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OODA and CECA: Analysis of Decision-Making Frameworks

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Abstract

Observe, Orient, Decide, and Act (OODA) concepts have supported understanding human decision processes for agile and competitive decisions about human warfighters and human-centric operations. However, future military decision-making based on human-machine teaming relies on technology and interaction concepts that support joint human-machine intelligence, not just human capabilities, which require the modification of new OODA concepts. The Critique-Explore-Compare-Adapt (CECA) Loop is proposed as an improved descriptive model based on recent advances in the cognitive sciences. The CECA Loop has explicitly been based on the premise that goal-oriented mental models are central to human decision-making as the means to represent and make sense of the world. The model puts two mental representations, the conceptual model established through operational planning and the situation model, which represents the state of the battlespace, at the center of the decision-making process. Additionally, the four phases of the CECA Loop broadly correspond to the identification of information needs (Critique), active and passive data collection and situation updating (Explore), comparison of the current situation to the conceptual model (Compare), and adaptation to aspects of the battlespace that invalidate the conceptual model or block the path to goal completion (Adapt). Nevertheless, the CECA Loop is intended to serve as a simple but widely applicable framework to study decision-making in Command and Control (C2). The introduction of critical thinking elements and the exposition of the central role of planning and the mental representation of operational concepts in C2.

Keywords

OODA, CECA, Command and Control

1. Introduction

Emergency management is vital for contemporary society due to the nature of the problems it aims to address. Today's world can be characterized by the increased level of uncertainty within large-scale processes, which have rendered the global landscape unpredictable to a substantial degree. The range of threats modern communities face is vast and continues to expand over the years and decades. Humanity has been subject to natural disasters of immense magnitude since the dawn of history. Despite the recent advancements, technological means remain unable to counteract the destructive potential of the elements.

Additionally, technology per se is a vital enabler of disastrous human-made events which threaten even the most advanced nations. As constructions and mechanisms continuously grow in size and complexity, so does the possibility of malfunctioning, which can entail adverse consequences. Finally, the ideas of uncertainty are strongly related to the infamous threat of international and domestic terrorism, menacing the entire world.

These challenges form an area of increased concern for global communities and policymakers. Accordingly, significant recourses and assets are allocated to address the problem. Nevertheless, while strategic resolutions remain pivotal, the direct response to such challenges has earned a particularly vital status. Whatever the underlying issues behind a disaster, its occurrence must be addressed with due diligence, efficiency, and caution. The response protocols are executed by diverse teams of multiple units expected to work in the spirit of interprofessional cooperation and understanding. Therefore, organizing such units is challenging, requiring robust and educated leadership. Emergency managers must demonstrate a level of decisiveness and inner strength adequate to the magnitude of a disaster. Moreover, these crises often unfold rapidly, adding a rush element to the unpredictable situation. Therefore, efficient yet correct decision-making is an essential characteristic of a strong leader in emergency management.

While the sphere demonstrates an array of particularities, making it sufficiently different from most industries, reviewing it within universally accepted paradigms is still possible. However, even though some theories and approaches may stem from public business and leadership, many acquire a different form in law enforcement, military operations, and emergency management. In other words, the universal principles of leadership and effective decision-making can only be transferred to the emergency management domain with certain necessary adjustments. These alterations reflect the indeterminacy, changeability, and constant risks in disaster and terrorism response. At the same time, as the discipline constantly evolves, the institute of emergency leadership philosophy undergoes similar changes dictated by the essence of the new age. In the era of new international challenges, the leading minds of emergency management have become concerned with redefining the field's decision-making principles. This paper aims to contrast the two top frameworks in this regard, the OODA Loop and

CECA, regarding their adaptation to the current changeable environment.

2. Review of Literature

It is essential to consult the existing sources of valuable academic data to discuss the applicability of a particular decision-making paradigm within the emergency response framework. Effective decision-making in the stressful emergency response environment is one of the critical aspects of the professional sphere. The current literature review aims to provide temporary information regarding the status of decision-making in emergency management and response and its fundamental principles within the study area. First of all, as can be inferred from the nature of the mission, emergency response deals with rapidly unfolding occurrences, demonstrating elevated damage risks (Glarum & Adrianopoli, 2019). Furthermore, while the field generally possesses distinctive features, the array of human-made, natural, and terrorism-associated threats is highly variable. Glarum and Adrianopoli (2019) confirm that no universal solution would fit all situations within emergency response objectives. Accordingly, this idea implies that the optimal decision-making paradigm for emergency management is expected to be sufficiently versatile.

At the same time, emergency response teams tend to be organized by a strictly structured hierarchy, which promotes the ability of a unit to follow the leadership's commands. While most of the world's industries sway toward more democratic administration systems, emergency management has been unable to follow the general pattern due to the immense value of subordination in such a changeable and stressful environment. Nevertheless, while leadership authority in this sector tends to be significantly higher, sensemaking remains essential (Glarum & Adrianopoli, 2019). In other words, while emergency responders in the field are expected to follow the commands they receive from the control center, they need to understand the context and the purpose of the designated tasks. According to Schildt et al. (2019), there exists a nexus between the power of leadership and the sensemaking potential of a situation. Systemic administration is met with higher respect, thus contributing to the sensemaking process within units. On the contrary, the lack thereof negatively affects a team's ability to see the complete picture.

Overall, the operations within the sphere of emergency management are often filled with many cases in which it is required to make difficult decisions. For example, Hoekstra and Montz (2017) reviewed the decision-making process in disaster response based on the case study of Superstorm Sandy. Within this in-depth study, the emphasis was made on the internal processes experienced by leaders in decision-making. The interviewees have nearly unanimously pointed to the possibility of casualties as the critical factor influencing their decision-making. In other words, the risks related to people's lives hold the most weight in the practical environment, prevailing over infrastructural damage and economic aspects. The data presented by Poggi et al. (2021) equally outlines the

costs of latency in data collection in decision-making in rapidly changing catastrophic scenarios. At the same time, this article refers to decision-making as one of the critical enablers of community resilience and recovery. Accordingly, the optimal decision-making paradigm for emergency management must consider the essential notions outlined within the current literary space.

3. OODA

The OODA Loop has been one of the prominent decision-making techniques used across various spheres of human activities. However, the range of applications mainly comprises military organizations and similar structures. According to Bryant (2006), OODA is an acronym for Observe, Orient, Decide, Act, and this looped pattern guides military decision-makers. Moreover, the OODA Loop was embedded in the United States Armed Forces Doctrine. Using the model on such a high level of national security is often viewed as one of the primary arguments in favor of its unconditional effectiveness. It comprises four preliminary stages, which are supposed to bridge a given situation's broad conceptual framework and tactical circumstances (see Appendix A). In addition, Bryant (2006) states that the OODA Loop is often considered intuitively accurate, meaning that its features inherently correspond to the nature of the task faced by military-like institutions.

4. CECA

Ultimately, when the leading decision-making paradigm reveals its flaws through research and practice, the emergence of other promising avenues becomes a matter of time. CECA stands for Critique, Explore, Compare, Adapt, and it is an alternative loop used for the decision-making process in stressful environments. However, experts do not limit the applicability of the CECA framework solely to military-like structures, as "it is intended to serve as a framework for describing natural human cognition and discussing prescriptive measures for supporting command decision-making" (Bryant, 2006: pp. 191-192). This model relies on the initial outline of the conceptual framework completed by a decision-maker (see Appendix B). Next, this outline is critically analyzed concerning the presently observed situation. Once the degree of divergence has been estimated, the decision will be made regarding how the problem can be affected to adjust it closer to the prior conceptual understanding. Therefore, the CECA model promotes an active approach to leadership and decision-making. Furthermore, it is highly goal-oriented, corresponding to the requirements set by emergency management.

Sensemaking

The decision-making frameworks discussed in the previous sections have proven their effectiveness across years and different military operations. However, as suggested by the focus of the emergency management sphere, even the principles

widely applied in adjacent sectors may only partially correspond to its missions and objectives. Therefore, comparing the two frameworks in the context of the emergency management features determined through the literature review appears relevant and valuable.

First, sensemaking remains an essential component of emergency management unit functioning. People who form the response teams pursue similar objectives and are expected to unconditionally follow the leadership's commands. However, ensuring each member's understanding of the specific ideas becomes each command or strategy is vital. The response will benefit from evidence-based, informed practices executed cautiously (Weick, 1993). Both frameworks discussed within this paper rely on this aspect of emergency decision-making. The OODA Loop focuses on observation and orientation to keep the practices informed. However, Rousseau and Breton (2004) observe the lack of the "feedback or feed-forward loops needed to model dynamic decision-making" (p. 4) effectively. Therefore, the OODA Loop demonstrates decreased effectiveness in terms of sensemaking. On the other hand, the CECA framework has a higher potential in this regard, as the adaptive capability of the model renders it closer to contemporary requirements.

The second essential notion within the sphere of emergency management comprises the organization of role structures within units. This profession can be deemed military-like due to the strictly regulated nature of its protocols and the need for a strong hierarchy. Both decision-making paradigms acknowledge such a necessity, granting the leader the theoretical power to give unconditional commands. Accordingly, both frameworks inherently expect the followers to accept and implement the decisions of their leaders (Bryant, 2006). Under such circumstances, the cost of an incorrect decision becomes higher, and in the case of disaster and terrorism response, this parameter is measured in human lives.

5. Implications

Research suggests that the CECA loop demonstrates better decision-making flexibility, prompting leaders to consider more variables by comparing the conceptual framework and its current reflection. The OODA loop is obsolete, as its lack of agility may entail adverse consequences due to insufficient adaptation (Bryant, 2006). Therefore, the CECA model appears favorable in this area, as well.

Finally, decision-making should create an atmosphere of trust within disaster response units to tackle global challenges. This feeling is crucial for stressful environments associated with increased pressure, rapidity, and changeability (Seddighi, 2020). People are often forced to push themselves beyond the limit of the impossible, which is only possible because they fully trust the leader in charge of critical decisions. As controversial as a decision may seem, it will be more likely to follow the proposed strategy (Weick, 1993). As each unit has different values, objectives, and personalities, sufficient flexibility is required. The CECA frame-

work is generally associated with agile decision-making practices, instrumental in building team trust.

6. Conclusion

The decision-making framework utilized for the emergency response challenges should reflect the acute issues the sphere addresses. The contrast analysis of the two main approaches indicates that the CECA loop is much better adapted to the current environment. When discussing decision-making paradigms, Bryant (2006) mentioned the outdated mechanism of the OODA model, which eventually lost its status after years of prevalence in the military environment. Despite potential similarities between the army and emergency management, the latter requires even more agility in decision-making. Global terrorist threats cause a considerable portion of the current indeterminacy. As the response practices effectively interrupt terrorists' activities, the latter attempted to devise new techniques and bypass the global security systems. As a result, the challenges posed by international and domestic terrorists constantly evolve, attacking the well-being and safety of communities from different angles. Therefore, the response mechanism should respond to this changeability by adopting an agile decision-making model capable of adjusting the measures to particular threats. The CECA loop is the optimal choice by the parameters discussed.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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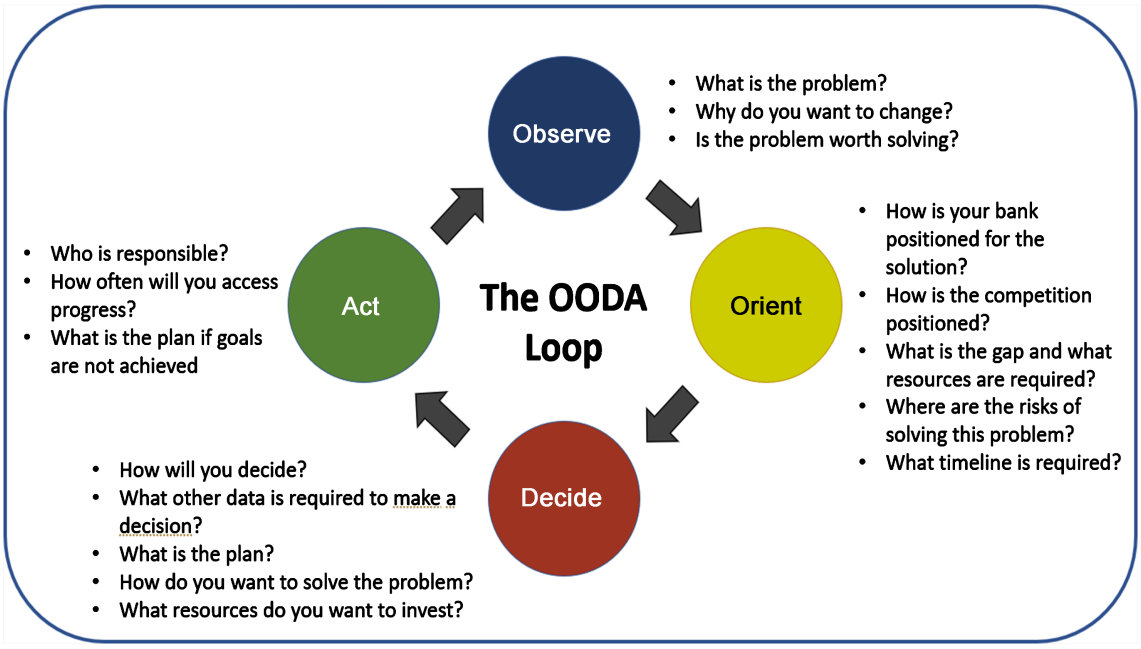
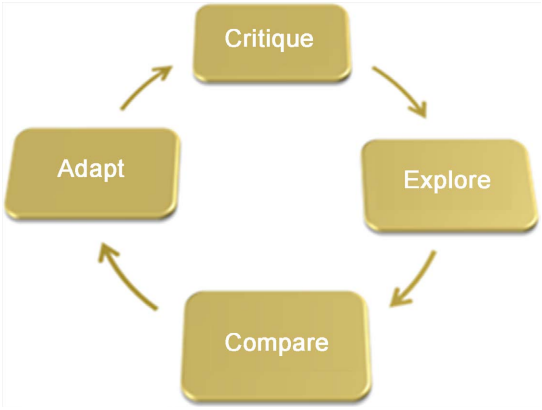
Appendix A: The Observe-Orient-Decide-Act (OODA) Loop



Note. Adapted from Nichols, C. (2022, September 19). Using the OODA loop for faster bank decision making. South State Correspondent Division. https://southstatecorrespondent.com/banker-to-banker/using-the-ooda-loop-for-faster-bank-decision-making/.

Appendix B: The Critique-Explore-Compare-Act (CECA) Loop



Note. Adapted from *Management Models Pocketbook Archives* (2018, March 19). Management Pocketbooks. https://www.pocketbook.co.uk/blog/tag/management-models-pocketbook/.