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TECHNICAL REPORT

The validity of the preference profiles used for evaluating impacts in the Dutch National Risk Assessment

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Summary

This report focuses on the validity of the sensitivity analysis methodology as it is applied in the National Risk Assessment (NRA). We advise readers who are unfamiliar with the NRA to read Chapter 2, which provides an outline of the NRA and how sensitivity analysis is conducted within the methodology.

The principal aim of the Ministry of Security and Justice is to maintain and advance a just and safe society within the Netherlands. In order to anticipate, tackle and mitigate potential threats that affect safety in Dutch society, the national government developed a National Security Strategy in 2007. The first step in this approach involves a country-wide identification of potential threats in the long-, medium- and short-term, and an assessment of their associated risks; the National Risk Assessment (NRA).

The NRA assesses the effects of threats across many impact criteria. These scores are aggregated into one impact score using the weighted sum method. By default each impact criterion is weighted equally in the aggregation. The result is a neutral impact score. This is the score used in the risk diagram; an important outcome of the NRA. However, people, differ in their opinions about the importance of the individual impact criteria. Some will undoubtedly want to ascribe different weights to different impact criteria. Different weights can change the position of the scenarios in the risk diagram. The NRA accounts for the diversity in values of the general public by conducting a sensitivity analysis on the impact scores using four sets of weights. Each set reflects a set of values corresponding to four specific value orientations called preference profiles.

There is no consensus about how the Dutch population combines impact criteria to form its perceptions of risks. Therefore, the Research and Documentation Centre (WODC), Department of External Scientific Affairs of the Dutch Ministry of Security and Justice asked RAND Europe to assess the validity of the preference profiles used in the NRA. This report summarises the results of this assessment by answering two main questions:

- Are the preference profiles that are used in the National Risk assessment valid?
- What is the most appropriate method for developing one or more weight set(s) that are representative of the Dutch population?

This report summarises the results of this assessment in the form of answers to four questions:

- Is the multi-attribute model in the Risk Assessment methodology a valid approach to reflecting the range of values held in the Dutch population?
- Do the four cultural worldviews used in the Risk Assessment methodology help to explain individuals' concerns about scenario impacts?

- Do these cultural worldviews reflect the range of viewpoints that exist within the Dutch population?
- Are the weights used in each cultural profile representative of the weights expected for the specified worldview?

To assess the validity of the preference profiles, we reviewed literature in the fields of decision analysis and risk perception and discussed our interpretations of this literature with several researchers familiar with these fields and/or the NRA methodology. The literature review indicates that the preference profiles used in the NRA have limited validity for describing concerns of the Dutch population about the impact of hazards. The weights used in the preference profiles have not been validated as representative, either of the cultural views they are meant to reflect, or of the cultural views of Dutch population.

However, there are several practical alternatives for improving the validity of how the NRA reflects views of the Dutch population beyond the current use of preference profiles. These alternatives include:

- Conducting surveys of members of the Dutch population to elicit sets of weights that can be used as representative preference profiles.
- Conducting sensitivity analysis that abandons the use of preference profiles and instead fully explores the influence of the importance weights on priorities.
- Abandoning the use of preference profiles and instead measuring concerns about the scenarios directly.
- Deriving preference profiles from an expanded survey of importance weights and direct assessment of the concerns about the scenarios.

In choosing between these alternatives, the Ministry of Security and Justice should consider several factors, including the effort required to implement each alternative, how frequently the analysis will need to be updated, and risks to successful implementation. Perhaps most importantly for decisions about the National Safety and Security methodology, the Ministry of Security and Justice should clarify whether the NRA method will be used to support a mathematical exercise based on the judgements of the NRA methodology working group, excluding public engagement, or expanded to incorporate a deliberative risk management process. Though the current process is an analytical exercise, the risk management literature suggests that incorporating public engagement into the policymaking process builds public confidence in governance, results in policies that more closely reflect community values and leads to greater public support for decisions (Renn, 2006). The most common criticisms of this form of deliberative risk management is that non-experts are not equipped with knowledge to understand risk assessments and that the public's risk perceptions will divert resources away from the most serious threats. However, risk communication studies have shown that these concerns are not valid (U.S. Department of Health and Human Services, 2002).

While the focus of this study was on the validity of the preference profiles used in the NRA, the values of the Dutch population enter into the NRA methodology in other ways. As the Ministry of Security and Justice continues to refine the National Safety and Security Method, consideration also should be given to some of the other ways that values are,

perhaps inadvertently, represented in the NRA by the officials conducting it. These include:

- The method through which the scenarios are selected.
- The inclusion in the impact criteria of factors suggested by the psychometric risk perception literature related to the ability of science to explain the cause-effects mechanisms leading to impacts.
- The precision with which science can estimate the impacts, and the catastrophic potential of the scenario.
- The value functions used to score scenarios on impact criteria.