A NOVEL APPROACH TO STRATIFYING CORPORATE RISKS FOR IMPROVED RISK GOVERNANCE IN THE WATER SECTOR

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ABSTRACT

Faced with a risk governance question from the Board about which corporate risks required their attention, Water Corporation conducted a research project with UTS-ISF. This first explored approaches to risk stratification from across disciplines and then developed a set of 'Risk Characteristics' beyond likelihood and consequence and a novel process for assessing risks. The paper describes how the project built on Water Corporation's existing corporate risk framework and how a novel approach was developed drawing on systems-thinking and multi-criteria-analysis. The results of risk stratification were communicated via innovative visualisations, designed to synthesise the analysis and inform decision-makers on which risks to focus.

INTRODUCTION

Risk management is in its essence, subjective, but despite this, it is possible to use structured approaches to identify, understand, prioritise, and manage risks.

This research project aimed to build on Water Corporation Western Australia's existing extensive corporate risk framework to solve an issue with corporate risk reporting that had become apparent over time. It was noticed that the existing corporate risk framework applied within Water Corporation, while highly developed and aligned with international standards, was unable to sufficiently discriminate and prioritise between the organisation's corporate risks. As a result, 80% of the 20 or so corporate risks had been rated at the same risk rating level. Further, risk ratings generally remained the same from year to year.

The risk ratings are based on the traditional rating on a risk matrix through a calculation of consequence and likelihood with a colour coding representation, with risks rated as 'high' being shown as yellow. Within Water Corporation, this problem had come to be referred to as the 'sea of yellow' as most corporate risk ended up with a 'yellow' rating. This was despite the extensive work in risk management and risk assessment underlying the individual corporate risk evaluations. As a result, the existing method for corporate risk reporting was not seen as particularly useful for prioritising the allocation of resources to areas of need, or in determining which risks should be given greater emphasis in the considerations of the Board and Executive.

To solve this problem, the collaborative research team explored best practice approaches to risk stratification from across disciplines and then drew on systems-thinking (including complexity and uncertainty) and multi-criteria-analysis in developing an innovative approach. This approach introduced novel 'Risk Characteristics' to the assessment of corporate risks. These characteristics, defined together with Water Corporation staff, act as criteria beyond the traditional likelihood and consequence. The approach was trialled on a series of case study corporate risks covering diversity issues relevant to Water Corporation's operations.

BACKGROUND

Water Corporation is the principal supplier of water, wastewater and drainage services in Western Australia (WA) and is a State Government owned business.

Water Corporation has a holistic, integrated Risk Management Framework consistent with International Standard (IS0 31000: 2018). This standard provides an internationally recognised benchmark for risk management practice. It includes principles and processes for managing risk that can be used by across organisations. According to the standard, the purpose of risk assessment is to, 'provide evidence-based information and analysis to make informed decisions on how to treat particular risks and how to select between options' (IS0 31000: 2018).

Water Corporation's risk management framework incorporates risks across the organisation's value chain. This is consistent with best practice for corporate risk management frameworks of Australian water utilities. Water Corporation risk management is also highly developed with risk managers across a range of areas maintaining detailed risk registers and employing operational risk management for its assets.

Aligning with good corporate governance practice, within Water Corporation's risk management framework, corporate risks are overseen by the Audit and Risk Committee of the Board and the Risk Management Committee of the Executive.

PROJECT METHODOLOGY

Despite being best practice in most regards, an issue with Water Corportation's Risk Management Framework was identified in that it was not able to sufficiently discriminate nor prioritise between the organisation's corporate risks.

This research project, therefore had the goal of improving the organisation's risk management framework, particularly about what additional analysis of the existing business, operational and corporate risks might provide a 'stratification' of corporate risks that could be reported to the Board.

The project employed a transdisciplinary research design (Mitchell et al 2015) and progressed in two stages. That meant there was an initial focus on the 'problem space' of risk management and the need for further risk stratification within Water Corporation before looking for approaches and solutions from across various disciplines. As well as being problem-centric, taking a transdisciplinary approach to the research also meant that elements of the research were allowed to emerge as the project progressed and that there was a level of iteration built into the research design. This was particularly the case in relation to identifying and defining the risk characteristics. These characteristics, which were central to the project, saw a series of iterations in their development, testing and refinement.

Stage one started by first reviewing possible risk prioritisation and stratification methods from outside the water industry. This included a literature review as well as a structured consultation with UTS experts from sectors including energy, transport, corporate law, information technology, and finance. With no obvious candid methods to transplant, the UTS-ISF and Water Corporation project team then developed a novel approach to risk stratification that would be meaningful across Water Corporation's business, and that also would be able to enhance existing risk management processes.

This novel approach was a form of 'multi-dimensional risk assessment'. This involved the development of six new risk characteristics. These characteristics were developed, through workshops with Water Corporation's risk practitioners. The thinking draws on risk management practice within Water Corporation as well as a theoretical foundation from the literature on complex systems and uncertainty. This meant that the novel characteristics for assessing risks were meaningful to risk practitioners as well as having a theoretical basis.

In a pilot, the characteristics were then used to rate the organisation's business and operational risks under the corporate risk (i) Inadequate wastewater treatment capacity, reliability and disposal mechanisms.

In Stage Two, the risk stratification process was repeated and refined over a series of four further case studies of corporate risk for:

ii. Failure to prepare for cyber threats,
iii. Undesirable water aesthetics,
iv. Supply interruption for critical goods/services,
v. Impacts from bushfire on or affecting managed assets.

Parallel to this, a process was established for a 'snapshot' analysis of all corporate risks against one another in terms of their perceived current level of importance to the organisation. Further, the project developed innovative visualisations appropriate for communicating insights into the prioritisation of risks.

The project outcomes and visualisations were presented to the Water Corporation's Executive and Board in order to test their potential to communicate a synthesis of the risk stratification analysis in a simple and meaningful way. A second literature review was then conducted to look for any mentions of 'multi-dimensional risk assessment' or any of the novel risk characteristics.

PROJECT OUTCOMES

The outcomes from the project were the six risk characteristics, the novel approach to risk stratification of corporate risks, and a set of visualisations for summarising the results for decision-makers.

Novel risk characteristics (criteria)

The six novel risk characteristics developed and refined throughout the project were (risk):

1. **Velocity** of the impact after an event - Speed of impact; How soon after the event the impact occurs
2. **Emergent**/novel - a new, previously unknown risk with potential significant impact
3. **Slow onset**/delayed impact - manifests as a slow, persistent trend or reaches a tipping-point in 5-10yrs
4. **Confidence in the risk assessment** - level of confidence in Water Corporation's assessment of the risk
5. **Confidence in the risk mitigation** for the risk - confidence in current mitigation / risk treatments
6. **Reversibility**/recoverability - Whether the impacts from the risk are irreversible or reversible

Risk stratification process developed

The stratification process applied to each of the five case study corporate risks involved a series of four steps. There were:

I. Data collection: Data on the underlying business/operational risks was collected including likelihood and consequence ratings for each risk

II. Risk assessment workshop: Online workshops were held with ISF, the Water Corporation risk management team and the specific risk practitioners, including the risk coordinator for the case study corporate risk. In these workshops, the underlying business and operation risks (for each corporate risk) were scored against the six risk characteristics.

III. Weighting of scores: in the workshop, the six risk characteristics were weighted (by pairwise analysis) for each particular corporate risk. The business and operation risk scores were weighted based on the results from the pairwise analysis

IV. Decision framework application: Each business/ operational risk was filtered through the decision framework as shown in Figure 1. The framework filters categorised each business or operational risk into either Important, Priority or Critical risk groups.

Visualisation of the results

Figure 2 shows the five corporate risks that were assessed using a visual risk stratification based on colour. Corporate risks with higher proportions of red and yellow have scored higher in general in the risk-scoring processes conducted in the workshops with risk coordinators and practitioners. The individual business/operational risks are represented as segments in the full circle for each corporate risk. Figure A shows that from the perspective of the risk coordinators/practitioners the water aesthetics and cyber threats corporate risks had the highest proportion of critically rated business/operational risks. This means that these underlying risks scored high on at least one risk characteristic and were also considered as low confidence for mitigations and treatments currently in place.

The height of the corporate risk plotted against the y-axis represents a 'snapshot' of the current importance that the corporation is placing on that corporate risk at the time of the analysis. This was a simple and separate analysis from the risk stratification. It focused not on a dead analysis of the risks but a quick take on the current organisational focus.

Figure 3 depicts the risk characteristics that are driving each corporate risk as well as those that drive the business and operational risks to be ranked as Critical. Priority and Important risks can be seen in the shaded grey. This visualisation provides a more granular understanding of each corporate risk including what types of risks were driving the stratification.

Looking at the results in Figure 3, the most important risk characteristic for the cyber threats corporate risk was 'reversibility' and this characteristic drove the high scores on the critical business/operational risks. This suggests there are a significant number of business or operational level risks under cyber threats that are both irreversible and for which there is a lack of confidence in the current mitigation.

DISCUSSION

Reflection on the results

Figure 2 allows for a comparison between both the snapshot of current priorities as well as individual risk coordinators' concerns, creating a useful cross-corporation dialogue into the effectiveness of current risk mitigation strategies. Figure 3 then introduces a new language for considering risks and promotes different conversations about how to assess and manage risk. This has resulted in a step towards addressing the inherent complexity and uncertainty that exists for risk management in organisations like Water Corporation.

The novel approach allows for comparison between both the current priorities as well as individual risk managers' concerns creating a useful cross-corporation dialogue into the effectiveness of current risk mitigation strategies. The process also introduces new language for considering risks and promotes different conversations about how to assess and manage risks. This has resulted in a prominent step towards addressing the overall complexity and uncertainty that preside within risk management.

Multi-dimensional risk assessment and Risk velocity

ISF conducted a multi-disciplinary literature review looking for cases where multi-dimensional risk assessment or any of the novel risk characteristics had been used. It was found that risk velocity had been used to account for the characteristics of complex systems (such as speed of impact after event - velocity, emergence, non-linearity etc). This search enabled ISF and Water Corporation to better position the novel risk stratification approach developed in this project.

Looking at multi-dimensional risk assessment, the literature is relatively sparse but examples that took into account various forms of risks and uncertainty in

major project delivery can be found including, Cagno *et.al.* (2007) Polanski *et.al.* (2014) and Viana *et.al.* (2021) and 2022)

Although not found before the project started, literature does now exist on assessing risks in terms of risk velocity. This criterion has been used to assess business and financial risks in fields such as banking. Interestingly, most of the development of risk velocity as a concept has occurred in parallel to the current project but in different sectors.

Completely separate from this project, the characteristic of risk velocity has emerged in several fields of risk assessment as a novel criterion for assessing risks. Examples include AlAli (2020), Baloglu, and Cakali (2022), COSO (2017) Justin and Brinckerhoff (2016) Parkin (2021), Ramamoorti et al. 2019 and Tattam, D. (2013). Its emergence in the literature has been explained by a range of critiques of traditional risk assessment, particularly around the inability of traditional risk assessment to capture the speed and duration of certain risks. These developments occurred particularly after the emergence of the COVID 19 pandemic.

The literature on risk velocity to date is principally in the financial, banking and enterprise risk management sectors. Risk velocity has been understood as a measure of the speed at which a certain risk or event causing losses (or gains) occurs. Others (Chaparro, 2013; Parkin, 2021; Tattam, 2013): have suggested that there are three parts to a risk velocity; the time that an event takes to occur, the time taken for a risk to cause an identifiable impact and the time required to recover from the impact of an event.

In the ISF Water Corporation project, each of the three elements of time in relation to risk was considered, but a simpler definition based on time to impact was adopted. The risk characteristics from this project are bespoke, being co-created between the research team and Water Corporation risk practitioners in Stage one.

While present now in the literature, the inclusion of risk velocity in corporate risk assessments can still be considered leading-edge and innovative (Parkin 2021). Further, given that the risk velocity assessment has emerged to date only in financial asset management, banking or enterprise risk management, introducing risk velocity as a consideration by Water Corporation remains novel for the water sector.

Outcomes for Water Corporation to date

The overall consideration of the corporate risks remains consistent with previous years. This means that the risk profile is qualitative and provides a high level prioritisation of the risk exposures faced by Water Corporation and where effort is best placed to explore options for risk reduction.

Decisions on investment allocations against the risks are made on the basis of the net business benefit of individual risk reduction initiatives against specific risks.

The introduction of novel risk characteristics and operationalising this approach, is taking a staged approach and is being managed with careful communication with our Board and other stakeholders who need to have a consistent understanding of these characteristics.

The following progress has been made across our assessment of corporate risks:

1. Velocity has been scored against all corporate risks. The Board has been introduced to the concept of velocity and how it differs from the standard risk ratings. Challenging our risk indicators and the types of controls in place to consider velocity scores will emerge as the maturity our analysis of velicity increases. For example a risk with a high velocity score should ideally have Key Risk Indicators and controls that align to the velocity score.

2. Emergent/novel risks are identified against external and internal scans considering for example risk themes arising through the operaitonal and business risks being identified across the corporation.

3. Confidence in the risk assessment is being monitored through the:
    - underlying data and the operational risk frameworks that underpin the corporate risk summary which highlight those risks that have little data to inform the risk rating
    - existence of controls in place and their effectiveness rating to manage the control.

4. Confidence in the risk mitigation for the risk is being monitored through the indicators in place to validate the control ratings and the monitoring of the risk occurring. A level of confidence is assured when risk mitigations are appropriately justified, funded and factored into business planning processes.

Noting that while this analysis continues to be developed, the ability to apply this approach to a prioritisation of risks to be provided to the Board and Audit & Risk Committee is maturing with incremental change.

CONCLUSION

Overall, it was found that a multi-dimensional risk assessment with novel risk characteristics for the assessment of corporate risks was a viable means of risk stratification. Adding to the simple consequence and likelihood matrix with new risk characteristics was shown to be a viable way of enhancing the assessment of complex corporate risks.

Variations of the approach to multi-dimensional risk assessment developed in this project have significant potential to be useful in assisting to identify priority corporate risks for decision-makers to focus attention on. The approach may also help define risk appetites in relation to individual corporate risks with Boards and Executives.

As well as the value the approach offered in risk prioritisation for decision-makers, the novel risk characteristics and stratification method provides a potential for Water Corporation and other organisations to enrich their discussions around risk management and risk governance. This is by providing several new lenses for risk managers and decision-makers to consider the various risks and their treatment.

Taken forward, not all novel risk characteristics developed in this project are likely to be equally useful. Risk assessment methodologies might also change. As risk assessments and associated reporting requirements evolve to meet Board expectations, the addition of these or similar, risk characteristics is, however, an important element to consider.

Ever-changing environments and expectations dictate that it is a constant journey to evolve and improve corporate risk assessment and its associated reporting. The relatively simple instrument of the risk matrix with limited ratings requires additional context to assist with decision making. This research has greatly assisted in providing that additional information.

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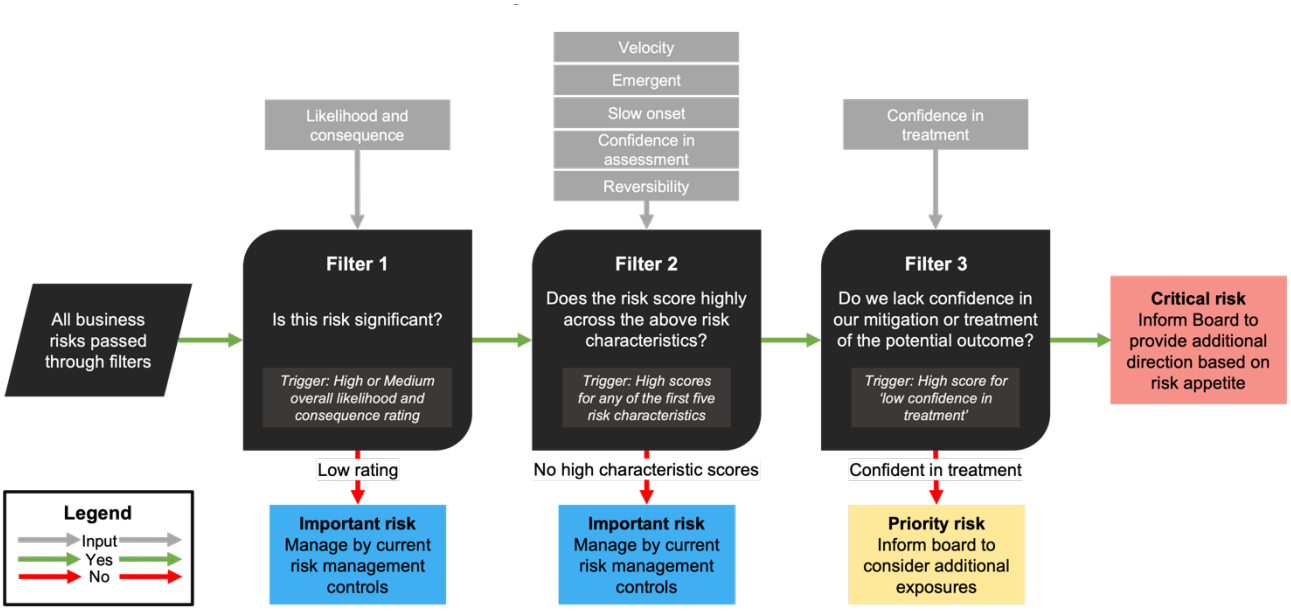

Figure 1 Decision framework used for stratifying business/operational risk in case studies

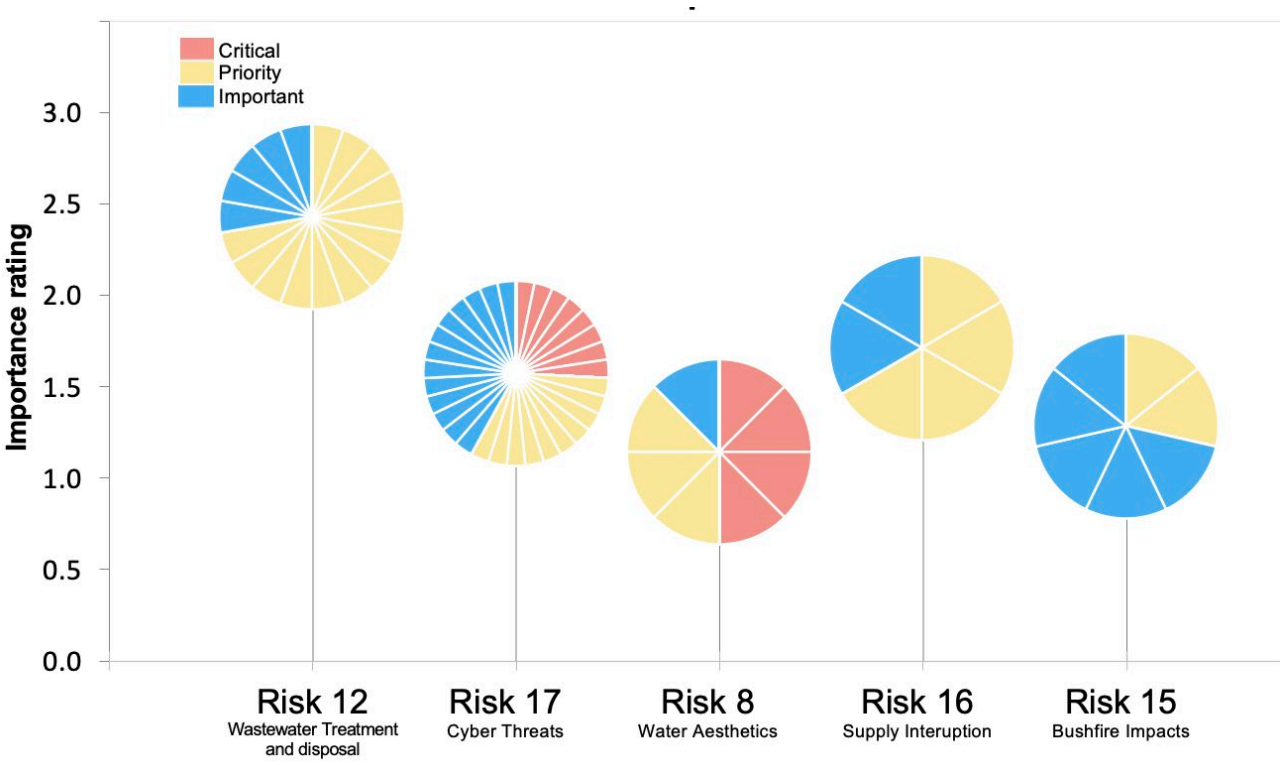

Figure 2: Stratified corporate risks (with component business risks)

The three colours representing business risks rated as either Critical, Priority or Important risks.

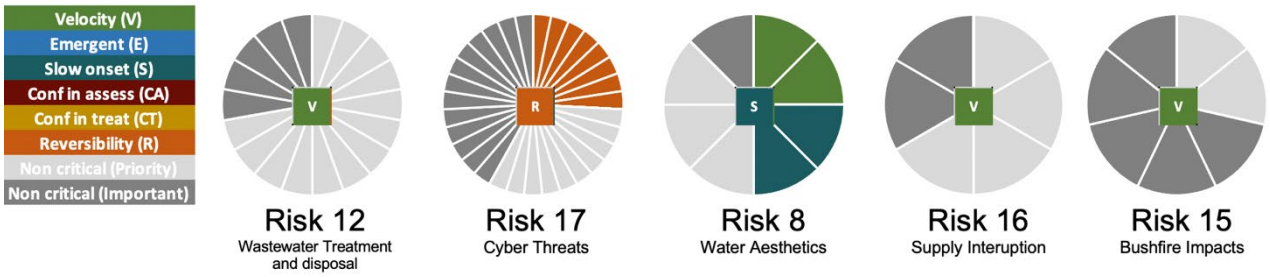

Figure 3: Most influence characteristic for each corporate risk and critical-rated business risks