

Snow Flake of risk could change Risk in Project Management ¹

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Concept/Abstract

The conceptual development of the Shape Based Risk Model for us in quantum computing offers the potential for near real time mapping of project risk, enabling practitioners to visualise their effect and account for them dynamically

The foundation of this research originated from a fundamental question “What makes project risk similar and what makes each risk unique?”

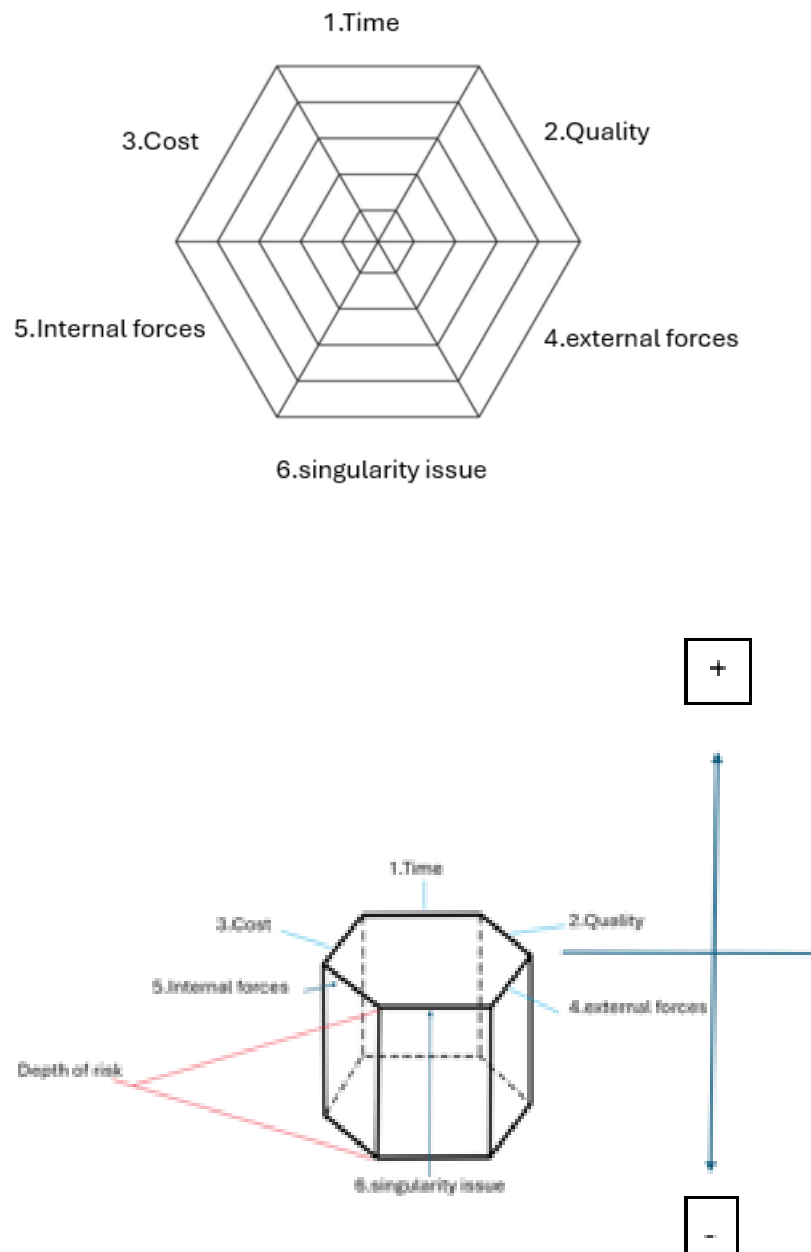
Rather than approaching risk solely through established project management frameworks, the author sought to consider risk in this way. This reflective process led to the conclusion that every risk is unique in its specific characteristics, context, and potential consequences. However, despite this individuality, risks also share a number of common attributes that enable them to be analysed using consistent methodologies. Consequently, risk may be viewed as simultaneously unique and universal—possessing characteristics that distinguish one risk from another while exhibiting underlying properties common to all forms of uncertainty.

The Author therefore sought an analogy capable of representing this dual nature of risk. The concept of a snowflake emerged because, while every snowflake shares a common underlying structure, each possesses a unique pattern.

Building upon this analogy, a geometric representation was designed to provide a visual framework for modelling project risk. The intention was not merely to create a graphical representation, but to develop a conceptual model capable of illustrating both the intrinsic characteristics of an individual risk and its relationship with other risks within a project management environment. The resulting shape therefore represents a single risk entity, whilst simultaneously providing a mechanism through which interactions with other risks may be examined.

By doing so, the model could respond dynamically to individual project risks, illustrating their impact, causal relationships, cascading effect and potential influence on future project events. This could revolutionise risk management in projects with an ability to see effect rather than guess and also cause as each new flake brings with it changes and how that will ripple through the project.

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Literature review

Taking the following use of shapes in quantum computing, and ability to see more than one side of the same situation, as the start for the review for this paper as an intro to quantum computer concept (Nielsen, Chuang, 2010) “*Quantum computation and*

quantum information". This gives the reader a good base of what is quantum and how it works etc. This brief concept guide gives the reader an idea of how quantum works and, also the reasoning behind why this computer system is chosen for this concept shape idea. With risk being more than just yes or no, the usage of quantum was to this study an obvious choice (Woerner, Egger, 2019). Taking the review done by KIM Dae Jong gives a good bases of quantum computing (Dae Jong,CHA,2025) the very idea that 0 and 1 are not enough to cover such a complex concept as risk means that being 1 and 0 at the same time is put forward as the main reason for this style of computer power being used for this.

(Jong, K.I.M.,CHA, 2025) Speaks about Yum and Choi (2022) studied the impact of quantum entanglement on the performance of quantum computers, which creates correlations between multiple quantum bits to create more complex quantum states, which greatly improves the performance of certain algorithms. In particular, their work analysed the progression of quantum entanglement in an ion-trap-based quantum computer to assess the feasibility of quantum computing technology. Using this latest concept, it could be suggested that quantum entanglement may be the progress moving new concept. Now (Tóth,Lent,2001) with in this review, explored quantum computing with quantum-dot cellular automata, providing insights into alternative approaches to implementing quantum computation. Their work demonstrated how quantum-dot cellular automata could potentially overcome some of the scaling challenges in quantum computing implementations, which has implications for the timeline of business adoption.

This with the new shape concept, in this studies opinion would assist with scaling this upwards and with testing, hopes to give better results. The use of the shape suggested by this study in order to connect risk to quantum, with new versions of quantum coming on with new chemical structure of crystal quantum and this very shape being the same as those chemical qubits should help connectivity in the quantum processor.(Dubey, Mehra, Kumar, Sharma, Chowdhury Rana,2026)



Fig 1 (Sam Jarman.2026)

With this latest idea the study would say new concept that, this backs the logic of the risk shape as it blends. This of course is yet to be proved as does all of this idea. The purpose of the paper is to promote the idea and see where it takes the nature of risk management going forward.

(Chow, 2024) study of using quantum computing in medicine shows how risk can be managed in a medical way using this new technology. The concept of using Qubits and superposition assist in the decision-making methodology being required, as for this being taken into project management. (Indrajit, 2024) lit review shows what the impact of quantum could have on project management and risk. (Aliyev,2025) spoke about how Bosch have used Quantum in a range of projects and AI combined, this leads to a more specialist risk analysis in the process of using Monte Carlo simulation. This is the very reason why This study wants to present the idea of using this shape risk design within quantum to better manage risk. One of the main statements to come out of this paper is as follows” Risk Mitigation Thanks to AI-PM's predictive models, organizations may proactively detect vulnerability-ties and mitigate risks before they worsen. Its precision is constrained when it comes to high-dimensional uncertainty and cascading risks. By fusing high-dimensional quantum simulations with real-time data, QAI-PM overcomes these constraints. This method offers unmatched accuracy in identifying and reducing risks and dynamically modifying tactics to manage and change project complexity. The integration of quantum models ensures effective risk minimization, including interdependent delays.”

Problem definition

The problem is that with most if not all current risk management in project management using computers or software, the built-in issue of bias occurs and has been having a detriment effect on the outcome prediction. (Johnson, K.N.,2019)

The reasoning behind the shape being discussed and promoted as a possible answer has the following

- Probability An ability to address this on a level of data and time not used before in risk management
- Uncertainty – “Most frequently “uncertainty” simply either refers to the limits of our knowledge in regard to the possibility of sudden and unexpected (undesired) events – such as the so called ‘black swans’ or ‘unknown unknowns’(Christian Fjader.2020). .
- Proximity this is where the quantum could show the impact or due to its speed could help reduce impact.
- Dependency between risks again this is how the system in the author’s opinion would be best at showing the impact of one risk on another.

In order to test the concept, the following could be suggested.

mixed methods: with suggestions of the below as where and how to test.

Expert interviews with quantum/project specialists -This is where the concept needs to be taken further and confirmed as a possible idea or not.

- Risk workshops - this is where the testing of the ideas
- Simulation data
- Delphi study for expert consensus - This has happened and from those who were involved the contention was positive.

Analysis

How this would be done the author leaves to those who wish to test as does not want to add bias through method that make sure answers which would bias this idea as being workable

Summary

This Paper has proposed a novel conceptual framework that integrates established principles of project risk management with emerging concepts in quantum computing through the application of a shape-based methodology. The intention is not to present a definitive model, but rather to introduce a research proposition that can be subjected to rigorous academic investigation and empirical validation.

It is the author's hope that this conceptual framework will encourage further research to test its validity, reliability, and practical applicability within both project management and quantum computing domains. By representing project risks through a dynamic geometric shape, the methodology seeks to provide a more intuitive means of visualising the evolution of risks, identifying the conditions under which individual risks may materialise into issues, and illustrating the complex interactions and interdependencies that exist between multiple risks throughout the project lifecycle.

Ultimately, the value of this work lies not in claiming a proven solution, but in establishing a foundation for future academic enquiry into whether shape-based visualisation can improve the prediction, communication, and management of project risk in complex and uncertain systems.

Author's declaration on use AI

AI has been used in this work for focusing my thoughts and helping with grammar and spelling due to my being dyslexic and having mild asperges.

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