A Human View Methodology to Address Stakeholder HSI Concerns

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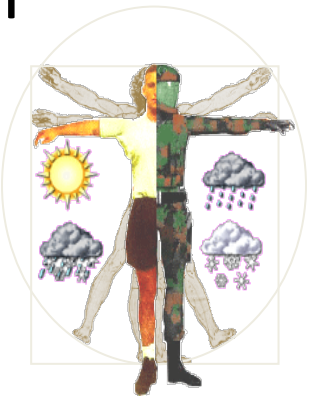
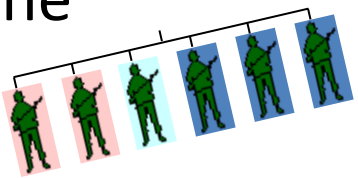
The Human View (HV) …

- Is an architectural viewpoint that focuses on the human part of a system.
  - Organizes information about how the human "fits in" or "interacts with" the system.
- Adds value by providing a more complete representation of the system by including human capabilities and limitations.
  - Ensures that the human is fully considered in the system enterprise architecture by structurally incorporating them into engineering planning.
  - Provides human-system parameters that can be used to minimize human risk with the overall system.





Human View and DoDAF

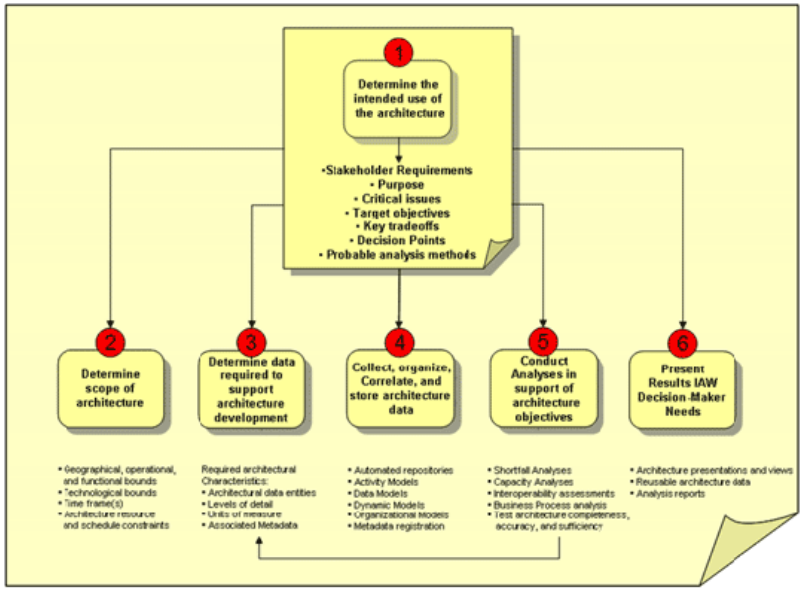
- In the Department of Defense Architecture Framework (DoDAF)[1] context, the Human View can be considered and implemented as a part of a "**Fit-for-Purpose" (FFP)** model.
  - FFP models are purposely focused to address issues within a specific stakeholder project or mission area.
  - The Human View can answer questions about the constraints and limitations of the human system component.
- However, very little guidance exists for the creation of Fit for Purpose Human Views, or their use in architecture analysis.

[1][Version 2.02 Change 1]

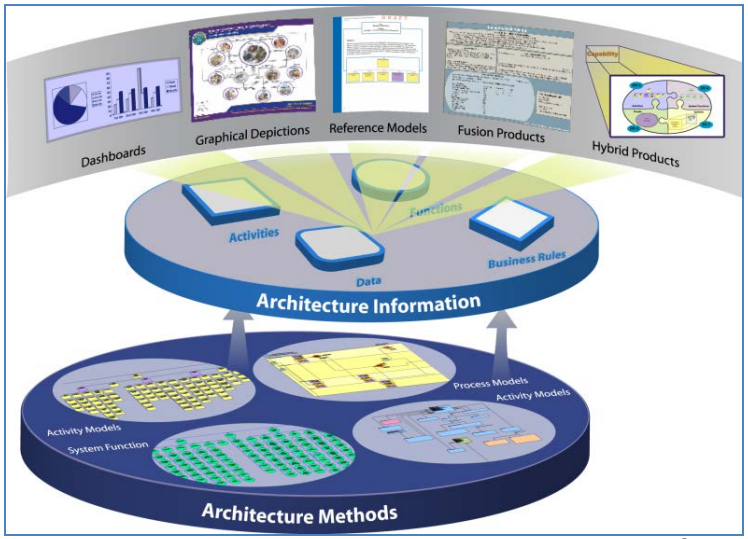
HV Fit for Purpose Application

- The HV Method was applied to a current Army System to create a Fit-for-Purpose HV.
- The Wafighter Information Network – Tactical (WIN-T), Soldier Network Extension (SNE) was selected to address PM WIN-T crew performance questions.

Legacy View Method



Fit for Purpose Method



PEO C3T
PROGRAM EXECUTIVE OFFICE COMMAND CONTROL COMMUNICATIONS-TACTICAL

Warfighter Information Network Tactical (WIN-T)

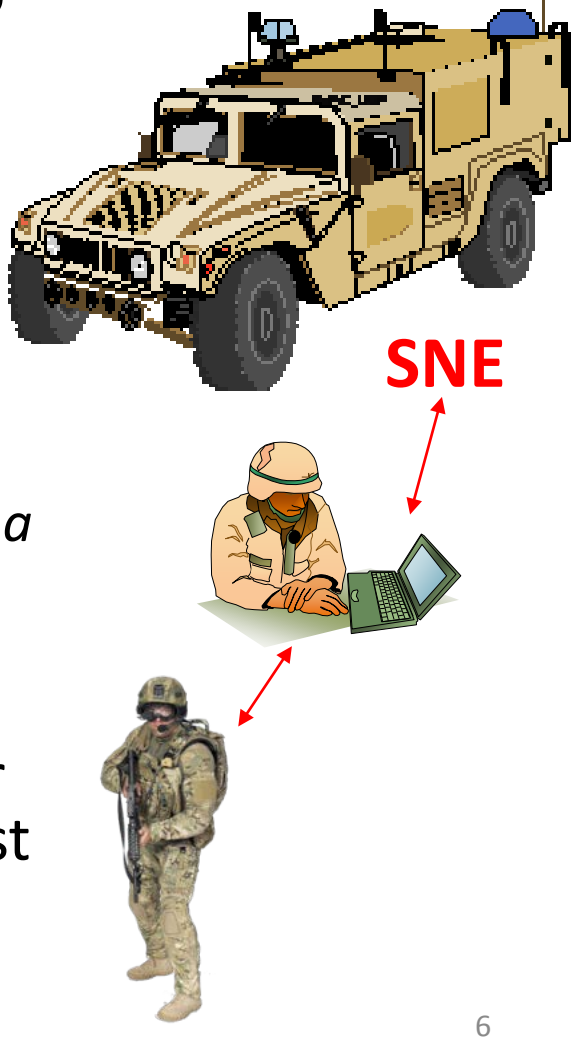
PROJECT MANAGER WIN-T

- WIN-T is a tactical level communications network that provides voice and data services without needing a fixed infrastructure.
- WIN-T Increment 2 includes ‘the on-the-move' capability at the Battalion level so voice and data communications can be used while mobile.
- Soldiers use the WIN-T network to access maneuver, fires, and intelligence applications from inside moving vehicles.
- Commanders are able to communicate mission decisions from their vehicles rather than being tethered to fixed command posts.

COMMANDER POP (Point-of-Presence)

Soldier Network Extension

- The Soldier Network Extension (SNE) is a sub system of WIN-T
  - Installed on select vehicles to extend lower echelon tactical radio networks for geographically separated elements.
- Stakeholders are concerned about SNE Crew composition - how to optimize SNE operations in varying missions
  - *Soldiers with different MOS [job series] may be a better match for the mission tasks that require WIN-T technologies*.
- HV has been applied to determine the differences between a General Purpose User (GPU) and a Signal Support Systems Specialist (25U) when conducting SNE Crew tasks.



HV Method for FFP Process Steps

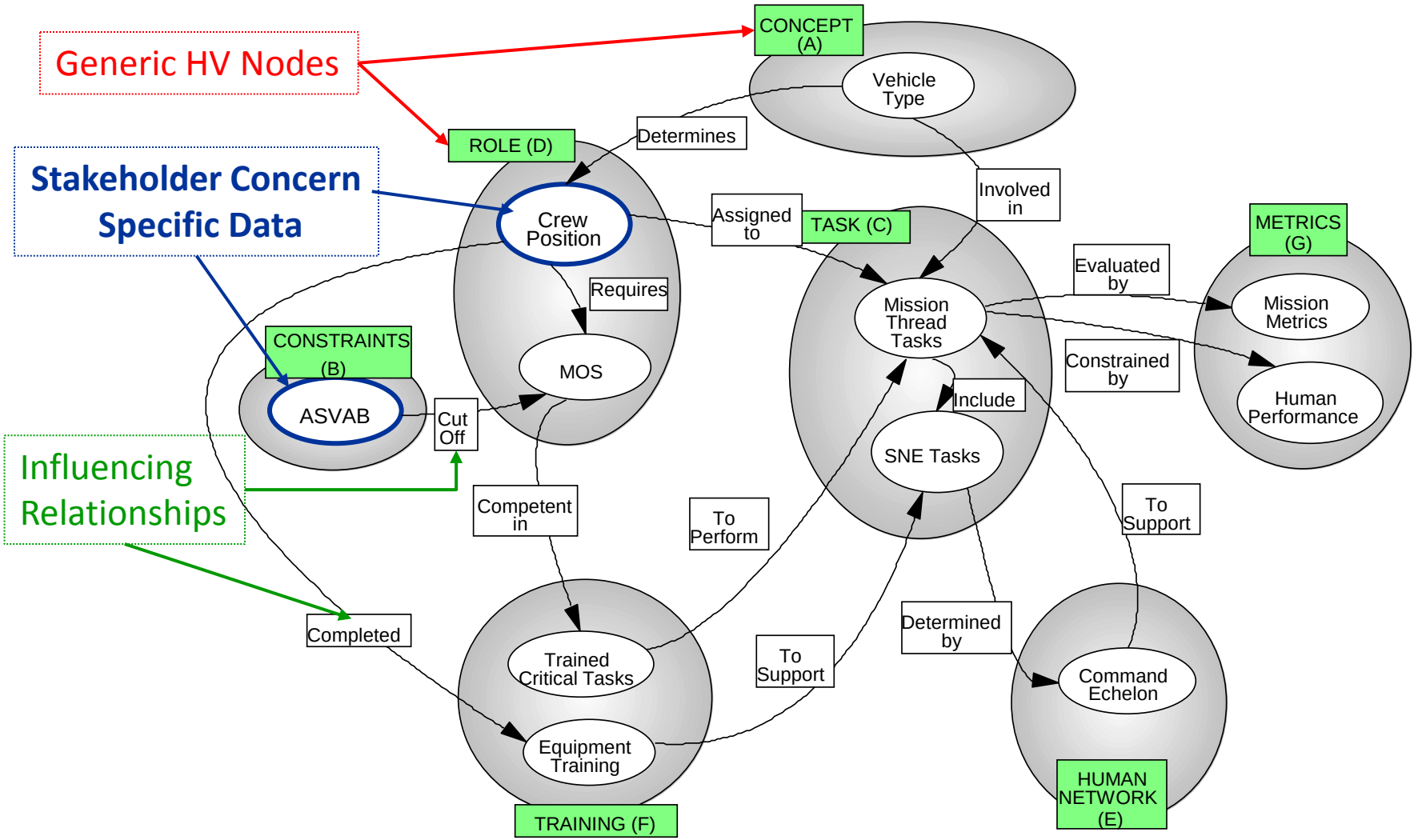
1. Map the Human-in-the-System Domain
2. Collect Context-Focused Data
3. Identify Data Relationships & Workflow
4. Select Inputs for Dynamic Simulations
5. Provide Human View FFP Models

"Fit for Purpose Views are driven by Stakeholder Questions."

1. Map the Human-in-the-System Domain

- Create a Data Map.
  - Identifies the data context for the stakeholder question.
  - Identifies the links between data sets
    - Partitions independent and dependent variables for analysis
    - Identifies causal relationships.
  - Shows the content specific data needed for each Human View Node.
- There are multiple ways to map the HV
  - Depends on data available and type of analysis
  - Data Map is core concept to visualize the HV data, data flow, links & relationships and identify areas of concern.

WIN-T SNE Data Map



ASVAB=ARMED SERVICES VOCATIONAL APTITUDE BATTERY MOS=MILITARY OCCUPATIONAL SPECIALTY

2. Collect Context-Focused Data

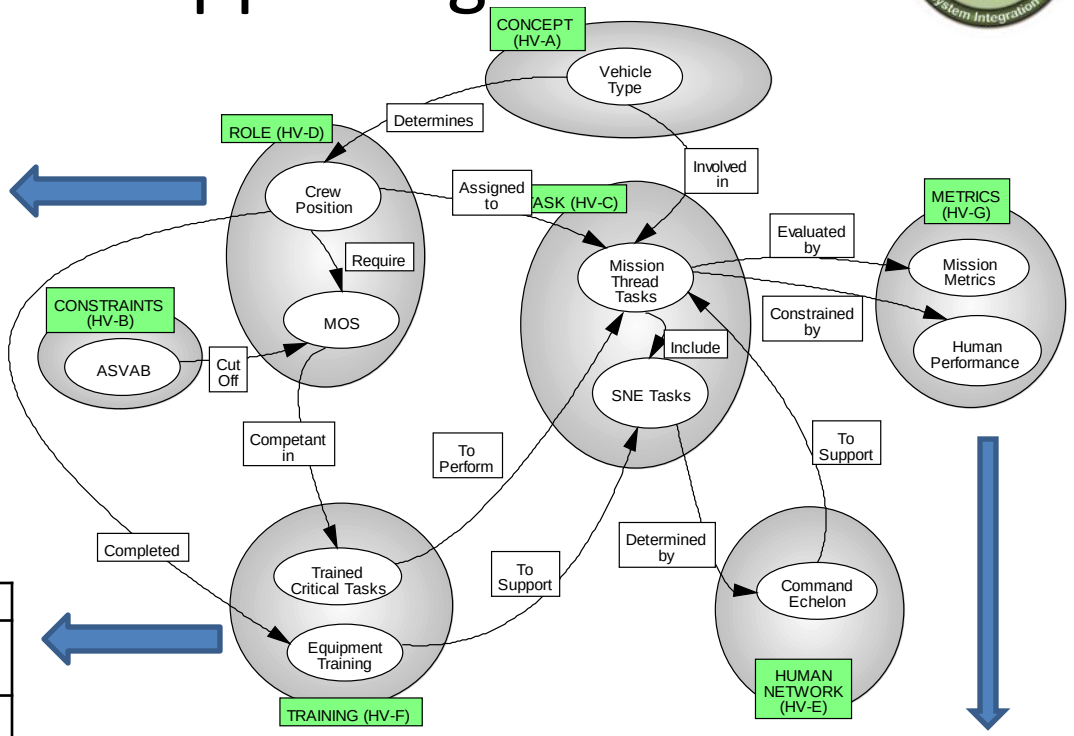
- Identify information sources and collect data based on the types identified in the Data Map.
- Create a *Data Repository* – suitable for search and initial analytics.

SNE Data Repository – High Level	
HV Product Nodes	**Descriptions**
A Concept	SNE system differentiated by Vehicle Type
B Personnel Constraints	ASVAB Scores - Subtests and Line Scores
C Tasks	Mission Thread SNE Related Tasks
D Roles	SNE Crew by Position and MOS
E Human Network	Command Echelon that supports the Signal Soldiers
F Training	MOS Critical Task Training and WIN-T Equipment Training
G Metrics	AUTL Task Metrics

AUTL=ARMY UNIVERSAL TASK LIST

SNE Data Repository
Detail Level - Supporting Data

MOS	*19K*	*11B*	*25U*	*11A*
Descriptor	*Armor*	*Infantry*	*Signal*	*Commander*
WIN-T Role	GPU	GPU	Expert User	Supported User
ROLE	**Driver**	**Rifleman**	**Support System Specialist**	**Company Commander**
Responsibility	Crew Member	Basic Equipment Operator	Communications	Decision Maker

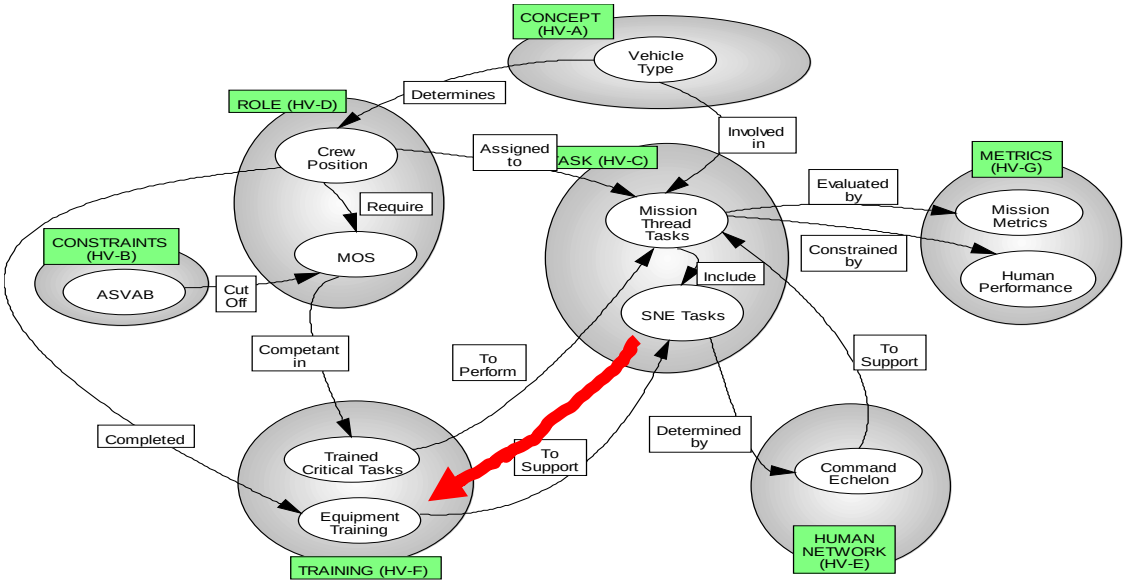


25U10	GPU
Install, configure, employ, troubleshoot, and maintain VMP	Install, operate, maintain the VMP
Install, configure, employ, troubleshoot, and maintain PoP	Install, operate, maintain the PoP
Install, configure, employ, troubleshoot, and maintain SNE	Install, operate, maintain the SNE
-	IAW unit assignment
Install, configure, employ, troubleshoot, and maintain Signal Support Equipment	-
Unit level maintenance of cable connectivity between WIN-T information/network systems.	-
Deployment and configuration of the WIN-T Inc 2 component/platforms, infrastructure, and architecture	-

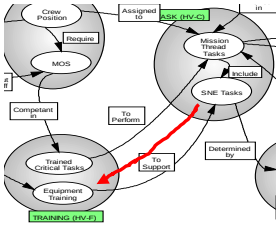
No.	***Scale***	***Measure***
01	Yes/No	Information and data collected, processed, displayed, stored, and disseminated directed relevant information to the right persons at the right time in a usable format to facilitate situational understanding and decision making.
02	Time	To direct, establish, and control the means by which the various staffs and forces send and receive operationally significant data or information, to minimize operations delayed or affected because of lack of information.
03	Time	For common operational picture to reflect real-world situation.
04	Percent	Of critical information acquired and disseminated to subordinate commanders and appropriate members of subordinate staffs.
05	Percent	Of time that data was presented to the decision maker in the requested format.

3. Identify Data Relationships & Workflows

- Determine influencing relationships relevant to current human-system issues from Data Map.
- Cross link content specific data tables and identify causal relationships between data sets.



OLD DOMINION UNIVERSITY
IDEA FUSION



Mapping SNE Tasks to Training

SNE TASKS | **25U TRAINING** | **GPU TRAINING** | **SHORTCOMINGS AND IMPACT**

WIN-T Mission Thread	Description	Task Sequence (Adapted) *SNE Tasks Only*	25U Training		GPU Training		Impact on Task Performance: LOW - Duty Specific Training Sufficient MED - WIN-T Equipment Training Sufficient only for SOPs, HIGH - Critical Task Training Required		
			Critical Task Training	Additional WIN-T Equipment Training	WIN-T Equipment Training	Duty Position Training	Perceived Task Difficulty	GPU Training Adequate	Impact to Task Performance
#3	SNEs utilize TIGR" [and enable FOS/AFATDS]	At CoCdr (SNE), take previously received *LW* Image; Attach an image to a TIGR report; Wait synch time for TIGR to replicate image to BDE	25U Course Item #16 Hardware & Software			Application TIGR Training	LOW	YES	LOW
#6	TCNs, PoPs, and SNEs utilize WIN-T MDA soft phone	VOIP User dials CNR Gateway or SNE Operator to connect to SNE CNR GW; SNE Operator uses CNR Application to dial BN RTO VoIP	25U Course Item #6 Combat Net Radio	Install, configure, employ, troubleshoot, and maintain SNE	Install, operate, maintain the SNE		MED	SOP Only	HIGH FOR NON SOP EVENTS
#11	Support Net-Centric operations in an open [unclassified & classified] network	Company generates traffic /previously received data from NWS to verify routing capability from CoCdr (SNE) to BDE; Verify routing capability across Network	#113-623-7002 "Perform Quality Control on FLM of Assigned Equipment"	Deployment and configuration of the WIN-T Inc 2 component/platforms, infrastructure, and architecture			HIGH	NONE RECEIVED	HIGH FOR ALL EVENTS

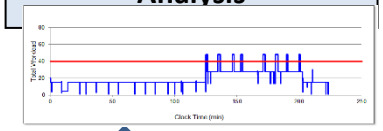
4. Select Input for [SNE] Dynamic Simulations

Select causal relationships to vary conditions of role-task assignment and skill level to evaluate the impact on mission performance.

Metrics	Description
Human Limitations:	
Operator Workload	Component overloads, total workload, thresholds and problematic tasks
Workload Density	Weighted workload, indicates high demand of a task
Organization Design:	
Load Balance	Distribution of workload, tasks between employees
Human Availability	Busy-idle time (processing time vs. monitoring, communication time)
Training & Selection:	
Sufficient Training on Task (Critical, Equipment, Duty)	Characterization of Simulation Moderators to indicate performance adjustments due to superior and inferior training on mission tasks
Correct Personnel Categorization (ASVAB Line Scores & Cut Off)	Characterization of Simulation Moderators to include positive and negative offsets due to ASVAB parameters

Human Performance Modeling & Simulation

Perform Workload Analysis

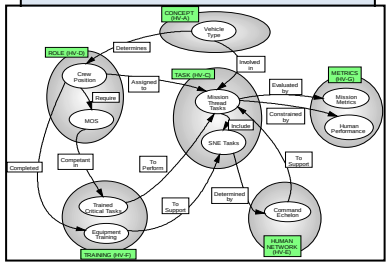


Correlation

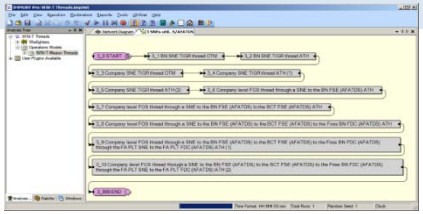
Adjust HV Model

Identify Areas of Interest

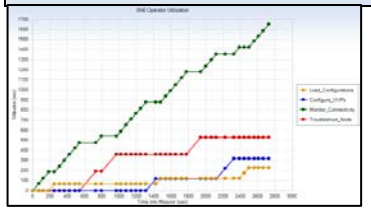
Create HV Data Map



Create IMPRINT Simulation Model



Evaluate Performance Parameters

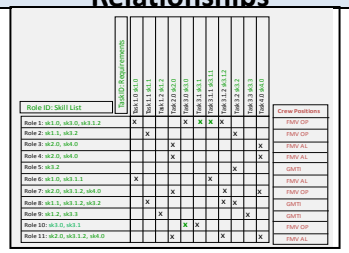


Update IMPRINT Model

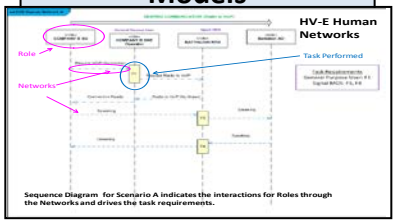
HV Templates

Collect Data

Establish Data Repository Relationships



Create Static Data Models



Simulation Results

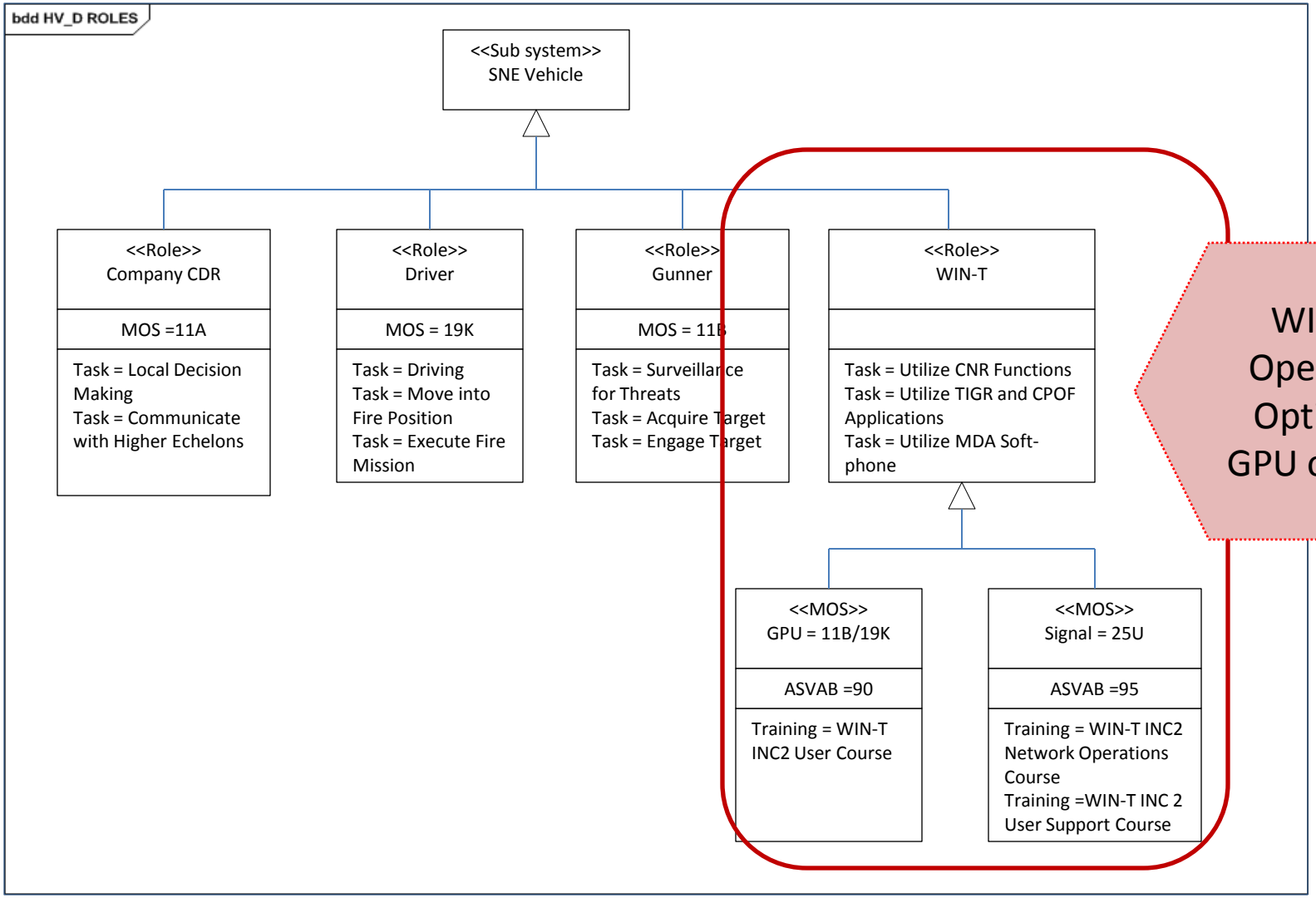
IMPRINT=IMPROVED PERFORMANCE RESEARCH INTEGRATION TOOL

5. Provide Human View FFP Models

- SysML HV templates were developed to convert HV data to standard formats for System Architecting and Engineering communities.
  - Extract data from HV Repository tables to populate the templates,
  - Augment with outputs from the dynamic simulation.
- Provides the Human View FFP Models.

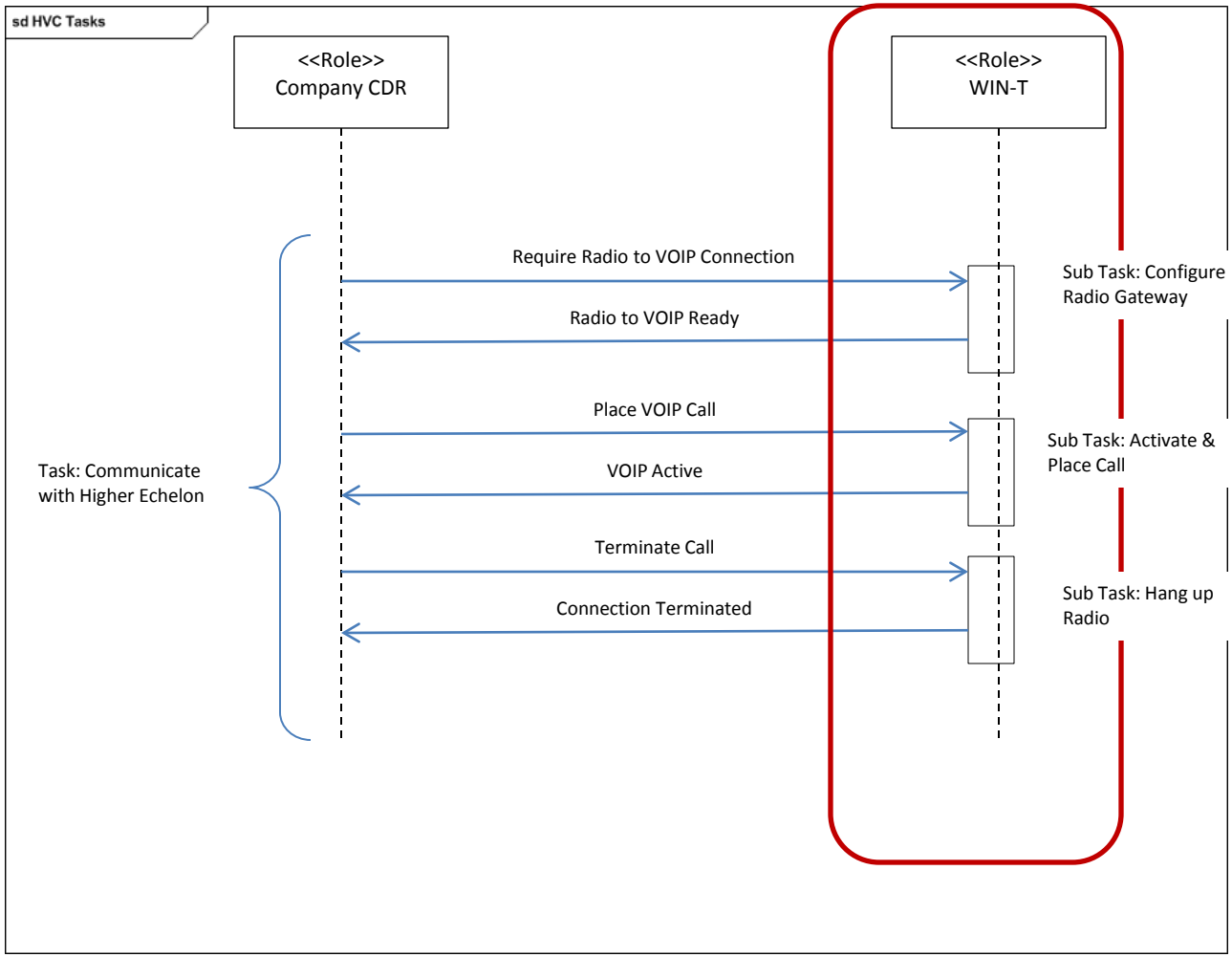
Human View SNE Roles:

SysML Block Diagram with MOS Options



Human View SNE Tasks:

SYSML Sequence Diagram with Simulation Results



GPU vs 25U Time-on-Task Simulation Results

SNE Sub Tasks	GPU	25U
Configure Gateway	37	33
Activate Call	44	37
Hang up Radio	13	11
Total Sequence Time	**94**	**81**

AUTL Metric:

#5 - Time - To establish both data and voice communications with combatant command and its components.

Summary

- The Human View Fit for Purpose analysis provided a performance comparison for a GPU and a Signal Soldier (25U) operating the Soldier Network Extension (SNE).
- Simulation results are posted back to the HV SysML Models.
- HV FFP Data Repository establishes baseline for future work.
- Additional issues, such as manpower availability, technology design changes, can now be simulated as part of the SE Tradespace.

WIN-T Inc 2 SBCT (TAA)								
System	# of CIs per Echelon	Team Count per CI	GPU	25U E4	25U E5	25U E6	25U E8
TCN (BCT)	2	2					
TCN (BN)	7	2					
STT (BCT)	2	2					
STT (BN)	7	2					
NOSC-B	1	21		3			1
TR-T	1	3					
POP	11	1	1				
SNE	51	1	1				
VWP	16	1	1				

Conclusion

- ☞ The Human View FFP Method successfully provided data and analytic support to drive mission-based simulations to determine the impact of changes to the human system.
- ❑ The Human View FFP Method
  - ✓ Develops models to describe how soldiers complete mission tasks,
  - ✓ Supports constructive simulations for "as-is" and "to-be" design and evaluation trade studies,
  - ✓ Provides early mitigation of risk areas using HSI techniques to reduce technology impacts on the operator and subsequent effects on human performance.

HV-FFP Method
1. Map Human-in-the-System Domain
2. Collect Specific Data
3. Identify Causal Relationships
4. Select Inputs for Simulation
5. Provide Human View FFP Models
6. Share and Archive Data!

Questions & Comments

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