



Calhoun: The NPS Institutional Archive
DSpace Repository

Faculty and Researchers

Faculty and Researchers' Publications

2015

Improving Navy MPTE Studies with Model-Driven Big Data

Lucas, Tom; Sanchez, Susan; Buttrey, Sam; McDonald,
Mary; Upton, Steve; Borozny, Erin; Dehollen, Nick;
Desousa, William

Monterey, California. Naval Postgraduate School

<http://hdl.handle.net/10945/57677>

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>



**NAVAL
POSTGRADUATE
SCHOOL**

NAVAL RESEARCH PROGRAM

MONTEREY, CALIFORNIA

IMPROVING NAVY MPTE STUDIES

WITH MODEL-DRIVEN BIG DATA

by

Principal Investigators: Professor Tom Lucas and

Professor Susan Sanchez

Other Researchers: Sam Buttrey, Mary McDonald, Steve Upton,

LCDR Erin Borozny, LT Nick Dehollen, ENS William Desousa

GSOIS

1 OCT 2014 – 31 MAR 2015

Prepared for: OPNAV N1

Mr. Ilia Christman, Mr. Wayne Wagner, and LCDR Will Corley

FY15 Mid-Year Report

Background: The Navy uses complex models to help manage its human capital. These models assist Navy leadership in understanding the potential impacts and risks of changes to force structure, policies, and the economy on its future personnel. Many of these models contain a large number of input variables, some of which are uncertain. They also generate an enormous amount of output data. This project is assessing the feasibility and benefits of data farming with these models—that is, embedding a chosen N1 manpower, personnel, training, and education (MPTE) tool in an environment that enables efficiently running and analyzing designed experiments over a breadth of input variables, thereby creating model-driven big data. This will enable N1 to better understand and utilize its complex models to support resource and policy decisions that create and shape the future Navy. For 2015 research, the chosen model is the Officer Strategic Analysis Model (OSAM). We are investigating the possible use of the Navy Total Force Strength Model (NTFSM) for 2016 research.

Process and Research Objectives: The objective of this research is to improve the ability of OPNAV N1 analysts to quickly and efficiently obtain experimental information from their computational models. This will allow them to quickly quantify the potential impacts of numerous resource and policy options. The process of developing, testing, and demonstrating this new capability includes: (1) identifying an appropriate N1 MPTE computational model to be embedded in a data farming environment, (2) developing and testing software scripts and the accompanying hardware to make the chosen model data farmable, (3) running a proof-of-concept test case that assesses and demonstrates the new capabilities, and (4) transferring the new capabilities to N1.

Findings and Conclusions: This research continues in an iterative fashion of developing, testing, and using the new software to data farm OSAM (and eventually NTFSM). We have already developed, tested, and began the initial usage of a prototype software tool known as OSAMRunner. OSAMRunner is a command line wrapper, written in C#, around a SEED-modified version of the OSAM model that allows users to run multiple replications of OSAM (without human intervention) from the command line. It also exports the OSAM output database tables to a set of csv-formatted files that users can easily open in any analysis package—such as Excel or JMP. There is still some work needed so that analysts can join a set of tables into a single file. Thesis student-officers are using/testing this new capability in OSAM—with an emphasis on quantifying variability in outcomes to numerous inputs—e.g., policy options. We have also added a much better random number generator to OSAM—the Mersenne Twister.

Recommendations: NPS Student-officers who are participating in this research are coordinating with OPNAV N1 staff—in partnership with SEED Center researchers—to identify studies and models (e.g., NTFSM) that will use and test the data farming capabilities being developed. If the new capabilities in OSAM and NTFSM prove valuable, they will be applied to support other N1 studies—such as, the results of various options on female SWO retention.