

## ***Interactive comment on “Systems analysis – a new paradigm and decision support tools for the water framework directive” by M. Bruen***

### **Anonymous Referee #1**

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#### GENERAL COMMENTS

This article raises many interesting points and introduces a wide range of useful concepts. It offers a wide-ranging collection of techniques, which brings together a useful set of literature into one place.

The introduction to the classical paradigm of systems thinking is good, and provides a useful context. The article has the potential to add to the knowledge of new paradigm systems thinking, but at the moment, this is obscured by a lack of structure. The article lacks links between the ideas, several areas where better links could be made are suggested below. It would be greatly strengthened by a more analytical section pulling together the key themes from looking at the different methods. At the moment, there

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is a good deal of interesting information there, but it is in places descriptive and it is hard to get a sense of what conclusions can be drawn from the information. Neither the abstract nor the introduction make it clear what stage the WINCOMS project is at.

This paper appears to be a review paper that was then used to help determine the methodologies to be tested in the WINCOMS project, but that is not made clear. A clear exposition of the criteria against which the different methodologies were tested or selected for the WINCOMS project would be useful, and could provide a useful organising framework for structuring the review section. Once these considerations are taken into account, and the review is structured so as to make the analysis of methods or more apparent, or at least to draw out some key themes, the introduction section, including the section about the structure of the paper, should be re-written. The conclusion could do more to link back to the new systems paradigm and possibly its relationship to new ways of using information and communication technology, thus clarifying the paper's theoretical contribution.

The suggestions below for clarification and restructuring would help to draw out the interesting points made in the paper and thus enhance its potential contribution.

#### SPECIFIC COMMENTS

pg. 1491 - 15 The statement in the abstract “this is best done by trained sociologists fully integrated into the process” could provide an interesting hook for the discussion, but as it stands comes across as an unsubstantiated claim. If this is to be stated in the abstract, it needs to be discussed further in the paper.

pg. 1491 - 20 The WFD requires more than just good chemical water quality status. Mention should be made of the need to good ecological status and the fact that the WFD looks at hydro-morphological and ecological improvements as well as chemical improvements.

Pg. 1493 - 15 At this stage, the WINCOMS project should be introduced and the

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connection between this project and the rest of the article made clear - at this time, the text does not mention section 6 at all.

1495 - 12 - 19 It is not really clear why de Bono's work and these other techniques such as Metaplan are in this section on old paradigm systems approaches. De Bono's work in particular has roots in second order systems thinking. These concepts might more usefully be talked about in section 4.

It might be helpful to talk also about the changing dynamics of the WFD - that requires active participation and involvement of stakeholders in generating ideas, not just in commenting on concepts (this may need to be referred to on pg. 1496, 19-20, as this could contradict the comment that participants may be able to comment better on a single proposal. This statement stands at odds somewhat with shifts in legislation such as SEA Directive requiring involvement of stakeholders in the generation of alternatives, as well as the requirement for active participation in the WFD. Enserink, B. and Monnikhof, R. 2003. 'Information Management for Public Participation in Co-design Processes: Evaluation of a Dutch Example.' *Journal of Environmental Planning and Management*, 46 (3): 315 - 344. may be a useful reference here.

Pg. 1496 - section 3 The new paradigm systems section could be further elaborated, to the standard of the section on the old paradigm systems, with more reference to the systems literature, e.g.:

Checkland, P. 2000. 'Soft systems methodology: a thirty year retrospective.' *Systems Research and Behavioral Science*, 17 (S1): S11-S58. Innes, J. E. and Booher, D. E. 1999. 'Consensus Building and Complex Adaptive Systems: A Framework for Evaluating Collaborative Planning.' *Journal of Planning Association*, 65 (4): 412-423. Ison, R. and Watson, D. 2007. 'Illuminating the Possibilities for Social Learning in the Management of Scotland's Water.' *Ecology and Society*, 12 (1): 1-21. <http://www.ecologyandsociety.org/vol12/iss1/art21/> Ison, R. L. 1998. *The Future Challenge: The Search for System*. 9th Australian Agronomy

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Conference, Wagga wagga, The Regional Institute Ltd. accessed Aug. 12, 2003. <http://www.regional.org.au/au/asa/1998/plenary/ison.htm> Ison, R. L., Maiteny, P. T. and Carr, S. 1997. 'Systems Methodologies for Sustainable Natural Resources Research and Development.' *Agricultural Systems*, 55 (2): 257 - 272.

Pg. 1498 -10 Section 4 would greatly benefit from an introductory paragraph, it is not clear what this section is setting out to do. It would help to have some information about how these tools were found, how they were chosen, and what was the goal of the review. The section suffers from a lack of analysis, it reads more like a collection of information about tools, without having clear themes and concepts drawn out and summarised.

Pg. 1497 - 19 This section on utility could do with a reference.

1498 - 4 - 9 This section could do with a reference.

Pgs. 1499 - 1501, lines 5 - 28 It is not clear what these sections (Weighted averages, Multiplicative models, etc) add to the argument.

If this is original work that makes a contribution to DSS, this does not come across in the narrative. They seem to go into far more detail than any of the other sections, and it is not clear what this detail adds. It is also not clear how this information relates to water planning. If this is original work by the author, and it specifically relates to the DSS tested in the research project, it should be in a separate section and this should be made clear. If it is not, I would suggest that the author should summarise the key points, and point the reader to the original texts for the mathematical detail. This would free up some words for the more analytical summaries of the tools that would strengthen the paper overall.

The section on hierarchy on pg. 1501 is interesting, but could do with some elaboration as to what types of hierarchy are being discussed - here it looks like managerial hierarchies, but hierarchy theory has more general applications - e.g.: Allen, A. D. and

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Hoekstra, T. W. 1992. *Toward a Unified Ecology*, New York, Columbia University Press.  
Gibson, C. C., Ostrom, E. and Ahn, T. K. 2000. 'The concept of scale and the human dimensions of global change: a survey.' *Ecological Economics*, 32 (2): 217 - 239.

Pg. 1503 - 9 Define 'Kalman Filtering'

Pg. 1505 lines 3 - 11, This section reads as rather a list of tools, without giving much contextual or analytical information - what can be gleaned from the research into these tools?

Pg. 1505 - 9 Define FI FCTRF TRI method and if possible give the full title, not just the acronym

Pg. 1505 section 5 Again, this section would benefit from an introduction - what is the point of the section, how does it relate to the previous section, how have these approaches been chosen? Is it just a selection of methods? Are they commonly cited? Are they the only methods that show up in an academic review?

This section pulls together useful literature and a useful set of methodologies, but would benefit from more analysis of the methodologies - what are their characteristics? How do they differ? Has any research been undertaken to evaluate the outcomes of using these methodologies?

Are there any categories that could be used to classify the methodologies? E.g. electronic methodologies, DSS, more generic, social learning (that may and may not have digital components). It is not clear at the moment whether these are all seen as DSS or if they all have digital components.

The section would also benefit from a brief summary of key points, to lead into the sixth section and to clarify what the WINCOMS project will add to this literature (at the moment, I don't think the article does justice to what will be added by the WINCOMS project). Section 6 starts with 'to address some of these issues', but it is not clear which issues these are.

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1510 section 6 It is not clear why these two methodologies were chosen. Was this the outcome of the academic review carried out and discussed in the first part of this paper? If so, it would be helpful to summarise the key advantages of these two methodologies and why they were chosen, and to better link this with section 5.

1511 section 7 - Conclusions This section introduces the concept of shifts in digital support such as Graphical User Interfaces. More could be made of this earlier in the paper, it seems a very relevant and important point, and it is not done justice by only being discussed in the conclusion. Perhaps it could be introduced in section 6, which is more specifically about DSS.

The conclusion could elaborate a bit more on the link between the methodologies reviewed, the project as planned and the shift to a new systems paradigm. This is mentioned briefly, but as it is the core intellectual framework of the paper, the conclusion should draw out key themes and concepts more clearly at this stage.

## TECHNICAL CORRECTIONS

pg. 1492 - 22 - stakeholders should read stakeholders'

pg. 1496 lines 11 - 14 need greater clarity in the grammar

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Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 4, 1491, 2007.

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