# RISK MANAGEMENT ASSOCIATED WITH THE CYNEFIN FRAMEWORK FOR SCIENTIFIC RESEARCH: STRATEGIES FOR DEVELOPING A STANDARDIZED MODEL

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**Abstract:**

The standardization of a risk management model associated with the Cynefin structure, as it is a tool used in the management of complex problems, and its application in the development of scientific research projects, provides the researcher with a more adequate decision-making process in the face of the risks that arise. Research shows that the negative effect of risks can affect the good performance of research and the fulfillment of its preliminary objectives. The objective of this study was to develop a specific risk management model for application in scientific research projects. The results showed that the strategy of using the Cynefin structure, associated with Risk Management through the proposed modeling, offers better transparency and innovative products, the result of scientific research.
**Keywords:** Risk management; Cynefin structure; Public Governance.

# GESTÃO DE RISCOS ASSOCIADA A ESTRUTURA CYNEFIN PARA PESQUISAS CIENTÍFICAS: ESTRATÉGIAS PARA IMPLANTAÇÃO DE MODELO PADRONIZADO

**Resumo:**
A padronização de um modelo de gestão de riscos associado a estrutura Cynefin por tratar de uma ferramenta utilizada na gestão de problemas complexos, e sua aplicação no desenvolvimento de projetos de pesquisas científicas proporciona ao pesquisador uma tomada de decisão mais adequada frente aos riscos que se apresentam. A pesquisa mostra que o efeito negativo dos riscos pode afetar o bom desempenho das pesquisas e o cumprimento de seus objetivos preliminares. O objetivo deste estudo foi desenvolver um modelo de gestão de riscos específico para aplicação em projetos de pesquisas científicas. Os resultados mostraram que a estratégia de utilização da estrutura Cynefin, associada à Gestão de Riscos por meio da modelagem proposta oferece melhor transparência e produtos inovadores, fruto das pesquisas científicas.
**Palavras-chave**: Gestão de Riscos; Estrutura Cynefin; Governança Pública.

## 1. INTRODUCTION

With a view to minimizing risks that often result in significant losses in projects [1], risk management should be a preponderant factor in ICTs for submitting R&D projects.

Scientific research often involves significant investments, including funding of human resources, and in this way, risk management helps to identify and mitigate possible risks to these investments, thus protecting the resources invested in the project [2].

In Brazil, Normative Instruction No. 01/2016 [3] aims to strengthen management, improve processes and achieve institutional objectives through the creation and improvement of internal management controls, the systematization of risk management within the scope of federal organizations, aiming at improving Brazilian public governance. It should be noted that the Federal Court of Accounts [4] prepared a Risk Management guide that provides practical guidelines and methodologies that address the basic concept of risk, including stages of identification, analysis, treatment and monitoring of risks, for which it describes a dosimetry for organization of probability and impact for measuring risks in low, medium, high and very high and extreme.

Risk management is an iterative process that can be applied at all levels of the project [5]. For Rampini (2019) [6], the RM process in projects must be adapted to the specificities of each project, aiming at achieving its objectives in a way that adds value, as well as assisting the manager in decision making.

The Cynefin model developed by Dave Snowden (2007) [9] helps in decision making, providing guidance on the most appropriate approach to deal with complex problems. It divides the problems (in this study treated as risks) into five main domains: obvious, complicated, complex, chaotic and disorderly. Each domain has different characteristics and requires different resolution strategies. The model promotes a mentality of adaptation, continuous learning and experimentation to adapt to different realities [7].

In the context of scientific research, risk identification and immediate response capacity play an essential role in mitigating damage to the development and completion of research. Some adaptive approaches can be incorporated such as the Cynefin framework [8]. The Cyfenin method, created by Snowden, et al (2007) [9] brings a perspective on complexity to be applied by managers for efficient decision-making in the face of obstacles that arise.

Recognizing risks in the five domains of the Cynefin framework, developed by Dave Snowden (2007) [9] is important for adequate decision making regarding risk coping. However, it is important to correctly classify them in the Cynefin structure for assertive decision-making by the researcher.

For Vasilesco (2011) [10] the Cynefin model operates in the strategic decision process, reflects interests and behaviors present in management and organizational theory. It assists institutions in their activities based on several daily decisions with a certain complexity and generally under risks and uncertainties.

The application of Cynefin in Risk Management aims to facilitate the understanding of the complexity that involves each risk and its identification in one of the domains of the

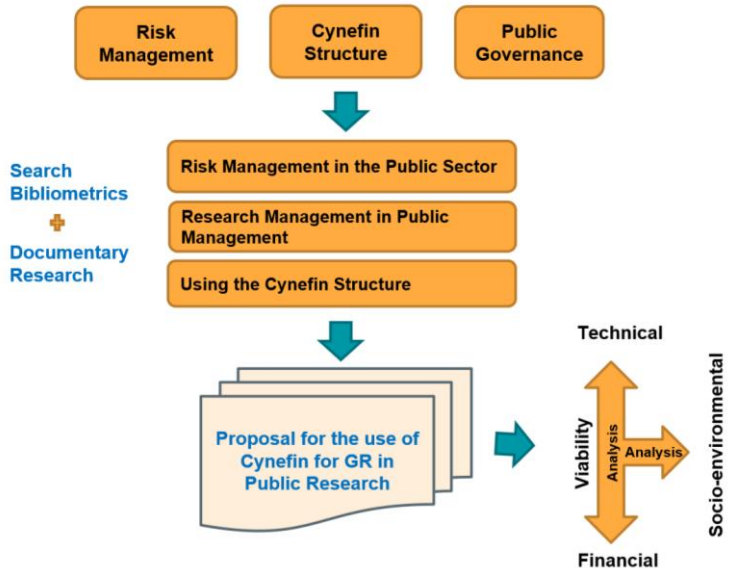
Cynefin structure allows researchers, decision makers, efficient responses to risks in research [11].

In this scenario, the association of the cynefin structure with risk management is intended to lead a practical conceptual framework, thus helping institutions to understand and classify risks effectively, enabling strategic decision-making for public governance.

## 2. METHODOLOGY

Supported by a documentary and descriptive methodology to understand the context in which GR is carried out in public organizations, especially in research projects, the study analyzed the results of searches for the topics Risk Management, Cynefin Structure and Public Governance. For this, the risk dosimetry described in the Risk Management Guide [4], the Snowden Complexity Domains, 2007 [9] was taken as a reference and the database of the Web of Science platform was used to propose the use of Cynefin in research projects in public institutions, as well as verifying their viability in technical, financial and socio-environmental contexts. This process is illustrated in Figure 1.

Figure 1: Diagram of Methodology Used




Source: The authors (2023)

## 3. CYNEFIN AND RISKS

Cynefin divides situations into five main domains: Obvious, Complicated, Complex, Chaotic, and Disorderly. Each domain has its own characteristics and requires different risk management approaches that involve several steps, including identification and classification and assessment of its likelihood and impact.

In the Obvious domain, risks are known and predictable. Risk management in this domain is based on best practices and standardized procedures. Managers can use traditional risk management methods, such as risk analysis, to identify and mitigate risks.

In the Complicated domain, the risks are confusing but can be understood through experts and detailed analysis. Managers must use experience, expert advice

and analysis tools to deal with these risks. Decision making is based on information analysis and expert assessments.

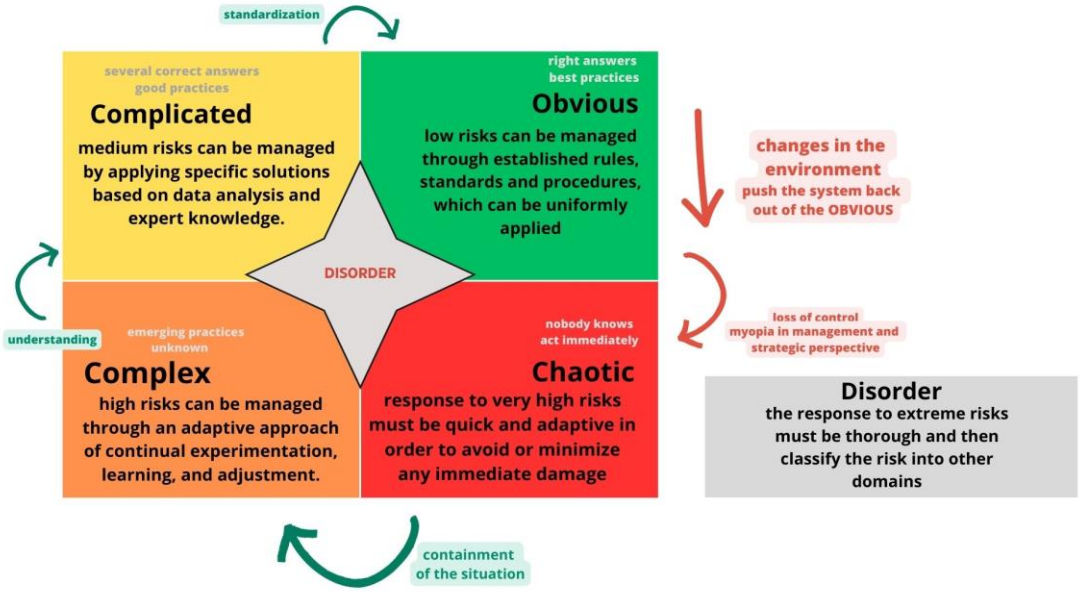
In the Complex domain, risks are interconnected and emergent, making it difficult to predict outcomes. In this case, managers should adopt a more experimental and interactive approach, seeking to learn from interactions and adapt as necessary.

In the Chaotic domain, there are no clear patterns and the situation is highly volatile. In this case, it is essential to act quickly to stabilize the situation and avoid further damage. Risk management in this domain requires an agile and recovery-oriented response, prioritizing stabilization before implementing more structured approaches.

Finally, the Disordered domain is characterized by the absence of a clear relationship between the causes and effects of risks. In this case, a careful diagnosis is necessary to classify the problem in one of the previous domains and then to adopt the appropriate approach for the risks that present themselves.

Understanding Snowdem's (2007) [9] five domains, shown in Figure 2, helps researchers understand and analyze the context in which the risks in these domains are inserted, especially when dealing with complex and ill-defined problems. It thus provides a framework for understanding the different aspects and dynamics that can influence research, such as multiple variables, complex interactions, and uncertainties.

Figure 2: Cynefin Structure associated with Risk Management




Source: The authors (2023)

## 4. RESULTS AND DISCUSSIONS

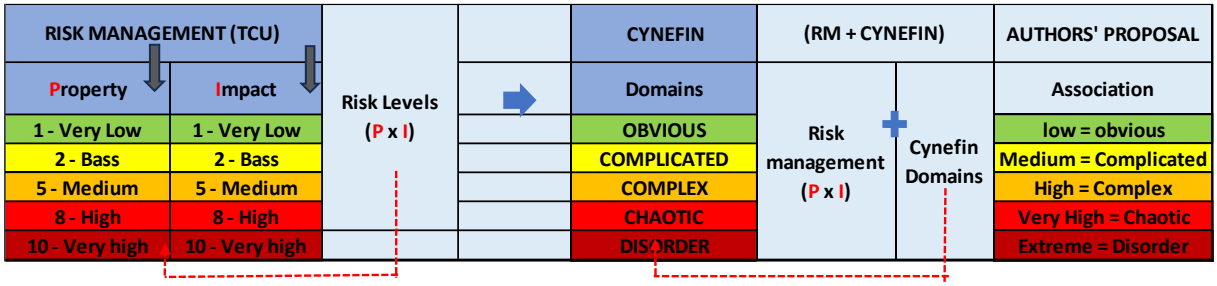
When applying the Cynefin methodology in risk management, that is, when using the composition of the probability x impact product, the risk will automatically be identified in one of the five domains of Snodew, 2007 [9], so that managers obtain a clearer view of the complexity of the situation and thus adopt the most appropriate strategy to deal with the different types of risk.

Figure 3 brings the established by the TCU, (2018) [4] for common understanding of the classifications of probability and impact of the risks with the

weights 1; two; 5; 8 and 10, in real situations, to be prepared in a way that is compatible with the context and the specific objective of the risk management activity. The product of the established weights allows the identification of the degree of risk, that is, low, medium, high, very high and extremo.

This study brings the association of the degree of risks identified in a context of correlation with the cynefin domains created by Snowden (2007) [9], which will allow the manager to make a more assertive decision regarding the risks that arise.

Figure 3. Risk Levels associated with Cyenfin Domains



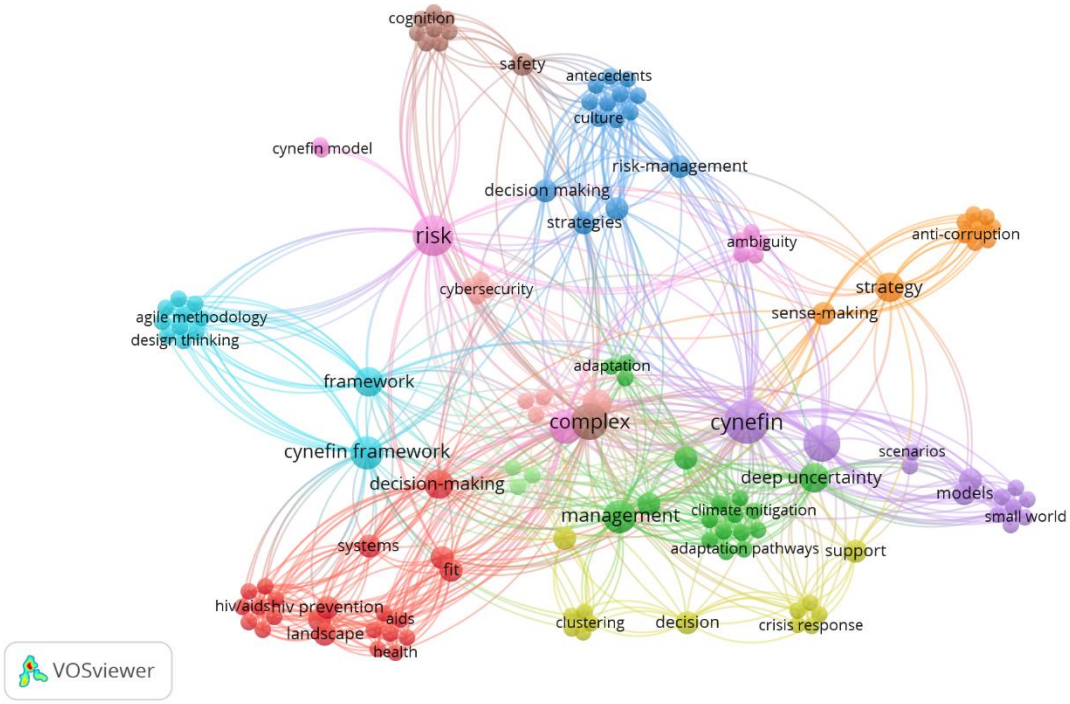

Source: The authors (2023)

In this study, the Cynefin structure is associated with risk management, as it helps to understand and categorize the complexity of a problem or situation, allowing managers to identify the appropriate approach to deal with different types of risk, as well as for the manager to understand complexity of risk-related issues and assist in making appropriate decisions and classify risks according to the complexity and uncertainty involved, and thereby make more appropriate decisions on how to identify, assess and address these risks effectively.

The study points out that, in scientific research, it is important to define the scope of the investigation and the frontiers of knowledge. The Cynefin structure associated with Risk Management can help to delimit the study areas, identify the demarcations between the known and the unknown and explore new environments of scientific knowledge. When facing complex decisions during a scientific research, the researcher can rely on the Cynefin x Risk Management structure, as this set of tools and approaches help in decision making in different types of problems and contexts. It facilitates the researcher to consider the complexity of the risk, evaluate the uncertainties and select the best strategies to advance the scientific research.

Figure 4 analyzes the key words from this study – cynefin in risk management – using the database of the web of science platform, in order to identify the occurrence (frequency) of publications related to the topic and the use of the VOSviewer software allowed viewing and identifying 132 items and 11 clusters related to these words. In addition, the words identified in the use of the VOSviewer software indicate a trend of recurring themes in publications related to the proposed theme.

Figure 4. Graphic analysis with the words work theme – cynefin in risk management




Source: The authors (2023)

In this approach, researchers can develop what-if scenarios and models to assess potential risks and test different approaches. This allows for a deeper understanding of the risks involved and better decision-making by researchers. Since the application of the Cynefin framework must be adapted to the specific needs and characteristics of scientific research, taking into account the field of study, the research team and the interested parties involved.

## 5. CONCLUSION

The Cynefin framework enables researchers to analyze the risks and uncertainties associated with their research projects. The model recognizes that uncertainty is inherent in complex systems and provides guidelines for managing uncertainty and minimizing associated risks, with a view to helping researchers identify potential problems or challenges and take steps to mitigate the risks involved.

Conclusively, the Cynefin model offers a structured and comprehensive approach to risk management. By categorizing risks into different domains – simple, complicated, complex and chaotic – it allows organizations to better identify and understand the nature of the risks they face. By implementing risk management based on the Cynefin model, institutions can improve their responsiveness and reduce the damage caused by unwanted events. This not only strengthens their resilience, but also increases their ability to seize opportunities in complex environments.

Therefore, risk management based on the Cynefin model is a valuable approach to help institutions identify, analyze and deal with risks in the most effective way, thus providing a solid foundation for the success and sustainability of their projects.

In summary, the association of Cynefin domains with Risk Management can be useful in scientific research to understand the complexity of problems, make important decisions, promote identification, risk analysis and uncertainty management. Using this model of association, researchers can develop a more suitable approach for their projects, resulting in better results and scientific advances.

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