Forecasting Personnel Readiness for the Center for Army Analysis

Kieran Howard, Cori Lemere, Jack Martin, Angel Reyes, and Roger Burk

United States Military Academy

Corresponding author's Email: Kieran.Howard@usma.edu

Author Note: Cadets Howard, Lemere, Martin, and Reyes are seniors in the Department of Systems Engineering at the United States Military Academy – West Point. The Cadets are participating in the First Class Capstone Project Program. The cadet team would like to thank our capstone advisor Dr. Roger Burk for guiding us throughout our research and project. The team would like to express our gratitude to our client Lieutenant Colonel Shawnette Rochelle from the Center of Army Analysis (CAA).

Abstract: In support of the planning efforts of the United States Army and the Pentagon, The Center for Army Analysis (CAA) has been using a discrete-event simulation called MARATHON (Modeling the Army at Home or Not) since 2005 to model the readiness and distribution of Army units during potential future conflicts. This simulation was originally created using dwell time to forecast when units would be ready to deploy, based on the ARFORGEN (Army Force Generation) policy. Now that the army is moving on to the SRM (Sustainable Readiness Model) policy, the CAA requires a revamping of their personnel readiness forecasting method. In order to attack this problem, our team applied the Systems Decision Process (SDP). After going through steps of the SDP, we arrived at a few candidate solutions; using Markov Chains, Systems Dynamics, and discrete event simulation using ProModel. Ultimately, due to its coding compatibility with MARATHON, effectiveness at modeling steady-state systems, and flexibility, we decided to recommend the Markov Chain approach.

Keywords: Sustainable Readiness Model, Personnel Readiness, Markov Chain

1. Introduction

The Center for Army Analysis (CAA) provides significant support to Total Army Analysis, a process that incorporates multiple drivers of readiness (e.g. personnel, training, medical profiles, permanent change of station [PCS] rates, etc.) in order to identify the future force needed to meet emerging threats. The CAA currently lacks a methodology for properly forecasting personnel readiness at the unit level beyond a 12-month horizon. The absence of unit-level manning readiness forecasting impacts the fidelity of models and simulations designed to support senior leaders’ decision analysis across several domains, particularly force structure. Development of a comprehensive forecasting methodology would benefit the Army staff-and organizations whose function is manning the-force in ongoing efforts to refine models and simulations that seek a proper assessment of force structure needs. The remainder of this paper will discuss some background information and research on this issue, leading to our revised problem statement. Then we will explain the design process of our solutions. To conclude we will analyze our final candidate solutions, and discuss potential directions for others to approach this problem in the future.

2. Background

In 2005, the CAA created a discrete-event simulation called MARATHON (Modeling the Army at Home or Not). This simulation is CAA’s means of replicating the cyclical unit readiness under the current policy: ARFORGEN (Army Force Generation). Starting in FY 2017 MARATHON will need to reflect the new readiness policy, Sustainable Readiness Model (SRM). MARATHON operates using the Standard Requirement Code (SRC) to identify the different types of units from company level to brigade level. CAA’s model uses the concept of dwell time to predict a unit's readiness. Using dwell time, a unit has one year of train up for a one-year deployment. This approach assumes that regardless of the type of unit, it will take exactly one year to train and be ready for deployment. Therefore, once a unit returns from deployment it will take them one year until they are ready for another deployment. While this method was a convenient way to forecast unit readiness, it was not accurate. CAA asked for the development of a comprehensive forecasting methodology to predict personnel readiness beyond a twelve-month horizon in order to identify the future force needed to meet emerging threats.