TrafficQuest

CENTRE FOR EXPERTISE ON TRAFFIC MANAGEMENT

TrafficQuest report

From Business Case to Value Case

Brede welvaart in decision-making for traffic management

Colophon

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Contents

Preface

The TrafficQuest Challenge of this year builds on the Challenge of 2022 about Traffic Management and Human Well-Being (*Brede Welvaart*). However, with this year's challenge, the team dove deeper into the application of *brede welvaart* in decision making for Traffic Management projects at Rijkswaterstaat by investigating how we can move from business cases to value cases. This added a new dimension to the discussions about *brede welvaart* and allowed the team to expand their knowledge on business cases and value cases. The interviews and the workshop with Rijkswaterstaat and TNO-experts on traffic management, *brede welvaart*, and economics, resulted in interesting discussions. Besides the valuable insights they provided, the sessions were also valuable because of how they (re-)connected experts across different domains – which is also part of one of the recommendations of this report. We would like to thank everyone involved in the interviews and workshop for their enthusiastic participation!

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1 Introduction

1.1 Background and approach

In recent years, well-being has gained increasing attention across research, policy, and societal debates. At the global level, discussions on measuring progress beyond GDP gained momentum following the publication of the *Commission on the Measurement of Economic Performance and Social Progress* report in 2008 (Stiglitz et al., 2009). Since then, well-being-oriented approaches have continued to develop internationally (e.g. the OECD's Well-Being Framework (OECD, n.d.-b)), at the European level (e.g. the European Commission's beyond GDP initiatives (EU Science Hub, n.d.)), through transnational collaborations (e.g. the Wellbeing Economy Alliance (Wellbeing Economy Alliance, n.d.)), and within national agendas such as New Zealand's Wellbeing Budget (Government of New Zealand, 2022) and Scotland's National Performance Framework (Scottish Government, n.d.).

In the Netherlands, *brede welvaart* (human well-being[1]) has become an important guiding concept. Key examples include the annual Monitor of Well-being and the SDGs by CBS (2023) and various studies focused on *brede welvaart* within the mobility domain by PBL (Snellen et al., 2021), TNO (Vonk Noordegraaf et al., 2021), and other. At its core, *brede welvaart* recognises that prosperity involves far more than material wealth. It integrates multiple dimensions of what people value in life, including health, safety, education, social relationships, meaning and personal development, opportunities for leisure, and the quality of the living environment. Mobility plays an important role within this broader well-being context. On the one hand, mobility systems can enhance access to essential opportunities – jobs, amenities, green spaces, social interactions – and promote healthier lifestyles through active travel. On the other hand, mobility can also introduce negative impacts such as pollution, noise, congestion, and traffic accidents, all of which can decrease well-being.

Traffic management measures can therefore also influence *brede welvaart*. This was first explored in the TrafficQuest Challenge in 2022 (Ashari et al., 2022), which provided recommendations on broadening the perspective in traffic management by incorporating more dimensions of *brede welvaart*. One promising area for doing so is the development of business cases for traffic management systems, which traditionally focus on financial and operational justification. A business case aims to clarify the purpose and expected results of a project. It outlines the current and desired situations, associated costs and benefits, roles and responsibilities, feasibility, risks, and potential alternatives. However, within the context of traffic management, business cases often seem to emphasize economic or financial outcomes for the initiating organization. This raises the question: what would the picture look like if business cases systematically incorporated broader societal impacts and a wider range of stakeholders? In other words, what happens when we evaluate traffic management interventions through a *brede welvaart* lens?

[1] In this report we will use the Dutch term *brede welvaart'.*

This prompts a further question: are we moving from traditional business cases towards more comprehensive 'value cases'? This TrafficQuest Challenge aims to explore exactly this transition – mapping the pathway from business case to value case and understanding what such shift would mean for traffic management and well-being-oriented policymaking.

1.2 Goal and scope of the challenge

TrafficQuest was the partnership between Rijkswaterstaat (RWS), TNO, and TU Delft in the field of traffic management and traffic information. From 2009 to 2016, this cooperation was active in developing, accumulating, applying, and disseminating knowledge about traffic management and traffic information. For more than seven years, TrafficQuest covered the entire field, from the more fundamental, theoretical knowledge about traffic management and traffic information to 'operational knowledge' about its application and effectiveness. At the end of 2016, the decision was made to continue on a smaller scale, concentrating activities on a number of current challenges and on the publication of *Verkeer in Nederland* ('Traffic in the Netherlands'). This annual publication gives an overview of how traffic is currently being managed in the Netherlands and developments in traffic management.

A TrafficQuest challenge is a quick-scan expert analysis with a short lead time. TrafficQuest challenges are intended to address and dive deeper into specific topics related to traffic management. Over the past years, challenges have been conducted on traffic management and traffic safety; the impact of C-ITS use cases; 3D printing; traffic management and AI; traffic management and *brede welvaart*; and car dependency and traffic management in an era of automated driving.

The goal of this year's TrafficQuest challenge is to provide insights in the current state of brede welvaart in traffic management business cases and to identify opportunities and recommendations for the transition from business cases to value cases. This should enable decision-making to be based on a wider array of considerations – ranging from financial costs and benefits of an investment to *brede welvaart* impacts – covering *People, Planet and Profit* (PPP) aspects.

In this challenge, we consider the transition from a business case to a value case to include three key elements[2]:

- from a financial focus to a focus on *People, Planet and Profit* (PPP);
- from emphasis on monetary aspects to also including (non-monetary) quantitative and qualitative aspects;
- and from a long-term view mainly for the individual organisation perspective, to a short, medium and long-term view for both the individual organisation and the societal perspective.

[2] The definitions of business case and value case are provided in section Definitions and terminology2.1.

These transitions match with the idea of *brede welvaart* – as was described in the introduction. PPP covers most of the broad scope of societal impacts of *brede welvaart* and the focus on short-, medium- and long-term impacts matches the focus of *brede welvaart* on both *here and now* and *later and elsewhere*. Therefore, the scope of this challenge will be on the transition from business case to value case as a way to include more elements of *brede welvaart* in traffic management decision-making. Due to the application on traffic management, the scope of *brede welvaart* in this challenge includes - but is not necessarily limited to - the themes identified by TNO to be related to the mobility domain: accessibility, living environment, health, and safety (Vonk Noordegraaf et al., 2021).

1.3 Contents report

This report is structured as follows. Chapter 1 presents the background, approach and scope on this challenge. Chapter 2 brings the current state of traffic management business cases, covering the terminology adopted in this report, the key elements of a business case at Rijkswaterstaat (RWS), the Five Case Model approach for business cases as an example of guidelines found outside the Netherlands, and overall reflections. Chapter 3 focuses on value cases for traffic management, starting by giving an overview of *brede welvaart* in mobility and traffic management, further detailing how it is included currently in business cases, and providing practical experiences with business cases in RWS. Then, chapter 4 presents the results of the exploration done in this challenge on how to move from a business case to value cases, and finally chapter 5 gives conclusions and recommendations.

2 Guidelines for traffic management business case

In this chapter, the first step of the analysis is made: analysing the guidelines for developing business cases for traffic management. It starts with some useful definitions and terminology. Then the guidelines at Rijkswaterstaat (RWS) are analysed, followed by an international example. At the end of this chapter, we reflect on the different guidelines and the space they give for non-financial considerations.

2.1 Definitions and terminology

Throughout this report, a number of concepts are relevant in the context of business cases as carried out by RWS. The definitions of the concepts are provided below and are further discussed and contextualised if needed in the following chapters.

- **Business case:** a formal document that consolidates the findings from a proposal evaluation, serving as the official method for presenting information to support decision-making (Infrastructure Australia, 2021). It serves an analysis tool to clarify the financial implications of a project for a public authority[3] (Ministerie van Financiën, 2020) and for documenting the current evidence and perspectives related to the development, approval, and implementation of a proposal (HM Treasury, 2018).
- **Value case:** formal definitions differ. In the context of this research (see section 1.2), a value case is defined as a document that contains the broader impacts of a project, beyond financial implications. It covers impacts on People, Planet and Profit, for both the organizational perspective as the perspective of other stakeholders and society in general. A value case considers short-, medium- and long-term impacts and can include monetary, quantitative and qualitative impacts.
- **Societal Cost-Benefit Analysis[4] (together with NPV, Payback Period, B/C Ratio):** SCBA evaluates the costs and benefits of different alternatives from a societal perspective, incorporating social values based on the principles of welfare economics (Modijefsky et al., 2024). An SCBA aims to assign monetary values to benefits and costs wherever feasible and to provide an overall indication of the net benefit (Bos et al., 2022). A SCBA can make use of different metrics, such as the Net Present Value (NPV) – the balance of expenditures and revenues across the entire project life cycle, discounted back to a specific starting point at the beginning of the project (Bonner, 2022) – the Benefit–cost ratio (BCR) – the ratio between the present value of economic benefits and the present value of economic costs (HM Treasury, 2018) –, and the payback period – the time required for a project's cumulative cash inflows to exceed its cumulative cash outflows (Bonner, 2022).

[3] Business cases are also made by private firms, but those business cases are outside the scope of this project.
[4] In Dutch: Maatschappelijke Kosten-Baten Analyse (MKBA)

The demarcation between a business case, a value case and an SCBA is illustrated in Figure 1. As explained in the introduction of this challenge, the main differences between the business case and the value case are the topics (financial versus PPP), the content (monetary versus also quantitative and qualitative), and the temporal element (from long term mainly for organizational perspective to short, medium and long term for organizational and societal/system perspective).

The SCBA would land in between a business case and a value case. It does consider more than only financial impacts and the core outcome is an SCBA-ratio (*MKBA-saldo* in Dutch) of monetized effects. However, it does also allow for mentioning other impacts – where possible in a quantitative fashion (Bos et al., 2022). In most recent guidelines, the SCBA was expanded to include opportunities to also elaborate on qualitative impacts separately from the monetised impacts (Modijefsky et al., 2024). With this inclusion, the SCBA covers a large part of the domain of the value case. However, the value case also includes the organisation perspective that the business case considers – where the SCBA considers mainly system or societal views. This makes the value case – as defined in this report – a more complete instrument to replace the business cases for traffic management projects, which makes the transition from business cases to value cases the focus of this report.

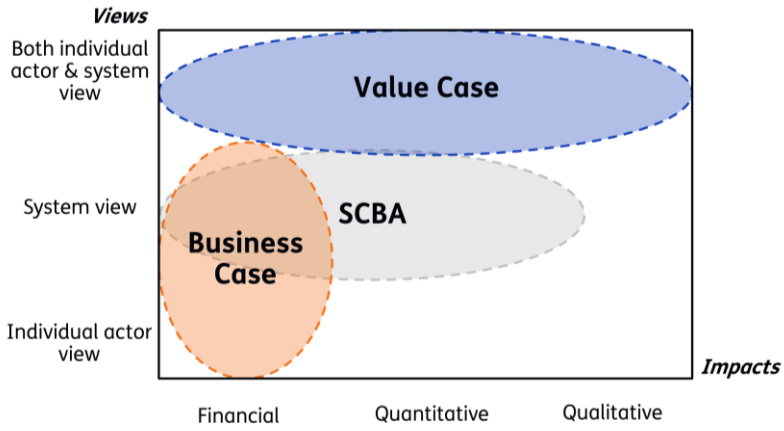

Figure 1: Illustration of differences between business case, value case, and SCBA

Some other definitions that will occur in the remainder of this challenge:

- **Base case (baseline scenario, or zero alternative):** a base case should outline the anticipated outcomes of a "do-minimum" scenario, assuming the existing infrastructure, network, or service continues to operate under appropriate management practices. It represents the alternative if the proposed project were not carried out.
- **Risk analysis:** refers to the process of identifying, describing, categorizing, allocating, and assessing risks.
- **Scenario Analysis**: involves examining how different situations, including related assumptions and estimated variables, influence the outcome of a business case. It serves as a way to explore uncertainty regarding the future outcomes of a decision by defining a limited set of internally consistent future scenarios and evaluating the alternatives against each one.

- **Ex-ante:** refers to an analysis that is performed based on assumptions and predictions, therefore before an event. An ex-ante SCBA is conducted before investing in a policy or project, in which one is interested in exploring the available possibilities, and is useful for making decisions about future resource allocation (Bonner, 2022).
- **Ex-post:** refers to an analysis that is performed based on knowledge and retrospection, therefore after an event. An ex-post SCBA is conducted at the end of a policy or project, allowing the assessment of its efficiency by measuring the project's impacts in terms of profitability and the achievement of intended objectives.
- **Alternatives (options):** represent a potential solution to a problem, including base case options ("do nothing" or "do minimum").
- **Options analysis:** refers to the evaluation of alternative options for addressing an identified problem or realising an opportunity.
- **Preferred option:** refers to the alternative most likely to deliver the best value for money, offering the optimal balance of benefits, costs, and risks, and is the recommended option to proceed with (New Zealand Government, 2019).
- **Sensitivity analysis:** involves examining which variables have the greatest influence on the outcomes of the business case[3]. It involves changing one or more important variables within a model or analysis to assess how such changes influence the output or results.
- **Five case model (Strategic, Economic, Commercial, Financial, Management cases):** represents a structured framework for developing and presenting a business case, encompassing its strategic, economic, commercial, financial, and management dimensions. The Five Case Model (5CM) is a widely adopted tool for developing business cases, commonly used by central, devolved, and local governments in the UK, as well as in other countries worldwide (New Zealand Government, 2019), having been adopted by the G20 in 2018 as an international standard for preparing infrastructure projects (OECD, n.d.-a).
- **Project**: a project encompasses all activities required to deliver the intended product or service. Represents an intervention involving infrastructure, technology, or service.
- **Sunk costs:** represent costs that cannot be recovered through resale in the market. Any sunk costs incurred previously should be excluded from a cost–benefit analysis. They represent costs that have already been incurred and cannot be reversed, making them not relevant to the subsequent decision-making process.

2.2 Key elements of a Rijkswaterstaat business case

Based on an analysis of the Rijkswaterstaat's Framework for Business Cases (RWS, 2025) and the Public Business Case Manual of the Dutch Ministry of Finance (2020), a set of key elements has been identified as the main components of a (public) business case in the Netherlands. It is im-

portant to note that the following table is not intended as a prescriptive guide or a recommendation on the exact content, order, or structure of a business case, but rather as an overview of the main elements identified in the two reference documents. Furthermore, the structure presented below does not suggest a fixed chapter or section format but rather illustrates the main elements, which can be incorporated in a more flexible manner within a business case report.

Table 1: Key elements of a (traffic management) business case

Element 1: Contextualisation
Provides an overarching contextualisation for the business case, including: • **Description of project:** reason, objective, problem/gap/opportunity that it aims to address, what is within scope and outside scope, time horizon considered, etc. • **Description of alternatives:** what are the alternatives under consideration, including a baseline (or zero) alternative, which represents the situation if the intended project or measure is not implemented or a "do-minimum" situation. The project alternatives should be described in such a way that decision-makers can get a good picture of them. • **Identification of relevant stakeholders:** which parties are involved in the project, who is responsible for what, what interests do parties have in the project, how can parties influence the project, etc.
Element 2: Procedural aspects of business case
Includes information regarding necessary preparatory meetings and procedural aspects for the execution of the business case. • Definition of composition and mandate of team, client of business case, organisation and project-related arrangements for the execution of the business case as a project itself. • Confidentiality of information within business case.
Element 3: Qualitative analysis
Includes identification, but not a thorough quantification, of relevant costs and revenues for the business case, as well as any relevant non-financial considerations. • **Project revenues:** identification of relevant revenues (if any) associated with the business case (as demarcated in the contextualisation), including relevant differentiations (direct vs indirect, recurring vs non-Recurring, grants and subsidies, residual values…) and when in the time horizon being analysed in the business case they occur. • **Project expenditures:** identification of relevant expenditures associated with the business case (as demarcated in the contextualisation), including relevant differentiations (direct vs indirect, fixed versus variable, capital expenditure vs operating expenditure…) and when in the time horizon being analysed in the business case they occur. • **Non-financial considerations:** identification of which non-financial considerations are important for the assessment and how each alternative performs or scores in them. Non-financial considerations are those that do not lead to cash receipts or cash expenditures but nevertheless do play a role in the

choice of an alternative. Examples include impacts on sustainability, health, noise, quality of life, policy alignment, among others. Non-financial considerations can be monetised if sufficient and reliable information and methods exist (e.g., via shadow price, willingness to pay (WTP), or other suitable approach) and if this is in line with the purpose of the analysis. In any case, non-financial considerations (monetised or not), should be presented separately from the financial analysis of the business case.

Element 4: Quantitative analysis

Includes the quantification of the revenues and expenditures associated with the business case.

- A base year should be defined for all alternatives, as well as the time horizon of the analysis. The base year is the year to which all investments and benefits are discounted.
- A consistent price type should be used for the analysis, according to applicable guidelines for Cost-Benefit Analysis and Financial appraisal (Real prices – excluding inflation – or nominal prices – including inflation).
- A common appropriate discount rate should be used for all alternatives in order to bring values to the base year.
- Investments, costs and revenues for all alternatives, including a reference alternative, should be identified for the lifetime of the analysis. Relevant financial metrics for the assessment of the alternatives in the business case should be computed (e.g., Net Present Value (NPV), Internal Rate of Return (IRR), Payback period, Benefit-Cost Ratio (BCR), or others, according to guidelines and recommendations). Differences ("deltas") between each alternative and the reference case (zero alternative) should be computed, according to relevant financial metric.
- Specify how the project intends to cover the costs (e.g., internal funding, subsidies, loan…).

Element 5: Risk analysis

Includes identification and description of main risks associated with project or initiative. Can include, for instance:

- Identification of types of risks (pure, spread, project-specific, non-project-specific…)
- Identification of who bears each risk identified (project owner, project executor, third party…)
- Analysis of each risk in terms of probability/likelihood, impact, expected value (i.e., expected additional expenditure or reduction in revenue per risk event given by the likelihood and impact), measures in place to address each identified risk (e.g., mitigate, avoid, accept, transfer…).

Element 6: Sensitivity analysis

Includes a sensitivity analysis of how results might change under different conditions for the values of key parameters. Can include, for instance:

- Analysis of scenarios, in which for each option under consideration a set of scenarios (e.g., conservative, neutral, optimistic) is performed for different values of key parameters or assumptions (e.g., discount rate, investments, costs…).

- Calculation of switching values to test how much a parameter (e.g., discount rate, prices, risk-related parameters…) would need to change in order to alter the choice of the preferred option.

Element 7: Conclusions and recommendations

Provides the outcomes of the business case analysis and recommendations:

- Results of quantitative analyses (e.g., NPV) for each option evaluates, as well as differences compared to base case.
- Results of risk and sensitivity analyses performed.
- Results of non-financial considerations analysed.
- Definition of preferred option.
- Discussion of robustness of conclusions and recommendations.

2.3 International business case guideline: the Five Case Model

With the key elements in a business case at RWS in mind, it is interesting to compare this to an international example. We picked the *Five Case Model* for this comparison. This business case model is recommended by the UK Treasury and has been widely adopted for business cases for major projects and expenses in the UK and internationally (The Folio Partnership, n.d.).

The Five Case Model is a structured methodology for developing business cases that can be applied for a variety of policies, programmes and projects. The method considers the strategic goal and the need for a project, the (societal) benefits, the financial viability, and the practical feasibility. As the name suggests, it consists of five cases[5].

1. In the **Strategic case**, the case is made for the needed change. The case should demonstrate the alignment with the organisational goals and strategy, and with the stakeholder interests and priorities. It should include clear, SMART objectives, an understanding of the current situation (Business As Usual), the identified needs, the potential scope of the proposed project, and the potential benefits, risks, and dependencies.
2. The **Economic Case** focuses on identifying the options that deliver the most public value, including social and environmental effects alongside financial metrics. It includes the appraisal (by – among other things - a cost benefit analysis) of a long-list of project alternatives – including the business as usual, a 'do minimum' scenario, and any other options. This case concludes a preferred option.
3. The **Commercial Case** demonstrates the commercial viability of the preferred option. It addresses the procurement strategy, the capability of the market to deliver, the risk allocation,

[5] A full overview of the five cases, the required contents of the business case, and the process of developing a business case with this model can be found in the guide from the UK Treasury (2018).

and the contractual arrangements. This all aims to ensure an effective partnership between public and private sectors.

4. In the **Financial Case**, the affordability and funding of the project are assessed. Important point of attention is the whole lifecycle cost of the to be realised project.
5. Lastly, the **Management Case** considers the deliverability of the project and realisation of its benefits. Think of governance structures, risk management and evaluation of the project.

Together, these five cases comprise a full business case. It considers financial and non-financial aspects and provides space for considerations on societal level (e.g. in the economic and strategic case) and on organisational level (e.g. in the financial and management case). Throughout the development of a project, the attention of the business case shifts from a focus on the strategic, economic and financial cases in the early phase, to all five cases at a higher stage of project maturity.

2.4 Reflection on traffic management business case guidelines

Both guidelines – the Dutch examples and the international example – provide clear instructions of which elements a business case should contain. However, the guidelines for the *Five Case Model* seem to follow a more detailed and standardised approach in how the cases are developed and how they are assessed. Note that this difference with the guidelines for business cases at RWS can partly be explained by a potential difference in the order of magnitude of the projects these cases are developed for.

While it is explicitly stated that the main focus of the business case at RWS is on financial aspects, the Dutch guidelines do provide space for non-financial considerations as well. The guidelines mention that no business case is complete without the relevant non-financial considerations (e.g. public support, or sustainability and safety impacts). However, these non-financial considerations do not get a very prominent place in the business case: a subsection of the financial considerations and if needed a section in the conclusion – after all financial considerations. The *Five Case Model* separates the financial feasibility of a project from the economic benefits. The economic case focuses explicitly on the created public value, both monetized and non-monetized, which gives these non-financial considerations a more prominent place in the business case. However, the *Five Case Model* does have a strong focus on quantification and monetisation of these benefits where possible. This is less strict in the guidelines of RWS where qualitative descriptions are explicitly mentioned for the non-financial section and the content of this section is less prescribed.

3 Business and value cases for traffic management

The previous chapter showed that, in theory, a business case can include all elements that would constitute a value case. However, the emphasis of the business cases guidelines seems to remain on financial aspects. It is then interesting to explore to what extent current business cases reflect the broad scope of value cases, especially when it comes to which elements of *brede welvaart* are considered. Is the concept of *brede welvaart* actually ready to be included in value cases and is this already done in practice? To answer these questions, we first explored the state of the art of how *brede welvaart* is operationalised in the context of mobility and traffic management. Then we examined examples of business cases related to mobility and traffic management to assess to what extent and in what way *brede welvaart* is already being considered in business case documents. Lastly, we interviewed three experts about their experience with business cases in the traffic management context to explore to what extent elements of value cases (*brede welvaart* or *People* and *Planet* aspects; non-financial and qualitative aspects) are currently incorporated in business cases.

3.1 *Brede welvaart* in mobility and traffic management

The operationalisation of *brede welvaart* in the mobility domain marks a paradigm shift, moving the focus away from facilitation of traffic and maximizing economic output to also considering the quality of life and well-being (Vonk Noordegraaf et al., 2021; Gorter & De Ridder, 2022). *Brede welvaart* in mobility can be structured around four core dimensions, namely accessibility, safety, health, and living environment (Snellen et al., 2021; Vonk Noordegraaf et al., 2021; Ashari et al., 2022). This approach views mobility as a means to allow people to reach activities (e.g. work, grocery shopping, social visits) and participate in society, rather than seeing mobility/traffic flow as a goal in itself (Snellen et al., 2021; Vonk Noordegraaf et al., 2021; Gorter & De Ridder, 2022).

A critical step in the operationalisation of *brede welvaart* is the development of a broad set of indicators that capture these dimensions. TNO proposed a set of 42 domain-specific indicators based on the four PBL dimensions (Vonk Noordegraaf et al., 2021; Gorter & De Ridder, 2022). In addition to the set of indicators, attention was given to three key elements needed to operationalise *brede welvaart*:

- **Distributional Effects**: *brede welvaart* demands explicit attention to how the costs and benefits of mobility measures are distributed among different population groups, regions (urban vs. rural), and across generations (here and now vs. later/elsewhere) (Vonk Noordegraaf et al., 2021; Ashari et al., 2022; Peters et al., 2024).
- **Comprehensive Data Collection** is related to gathering continuous and periodic data cross the full breadth of the *brede welvaart* dimensions, including subjective information (e.g. quality of public space, feeling of safety) through surveys and interviews, rather than relying solely on traditional traffic data (Vonk Noordegraaf et al., 2021; Ashari et al., 2022).

- **Integrating into Existing Processes**: *brede welvaart* indicators are intended to supplement existing evaluation tools, such as the Integrated Mobility Analysis (IMA) and the Social Cost-Benefit Analysis (MKBA), to ensure a broader assessment of effects (Vonk Noordegraaf et al., 2021; Gorter & De Ridder, 2022).

Traffic management, traditionally, has a strong focus on maximising accessibility and safety (Snellen et al., 2021; Ashari et al., 2022). Introducing *brede welvaart* means integrating the broader goals into existing traffic management functions by:

- **Shifting the focus**: while safety often holds priority and/or is precondition (e.g. warning systems or crash prevention), traffic management could incorporate goals like minimizing greenhouse gas emissions or improving air quality (Ashari et al., 2022).
- **Prioritisation**: in traffic management measures like information provision or advice, optimisation should consider dimensions beyond travel time, such as emissions or experienced emotions during the journey. For monitoring and detection, the ability to distinguish between specific user groups is relevant for *brede welvaart* (Ashari et al., 2022).
- **Looking at the operational constraints**: currently, the scope for implementing *brede welvaart* by operational traffic management is limited; explicit *brede welvaart* goals must first be set at the strategic (policy) level (Ashari et al., 2022).

Most Recent Advancements

Recent advancements reflect the ongoing shift toward integrating *brede welvaart* into Dutch infrastructure and mobility policy by the development of frameworks and tools. Some examples are:

- Multimodal Network Framework (*Multimodaal netwerkkader)*: this framework provides traffic managers with guidance for fairly dividing limited infrastructure capacity among different transport modes (car, bicycle, public transport). It is considered a significant improvement over prior approaches since it explicitly addresses distribution effects across different modalities (Ashari et al., 2022; CROW, 2025).
- Explicit *brede welvaart* project definition: recent infrastructure planning, such as the MIRT investigation for the N33-Noord, has been defined explicitly as a *brede welvaart* task focused not only on accessibility and traffic safety. This means evaluating the project based on themes like economy, living environment, landscape, traffic safety, and sustainability (RWS Ontwerpt, 2024).
- New guidance on indicators: the *Denkkader Brede Welvaart* is a framework developed to help users, including policymakers and project managers, define *brede welvaart* goals and indicators relevant to the Ministry of Infrastructure and Water Management (IenW) (Gorter & De Ridder, 2022).

Despite the advancement, a clear gap is the need for a structured methodology to link concrete traffic management practices with *brede welvaart* aspects (Ashari et al., 2022). Furthermore, advancing *brede welvaart* requires better data accessibility concerning distribution effects (linking mobility, regions, and population groups), which is currently hindered by strict interpretations of privacy laws and commercial interests (Ashari et al., 2022).

International Examples

Brede welvaart is a localised version of international concepts such as beyond GDP and well-being economy (Gorter & De Ridder, 2022). International examples emphasize integral policy-making and explicit attention to social and environmental outcomes alongside economic factors. Some examples are included in the table below.

Table 2: Examples of international business case

International Example	Key focus and relevance to *brede welvaart*
Wales – Well-being of Future Generations Act (Peters et al., 2024; Biscaro Uliana & Poelma, 2024)	The Act adopted since 2015, focuses strongly on intergenerational justice. It mandates that policymaking should integrate goals related to equality, health, environment, and social cohesion. This has directly impacted mobility decisions, such as suspending new road projects to promote sustainable alternatives.
United Kingdom – Social and Distributional Impact (SDI) Evaluation (Alonso González et al., 2022)	Required for major new road projects (costing over £10 million), this evaluation framework aims to assess and prevent adverse effects on vulnerable population groups, reflecting a focus on the principle of equitable distribution of effects.
Flanders (Belgium) – Basic Accessibility (*Basisbereikbaarheid)* (Alonso González et al., 2022)	This system emphasizes ensuring a guaranteed minimum level of mobility options for everyone. This approach aligns with the *brede welvaart* concept of addressing vervoersarmoede (mobility poverty) and ensures sufficient access to destinations, reflecting a sufficientarism concept (ensuring "enough" for all).
United Stated – Transportation Equity Regulations	The US Department of Transportation instructs metropolitan planning organisations to include equity effects in their projects and plans to address distributional concerns (e.g. disproportionate negative impacts on low-income or minority groups).
European Common Evaluation Methodology for CCAM (EU-CEM) (FAME et al., 2025)	Is a framework designed to guide professionals in planning and conductions evaluations for Connected, Cooperative, and Automated Mobility (CCAM). It covers relevant impact areas such as traffic safety, energy and environment, and services and operation (including traffic flow efficiency and liveability). The underlying principle is that CCAM should contribute to a more sustainable mobility system (balancing economical, societal and ecological impacts).

3.2 How is *brede welvaart* currently included in business cases?

In order to evaluate how *brede welvaart* is currently being considered in Dutch and international examples of business cases, a two-step approach was used. First, a list of Dutch and English keywords linked to brede welvaart was developed and used to analyse six business cases (three Dutch

examples provided by Rijkswaterstaat and three international cases from the UK, Australia, and Canada). The frequency of these keywords was assessed using TNO's M365 Copilot, with each document processed in a dedicated notebook. The list with *brede welvaart* related keywords was derived based on content from TNO (Ashari et al., 2022), PBL Snellen et al., 2021), CBS (CBS, 2023) and some other sources, such as the European Common Evaluation Methodology for CCAM (EU-CEM) (FAME et al., 2025). In the second step, the context of each keyword occurrence was examined to determine whether it related to specific results, targets, or indicators, or was mentioned in a more general sense. A detailed description of the steps used in the analysis is provided in Appendix A.

Table 3: List of keywords in Dutch and English associated with Brede Welvaart used for analyses

***Brede welvaart*–associated keywords (Dutch)**	***Brede welvaart*–associated keywords (English)**
'Brede welvaart' ; 'Welzijn' ; 'Kwaliteit van leven' ; 'Toegang tot voorzieningen' ; 'Natuurlijke omgeving' ; 'Tevredenheid over het leven' ; 'Bereikbaarheid' ; 'Toegankelijkheid' ; 'Veiligheid' ; 'Gezondheid' ; 'Leefomgeving' ; 'Maatschappelijke impact' ; 'Maatschappelijke gevolgen' ; 'Sociale impact' ; 'Sociale gevolgen' ; 'Ruimtelijke kwaliteit' ; 'Milieuvervuiling' ; 'Geluidsoverlast' ; 'Ruimtegebruik' ; 'Duurzaamheid' ; 'Tevredenheid met het leven' ; 'Ervaren regie over het eigen leven' ; 'Levensverwachting' ; 'Sociale cohesie' ; 'Sociale contacten' ; 'Leefbaarheid' ; 'Gelijkheid' ; 'Billijkheid' ; 'Rechtvaardigheid' ; 'Verdelingseffecten' ; 'Luchtkwaliteit' ; 'Maatschappelijke Baten' ; 'Omgevingshinder'	*'Prosperity' ; 'Well-being' ; 'Wellbeing' ; 'Quality of life' ; 'Access to facilities' ; 'Natural environment' ; 'Satisfaction with life' ; 'Accessibility' ; 'Availability' ; 'Safety' ; 'Health' ; 'Living environment' ; 'social impact' ; 'social impacts' ; 'Spatial quality' ; 'Environmental pollution' ; 'Noise' ; 'Use of space' ; 'Sustainability' ; 'Life satisfaction' ; 'Perceived control over one's own life' ; 'Life expectancy' ; 'Social cohesion' ; 'Social contacts' ; 'Liveability' ; 'Equality' ; 'Equity' ; 'Justice' ; 'Distribution effects' ; 'Distribution impacts' ; 'Distributional effects' ; 'Distributional impacts' ; 'Air quality'*

International examples of how brede welvaart is currently included in business cases

In this section, three international examples of business cases are analysed. No examples regarding traffic management specifically were found, so examples of business cases dealing with infrastructure and public transport were used. First, an example from the UK regarding the replacement of a 3.5-mile section of single-lane carriageway to a dual carriageway in main road A417 (Business Case A417 Missing Link). The second example refers to the Sydney Metro City & Southwest project, which aimed at expanding rail capacity, improve connectivity, and relieve congestion in the Central Business District and surrounding areas. The third example refers to transformation of the GO Rail, the rail service for the Greater Toronto and Hamilton Area (GTHA) in Ontario, into a Rapid Rail System in order to provide faster and more efficient train services.

Business Case A417 Missing Link (Department for Transport & National Highways, 2023)

In the A417 Missing Link business case, several *brede welvaart* related keywords are mentioned, as depicted in Figure 2 (note that the size of the words in the word clouds throughout this chapter say something about the relative frequency of being mentioned within one business case; the absolute numbers can be found in Appendix A. The sizes of the words cannot be compared between word

clouds). Given the substantial frequency of certain terms (e.g., noise, air quality, safety), conducting an in-depth analysis of all occurrences was not feasible. Therefore, a subset of keywords was selected for a high-level contextual exploration.

- **Noise**. "Noise" is mentioned 61 times in the A417 Missing Link business case. References are made in multiple sections and chapters of the business case. Monetised benefits of around £0.5 million are associated to noise reduction due to the project, as well as number of houses exposed to daytime or nighttime noise annoyance (net decrease of 80 houses experiencing daytime noise annoyance and a net decrease of 22 houses experiencing night-time noise annoyance). Noise is also one of eight indicators assessed within the Distributional Impact Assessment, with conclusion that the largest share of the population that would experience a benefit are in the least deprived income band, and that the noise assessment would be overall moderate beneficial.
- **Air quality**: "Air quality" is mentioned 41 times in the A417 Missing Link business case. Similar to noise references, the document presents references to air quality in multiple sections and chapters. Monetised disbenefits of around £6 million (net present value) are associated with the project, due to an increase in regional Nitrogen Dioxide (NO_2) and Particulate Matter ($PM_{2.5}$). However, the report also notes that air quality would improve locally within the Birdlip Air Quality Management Area (AQMA), as fewer vehicles would pass through. Within the distributional impact section, air quality (both in terms of $PM_{2.5}$ and NO_2) is expected to improve significantly for higher income groups (80%–100% income bands), while those in the 40%–60% and 60%–80% income bands are anticipated to experience a slight or moderate improvement in air quality.
- **Accessibility**: "Accessibility" is mentioned 15 times in the A417 Missing Link business case. References to accessibility are made in relation to anticipated reductions in traffic flows of up to 60% in 2026 through the Birdlip area and along Birdlip Hill. Within the section on social impacts assessment, accessibility is mentioned as having a slight beneficial impact, primarily due to improved travel time reliability and time savings resulting from the provision of a high-quality dual carriageway with associated improvements. In the distributional impacts section, accessibility was assessed as 'neutral'.
- **Quality of life:** "Quality of life" is mentioned ten times in the A417 Missing Link business case. The report mentions as one of the strategic benefits that the project would lead to better quality of life with enhanced access to community and services, mentioning also "quality of life" as one of the objectives that the project aims to achieve ("enhance the quality of life for local residents and visitors")
- **Wellbeing**: "Wellbeing" is mentioned seven times in the A417 Missing Link business case. The report mentions as one of the strategic benefits that the project would lead to health and wellbeing improvements. "Wellbeing" is also mentioned in the context of the project providing improved access to the natural environment, offering recreational and wellbeing benefits for local communities and visitors.
- **Sustainability**: "Sustainability" is mentioned four times in the A417 Missing Link business case, mostly in references such as "Economic growth will not be delivered at the expense of sustainability", and in relation to the role of a dedicated Social Value and Sustainability Lead for the project.

- **Prosperity**: "Prosperity" is mentioned four times in the A417 Missing Link business case in the context of supporting economic growth (e.g., "improve prosperity by the provision of a free-flowing road giving people more reliable local and strategic journeys.")

Figure 2: Word cloud depicting brede welvaart keywords identified in the Business Case for A417 Missing Link

Business Case Sydney Metro City & Southwest (Sydney Metro, 2016)

In the Sydney Metro City & Southwest business case, there are also multiple *brede welvaart* related keywords mentioned, as depicted in Figure 3. Similar to the A417 Missing Link business case, a subset of keywords was selected for a high-level contextual exploration.

- **Safety**: "Safety" is mentioned 36 times in the Sydney Metro City & Southwest business case. It is mentioned as one of the key objectives linked to liveability within the New South Wales state ("improve safety and security"). It is also identified as a key business requirement for the Sydney Metro City & Southwest project, within both the customer experience and safety and assurance categories. The report further highlights rail safety as one of the transport-related benefits of the project, achieved through reduced station crowding and the integration of advanced technologies and design elements (e.g., train protection systems, platform barriers, extensive CCTV coverage). The report mentions monetised benefits of around $221 million (present value) related to safety, coming from economic savings due to a reduction in the average number of safety incidents per rail journey (e.g., due to enhanced safety features, such as platform screen doors). However, it also notes a monetised dis-benefit of $-30 million (present value) concerning rail safety, coming from an expected increase in the number of individuals using metro services (as more people live and work along the corridor), which raises the average number of potential safety incidents each year.
- **Liveability**: "Liveability" is mentioned 15 times in the Sydney Metro City & Southwest business case. Liveability appears (together with productivity and sustainability) as one of the three themes through which the Australian and NSW governments' strategic priorities are organised. The liveability theme contains 16 key goals and objectives, spread between national, state and city, and transport levels, including for example "Improve social equity and quality of life in our

cities and regions", "Reduce road fatalities", "Revitalise existing suburbs", and "Put the customer first, and design the transport system around the needs and expectations of the customer". The business case refers to several monetised benefits and dis-benefits that may be associated with "liveability", such as "Public transport travel time benefits", "De-crowding", and "Road user externalities", although these are not explicitly linked to "liveability".

- **Health**: "Health" is mentioned eight times in the Sydney Metro City & Southwest business case. Within the justification for the project, the report states that the Sydney Metro will give people better access to health care. "Health" is also mentioned within the Sydney Metro City & Southwest Project objectives to "Serve and stimulate urban development" with the guiding principle of promoting the health, growth and development of communities. "Health" is also associated with City-building benefits, including increased economic activity, economic productivity, jobs, worker income, savings in infrastructure provision. There are monetised benefits of approximately $110 million (present value) where "Health" is linked to savings in public infrastructure provision. This is due to higher-density development along the Sydney Metro City & Southwest corridor, which is expected to reduce government expenditure on basic community services, including health care facilities, schools and public transport, by concentrating population growth in well-serviced areas.
- **Equity**: "Equity" is mentioned five times in the Sydney Metro City & Southwest business case. References to "equity" are mostly generic and not connected by monetised benefits or dis-benefits. They are linked to liveability objectives, current challenges related to economic growth and productivity, and ways in which city-building benefits associated with the project can improve social equity.
- **Quality of life**: "Quality of life" is mentioned only once in the Sydney Metro City & Southwest business case, as part of one of the liveability-related goals at the national level: "Improve social equity and quality of life in our cities and regions".

Figure 3: Word cloud depicting brede welvaart keywords identified in the business case for Sydney Metro City & Southwest

Business Case GO train service expansion (Metrolinx, 2018)

In the GO train service expansion business case, ten of the *brede welvaart* related keywords were identified, as depicted in Figure 4. A subset of keywords was selected for a high-level contextual exploration.

- **Quality of life**: "Quality of life" is mentioned 44 times in the GO Train Service Expansion business case, appearing across multiple sections and chapters. A dedicated section on quality-of-life benefits is included within the Strategic Case chapter of the business case. In the justification for the project, "quality of life" is mentioned as a key factor in the expansion of the GO Rail into a Rapid Rail System, by making it easier for people to access more of the region through safe and convenient services. References to "quality of life" benefits are mentioned in the Strategic case by connecting nearly 30% of the Greater Toronto and Hamilton Area population with fast, frequent, and reliable services while also supporting a healthier region by adding 15 million walk and cycle trips to stations a year. Additional benefits mentioned in connection to "quality of life" include people having more time to spend with their families and improved access across the region. The business case proposes indicators related to "quality of life", including the estimated reduction in the number of accidents resulting in injury or death, the estimated reduction in health-impacting emissions, and the estimated change in active travel. The GO Expansion Project is associated with "7,000 fewer collisions by 2055 and up to 15 million more trips per year made by walking or cycling".
- **Health**: "Health" is mentioned 39 times in in the GO Train Service Expansion business case. The report mentions that the GO Expansion project will "generate 15 million new walking and cycling trips to access GO Rail station a year". Improved health due to cleaner air and a more active population is also emphasised as a benefit of the project to rail passengers, drivers and the overall region. The business case provides monetised benefits related to health and safety of $1.1 billion due to due increased walking and cycling to GO Rail stations and fewer vehicles on the road leading to fewer car accidents. Increased physical activity is also expected to lead to monetised benefits of around $565 million (present value)
- **Accessibility**: "Accessibility" is mentioned 26 times in the GO Train Service Expansion business case, both in terms of improving access to train stations and in terms of increasing accessibility and reducing travel times to different opportunities. The report states that 42 stations will be upgraded to improve accessibility, aiming to achieve full disabled access in accordance with applicable regulations, and to enable passengers to board and alight more quickly, reducing trip times by 2-5 minutes.
- **Sustainability**: "Sustainability" is mentioned eight times in the GO Train Service Expansion business case. The business case states that the GO Expansion Project is expected to enhance sustainability by improving the resource efficiency of the transportation network through the provision of more efficient trains that produce lower emissions per passenger-kilometre travelled. Additionally, benefits are also anticipated through the reduction of transportation emissions by encouraging travellers to shift from the road network to the rail network, supported by the introduction of new stations and improvements in service frequency, travel speed, and reliability. In terms of sustainability-related goals, the business case states that the GO Expansion Project is expected to reduce emissions per rail trip by 70 percent and total greenhouse gas

emissions by 13.5 megatons, while also lowering levels of Criteria Air Contaminants (CACs) and other pollutants that affect human health.

- **Availability**: "Availability" is mentioned six times in the GO Train Service Expansion business case. The term is primarily used in general contexts, such as noting that the majority of GO train services operate during peak periods and in peak directions due to infrastructure availability or referring to the lack of parking availability in the area. In terms of expected outcomes of the GO Expansion, the business case states that the provision of more frequent, all-day service will enhance the quality and availability of GO Rail. Additionally, it is also stated that the proposed corridor improvements, including electrification and track upgrades, are expected to increase train frequency during peak periods and improve the availability of GO Rail.

Figure 4: Word cloud depicting brede welvaart keywords identified in the GO Expansion Business Case

Dutch examples of *brede welvaart* in business cases

In this section, three Dutch documents are analysed. First, there are two examples of business cases from Rijkswaterstaat: *Business case automatisch rijdend openbaar Vervoer* (automated public transport) (Van Baekel & Moesker, 2025), and *Businesscase vervangingsstrategie wegkantsystemen door iWKS* (replacement strategy for roadside systems) (Horstman & Price, 2018). Secondly, also an example of a value case by Landelijk verkeersmanagement Beraad (National Traffic Management Council, LVMB) is analysed: *Valuecase iVRI* (Value case for intelligent traffic control systems) (Van Gent & Visscher, 2025).

Business case automated driving public transport (Van Baekel & Moesker, 2025)

This business case considers the required investments and potential benefits of the introduction of automated busses in public transport. The key-word analysis described above resulted in only two hits, which were both on the word 'safety'. This can be explained by investigating these hits. Increased safety is mentioned as one of the core benefits of automated public transport, but this business case only focuses on another core benefit: reduced costs. Therefore, safety or any other *brede welvaart* effects are not taken into account in the rest of the business case and do not appear in any conclusions.

Businesscase vervangingsstrategie wegkantsystemen door iWKS (Horstman & Price, 2018)
This business case considers the replacement of road-side systems by Rijkswaterstaat. In this business case, some more *brede welvaart* keywords were mentioned (see Figure 5)

- Societal benefits (*Maatschappelijke baten*) were mentioned five times, mainly in the section on non-financial considerations. This section includes qualitative scores (-/0/+) for certain aspects. In the explanation of scores, societal benefits seem to include potentially fewer accidents in the future, and less depreciation of the current roadside systems.
- Safety is mentioned (five times) as an important reason for the replacement of current outdated roadside systems. However, it is only briefly mentioned in the non-financial considerations as an aspect for which it is expected that there are no differences between the current WKS and new iWKS. Meanwhile, societal benefits did include the potentially lower number of accidents in the future with iWKS and future in-car messaging services. However, the disregard of safety as a separate aspect in this evaluation was not further substantiated.
- Also sustainability was found (4 times) in the non-financial considerations. However, the impact on sustainability was not further explained or considered.

In the conclusions of the business case, there is a small role for the non-financial considerations. They are only mentioned in one of the conclusions, where it was stated that the qualitative evaluation supports the same preferred alternative as the quantitative evaluation. The more operational aspects that were discussed in the non-financial chapter – maintainability, feasibility, required capacity - were more prominently addressed in the conclusion, but *brede welvaart* aspects were lacking.

Figure 5: Word cloud depicting brede welvaart keywords identified in Businesscase vervangingsstrategie wegkantsystemen door iWKS

Valuecase Intelligente verkeersregelinstallaties (IVRI) (Van Gent & Visscher, 2025)
The title of this document – which translates to 'Value case Intelligent Traffic Signal Control Systems' (iVRI) – implies that this evaluation goes beyond monetary costs and benefits. The results of our quick keyword analysis in Figure 6 show that we indeed find more keywords for *brede welvaart* in this document than in previous Dutch examples. The evaluation distinguishes between effects of

iVRIs for different user groups – logistics companies, emergency services, public transport, cyclists, government and road operators - and for society as a whole. The effects are determined by reasoning from input (iVRI) through output (functionalities of iVRI), outcome (direct effects) to impact (broader effects on society). In the end, the effects are monetized where possible. The value case does not conclude with a strong recommendation due to uncertainties and difficulties of quantification for several effects. Instead, a societal break-even point is determined by reasoning what percentage reduction in societal costs of accidents, pollution or congestion should be reached to break even on the total costs of the iVRIs.

As can be seen in Figure 6, multiple *brede welvaart* aspects are covered in this evaluation. Below, we dive into some of these elements:

- A reduction in noise pollution was mentioned (12 times) as societal benefit through three of the user groups. It was also mentioned in the conclusion of the value case as indirect effect. Noise pollution was considered qualitatively.
- Societal benefits were mentioned (10 times) throughout the report since for every user group, societal impacts of the realization of iVRIs were determined.
- Air quality was mentioned (9 times) in a similar way as noise pollution. However, air quality was quantified through the pricing of CO2 emissions.
- (Traffic) safety was mentioned (32 times)[6] throughout the value case as one of the key direct effects of iVRIs. This benefit mainly occurred at three user groups (emergency services, cyclists, and government). A rough quantification of the traffic safety benefits was conducted, and traffic safety benefits were one of the three types of monetized benefits that were used to determine a societal break-even point for iVRI investments.

Figure 6: Word cloud depicting brede welvaart keywords identified in report Valuecase Intelligente verkeersregelinstallaties (IVRI)

[6] The keyword '*veiligheid'* (safety) only occurred 3 times in the document. However, '*verkeersveiligheid'* (traffic safety) occurred another 29 times. Because traffic safety is also relevant for *brede welvaart*, these hits were also included in the table.

Reflection on the examples of brede welvaart in business cases

In most international examples, brede welvaart aspects (when mentioned) are either approached from a qualitative perspective or monetised perspective, with a few examples identified of references to *brede welvaart* indicators (e.g., with indicator values, targets, thresholds etc.).

Monetised examples

- **Noise**: monetised benefits ~£0.5m present value (UK A417 business case) (Department for Transport & National Highways, 2023).
- **Air quality**: monetised disbenefits ~£6m present value (UK A417 business case) (Department for Transport & National Highways, 2023).
- **Health**: monetised benefits ~$110m present value (Australia, Sydney Metro business case) (Sydney Metro, 2016)

Qualitative examples

- **Accessibility**: assessed as having a "slight beneficial" impact overall, but "neutral" impact when considering distributional effects across population groups (UK A417 business case) (Department for Transport & National Highways, 2023).
- **Wellbeing**: improved wellbeing by "improved access to the natural environment, offering recreational and wellbeing benefits for local communities and visitors" (UK A417 business case) (Department for Transport & National Highways, 2023).

Reference to brede welvaart indicators

- **Quality of life benefits:** improved with expected "7,000 fewer collisions by 2055 and up to 15 million more trips per year made by walking or cycling" (Canada, Go Train business case) (Metrolinx, 2018).
- **Sustainability**: improved due to reduced "emissions per rail trip by 70 percent and total greenhouse gas emissions by 13.5 megatons" (Go Train business case) (Metrolinx, 2018).

The Dutch examples of business cases showed little attention for *brede welvaart* aspects. One example merely focused on financial aspects and excluded other *brede welvaart* aspects. The other example did consider *brede welvaart* aspects in a section on non-financial considerations. However, it excluded some aspects from the analysis without clear supporting arguments. The aspects that were included played only a minor role in the conclusion of the business case.[7] The Dutch value case example showed more *brede welvaart* aspects, with a strong focus on different user groups and different domains (e.g. noise, air quality, liveability and safety).

3.3 Practical experiences with business cases at RWS

The existing business cases that were analysed in the section above show varying levels of attention to *brede welvaart* topics. However, since there were just a few Dutch examples and not all

[7] Worth to note is that the focus of this business case was on the operational side of the different project alternatives, which might explain the lack of more *brede welvaart* in the conclusions.

considerations might end up in the final documents, we want to add some perspective from professionals from practice. Therefore, three experts from Rijkswaterstaat were interviewed about their involvement with business cases at Rijkswaterstaat and elsewhere: Arjen Horstman, Jon Barlow and Jan Helmer. The interviews provided interesting insights in three main topics: qualitative versus quantitative factors; the freedom of including qualitative aspects; and the power of the decision maker.

Qualitative versus quantitative factors in business cases

One of the reasons for researching how to include more *brede welvaart* aspects in business cases is the fact that these aspects are often qualitative factors which are difficult to quantify and monetize. This makes them different from monetary costs and benefits and calls for a different approach.

As can be seen in section 2.2, current business cases at RWS already include space for qualitative aspects. These can for example be aspects such as durability, maintainability and sustainability (Horstman, personal communication, 10-09-2025). Helmer (personal communication, 7-10-2025) states that every well-designed business case at RWS already includes (qualitative) values, but that a value case on its own does not guarantee a solid business case. Helmer (2025) personally uses a five-step approach for integrating non-financial aspects in business cases: define the aspect, describe the trigger mechanism, assess its significance, quantify it, and monetize it if possible. Not all *brede welvaart* aspects will reach the fifth step of analysis. Up to which step the analysis is done varies per aspect and depends on the extent to which the qualitative impact can be quantified and on the relevance of the *brede welvaart* aspect for the business case.

In the five case model in the UK (see also section 2.3), the qualitative values can be assigned in the strategic case. Alternatively, they might be included in the economic case in the "adjusted BCR" – the adjusted benefit-cost-ratio. The BCR is adjusted for the benefits with assessment methods that are less established and so allows inclusion of effects that might otherwise have been non-monetized benefits (Barlow, personal communication, 10-09-2025). Including the qualitative values in an economic context also happens in business cases at RWS. When quantification is not possible, these factors are sometimes still included for transparency. They are then shown as PM ['pro memorie'] items in the business case (Helmer, 2025).

Not only the extent to which qualitative factors are included in business cases matters, also the extent to which they are considered in the final decision is important to discuss. This starts with the guidelines for business cases. While a section on non-financial considerations is required, these sections are not always part of the considerations in the final decision. This shows a gap between what is requested and what is used in the decision-making (Horstman, 2025). It is also not easy to make the qualitative aspects part of decision-making. Because of their qualitative nature, these factors are difficult to compare in project alternatives – an essential part of decision-making with business cases. This leaves room for improvement in the way we include qualitative aspects in business cases, and in the importance of these aspects (Horstman, 2025).

According to Helmer (2025), the qualitative aspects that are included as PM items are presented as discussion points rather than exact scores to compare alternatives on. However, there are efforts to improve quantification and monetization of these aspects where possible.

The freedom of including qualitative aspects in business cases

The sections with non-financial considerations in the business case guidelines of RWS do not describe which factors should be included (see section 2.2). The five-case model from the UK is more prescriptive about what should be in the different cases (Barlow, 2025). This difference, and the freedom that the guidelines at RWS give, have benefits and risks.

A business case should serve its project – e.g., it should scale in extensiveness with the size of the project. Not all projects require the same level of detail, which means some analyses will be more important for certain projects than for others (Barlow, 2025). Small projects related to traffic management might be difficult to relate to *brede welvaart* themes on societal level. In such cases, the business case should serve its purpose – supporting project decisions – and should consider aspects that are relevant to the decision in this specific project (Horstman, 2025). Flexibility in the non-financial section of a business case allows for the communication of any unusual costs and benefits of projects, going beyond strictly economic aspects (Barlow, 2025). However, Helmer (2025) adds that the reports should clearly state which aspects were considered and which aspects were excluded (and why). The reports should contain support for these decisions – if possible, with references. This would prevent a project team from being too selective on included aspects.

A second benefit of the freedom of including qualitative aspects lies in the room it gives to experiment with new appraisal methods. Helmer (2025) illustrates this with examples of how they quantified some societal impacts such as noise reduction, property values, or health. In his example, Helmer explains that a minimum level of the societal benefits of a reduction in noise levels, was determined by the costs of the mitigating measures that are required to meet the norm of the maximum noise levels at nearby houses. With this method, the societal benefits are set to be at least equal to the costs we are willing to pay to reach the set norms. Helmer (2025) adds that with this method, noise is still relatively easy to monetize, while other societal impacts such as health can be more complex. In the UK, Barlow (2025) also saw the benefits of the freedom that this qualitative section gives. It gave consultants the opportunity to include appraisal methods for factors that are not prescribed in guidelines, but that help develop understanding of the value of the project – such as societal impacts and distributional effects.

Due to constraints in budget and time for setting up business cases, the people making them usually have to prioritise which impacts to assess (Barlow, 2025). This selection can consciously or unconsciously create a bias in the business case. The bias can be introduced by adapting business cases to shifting government priorities, although as government policy changes over time, this is also a positive aspect of flexibility (Barlow, 2025). However, the biases can also be more explicit. If a project team knows there is a preferred outcome of the business case beforehand, they could selectively emphasize factors that support that outcome. The consequences of this risk become more

serious if the qualitative sections of business cases would get more influence in the final decision-making (Horstman, 2025) – as was discussed in the previous section.

Barlow (2025) saw similar risks materializing in the UK. The adjusted BCR that was introduced in a previous section could be used for a process that is called *'BCR-hacking'* – where consultants would add analyses of other impacts to the adjusted BCR until the adjusted benefit-cost ratio was sufficient for the desired outcome. However, Barlow (2025) still considers the adjusted BCR a useful approach because of the need for proportionality of the analysis to ensure reasonable appraisal costs, and because of the option to consider effects that are important to government and society but that might lack established assessment methods.

Preventing biased business cases can be done by creating more direction on what factors should be included in the qualitative section. This could for example be done by involving different stakeholders in selecting the relevant factors to include – which would also include more stakeholder perspectives that are often not considered in business cases (Horstman, 2025).

The power of the decision maker

A lot of the above-mentioned considerations regarding (qualitative) values in business cases do to some extent depend on the decision-maker. With the specific request they give for the business case and the extent to which they consider (qualitative) values in their decision-making, they can make or break the role of (qualitative) values in business cases.

While there is space for qualitative considerations in the RWS business case guidelines, in practice the request for the business case often focuses on the financial outcomes. This means that if the ambition is that there should be more emphasis on qualitative factors in business cases, the official requests from the decision-makers should reflect this. Only then will the real change be made (Horstman, 2025). Helmer (2025) explained that the process of writing the business case can get delayed significantly when project teams get the instruction to include all kinds of *brede welvaart* aspects in their business cases, while the decision-makers (in the end) are only interested in the financial outcomes. While the effort of such a project team might be in line with the organisations policy, the business case might not be accepted until the content – the considered financial or non-financial aspects – aligns with the request from the decision-maker.

As mentioned in the previous, sometimes a business case is requested for a decision while there is already a preferred outcome. Or higher management restricts which project alternatives or *brede welvaart* aspects can be included in the analysis (Helmer, 2025). Such situations can push towards business cases that support the preferred decision (Horstman, 2025). This would prevent the creation of business cases that tell the whole, transparent story of the impact of a project (both positive and negative) (Helmer, 2025) – which is exactly what we aim for by including more values in business cases.

The role of (qualitative) values in business cases is affected by the extent to which decision-makers take them into consideration. This often depends on the type of project, Helmer (2025) describes.

Projects at RWS can be split into two categories: operational and policy driven. The first category focuses on maintaining existing functionality and capacity of the main networks RWS operates, while the second category is aimed at changing functionalities or capacities. For the operational category, there are service level agreements (SLA) between RWS and the ministry of Infrastructure and Water (IenW), with fixed budgets. This means that in business cases in the operational category, there is not much room for considerations that go beyond these SLAs. The budgets for such projects are reserved for meeting the requirements of the SLA. Since *brede welvaart* aspects are only to a limited extent considered in these SLA, extra investments for a better impact on *brede welvaart* aspects would often be on RWS's own costs – unless IenW makes additional budget available. Therefore, the *brede welvaart* aspects play a smaller role in decision-making in the operational projects (Helmer, 2025).

Policy-driven projects are financed from budgets that are often separate from the SLA budgets on the operational side. Since these projects aim to change (or improve) something rather than meet the SLA, there is more room to consider *brede welvaart* aspects in the respective business cases. However, even in operational business cases, there are some ways to also consider *brede welvaart* aspects. As was discussed in some of the sections above, societal impacts or other non-financial aspects can be included as PM items – which makes them discussion points in the final decision – or they can be included in the separate non-financial section. The question remains, however, to what extent this is considered in the final decision by the decision maker.

Reflections on practical experiences with business cases at RWS

The interviews show a current practice of fit-for-purpose business cases in which qualitative aspects are to some extent included. These aspects can be more practical and on organizational level (e.g. maintainability) or on broader societal level. However, not all projects can intuitively be linked to broader societal impacts – which is also not always what is requested by the decision-makers.

Two gaps occur in including more (qualitative) societal impacts: there is a gap between the freedom that guidelines give for including non-financial impacts and what is expected by the decision-maker; and there is a gap between including non-financial societal impacts and them influencing the final decision. While both gaps relate to organizational priorities – whether by adjusting the SLA or by revising decision-making criteria to include broader, non-financial impacts – the latter also depends on how these non-financial aspects are presented within the business or value case. When these gaps are being addressed, attention should also be paid to the level of detail of the guidelines for non-financial sections of business cases. Guidance on transparent and well-reasoned non-financial impacts would make business cases with a prominent place for non-financial aspects more comparable and less prone to biases.

4 Transition to value cases with *brede welvaart* impacts

The previous chapters explored the current state of business cases - from guidelines to actual business cases and practical experience – and the current state of the operationalization of *brede welvaart* in mobility and traffic management. The next step is to build upon that by identifying what is needed to move from business cases to value cases. This is done by exploring which *brede welvaart* impacts are considered relevant for traffic management business cases and by exploring technical and organizational challenges that have to be addressed to pave the way to value cases for traffic management at RWS.

4.1 *Brede welvaart* in traffic management business cases

In order to explore how *brede welvaart* impacts could be potentially included (or considered) in a traffic management related business case, a workshop with professionals from RWS and TNO was organised on October 20, 2025, at TNO's office. After an initial introduction round and a presentation with contextualisation about the project, participants from both organisations were split into two groups (each with representatives from both RWS and TNO) and asked to explore potential *brede welvaart* impacts in an illustrative mini case study of a business case related to installing ramp metering at a fictitious on-ramp of a notoriously congested high-way (see the introduction slides in the figures 7 and 8).

Participants were asked to: (1) identify *brede welvaart* impacts they see as relevant for the given case; (2) specify if the mentioned impact was expected to be positive or negative; (3) specify how does the impact occur, and who it affects; and (4) specify to what extent the impact can be quantified or monetised. Detailed results of this activity in the workshop are presented in Appendix B.

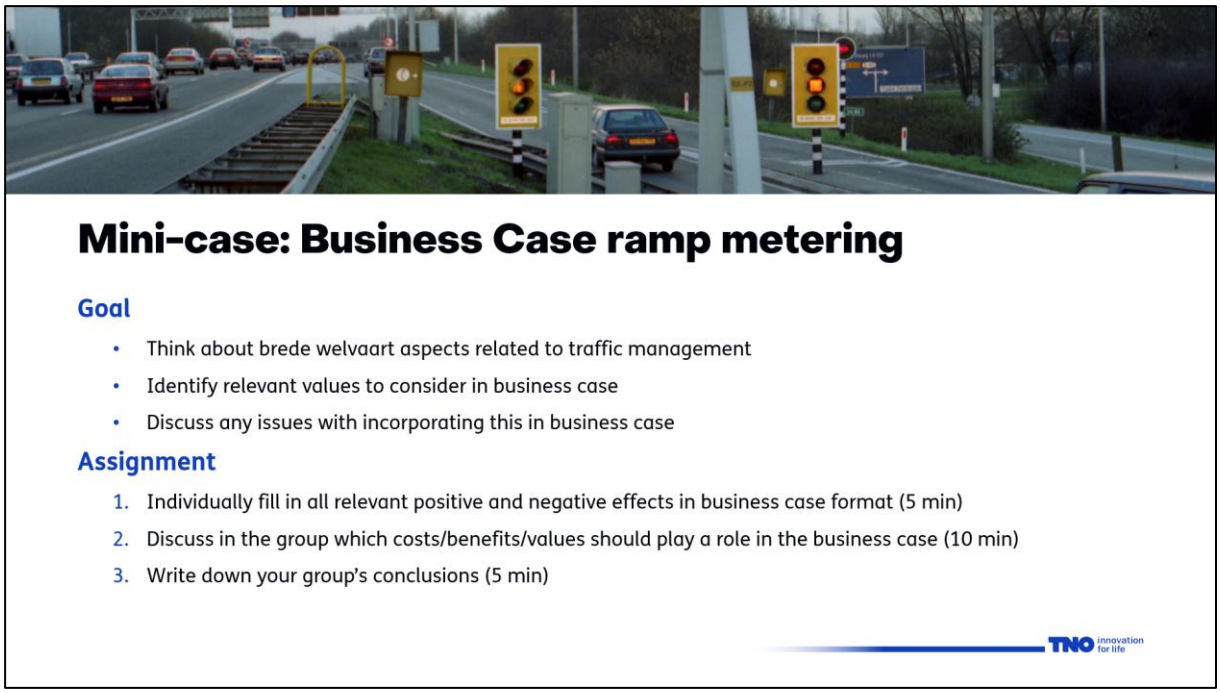

Figure 7: Contextualisation slide of illustrative mini case study of brede welvaart impacts on traffic management business cases (slide 1 of 2)

Contextualisation slide of illustrative mini case study of *brede welvaart* impacts on traffic management business cases (slide 1 of 2

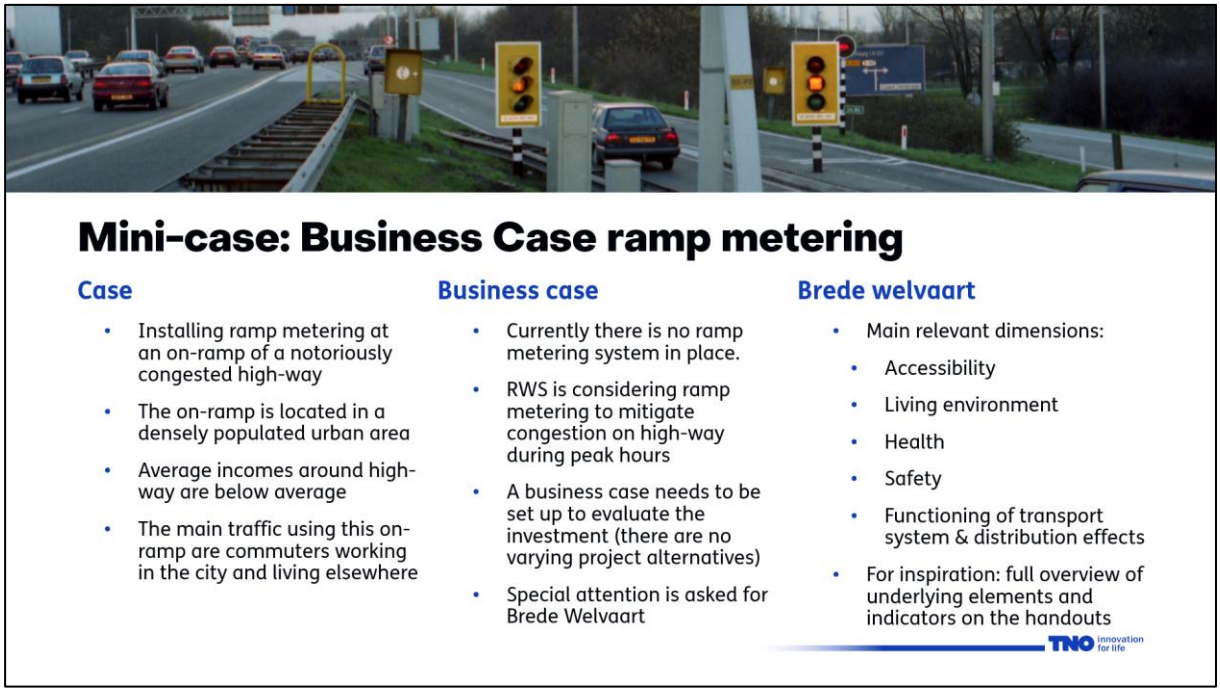

Figure 8: Contextualisation slide of illustrative mini case study of brede welvaart impacts on traffic management business cases (slide 2 of 2)

As a result of this activity within the workshop, 47 potential impacts were collected from participants. To structure the presentation of these results, the four domains of *brede welvaart* in mobility (accessibility, health, safety, and the living environment) are used to cluster the input, together with an additional "others" category to discuss suggestions that cannot be incorporated into the previous ones. As can be seen in Table 4, most impacts were identified in the domain of living environment, followed by accessibility and safety. The following subsections present the outcomes of this activity, clustered per domain.

Table 4: Summary of brede welvaart impacts identified in activity 1 of workshop

Brede welvaart domain	Occurrences
Living environment	15
Accessibility	9
Safety	6
Health	3
Others	14
Total	**47**

***Brede welvaart* impacts on the living environment**

Living environment received the highest number of mentions (15) regarding impacts identified by participants. Almost all references concerned emissions, pollution, or noise (14), with one mention of vibrations. Six impacts were identified as negatively associated with the living environment (i.e., contributing to a deterioration of the living environment). These were mainly related to noise and emissions caused by traffic jams forming as a result of ramp metering. One participant mentioned a positive impact due to reduced pollution. Five references to noise and pollution considered both positive and negative effects, largely due to a potential balancing effect (e.g., less pollution on the highway due to improved traffic flow, but more pollution on the ramp due to drivers accelerating and braking). One reference to air pollution, one to noise pollution, and the mention of vibration were not further detailed by participants. For quantification, CO_2 levels and number of decibels (dB) as an indicator for noise pollution were suggested.

***Brede welvaart* impacts on accessibility**

The *brede welvaart* domain of accessibility was mentioned nine times in relation to impacts identified by participants. Accessibility itself was noted four times (three concerning accessibility and travel time, and one linked to local accessibility), followed by ease of crossing (2), comfort and merging (2), and experienced accessibility (1). Of these nine impacts, four were identified as positively associated with accessibility (i.e., contributing to an increased accessibility). These were mainly related to reduced congestion and improved travel times and could be quantified or monetised using indicators such as travel time or value of time (VoT). Three of the nine impacts were identified as negatively associated with accessibility (i.e., contributing to a decreased accessibility). These were largely linked to traffic backing up on the underlying road network and queues forming

on these roads and could also be quantified or monetised using VoT. Finally, one impact (accessibility/intercity travel time) was mentioned as potentially having a positive and negative effect – positive for the mainline road users, and potentially negative for the users of the on-ramp, if the waiting time on the on-ramp is not compensated by a better travel time on the mainline. This could be quantified by average travel time and VoT. Easier merging was another impact mentioned.

***Brede welvaart* impacts on safety**

The *brede welvaart* domain of safety was mentioned six times in relation to impacts identified by participants. All mentions referred to impacts related to traffic safety or accidents, with three indicating positive effects on safety due to greater control over the number of cars on the road, which reduces congestion and accidents. One participant noted, albeit with some uncertainty, that a negative impact on safety could occur following the introduction of ramp metering, which might be experienced by road users near the on-ramp. Finally, two participants mentioned both positive and negative impacts on safety, with positive effects linked to improved traffic flow (fewer cars "suddenly merging" can reduce accidents), and negative effects associated with the risk of minor accidents caused by "careless drivers" approaching the on-ramp metering traffic light. In terms of quantifying safety impacts, participants referred to indicators such as the number of accidents and the number of injuries.

Brede welvaart impacts on health

The *brede welvaart* domain of health was mentioned three times in relation to impacts identified by participants. "Health impacts" was mentioned twice, while "health of surrounding residents" was mentioned once. Of the three references to the health domain, two were associated with negative impacts on health, and one was linked to both positive and negative impacts. The negative impacts were mainly due to physical health issues related to noise levels and emissions or pollution, as well as mental health effects associated with noise. The positive/negative mention also referred to noise and emissions but emphasised that these could be either positive or negative depending on the population group. Participants did not elaborate on how the health impacts could be quantified or monetised. It is important to note that noise and emissions are included within TNO's *brede welvaart* indicators wheel under the living environment domain. However, since participants explicitly highlighted health impacts associated with noise and emissions, these were retained in this category.

Additional *brede welvaart* impacts mentioned

Participants also identified 14 impacts not explicitly covered within the four dimensions of *brede welvaart* in mobility. Most related to the functioning of the transport system. These included five references to impacts on travel time, four references to impacts on congestion and throughput, and one reference each to blocking-back effects. Other impacts mentioned included damage to asphalt on the ramp, impacts on the image or trust in the Government, impacts on quality of life, and impacts on the market value of houses. Five impacts were considered negative for the functioning of the transport system, mainly due to potential adverse effects of congestion and travel time (note: how these impact the four dimensions of *brede welvaart* in mobility was not discussed and can be both positive and negative). Three impacts were mentioned as negative, but participants expressed

uncertainty about their likelihood; these were associated with a possible reduction in house market value, impacts on quality of life, and the risk of congestion forming on surrounding roads. Three impacts identified were related to improvements in travel time – which can have varying effects on *brede welvaart* (depending on which dimension is considered). Finally, three impacts were noted as potentially having both positive and negative effects, linked to congestion or throughput and the Government's image. For quantification, suggested indicators included maintenance costs (to monitor the mentioned negative impact on asphalt), as well as value of time (VoT), speed, and number of vehicles.

4.2 Challenges of implementing more *brede welvaart*

In the same workshop mentioned earlier, participants were asked to explore what is needed to incorporate more brede welvaart elements into business cases, as well as any potential barriers or challenges that might prevent this. They were invited to examine two groups of factors: (1) technical aspects, covering data, models, methods and related topics, and (2) organisational aspects, including collaboration, culture, budget, and the way decision-making takes place. Detailed results of this activity in the workshop are presented in Appendix C.

Figure 9: Contextualisation of workshop activity to explore barriers associated with incorporating brede welvaart elements into business cases (slide 1 of 2)

Figure 10: Contextualisation of workshop activity to explore barriers associated with incorporating brede welvaart elements into business cases (slide 2 of 2)

Technical aspects

Participants identified 21 technical factors influencing the implementation of a broader *brede welvaart* perspective in business cases. After analysing the input provided, the project team grouped these factors into four clusters: business case setup & approach, data & indicators, methods, and models & measurements.

- **Business case setup & approach.** Within this cluster, participants highlighted the need to identify all relevant aspects that influence a business case and to establish a clear demarcation of what should fall within scope and what lies outside it. For each aspect identified as relevant, an analysis of its functioning and magnitude (i.e., are the impacts very large or small?) should also be performed. Budget allocations across different areas such as infrastructure, mobility, health, education, and others were mentioned as a limiting factor. Finally, participants stressed the importance of an approach that clearly separates the different project alternatives under consideration within a business case, and then allowing an assessment of *brede welvaart* impacts. They also emphasised the need for proper sensitivity analyses on critical parameters of the business case to evaluate the robustness of decisions and recommendations.
- **Data & indicators.** Regarding data and indicators, participants highlighted the need to develop new indicators and models or algorithms to support the incorporation of a more *brede welvaart* perspective into business cases. In some instances, participants also emphasised the need not only for data and indicators, but also for knowledge development on how to quantify or monetise certain *brede welvaart* or societal aspects, such as personal experience and subjective well-being, among others.

- **Methods**. Within this cluster, participants mentioned factors beyond data and indicator availability, including the need to develop and incorporate validated approaches for incorporating indicators or perspectives that might have different weights in a policymaking arena (i.e., how to weight different policy options?). In line with this, how to incorporate underlying societal values (i.e., values that many people share) into business cases was also mentioned as a challenge. The need for more insights regarding distribution effect analyses of different measures taken was also emphasised. Finally, the need for selection methods to choose *brede welvaart* domains and indicators to be incorporated in the business case, as well as how to effectively communicate evidence-based results were also mentioned by participants as relevant challenges within the methods cluster.
- **Models & measurements**. Within models and measurements, participants highlighted the need for accurate models to account for environmental effects within business cases, as well as models that incorporate aspects such as mental health and the distinction between measured and experienced impacts.

Organisational aspects

Participants identified 28 organisational factors influencing the implementation of a broader *brede welvaart* perspective in business cases. After analysing the input provided, the project team grouped these factors into six clusters: requests for business cases and value cases, business case guidelines, budget, communication, skills, and collaboration.

- **Request for business cases and value cases.** This group of factors received the highest number of mentions (10) from participants. The main issue raised concerns the need for the original request for a business case, undertaken for a given project appraisal, to include *brede welvaart* elements so that the project team can properly take them into account within the defined scope of the business case project. Comments highlighted the importance of updating the mental models and mindset of those commissioning business cases, so that value cases (including more *brede welvaart* aspects) becomes "the normal thing to do". In addition, participants pointed out the need for a broad shift towards *brede welvaart* thinking, starting at the national level and cascading down to lower political and policy-making levels. They also stressed the need to review and update the performance indicators used to evaluate projects.
- **Guidelines for business cases.** The previous cluster focused on the scope of a business case request made by an initiator. This cluster relates to the guidelines for carrying out a business case, which should provide a common structure for all business cases performed. Within this group of factors, participants emphasised that the guidelines should specify a minimum set of domains to be covered in a value case analysis in order to reduce the risk of framing. Additionally, it was noted that the business component of a business case should be clearly separated from the societal component to enable proper evaluation of impacts and options within the business case. However, participants also highlighted that, although this separation is important, it often involves a trade-off between the financial aspects of a business case and *brede welvaart* aspects, indicating that such separation may not be easy to do in practice and that methods for balancing *brede welvaart* considerations with other aspects may need to be developed. Finally,

participants also mentioned that the guidelines themselves can restrict the inclusion of non-financial considerations, reiterating the point that the guidelines should explicitly incorporate *brede welvaart* aspects when defining the minimum requirements for a business case analysis.

- **Budget.** Participants mentioned limitations associated with the financial cycle and noted that the budget allocated for business case analysis considers only financial benefits and not *brede welvaart* or societal benefits, which limits the scope for explicitly including these aspects when conducting a business case.
- **Communication**. In terms of communication challenges, participants highlighted the need to raise awareness and provide training for decision-makers on *brede welvaart*, enabling them to incorporate its elements when commissioning business cases. Furthermore, participants emphasised the importance of developing compelling examples of value cases that can act as benchmarks to help shift mindsets.
- **Collaboration**. In terms of collaboration, participants noted the need for closer cooperation between *brede welvaart* experts and (business case) domain experts, as well as the involvement of a wider range of stakeholders. However, it was also observed that identifying which stakeholders should be involved in a business case or value case analysis is a challenge in itself.
- **Skills.** Regarding skills, participants highlighted the need to develop skills to look broader among personnel working on business cases, as well as to collect additional data and develop new indicators.

5 Conclusions and recommendations

The worldwide trend of measuring progress beyond GDP gained momentum in the Netherlands as the concept *brede welvaart* which considers a variety of domains – health, environment, safety, etc. In 2022, a TrafficQuest Challenge explored the connection between *brede welvaart* and traffic management. It concluded that traffic management could have an impact on several aspects of *brede welvaart* and thus recommended *brede welvaart* to be more incorporated in the processes around traffic management. The current TrafficQuest Challenge built on that recommendation by exploring how *brede welvaart* could be incorporated in business cases for traffic management by moving towards value cases.

Value cases were found to differ from business cases in three distinct ways:

- Where business cases mainly include monetary aspects, value cases include **monetary, quantitative** and **qualitative aspects**.
- Where business cases focus mainly on financial aspects (profit), value cases focus on **People, Planet** *and* **Profit.**
- Where business cases focus on the long-term mainly from financial and individual (RWS) perspective, value cases focus on the **short, medium** and **long-term** for both the individual perspective as system and the **societal perspective**.

This research first explored the current state of traffic management business cases – from guidelines to examples and practical experiences. Secondly, the potential for moving to values cases was explored by analysing the operationalisation of *brede welvaart* in traffic management and by conducting an expert workshop on challenges and opportunities for value cases in traffic management.

5.1 Current state of traffic management business cases

Current guidelines for business cases at RWS allow some space for non-financial considerations, but the emphasis remains on financial aspects. This is reflected in the minor role for *People* and *Planet* in the business case report. Compared to the international *Five Case Model*, the RWS guidelines give the non-financial sections less prominence but provide more flexibility in terms of which impacts to include and how to assess them – including qualitative methods. The *Five Case Model* is more prescriptive and focuses on quantification and monetisation whenever possible.

The limited role of *People* and *Planet* is also found in Dutch traffic management business cases, where a keyword analysis showed limited attention for *brede welvaart* aspects in the analysed examples. International examples showed some more attention for these aspects. However, these more elaborate business cases could partly be explained by the fact that they were often developed for larger and more infrastructure-focused projects. The interviewed experts confirmed that traffic management projects are sometimes difficult to relate to broad, societal impacts and that it

is easier to link projects to non-financial impacts on organisational level, such as maintainability. They argued for fit-for-purpose business cases that are proportional to the project scale.

Interviews revealed two gaps in current business cases. Firstly, there is a gap between the freedom that the guidelines at RWS offer for including non-financial considerations and the expectations from the internal client of the business case. The official requests for business cases often focus on the financial aspects, which makes the space the guidelines give for non-financial considerations less relevant. The second gap occurs when the non-financial section is used for addressing elements of a value case, such as *People* and *Planet* impacts. The question then is whether these considerations actually play a role in the decision-making process. Both gaps concern the culture of attention for and prioritisation of *brede welvaart* within the organisation – at leadership and decision-making level, and at the level where business cases are being developed. Developers of business cases can influence how non-financial considerations are presented in the business cases, but real change requires support from decision-makers.

5.2 Potential of value cases for traffic management

Brede welvaart has seen widespread adoption in Dutch policymaking, but its implementation in operational traffic management context is more limited. Recent advancements such as the Multimodal Network Framework (*Multimodaal netwerkkader)* (Ashari, *et al.*, 2022; CROW, 2025) or the *Denkkader Brede Welvaart* (Gorter & De Ridder, 2022) contribute to structuring the approach of integrating *brede welvaart* in traffic management. However, a gap remains for a structured framework for linking traffic management with *brede welvaart* aspects. Limited data availability for quantifying impacts also plays a role in this limited uptake of *brede welvaart* in traffic management.

The potential for linking traffic management to brede welvaart impacts is recognised by experts at RWS and TNO. In a workshop, they identified potential impacts of implementing ramp metering at an on-ramp in an urban area. Most impacts occurred on societal level and linked to the living environment domain, followed by accessibility, safety and health. Topics such as noise and air pollution (and their link to health of local residents) were mentioned most often. Opportunities for quantification of these impacts ranged from qualitative to monetised, and various impacts were identified to affect different groups – showing the potential of considering distribution effects for traffic management.

By transitioning to the broader focus of value cases for traffic management, these societal level impacts can be taken into account. A value case focusing on *People, Planet and Profit* impacts, combined with the distribution effects of these impacts, allows for the communication of the full story of a project's impact – including impacts that are difficult to quantify. This can provide decision-makers with more information about positive or negative impacts and more insights in distribution effects – all of which could have remained hidden with a financially-focused business case.

5.3 Recommendations for implementation of value cases

Transitioning to using value cases for traffic management and integrating *brede welvaart* in decision-making does come with some challenges. Combined insights from the interviews, workshop, and the state of the art of *brede welvaart* in traffic management result in three main recommendations.

Recommendation 1: Enhance a culture of value cases and *brede welvaart* within RWS
This TrafficQuest challenge showed that the attention for *brede welvaart* impacts of traffic management is present among different individuals within the organisation, but it is not yet firmly embedded in decision-making and the way of working with value cases. A culture should be created in which decision-makers consider impacts related to *People, Planet and Profit*-topics and their distribution effects on the short, medium and long term, seen from different stakeholder perspectives. This will result in decision-makers commissioning value cases instead of business cases and taking into account monetary, quantitative and qualitative impacts.

A similar culture shift will have to occur among the people who develop the value cases. They will need to get accustomed to assessing and communicating *People, Planet and Profit* impacts of their work. This requires the development of relevant skills and enhanced collaboration between departments to gather required value case expertise or domain expertise on specific impacts. All these recommendations are under the condition that the shift from business cases to value cases is also reflected in the available budgets for developing the value cases and any required skills.

Recommendation 2: Advance research on indicators, models, and appraisal methods
While value cases allow for qualitative impacts to be included, experts did argue that it is easier to compare projects and alternatives based on monetary and quantitative factors. Whenever possible, the appraisal should therefore be at least quantified and potentially monetized. This requires a continuation and potentially an intensification of the research into indicators that capture different *brede welvaart* impacts – also including sometimes subjective social aspects. Not only should these indicators be developed, the knowledge on how to apply them should also be safeguarded in the organization. This might require additional model developments to accurately estimate and quantify impacts of projects on specific indicators.

Value cases will contain a variety of indicators on impacts that cannot always be easily compared. Therefore, we recommend investigating methods of balancing indicators to support decision-making with insights into trade-offs between different indicators. Validated methods for comparing different impacts can help to prevent biases in decision-making. For this, it is also important to investigate which values of a specific indicator should be considered (un)acceptable or a target value. Safeguarding attention to distribution effects is a critical condition of these methods.

Recommendation 3: Develop a structured guideline for value cases

A transition to value cases will give more emphasis to non-financial considerations, which should be reflected in the guidelines. These new guidelines should provide more detail on which impacts need to be assessed – e.g. the assessed impacts should cover all *People, Planet, Profit* aspects – to limit the risk of biases in value cases. This can involve a selection method that involves various stakeholders and/or bases the required impact assessments based on the type of project.

Also, the presentation of these different impacts in the value case report and the way attention should be given to monetary, quantitative and qualitative impacts should be addressed such that they can all be considered in decision-making. In support of transparent decision-making based on a broader set of impacts and distribution effects, guidelines will also need to address how to assess these value cases. The guidelines for SCBAs (Modijefsky et al., 20224) can be used as inspiration for some of these analyses without necessarily making the value case guidelines as extensive as the SCBA guidelines (it can also be limited to exploring impact pathways or causal diagrams). Implementing the value case guidelines will benefit from synergy with the recommendations above through enhanced awareness for value cases, increased collaboration of traffic management departments with economic departments with value case expertise, and advancements in research on the required indicators, models and methodologies.

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Appendix A: Detailed results of keywords analyses

In order to evaluate how *brede welvaart* is currently being considered in Dutch and international examples of business cases, a layered approach was defined:

- **Step 1: overview of *brede welvaart* in business cases.** In this initial, a list of keywords (in Dutch and in English) commonly associated with *brede welvaart* was developed. Then, a set of six examples of business case (or value) case were investigated in order to see how often these keywords appeared in these documents. Three Dutch examples of business cases (or value cases) were analysed, and three international examples of business cases were also analysed.

  The Dutch documents analysed were "Business case automatisch rijdend openbaar vervoer - Actualisatie van de investeringen en besparingen van automatisch rijdende bussen in het openbaar vervoer" (Van Baekel & Moesker, 2025), "VALUECASE IVRI (2025)" (Van Gent & Visscher, 2025), and "Businesscase vervangingsstrategie wegkantsystemen door iWKS (2018)" (Horstman & Price, 2018). All Dutch documents were made available by Rijkswaterstaat for analysis and used solely for this project.

  The internal examples of business cases analysed were "A417 Missing Link - Full Business Case (Department for Transport & National Highways, 2023)", "Sydney Metro City & Southwest Final Business Case Summary" (Sydney Metro, 2016), and "GO Expansion Business Case" (Metrolinx, 2018). All international examples were identified via desk research and are open to the public.

  The analyses of frequency in which each Dutch or English keyword appeared in the documents were performed with the support of TNO's M365 Copilot. Each list of keywords (see table A.1 below) was provided to an individual Copilot Notebook (one Copilot Notebook was created for each document analysed) with the request to count how many times each keyword for the corresponding keyword lists appeared in each document as well as the page numbers in which they occurred. The list with *brede welvaart* related keywords was derived based on content from TrafficQuest (Ashari et al., 2022), PBL (Snellen et al., 2021), CBS (CBS, 2023) and some other sources, such as the European Common Evaluation Methodology for CCAM (EU-CEM) (FAME et al., 2025).

Table A1. List of keywords in Dutch and English associated with Brede Welvaart used for analyses

***Brede welvaart*–associated keywords (Dutch)**	***Brede welvaart*–associated keywords (English)**
'Brede welvaart' ; 'Welzijn' ; 'Kwaliteit van leven' ; 'Toegang tot voorzieningen' ; 'Natuurlijke omgeving' ; 'Tevredenheid over het leven' ; 'Bereikbaarheid' ; 'Toegankelijkheid' ; 'Veiligheid' ; 'Gezondheid' ; 'Leefomgeving' ; 'Maatschappelijke impact' ; 'Maatschappelijke gevolgen' ; 'Sociale impact' ; 'Sociale gevolgen' ; 'Ruimtelijke kwaliteit' ; 'Milieuvervuiling' ; 'Geluidsoverlast' ; 'Ruimtegebruik' ; 'Duurzaamheid' ; 'Tevredenheid met het leven' ; 'Ervaren regie over het eigen leven' ; 'Levensverwachting' ; 'Sociale cohesie' ; 'Sociale contacten' ; 'Leefbaarheid' ; 'Gelijkheid' ; 'Billijkheid' ; 'Rechtvaardigheid' ; 'Verdelingseffecten' ; 'Luchtkwaliteit' ; 'Maatschappelijke Baten' ; 'Omgevingshinder'	*'Prosperity' ; 'Well-being' ; 'Wellbeing' ; 'Quality of life' ; 'Access to facilities' ; 'Natural environment' ; 'Satisfaction with life' ; 'Accessibility' ; 'Availability' ; 'Safety' ; 'Health' ; 'Living environment' ; 'social impact' ; 'social impacts' ; 'Spatial quality' ; 'Environmental pollution' ; 'Noise' ; 'Use of space' ; 'Sustainability' ; 'Life satisfaction' ; 'Perceived control over one's own life' ; 'Life expectancy' ; 'Social cohesion' ; 'Social contacts' ; 'Liveability' ; 'Equality' ; 'Equity' ; 'Justice' ; 'Distribution effects' ; 'Distribution impacts' ; 'Distributional effects' ; 'Distributional impacts' ; 'Air quality'*

- **Step 2: in-depth analysis of *brede welvaart* keywords mentioned.** In this second stage, for every document and keyword identified, an analysis was performed in order to investigate the context in which each keyword was mentioned in the documents (e.g., were the keywords mentioned associated with results of analysis, desired target levels, indicators and similar or were they mentioned in a more generic way in the report?).

The results of the above-mentioned steps are presented in section 3.2.

Table A2. Full results of brede welvaart keywords identified in Business Case A417 Missing Link – Full Business Case (UK, November 2022). Page numbers in these tables may not exactly correspond to those in the business case document due to variations in formatting, such as the use of Roman numerals (I, II, III, IV…) for initial pages followed by Arabic numerals (1, 2, 3, 4…).

Keyword	Total Mentions	Pages Mentioned
Noise	61	7 (2), 10, 11, 12 (2), 40, 47, 53, 57, 58, 61 (2), 65, 66 (4), 67, 68, 71, 72, 74, 77, 79, 94, 95, 97 (17), 99, 104, 105, 106 (9), 110 (2), 113, 145, 158
Air quality	41	7 (2), 11, 12 (2), 29, 40, 47, 52 (2), 53 (4), 54 (2), 61, 67, 68, 72, 74, 77, 79, 95 (2), 96 (4), 97 (2), 106 (2), 110 (2), 145, 156
Safety	33	8, 31, 32 (3), 47 (2), 54, 55 (2), 60 (3), 64 (4), 66 (2), 67, 70 (2), 88, 90 (2), 103 (2), 116, 126, 138, 148, 154 (2)
Natural environment	20	10, 22 (2), 43 (2), 55 (2), 56 (2), 60, 65, 68, 75, 96, 97 (3), 102 (2), 103
Health	17	9, 10 (2), 21, 41, 59, 61, 64, 65 (2), 70 (2), 116, 126, 148, 149, 154
Accessibility	15	10, 13, 48, 55, 61, 65, 103, 104 (5), 107 (3)
Equality	15	15 (2), 71, 104, 120 (2), 127, 144 (6), 157 (2)
social impacts	11	2, 5, 11, 13, 74 (2), 103 (2), 113, 114, 149
Quality of life	10	9, 10, 21, 22, 37, 59, 61, 65, 74, 149
Wellbeing	7	6, 10, 32, 41, 56, 65, 75
Sustainability	7	15, 37, 120 (2), 127, 147, 152
Distributional impacts	6	2, 5, 104 (2), 106, 156
Availability	5	103, 116 (2), 121, 125
Prosperity	4	22, 56, 61 (2)
social impact	2	74, 113
Well-being; Access to facilities; Satisfaction with life; Living environment; Spatial quality; Environmental pollution; Use of space; Life satisfaction; Perceived control over one's own life; Life expectancy; Social cohesion; Social contacts; Liveability; Equity; Justice; Distribution effects; Distribution impacts; Distributional effects	0	

Table A3. Full results of brede welvaart keywords identified in Business Case Sydney Metro City & South-west Final Business Case Summary (Sydney Metro, 2016).

Keyword	Total Mentions	Pages Mentioned
Safety	36	12 (3), 23 (2), 26, 51, 53 (3), 54 (7), 57 (2), 61 (3), 66, 67 (3), 68 (4), 71 (3), 72 (2), 100
Sustainability	18	2, 21, 22 (2), 23 (2), 31, 54 (4), 57, 73, 75, 100 (4)
Liveability	15	19 (2), 21 (2), 22 (2), 23 (2), 31 (2), 33 (2), 35, 41, 88
Accessibility	12	54, 60 (3), 70, 71, 74 (2), 88 (4)
Health	8	10, 31, 53, 57, 73 (2), 75, 100
Equity	5	23, 36, 57, 75, 77
Noise	3	54, 71, 72
Prosperity	1	32
Quality of life	1	23
Availability	1	86
Well-being; Wellbeing; Access to facilities; Natural environment; Satisfaction with life; Living environment; social impact; social impacts; Spatial quality; Environmental pollution; Use of space; Life satisfaction; Perceived control over one's own life; Life expectancy; Social cohesion; Social contacts; Equality; Justice; Distribution effects; Distribution impacts; Distributional effects; Distributional impacts; Air quality	0	N/A

Table A4. Full results of brede welvaart keywords identified in Business Case GO Expansion Business Case (Metrolinx, 2018).

Keyword	Total Mentions	Pages Mentioned
Quality of life	44	4, 11 (2), 15, 23 (4), 26, 32, 33 (2), 38 (2), 45, 46, 47 (5), 49, 56, 67 (2), 71 (2), 72, 108 (3), 119 (5), 135 (4), 140, 189, 190 (2)
Health	39	12, 18, 23, 24, 26, 27 (3), 33 (2), 38, 47, 49, 72 (2), 108, 109, 121 (2), 133 (3), 135, 136, 137, 141, 148 (3), 149 (5), 151, 154, 190 (2), 193
Prosperity	35	4, 7, 11, 16, 23 (2), 24, 26, 33, 38 (2), 45, 47 (2), 49, 52, 67, 69, 71, 72, 108 (3), 123 (2), 126, 130, 135, 136, 138, 140 (2), 150 (2), 190
Accessibility	26	9, 11 (2), 16, 17, 46, 55, 56, 65, 71, 99 (2), 100, 103 (5), 105, 108 (3), 120, 138, 147, 193
Safety	26	12, 27 (2), 47, 76, 77, 98, 99 (2), 117, 121 (2), 140, 148, 149 (2), 151, 154, 177, 181 (2), 184 (3), 185, 193
Noise	8	99, 156 (4), 186 (3)
Sustainability	8	47 (2), 49, 68, 71, 132, 135, 140
Availability	6	55 (3), 71 (2), 172
Well-being	1	148
Air quality	1	68
Wellbeing; Access to facilities; Natural environment; Satisfaction with life; Living environment; social impact; social impacts; Spatial quality; Environmental pollution; Use of space; Life satisfaction; Perceived control over one's own life; Life expectancy; Social cohesion; Social contacts; Liveability; Equality; Equity; Justice; Distribution effects; Distribution impacts; Distributional effects; Distributional impacts	0	N/A

Table A5. Full results of brede welvaart keywords identified in Business Case Automatisch Rijdend Openbaar Vervoer (Van Baekel & Moesker, 2025).

Keyword	Total Mentions	Pages Mentioned
Veiligheid (Safety)	2	5, 30
Brede welvaart; Welzijn; Kwaliteit van leven; Toegang tot voorzieningen; Natuurlijke omgeving; Tevredenheid over het leven; Bereikbaarheid; Toegankelijkheid; Gezondheid; Leefomgeving; Maatschappelijke impact; Maatschappelijke gevolgen; Sociale impact; Sociale gevolgen; Ruimtelijke kwaliteit; Milieuvervuiling; Geluidsoverlast; Ruimtegebruik; Duurzaamheid; Tevredenheid met het leven; Ervaren regie over het eigen leven; Levensverwachting; Sociale cohesie; Sociale contacten; Leefbaarheid; Gelijkheid; Billijkheid; Rechtvaardigheid; Verdelingseffecten; Luchtkwaliteit; Maatschappelijke Baten; Omgevingshinder	0	N/A

Table A6. Full results of brede welvaart keywords identified in report Businesscase vervangingsstrategie wegkantsystemen door iWKS (Horstman & Price, 2018).

Keyword	Total Mentions	Pages Mentioned
Veiligheid (Safety)	5	13, 14, 22, 24, 26
Maatschappelijke Baten (Societal benefits)	5	15, 25 (2), 26, 27
Duurzaamheid (Sustainability)	4	25 (2), 26 (2)
Gezondheid (Health)	2	24, 26
Omgevingshinder (Environmental pollution)	2	24, 27
Brede welvaart; Welzijn; Kwaliteit van leven; Toegang tot voorzieningen; Natuurlijke omgeving; Tevredenheid over het leven; Bereikbaarheid; Toegankelijkheid; Leefomgeving; Maatschappelijke impact; Maatschappelijke gevolgen; Sociale impact; Sociale gevolgen; Ruimtelijke kwaliteit; Milieuvervuiling; Geluidsoverlast; Ruimtegebruik; Tevredenheid met het leven; Ervaren regie over het eigen leven; Levensverwachting; Sociale cohesie; Sociale contacten; Leefbaarheid; Gelijkheid; Billijkheid; Rechtvaardigheid; Verdelingseffecten; Luchtkwaliteit	0	N/A

Table A7. Full results of brede welvaart keywords identified in report Valuecase iVRI (Van Gent & Visscher, 2025).

Keyword	Total Mentions	Pages Mentioned
Geluidsoverlast (Noise annoyance)	12	5, 19, 21 (2), 23, 25 (3), 33, 38, 40, 45
Maatschappelijke Baten (Societal benefits)	10	5, 6, 7, 32 (2), 33, 42 (2), 45 (2)
Luchtkwaliteit (Air quality)	9	14, 25 (2), 29, 31 (3), 32, 38
Leefbaarheid (Liveability)	4	38 (4)
(Verkeers)veiligheid ((Traffic) safety)	32*	(Verkeers)veiligheid
Bereikbaarheid (Accessibility)	2	33, 38
Toegankelijkheid (Accessibility)	1	10
Brede welvaart; Welzijn; Kwaliteit van leven; Toegang tot voorzieningen; Natuurlijke omgeving; Tevredenheid over het leven; Gezondheid; Leefomgeving; Maatschappelijke impact; Maatschappelijke gevolgen; Sociale impact; Sociale gevolgen; Ruimtelijke kwaliteit; Milieuvervuiling; Ruimtegebruik; Duurzaamheid; Tevredenheid met het leven; Ervaren regie over het eigen leven; Levensverwachting; Sociale cohesie; Sociale contacten; Gelijkheid; Billijkheid; Rechtvaardigheid; Verdelingseffecten; Omgevingshinder	0	N/A

*The keyword 'veiligheid' (safety) only occurred 3 times in the document. However, 'verkeersveiligheid' (traffic safety) occurred another 29 times. Because traffic safety is also relevant for *brede welvaart*, these hits were also included in the table.

Appendix B: Workshop results (Activity 1: identification of brede welvaart impacts)

Brede welvaart domain	Impact	Positive/Negative	How does this impact occur? Who notices it?	To what extent can this impact be quantified or monetised?
Others	Asphalt of onramp	Negative	Damage due to accelerating trucks, effects are notices by RWS	Costs of maintenance
Others	Congestion	Negative	Congestion flows over to the neighbourhood? Cars that are not from the neighbourhood. Direct neighbourhood receives negative impact	
Living environment	Air pollution	?		
Others	People cannot leave area because of congestion on ramp	Negative	Inhabitants. People more stressed, late to work	
Health	Health of surrounding residents	Negative	Noise nuisance, emissions	?
Accessibility	crossability/Ease of crossing	Negative	Backed-up traffic on underlying road network	No
Living environment	Noise pollution	?	accelerating cars	
Living environment	Air pollution	Negative	Local residents, due to more cars waiting	Can be quantified by models, difficult to monetise

Brede welvaart domain	Impact	Positive/Negative	How does this impact occur? Who notices it?	To what extent can this impact be quantified or monetised?
Accessibility	Local accessibility	Negative	Local residents due to spillback	Models for impacts, VoT for monetary value
Accessibility	crossability/Ease of crossing	Negative	More cars in queue on underlying roads	Not sure
Others	Travel time loss for people using the on-ramp	Negative		Can be quantified
Safety	Traffic safety	Negative (?)	road user near on-ramp	
Living environment	Air pollution	Negative	Inhabitants Cars are waiting while running engines are on, close to houses	Measuring pollution
Living environment	Living environment (emissions)	Negative	Traffic jam is replaced in surrounding areas (lower-level network)	
Accessibility	Accessibility/intercity travel time	Positive	Commuter due to less traffic jams	Models for impacts, VoT for monetary value
Others	Travel time underlying road network	Negative	Road users	Value of Time
Others	Maybe blocking back effects	Negative (?)	People using the streets around the on-ramp leading to	Can be observed/simulated
Others	Quality of life	Negative (?)	More cars in queue on underlying roads	Difficult
Others	WOZ value	Negative (?)	Due to the crowds around houses, are values going down?	?
Others	travel time	Positive	less congestion in road lane	

Brede welvaart domain	Impact	Positive/Negative	How does this impact occur? Who notices it?	To what extent can this impact be quantified or monetised?
Living environment	Living environment (noise)	Negative	Traffic jam is replaced in surrounding areas (lower-level network)	
Safety	Vkveil - Traffic Safety	Positive	Metered, calm traffic flow	+
Accessibility	experience/comfort/expectation	Positive		
Living environment	Noise pollution	Negative	Local residents, due to more cars waiting	Can be quantified by models, difficult to monetise
Living environment	Noise pollution	Negative	Inhabitants Cars are waiting while running engines are on, close to houses	Measuring decibel
Safety	Safety	Positive	More control over number of cars on road reduces congestion etc	
Accessibility	Accessibility	Positive	Traffic flow improves, faster at location (car drivers)	Travel time reduction / Value of Time
Living environment	Noise	Negative (can also be positive)	More impatient drivers honking at traffic light on ramp due to queues forming (affects more who lives around)	Db (?)
Living environment	Environment	Positive	Citizens Less pollution	Health? Emissions?
Health	Health impact	Negative	Inhabitants Physical health decreases as a result of pollution. Mental health decreases as a result of noise	

Brede welvaart domain	Impact	Positive/Negative	How does this impact occur? Who notices it?	To what extent can this impact be quantified or monetised?
Others	Travel time gain for mainline	Positive		
Others	Travel time HWN (highway network)	Positive	Road users	Value of Time
Safety	Safety	Positive	Less accidents on ramp	# Accidents; # injured people
Living environment	Emissions	Positive (can also be negative)	Improved traffic flow leads to reduced "accelerating and braking" behaviour	CO2 * With more Evs we have less pollution as well
Living environment	Environmental effects	Positive/Negative	Local residents	Noise and emission factors
Others	Congestion	Positive/Negative	Congestion moves from road to ramp (positive for road, negative for ramp) Congested traffic gives more CO2/PM -> localized Noise probably lower on the ramp and higher on road	Reachability can be quantified/monetised
Others	Government image/trust	Positive/Negative	"Expensive thing", "only turned on during rush hour"	
Living environment	Less pollution from highway, more pollution from on-ramp	Positive/Negative	Inhabitants of neighbourhood close to ramp	Can be quantified
Living environment	Noise	Positive/Negative		
Safety	Accidents	Positive (can also be negative)	Improved traffic flow with less cars "suddenly merging" can reduce accidents (but	# accidents/year

Brede welvaart domain	Impact	Positive/Negative	How does this impact occur? Who notices it?	To what extent can this impact be quantified or monetised?
			minor accidents due to "careless drivers" approaching on-ramp metering traffic light can increase)	
Accessibility	(experienced) accessibility	Positive	Congestion reduces, so accessibility increases	Can be monetized
Health	Health impact	Positive/Negative	Affected by impacts on noise and emissions	What is the effect on various populations groups?
Safety	Safety	Positive/Negative	Less turbulence (positive) More traffic at end of queue (negative) Road users perceive this	Number of accidents
Accessibility	Accessibility/intercity travel time	Positive (can also be negative)	Improved traffic flow, reduced travel time (everyone using ramp)	Can be quantified by throughput rate, average travel time (can be monetised based on VoT estimates)
Others	Throughput	Positive/Negative	Road users. Positive impact on highway Positive/Negative impact on urban roads	Measuring speed/volumes
Accessibility	Easier merging (comfort)			
Living environment	Vibrations			

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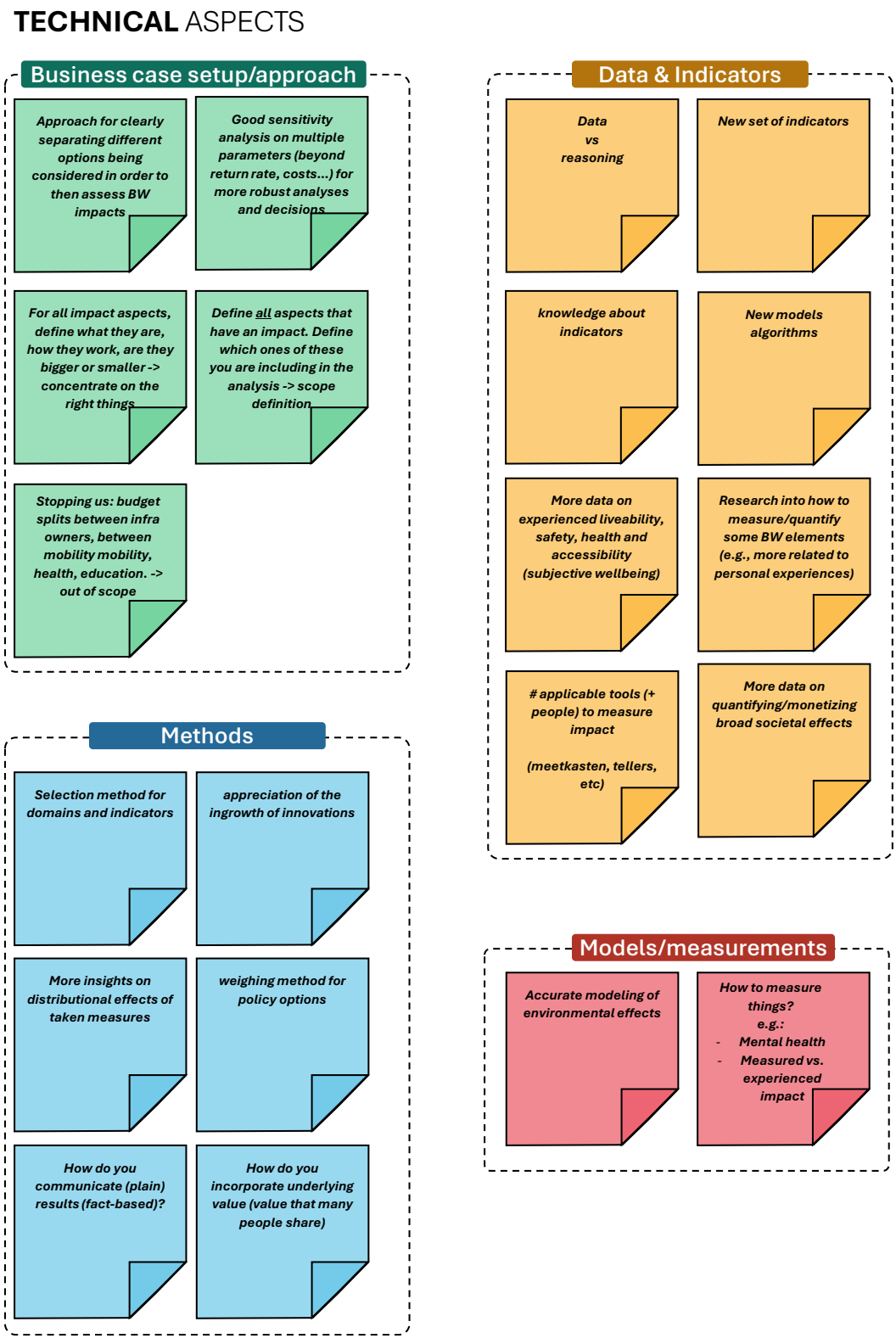
Appendix C: Workshop results (Activity 2: barriers for brede welvaart in business case)



ORGANISATIONAL ASPECTS