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Optimization of Business Processes through Digitization and Automation

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BUSINESS PROCESS OPTIMIZATION BY DIGITIZATION

EXECUTIVE SUMMARY

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Project Summary

Reporting and clerical functions at Naval Special Warfare (NSW) Echelon IV commands are ripe for digitization, automation, and optimization. While cost is a concern for prioritizing a more automated data system, there are potentially large benefits including the use of these data for prediction modelling within the Navy Sea, Air, and Land (SEAL) community. This study utilizes two unique digitalized NSW datasets to showcase how to use "big data" in the context of SEAL training and how it can be used to predict medical and performance fails during Basic Underwater Demolition SEAL (BUDS) training and passing various types of training evolutions (e.g., two-mile swim, four-mile run, etc.). Our main findings indicate higher probabilities for a medical fail to occur amongst males, Whites, and SEALS (both enlisted and officers). For performance fails, the results show higher probabilities for fails to occur amongst females, Blacks, Hispanics, and enlisted SEALs. Lastly, those more likely to pass evolutions are taller, older, lighter (in terms of weight), males, married, White, officers, and college educated. This study is just one example of how long-term efficiencies could be gained from greater automation of data using simple software. Some data (such as those shown in this study) could provide long-term benefit if captured in a more persistent manner. We highly advocate the implementation of a more automated data/software collection system and the use of "big data" for NSW studies going forward in the near future.

Keywords: *optimization, business process, Naval Special Warfare, NSW*

Background

Reporting and clerical functions at Naval Special Warfare (NSW) Echelon IV commands are ripe for digitization, automation, and optimization. While cost is a concern for prioritizing a more automated data system, there are potentially large benefits including the use of these data for prediction modelling. This study shows a framework for how to use "big data" in the context of SEAL training and how it can be used to predict medical and performance fails during BUDS and passing various types of training evolutions (e.g., two-mile swim, four-mile run, etc.). In addition, we highlight how long-term efficiencies could be gained from greater automation of data within the NSW system.

The study of adverse medical conditions related to BUDS training is nothing new. For example, Linenger et al. (1993) analyzed medical conditions and injuries among NSW SEAL trainees and found strenuous, sustained physical training results in a high incidence of medical conditions and musculoskeletal injury in trainees. In a more recent study by Ledford et al. (2020) that examined the success of individuals in the first phase of BUDS, the authors found that psychological and physiological resilience can be important predictors of persistence individually. Furthermore, the authors found that combining the measures provides a more holistic view to predict the success individuals in BUDS.

This study builds on previous research and utilizes two unique digitalized NSW datasets used in a prediction model framework. The first dataset is categorized from BUDS transcripts and includes detailed demographic information for individuals going through the BUDS program for Naval Special Warfare. In addition, it provides the specific reason(s) for why individuals failed out of the training cycle. The BUDS transcript dataset includes a total of 44,896 observations. The second dataset focuses on performance metrics for training under Naval Special Warfare Command. It includes demographic information as well as whether the individual(s) passed different types of

evolutions (e.g., two-mile swim, four-mile run, etc.) during their training. The dataset includes a total of 106,972 observations.

For our prediction model, we use Ordinary Least Squares (OLS) in our regression analysis. The first regression model uses the BUDS transcript data to predict being washed out of BUDS. The second model uses the Student Performance dataset to predict whether an individual passes their evolution.

Findings and Conclusions
Our main findings indicate higher probabilities for a medical fail to occur amongst males, Whites, and SEALS (both enlisted and officers). For performance fails, the results show higher probabilities for fails to occur amongst females, Blacks, Hispanics, and enlisted SEALs. As for passing evolutions, we find that individuals who are taller, older, lighter (in terms of weight), males, married, White, officers, and college educated are more likely to pass.

This study is just one example of how long-term efficiencies could be gained from greater automation of data using simple software. Some data (such as those shown in this study) could provide long-term benefit if captured in a more persistent manner. We highly advocate the implementation of a more automated data/software collection system and the use of "big data" for NSW studies going forward in the near future.

Recommendations for Further Research
Additional research in this area should be extended toward better predicting the reasons behind medical and performance fails. Examples include examining the type of environment that contributes to injuries. Are there higher injury rates during periods of hot or cold weather? What about conditioning, persistent training, lack of sleep? While we have detailed demographic data available for this study, which we use as predictors for fails, we do not have environmental information. Developing a system to track these types of data and utilize them in a similar framework could provide useful information for decision makers within Naval Special Warfare.

References
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Acronyms
NSW   Naval Special Warfare
SEAL   Navy Sea, Air, and Land
BUDS   Basic Underwater Demolition SEAL