



Calhoun: The NPS Institutional Archive
DSpace Repository

Faculty and Researchers

Faculty and Researchers' Publications

2022

Advancing the Application of Design of Experiments (DOE) to Synthetic Theater Operations Research Model (STORM) Data

Sanchez, Susan M.; Lucas, Thomas W.; Upton, Stephen C.; McDonald, Mary L.; Hernandez, Alejandro S.; Morgan, Brian L.; Barreto, Jane F.

Monterey, California: Naval Postgraduate School

<https://hdl.handle.net/10945/71897>

This publication is a work of the U.S. Government as defined in Title 17, United States Code, Section 101. Copyright protection is not available for this work in the United States.

Downloaded from NPS Archive: Calhoun



Calhoun is the Naval Postgraduate School's public access digital repository for research materials and institutional publications created by the NPS community. Calhoun is named for Professor of Mathematics Guy K. Calhoun, NPS's first appointed -- and published -- scholarly author.

Dudley Knox Library / Naval Postgraduate School
411 Dyer Road / 1 University Circle
Monterey, California USA 93943

<http://www.nps.edu/library>

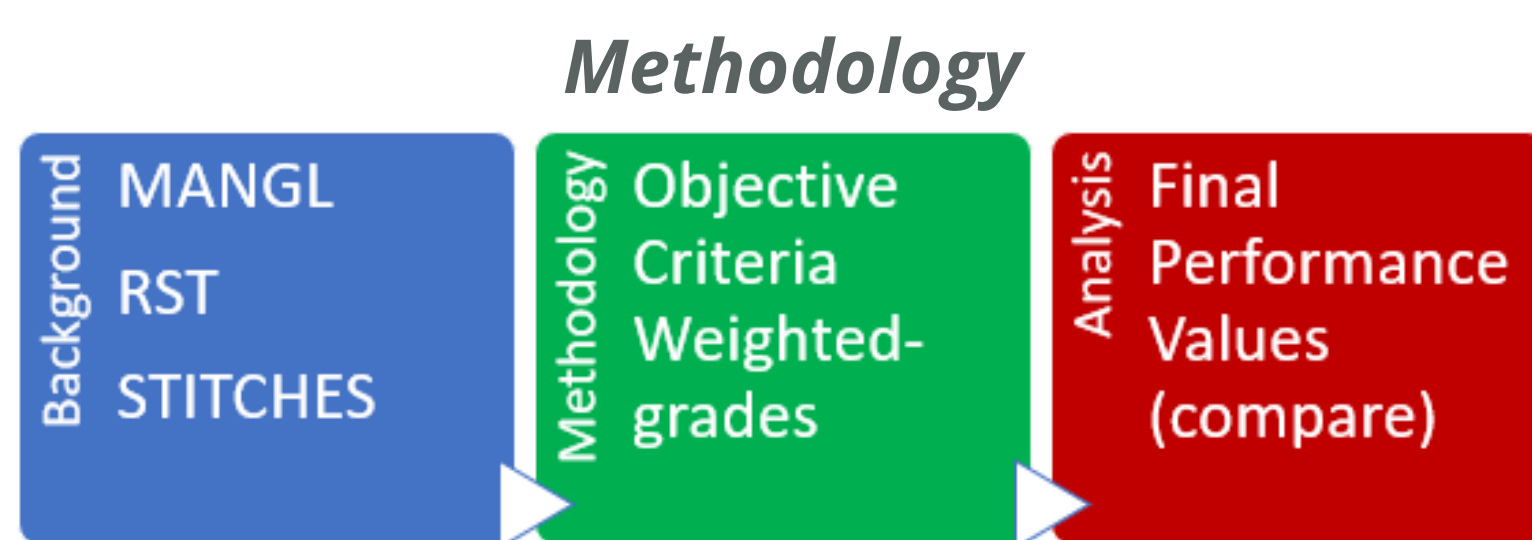
Common Message Sets across Data Links



Naval
Postgraduate
School

Background

The US military operates data links across multiple mediums to pass battlespace information. Existing links (e.g., Link 16, CEC, and IP based links) are capable of sharing track data. Once moved off its original link, the track data will lose most of its unique properties and thus is rendered less useful. In addition, the stove-piping of kill chains into one data link increases its vulnerability as the threat must only disable one node or deny one medium to render it inert.



Research Questions

- What changes can be made to existing data links to translate a track to another link in a different medium while retaining its original properties?
- How can data link platforms be modified to ensure reception of tracks that retain their original properties?

Objective: Find a method to method to modify current data links to allow track data to be passed across different data links while maintaining its original properties.

MANGL(1): network gateway and software payload that taps into multiple different networks and funnels prioritized information into a common tablet interface that is wirelessly updated from radios that users already carry. MANGL is the bridge that enables true digital interoperability.

RST Ontology puts data into a common framework where other formats could be created and enabling a large set of tools to function in the common data format. Simple core conceptual model but could be enhanced with any information needed to create an even richer information exchange environment.

STITCHES: software-only/fully government owned (non-proprietary) toolchain. Rapidly integrates heterogeneous systems across domains by producing extremely low latency/high throughput middleware between systems without needing to upgrade hardware or breaking into existing system software.

Findings

Category	Meaning	%	MANGL		RST		STITCHES	
			Grade	Weighted Grade	Grade	Weighted Grade	Grade	Weighted Grade
Maturity	What is the level of development of this system?	50%	5	2.5	2	1	4	2
Current Use	How is the system being used today?	50%	5	2.5	1	0.5	3	1.5
Modify	Can the system modify current data links?	100%	5	5	3	3	5	5
Passing data	Does the system allow track info to be passed?	100%	5	5	3	3	5	5
Track properties	Does the system maintain the original properties of the track?	100%	5	5	3	3	5	5
				20.0		10.5		18.5

What We Accomplished

- MANGL ranked #1 with STITCHES a close second (not a POR yet). RST is theoretical only.
- All three appear to have the required capabilities.

Next Steps

- Use MANGL in Navy tests.
- Include STITCHES in Navy exercises/demos.
- Forward RST in master's thesis work.

(1) MANGL-Marine Air Ground Task Force Agile Network Gateway Link
RST-Rich Semantic Track using OWL (Web Ontology Language)
STITCHES-System-of-systems Technology Integration Tool Chain for Heterogeneous Electronic Systems



Researcher: Mr. Brian P. Wood
Topic Sponsor: LT Skyler Schneider; Instructor, Naval Fighter Weapons School, Naval Aviation Warfighting Development Center (NAWDC)

NRP Project ID:
NPS-22-N219-A