# Organizing Structures and Information for Developing AI-enabled Military Decision-Making Systems

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***Abstract— Background*: AI-enabled decision-making systems play a critical role in the planning and execution of effect-based approach operations (following an effect-based approach), thereby empowering armed forces. The crucial aspect is to figure out what kind of AI-enabled system we can or should build to be successful, taking into account the current and future technologies available. *Aims*: This paper aims to eliminate ambiguity surrounding military decision-making systems by replacing the term "AI-enabled" with the more accurate and realistic "AI-automated." It is important to note that the current focus of researchers and the government is on building AI applications that can assist commanders and staff in streamlining the decision-making process, rather than creating systems that can make decisions. The primary objective is to identify the AI technology required to improve future C2 systems and then act accordingly. An important point is that computer-assisted processes already provide efficiency. Therefore, the appropriate question to address is: "Should AI be used to enhance the automation of the decision-making process, or should AI itself be used to drive the decision-making process?" *Methods*: The study suggests that experimentation should guide the understanding of appropriate AI-enabled technology for C2 system development. The following discusses the necessary approach to follow. *Results*: Although conducting experiments on this topic is challenging and costly due to the lack of AI-enabled systems, previous studies have conducted some of the feasible experiments that validate our initial interpretation. These findings highlight the importance of further research in the suggested direction and indicate the need for a deeper understanding of the topic. *Conclusions*: Meanwhile, a possible method for the armed forces to be ready for upcoming AI technologies involves creating an organization, the Military Experience Factory, which is committed to gathering high-quality data from military units carrying out operations.**

**Keywords—artificial intelligence, logic agent, machine learning, military decision-making systems, decision-making process, effect-based approach operations, multi-dimension operations, wargaming, course of action, military experience factory.**

## I. Introduction

This article aims to contribute to ongoing research debates concerning the development of effective military decision-making systems that utilise artificial intelligence (AI) and machine learning (ML). The article also proposes ways to improve the performance of such AI/ML systems by organising military structures and information. This article aims to assist the industry in obtaining a comprehensive awareness of the pertinent technologies, aid military commanders and staff in acquiring, arranging, and supervising their associated data, and enable academia to concentrate on future research and experimentation.

Section I presents an introduction to some preliminary definitions and consideration on Artificial Intelligence and Machine Learning and related work. Section II deals with the problem of developing military decision-making systems empowered by AI/ML for effect-based approach operations. Section III addresses the operalisation of artificial intelligence and machine learning when developing military decision-making systems where it is presented the concept of a Military Experience Factory and a practical approach on how to gather and manage data for its prospective use with artificial intelligence applications. Section IV summarize all the takeaways of the paper.

Today, there is much discussion surrounding Artificial Intelligence (AI) and its potential military applications, with claims that this technology will revolutionize the planning and execution of future campaigns. However, the frequent misuse of technical terms has led to confusion and a lack of understanding regarding the true challenges in developing AI/ML-based military capabilities.

This article argues that it is not appropriate to utilise the generic term AI when referring to building Military Systems. Instead, one ought to specify the particular kind of AI tool that is being applied.

Actually, it is imperative for clarity that we understand the precise definitions of these terms. AI is frequently utilised to denote computer-based methods that mimic a number of human intelligence capabilities such as deduction, correlation, selection, prediction, recognition and inference [1].

There are two distinct approaches to simulating human brain functions: the first entails employing logic to create an agent capable of resolving proposed queries/problems (current data) by employing the logic rules on which it was built/instructed. This method shall be named the Logic Agent (LA). The second approach to emulate human intelligence relies upon how the brain is constructed [1].

There are numerous human brain simulators available, but the most promising ones are those based on Artificial Neural Networks (ANNs)/similar models and Machine Learning (ML). The ML approach is particularly powerful as it can detect patterns from data without requiring prior knowledge of the underlying logic rules governing the observed phenomenon (posterior and a priori information).

However, each method has its own benefits and drawbacks. For instance, from a mathematical perspective, Machine Learning/Artificial Neural Networks are complex, non-linear functions generated from data through a prolonged training phase. Sufficient, pertinent and evenly distributed data is essential to ensure the training phase converges to a finite solution. Additionally, relevant computational resources are also necessary to prevent a considerably extended training process. Furthermore, a deterministic methodology for determining the optimal stopping point during the training process is lacking. This can result in suboptimal performance of the resulting ML/ANN, leading to poor generalization performance and rendering the ANN ineffective or not superior to canonical mathematical models [2].

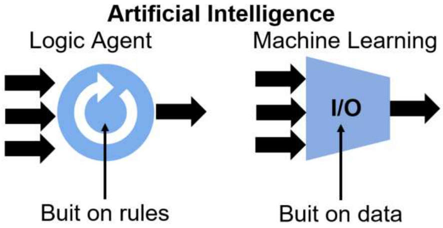


Fig. 1. Comparison between Artificial Intelligence based on Logic Agents and Artificial Intelligence based on Machine Learning.

On the other hand, Machine Learning/Artificial Neural Networks can be incredibly powerful tools once correctly trained using high-quality data. They become input/output (I/O) black boxes, whereby providing input data results in an immediate output. This means that the output is obtained by executing the same calculation complexity, and the time to get the result is always known in advance. This feature renders ML/ANNs highly intriguing models for prompt military applications (Fig. 1).

LA, on the other hand, must compute the response once given the input, so the duration for obtaining the outcome depends on the complexity of the query. Therefore, LA are comparatively unsuitable for real-time operations than ML/ANNs or they need also, at time of execution, huge computational resources (Fig. 1).

LA are more suitable when rules are well known and the time to answer is not critical, e.g. to instruct a computer to chess playing where chess rules and moves are completely known, a LA will perform at its best. On the other hand, if the problem is to read strings (e.g. text from a car plate) or known shapes (e.g. human face) from images, ML/ANNs will perform much better [2]. In the military context, LA can be better used for catching Observations, Lessons Identified, and Lessons Learned from multiple formatted documents, interviews of leaders and operators, and the general analysis of the operational situation. But, there are also important studies that use ANNs to catch patterns from the available data [2].

An essential factor for military applications, determining the superior technology to use, is the ability to make accurate predictions. It is widely recognized that Artificial Neural Networks, or ML, are the most effective generalizers due to their capability to smoothly approximate all ranges of data considered during the training phase. This capability does not apply or partially applies to Logic Agent-based techniques [2].

Therefore, it is imperative to specify whether LA or ML are required when planning and developing military decision-making capabilities that incorporate artificial intelligence tools. The usage of the term AI *tout court* can lead to severe misunderstandings.

As far as related work is concerned, due to the classified nature of these topics, the relevant work of military decision-making systems enhanced with LA/ML is not broadly available or is outdated. However, there is some work to take into consideration. In particular, an interesting experiment was performed by Rash et al. [3] in a controlled environment where authors find out that it is possible and also convenient to incorporate AI/ML in military decision making systems, even though more research is need.

Schwartz et al. [4], in a recent study, propose a software application that incorporates AI/ML to execute the entire burden related to the military decision-making process. The conclusions of the study are that efficiency (in terms of work done in a timeframe) increases dramatically, but, concerning the effectiveness, they argue that without a solid database of structured data AI/ML systems cannot provide correct indications to improve the effectiveness of results (i.e., correct decisions).

Stephenson [5] reports on a tool for military decision-making systems that shows that efficiency is dramatically improved by computer-assisted processes even though AI/ML in not empowered.

Park et al. [6] discuss about a deep reinforcement learning technique embedded in a military decision-making system as a way to improve efficiency of decisions made by commanders and staff in multi-domain operations.

Baker et al. [7] recently presented their work on the use of AI/ML for military decision-making systems, where they argue that the use of AI/ML is effective when AI/ML plays a role of "control" to avoid human mistakes instead of using AI/ML for making military decisions directly.

Hare et al. [8] present a new warfighter-interface game in the context of multi-domain operation to investigate how human decision-making principles, enabled by AI/ML, can help the decision process.

Berggren et al. [9], reporting on Swedish armed forces, argue that effectiveness has to be assessed constantly when developing command and control systems. The method to follow is the use of research and scientific approach; otherwise, the results may be wrong.

## II. MILITARY DECISION MAKING SYSTEMS FOR MULTI-DOMAIN OPERATIONS IN THE CONTEXT OF EFFECT-BASED APPROACH OPERATIONS (EBAO)

From a purely military perspective, armed forces have a significant competitive advantage over their adversaries when they are able to integrate innovative technology. This enables the development of more efficient and potent military capabilities compared to previous generations. When discussing "cutting-edge technology," we refer to technologies that are available exclusively to a select few advanced countries capable of developing such equipment.

However, when observing troops on the ground carrying out conventional land operations, such as defense and attack, it can be challenging to determine which side has the advantage apart from technology. Factors such as troop training, terrain knowledge, motivation, cohesion, forces-ratio, leadership, and logistical support can all contribute to a competitive edge.

To ensure military success, in areas specifically prone to innovation, armed forces must focus on capabilities directly linked to new technologies (e.g. Emerging Disruptive Technologies). This paper, as an example, addresses capabilities that implement Command, Control, Communication, Computer, Intelligence, Electronic Warfare and Sensors (C4IEWS) generally called military decision-making systems. An automated system that connects to multi-domain sensors can offer commanders and staff a substantial advantage by providing an effective real-time picture of the situation on the field. Systems without sensor connections result also in massive delays due to manual updates, resulting in a significant loss of power for commanders and staff.

When we talk about using artificial intelligence, LA/ML, to enhance military decision-making systems, what we really mean is that the machine will guide the solution to the operational/logistic/intelligence problems. Using terms like decision support or the like when referring to artificial intelligence is misleading. When we talk about augmenting our decision processes with LA/ML technologies, we are saying that the machine will propose all the possible options. It will not be about helping commanders and staff make their decision as happens with computer-assisted decision systems. LA/ML will provide solutions that would take years for humans to evaluate, so in conducting multi-domain operations (based on EBAO), commanders and staff do not have the time to do this, and then they have to accept the decisions provided by the machine. This is the stark reality. The dependability of LA/ML decision-making systems must be assessed at the time the system is built, not during the execution phase of operations. It's also worth noting that while Explainable AI (XAI) methods that offer approximate explanations might aid in understanding these systems, they often do not achieve the same level of accuracy or reliability as the original models.

Industry, government, and academia should use terms such as "military decision-making systems automated by AI" to refer to AI-enabled military decision-making systems in order to avoid misleading evaluations. We argue that AI (and Machine Learning) can only currently support automation in the decision-making process, rather than making decisions itself. Therefore, it raises the question: what types of AI-enabled military decision-making systems should be sought after? Can we ensure that the most promising solution lies in implementing systems wherein artificial intelligence governs the decisions de facto? Does AI provide all possible alternatives and the optimal solutions or does it simply streamline the workload for commanders and staff to implement the decision process (with humans discovering various options and solutions)?

The key consideration is that we are not advocating for the adoption of new technologies solely to gain an advantage over adversaries. The aim of this study is to determine whether and when the implementation of LA/ML technology leads to a notable enhancement in the military's combat capabilities. The key question is whether implementing LA/ML technology leads to a significant increase in military capabilities that are already advanced and computer-assisted.

Understanding the difference between computer-assisted capabilities (e.g. C4IEWS) and those also enabled by LA/ML is crucial in evaluating the feasibility of investing significant resources and time in replacing well-established, advanced capabilities with a technology that is not straightforward to test and might never be entirely reliable. Does technology or LA/ML play a greater role in making accurate and effective decisions? In what scenarios do commanders and staff reap the most benefits from LA/ML? Are decisions made through LA/ML superior to those made by human commanders and staff? Is the advantage of LA/ML simply theoretical or is it a tangible and measurable benefit?

It should be clear that during the planning or re-planning phases of the execution stage of a multi-domain operation, commanders and staff are under pressure to issue appropriate orders to enable their forces to perform the planned tasks on time. At such points, the implementation of an advanced military decision-making system can make a significant difference compared to legacy/manual procedures. Consequently, time pressure can also be mitigated by an appropriate computer-based system that supports all stages of the military decision-making process. Enabling LA/ML into the systems is a completely different story that must not be conflated.

The point is that we should not confuse the benefits of a computer-based decision support system (automation), which offers undeniable advantages in terms of efficiency (e.g. time, available options, probability/likelihood of events, prioritisation of risks based on best practice and doctrine), with those of a decision support system that replaces the decisions of commanders and staff with those made by LA/ML.

Artificial Intelligence hype aside, the reality is that modern computer-based military decision-making systems can already dramatically improve efficiency, but it is not yet clear that LA/ML-enabled decision making systems can make better decisions than humans can. It is important to consider both efficiency and effectiveness. While some reports and papers suggest that LA/ML-enhanced C4IEWS systems surpass human capabilities in terms of efficiency, we must also scrutinize the effectiveness of decisions made. For instance, we should ask whether the decisions were correct, led to success, or could have been made at lower cost while still achieving success. To accurately measure effectiveness, it is essential to conduct real-world tasks in actual environments. Without this crucial step, outcomes may remain misleading.

Sometimes one of the most important features in favour of LA/ML-based decision systems is that they can consider all possible scenarios and then select the most promising Course of Action (COA) to help humans make a decision. Partially right! In fact, these systems provide all possible combinations based on the data they have been trained on. So if the data was not relevant to the current situation (which we never know in advance), the machine's support can be misleading. If we refer to decisions supported by logic agents, based on known rules and doctrine, well-trained commanders and staff will reach the same conclusions without any support. Again, the issue is not only efficiency, but also the effectiveness of the decisions made.

Computer-based systems can also process all available information from multiple sources and present a range of potential options to commanders and staff during the war-gaming phase. Why replace the intellect, sensitivity, skill, and expertise of commanders and staff with LA/ML if we cannot be confident that LA/ML decisions are better than those made by humans? Sometimes enhancements come from computer-assisted systems rather than from LA/ML, but it is often hyped as being the merit of Artificial Intelligence.

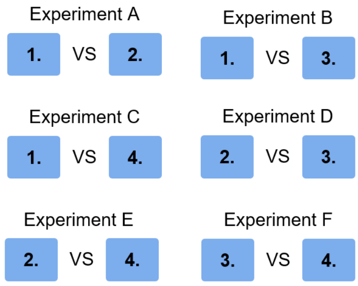


Fig. 2. Appropriate experiments useful to figure out the effectiveness of the military decision making systems.

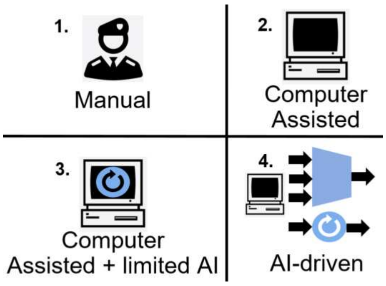


Fig. 3. Alternatives regarding the experiments to be performed in terms of AI (LA/ML) assistance.

This paper proposes that appropriate experiments to test the performance between LA/ML and humans should be conducted by considering the following alternatives (Fig. 3):

1. Commanders and staff make decisions without military decision making systems (**manual process**)
2. Commanders and staff make decisions supported by computer-based military decision support systems (**computer-based without LA/ML**)
3. Commanders and staff trained on LA/ML systems and simulators make decisions using computer-based decision support systems with limited or no LA/ML support, automation AI (**computer-based without or with limited support of LA/ML making decisions plus LA/ML training for commanders and staff**)
4. Military decision systems empowered by LA/ML make relevant decisions throughout the planning/re-planning process (**LA/ML make decisions providing all the alternatives and "best" solutions and humans take the provided results for granted without additional control**).

Logically, and given the reality of the currently available technologies, and the fact that we have not done any controlled experiments on this issue so far, if we had to bet on these alternatives, the best overall choice would be developing systems on option 3 (**computer-based without or with limited support of LA/ML plus LA/ML training, AI- automation**), not option 4 (**LA/ML make decisions and humans accept results without control**). Then, of course, we should run many experiments, see Fig. 2 and 3, on all possible combinations to find out which of the alternative is the best in terms of effectiveness (success with least attrition) and circumstances. With option 3 (experiments B, D, and F, in Fig. 2), we invest in humans and continue to use their intuition and sensitivity, which is not available to the (narrow) artificial intelligence implemented so far [1].

When planning LA/ML-enabled military decision-making systems, decision-makers should consider the following issues. For example, they can focus on intelligent trainers/simulators rather than investing in systems that replace human decisions. Indeed, the military environment is very different from the space environment when planning new capabilities for new space missions. Sending an autonomous system into space to make decisions on its own is almost mandatory for the success of the mission, but when we are facing, for example, a nuclear war or a confrontation that could result in thousands or hundreds of thousands of deaths, making the best decision is crucial for our lives, and replacing humans with machines (or leaving the control to LA/ML) may not be trivial.

TABLE I. EXPECTED RESULTS FROM COMPARING ALTERNATIVES

| **Exp.** | **Expected results (to be tested)** |
|---|---|
| A (1. vs 2.) | 2. better efficiency, 1. vs 2. comparable effectiveness |
| B (1. vs 3.) | 3. better efficiency, 3. better effectiveness |
| C (1. vs 4.) | 4. better efficiency, 1. vs 2. **unknown** effectiveness |
| D (2. vs 3.) | 3. better efficiency, 3. better effectiveness |
| E (2. vs 4.) | 4. better efficiency, 2. vs 4. **unknown** effectiveness |
| F (3. vs 4.) | 4. better efficiency, **3. better effectiveness** |

Fig. 4. Relevant comparisons among all kinds of military decision-making systems. All the alternatives have to be tested (A-F) for efficiency and effectiveness.

The literature presents one of the few publicly available reports, authored by the US Army [3], which illustrates the circumstances under which artificial intelligence can make a difference. Nonetheless, the primary outcomes pertain to efficiency rather than effectiveness. Based on Table 1, the US Army conducted partial testing of experiments A and B, confirming the expected results presented in the Table. Nevertheless, the most crucial experiments to undertake are E and F. Unfortunately, the cited paper does not include experiments E and F carried out by the US Army. The outcomes of experiment E would help show whether it is worthwhile to develop military decision-making systems that are enhanced by LA/ML. Experiment F would explore whether machines can surpass human effectiveness in decision-making for planning and executing multi-domain operations.

Apart from technical issues related to building artificial intelligent agents (data distribution, data consistency and model errors), this paper "arbitrarily" argues that the expected comparison between 3. and 4. (experiment F in Fig.4) may be in favour of 3. and not 4., because, so far, military organisations have only relied on technology provided by industry to build their military decision making systems, thinking that no additional data-managing effort would be required of them to have effective systems based on LA/ML. In practical terms, the military lacks the necessary data to construct such systems.

However, industry cannot work miracles. The point is that, military organizations must provide pertinent data; otherwise, LA/ML-powered decision-making systems will yield undependable results forever.

Next section discusses how military organizations should organize, on time, their structures and information to allow building effective LA/ML-enhanced decision-making systems.

## III. Relevant issues when operationalizing LA/ML for developing military decision systems

It should be quite clear now that possessing relevant data to build LA/ML-enhanced decision-making systems is key for successfully create intelligent agent that assist commanders and staff to execute the decision process. Therefore, the presence of relevant data coming from the field should be considered as a strategic asset for prospective use and improvement. To do so, military organizations should reorganize themselves so that, when necessary, industry, asking for data, can obtain that data for the development of dependable systems.

However, acquiring pertinent data is not without cost. It is essential to invest in adequate structures and modify/integrate new procedures geared towards high-quality data gathering. It is recommended to establish streamlined structures focused solely on quality data gathering and improvement. This does not refer to the establishment of fresh measurement programs which are likely already implemented everywhere [10] and based upon automated risk management [11] and sometimes empowered by Game Theory [12]. Quality data collection should be prioritized to develop potential LA/ML systems for military purposes. The future of artificial intelligence remains unknown in the next decade or two. However, we have recently recognized the significance of accumulating quality data over the past twenty years to facilitate the creation of efficient command and control systems. The primary objective is to assemble this information to be utilized in future (AI/ML) applications.

The first objective of this paper is to propose the adoption of an organizational concept, initially developed for NASA in the area of software engineering, to military commands and units. This concept, known as Experience Factory (EF) [13], was initially devised during the 1970s, implemented during the 80's and 90's, and used until the early 2000s by organizations involved in software development for NASA.

To obtain pertinent data, units need to structure their organization adequately. Figure 3 displays the organizational structure. On the left side, multiple units are executing military activities (so called *tasks*) including operations, training, exercises, and maintenance. While carrying out operations, data is collected with assistance from an outside entity named the Military Experience Factory (MEF), on the right of Fig. 5. Its purpose is to enhance the overall effectiveness of operations and collect information such as Feedback, Lessons Identified, Lessons Learned, and other quality structured data.

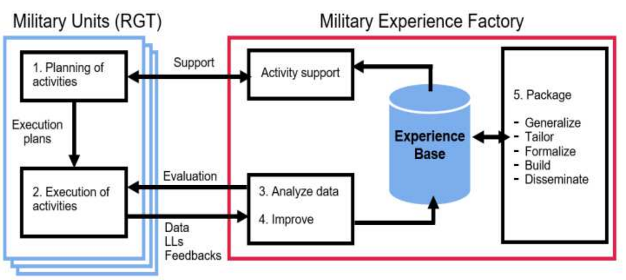


Fig. 5. An example of Military Experience Factory between Brigade (BDE) and Regiment (RGT) levels.

While units perform their activities with MEF's support, MEF analyzes data for future use and improvement. The structured data is organized to train Artificial Intelligence algorithms, primarily machine learning, for the development of military decision-making systems. Specifically, MEF stores all available structured information in the Experience Base (EB) for future use [14], a database similar to a Lessons Learned repository containing structured data and process information, but with analytical data (not only textual information). After reviewing all the gathered information, the MEF staff can consolidate it for potential reuse and dissemination. This stage signifies the conversion of data into knowledge. Additionally, the MEF assumes responsibility for evaluating the quality of the gathered data in terms of its even distribution across all ranges, quantity, correctness, and reliability. The point is that, since it is impossible to predict what will be necessary in the next twenty years, obtaining controlled and structured data is preferable to having little or none.

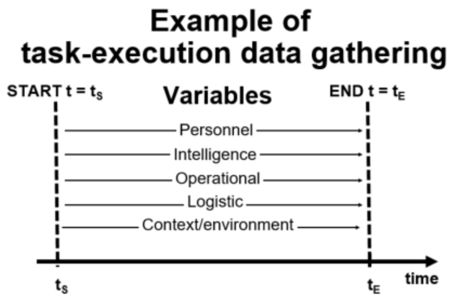


Fig. 6. Example of task-execution data gathering, where S stands for at the start and E stands for at the end of the task execution. Data is sampled at the start and at the end.

Note that the MEF's scope exceeds data collection. As it pertains to software organizations at NASA, MEF is a body devoted to ongoing enhancement, prioritizing the caliber of military operations carried out by the units. MEF collates and evaluates all data and information, packaging the experience for subsequent use.

The second critical discussion point of this paper is how units can plan their data for future use with the help of a MEF, leading to the creation of decision-making systems powered by Artificial Intelligence and Machine Learning.

Apart from the particular technology utilized to construct Intelligent Agents, it is vital to have access to adequate data. The most potent tool will not deliver accurate results without appropriate data. In the commencement of this paper, it was emphasized that the data should be plentiful for the training set, the test set, and the assessment set, which are used to develop, test, and evaluate the model's generalization and forecasting capabilities. All these three sets are necessary to develop any ML-based decision-making system.

To explain how military organizations, supported by the MEF, should organize the gathering of their task-execution data, we present an example (Fig. 6). Let us assume that the task to be executed is a tactical movement from point A to point B by a specified deadline by a Cavalry armored Regiment. Then, the unit should first identify the variables and then collect the data accordingly. For example, relevant variables usually fall within the areas depicted in Fig. 6 such as Personnel, Intelligence, Operational, Logistic, and Context/environment:

- *Personnel*: number of troops, number of officers, number of tank pilots, number of casualties, number of injured etc…
- *Intelligence*: number of opponent troops, number of armored vehicles,

- *Operational*: complexity of task, planned distance, executed distance, time to go etc…
- *Logistic*: %efficiency of vehicles, number of recovery vehicles etc.
- *Context/environment*: average height difference, % maximum slope, inch/mm of rain per day etc.

$$M^{S\text{-}E}{}_{TASK}=\begin{bmatrix} P_S & I_S & O_S & L_S & CE_S \\ P_E & I_E & O_E & L_E & CE_E \end{bmatrix} \sim (0, 1) \quad (1)$$

$$\downarrow$$

$$M_{TASK}= \quad (P, I, O, L, CE) \sim (0, 1) \quad (2)$$

$$\downarrow$$

$$M^K{}_{TASK}= (M^1{}_{TASK}, M^2{}_{TASK}, \ldots, M^N{}_{TASK}) \sim (0, 1) \quad (3)$$

K= 1.. N, where N is the no. of executed tasks

Note that the sampling of data must be executed twice. Firstly, at the start (S) of the activity/task and lastly, at the end (E) of it on the same variables (1). The results is a matrix (1) called $M^{S-E}{}_{TASK}$ that is put is relationship with (0, 1) representing failure and success of the activity. In the proposed example success (1) is that the unit reached point B, failure (0) is that the unit did not. The formula in (2) recalls that raw data needs to be combined together in order to become features for ML-training (no more details are provided on how to do this information merging because it is out of the scope of this work). Once the data structure is in place, it is easy to records data from a number of task executions (1..N), see (3). Structured data as depicted in (1), (2), and (3) can effectively be used to build ML-enabled functions for the operationalization of military decision-making systems such as C4IEWS or similar. This same pattern can eventually be used to formalize Observations, Lessons Identified, and Lessons Learned in other military fields. Note that storing information in the EB in a structured format as depicted in Fig. 6 is valuable also for video, audio, and communication logs, as well as visual or electronic sources such as satellite imagery, for their potential use in developing ML-enabled applications.

## IV. Conclusions

This section summarizes the key points of the study, with the objective of aiding the industry, academia, and military in comprehending the automation of military decision-making systems by AI/ML.

Before proposing the development of AI/ML for military decision-making, it is imperative to conduct thorough experimentation to determine the feasibility of such an endeavor in order to maintain international military competitiveness. It is suggested that computer-assisted processes already provide efficiency. When it is declared necessary to develop military decision-making systems equipped with AI/ML to ensure that commanders and staff retain control over all possible decisions, what is really meant is that AI/ML-automation would be implemented. AI/ML would assist with error control, information searching, analysis, and integration, list compilation, and the creation of well-thought-out maps featuring only necessary information to support decision-making. By combining AI/ML with computer-assistance, decision-making efficiency can improve. This ensures that commanders and staff maintain control over the decisions.

Apart from the AI/ML assistance recommended for military decision-making systems, military organizations must prepare by establishing structures and procedures to collect high-quality data and improve processes. Similarly to NASA's past practices, this paper proposes establishing a Military Experience Factory to collect, organize, analyze, and share well-organized and high-quality information obtained from the completion of military operations by units conducting multi-domain (or single service) operations. This study includes a practical demonstration of information management techniques to achieve this objective and outlines the Military Experience Factory's appearance.

## Disclaimer



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