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## **Comment on hess-2021-177**

Anonymous Referee #1

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Referee comment on "Using Multi-Criteria Decision Analysis for transdisciplinary co-design of the FANFAR flood forecasting and alert system in West Africa" by Judit Lienert et al., Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2021-177-RC1>, 2021

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This manuscript does not meet the standards of a good research paper. It more like a diary or a story of what was done. It is also quite annoying that the authors are so strong agenda in advocating the terms transdisciplinary and co-creation without really demonstrating what new those ideas bring into the traditional MCDA process.. There are lots of unjustified claims and procedural statements. There is no clear structure of the overall modelling procedure and methods used. New twists and approaches are introduced here and there along the text. The structure used in the modelling seems to be very different from standard procedures so a description and justification is needed in one place not scattered in the text.

The essential question is whom is the paper intended to and what are its real contributions? As it is now the modelling parts can possibly be understood by someone who is well familiar with different MCDA methodologies. I do not think that the readership of this journal has the required background in MCDA. The contribution can be that such an extensive project has been set up and completed. But for a project description there should also be some critical evaluations of the possible weaknesses and challenges related to the modelling approaches used. Now the report only provides a happy story. This is never the case in real life.

The paper is about the design of a forecasting system and as such the topic is one that is common and well-studied in engineering. For an exemplary paper see:  
<https://www.tandfonline.com/doi/full/10.1080/09544828.2016.1214693>

Perhaps a note to this literature would be help the reader to place the article in the general literature.

The paper strongly advocates the terms transdisciplinary and co-creation (in the text also co-coproduction, co-design). These are ideas which have been embedded in interactive MCDA for tens of years. MCDA uses data produced by experts from different fields. I personally do not see this as a novel co-creation or transdisciplinary process. In my opinion the paper reports a typical MCDA project and not anything else. There might be room for a separate paper discussing what new do the terms transdisciplinary and co-creation bring into MCDA and vice versa.

The paper is full of poorly formulated sentences. I will not go into these in detail. As an example I have included a copy of the abstract with some exemplary points noted with question marks or BOLD text. The abstract is way too long and anecdotal.

**Abstract.** Climate change is projected to increase flood risks in West Africa. The EU Horizon 2020 project FANFAR co-designed a pre-operational flood forecasting and alert system for West Africa in three lively? workshops with 50–60 stakeholders, BY? adopting a transdisciplinary framework from Multi-Criteria Decision Analysis (MCDA). We aimed to (i) exemplify MCDA as a structured transdisciplinary process; (ii) prioritize suitable FANFAR system configurations; and (iii) document and discuss empirical evidence WHAT IS THIS EVIDENCE DISCUSSED?. We used various interactive problem structuring methods DID YOU REALLY USE MANY PROBLEM STRUCTURING METHODS OR SOME OTHER PROCEDURES in stakeholder sessions to generate 10 objectives and design 11 FANFAR system configurations. The non-additive MCDA model combined expert predictions about system performance with stakeholder preferences elicited in group sessions. A VERY STRANGE WAY OF SAYING THAT THE MCDA MODEL WAS BASED ON EXPERT DATA ON THE EXPECTED PERFORMANCE. All groups preferred a system producing accurate, clear, and accessible flood risk information that reaches recipients well before floods. THIS WOULD BE THEIR IDEAL BUT PREFERENCES RELATE TO TRADE-OFFS. To receive HOW IS THAT RECEIVED? this, most groups would trade off SPELLING, higher operation and maintenance costs, development time, and implementing several languages TRADE-OFF TO WHAT . We accounted for uncertainty in expert predictions with Monte Carlo simulation. Sensitivity analyses tested the results' robustness for changing MCDA aggregation models and diverging stakeholder preferences. Despite many uncertainties, three FANFAR system configurations achieved 63–70 % of the ideal case over all objectives in all stakeholder groups, and outperformed other options in cost-benefit visualizations. VERY STRANGE CLAIM Stakeholders designed these best options to work reliably? under difficult West African conditions rather than incorporating many advanced features WHAT DOES THIS REFER TO?. The current OR THE PROPOSED? FANFAR system combines important features increasing system performance. Most respondents WHO? of a small online survey are satisfied, and willing to use the system in future THIS KIND OF SURVEY DOES NOT REALLY PROVE THAT THE SYSTEM WOULD BE USED IN REALITY- THE PAPER DID NOT CONSIDER ANY USABILITY QUESTIONS WHICH ARE ESSENTIAL WHEN DEVELOPING NEW SOFTWARE. We discuss our learning ? drawing from design principles of transdisciplinary research. We attempted to over-come CHECK SPELLING "unbalanced ownership" and "insufficient legitimacy" WHY THESE CONCERNS AND NOT E.G. LACK OF TRANSPARENCY OF THE MODEL by including key West African institutions as consortium partners and carrying out co-design workshops with mandated representatives from 17 countries. MCDA overcomes TOO GENERAL STATEMENT challenges such as "lack of technical integration" WHAT DOES THIS MEAN AND HOW IS IT OVERCOME, or "vagueness and ambiguity of results". Whether FANFAR will have a "societal impact" depends on long term financing and system uptake by West African institutions after termination of EU sponsoring. We hope ? that our promising results will have a "scientific impact" ON WHAT and motivate further DO YOU MEAN :STUDIES OF ? stakeholder engagement in hydrology

research.

Some more remarks:

The paper uses the terms expert predictions, predicted outcome (section 2.8) and data (Box 7 in Fig.1.) . Why not Use the word data always?

Section 2.8 : The authors make strong claims in favor of non-linear models but do not critically discuss the new problems created. For example , the introduction of the coefficient gamma is not at all simple. How do you justify and explain the value selected for gamma to the stakeholders? The justification that attributes are non-compensatory can also be challenged. Typically any system design starts with some minimum requirement with respect to the attributes and only when these are met one starts to compare extra features.

Also the aggregation of opinions by taking averages is quite problematic as the result is then nobody 's opinion.

The notation and names used for the options and variables etc. are so difficult that the reader really cannot follow the text. Are they all needed? Who can understand Table 1 and 2.

Discussion is not a discussion of the approach but a report of the process. The claim that this co-design would meet the main requirements is strong. The discussion of the process continues in an anecdotal mode in 4.1.1. Where is critical evaluation?

4.1.2. is quite strange and unclear and full of unsupported claims with these cryptic notations. Quote: The weights indicate that most groups preferred that the system produces accurate, clear, and reliable information that reaches recipients well before a flood (11\_accur\_info; 12\_clear\_info; 21\_reliable\_info; 22\_timely\_info; Figure 4)

4.2.2. This section uses concepts and statements from Lang et al. but in this context they remain un-understandable such as this: `` Possible coping strategies are "Low thresholds for and appropriate levels of participation" (Lang et al., 2012)``

In this section the authors seem to accept a preference modelling approach which is not understandable to the stakeholders. This is not really supported by the professionals in the field.

The conclusion that system would be used in reality, when people say that they intend to use it, not really supported real life experience. There is no guarantee of real use even if people say they will use . User acceptance is a much more complicated issue and depends on the system and interface design and not only on the configuration. There is a rich literature on human computer interaction and the user acceptance of software