Abstract

"Report on practical application and development of Decision Support Tools in water management"

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The Decision Support Systems (DSS) are computer based systems designed to improve the ultimate effectiveness of decision making when dealing with ill- or semi-structured problems. Generally, although employing distinct approaches, DSS are expected to explore multiple perspectives of the problem at hand; enhance decision makers' insight in the problems drivers and policy outcomes; and facilitate communication and knowledge transfer between the actors involved in or affected by the decision. In environmental policy fields, having to tackle complex and interwoven issues, DSS also play a crucial role as a catalyst of interdisciplinary research and promoter of scientific policy advice. Numerous DSS have been developed, integrating advanced modelling, simulation, optimization and knowledge-based tools with spatial data management functionality. These systems differ considerably according to the problems targeted, the scales considered, and the objectives aimed at. More recently, research and development projects have been funded under the 5th EU research framework (1999-2002) to address issues related to harmonising modelling tools and developing integrated DSS to assist the implementation of the Water Framework Directive (WFD).

Over the past decades the DSS seem to have been continuously loosing their appeal, most importantly because of their conceptual ambiguity and frustration related to the lack of successful implementation. Using DSS to solve real-world decision problems, however theoretically sound and justifiable they may be, is beset by several snags, and the risk of decision support systems failing to be up to the challenge of real-world problems is reported to be high. There are many reasons for a low acceptance of DSS among policy makers. In many cases the systems developed to tackle specific issues fail to address the problems' changing context. System complexity, highly demanding user interfaces not geared to users' skills, low transparency of the system's mode of operation ('black box' technology), mismatch between requested and supplied functionality, failure to consider the institutional issue of DSS implementation are also frequently quoted reasons for DSS failure. Cognitive obstacles, such as an aversion among senior executives to DSS technology, have been reported as significant in specific situations. In addition, the overwhelming majority of decision support systems have been developed in an academic environment, which implies limited scope to oversee the implementation process and the adaptation of the DSS to specific organisational contexts once the corresponding research project has been completed.

As a result of only partly fulfilled promises, the DSS field suffered from increasing frustration, rising negative attitudes and frequent abandonment, especially in light of the persistent lack of the implementation success. Yet, this standpoint does not account for the variety of benefits, taking place during the DSS development and/or implementation in management practices. We argue that judgements about the success or failure of DSS have to take into account a variety of benefits which go beyond simple measuring whether DSS are being applied or whether the recommendation produced are taken up by the policy makers. If wider benefits are to be accounted for, the foundation of DSS has to be revised. The definition of DSS must not be restricted to a piece of software but should include a set of supporting methodologies/techniques, not coded in form of computational algorithms, which facilitate software development, implementation in a given institutional context and application to a specific management problem. The achievements of DSS may be materialised in the decision outcomes (more effective and efficient decisions) and in the (changes to) decision process (more informed, inclusive and transparent decision making). In such a context, development, implementation and application of DSS entail complex interactions between the human mind and computer technology, able to stimulate learning, question beliefs and tacit assumptions and render decision making processes more transparent and effective.

The report will consists of a summary of DSS developed to facilitate the WFD implementation, and a broader literature review analysing different measures and drivers of the implementation success. Based on the insight provided from the review, a set of recommendation for the development and implementations of DSS (DSS policy briefs) will be developed.