Properly Equip Planners, Instead of Just Manning Equipment

A first step in a user-oriented PSS development approach as support for the integration of land use and transport planning

M.C.G. te Brömmelstroet
University of Amsterdam

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Abstract: There is a growing need for planning support in planning practice, especially in land use and transport integration. Recent studies have shown that instruments that provide such are seldom implemented. Building on recommendations of those studies, this paper explores how to develop a planning support system (PSS) for this specific field of planning and shows some preliminary results of the first steps towards such a PSS. An qualitative assessment on the strengths and weaknesses of two recently developed instruments that share this goal; the VPR and the SDS+STE. Due to time constraints, the focus is on the background and framework of the study.

1. BACKGROUND

Recent publications of Vonk (2006) and Couclecis (2005) have emphasised that, once again, computers and models on the one hand and the planning community on the other are not a happy couple. According to Couclecis, the field of computer-aided planning can even be defined as a 'Janus partnership' because of intrinsic fundamental differences between the communities of modellers and planners (Couclelis, 2005, p. 1355).

One reaction to such a rather disillusioning conclusion could be to leave the field of computer-aided planning altogether. But this would pass over the fact that the planning community, or at least some specific planning domains, are in desperate need for the support of computers and models in their day-to-day activities. Planning "involves actions taken by some to

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affect the use of land controlled by others, following decisions taken by third parties based on values not shared by all concerned, regarding issues no one fully comprehends, in an attempt to guide events and processes that very likely will not unfold in the time, place, and manner anticipated", thus planners "can use all the help [they] can get" (Couclelis, 2005, p. 1955).

The domain of land use and transport policymaking fits the above statement on planning like a glove. First of all, it faces massive changes in the context of planning as such in the last decades. Planning has become "more integrated, holistic, region-oriented, partnership-oriented, strategic, scenario-based as well as more interactive and participatory in nature" (Geertman and Stillwell, 2003b, p. 4). Secondly, it has to deal with a very complex and ill-structured issue, it has to develop new approaches to form the policymaking process, including new stakeholders, new arenas and different rules of the game. In such a context, supportive models that facilitate and support the process and add technical information and knowledge to the policymaking steps are called for.

For that reason, instead of throwing in the towel, this paper presents the results of a first step in an innovative development approach, towards a system that can truly support this policymaking process. This approach focuses on the potential user and his/her needs and demands. Unlike traditional methods, it will stay in close cooperation with these users throughout the process. In the GIS community, where the same problems have occurred with GIS project failure and a supply-demand gap, such a method has resulted in an increased number of successful projects (Reeve and Petch, 1999). Before going into the development approach, the land use and transport planning domain is discussed. After all, this is what we want to support in the end. Then, a short overview of the problems and proposed solutions in the history of computer-aided planning is given. This will then lead to the (user-oriented) development approach of our research. A glimpse of the results of the first step in this approach are presented, before this paper concludes with a view on the way forward.

2. PLANNING SUPPORT FOR LAND USE AND TRANSPORT PLANNING

2.1 Land use and transport integration

The current debate on air quality in the Netherlands has put sustainability on top of the political agenda once again. The European Union has laid down minimal norms for air quality in a Framework Directive. Every member state has to meet those norms, but is free to decide how it is going to do that. The

Dutch government has decided to link the norms directly to spatial planning. As a result, many land use and transport projects are blocked (approximately one third of them (Buijsman, 2005)). Because of the high financial costs of this as well as the risk of not meeting policy goals, many stakeholders are now looking for solutions. We argue that integrating land use and transport policies and plans is one of the essential approaches towards this. To achieve such integration, the processes that result in these plans and policies need to be linked more closely. Coordination on the level of plans, where all stakeholders have their minds set, their ideas on paper and their options limited is far less efficient than integration in earlier phases. For instance, while thinking on a long-term vision for a region, the minds are relatively open and so are the possibilities. While computer-aided planning has known a history of disappointment as a whole, it is especially these early phases in the policymaking process that have very little tools and models to support. This is partly due to its ill-structured character, yet it is exactly this character that calls for some sort of support.

This notion is not new. In fact, many scholars have recognized and still recognize the importance of integrating land use and transport policies in the quest for a more sustainable urban environment (among others Banister, 2005; Bertolini et al., 2000; Bertolini et al., 2005; Curtis and James, 2004; Geerlings and Stead, 2003; May et al., 2003; Meyer and Miller, 2001; Priemus et al., 2001; Wegener and Fürst, 1999). Harris noted in this respect that "disjointed and incremental planning leads to the pursuit of conflicting objectives by conflicting means and to the propagation of unintended consequences over space, time and function" (Harris, 1994, p.33). Among professionals and politicians, this recognition can also be noticed. The latest national policy document, the *Nota Ruimte* (Department of VROM et al., 2004) and the *Nota Mobiliteit* (Department of V&W, 2005) both address the importance of the integration of both policy domains.

However, little coordination is to be observed in the field. Especially on the regional level, where more and more planning issues need to be addressed (due to (1) decentralization pressures from the national level and (2) the recognition that many planning problems can not be handled on the local level anymore), the gap between the land use and transport planning seems to be the largest. As a result of decades of research on the interrelations between land use and transport, it is not so much fundamental knowledge that is the problem. Yet, putting this knowledge into practice is much more of a barrier. The explanation for this can be sought in two different directions. On the one hand there is the difficulty of building bridges between the two contents of land use and transport policy. Secondly, thee is the persistence of institutional barriers, at all levels of the policy-making process; from policy design to policy implementation.

The first problem has received attention from various groups of scholars. In Le Clercq and Bertolini (2003) and Bertolini, le Clercq and Kapoen (2005) the term 'sustainable accessibility' is proposed as a conceptual framework. With accessibility defined as 'the amount and the diversity of places of activity that can be reached within a given travel time and/or costs' and sustainable as 'minimizing the use of non-renewable or hard to renew resources, including space and infrastructure', this concept can be directly related to both the qualities of the transport system and the qualities of the land use system. Economic, social and environmental goals can be expressed with this concept (e.g. customer access, social contacts and resource efficiency). The second problem however, has received less attention so far.

2.2 Planning support systems to the rescue

To translate the concept of 'sustainable accessibility' into day-to-day planning practice, two issues need to be considered. The first is that due to the intrinsically complicated nature of this concept, (computer) tools and instruments are necessary. This second issue is the problem of the consistent institutional barriers between the land use and the transport policy domain. For the concept of sustainable accessibility to have effect on the resulting land use/transport plans, the early policy making stages (as problem definition and alternative design) are the most suitable for it to be implemented. Here, there is still room for creativity and learning. Yet, it is especially these phases that have received little attention by the developers of (computer) tools and instruments.

The history of attempts to support planning through the development of (computer) tools and instruments is a troubled one, studded with failures and disappointments. Yet, a recent wave of interest in so-called Planning Support Systems (PSS) has created some positivism, not without reasons. Planning has become more and more complicated. Combined with the obligation of planners to present 'hard numbers' to prove that plans are meeting all sorts of norms, this has resulted in a wide number of planning domains requesting for computerized planning support (see for an overview Batty, 2003; Geertman and Stillwell, 2003a). While the large-scale models of the 1950s and 1960s were no success, the geographical information systems (GIS) of the 1990s are poorly matched to non-basic functions of planners, PSS (as an umbrella-term for a wide variety of instruments, tools and approaches) are believed to be better suited for the complex set of tasks of planners, because of the pick-and-mix characteristics of it.

Yet, this optimism is already mirrored with the same concerns that haunt the field of computer-aided planning since the field first emerged in the 1950s. The next chapter will present the history of these concerns and of proposed solutions. This can show the general pitfalls and guide our development approach around them.

3. A HISTORY OF COMPUTER-AIDED PLANNING: PROBLEMS AND SOLUTIONS

Due to changing views on planning and 'the sky is the limit' developments in hardware and software capabilities in the field of Information Technology, the characteristics of computer-aided planning have changed dramatically almost every decade since it first emerged in the 1950s. The overview presented here does not aim to give a detailed literature overview of these developments, for it goes beyond the scope of this paper to do so and other scholars have already provided such (see e.g. Brail and Klosterman, 2001; Geertman and Stillwell, 2003a; Klosterman, 2001). Here, we will focus on the problems that are recognized over time. For this purpose, the overall development of computer-aided planning should be shortly introduced. Then, the problems and proposed solutions in the literature are discussed.

3.1 How the field evolved from LSUM to PSS

From the late 1950s to the early 1970s there were two parallel trends that resulted in a strong belief that computer-aid could mean a revolution in planning. This revolution was believed to result in a perfect understanding of real-world processes and full control over them by the planning society. Firstly, there was a widespread faith in science and technology (e.g. Harris, 1960; Klosterman, 2001). This trend was supported by the amazing advances in computer technology. Secondly, in a milieu that science could extend to the entire realm of human affairs, the approach towards (urban) planning changed from planning as architectural design towards planning as a rational science with an emphasis on positivism, rationalism and systematic decision-making (Batty, 1994). While beforehand urban planning was the domain of great visions and ideals (e.d. the garden cities of Howard, new towns and green belts), growing complexity led to the belief that only through rationality those visions could be realised. Because it was believed that cyclical generating and evaluating alternatives based on full information resulted in the best plan in a top-down fashion, this was intimately bound up with the use of computers (Batty, 2003).

Accordingly, large projects were initiated to develop the so-called large-scale urban models (LSUM's) for various cities. These models were designed to encompass all complex processes of the urban environment, because it was believed that "failure to replicate known complexity is tolerating ignorance without cause" (Lee, 1994). New insights in modelling algorithms supported these developments. Maybe the most important example is the introduction of the gravitation model that modelled the relation between two zones (Lowry, 1964) closely followed by Alonso's theory on location and land use (bid rent theory) (Alonso, 1964). Also, first attempts to develop urban cellular automata were undertaken.

As will be discussed below, the LSUM's were not a big success. With a changing view on planning in the 1970s (less techno-rational, more political (Couclecis, 1991; de Roo, 2004)), these all-inclusive models were loosing ground fast. In their place, more task specific tools were developed; decision-support systems (DSS). This term was first coined in management literature in the late 1970s by Gorry and Morton (Batty, 2003; Gorry and Scott Morton, 1971; Klosterman, 2001). *S*DSS, as an acronym used to point out the specific stance of DSS with a spatial component (Densham and Rushton, 1988), were developed for planning specific tasks. An ideal-type SDSS consists of three components (interface, database and a model base) which should integrate all relevant information, the full range of analytical and statistical tools and visualization and presentation facilities. Important improvement over LSUM's is that the objective of the systems is to provide flexibility and ease-of-use; they are designed to support ill-structured decisions (by providing quantitative *and* qualitative analytical possibilities) (Klosterman, 2001).

In the late 1980s and early 1990s, a parallel development of geographical information systems (GIS) was seen as a major leap forward for computer-aided planning. GIS were able to support the whole range of planning tasks; gathering and organizing data, apply spatial analysis and produce maps for visually presentation. Soon, they became the core part of most SDSS. As a instrument to improve the accessibility and usability of spatial data, these systems succeeded, yet "[f]or a variety of practical, technical, and theoretical reasons GIS capabilities are not yet fully attuned to the information needs of planning"(Couclecis, 1991, p. 9). The systems are on the one hand too generic, providing all functionalities, but one the other hand they do not offer essential analytical tools (e.g. for analyzing relational space characteristics). Also, the wide range of possibilities offered, doesn't help to improve clarity for potential users.

Again, these developments were overtaken by changing views in planning. Following Healey, planning nowadays can be best seen as an ongoing process of social design, dialogue and debate in which planners, public officials, and the public attempt to decide together how to best manage the collective concerns of society (Healey, 1996; referred to in Klosterman, 2001). This communicative approach (after Habermas, 1984) asks for new systems that can support "collective design, social interaction, interpersonal communication, and community debate which attempt to achieve collective goals and deal with common concerns" (Klosterman, 2001). Facilitating this through "interactive, integrative, and participatory procedures [with] particular attention to long-range problems and strategic issues" (Klosterman, 2001), the new wave of planning support systems (PSS) should provide the planner with the right tools for the entire planning process, which is different for every specific issue. These PSS were and are believed to overcome the problems that LSUM's, SDSS and GIS have faced before, but again practice shows otherwise (Vonk, 2006). If we see this as an evolution in which we learn from mistakes made before, it is wise to consider the faced problems in more detail before continuing.

3.2 Why computer-aided planning failed so far

One of the first fundamental critiques on the field of computer-aided planning was coined by Lee in his Requiem for Large-Scale models. The attempts to include the complex urban system in one computer model were bound to end up in disappointment, because 'every additional component introduces less that is known than is not known' (Lee, 1973, p. 165). The widely supported principle of Occam's razor[1] supports this idea. If one sees how many variables influence traffic (figure 1), one can only imagine how such a scheme would look like for the whole urban situation. Associated with this, Lee defines seven 'sins' of the modelling community which underlie the failure of LSUM development. These are; hypercomprehensiveness; grossness; hungriness; wrongheadedness; complicatedness; mechaniccalness and; expensiveness.

As addressed above, this article heralded an era that can be typified as the 'dark ages' of computer-aided planning. Although the developments in hardware and software really picked up speed, the intrinsic problems were not solved. This lead the Journal of the American Planning Association to issue a special edition in 1994 with a retrospect on Lee's Requiem in the light of a changed society, planning context and technological framework by some of the most influential scholars in the field of computer aided planning. Klosterman (1994) argues that Lee's "Requiem" have had a significant

[1] The principle of Occam's Razor (also called the principle of simplicity) is most often defined as '*entities should not be multiplied beyond necessity ("entia non sunt multiplicanda praeter necessitatem").* Albert Einstein rephrased it as "the supreme goal of all theory is to make the irreducible basic elements as simple and as few as possible without having to surrender the adequate representation of a single datum of experience"(Ariew, 1976)

impact on planning practice and scholarship (with over 120 citations in the Social Science Citation Index).

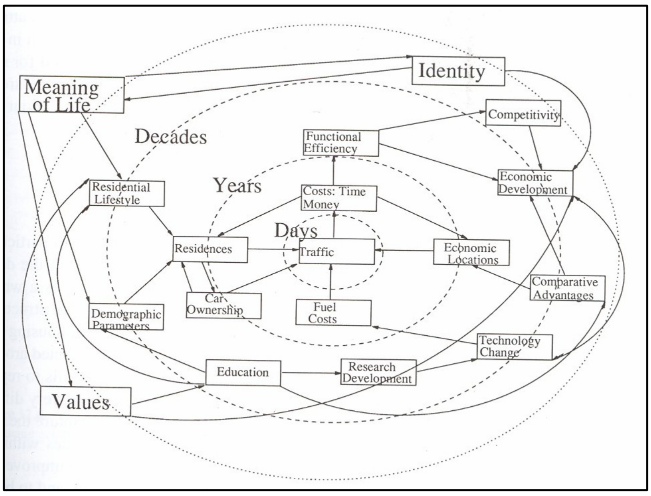

Figure 1. The complexity of variables influencing traffic (taken from Allen, 1997).

Harris goes even further pointing at the fact that the article 'did a great disservice to both planning and modeling (…) and significantly delayed the development and use of models in planning' (1994, p. 31-33). The article did indeed mark the end of an era of positivism and rationalism in planning and modeling, but why blame the messenger, instead of taking the message to heart and changing the approach towards modeling for planners?

Batty (1994) argues that, while the original surge of practical applications subsided, planning applications diffused around the globe. The large-scale models represent theories and instruments that are both essential and natural for planning. The reasons why practical applications are still limited is because the models are difficult to apply due to a lack of data, the absence of theoretical consensus and limits to organizations. Although most of the technical limitations are overcome by advances in technology, the volatility of the planning problem context and the inability to develop models that are sufficiently robust for this task are still major reasons for lack of practical applications. Lee (1994) is less enthusiastic about the progress made in the two decades after his article. Again, he concludes that the modelling society failed to change their attitude and approach, once more failing to meet the high expectations of the planning society.

GIS has become much more widely embedded in planning practice, although mostly for simple routine tasks. The analytical capabilities are widely underused. Klosterman summarizes that GIS are to 'general-purpose', unable to accommodate particular needs of planning and not able to go beyond standard functionality (Klosterman, 2001).

A recent assessment of the field, shedding light in the recent wave of PSS instrument is provided by work of Geertman (2002), Geertman and Stillwell (2003a; 2003c) and Vonk (2006; 2005). Together, these publications show that the early optimism that PSS would be able to bridge the gap between planners and models is again not mirrored in practice. "Most PSS do not readily fit the changing needs of the planning profession; they are too generic, complex, inflexible, incompatible with most planning tasks, oriented towards technology rather than problems, and too focused on strict rationality" (Geertman and Stillwell, 2003c, p. 292). Additionally, Vonk argues that little research on user demands and the fact that technology is driving planning instead of the other way around is a dominant failing factor. He concludes that miscommunication between system developers, users and experts of PSS results in a mismatch between the characteristics of the contemplated users and their planning processes on the one hand and PSS on the other. Consequently, most PSS do not go beyond a prototype phase (Vonk, 2006).

3.3 How to continue after such criticism

Taking hit after hit, one wonders why the modeling society doesn't just throw in the towel; maybe planning cannot be supported with instrument, maybe it is just too unique and too ill-structured.

Yet, there are too many reasons why we should continue the quest for computer-aided planning. Three of them are most significant in this specific case. Firstly, planning practice is desperately seeking for tools and instruments that can structure and support communicative processes (Vonk, 2006). Communicative planning is not just about sitting around and chat. Although this is one of its components, it should also be about testing ideas, creating new knowledge and result in decisions. To achieve such, rules of engagement are needed; equal power, ability to test information and knowledge, (see e.g. Habermas, 1984; Jessop, 1998). Secondly, new planning arenas (e.g. regional) are not facilitated with legal frameworks and structures; here, the need for some support to go forward is especially apparent. Thirdly, transitions to new insights and new planning goals (e.g. integrating land use and transport) ask for collective and transdisciplinary learning in which stakeholders, experts and the public together learn and together create new intersubjective knowledge. Providing insight in complex interrelations and abilities to test hypotheses is what computers could add to this process (Rotmans, 2005). So, the question is not if, but how we should continue with developing models for planning support. The literature mentioned above provides some clues.

Lee's 1973 article concludes with four guiding principles for future modeling efforts. Firstly, models should be *transparent* to be readily understandable by potential users. Secondly, they should be based on strong *theoretical foundation*, objective information and wisdom or judgment to overcome empty-headed empiricism, abstract theorizing and poorly informed modeling. Thirdly, they should be based on *particular planning problems* that are experienced in practice and finally they should be based on the principle of simplicity (Lee, 1973). The same guiding principles are repeated in his retrospect in 1994, because according to him, modelers have failed to pick them up (Lee, 1994).

Twelve years after this retrospect, Vonk recognizes that these principles are still not fully applied in practice (Vonk, 2006). He provides us with three possible approaches to go forward; instrument approach (focussing on usefulness and user-friendliness), user approach (user acceptance) and transfer approach (focussing on diffusion). The latter two are aimed at instruments that are developed for specific agencies and for specific users. Because we are looking for a PSS that can be used to support planning processes between several agencies and institutions, the former approach (focussing on usefulness and user-friendliness) should be the dominant one. It is this approach that puts the instrument as a dependent variable and the user as the independent one.

3.4 Participatory development

Recognizing and learning from these difficulties and their underlying rationale, we opt for a user-oriented development and design process towards a PSS that supports the integration of land use and transport policy-making, bridging the content as well as the institutional gap between the two domains. It is believed that including the potential users from the offset of the development process through all phases until the final implementation has several benefits. First, it will result in a PSS that is closely connected to this specific field of planning practice with its specific processes and problems (user as independent variable). Secondly, it enables us to make use of the implicit and tacit knowledge of the stakeholders in this domain. Thirdly, it will create commitment for the developed PSS, because the participants will recognize the assumptions made. Fourthly, this same recognition will open the black box. Fifthly, it will create extra supervision in avoiding the seven sins of Lee. Finally, it will support a process of mutual learning by getting the relevant stakeholders on the same table discussing the crucial interrelations between land use and transport (land use and transport planners learn) and between computer tools and planning processes (modellers and planners learn).

This continuous cooperation is performed through a so-called 'community of practice', including stakeholders, planners, experts and modellers as proposed by Vonk (2006).

Before even starting with the development of a PSS, two aspects have to be clear. Firstly, the current needs and demands of the potential users need to be analyzed. Secondly, recently developed PSS that share some, or most, of the objective have to be examined. Strengths and weaknesses of those PSS can result in some guidelines to start the development with. As Klosterman already recognized "PSS must not be seen as a radically new form of technology […], it must take the form of an information framework that integrates the full range of current (and future) information technologies useful for planning" (Klosterman, 2001, p. 15).

Therefore, two recently developed PSS with similar objectives (the VPR and the SDS+STE) are assessed. Some qualitative results are presented below. First, we will outline why these tools are chosen. Then, both PSS will be shortly introduced, after which. This will lead to a common understanding of the dominant factors for failure in this sector. The recently developed PSS will be assessed based on these factors and on how well they score on our own objectives. In the final part of this paper, we will draw some preliminary conclusions and summarize the lessons learned.

4. ASSESSING RECENT DEVELOPED PSS

Due to the rather technical engineer-driven background of the planning subject, the transport planning domain has already had a long history of computer aid in planning; tools to calculate necessary capacity of roundabouts and angles of highway ramps (often spreadsheets), to design solutions (CAD-tools) and the more sophisticated dynamic transport models and five step static models to calculate I/C ratios throughout a network (see chapter 3 and e.g. Ortúzar and Willumsen, 2002) are all used in practice.

It is expected of land use planners that they are more visionary and abstract in their work, making it harder to use computer tools. As we will see in the next chapter, the invention of linking databases to geographical maps (as in GIS), introduced more and more spatial analytical software and instruments to the field in the late 1980s and 1990s.

4.1 Selecting relevant land use and transport PSS

Here, we are especially interested in the instruments that link both fields, mostly referred to land use and transport integration (or LUTI) instruments as you will. Because this term is an umbrella for computer tools, planning methods as well as process management approaches (Al and van Tilburg, 2005), we narrow it down to the LUTI PSS, defined here as facilitating infrastructures to arrange information throughout the policy-making process (based on Batty, 2003; Geertman and Stillwell, 2003b; Klosterman, 2001). Besides this, the research is focussed on the regional level. Here the gap between land use and transport appears to be the largest, while more and more strategic planning issues have to be dealt with on this level.

The PSS should aim to support the *entire planning process*, but the main focus is on the *early phases* (visions, alternative development). Because the minds are relatively unset in this stage, real integration is more likely then in later planning phases.

This integration is partly a process of deliberative or *communicative learning* between all stakeholders. In such an approach existing tacit knowledge is as important as new scientific information. Getting it out in the open and discussing ideas are important elements that can and should be supported within a PSS. It should be able to add new knowledge to the debate and adapt to changing ideas and views of the users.

The definition of a PSS as being a facilitating infrastructure to arrange information implies a *process as well as a content-oriented* component (e.g. a protocol supported with different instruments at different stages).

Because we adhere to a user-oriented PSS development (see above), this assessment also has to include the users. Therefore, it is crucial that the PSS has been used in at least one practical situation.

Both the VervoersPrestatie in de Regio (VPR) as the combination of the Spatial Design Support and Spatial Transport Evaluator (SDS+STE), meet all of the criteria above.

4.2 A short description of both PSS

After the success of an approach to stimulate cooperation between urban design and transport at the level of location design (VervoersPrestatie op Locatie(VPL)), SenterNovem (together with the AME institute of the University of Amsterdam) wanted to upscale the potentials of this process, its tools and the positive effects to a regional scale. The VPR should support the elimination of mobility problems and the improvement accessibility through the process of land use planning on a regional scale. Through process and content-oriented support, the focus is on forcing back the need to move by car. In the 2001-2003 period, seven pilots were executed by several consultants. According to SenterNovem, the pilot *Stedendriehoek*, executed by Goudappel Coffeng came closest to the VPR body of thought.

The SDS+STE is a set of tools developed by Royal Haskoning and is developed to support two core activities of an iterative planning process; analysis and testing, see figure 2. The set as a total is used in two pilot studies; *Netwerkstad Twente* and *Zuid-holland*.

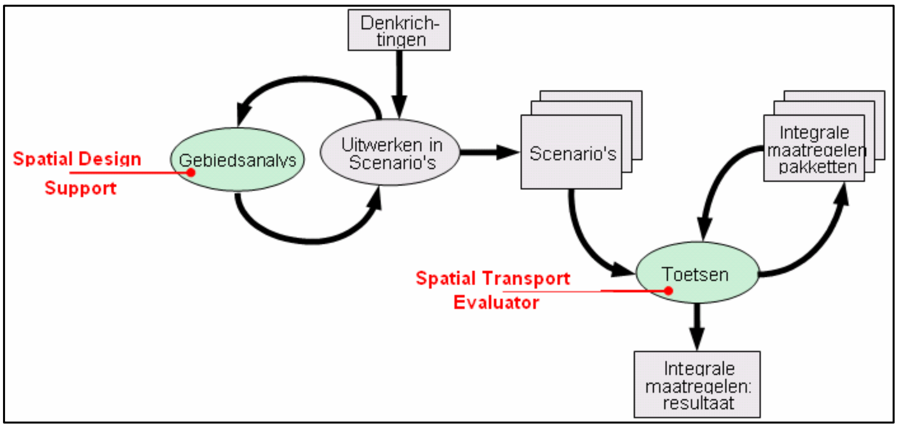

Figure 2. SDS+STE as a process.

4.3 A qualitative assessment (preliminary results)

Both PSS are assessed by interviews with both their developers and the users. Due to time-constraints, the users are not interviewed yet, therefore, this paper only presents the results of the interviews with the developers. For the VPR two consultants of SenterNovem and one of Goudappel Coffeng are interviewed. For the SDS+STE, we have talked with two consultants of Royal Haskoning. Furthermore, the reports concerning the pilots were included in this research.

The VPR as a PSS has not been applied outside of the pilot studies, yet its body of thoughts has probably influenced many consultants and users. Because the VPR was not more then 'an approach', which the consultants had to fill in with their own tools and instruments, it has generated a variety of processes and instruments and linked existing ones together.

The pilot carried out by Goudappel Coffeng was successful as far as the VPR goals are concerned. Although land use was leading, the policy options designed in the pilot showed an increased integration between land use and transport with better scores on relevant indicators. It did not lead to concrete policy-decisions, but due to some political commitment, the recommendations were included in later documents.

The introduction of some new indicators fuelled the collaborative learning process, which lead to new ideas and scenarios. Nevertheless, some guidelines were already set in front (there had to be a new bridge and a light-rail network in the end result). Instruments were used as back-office tools, so users only saw the output of it. Parameters were discussed, but the participants all agreed with the assumptions behind them.

The assessment of the SDS+STE instrument shows roughly the same results. According to the consultant, the tool was not used (as one set) after the pilots, due to the fact that it was unusual for a consultant to guide the whole process. Due to a lack of political commitment (especially in the *Zuid-Holland* pilot), the process failed to achieve integration of policy in documents. Yet, this made it possible for the participants to think free (due to its informal nature) and this positively influenced the deliberative learning process. The resulting scenarios show that integration is achieved.

Both PSS have been applied to a particular planning problem. Transparency of the tools was low, but this was not considered to be problematic by the participants. The same goes for the user-friendliness and usefulness.

5. THE WAY AHEAD

How do we continue from here? First of all, the users of the models have to be interviewed. With their answers on the same questions, we can assess if the modellers and users have cooperated and if both are equally satisfied. Then, more PSS have to be included in the assessment. Currently, we are on the way to assess IRVS+Ruimte, Mobiliteitstoets, Scenarioworkshop and TIGRIS XL. Hopefully, more can be presented in July at the Eindhoven conference.

Due to time constraints and limitations concerning the paper size, only a few results are presented. Again, additional results will be presented in July.

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