

Further development of the SRC's risk management framework

Update on implementation progress

4 October 2016

Note: This paper has been prepared for the purpose of discussion. Content should not be interpreted as representing the views or policy of the Electricity Authority.

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Executive summary

The Security and Reliability Council (SRC) has previously agreed to the development of a risk management framework (RMF) that can be used when undertaking its role of monitoring significant security and reliability matters. That agreement also set the scope and desired outcomes of the RMF.

The secretariat has continued to develop the RMF and now seeks the SRC's feedback on:

- design principles and where the secretariat proposes to compromise two of these principles
- a proposed structure for the RMF.

The structure proposed involves a single master bowtie that categorises similar threats or consequences into groups. The proposed structure also includes ten sub-bowties that allow a more detailed focus on the groupings created by the categorisation.

1 Introduction

1.1 The SRC's role includes providing advice on security and reliability matters

- 1.1.1 The SRC functions under the Electricity Industry Act 2010 (Act) include providing advice to the Authority on security and reliability of supply matters.
- 1.1.2 As such, understanding the security and reliability risks facing the electricity industry is well within the ambit of the SRC.

1.2 The SRC has agreed to the development of an industry-wide RMF for its use

- 1.2.1 The SRC has received four papers relating to the RMF at meetings over the last 16 months:
- a) *A risk management framework*, 1 July 2015¹
 - b) *Development of a risk management framework*, 22 October 2015²
 - c) *Further development of the SRC's risk management framework*, 15 March 2016³
 - d) *Development of the risk management framework*, 21 June 2016.⁴
- 1.2.2 The SRC wants the RMF to create these key outcomes:
- a) improve the visibility of risks that are not widely known
 - b) improve the understanding of risks (and their interactions) that are not well understood
 - c) identify any gaps or overlaps between the responsibilities of risk owners
 - d) stimulate valuable risk insight and actions within the electricity industry.
- 1.2.3 The SRC's role with the RMF does not include owning risks, managing risks or proposing solutions.
- 1.2.4 The SRC agreed that the threshold for inclusion in the RMF is 'security, reliability and quality of supply events that have consequences greater than an economic loss of \$10m and the potential to cause loss of life.' By deliberate omission, this means the RMF is not intended to assist the SRC in its function of monitoring the performance of the system operator.
- ### 1.3 The SRC asked the secretariat to undertake further development of the RMF
- 1.3.1 The SRC's primary expectation is that the secretariat will develop a bowtie-based⁵ RMF that achieves the desired outcomes set out in paragraph 1.2.2. The SRC has also created three specific expectations:
- a) The draft 21 June 2016 minutes recorded that "it was a key milestone to get one or two bowties presented at the SRC's next meeting."
 - b) Action item #6 records that "Secretariat to assess what the threshold should be for a risk that the SRC 'can live with', and incorporate into further development of the RMF [by 19 October 2016]."

¹ <http://www.ea.govt.nz/dmsdocument/19900>

² <http://www.ea.govt.nz/dmsdocument/20052>

³ <http://www.ea.govt.nz/dmsdocument/20853>

⁴ <http://www.ea.govt.nz/dmsdocument/20858>

⁵ This refers to the bowtie methodology of risk management. For the benefit of any readers new to the concept, please refer to Appendix A.

- c) Action item #5 records that “Secretariat to consider engagement with industry and the Commerce Commission in further development of the RMF [by 1 April 2017].”

1.4 The purpose of this paper is to seek the SRC’s feedback on the design principles and overall RMF structure

1.4.1 In this paper the secretariat is seeking the SRC’s feedback on:

- a) the design principles that the secretariat is now applying, including the trade-offs inherent in those principles
- b) the proposed structure of a ‘master’ bowtie, including the scope of the proposed sub-bowtie topics.

1.4.2 This paper advances the overall development of the RMF and:

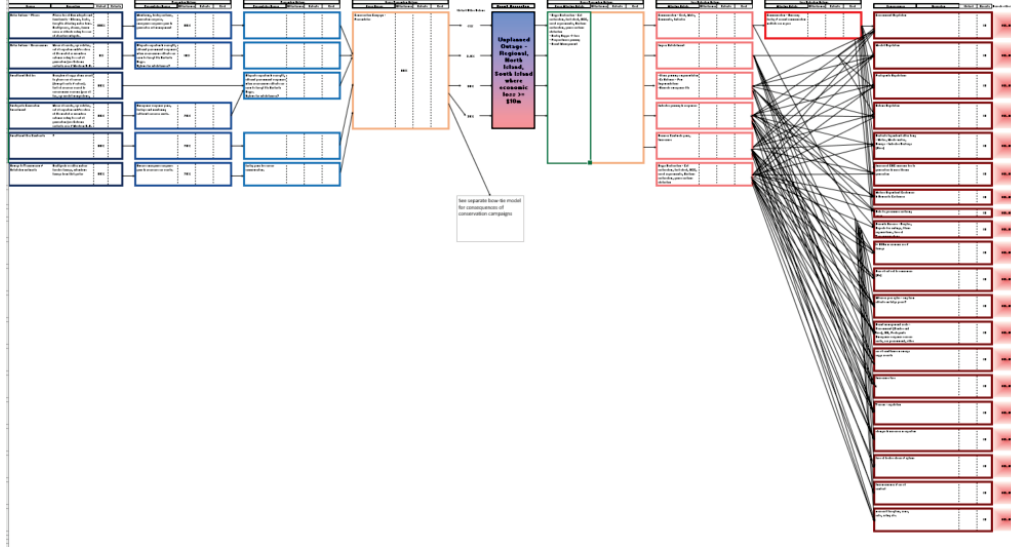
- a) meets the expectation in paragraph 1.3.1a) to present at least one bowtie to the SRC
- b) explains in paragraph 2.2.4b) why the design principles proposed mean that developing a threshold for risks that the SRC ‘can live with’ (as set out in paragraph 1.3.1b)) should happen at a later stage of development
- c) does not address the action to consider engagement with industry and the Commerce Commission (as set out in paragraph 1.3.1c) as the secretariat has deliberately limited external engagement to be with Transpower only until the RMF progresses to a stage where wider involvement would be beneficial.

2 Implementation challenges have led to the development of design principles

2.1 The complexity of the industry means that some trade-offs are necessary

- 2.1.1 The secretariat’s focus has been on developing a structure for the RMF that will remain fit-for-purpose. In doing so, a number of different potential structures have been experimented with, with each revealing some development and implementation challenges. These challenges reflect the breadth and complexity of the industry and its interactions, as set out below.
- 2.1.2 The secretariat found that some bowtie structures resulted in a lot of duplication between bowties. This would be inefficient for bowtie developers and users alike and create a risk of documentation misalignment if changes to common elements were not reflected in all the necessary locations.
- 2.1.3 By attempting to capture all relationships between threats to controls and responses to consequences, the secretariat created unmanageable, incomprehensible draft bowties. An example is included below.

Figure 1: An example of overly-detailed relationship mapping



- 2.1.4 In the RMF paper at the 21 June 2016 SRC meeting, the secretariat noted that how bowties look influences the quality of development discussions. This has remained a relevant lesson informing structural design considerations.
- 2.1.5 Developing detailed bowties is a time-intensive undertaking. The creative side of the process lends itself to developers' comments prompting the exploration of further layers of detail on individual elements (for example, a control) of a bowtie. This tendency to delve deeper on narrower topics can slow and complicate development.
- 2.1.6 In some cases, an individual bowtie element may have different purposes that may lead to superficial duplication in the bowtie. The best example encountered by the secretariat was the triggering of official conservation campaigns (OCC) under clause 9.23 of the Code. OCCs can be treated as:
- a control to reduce the probability of the top event occurring
 - a response to mitigate the impact of a top event occurring
 - an event in their own right, given that the economic cost could be greater than the \$10 million threshold set by the SRC (as set out in paragraph 1.2.4).
- 2.1.7 Facing these challenges has forced the secretariat to consider where trade-offs or compromises are acceptable in order the best meet the desired outcomes of the RMF.
- 2.2 Design principles have emerged from the challenges faced**
- 2.2.1 The secretariat believes the following design principles provide suitable guidance for implementing the RMF. Of particular importance are the implications for what trade-offs are acceptable as this influences when and how the RMF will be implemented.
- 2.2.2 The design principles that the secretariat considers must not be compromised on are:
- the structure must support the required scope of the RMF, ie. security, reliability and quality of supply events that have consequences greater than an economic loss of \$10m and the potential to cause loss of life (as set out in paragraph 1.2.4)

- b) the individual outputs of the RMF must each fit on an A3 sheet of paper and be easily comprehensible by developers and users (ie, be well-presented and with limited complexity)
- c) the breadth of the structure must be comprehensive enough to cope with the industry-wide scope
- d) every element (threat, control, response and consequence) must be briefly described with detail sufficient to distinguish it from any other element
- e) every control and response in a bowtie must identify the relevant owner(s)
- f) every consequence must identify the affected parties
- g) the structure must be flexible enough to cope with possible changes in the future, including:
 - i) assessment of the effectiveness of controls and responses
 - ii) assessment the likelihood of threats
 - iii) incorporating information received from participants
 - iv) providing RMF information to participants to improve their knowledge of risks.

2.2.3 The design principles that are desirable but ultimately can be compromised upon are:

- a) detail and depth of information (ie, comprehensive descriptions, or assessments of effectiveness and likelihood) is desirable, but not vital during the development phase of the RMF
- b) without compromising the principle of comprehensibility (as set out in paragraph 2.2.2b)), taking as granular an approach as possible is preferable.

2.2.4 The implications of this are that the secretariat expects to:

- a) keep the RMF broad and shallow for the current phase of development. In practice, this means providing only a 'what' and 'who' (description and owner/affected party) for each element in a bowtie. By not delving into risk assessments, the secretariat will complete population of all bowtie elements sooner than would otherwise be the case.
- b) defer the decision on what risks the SRC 'can live with', as this would need to be supported by deeper analysis. In particular, the SRC would first want to know what the 'treated' or 'residual' risk was assessed to be before it determined what advice (if any) would be appropriate.
- c) reduce the number of elements in the RMF bowties by aggregating related elements into groups. A grouped element like this will display an aggregation of the contributing relationships with other elements, obscuring the exact relationships. This loss of granularity is the price of simplifying but will be preferred where necessary to ensure a comprehensible result. The SRC will still have visibility on all of the components within a grouped element; the loss of visibility relates only to the ability to display the exact relationships with neighbouring elements in the bowtie.

3 The secretariat proposes a master bowtie with categories of threats and consequences

3.1 The proposed structure aggregates related threats and consequences into different categories within one master bowtie

3.1.1 The secretariat proposes that the RMF be structured around a single all-encompassing bowtie. This master bowtie will categorise threats and consequences into groups. This master bowtie will be supplemented by a layer of sub-bowties that illustrate the individual threats or individual responses within a particular grouping.

3.1.2 This approach to the structure is demonstrated in the following series of figures. Each figure is illustrative only; there is no actual data underlying this.

Figure 2: Illustration of a master bowtie with grouped threats/consequences

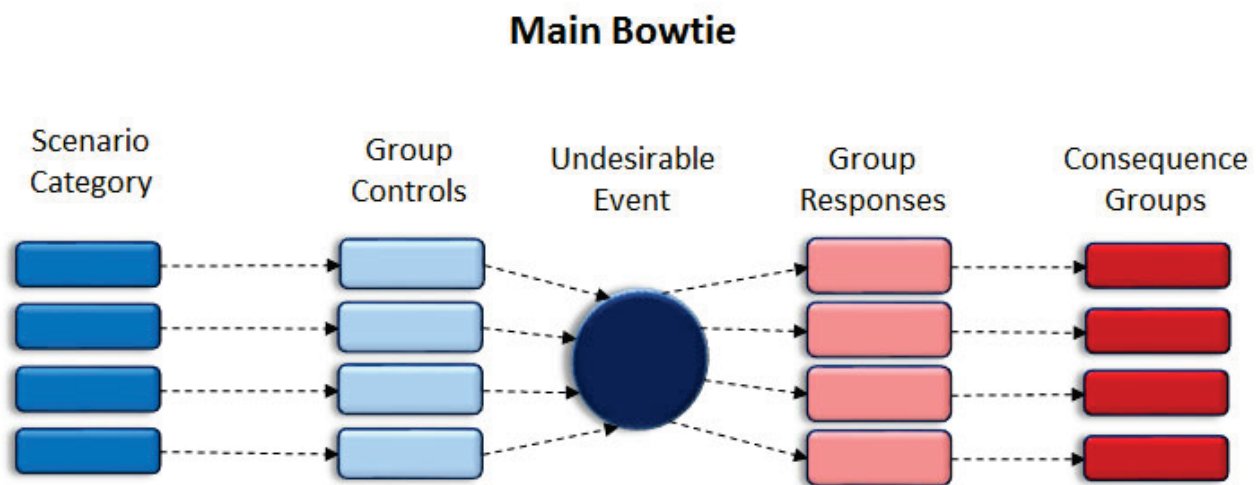


Figure 3: Illustration of how a master bowtie would relate to sub-bowties for the threat groups

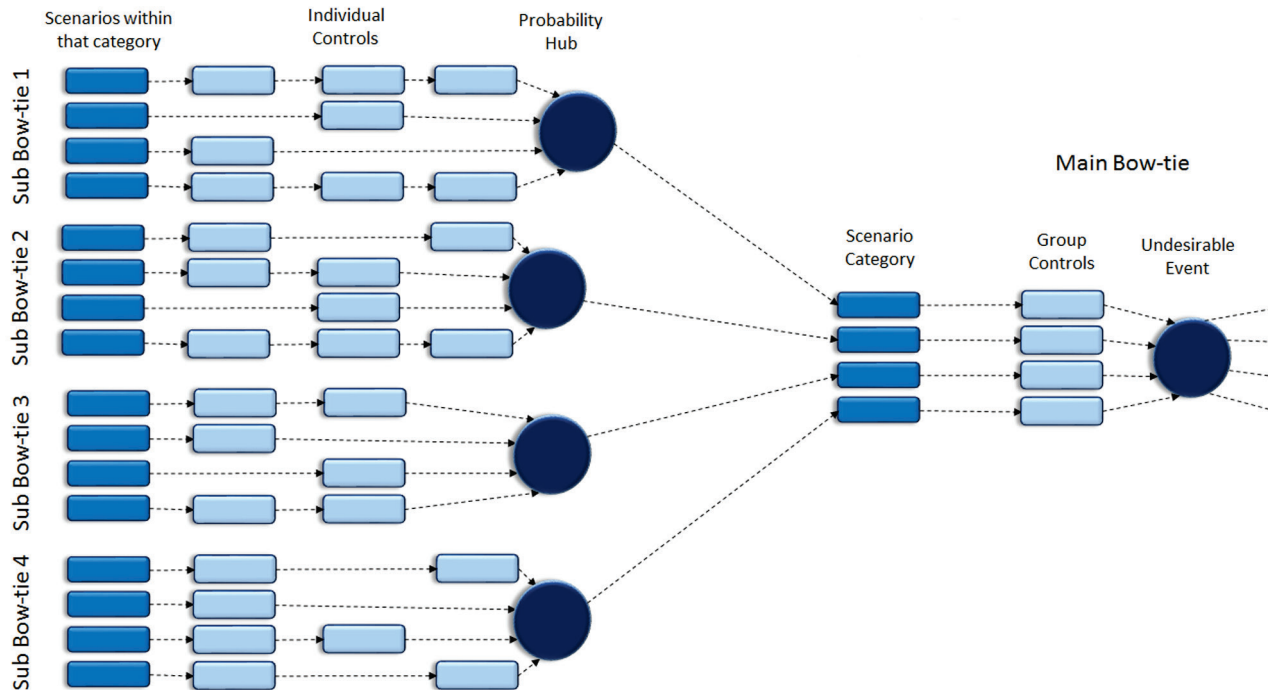
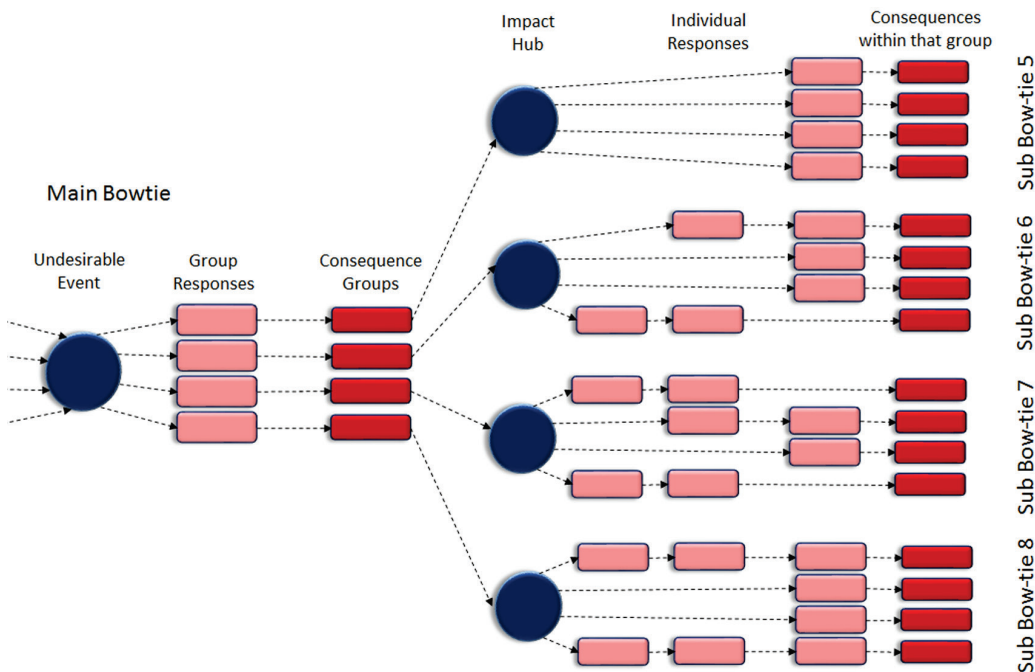


Figure 4: Illustration of how a master bowtie would relate to sub-bowties for the consequence groups

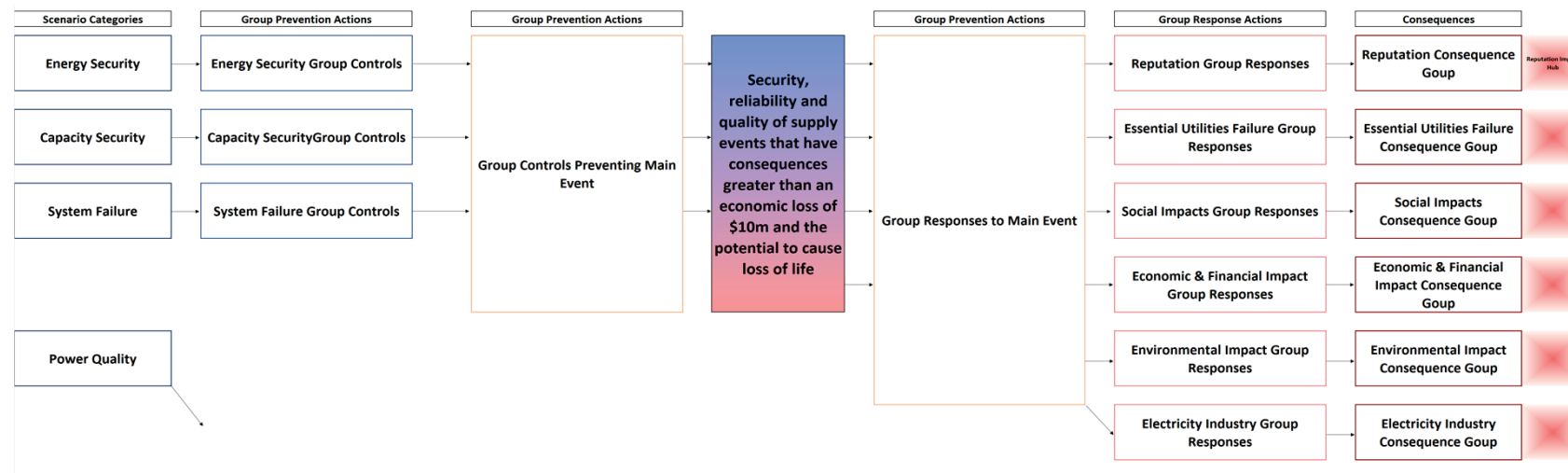


3.1.3 In practice, all this information would never be provided to the SRC on a single page. Each sub-bowtie would appear on a separate page. Because each sub-bowtie is actually half of an archetypal bowtie, this enables more complexity to be included in each one, subject to the requirement to ensure they are also readily comprehensible.

3.2 The draft master bowtie has three threat categories and six consequence categories

- 3.2.1 The actual master bowtie proposed by the secretariat has three threat categories and six consequence categories. There would need to be nine sub-bowties to account for these categories.
- 3.2.2 In addition to the one master bowtie and nine sub-bowties, the secretariat proposes there can be sub-bowties created if a control or response causes such significant consequences as to warrant SRC attention. The only example of this currently known to the secretariat is the OCC. The OCC is a control that aims to reduce the probability of something worse happening as a result of energy shortage/insecurity.
- 3.2.3 One possible but unlikely addition to this suite of master bowtie and sub-bowties would be an 'orphan' bowtie to capture power quality risks (ie, voltage drop/rise, harmonics, voltage flicker). The secretariat has been unable to envisage a situation where a power quality problem would surpass the \$10 million threshold to warrant the SRC's attention.
- 3.2.4 The proposed structure is set out in Figure 5 overleaf. The secretariat is keen to receive feedback from the SRC on the proposed approach and the categorisations used.

Figure 5: Proposed structure of the RMF's master bowtie



3.2.5 In order to illustrate how the sub-bowties might be structured, two are included below. While the data included in each is 'real', it is also in draft form. As such, the secretariat is not seeking the SRC's feedback on the detail on these sub-bowties.

Figure 6: Draft sub-bowtie for the energy security threat group

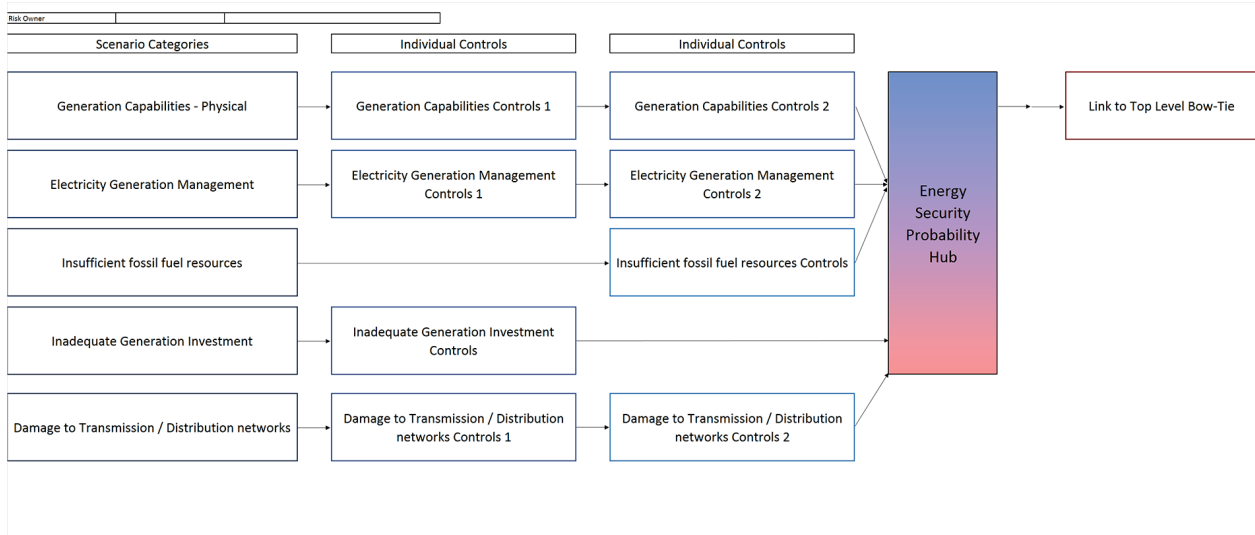
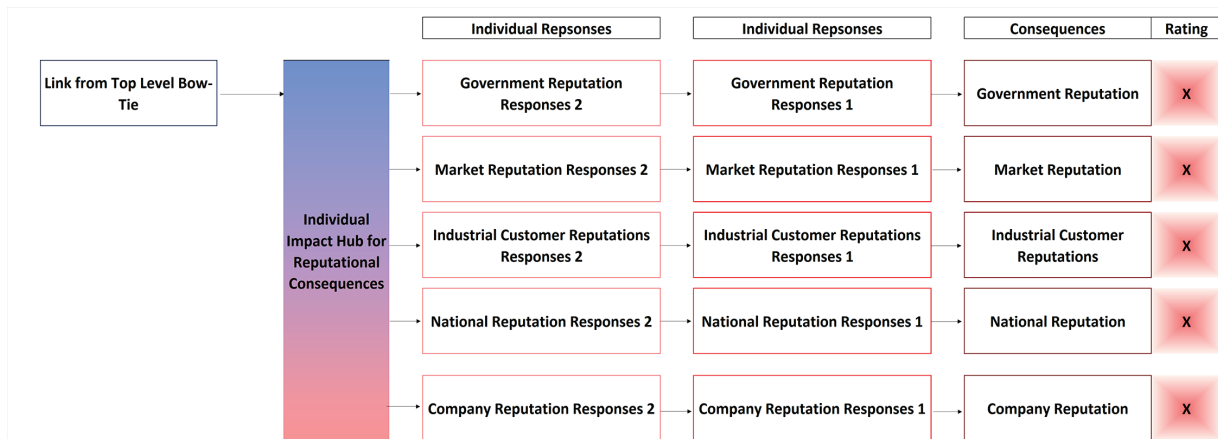


Figure 7: Draft sub-bowtie for the reputational consequences group



3.2.6 The probability and impact hubs that appear in the above two figures will not be functional elements in the initial completed versions of the RMF. Once the development focus shifts to provide more depth, these hubs will capture the treated and untreated risk probabilities of all upstream elements (in other words, anything connected to the left hand side of a hub).

4 Questions for the SRC to consider

4.1.1 The SRC may wish to consider the following questions.

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| <p>Q1. What is the SRC's feedback on the proposed design principles set out in section 2.2?</p> <p>Q2. What is the SRC's feedback on the proposed master bowtie structure set out in section 3?</p> <p>Q3. What further information, if any, does the SRC wish to have provided to it by the secretariat?</p> <p>Q4. What advice, if any, does the SRC wish to provide to the Authority?</p> |
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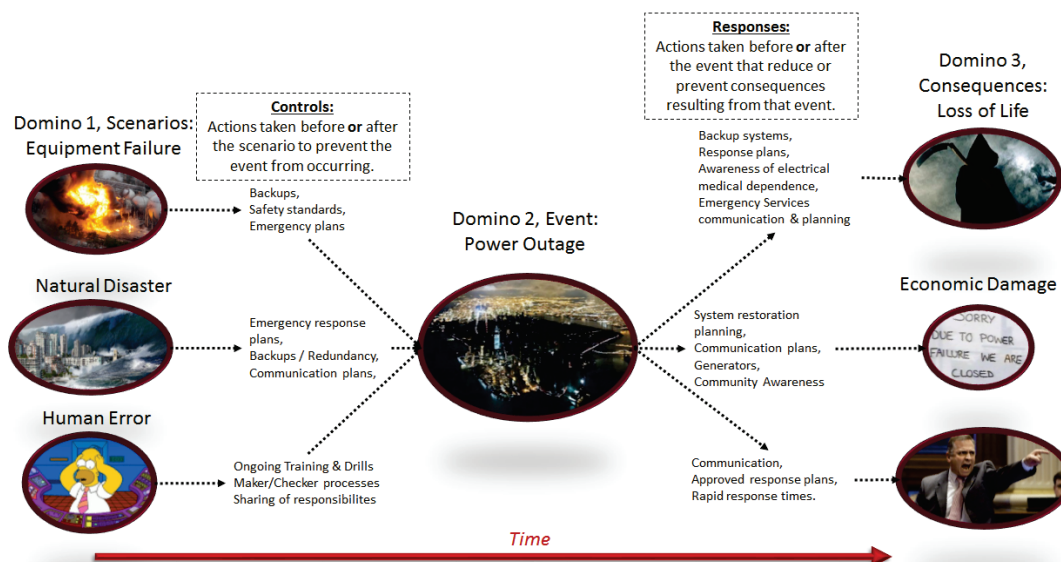
Appendix A: An overview of the bowtie methodology

Some people reading this paper may not have any prior familiarity with the bowtie methodology of risk management. To assist any such readers, an example bowtie is included in Figure 8 below and some useful written⁶ and video⁷ overviews are footnoted.

The bowtie is named for the eponymous shape created by a classic, simple bowtie with equal numbers of elements either side of the central point.

The central point is called the top event and represents the risk being managed. The left hand side of the bowtie deals with threats that could cause the top event to occur and the controls in place to reduce this likelihood. The right hand side of the bowtie deals with consequences that would arise if the top event occurred and the responses (often referred to as controls) that mitigate the impact of the top event.

Figure 8: An example of a classic, simple bowtie



⁶ For written overviews, refer to <http://www.cgerisk.com/knowledge-base/risk-assessment/thebowtiemethod> and <http://r4risk.com.au/wp/our-services-2/bow-tie-analysis/>

⁷ For video overviews, refer to https://youtu.be/RyS_RNKMGHs, <https://youtu.be/vB0O4TPm2q0>, and <https://youtu.be/P7Z6L7fjsi0>