Unit Prototype Combat System Child Table (TUP CS, SUP CS, and HUP CS)

The Combat Systems that belong to each TUP, SUP, and HUP need to be converted to the new names for the Combat Systems. For each existing record in each of these three child tables, the conversion process will access the CSP CS NAME for each Combat System and change the TUP CS NAME of the record from the CS GENERIC NAME to the new CS NAME.

3.4.12 Faction Table

Originally a JTLS Faction pointed to the Combat Systems Prototype of all units that belongs to the Faction. This led to problems especially when a given Faction contained both ground units and

naval units. To solve this problem, the attribute that links a unit to a Combat Systems Prototype was moved from the Faction to the both the TUP table and the SUP table.

Now that we are no longer sharing Combat Systems, this link can be moved back to the Faction. Thus the Faction Table will have one new attribute added called FC COMBAT SYSTEMS PROTOTYPE. The conversion routine will fill this new attribute with the TUP COMBAT SYSTEMS PROTOTYPE or the SUP COMBAT SYSTEMS PROTOTYPE of the Faction Leader.

3.4.13 Caliber Table

The entire Caliber Table will be removed from the database including the Targetable Weapon - Caliber Child Table.

How are we handling the limitation of weapons that can be fired by a specific unit in an order panel since we no longer have caliber. We are proposing ideas:

- JODA object Unit_TW - UNIT JEDI and TW JEDI

3.4.14 Combat System - Targetable Weapon Table

This table has only one attribute CS TW CAN FIRE. The data held in this table is problematic to begin with and it is fully expected that once the conversion is complete, end users will need to significantly review this data.

The reader needs to remember that this data is currently based on the Generic Combat System which means that the data held can represent Targetable Weapons that cannot be owned or fired for a specific Combat System Prototype. After the conversion is complete, incorrect data will still exist in the table.

For every Indirect Fire Combat System that is added to the Combat Systems Table, the records in this table for the old Generic Combat System will be copied. When the conversion is complete, the old records will be removed from the database.

Should we make this a set owned by a CS or leave it as an array?

3.4.15 Disease Related Combat Systems Data

Currently for each Disease Failure (DF) defined in the database and for each Faction Survivability Prototype (SP), the database holds three values for each represented combat system:

- The percentage of afflicted systems that are killed or die each day
- The percentage of afflicted systems that recover each day
- The percentage of operational systems which acquire the disease or failure type each day.

In looking at this data, the Design Team feels this data needs to continue being dimensioned for each type of Combat System. For example, a US M109 self-propelled howitzer will most likely be specified as a HOWITZER_SP Combat Arms Type, but it should have different disease parameters than a French GCT 155MM system. This means that the data needs to continue to be held in DF SP CS table.

The issue is how to hold this data in the model. Currently it is held in an array dimensioned by the number of Disease Failure types by number of Survivability Prototype entities by number of Combat System entities. At this point in time, the Design Team does not have a good feeling for the number of Combat Systems that will be defined for any given scenario. This number depends on how the user implements their database and how robustly they use the new Data Repository concept,

Because of the Database Repository concept, the Design Team envisions that a given scenario should have only those Combat Systems used by the represented forces. All other Combat Systems should be deleted and if needed at a later date, they can be drawn in from the repository.

Still we cannot be certain that all users will follow the concept. For this reason, we are planning on moving away from the DF SP CS array structure to having each DF SP combination own a list of Combat Systems that can be affected by the Disease Failure. To accomplish this there is no need for a database construct change, only a model construct change to hold the data in a different manner. Each structure, the Disease Failure Data (DFD) held in the list will have the following attributes:

- DFD COMBAT SYSTEM
- DFD DAILY KILL RATE
- DFD DAILY RECOVER RATE

Still during the conversion process, Each Combat System created will determine if there is any current record for that system's Generic Combat System in the DF SP CS table. If there is, the data will be copied. If not, then no new data will be added to the table.

Rename so it is SP DF

3.4.16 Lethality Data For Combat Arms Type (CAT)

The model holds three tables that describe lethality against Combat Arms Types.

- Area Kill Lethality Data
- Point Kill Lethality Data

- Probability Of Hit Data

The format and structure of this data will not change as a result of this ECP. During the conversion process, the existing data will need to be properly handled because as mentioned in [Section 3.4.1](#) all existing Combat Arms Type (CAT) records will be removed from the database and replaced with new CAT records named after the existing CS GENERIC NAME attribute of the existing Combat Systems.

To properly fill in this data, the conversion process will do the following when a new Combat System record is created:

- Access the CSP CS COMBAT ARMS EQUIVALENT attribute for the CSP CS record that is resulting in the generation of a new Combat System. This is the OldCAT.
- Copy all Area Kill Lethality records for the OldCAT and replace OldCAT with the CS GENERIC NAME of the CS that is creating the new Combat System.
- Copy all Surface Kill Lethality records for the OldCAT and replace OldCAT with the CS GENERIC NAME of the CS that is creating the new Combat System.
- Copy all Probability of Hit records for the OldCAT and replace OldCAT with the CS GENERIC NAME of the CS that is creating the new Combat System.

Because there are probably several CSP CS records that will end creating a new CS record and which point to the same OldCAT, the above copy procedure may result in an attempt to create multiple non-unique records in each table. This situation will be caught and the data will be thrown away.

3.4.17 Intelligence Information Prototype (IIP) Combat Arms Type Data

The model holds detection multiplier data and mobile detection multiplier data for every CAT record. This data structure will not change, but the conversion process will delete all of the existing CAT records and create new CAT records based in the CS GENERIC NAME. As described in [Section 3.4.16](#), the conversion process will do the following when a new Combat System record is created:

- Access the CSP CS COMBAT ARMS EQUIVALENT attribute for the CSP CS record that is resulting in the generation of a new Combat System. This is the OldCAT.
- Copy all detection multiplier IIP records held for the OldCAT and replace OldCAT with the CS GENERIC NAME of the CS that is creating the new Combat System.

3.4.18 Special Combat System Types

Each of the Special Combat System database parameters, COMBAT. SYSTEM CREWS, COMBAT SYSTEM AMPHIB, COMBAT SYSTEM AIRCRAFT, COMBAT SYSTEM HET, COMBAT SYSTEM OTHER TRUCKS, COMBAT SYSTEM CARGO TRUCKS, COMBAT SYSTEM TANKER TRUCKS will be removed from the database.

The variables COMBAT. SYSTEM CREWS, and COMBAT SYSTEM AIRCRAFT will be maintained in the code, but will be assigned based on the Combat System attribute CS SPECIAL CAPABILITY. As described in [New SVP Checks Section 3.6.1](#), only one Combat System can have a special capability of CREW and only one Combat System can have a special capability of AIRCRAFT. Maintaining these variables will make the code more efficient and easier to understand.

3.5 Supply Category Representation Changes

Although this ECP discussed removing the dependence on the Combat System Prototype structure, the Design Team feels for consistency the same type of change should be made to the Sustainment Logistics Prototype. The design does not call for the removal of the Sustainment Logistics Prototype, but calls for removing the sharing of a Supply Category in two different Sustainment Logistics Prototypes. This section of the design discusses the data changes needed to accomplish this goal.

3.5.1 Supply Category Table

Each of the records in the SC Table will be removed and replaced with a record for each SLP SC NAME that is unique. [Table 12](#) described the data changes to the Supply Category Table.

Table 12. Supply Category Table Changes

SC ATTRIBUTE	DESCRIPTION
SC GENERIC NAME	This table attribute will be removed. It is no longer needed.
SC NAME	Obtained from SLP SC NAME and represents the name of the Supply Category. The size of the name will be increased from 15 characters to 25 characters, No spaces will be allowed.
SC CONSUMPTION TYPE	This data will be duplicated from the SC CONSUMPTION TYPE each time a SLP SC record is used to create a new Supply Category.
SC SHIPMENT TYPE	
SC RIC	For each SLP SC record that becomes a new SC record, the value of SLP SC RIC is transferred to the SC RIC attribute.
SC NIC	For each SLP SC record that becomes a new SC record, the value of SLP SC NIC is transferred to the SC NIC attribute.

Table 12. Supply Category Table Changes

SC ATTRIBUTE	DESCRIPTION
SC PREFERRED UOM	For each SLP SC record that becomes a new SC record, the value of SLP SC PREFERRED UOM is transferred to the SC PREFERRED UOM attribute.
SC SUPPLY TYPE EQUIVALENT	For each SLP SC record that becomes a new SC record, the value of SLP SC SUPPLY TYPE EQUIVALENT is transferred to the SC SUPPLY TYPE EQUIVALENT attribute.
SC SPECIAL CAPABILITY	<p>The special Supply Category variables will be removed from the model. These are the special supplies called CATEGORY BRIDGING, CATEGORY BARRIERS, CATEGORY CLASS III GROUND, CATEGORY CLASS III AVIATION, CATEGORY CLASS III NAVY, CATEGORY CLASS IV, CATEGORY PERSONNEL, CATEGORY LEAFLET, CATEGORY CASUALTIES, CATEGORY.REMAINS,</p> <p>This attribute would hold one of the following values:</p>
	<p>BRIDGING - Every SC record that is created from an existing SLP SC record where the Supply Category is equal to CATEGORY BRIDGING will have this attribute set the value BRIDGING. This means that several Supply Category records can end up with an SC SPECIAL CAPABILITY of BRIDGING. This will be allowed. When determining if a unit has bridging material, the model will simply determine if the unit has any Supply Category with its SC SPECIAL CAPABILITY attribute equal to BRIDGING.</p>
	<p>BARRIER - Every SC record that is created from an existing SLP SC record where the Supply Category is equal to CATEGORY BARRIER will have this attribute set the value BARRIER. This means that several Supply Category records can end up with an SC SPECIAL CAPABILITY of BARRIER. This will be allowed. When determining if a unit has barrier material, the model will simply determine if the unit has any Supply Category with its SC SPECIAL CAPABILITY attribute equal to BARRIER.</p>
	<p>CLASS III AIR CLASS - Every SC record that is created from an existing SLP SC record where the Supply Category is equal to CATEGORY CLASS III AIR will have this attribute set the value CLASS III AIR. This means that several Supply Category records can end up with an SC SPECIAL CAPABILITY of CLASS III AIR. This will be allowed. When determining if a unit has air fuel the model will simply determine if the unit has any Supply Category with its SC SPECIAL CAPABILITY attribute equal to CLASS III AIR.</p>
	<p>CLASS III GROUND - Every SC record that is created from an existing SLP SC record where the Supply Category is equal to CATEGORY CLASS III GROUND will have this attribute set the value CLASS III GROUND. This means that several Supply Category records can end up with an SC SPECIAL CAPABILITY of CLASS III GROUND. This will be allowed. When determining if a unit has ground fuel the model will simply determine if the unit has any Supply Category with its SC SPECIAL CAPABILITY attribute equal to CLASS III GROUND.</p>

Table 12. Supply Category Table Changes

SC ATTRIBUTE	DESCRIPTION
SC SPECIAL CAPABILITY (Con't)	<p>CLASS III NAVY - Every SC record that is created from an existing SLP SC record where the Supply Category is equal to CATEGORY CLASS III NAVY will have this attribute set the value CLASS III NAVY. This means that several Supply Category records can end up with an SC SPECIAL CAPABILITY of CLASS III NAVY. This will be allowed. When determining if a unit has naval fuel the model will simply determine if the unit has any Supply Category with its SC SPECIAL CAPABILITY attribute equal to CLASS III NAVAL.</p>
	<p>CLASS IV - Every SC record that is created from an existing SLP SC record where the Supply Category is equal to CATEGORY CLASS IV will have this attribute set the value CLASS IV. This means that several Supply Category records can end up with an SC SPECIAL CAPABILITY of CLASS IV. This will be allowed. When determining if a unit has needed Class IV supplies, the model will simply determine if the unit has any Supply Category with its SC SPECIAL CAPABILITY attribute equal to CLASS IV.</p>
	<p>LEAFLET - Every SC record that is created from an existing SLP SC record where the Supply Category is equal to CATEGORY LEAFLET will have this attribute set the value LEAFLET. This means that several Supply Category records can end up with an SC SPECIAL CAPABILITY of LEAFLET. This will be allowed. When determining if a unit has leaflets, the model will simply determine if the unit has any Supply Category with its SC SPECIAL CAPABILITY attribute equal to LEAFLET. Similarly when the model determines if a Targetable Weapon represents Leaflets, the model will simply determine if the Supply Category from which the Targetable Weapon is drawn comes from a Supply Category where its SC SPECIAL CAPABILITY attribute equal to LEAFLET.</p>
	<p>PERSONNEL - Every SC record that is created from an existing SLP SC record where the Supply Category is equal to CATEGORY PERSONNEL will have this attribute set the value PERSONNEL. This means that several Supply Category records can end up with an SC SPECIAL CAPABILITY of PERSONNEL. This will be allowed. When determining if a unit has any extra personnel, the model will simply determine if the unit has any Supply Category with its SC SPECIAL CAPABILITY attribute equal to PERSONNEL.</p>
	<p>CASUALTIES - Only the first SLP SC record encountered for CATEGORY CASUALTIES will be used to create a SC record. That one created record will have this attribute set the value CASUALTIES. This means that only one Supply Category records can end up with an SC SPECIAL CAPABILITY of CASUALTIES. Any casualties created during the game, will be added to this Supply Category owned by the unit.</p>
	<p>REMAINS - Only the first SLP SC record encountered for CATEGORY REMAINS will be used to create a SC record. That one created record will have this attribute set the value REMAINS. This means that only one Supply Category records can end up with an SC SPECIAL CAPABILITY of REMAINS. Any remains created during the game, will be added to this Supply Category owned by the unit.</p>

Table 12. Supply Category Table Changes

SC ATTRIBUTE	DESCRIPTION
SC SPECIAL CAPABILITY (Con't)	NONE - Every SC record that is created from an existing SLP SC record where the Supply Category is not equal to one of the Special Supply Categories, will have this attribute set the value NONE.

3.5.2 Special Supply Category Types

As mentioned in [Table 12](#), the model will no longer be limited to a single supply category that represents special supplies, such a bridging, fuel, and personnel. The following special supply category variables will be removed from the model: CATEGORY BRIDGING, CATEGORY BARRIERS, CATEGORY CLASS III GROUND, CATEGORY CLASS III AVIATION, CATEGORY CLASS III NAVY, CATEGORY CLASS IV, CATEGORY PERSONNEL, CATEGORY LEAFLET. Although not part of this design, this improvement will open the door for eventually representing different types of ground fuel, such a diesel and benzine, or different types of aviation fuel.

The following special supply category variables will not be removed from the model, but will be removed from the database and assigned internally as part of the data initialization procedure: CATEGORY CASUALTIES, CATEGORY REMAINS.

3.5.3 Sustainment Logistics Prototype (SLP) Table Changes

The following database parameters are no longer needed since every unit can have multiple different types of trucks used to move supplies.

- SLP CARGO TRUCK
- SLP TANKER TRUCK
- SLP OTHER TRUCK
- SLP HET

No other database changes are required to this table.

3.5.4 Supply Type (SUT) Table Changes

Since presumably there will now be hundreds, if not thousands, of Supply Categories, specifying reserved fraction data for each Supply Category seems overly burdensome. For this reason, the reserve fraction is being placed on the Supply Type table.

The SUPPLY TYPE (SUT) data structure is currently used to hold Probability of Hit and Probability of Kill data for a unit's supplies, As described in [Table 12](#), each SC record has an attribute called

SC SUPPLY TYPE EQUIVALENT which references this data structure. One new attribute will be added to the SUT Table. This new attribute is the SUT RESERVED FRACTION attribute and the data for this attribute is obtained from the SLP SC RESERVED FRACTION attribute.

It all likelihood, several of the new SC records will point to a single SUT record. This means that the conversion process will lose data, but in reviewing existing databases, including Standard Database, this data is not different across the SLPs or across different Supply Categories that point to the same SLP SC EQUIVALENT SUPPLY TYPE. In other words, the current Standard Database has already assumed that RESERVED FRACTION is an attribute of a SUT and not a SC record. Any experienced data loss will be minimal.

3.5.5 Sustainment Logistics Prototype - Supply Category Table Changes

This entire table will be removed from the JTLS database. Since Supply Categories are no longer shared among SLPs, the data in this table is transferred primarily to the Supply Category Table as described in [Table 13](#).

Table 13. Sustainment Logistics Prototype - Supply Category Table Changes

SC ATTRIBUTE	DESCRIPTION
SLP SC NAME	Each SLP SC record can potentially become a SC record in the Supply Category Table. The value held in the SLP SC NAME attribute will be moved to the SC NAME attribute.
SLP SC RIC	For each SLP SC record that becomes a new SC record, the value of SLP SC RIC is transferred to the SC RIC attribute.
SLP SC NIC	For each SLP SC record that becomes a new SC record, the value of SLP SC NIC is transferred to the SC NIC attribute.
SLP SC PREFERRED UOM	For each SLP SC record that becomes a new SC record, the value of SLP SC PREFERRED UOM is transferred to the SC PREFERRED UOM attribute.
SLP SC SUPPLY TYPE EQUIVALENT	For each SLP SC record that becomes a new SC record, the value of SLP SC SUPPLY TYPE EQUIVALENT is transferred to the SC SUPPLY TYPE EQUIVALENT attribute.
SLP SC RESERVED FRACTION	The value of SLP SC RESERVED FRACTION is transferred to the new SUT RESERVED FRACTION attribute for the SUT referenced in the attribute SLP SC SUPPLY TYPE EQUIVALENT.

Although not a part of the database, the model determines if an SLP SC record is used as ammunition and this information is currently held by the model in an attribute called SLP SC USED AS AMMO. The entire SLP SC structure is not only removed from the database, but it is also removed from the model. The SLP SC USED AS AMMO information will now be held on the Supply Category structure in a new model controlled attribute called SC USED AS AMMO.

3.5.6 Other Tables Referenced By Supply Category

There are several tables that are currently dimensioned by Supply Category. Much of this data is repetitive and given the number of Supply Categories that are being placed in databases the data can be reduced by referencing the data not by Supply Category but by Supply Type (SUT). Again since several Supply Categories (SC) will point to a single SUT, there will be potential loss of data, but this is expected to be minimal and unimportant.

Table 14. Child Tables For Which Referenced Supply Categories Become Supply Types

TABLE ATTRIBUTE	BECOMES
SLP SLP SC DUMPED USABLE FRACTION	SLP SLP SUT DUMPED USABLE FRACTION
SP SC PACKET SIZE	SP SUT PACKET SIZE

3.5.7 Supply Density Data

Currently there is a table for Command Control Prototype (CCP), Supply Category (SC), Unit Posture (UP) and Terrain Type (TT) which holds the density information for the supplies in a unit that uses the specified CCP, while in the specified UP while located in the specified a grid with the specified TT. This data table fills a model variable called CCP SC UP TT DENSITY.

At some point in time, the equivalent Combat System data was changed from a four dimensional array (CCP, SC, UP, TT) to the following three arrays, which reduced the complexity of the data and the amount of data that the model needed to hold.

- CCP CS BASE DENSITY
- CCP CS UP DENSITY MODIFIER
- CCP CS TT DENSITY MODIFIER

Table 8 indicated that these three Combat System child data tables were being changed as a result of this design to:

- CCP CAT BASE DENSITY
- CCP CAT UP DENSITY MODIFIER
- CCP CAT TT DENSITY MODIFIER

We are proposing as part of this design to bring the supply density data into alignment with the combat system density data. This means that the single data table that currently holds the density will be changed to the following three tables:

- CCP SUT BASE DENSITY
- CCP SUT UP DENSITY MODIFIER
- CCP SUT TT DENSITY MODIFIER

The database conversion capability will end up throwing away a significant amount of data, pointing to importance of reviewing the resulting data tables after the conversion is complete.

The conversion procedure needs the “Baseline SLP” to accomplish the conversion. For each of the SUT records in the database, the conversion process will find an existing SLP SC record that has a SLP SC SUPPLY TYPE EQUIVALENT to the SUT record. If none is found, then the conversion process will look through all of the SLP SC records looking for a record that does have an SLP SC SUPPLY TYPE EQUIVALENT set to the SUT record. If no records are found, then no density data will be added to the new tables.

As soon as a record is found, the conversion process now knows which Supply Category (SC) to use to fill in the data for the SUT records. All other SC data that may also point to the same SUT is thrown away.

The following data is then added to each of the tables for each CCP.

1. Take the CCP SC UP TT DENSITY value, D, for the this CCP, for the selected SC, for the Unit Posture of Defend and for the Terrain Type OPEN. Create a record in the CCP SUT table with a density value of D. If the value of D is zero or the record is not found, move on to the next Supply Type (SUT)
2. For each Unit Posture (UP), take the CCP SC UP TT DENSITY value for this CCP, the selected SC, for the UP, and for the TT of OPEN and divide it by D from Step 1. Create a record in the CCP SUT UP table with this computed multiplier value.
3. For each Terrain Type (TT), take the CCP SC UP TT DENSITY value for this CCP, the selected SC, for Unit Posture (UP) DEFEND, and for this TT and divide it by D from Step 1. Create a record in the CCP SUT TT table with this computed multiplier value.

3.5.8 Lethality Data For Supply Type (SUT)

Unlike the lethality data described in [Section 3.4.16](#), no changes are required to this data for supplies. The conversion process does not alter the Supply Type data held in the database. This means that no changes are required to the structure of this data or the data held in this table.

3.6 Scenario Verification Program Changes

3.6.1 New SVP Checks

The following SVP checks need to be added to the verification process.

- No two Combat System that have a special capability of CARGO, TANKER, or HET should point to the same Transportation Class. This is an Error.
- No two Combat Systems that have a special capability of AMPHIB should point to the same Small Boat type. This is an Error.
- Only one Combat System should have a CS SPECIAL CAPABILITY of CREW. This is an Error.
- Only one Combat System should have a CS SPECIAL CAPABILITY of AIRCRAFT. This is an Error.

3.6.2 Changed SVP Checks

Numerous SVP checks need to be changed. The majority of these changes simply move the related database parameter from the CSP CS structure to the CS structure,

- Error 203 indicating that a CS uses ammo in an HRU fight and has no consumption per day parameter.
- Error 217 indicating that a CS drawn from supply category but the weight of the system is set to zero,
- Error 224 indicating that a CS uses ammo in an HRU fight and the ammunition assigned has no Surface Kill Lethality data.
- Error 239 indicating that a CS that represents personnel and has a weight specified of zero,
- Error 243 indicating that a CS has a DIS Code specified that is not value.
- Error 247 indicating that a CS requires crew, but no TUP/SUP CREW record exists.
- Error 248 indicating that an HRU speed is invalid because personnel Combat Systems must have a speed greater than zero.
- Error 405 indicating that a TUP/SUP lacks basic load for its CS.
- Error 419 indicating that a TUP/SUP has illegal full TOE strength.

- Error 424 indicating that a TUP/SUP uses ammo, but no basic load for that ammunition has been specified.
- Error 425 indicating that a TUP/SUP uses fuel, but no basic load for fuel has been specified.
- Error 426 indicating that a support unit has no trucks capable of moving a specific Supply Category.
- Warning 5014 indicating that a ELS - TUP Template Order of Battle (TOB) does not exist.
- Warning 5015 indicating that a ELS - HUP TOB does not exist.
- Warning 5016 indicating that a ELS - Template references invalid CS name.
- Warning 1132 indicating that a CS has invalid DIS code.
- Warning 1202 indicating that a CS that is out-of-fuel has an increased efficiency.
- Warning 1208 indicating that a Truck re-issue supply category is inconsistent.
- Warning 1221 indicating that a HUP lacks supplies to fight.
- Warning 1226 indicating that the Aircraft Combat System has reissue supply cat assigned.
- Warning 1229 indicating that a Crew count for personnel or one of the special Combat Systems is not equal to zero.
- Warning 1230 indicating that a SUP/TUP has insufficient Crew CS.
- Warning 1232 indicating that a FLP number responses for direct fire CS is greater than zero.
- Warning 1234 indicating that a FLP number responses for indirect fire CS is equal to zero.
- Warning 1236 indicating that at Transportation Class cannot move a specific Supply Category
- Warning 1240 indicating that a TUP/SUP has both posture and periodic fuel usage specified.
- Warning 1241 indicating that a TUP/SUP has both posture and movement fuel usage specified.

- Warning 1243 indicating that a CS uses ammunition to fight, but that ammunition supply category is not set to an As Used Supply Category.
- Warning 1251 indicating that a CS has a non-zero daily ammunition use, but no ammunition supply category is specified.
- Warning 1252 indicating that a HET has no dry carry capacity.
- Warning 1255 indicating that a TUP does not have 5 days of ground fuel specified.
- Warning 1261 indicating that a CS TW fires explicitly, but CS attrition type has no value.
- Warning 1264 indicating that a Truck or HET has reissue supply cat not self-propelled modify
- Warning 1408 indicating that a Squadron wiped-out threshold is too high.
- Warning 1409 indicating that a Squadron TUP has a score for aircraft value of zero.
- Warning 1413 indicating that a Support unit TUP has a scores for trucks of zero.
- Warning 1424 indicating that a Unit has no CS with range greater than decisively engaged distance.

3.6.3 Deleted SVP Checks

The following SVP checks need to be deleted.

- Error 226 indicating that a given Sustainment Logistics Prototype (SLP) has two or more of their truck types pointing to the same Transportation Class.
- Error 230 indicating that the CSP CS name is blank. This database parameter no longer exists.
- Warning 1217 indicating two CSP CS NAME parameters have the same name. CSP CS NAME no longer exists in the database parameter.
- Warning 1259 indicating that a TUP subordinate has different CSP than its TUP superior. TUPs no longer have a Combat System Prototype.
- Warning 1219 indicating that a HUP is associated with two different CSPs.
- Warning 1262 indicating that a CS has different attrition type in two or more CSPs.

3.7 Model Changes

Although the majority of this ECP is simply a reorganization of the data structures, there are some model changes that will need to be made. These model changes are described in [Table 15](#).

Table 15. Required Model Changes

CHANGE	DESCRIPTION AND REASON
Convoy Loading Algorithm	<p>Any Support Unit can now have numerous types of trucks which can be used to create convoys and move supplies. The loading algorithm for trucks will need to be improved to account for this change. The loading algorithm will not be optimal, but will attempt to reduce the amount of empty space on the convoy assets.</p>
Reduce Size of Supply Category Statistics Arrays	<p>As a result of this ECP, any given scenario will result in a large increase in the number of Supply Categories. There are many internally controlled statistics arrays that are dimensioned by the number of Supply Categories; therefore, these arrays will become extremely large. The entire concept of the Database Repository is that for a given scenario, only the supplies that are needed for the represented forces will be included in the scenario data. To date, database builders have been reluctant to delete this data because it was not easy to get back.</p> <p>If a database builder reduces the number of Supply Categories the size of this internally controlled statistics data may not be an issue, but the Design Team is still worried about the memory requirements.</p> <p>These supply statistics arrays will be removed from the model and changed to a list of statistics records. A record will only be created when it is needed. For consistency, the design calls for transferring not just the supply-based statistics arrays but all of the internally maintained statistics arrays to list.</p> <p>These following statistics lists will be maintained. The attributes of each object highlighted in Green indicate the attributes that are used to create unique records in each of the lists.</p> <p>An Aircraft Loss Statistics Record (ATT) will be held in an Aircraft Loss Statistics List. These records will have the following attributes:</p> <ul style="list-style-type: none"> • ATT OWNING FORCE SIDE • ATT KILLING FORCE SIDE • ATT OWNING SERVICE • ATT AIRCRAFT CLASS • ATT DAMAGE REASON - There are 9 reasons: Artillery, Air Strike, Air-to-Air, Ground Combat, Fuel Loss, Ground-to-Air, External Model Kill, Crash Land, Controller Kill • ATT PERIOD LOSS NUMBER • ATT TOTAL LOSS NUMBER

Table 15. Required Model Changes

CHANGE	DESCRIPTION AND REASON
Reduce Size of Supply Category Statistics Arrays (Con't)	<p>A Backorder Statistics Record (BTT) will be held in a Backorder Statistics List. These records will have the following attributes:</p> <ul style="list-style-type: none"> • ETT FORCE SIDE • ETT SUPPLY CATEGORY • ETT LAST PERIOD BACKORDER • ETT CUMULATIVE BACKORDER
	<p>An Aircraft Flown Statistics Record (FTT) will be held in an Aircraft Flown Statistics List. These records will have the following attributes:</p> <ul style="list-style-type: none"> • FTT OWNING FORCE SIDE • FTT SERVICE • FTT AIRCRAFT.CLASS • FTT MISSION TYPE • FTT PERIOD SORTIES FLOWN • FTT TOTAL SORTIES FLOWN • FTT PERIOD SORTIES LINKED • FTT TOTAL SORTIES LINKED • FTT PERIOD SORTIES CONVERTED • FTT TOTAL SORTIES CONVERTED • FTT PERIOD SORTIES INTERCEPTED • FTT TOTAL SORTIES INTERCEPTED • FTT PERIOD SORTIES ENGAGED • FTT TOTAL SORTIES ENGAGED • FTT PERIOD SORTIES DELIVERED WEAPONS • FTT TOTAL SORTIES DELIVERED WEAPONS • FTT PERIOD SORTIES LOST • FTT TOTAL SORTIES LOST
	<p>A Combat Systems Statistics (CTT) Record will be held in a Combat System Statistics List. These records will have the following attributes:</p> <ul style="list-style-type: none"> • CTT FORCE SIDE • CTT COMBAT SYSTEM • CTT DAMAGE REASON • CTT PERIOD LOST • CTT TOTAL LOST

Table 15. Required Model Changes

CHANGE	DESCRIPTION AND REASON
Reduce Size of Supply Category Statistics Arrays (Con't)	<p>A Supply Statistics (STT) Record which will be held in a Supply Statistics List. These records will have the following attributes:</p> <ul style="list-style-type: none"> • STT FORCE SIDE • STT SERVICE • STT PERIOD.USED • STT TOTAL.USED • STT PERIOD.REQUIRED • STT TOTAL.REQUIRED • STT PERIOD LOST • STT TOTAL.LOST <p>A Lanchester Kill Statistics (LTT) Record will be held in a Lanchester Statistics List.</p> <ul style="list-style-type: none"> • LTT VICTIM FORCE SIDE • LTT VICTIM COMBAT SYSTEM • LTT KILLING COMBAT SYSTEM • LTT PERIOD LOST • LTT TOTAL LOST
Damage Computation	<p>Combat Systems Truck and Amphib will use Combat Arms Type kill data just like any other combat system. There will no longer need to be special code to handle these systems.</p>
Impact on ASC	<p>The Automatic Supply Calculation Tool will be affected by this data change. It will be much more straightforward with the removal of the dependence on the SLP concept. This code needs to be changed to use the new data structures. No functional changes will result from this design,</p>
Impact on LOGFAS	<p>This change will make the link to LOGFAS easier for both the database developer and the LOGFAS code. This code needs to be changed to use the new data structures. No functional changes will result from this design,</p>

4.0 Data Changes

As outlined in [Section 3.0 Detailed Design](#), numerous database changes are required for this ECP. Since all of this data already exists in JTLS, the current DRM information only needs to be changed to properly identify the new name and data structure dimensions for each affected data element. The meaning, mode, units of measure, and relationships of these parameters do not change. The new data descriptions will be placed in the Database Requirements Manual (DRM).

5.0 Order Changes

The Controller needs to be able to change the data for these new data structures during game execution. The following orders need to be modified:

- Order SET CS ATTRIBUTES
- Order SET CSP PARAMETER
- Order SET COMBAT ARMS PARAMETER
- Order SET FLP PARAMETER
- Order SET SP DATA
- Order SET SHELTER PARAMETER
- Order SET TACTICAL UNIT PROTO
- Order SET SHIP UNIT PROTOTYPE
- Order FACTION.CREATE
- Order FACTION ATTRIBUTE CHANGE
- Order SET TW PARAMETER
- Order SET LOG GENERAL PARAMETER
- Order SET SUPPLY TYPE PARAMETER
- Order SET SLP DATA
- Order SET CCP PARAMETER

As noted by the above list, over the years there has been an inconsistency in the JTLS-GO order naming convention. Although, not important, the Design Team feels that keeping orders consistently names makes the model easier to understand. Not all orders can be consistently named because of limitations, such as order name length, but there are several differences that can easily be removed as we redo some of the above orders. These minor changes will be made as part of the work to update the above orders as a result of the data changes required by this ECP.

6.0 JODA Changes

No JODA Data System parameter, structure, or protocol changes are required to implement this design.

7.0 Test Plan

Text *[Describe the basic test objectives and procedures. This Test Plan section may be published as a separate document.]*

7.1 Test 1 Title

Purpose: *[Describe the specific feature, function, or behavior to be tested or measured.]*

Step 1: Text

Step 2: Text

Expected Results: *[Describe the specific model behavior to be observed.]*

7.2 Test 2 Title

Purpose: *[Describe the specific feature, function, or behavior to be tested or measured.]*

Step 1: Text

Step 2: Text

[Describe the specific model behavior to be observed.]