Creating Futures

Informing decision-making through deliberative approaches: A procedural guideline

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Product information
WISE (Waikato Integrated Scenarios Explorer) is an Integrated Spatial Decision Support System (ISDSS) designed especially for the Creating Futures project funded by the New Zealand Foundation for Research, Science and Technology (FRST). WISE has been developed for the Waikato region to support Environment Waikato's long term integrated spatial planning and decision-making. Information about the 'Creating Futures' project is available on the Internet, including an electronic copy of this report: http://www.creatingfutures.org.nz.

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Liz Wedderburn and Steven Kelly

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• Context

This report documents and reflects on a series of workshops held with representatives of organisations involved in the Future Proof project, which had as its aim the development of an integrated growth strategy for the Waikato region. The project brought together Hamilton City Council, Waipa District Council, Waikato District Council and Environment Waikato, as well as partner agencies Matamata-Piako District Council (Morrinsville), the New Zealand Transport Agency and tangata whenua. To this end, the Future Proof project drew up three individual growth scenarios for which public feedback was sought. These scenarios presented different possible futures for rural and urban land use, natural and cultural resource management, and resource and infrastructure management.

Representatives of the organisations who took part in the Future Proof program committed to a series of workshops with the Creating Futures research team, with the aim of testing a deliberation approach in the context of decision-making at the local and regional scales.

• Purpose

For the Future Proof participants, the workshop was designed to help them:

1. Deliberate the impact of the Future Proof scenarios across a wide range of values.
2. To use WISE to inform the deliberation of these values.

In the context of the Creating Futures project, the purpose of the Future Proof project was two-fold. As a first step, it reflects on the deliberation process as deployed in a series of workshops undertaken by the project team with representatives of organisations involved in the Future Proof program. As a second step, these reflections are used to develop a set of principles for the use of an integrated deliberation process in the decision-making context.

• The Deliberation Process

The deliberation process employed was designed by Martin O'Connor of the Université de Versailles. The process involves six stages:

1. Identify the problem

- What is the problem, at what scale does it occur, who is it a problem for, why is it a problem?

2. Organise the problem

- What are the options/strategies to address the problem, who are the stakeholders/actors in regards to the problem and the strategies, what are the value issues involved (the criteria by which problem and strategy are evaluated)?

3. Identify and mobilise tools for representation (e.g. maps, models of processes and systems)

4. Deliberate the consequences of the proposed strategy with regard to the identified stakeholders and the identified value criteria.

5. The preparation, validation and communication of the results and recommendations.

6. Return to step one (the deliberation process is iterative).

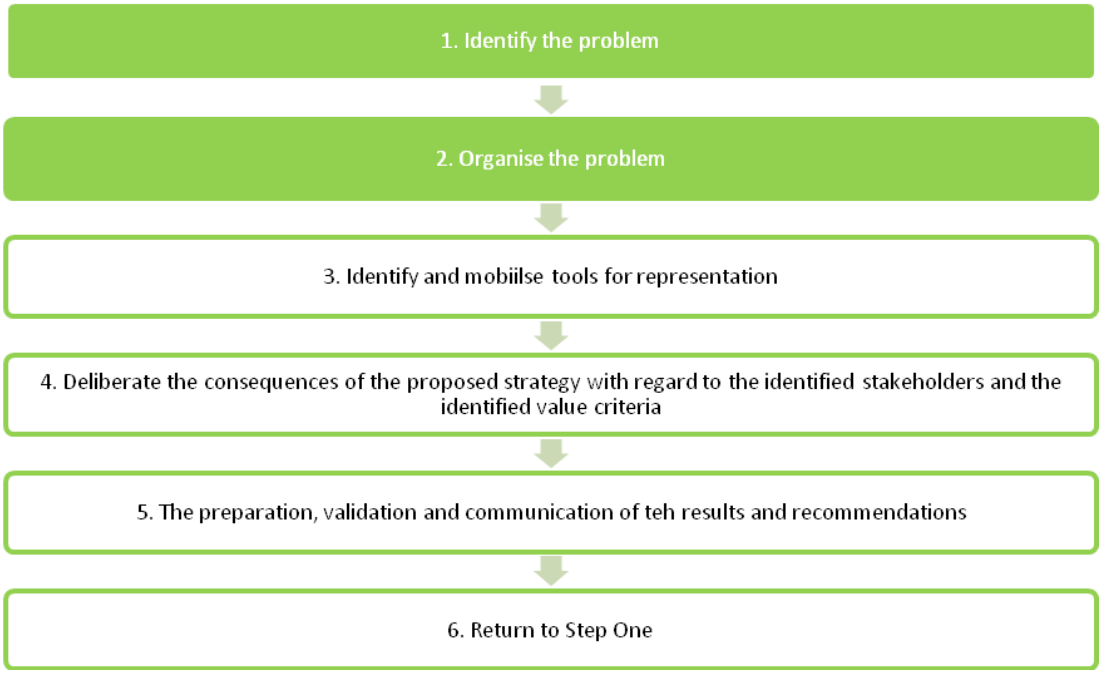
The following sections explore how this process was deployed in the specific context of decision-making within the planning processes of individual organisations.

• The Workshop Process

Prior to the official series of workshops which employed the deliberation process, a series of workshops were carried out with the Future Proof team to introduce them to both the deliberation process and the WISE model. These workshops resulted in a commitment by the organisations involved in Future Proof to participate in a series of three workshops. These three workshops often covered a number of the steps outlined in O'Connor's deliberation process presented above in a single workshop. The workshops were held over a period of four months and each lasted for a period of between three and four hours.

• Workshop One

The first workshop covered Steps One and Two of the deliberation process outlined above. Participants were asked to identify a key issue which they wanted to explore through the use of the deliberation matrix process and WISE.



Three organisations identified three separate, though inter-related issues:

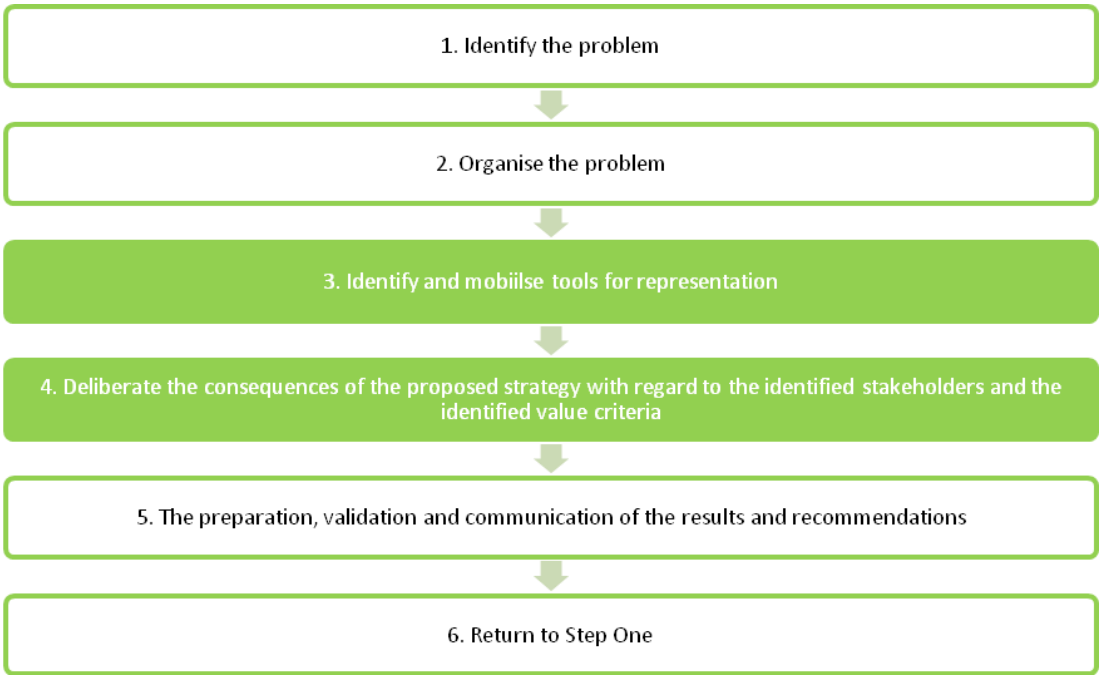
1. What are the likely effects of strong controls over Rural-Residential subdivision? (versus no control)
2. Rural subdivision
3. Provision of transport infrastructure and services
    a. What are the costs of transport infrastructure/ services
    b. Time/distance spent commuting
    c. Accessibility (to service and amenities)
    d. Mode of transport –what choices do people have?

Participants were then asked to identify what values they would use to measure the impacts of the issues identified. These were worked into Deliberation Matrices following the workshop to demonstrate how they might be conceptualised (see Appendix 1). These measures were then used to inform a series of possible questions which could be asked of the WISE model.

After each stakeholder group had identified its issue, questions for WISE and values these were shared with the wider group and a conversation arose from the organising of the Deliberation Matrix and what WISE could provide to populate the values. Of the key issues raised through this process, one dealt with understanding the assumptions behind the WISE model and two addressed the difficulty in accurately defining the specific issues being considered.

- **Workshop Two**

The second workshop covered Step Three of the deliberation process and began to develop the deliberation which makes up Step Four of the process.



As a first step, participants were asked to organise their issue using a deliberation template (see Appendix 2). This process has a total of 6 steps:

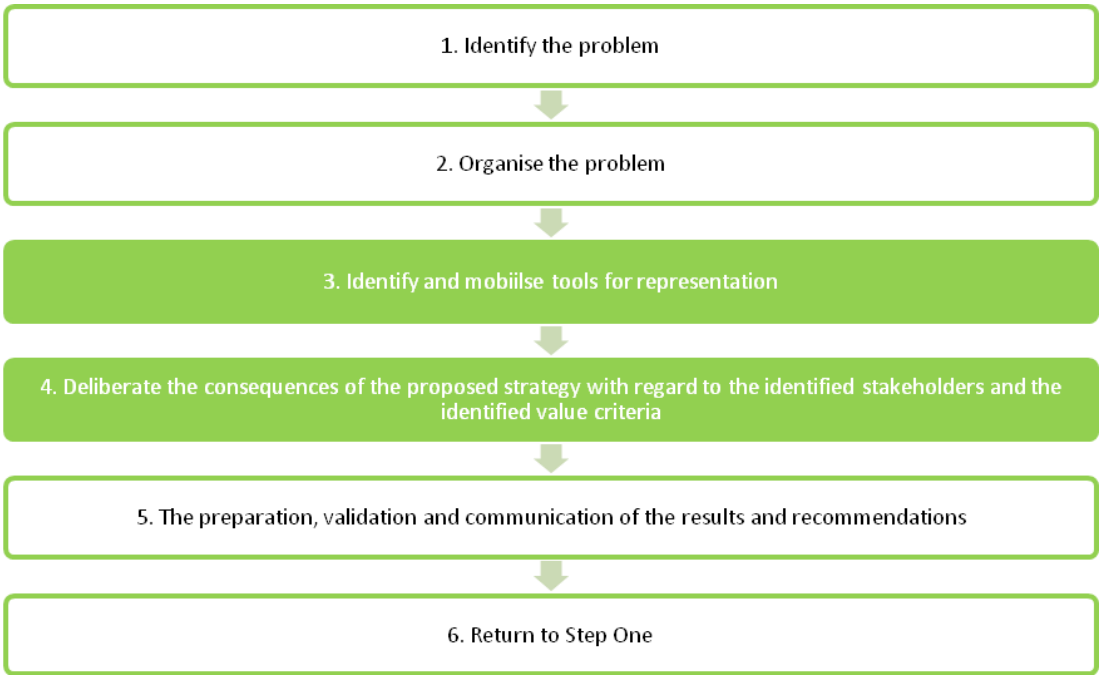
1. Assign weights to each of the categories, expressed as a percentage
    a. Environment
    b. Social
    c. Cultural
    d. Economy/Economic Activity
2. For each category, discuss what things you value that potentially could be affected by the intervention – complete the 'value' columns
3. Discuss the relative importance your group places on each of the values. Assign each value a weighting expressed as a percentage.
4. For each value you have assigned a weighting, what indicators could be used to fully describe the impact of the intervention on that value – complete the 'indicators' columns
5. Decide the level of satisfaction attained as a result of the intervention with regard to each indicator and allocate these a colour (red = decline in satisfaction; yellow = no change; green = improvement; blue = don't know).

6. Finally, give a final assessment regarding what your group considers the overall impact of the intervention on each value – use the same colour codes as above.

Having completed this process, the group was introduced to the ways in which WISE might contribute to populating the matrix. In the period following this second workshop, participants were asked to continue the conversation with the WISE modeller as to what type of information they would hope to receive from the model.

- **Workshop Three**

The final workshop again covered Steps 3 and 4 of the Deliberation process. The focus here, however, was on Step 3 as the WISE model was used to inform the decision-making process.



Participants were first presented with the deliberation matrices which they had completed in the previous workshop and asked to refresh their memories of how these had been constructed. These had been transferred from the templates into excel spreadsheets (see Appendix 3).

A combination of time constraints and a realisation that there was considerable cross-over in the issues raised by two of the participant organisations meant that this analysis was largely based on the issue identified by Hamilton City Council: rural subdivision. Participants were then taken through a process for working through the tools available through the WISE model to understand the impact of the two scenarios which had been identified: tight control of rural subdivision, no control of rural subdivision measured against the status quo. This process, presented by an Environment Waikato WISE technician, originally involved ten steps. Following the workshop, and drawing on

feedback presented in Section 5.2.2, several additional steps were added to this process. These steps aim to improve the robustness of both the interface between modeller and planner and the results of the model itself. At this stage, this process (presented as Appendix 4) should only be considered a possible guide until further testing and refinement has been undertaken.

Having worked through the possibilities of WISE in relation to populating a deliberation framework, participants were asked to reflect on whether this process had impacted on their assessment of how an intervention would affect their indicators.

• Key Learnings

Having completed the deliberation process through the three workshops, participants were asked to reflect on the process, In particular, participants were asked in what ways the deliberation process and the use of the WISE model could be used within their current work, and in what ways it could be improved. Several themes emerged from these discussions, covering procedural/operational aspects, questions around confidence in the model and its underlying assumptions, possibilities for developing the process and the model as a decision-making tool.

• Procedural Issues

• Workshop timing

There was a variety of opinions on the timing of and between the three workshops. While some participants bemoaned how difficult it was to get back into the process, one participant suggested it was difficult, when not involved in the process day to day, it was easy to get lost. However, another participant highlighted how important some of the time was both for allowing the researchers to work up the deliberation process, but also providing time for the participants to reflect on the issue they are deliberating.

• Understanding the process

There was a general perception that the relationship between the deliberation process and the model was not clear. Conversation around the process often turned to a discussion of the model as a standalone tool, rather than as part of a deliberation process which allows participants to evaluate the impact of different interventions or scenarios.

- **Issues around the WISE model**

    - **User interface**

Respondents were unanimous in suggesting that at the current stage of their involvement with WISE, they were not comfortable with the tool as something they could use themselves. Rather, it was seen as a tool which they would like to seek answers through for informing decision-making. It was also highlighted that the "user" interface was still relatively complex.

    - **User confidence – Dealing with uncertainty**

The WISE model produced some information which respondents felt was counter-intuitive to what they would have expected the outcome to be. This highlighted a certain level of confidence in the model among participants. Despite this, participants still saw value in being able to present different scenarios using a model which produced different outcomes.

- **Defining appropriate use**

    - **Consultation or thinking?**

Respondents believed that while the deliberation process provided an excellent framework for engaging stakeholders and assessing their values, the time required for such a process did not fit within their policy or decision making frameworks. As a result, participants believed that for them the value lay in organising their own thinking around policy making. This was also seen as beneficial in terms of informing the consultation they were able to achieve within their own processes.

    - **Decision-making relevance**

Several respondents suggested that the process could be improved by aligning it more closely with the policy making processes which already exist. In doing so, the process would become more relevant and there would be a greater possibility that it would be employed to test scenarios.

- **A guideline**

Taking into account the issues identified by participants, we are able to better tailor and extend O'Connor's deliberation process outlined above to the requirements of policy makers. Central to ensuring the utility of the deliberation framework is aligning it with the broader policy-making process. This will allow the deliberation approach to fulfil both a

consultative tool where necessary and an organisational tool for decision-makers. As it was used only in the latter sense in this series of workshops, the guideline presented below is designed specifically for this purpose, however, where applicable references to consultative processes are noted.

- **Step One**

    - **Defining the issue**

Allowing participants to define the issue can be time intensive but is vital to ensure the question is relevant and as specific as possible. Equally, defining key words and phrases used to define an issue needs to occur at the beginning of the process as they are used to ensure an ongoing understanding by all of frequently used phrases. All variables must be clearly defined and understood by the participants.

- **Step Two**

There are three parts to the second stage of the process: 1) Selection of value objects, 2) Creation of specific indicators for value objects, and 3) Evaluation of the status quo (present situation).

    - **Selection of value objects**

For planners and policy makers, the selection of value objects related to the specific issue they were attempting to assess (see Appendix 1). While in this particular case, the selection of value objects was determined largely by participants referring to their own expertise and experience, there is much scope to extend this process of defining value objects to the group scenario. Such a process is more time consuming but will go some way to ensuring that these value objects cover all appropriate values.

    - **Creation of specific indicators for value objects**

Again, individual participants decided on specific indicators that they will use to evaluate the present situation (and also the interventions introduced during Stage Three). In this case, indicators were again chosen from the expertise and experience of participants, however, under some circumstances this process can be particularly time consuming and difficult. Under those circumstances, we suggest that extensive, pre-determined list of indicators from which stakeholders can choose are made available. For example, some indicators for the value object water quality might be clarity, e-coli count and nutrient levels. Where possible these should be aligned with the capabilities of the modelling/mapping processes.

- **Evaluation of the status quo (present situation)**

Participants evaluate the present situation using their selected values and indicators. This information can be presented on the prepared assessment table – present situation (see Appendix 2). Coloured dots are used to indicate the stakeholder groups' perception of the given value/indicator set. In this case, we used green (good/better); red (bad/worse); blue (don't know); yellow (moderate/no big deal).Once completed, and where being used as a group exercise, each group can report their perspective to the wider group. The facilitator can then lead a group discussion to help the group make transparent the differences and/or similarities in their perspective.

- **Selecting appropriate interventions**

The consideration and selection of appropriate interventions or scenarios which would impact on the present situation should then be defined. Interventions or scenarios must be described in as much detail as possible to remove ambiguity and so the potential impact on the present situation can be assessed accurately.

- **Step Three**

Stage Three involves the mobilisation of models and/or mapping to demonstrate the impact of interventions on the value objects defined by participants. This process is outlined fully in Section 4.3, above.

- **Step Four**

Stage Four involves the deliberation of the chosen interventions. Each stakeholder group assesses each intervention (or suite of interventions) as to the impact it might have on the way in which they perceive the present situation. This is again achieved by using coloured dots – red for worsen; green for improve; blue for don't know, and; yellow for no change. The completed assessment tables can then be presented to the group and sufficient time should be made to allow groups to view the ways in which other groups assesses the interventions, to allow groups to report back their assessments, and to encourage dialogue between participants.

- **Adapting the process for the planning/policy interface.**

The above guideline may be supplemented by a reflection on how the specific issues identified in the Future Proof workshops might be addressed to improve the deliberation process.

Deliberation Step	Key Phases	Adapting to decision-making for policy processes
1. Identifying the problem	➢ What is the problem? ➢ At what scale does it occur? ➢ Who is it a problem for? ➢ Why is it a problem?	Inevitably problems in the policy realm are often defined by broader policy processes. Nonetheless, this first step remains important in this context, as it forces the policy-maker to engage with the process and compels them to organise their decision-making processes in a way which can then be deliberated effectively. In particular, this step forces policy-makers to accurately define the scale and extent of the problem as well as confirm what constitutes the core problem.
2. Organise the problem	➢ What are the options/strategies to address the problem? ➢ Who are the stakeholders/actors in regards to the problem and the strategies? ➢ What are the value issues involved (the criteria by which problem and strategy are evaluated)?	In the decision-making for policy context, the organisation of the problem is often based on the intuition of the planner. Selecting stakeholders in this context often becomes a process where the planner defines the stakeholder groups who may be impacted by the process, and then defines the values which will need to be assessed to take account of these values. However, attempting to reflect the values of multiple groups may lead to the identified values becoming generic to a “population” rather than specific (and comparable) to individual groups of stakeholders. It is important under these conditions to ensure that the definition of values to be assessed takes account of this and that where necessary the impacts of values on different stakeholders are assessed individually.
3. Identify and mobilise tools for representation	➢ Maps ➢ Models of processes and systems	As noted above, in the planning process, and particularly in the absence of any representative groups of stakeholders, much of the deliberation process will rely on the intuition of the planner themselves assessing the consequences of any proposed intervention. As a result, the deliberation process itself is ideally deployed with the outputs from any modelling or mapping undertaken. This will clarify that these outputs inform the deliberation process, rather than provide a separate representation of what may happen. The actual process of deploying mapping or modelling to inform this process must be open to questioning by the planner, and allow them to work on the outputs until they provide information which they feel is robust and relevant to the issue under consideration.
4. Deliberate the consequences of the proposed strategy	➢ Who are the stakeholders? ➢ What are the identified value criteria?	As mentioned in Step 2, it is essential that when deliberating the impact of any strategy, it is necessary to clearly define who will be affected and not allow the assessment to be generic to a population.
5. The preparation, validation and communication of the results and recommendations.		As in all the steps above, the process of communicating the results of the deliberation process must be integrated into the ways that the information will be used. At the planning-decision-making interface, this information must be presented in a way which allows those involved to feel confident in the way they use this information.
6. Return to step one (the deliberation process is iterative).		Within the policy-making environment, the reiteration of this process is likely to be tied to the continuing process of planning. It is important, therefore, for the process to be well-integrated with these broader processes. As highlighted in feedback from workshop participants,

Appendix 1: Deliberation Matrices developed for participants

Stakeholder: Waikato District Council

Issue: Rural Subdivision

- Land fragmentation around towns (prior to structure plans in place – urban limits)
- Loss of productive land
- Effects of concentration within urban limits
    - Provisions of requiring public transport
    - Provisions to allow high density housing
    - Infrastructure services- roading , 3 waters

Retaining remote rural populations

- Prevent loss of small rural villages e.g. Te akau, Te Mata, Glen afton
- Allow development around village centres e.g. schools, dairy, local pub

Make existing urban areas attractive

- Entice people to move into towns e.g. Ngarawahia, Huntly
    - Provide local employment
    - Traffic Bypasses- to remove heavy traffic
    - Allow industrial areas – for employment

Values:

Environmental:

- high quality soil
- flooding
- storm water flow
    - run off rates into streams
- water quality

Social:

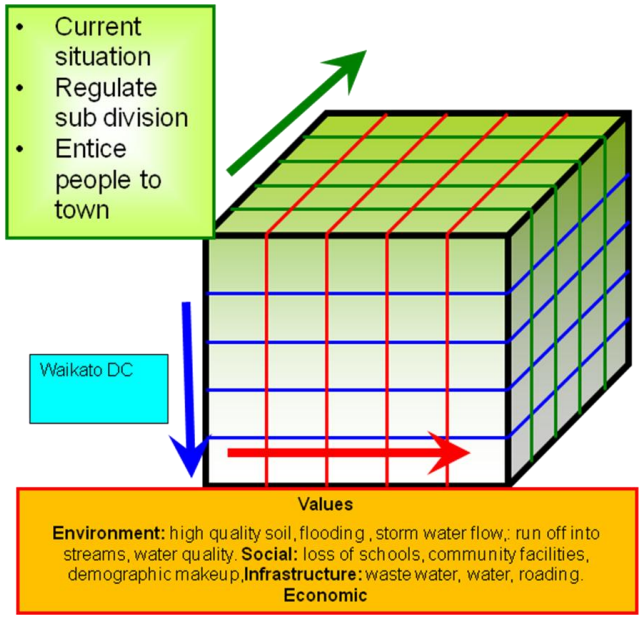
- Loss of schools
- Community facilities
- Demographic make up
-

Economic:

Infrastructure:

- Waste water
- Water
- Roading

Deliberation Matrix for Waikato District Council



Stakeholder: EW

Issue:

What are the likely effects of strong controls over Rural-Residential subdivision? (versus no control)

Values to assess against:

Economic:

- Urban economy
- Rural economy
- Dependence on exports, commodity prices
- House and land prices
- Employment/unemployment
- Developers/landowners
- Land productivity

Infrastructure

- Transport
    - Resource use
    - Public/private
    - Walking/cycling
    - Cost of infrastructure
    - Congestion
    - Efficiency of existing services
- Other

Natural hazards

- Value of at risk property
- Number of people at risk

Energy/Carbon

- Energy demand
- Effects on energy infrastructure
- Carbon dioxide production

Ecosystem services

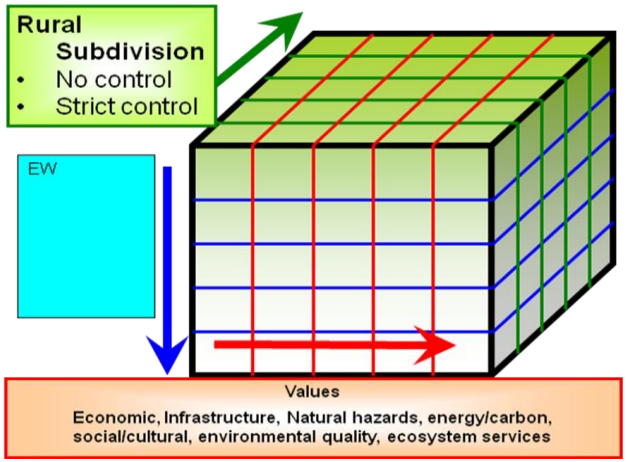
Social/Cultural

- Well Being
    - Lifestyle options
    - Health
    - Amenity/landscape/heritage
    - Recreational opportunities
- Equity

Environmental quality

- Biodiversity
    - Pests and diseases
- Water quality
- Water demand
- Air quality
- Soil quality

Deliberation Matrix for EW



Stakeholder : New Zealand Transport Agency

Issue:

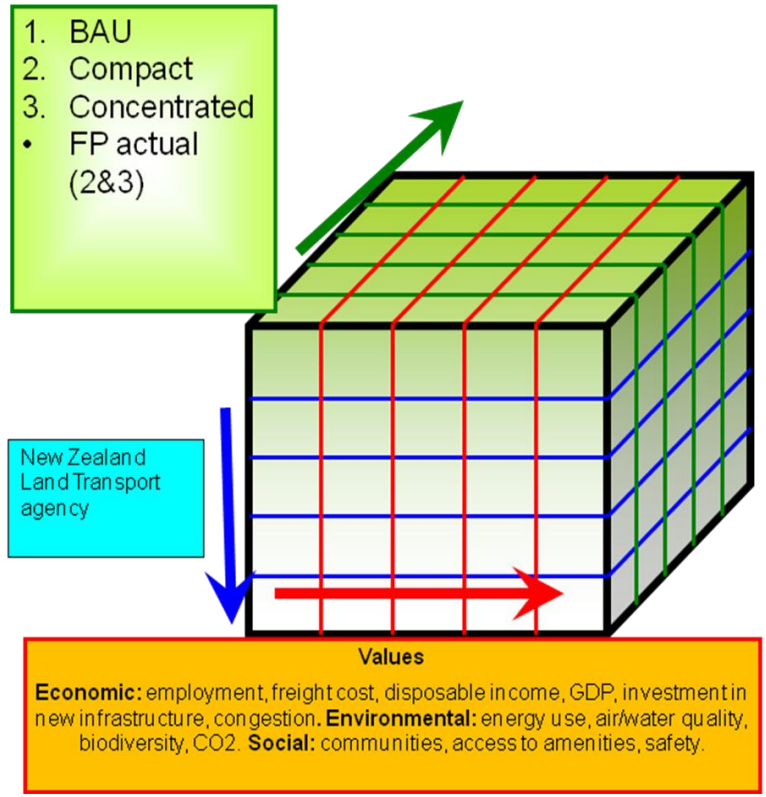
Provision of transport infrastructure and services

- What are the costs of transport infrastructure/ services
- Time/distance spent commuting
- Accessibility (to service and amenities)
- Mode of transport –what choices do people have?

Values:

- Economic: employment, freight costs, dispensable income, GDP, investment in new infrastructure (transport), congestion
- Environmental: energy use, air/water quality, biodiversity, CO2
- Social: communities, access to amenities, safety

Deliberation Matrix for New Zealand Transport Agency



Appendix 2: Sample Deliberation Template

Intervention:	[%]			[%]			[%]			[%]		
	Value	Indicators	Assessment	Value	Indicators	Assessment	Value	Indicators	Assessment	Value	Indicators	Assessment
	1. [___%]	1. 2. 3.		1. [___%]	1. 2. 3.		1. [___%]	1. 2. 3.		1. [___%]	1. 2. 3.	
	2. [___%]	1. 2. 3		2. [___%]	1. 2. 3		2. [___%]	1. 2. 3		2. [___%]	1. 2. 3	
	3. [___%]	1. 2. 3		3 [___%]	1. 2. 3		3 [___%]	1. 2. 3		3. [___%]	1. 2. 3	
	4. [___%]	1. 2. 3		4. [___%]	1. 2. 3		4. [___%]	1. 2. 3		4. [___%]	1. 2. 3	
	5. [___%]	1. 2. 3		5. [___%]	1. 2. 3		5. [___%]	1. 2. 3		5. [___%]	1. 2. 3	
	6. [___%]	1. 2. 3		6. [___%]	1. 2. 3		6. [___%]	1. 2. 3		6. [___%]	1. 2. 3	
	Overall			**Overall**			**Overall**			**Overall**		

Appendix 3: Completed Deliberation Matrices

Future Proof - Deliberation Matrix - Waikato District Council
Issue: Rural Subdivision Strategies: Existing Control; Strict Control Values: How you would measure the impact of the strategy

Intervention	Environment [25%]			Social [10%]			Economic [55%]			Cultural [10%]		
	Value	Indicators	Assessment	Value	Indicators	Assessment	Value	Indicators	Assessment	Value	Indicators	Assessment
	1. **Preserving soil quality**	1. Type of activity		1. **Number of schools**	1. Population		1. **Housing** *	1. Numbers		1. **Affect on Iwi**	1.	
		2. High nitrates			2.			2. Size			2.	
		3. Soil composition			3.			3. Value opf houses			3.	
								4. Location			4.	
	[5%]			[1%]			[25%]			[%]		
	2. **Flooding frequency**	1. Affectred dwellings		2. **Number of community facilities**	1. Population		2. **Economic productive land** *	1. 80% urban		2. **River settlement**	1.	
		2.			2. Community desire			2. 20% rural			2.	
		3.			3. Ideal location			3.			3.	
	[5%]			[2%]			[6%]			[%]		
	3. **Stormwater runoff**	1. Rate of runoff		3. **Attractiveness of small**	1. Safe area		3. **Income to council**	1.		3.	1.	
		2. Quality of runoff			2. Aesthetically pleasing			2.			2.	
		3.			3. Good facilities			3.			3.	
	[5%]			[5%]			[6%]			[%]		
	4. **Water quality**	1. Level of quality		4. **Access**	1. To community		4. **Income to landowner**	1.		4.	1.	
		2. Drinking (Health)			2.			2.			2.	
		3.			3.			3.			3.	
	[5%]			[1%]			[6%]			[%]		
	5. **Waste water discharge (river settlement)**	1. Quality of discharge		5.	1.		5. **Roading cost**	1. Number of reseals		5.	1.	
		2.			2.			2.			2.	
		3.			3.			3.			3.	
	[5%]						[6%]					
	6.	1.		6.	1.		6. **Three waters**	1. Cost of infrastructure		6.	1.	
		2.			2.			2.			2.	
		3.			3.			3.			3.	
	[%]			[%]			[6%]			[%]		
	Overall			**Overall**			**Overall**			**Overall**		

Future Proof - Deliberation Matric Workshop 2-31 March 2010 - Stakeholder: Hamilton City Council

Issue: Control over urban sprawl Strategies: TC (Tight control); NC (No control); SQ (measures TC and NC against SQ status quo)

Intervention - Status quo

Environment			[25%]	Social			[25%]	Economic			[25%]	Cultural			[25%]
Value	Indicators		Assessm	Value	Indicators		Assessment	Value	Indicators			Value	Indicators		Assessmen
1. Protection of high quality soils	1.	Amount (ha) of land in parcels above 4 ha	SQ TC NC	1. Lifestyle options *	1.	Housing choice - household sizes	SQ TC NC	1. Infrastructure *	1.	Affordability of infrastructure - roading - ?	SQ TC NC	1. Amenity/landscape/ heritage	1.	Protection of heritage values	SQ TC NC
	2.				2.	Housing affordability	SQ TC NC		2.	Congestion			2.	Access to facilities - museum - library –distance for residents	
	3.		SQ TC NC		3.		SQ TC NC		3.	Efficiency of existing services	SQ TC NC		3.		SQ TC NC
[6.5%]				[8.5%]				[12.5%]				[12.5%]			
2. Carbon emissions	1.	CO_2 emissions up or down	SQ TC NC	2. Amenity	1.	Access to open space	SQ TC NC	2. Urban economy *	1.	House and land proces and affordability	SQ TC NC	2 Safety .	1.	Sense of safety	SQ TC NC
	2.	Number of car trips/day	SQ TC NC		2.		SQ TC NC		2.	Employment /unemployment	SQ TC NC		2.	Vitality of areas	SQ TC NC
	3.	Energy demand	SQ TC NC		3.		SQ TC NC		3.		SQ TC NC		3.		SQ TC NC
[6.5%]				[8.5%]				[12.5%]				[12.5%]			
3. Biodiversity	1.	Spatial location	SQ TC NC	3. Health	1.	Access to wealking /cycling/open space	SQ TC NC	3.	1.			3 .	1.		
	2.	Biodiversity corridors - how many continue to exist			2.	Access to local services (walking distance-400 m)	SQ TC NC		2.				2.		
	3.		SQ TC NC		3.		SQ TC NC		3.				3.		
[6%]				[8%]				[%]				[%]			
4. Water demand	1.	Amount of water use	SQ TC NC	4.	1.			4.	1.			4 .	1.		
	2.				2.				2.				2.		
	3.		SQ TC NC		3.				3.				3.		
[6%]				[%]				[%]				[%]			
5.	1.			5.	1.			5.	1.			5	1.		
	2.				2.				2.				2.		
	3.				3.				3.				3.		
[%]				[%]				[%]				[%]			
6.	1.			6.	1.			6.	1.			6	1.		
	2.				2.				2.				2.		
	3.				3.				3.				3.		
[%]				[%]				[%]				[%]			
Overall				Overall				Overall				Overall			

Future Proof - Deliberation Matrix - Environment Waikato
Workshop 2 - 31 March 2010

Each 25% --> reflecting Local Government Act (Balancing 4 wellbeings)

Intervention

Environment		[25%]	Social		[25%]	Economic		[25%]	Cultural		[25%]
Value	Indicators	Assessment	Value	Indicators	Assessment	Value	Indicators	Assessment	Value	Indicators	Assessment
1. Biodiversity	1. Fragmentation 2. Area in indigenous vegetation 3. Protected areas		1. Health and wellbeing	1. 2. 3.		1. Regional economy	1. 2. 3. 4.		1. Maori cultural values	1. 2. 3. 4.	
[15%]			[40%]			[25%]			[70%]		
2. Water quality	1. 2. 3.		2. Amenity/lanscape heritage	1. 2. 3.		2. Strength of local economy	1. 2. 3.		2. Cultural identity of rural communities	1. 2. 3.	
[15%]			[10%]			[5%]			[30%]		
3. Water quanlity	1. 2. 3.		3. Recreational opportunities /lifestyle	1. 2. 3.		3. House and land prices	1. 2. 3.		3.	1. 2. 3.	
[15%]			[20%]			[10%]			[%]		
4. Air quantity	1. 2. 3.		4. Equity	1. 2. 3.		4. Land productivity	1. 2. 3.		4.	1. 2. 3.	
[15%]			[30%]			[10%]			[%]		
5. Soil quality	1. 2. 3.		5.	1. 2. 3.		5. Infrastructure - energy - transport	1. 2. 3.		5.	1. 2. 3.	
[15%]						[25%]					
6. Greenhouse gass emission	1. 2. 3.		6.	1. 2. 3.		6. Natural hazards	1. 2. 3.		6.	1. 2. 3.	
[15%]			[%]			[25%]			[%]		
Overall			Overall			Overall			Overall		

Note: We did not complete the selection of suitable indicators and assorted weighting/assessment

Appendix 4: Possible process for modeller/planner interface

1. Planner defines an issue
2. Planner defines a strategy to manage that issue
3. Modeller proposes options to simulate that strategy
4. Modeller proposes options for indicators to explore that strategy
5. Planner picks simulation and indicator options
6. Modeller carries out pre-processing of data
7. Modeller integrates new data and adjusts parameters to match strategy
8. Modeller runs simulation and captures preliminary results
9. Modeller analyzes preliminary results and reports on them to Planner
10. Planner reports back to Modeller on any counter-intuitive results that need further investigation
11. Modeller consults with experts and repeats steps 6-10 until Planner is satisfied with results
12. Planner reports back on any results that may need filtering or manipulation before being reported to wider audiences
13. Modeller compiles final results in consultation with Planner
14. Final results reported to others