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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "Efficient GIS-based model-driven method for flood risk management and its application in central China" *by* Y. Liu et al.

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The authors are indebted to the anonymous reviewer for raising numerous important issues which will improve our final manuscript. The following revisions will be made in response to those comments:

Comment 1: Overall, the manuscript describes the framework of a DSS (decision support system) that can be used for flood risk management. I agree with the authors that efficient ways are currently needed to manage flood risk and support decisions. This is definitely of high importance to communities and countries worldwide. From that perspective, the topic addressed is both interesting and important. In addition the system that is described is comprehensive and contains several state-of-the-art elements.

Unfortunately though the manuscript at its current form does not support sufficiently the claimed novelties of the system. In my opinion considerable work is needed to a) present better to readers the main elements (mostly conceptual but also technical) of the system and b) demonstrate the claimed superiority relative to simpler systems. Below I provide a list with major comments that in my opinion need to be addressed before the manuscript is eligible for publication.

Response 1: Thank you very much for the comments on the paper. This is a very good suggestion. The manuscript has been major revised by adding a lot of clarifications and information. The main contribution includes the following three aspects:

(1) We present a new methodological framework for decision support system (Section 3 in the revised manuscripts). We have added the clarification of the Systems Life Cycle to describe the implementation method;

(2) We illustrate a loose-coupling technical prototype for integrating heterogeneous elements, such as multi-source data, multidisciplinary models, GIS tools and existing systems (see Section 4 in the revised manuscripts).

(3) We describe how the optimization models and algorithms combined in this framework by a case study (see Section 5 in the revised manuscripts).

About method validation, we compare the MDSS model with others on a set of criteria (see Section 6 in the revised manuscripts).

Comment 2: Language errors (both grammar and syntax) are a major issue. In many cases text is confusing due to language errors. Since the manuscript is mainly descriptive, language has a strong control on the amount and clarity of information that is passed to the reader.

Response 2: Thank you very much for the comments on the paper. This is a very good suggestion. We've got expert advice on improving our manuscript from an American team.

Comment 3: From the abstract you state “The main innovation is the application of model-driven concepts. . .”. My opinion is that these “model-driven concepts” are not adequately and clearly described. For example you state: “Model-driven method is a recent trend in software engineering whose main proposal is to focus on models rather than on computer programs”. What do you mean exactly? Is the main topic of the manuscript about software engineering OR about a methodological/conceptual framework?

Response 3: Thank you, this is a very good suggestion for our paper. In the revised manuscripts, Model-driven method research can be distributed in two aspects. The first is as DSS foundations research, which is described in Section 3. The other is as software engineering research, which is described in Section 4.

Comment 4: Evaluation of the system is needed to show that the system works properly. Currently you are just presenting an example, which shows that system is functioning at an operational level. This is good but it does not provide evidence to justify the claimed efficiency of the system. How is this system superior from other simpler DSS? Can you provide an example showing how this system supports decision in a more efficient way?

Response 4: Thank you. We compare the MDSS model with others on a set of criteria (see Section 6 in the revised manuscripts). We choose the following methodological framework (Zeng et al., 2007; Chen et al., 2011; Qi and Altinakar, 2011), because they are representative method for risk management in some facets. Table 1 shows the comparison.

References

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Zeng, H., Talkkari, A., Peltola, H., and KellomÂĺ aki, S.: A GIS-based decision support system for risk assessment of wind damage in forest management, Environ. Modell. Softw., 22, 1240-1249, doi:10.1016/j.envsoft.2006.07.002, 2007.

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Table 1. Comparison between traditional tight-coupling systems and MDSS.

	Traditional tight-coupling systems	MDSS
Development efficiency	Complex development process: including Requirements, Design, Construction, Integration, Testing and debugging, Installation and Maintenance;	Two-stage development process: 1) Deploy the universal Loose-coupling technical prototype; 2) Iteration optimization with technical-loop and behavioral-loop;
Distributed integration	They solve the problems of scalability by harmonization, the maintenance cost becomes incredibly expensive;	It provides flexible integration methods with open library based on SOA;
Emergency needs	They cannot be provided within the prescribed time;	It publishes deployable software at any time by Loose-coupling technical prototype;
Deployment flexibility	They provide only one type or a few similar types of clients;	It provides flexible user interfaces with expanded GIS by WPF and Interface Service;
Model creditability	It is difficult to verify or maintain a single model in the tightly-coupling architecture;	According with the review from practitioners and managers, models will be modified to increase the adaptability; New client will be deployed to verify the model creditability; Automatically loop;

Fig. 1. Comparison between traditional tight-coupling systems and MDSS