Practical Approach in Project Risk Definitions: Addressing Ambiguities and Introducing a New Risk Meta-Language [1]

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1. Abstract

A common challenge faced by project risk analysts is justifying the nature of the items identified as risks to their audience. Analysts are often questioned about whether certain items truly qualify as risks, leading to debates and ambiguities. This paper aims to provide a well-reasoned response to these concerns by offering practical solutions for addressing the uncertainties surrounding the definition of risks in project risk analysis.

It delves into the complexities arising from distinctions between terms such as risk, issue, cause, effect, systemic risk, inherent risk, and risk events. To address these challenges, the paper introduces a new meta-language of risk, designed to support the clear and accurate definition and documentation of project risks, enhancing both understanding and communication among stakeholders.

2. Risk Definition

Risk has been defined in various references as follows:

The PMI Standard for Risk Management defines risk as:

> "An uncertain event or condition that, if it occurs, has a positive or negative effect on one or more objectives."

The Practice Standard 62R-11: Risk Assessment: Identification and Qualitative Analysis, published by AACEI, defines risk as:

> "An uncertain event or condition that could affect a project objective or business goal."

ISO 31000: Risk Management - Guidelines defines risk as:

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"The effect of uncertainty on objectives."

Dr. David Hillson, in Briefing No 6 "When is a Risk Not a Risk" defines risk as:

"Uncertainty that matters."

3. Risk Meta-Language

In risk definition, a chain of consequences is usually considered that shows the process of evolving a risk. This chain is starting from the cause of risk and ending at its effects. This chain is a powerful way to from a reasonable understanding from a risk. The following Figure shows this chain:

Risk meta-language as a way to introduce risks uses this chain in risk definition. As phrased by Dr. David Hillson in briefing No 22 "Using Risk Metalanguage to Develop Risk Responses", every risk can be stated as follows:

"Because of <one or more causes> , <risk> might occur, which would lead to <one or more effects>."

4. Problem Definition and Discussion

As mentioned, the issue lies in the ambiguities inherent in the risk identification process, which primarily arise from the definition of risk. This section introduces and discusses some of the key challenges associated with this issue.

Uncertainty in all Parts of Risk Meta-language

Uncertainty in any part of the risk chain is sufficient to define a risk. Whether it lies in the "cause," the "risk" itself, or the "effect," the presence of uncertainty in any of these components qualifies the situation as a risk. It is not necessary for uncertainty to exist solely in the "risk" portion of the chain.

Dr. David Hillson addresses this concept in Briefing No. 86: "Risks with 100% Probability." He introduces the concepts of aleatoric uncertainty, epistemic uncertainty, and ontological uncertainty as types of risks with 100% probability.

The following examples help to clarify this point and provide a deeper understanding.

Example 1 (project-specific Risk):

Company C has a long-term contract with a contractor for the commissioning of all its projects. This arrangement was factored into the project assumptions, with schedule and cost forecasts developed accordingly. However, during the engineering phase of the project, the project manager unexpectedly receives a message that, due to political issues, the contractor has withdrawn from the contract. Consequently, the project team must find a new contractor, likely resulting in an increase in project duration and costs. This situation is now reflected in the updated project risk register as follows:

Withdrawal of the commissioning contractor.

Rewriting the above risk using risk meta-language would result in the following:

> "Due to certain political issues, the commissioning contractor has withdrawn, which could lead to changes in schedule assumptions."

In the above example, the "risk" part of the chain is not uncertain, as the event has already occurred. However, the "effect" remains uncertain, which qualifies it as a risk under the principle that uncertainty in any part of the risk chain is sufficient for defining a risk.

Example 2 (an inherent risk):

Project team has provided the estimations for duration of manufacturing long lead items. Even if any uncertain event doesn't occur, an inherent tolerance is embedded in the estimations. This situation is now reflected in the updated project risk register as follows:

Uncertainty in duration of manufacturing long lead items.

Rewriting the above risk using risk meta-language would result in the following:

> "Due to inherent characteristic of estimations, a tolerance is embedded within them, which could lead to changes in schedule assumptions."

Similar to Example 1, in this case as well, it is the 'effect' that is uncertain, not the 'cause' or the 'risk'.

Example 3:

One of the project activities involves the hydrotesting of piping works. The exact duration of the hydrotest depends on the quality of the piping work, which cannot be determined until the hydrotest is conducted. Therefore, there is uncertainty regarding the duration of the hydrotests. The project risk analyst has identified this as a risk, defined as follows:

Uncertainty in hydrotest results.

Rewriting the above risk using risk meta-language would result in the following:

> "Due to factors such as the quality of welders, the quality of piping work varies across different routes, which could result in changes to the duration of hydrotests."

Similar to Example 1 and 2, in this case as well, it is the 'effect' that is uncertain, not the 'cause' or the 'risk'.

Example 4 (a systemic risk):

The project is currently in the initiation phase, where the concept is not yet fully developed to allow for precise estimations. Consequently, the assumptions regarding project time and cost are subject to significant changes.

The project risk analyst has identified this as a risk, defined as follows:

Possibility of changing in time and cost estimates.

Rewriting the above risk using risk meta-language would result in the following:

> "Due to the project being in the initiation phase, the project scope is not yet robust, which could result in changes in time and cost estimations."

Similar to Example 1, 2, and 3, in this case as well, it is the 'effect' that is uncertain, not the 'cause' or the 'risk'.

Example 5 (Risk Event):

The possibility of rain may cause delays in construction works.

The project risk analyst has identified this as a risk, defined as follows:

Possibility of raining.

Rewriting the above risk using risk meta-language would result in the following:

> "Due to weather conditions, rain may occur, which could result in delay at construction works."

As the risk meta-language indicates, in this example, the uncertainty lies in the 'risk' component. In this risk, the weather conditions is out of control of project team, so it can be ignored at all and the meta-language can be built as follows:

> "Due to the possibility of rain, there may be delays in construction works."

Example 6:

Due to weaknesses in the bid evaluation process, a qualified EPC contractor has not been selected, which may lead to potential execution issues. Some of the probable problems include:

- Use of inexperienced manpower
- Poor quality of engineering
- Delays in fabrication works due to limited availability of workshops

The project risk analyst has identified this as a risk, defined as follows:

Possibility execution problems

Rewriting the above risk using risk meta-language would result in the following:

> "Due to non-qualified EPC Contractor, there may be different problems in execution, which could result in project time and cost extension."

5. Discussion

By delving into all examples and their rewriting through risk meta-language, the following points have emerged:

First Point: Uncertain part of Risk Meta-Language

Referring to all examples, among the three components of the risk meta-language, uncertainty can reside in any of them. Having at least one uncertain component is sufficient to define a risk.

This point is fully aligned with definition of risk that is "uncertainty that matters".

Second Point: Contradiction in Risk Mata-Language

The components of 'cause' and 'risk' can be either certain or uncertain. However, a significant conceptual issue arises here. The second component of the risk meta-language is the 'risk' which, by definition, must be uncertain. This creates a contradiction between the definition of risk and the concept of risk meta-language in certain cases. For example, in Example 1, the second component, which is the 'risk' component according to the risk meta-language, is not uncertain.

The response of some risk experts to this problem is that it is not actually a risk, but rather an issue. However, if it is considered an issue, its effect must be certain. Since, in this case, the effect is not certain, it cannot be classified as an issue.

Another response to this problem is the argument that in this example, we are dealing with an inherent risk, and the risk meta-language is only applicable to risk events. To elaborate on this response, the following descriptions can be considered:

The contractor has withdrawn, and the project team is in the process of selecting a new contractor. The contractor's withdrawal is not part of the risk meta-language in this case, as everything is proceeding from that point onward. Based on the current schedule, which assumes the continuation of the previous long-term contract, the scope of work related to this contractor is set to begin in 3 months. However, the process of selecting a new contractor may take longer than 3 months. In this case, the risk meta-language would be as follows:

“Due to the process of selecting a new contractor, which may take longer than 3 months, there is a potential for delays in the start of the relevant scope of work.”

As the above risk meta-language shows, even considering the changed attitude, the 'risk' component is not uncertain.

So, we can conclude that risk meta-language is not applicable to some inherent risks.

Referring to example 4, the same justification applies to systemic risks. Therefore, the risk meta-language is not applicable to some inherent risks and systemic risks.

Third Point: Different Narratives in Risk Meta-Language

Depending on the approach and purpose of risk analysis, different versions of risk meta-language can be produced. For example, for the case presented in Example 1, following approaches can be taken:

First approach:

“Due to certain political issues, the commissioning contractor has withdrawn, which could lead to changes in schedule assumptions.”

Second approach:

“Due to the commissioning contractor withdrawal, an unplanned tendering process is being initiated, which could lead to changes in schedule assumptions.”

This problem becomes more pronounced as the chain of causes and events grows longer. For instance, the scenario outlined in Example 6 can be described as follows:

Weaknesses in the bid evaluation process (first part) led to the selection of a non-qualified EPC contractor (second part), which could lead to poor-quality engineering (third part), which could lead to numerous changes in the material take-offs (MTOs) (fourth part),

which could lead to delays in procuring materials and equipment (fifth part), which could lead to a delay in the overall project schedule (sixth part).

Considering the current status of project progress and the requirements of the risk model developed by the risk analyst, various elements of the above chain can be identified as individual risks. For example, these risks could include the following:

First approach:

“Due to probable changes in material take-offs (MTOs), there may be delay in procurement of equipment, which could lead to delay at project schedule.”

In this approach, the 'cause', 'risk', and 'effect' are uncertain.

Second approach:

“Due to probable poor quality of engineering, there may be frequent changes in material take-offs (MTOs), which could lead to delay at procurement.”

In this approach, the 'cause', 'risk', and 'effect' are uncertain.

Third approach:

“Due to non-qualified EPC Contractor, there may be different problems in execution, which could result in project time and cost extension.”

In this approach, the 'cause' is certain while the 'risk' and 'effect' are uncertain.

As demonstrated in the examples above, different versions of risk meta-language can be constructed for each case, allowing the probabilistic element to shift between the 'cause', 'risk', and 'effect'.

6. New Meta-Language for Risk definition

Based on the discussions above, the following conclusions can be drawn:

1- Uncertainty can exist in any component of the risk meta-language.
2- It is not necessary to have an uncertain event in order to define a risk.
3- Risk meta-language is not usually applicable for the inherent and systemic risks.
4- There is an inherent contradiction in the risk meta-language if the second component, labeled as 'risk', is not uncertain.
5- The risk meta-language cannot represent all cases, which challenges risk analysts in defining risks accurately.

In response to the aforementioned problems, a revised version of the risk meta-language is introduced in this paper. This version not only addresses the issues discussed above but also provides a more practical and conventional framework for risk analysts to define project risks in a manner that is compatible with real-world scenarios they encounter.

This meta-language is outlined as follows:

<certain/uncertain cause 1/event1> led/may lead to < certain/uncertain cause 2/event2>, which led/may lead to < certain/uncertain cause 3/event3>, … , which could lead to <certain/uncertain changes in project objectives>.

From this perspective, risk is introduced as a chain, regardless of which link in the chain represents uncertainty.

Considering the following points, this meta-language is more practical, accurate, and convenient compared to the previous one:

- Accommodation of Uncertainty: By incorporating both "led" and "may lead to," it accounts for the inherent uncertainty in predicting outcomes, making the language more adaptable to real-world scenarios. It does not have the limitation of always positioning the risk in the second part, as in many cases, the second part may not be uncertain. This flexibility allows the meta-language to accurately represent scenarios where the outcome is more predictable or deterministic, making it more versatile for various types of risks.

- Clear Definition of Causes and Effects: It allows for a clearer and more flexible representation of the chain of events, making it easier to track and assess the causes and their potential outcomes. It does not have a limitation in the number of sequences.

- A Comprehensive and Flexible Meta-Language for Representing Project Risks: It can provide an accurate representation of all types of risks, including inherent risks, systemic risks, and risk events, offering a comprehensive framework for capturing different risk categories within a project.

- Simplified Risk Mapping: It simplifies the process of mapping complex risks and their potential effects, reducing confusion and improving the communication of risk scenarios among stakeholders.

- Alignment with Real-World Scenarios: The structure reflects how risks unfold in actual projects, helping analysts better define risks in the context of specific project challenges.

7. Conclusion

According to current approaches to risk definition and the existing risk meta-language, project risk analysts often encounter the following challenges in defining and documenting risks:

- Ambiguity in Identifying Risks: Difficulty distinguishing between risks, issues, causes, and effects, leading to confusion in risk identification.

- Uncertainty Placement: Challenges in pinpointing where uncertainty lies within the risk statement—whether in the cause, risk, or effect.

- Justification Challenges: Difficulty justifying why certain items qualify as risks, especially when uncertainty is not explicitly tied to a specific event.

- Rigid Structure: Limitations of the current meta-language in accommodating complex chains of events or multiple interconnected causes and effects.

- Inconsistent Interpretation: Variations in how different stakeholders interpret the same risk definition, leading to communication gaps.

- Documentation Gaps: Struggles to document risks in a way that accurately captures their nature and potential impact, leading to incomplete or misunderstood risk registers.

The following solutions are proposed in this paper to address the aforementioned problems:

- Enhanced Risk Meta-Language: Introducing a revised risk meta-language that provides clearer distinctions between 'cause,' 'risk,' and 'effect,' enabling more accurate risk representation.

- Focus on Uncertain Impact: Emphasizing that an uncertain impact is sufficient to define a risk, regardless of whether the preceding causes or events are certain or uncertain.

- Streamlined Risk Definition: Proposing a new risk meta-language that structures risks as a chain of certain or uncertain causes leading to an uncertain impact, simplifying and enhancing the process of risk definition and documentation.

8. References

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Rasoul Abdolmohammadi, a Principal Engineer specializing in Planning & Scheduling at PETRONAS, brings over two decades of invaluable experience in project management. His expertise encompasses various domains, including time, cost, and risk management, establishing him as a distinguished figure in the industry. Rasoul has successfully developed, implemented, and executed project planning, control, and risk management processes across a wide range of international mega-projects within the oil & gas, utilities, and construction sectors.

Throughout his career, Rasoul has held pivotal roles such as Project Control Manager and Project Risk Manager, showcasing his proficiency in crafting pragmatic systems for project schedule, cost, and risk management. He is renowned for his innovative approaches to project risk analysis, a testament to his deep knowledge and insights in the field.

Rasoul's contributions extend beyond the workplace; he is the author of the acclaimed book, "Practical Project Risk Management Process," which encapsulates his wealth of experience and expertise. Furthermore, he actively shares his knowledge by presenting on project management best practices at prestigious international conferences, thereby enriching the collective understanding of project management methodologies

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