KwaliWijzer: An evaluation framework for spatial interventions

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The Netherlands Institute for Spatial Research is exploring options for developing a methodological framework and tool for evaluating spatial interventions. Such a framework can be used to analyse and estimate the spatial impacts of (large-scale) interventions, policy regulations and social trends with a spatial dimension. The goal of the project is to develop a tool that policy makers can use to find the answers they need and contribute to public debate.

This paper presents the first two stages in the development of the evaluation framework, consisting of a bank of spatial elements and a tool for selecting elements: the *KwaliWijzer*, or 'quality adviser'. When completed, the evaluation framework will be equipped with a method for estimating quantitative and qualitative effects and a method for comparing and combining these to present the overall impact of a spatial intervention.

Spatial quality versus spatial effects

In the Netherlands space is in short supply and the same space may be subject to multiple claims. The underlying goal of estimating the effects of spatial interventions is to protect spatial quality, which may be endangered by intensive use or urban sprawl, for example.

The term 'spatial quality' is frequently used in Dutch spatial policy. It was introduced in the mid 1980s by the National Spatial Planning Agency as a main policy goal and has played an important role during a period when spatial planning was searching for an identity (Reijndorp, 1998). Spatial quality is a broad concept that implies personal values and subjectivity. This puts it into the category of 'wicked problems' (Rittel and Webber, 1984). Defining spatial quality depends on the case in hand and on scale, time and context; there is no quick or decisive test for the usefulness of any one definition.

Right from the start the term 'spatial quality', as used in Dutch planning policies, has never been properly defined. Over the years it has acquired different layers of meaning depending on the context in which it is used:

- Physical environment: diversity, sustainability, coherence.
- Design: form, composition, integration and development.
- Essential terms of spatial planning: pattern, structure and process.
- Social needs[1]: perception value, utility value and future value.

Usually, though, spatial quality is defined in broad terms. In these cases, the aim of spatial policy is to multiply the utility value and raise the perception and future values of space. More precisely, this means that space has a high functional value when the land uses are complementary and do not conflict, it has a high perception value when the proper form is achieved, and a high future value when the use of space is sustainable and can be adjusted to changing needs over time.

It can be argued that these definitions are vague and can be interpreted in various ways by the different actors involved in spatial planning. But this situation has been useful because such freedom of interpretation allows different actors (such as policy makers or designers) to describe spatial quality in their own way, and by doing so to express their own values and interests. This implies that spatial quality can be defined more precisely only in specific situations, when the concept can be operationalized using a number of concrete and measurable effects.

After a long discussion the project team decided not to attempt a precise definition of spatial quality, but (at least in this stage of the project) to focus research efforts on the effects resulting from spatial interventions.

[1] This division is based on the terms used by Vitruvius to describe the quality of buildings: beauty (Venustas), utility (Utilitas) and solidity (Firmitas).

Plan evaluation methods and approaches

Planning is defined as a process, a sequence of choices leading to appropriate action (Davidoff and Reiner, 1962). It is a value driven process. The planning domain contains a range of actors, each with their own set of values, which at times conflict. But the choices made by these actors are not arbitrary, they are based on principles; they have to be defensible and they have to be communicated to the other participants in the planning process.

According to Nijkamp et al. (1990) there is general agreement that evaluation methods have considerable merit because they make values and choices more explicit. However, there is no single evaluation method that is capable of dealing consistently with the entire range of contexts and spatial interventions. For plans that raise complex questions, such as we can expect within our evaluation framework, the most suitable approach will probably involve a combination of methods.

Evaluation can be defined as objectification of a certain situation and the appreciation of this objectified situation (Voogd, 1983). Evaluations can be performed during plan development and approval (ex ante evaluation) and after the plan is implemented (ex post evaluation). Whereas ex post evaluations examine the real effects of a plan, ex ante evaluations are more predictive and consider the possible future consequences of a plan. The evaluation framework we are developing is to be used for ex ante evaluation of plans.

Bank of spatial elements

Before we can estimate the effects of an intervention we first have to identity the spatial elements affected by that intervention. Then we have to find out which effects belong to which elements and thereafter to operationalize those effects in some kind of measurable indicators.

We have studied the literature and collected about a hundred possible elements that can be affected by any kind of spatial intervention, such as large infrastructure projects, urban development, nature development, etc. The elements have been clustered using a method derived from the holistic approach to spatial planning, design theories and methods for evaluating spatial plans.

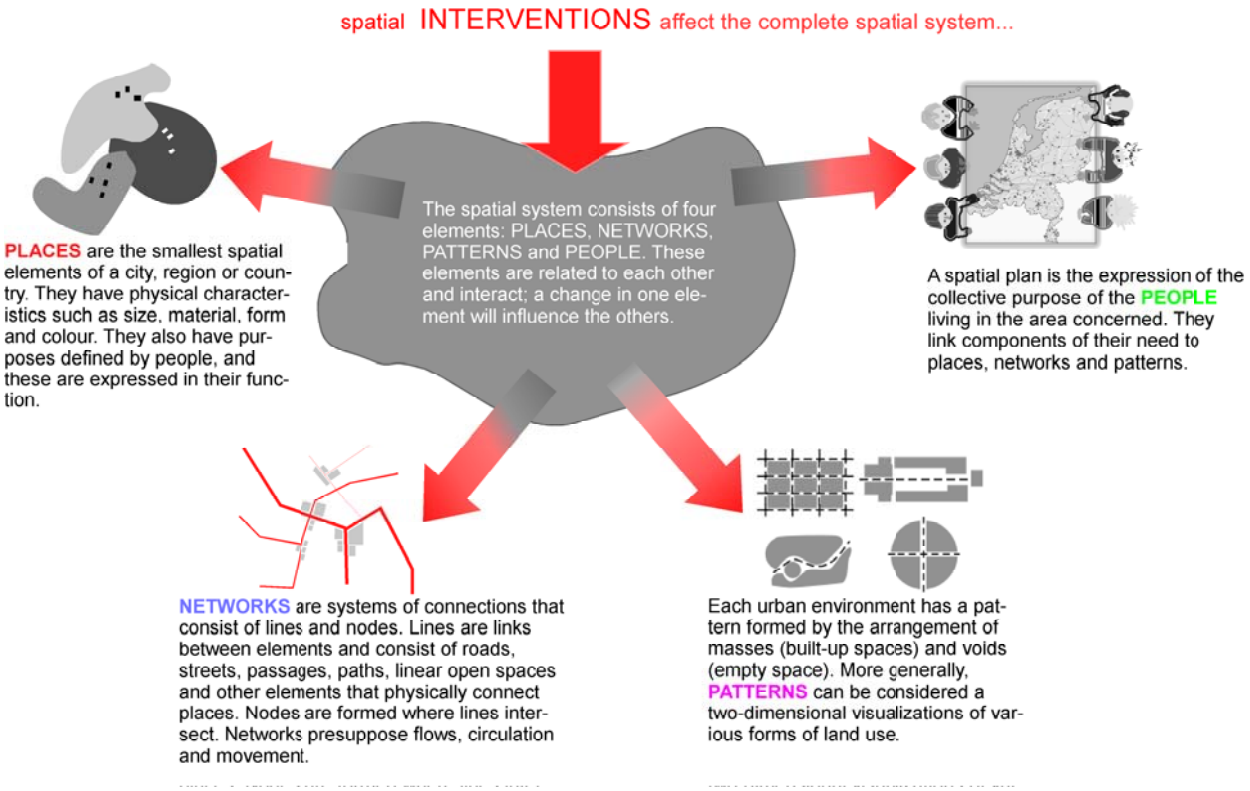

FIGURE 1. Conceptual framework of the *KwaliWijzer*

In this study we assume that each spatial intervention exerts an influence on all aspects of the spatial system. This system is defined as ‘a set of connected things or parts forming a complex whole’ (New Oxford Dictionary of English). Hall and Hagen (in Chadwick, 1956) define a system as: ‘A set of objects together with relationships between the objects and between their attributes.’ The objects ‘are the parts or components of a system, which are unlimited in variety’ and ‘Relationships are those that “tie the system together”.’

The *KwaliWijzer* defines the spatial system as a synergy of four subsystems: PLACES, NETWORKS, PATTERNS and PEOPLE.

Places are the smallest elements and are unique to spatial systems. They are the physical and functional elements of a region; in other words, land use on a regional scale. Places can also be seen as the physical and functional elements of a town or city, such as houses, offices, greenspace and leisure facilities. These are all functions on the urban scale.

The idea of **networks** originates from linkage theory and from the theory of network urbanism. The linkage theory emphasizes the ‘lines’ connecting one element to another. These lines are formed by roads, streets, passages, paths, linear open spaces and other linking elements that physically connect places. At the intersections of these lines are ‘nodes’, which often have multiple functions. The linkage theory presupposes flows, circulation and movement (Trancik, 1986).

The theory of network urbanism views space as a network of operators on three levels. On the first level are the providers of the physical infrastructure and specialized technical services, such as water, gas, electricity, waste collection, telephony, cable services, etc. On the second level are the functional networks of common-interest users:

- production and logistical networks
- commercial centres, distribution networks, brands and franchises, and leisure activities
- personal networks, such as family, friends and schools

On the third level the operators of the three functional networks create their own ‘virtual’ cities, regardless of municipal boundaries (Drewe, 1998).

The idea that space can be considered as **patterns** has its roots in the figure ground theory. The figure ground theory is based on the land coverage of buildings as solid masses (figures) in relation to open voids (ground). ‘Each urban environment has an existing pattern of solids and voids, and the figure ground theory is an attempt to manipulate these relationships by adding to, subtracting from, or changing the physical geometry of the pattern. The objective of these manipulations is to clarify the structure of urban spaces in a city or district by establishing a hierarchy of spaces of different sizes that are individually enclosed but ordered directionally in relation to each other. The figure ground drawing is a graphic tool for illustrating mass–void relationships; a two-dimensional abstraction in plan that clarifies the structure and order of spaces.’ (Trancik, 1986)

Churchill argues that ‘a city plan is the expression of the collective purpose of the people who live in it, or it is nothing.’ It is **people** who give meaning to space, who create it and use it according to their needs and wishes. According to the place theory: ‘a space, which is a bounded or purposeful void with the potential of physically linking things, only becomes place when it is given a contextual meaning derived from cultural or regional content. Hence the places have a certain patina given by human use over time. The idea of places is therefore strongly related to their spatial and cultural contexts.’ (Trancik, 1986)

In the *KwaliWijzer* the four subsystems just described (places, networks, patterns and people) are further divided into spatial elements, as shown in Figure 2. The purpose of this is to make a conceptual framework in which planners can easily identify spatial elements that are influenced by a certain intervention.

According to the system theory, all elements in the system are related to each other; if one element is affected, this is reflected in other elements of the system that are related to it. Take, for example, the influence of a new lake on the landscape. This will not only affect the appearance of the landscape, but also the elements that make up the landscape, such as wildlife and habitats, the soil, relief, vegetation, land use structure, and so on. And not only will the elements of the same subsystem be affected, but those of the other three subsystems as well. Figure 3 shows the relationship between the landscape and other elements within the subsystem Patterns and with elements of the other subsystems.

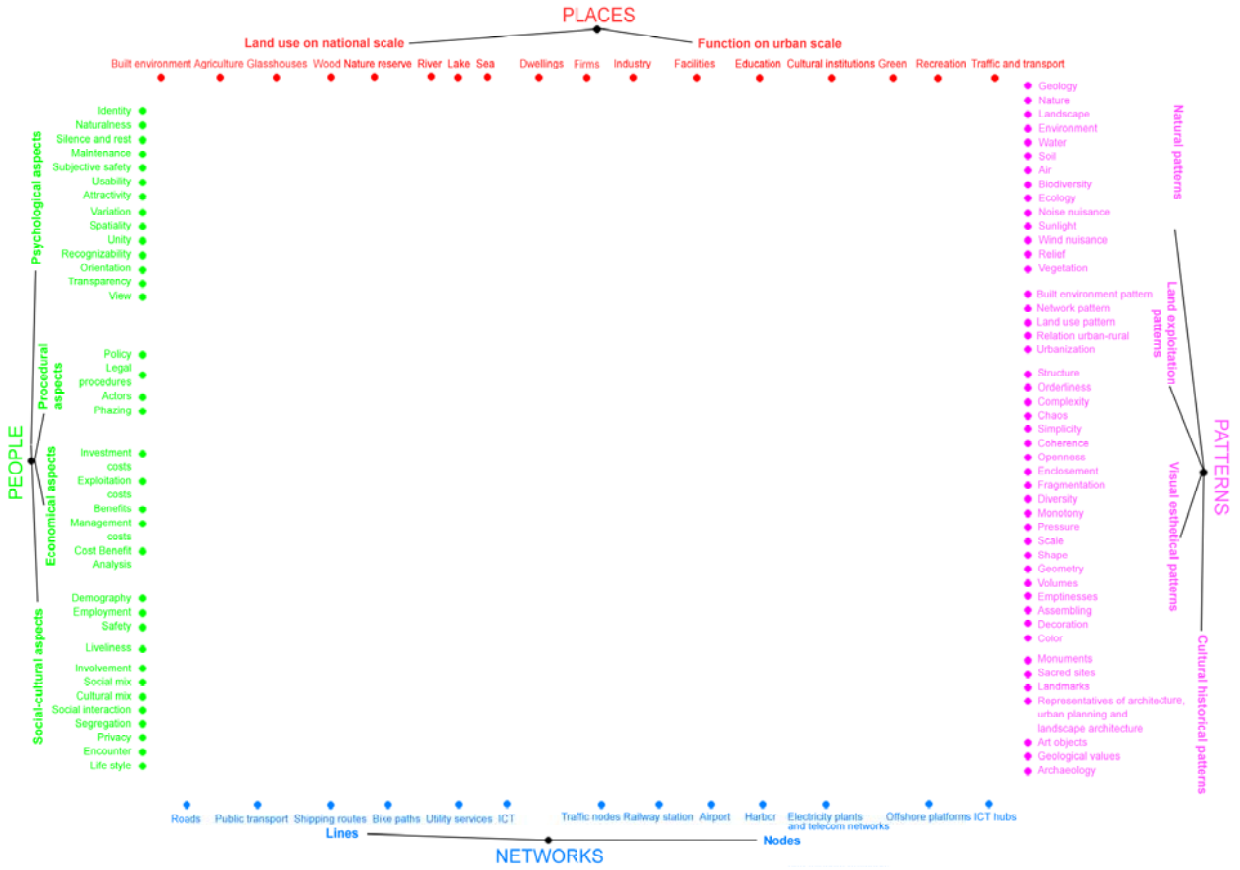

FIGURE 2. Spatial elements of the subsystems Places, Patterns, Networks and People

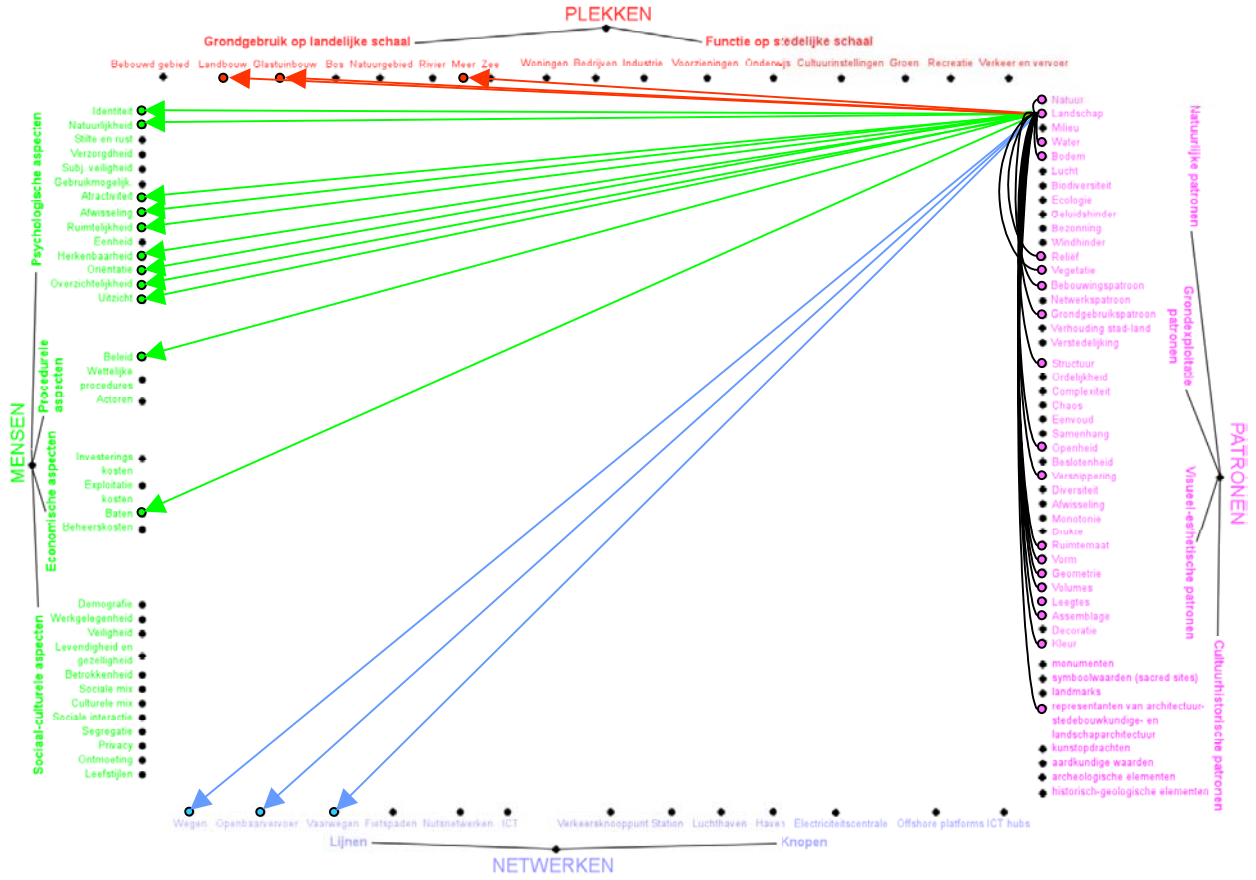

FIGURE 3. Spatial effects of a new lake on the landscape

The first exercise with the *KwaliWijzer* was for the feasibility study for the newly planned Randmeer ('Edge lake') along the Noordoostpolder. This study estimates the advantages and disadvantages of the two alternative plans for the new lake. The *KwaliWijzer* was used to evaluate one alternative, for a small lake (Klein Randmeer).[2] Figure 4 represents all the effects of the Randmeer on the spatial system.

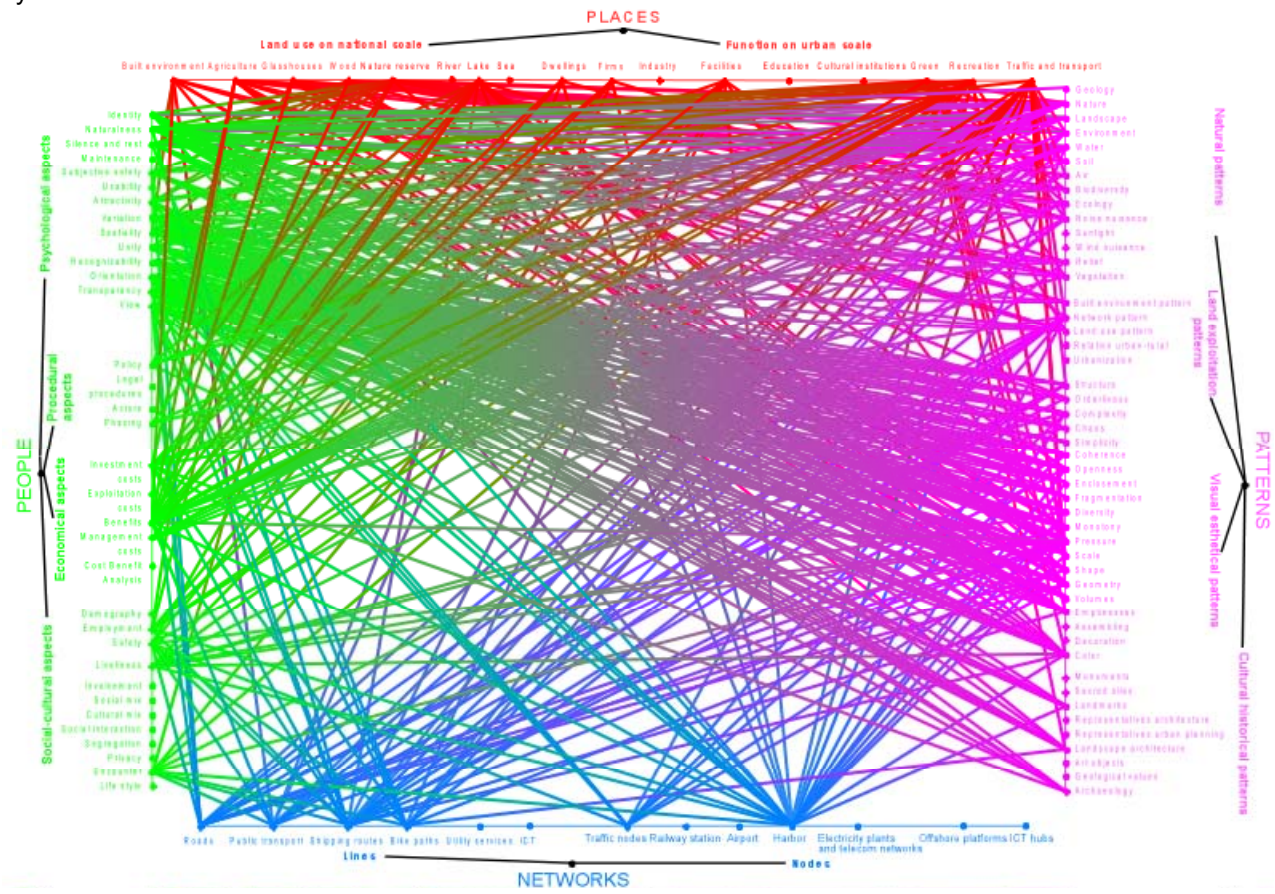

FIGURE 4. Complete matrix of relationships between the spatial elements affected by the Randmeer lake.

This diagram is not very useful for identifying all the links and relationships, but it does show the complexity of the problem. In view of this, we decided to develop a new tool – the *KwaliWijzer* software – to help planners deal with this complexity (not only in the Randmeer exercise, but also for general use when evaluating other spatial interventions). The aim is to allow users to select the effects they consider important for spatial quality. The *KwaliWijzer* was demonstrated for the first time in a workshop during the opening conference of the Netherlands Institute for Spatial Research, held in October 2002. The 28 participants who used it to evaluate the impact of the Randmeer lake reacted very positively.

What is the *KwaliWijzer*?

The *KwaliWijzer* an Internet-based software application which uses the AquaBrowser technology developed by Medialab (www.medialab.nl). AquaBrowser is a fuzzy visualization tool which shows the high level description of a conceptual space, hiding irrelevant information and displaying information elements in context (Veling, 1997). It is a generic Java applet that can be embedded into any web page. Medialab claims that users of AquaBrowser can browse through a dynamic conceptual space, which is continually reshaped to reflect their interests. Animations make transitions from one state to

[2] No decision has yet been taken on whether to implement the plan or not. In the Klein Randmeer alternative the primary functions of the new lake are recreation and nature conservation. The secondary function is water storage for the Noordoostpolder. In this alternative the existing built-up areas are respected to minimize the loss of farms and houses.

another appear more fluid, showing users why and how the information is rearranged. The user interface displays the information as words, which are distributed in the conceptual space the user is interested in. The words are larger and nearer the centre of the screen the more relevant they are to the user's preferences, and smaller and peripherally positioned if they are less relevant. Each of the user's actions will change and rearrange the distribution and importance of the words, putting those of greater interest to the user in focus and those of less interest nearer the edge of the screen.

The *KwaliWijzer* interface is divided into four windows (see Figure 5): AquaBrowser, Definition, Information and Effects.

In Figure 5 the AquaBrowser window displays the spatial elements and the relevant relationships between those elements for the Randmeer case. By clicking on one of the elements the window is rearranged to show the effect and its relation to other elements from the bank of elements. If an effect is in the centre of the AquaBrowser window, its definition is displayed in the Definition window and information on that subject is displayed in the Information window. Each effect selected by the user is automatically displayed in the Effects window. As the user moves through the AquaBrowser window, or though the links in information documents, the list of selected elements in the Effects window increases. The Edit List button takes the user to a window where any incorrectly selected elements can be deleted and selected elements weighted (Figure 6).

FIGURE 5. KwaliWijzer interface: the four windows

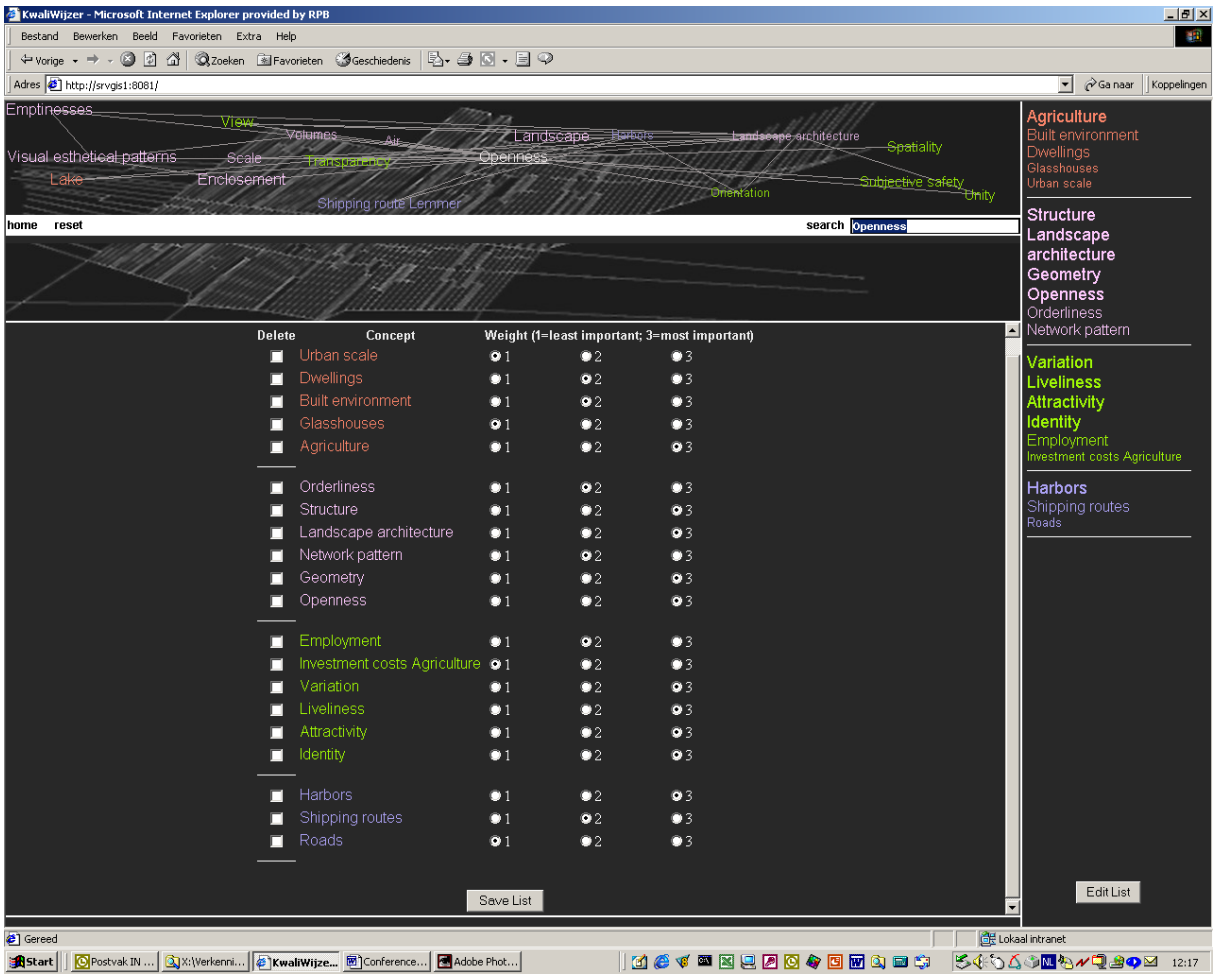

FIGURE 6. Weighting of the selected elements

When this reviewed list is saved, the list of elements in the Effects window changes. The deleted items disappear, the more heavily weighted elements are shown in bigger letters and the elements are grouped by colour, which represents the subsystem they belong to. This allows each user to see in which subsystem his preference lies (places, networks, patterns or people) and, within that subsystem, which element or elements are more important than the others.

At the same time, the *KwaliWijzer* calculates the outcome of the choices made by all the participants in the group session (Figure 7). As a result, we have two kinds of lists: individual lists (one for each participant in the session) and one collective list. Each user can compare their own choices with those of the other members of the group and the collective list. If a term typed into the search box does not exist in the system, it is added to the effects list. These terms can then be added to the bank of affected spatial elements.

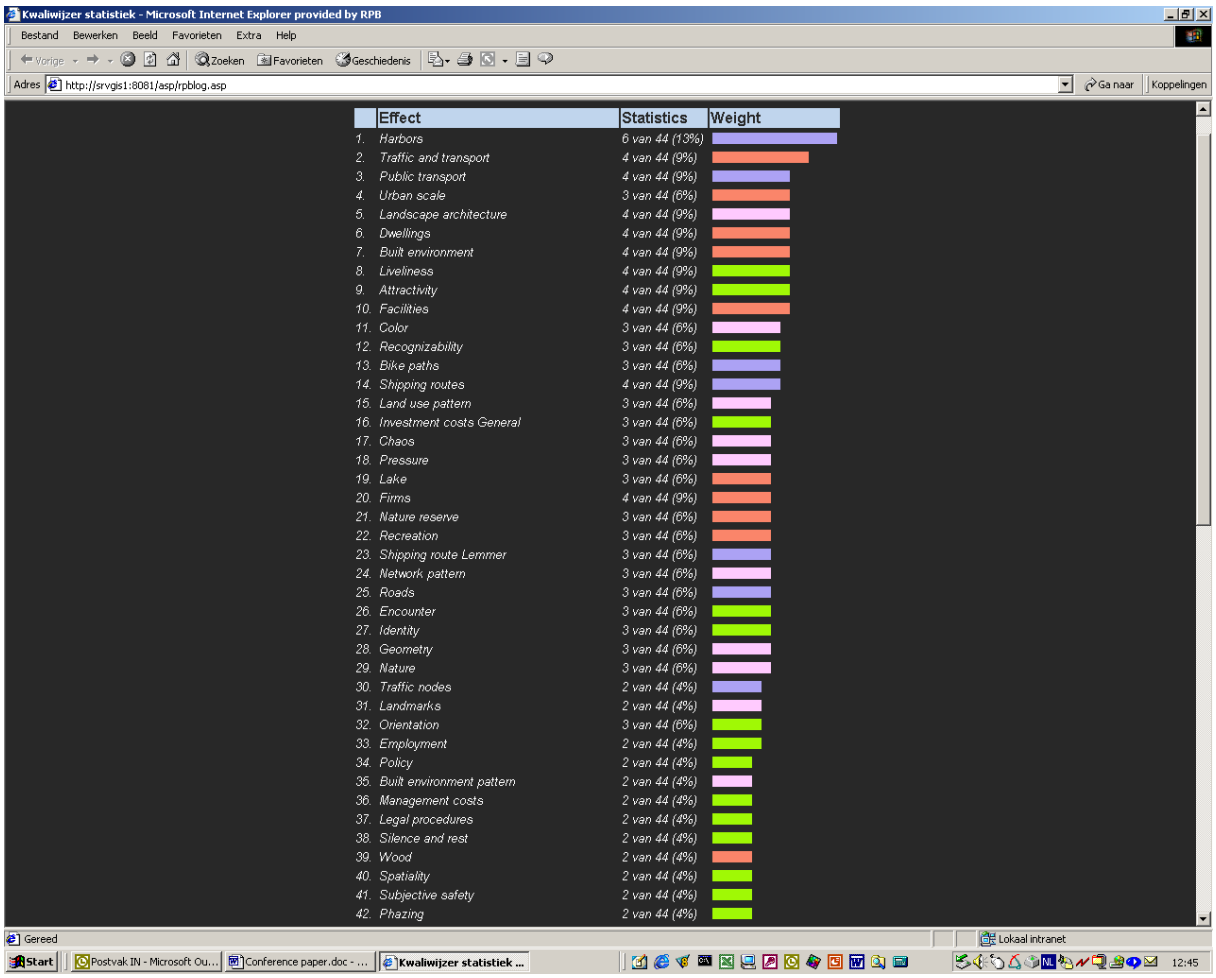

FIGURE 7. List of collective choices

The collective list can be used in different ways:

- to identify the most important elements selected by the group as a whole
- to identify elements missing from the bank of spatial elements
- to compile an agenda for further research on the spatial effects of these elements

The bank will grow as relevant elements are added each time it is used on a new project. Eventually it will contain all the elements needed to cover any future project.

Conclusion

The tool *KwaliWijzer* has been developed and used to evaluate the effects of a new lake on spatial quality. The research conducted so far completes the first two stages in the development of an evaluation framework for making ex ante evaluations of the effects of physical interventions on spatial quality. This started from the premise that the planning process is value driven and that the choices relating to the quality of space are highly subjective and depend on the specific situation in each case. The generic aims of *KwaliWijzer* are to objectify the process of plan evaluation and make it transparent and communicable.

The practical goal of *KwaliWijzer* is to help planners deal with the large number of spatial elements involved and to select those that they personally think are important in any specific spatial intervention. And because planners cannot be aware of all the many affected elements, the *KwaliWijzer* has an educational role as well: it collects all the identified spatial elements in the bank of spatial elements and demonstrates the complex relationships between those elements. Moreover, by recording the subjective selection of elements made by the users, individually and collectively, *KwaliWijzer* throws some light on the implicit values people have when considering the effects of physical interventions on spatial quality.

The list of collectively selected elements provides a research agenda for the next stages in the development of the evaluation framework: a method for estimating quantitative and qualitative effects and a method for weighting all the different effects to obtain a complete picture of the impact of a spatial intervention.

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