

BACKGROUND

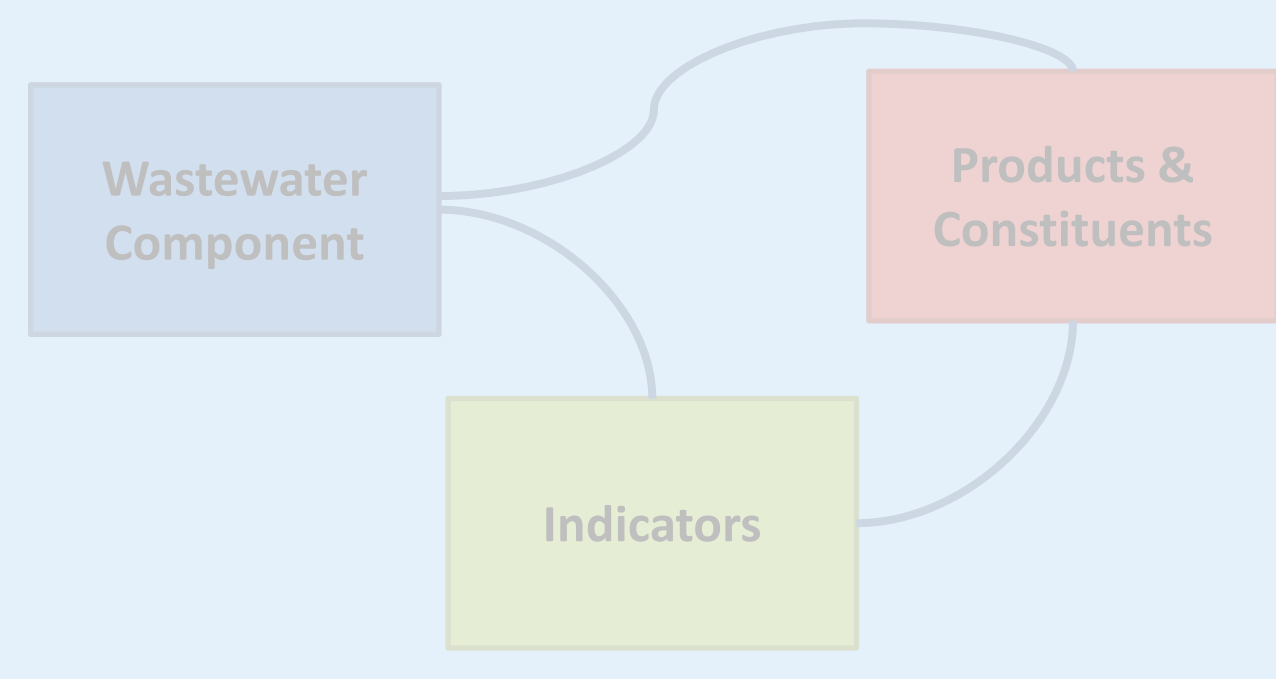
- Continual retrofitting of wastewater infrastructure in the industrialized world
- Growing need for new infrastructure in developing countries
- Growing environmental, energy and financial concerns continue to pressure conventional approaches to wastewater management

OBJECTIVES

- Help decision-makers 're-think' wastewater management and envision more sustainable alternatives
- Develop a decision-support system (DSS) to aid decision-makers, engineers and related constituents in selecting a system to balance environmental, economic and social needs

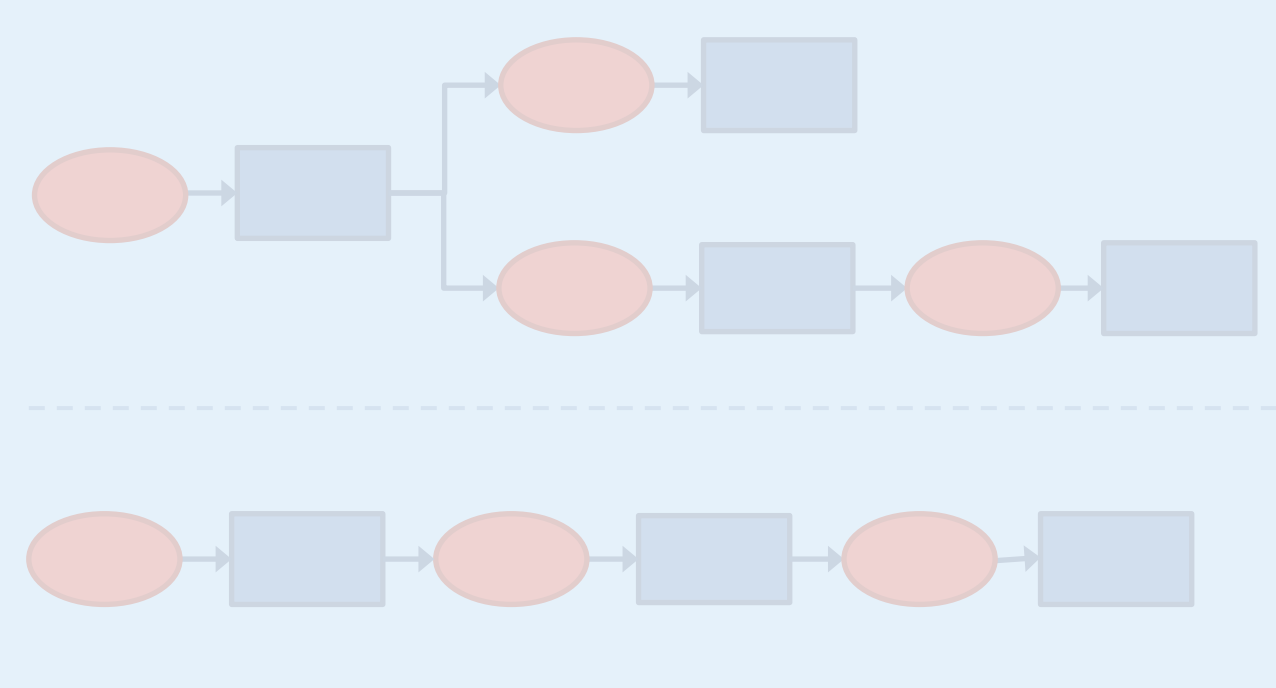
PROJECT MODULES

Database and Ontology of Wastewater



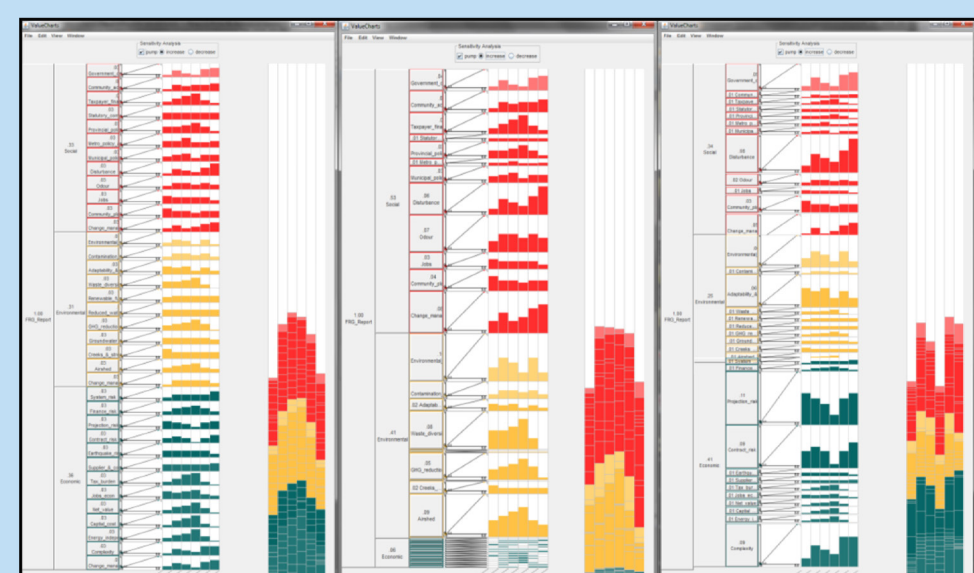
1

Generating Alternative WW Designs



2

Visual, Interactive Preference Elicitation



3

DESIGNING SUSTAINABLE WASTEWATER SYSTEMS: VISUAL, INTERACTIVE PREFERENCE ELICITATION

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STUDY OBJECTIVE

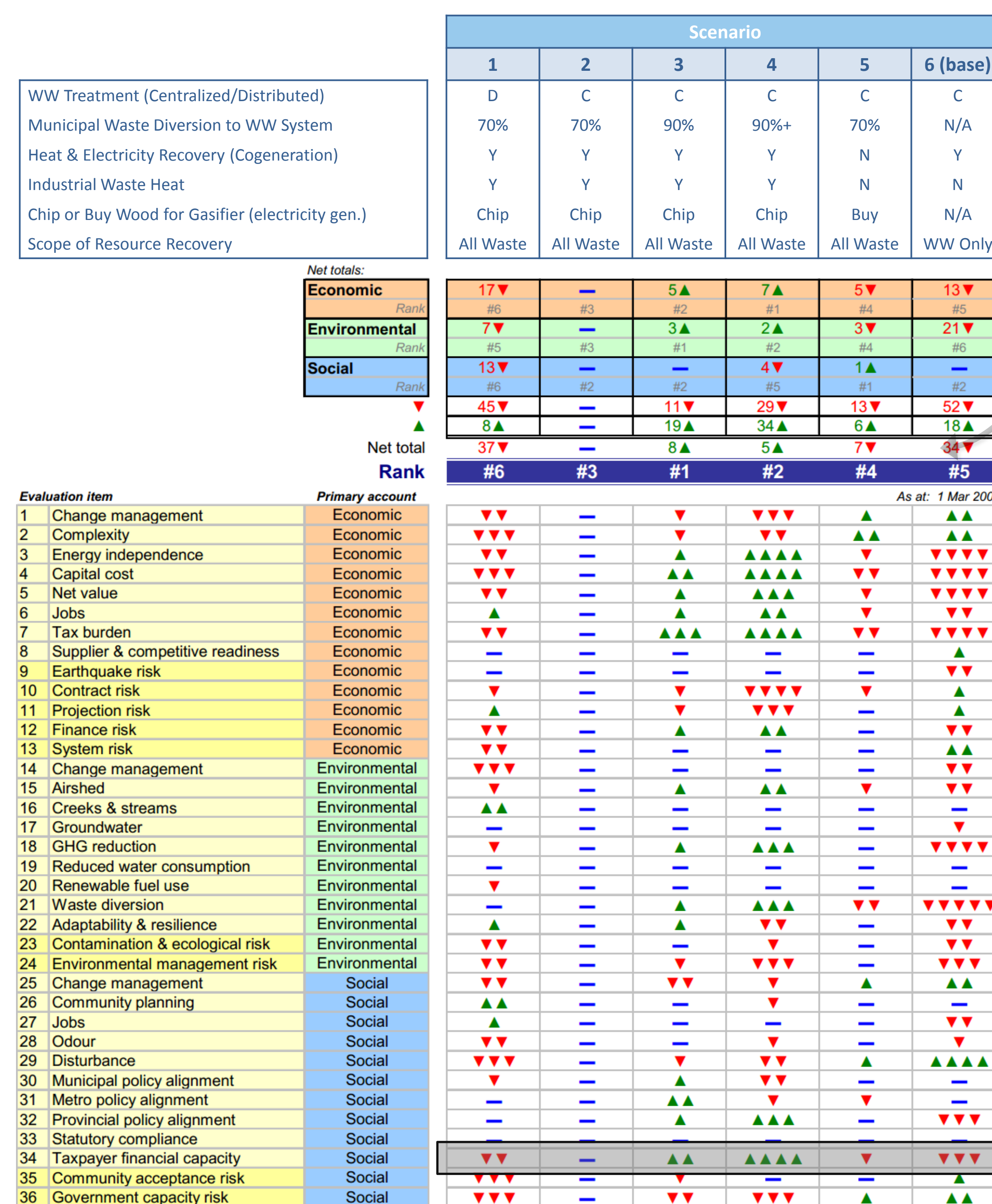
- Apply more interactive and intuitive visualization techniques to analyze data from a report recently completed for the City of North Vancouver, Canada. Report compared six wastewater alternatives for the city [1].

STATIC COMPARATIVE MATRIX

- As part of the report, the Fidelis Resource Group (FRG) estimated the triple bottom-line (TBL) for each alternative.
- Static comparative matrix shows the six TBL assessments and conveys the superiority of their final recommendation.

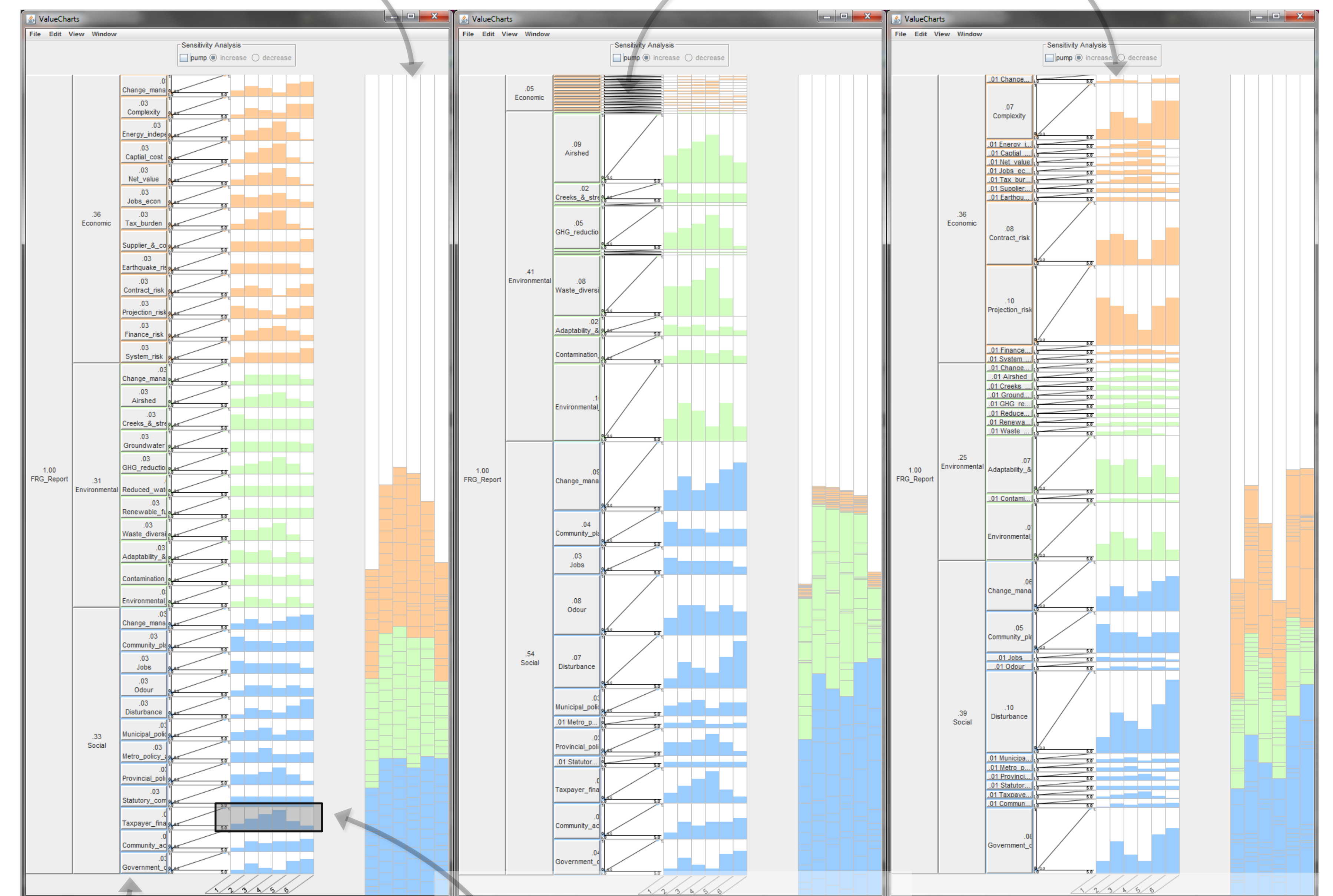
INTERACTIVE VISUALIZATION

- VALUECHARTS+**: A Multi-Criterion Decision Analysis (MCDA) tool
- User adjusts parameters for each criteria; visual feedback provided [2,3]
- Presents overview + details [4, 5]
- Simple visualization; can be used by a wide range of users



Cumulative Evaluation

Adjust Weights in Real-time



equally weighted

environmental and social emphasis

emphasis on selected criteria

Criteria

Evaluation of Criteria

HYPOTHESES

- ValueCharts+ can effectively support informative comparisons across a set of wastewater alternative designs with respect to a given preference model.
- Real-time interaction to explore different preference models of multi-stakeholder groups.

NEXT STEPS

- Verify hypotheses and redesign interface to make it more intuitive and effective for the domain of wastewater management.
- Work with community groups in North Vancouver to explore alternative approaches to wastewater management

REFERENCES

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- Carenini, G. and J. Loyd. ValueCharts: analyzing linear models expressing preferences and evaluations. 2004. ACM.
- Bautista, J. and G. Carenini. An integrated task-based framework for the design and evaluation of visualizations to support preferential choice. 2006. ACM.
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- Pommeranz, A., P. Wiggers, and C. Jonker. User-centered design of preference elicitation interfaces for decision support, in Proc. of the 6th int. conf. on HCI in work and learning, life and leisure: workgroup human-computer interaction and usability engineering2010.