

## Interactive Design Tools for Coastal Developments

### What are Interactive Design Tools?

Interactive Design Tools allow users (i.e. decision makers, project developers, stakeholders) to verify the suitability of designs of coastal interventions by providing users with rapid feedback on the potential consequences of their decisions. The principal aim is to let users learn from their choices by giving them insights in the effects of their decisions, which may facilitate stakeholder discussions and steer the decision-making process. The tools are a combination of software (i.e. the actual application or model) and hardware (i.e. the platform on which the application is running, such as surface tables, iPads or as a web service). Ideally, the same application runs on multiple platforms.

### Why Interactive Design Tools?

Coastal development projects are generally characterized by complex, dynamic and multidisciplinary environments involving different stakeholders. Support of these stakeholders is of vital importance for the successful implementation of such projects. The tools allow users (stakeholders) to play around, test ideas and get rapid feedback on their actions. This way the tools can provide a useful contribution in stakeholder sessions, workshops or client visits for communicating specialist knowledge to non-experts and providing insight into the interactions between multiple disciplines/processes.



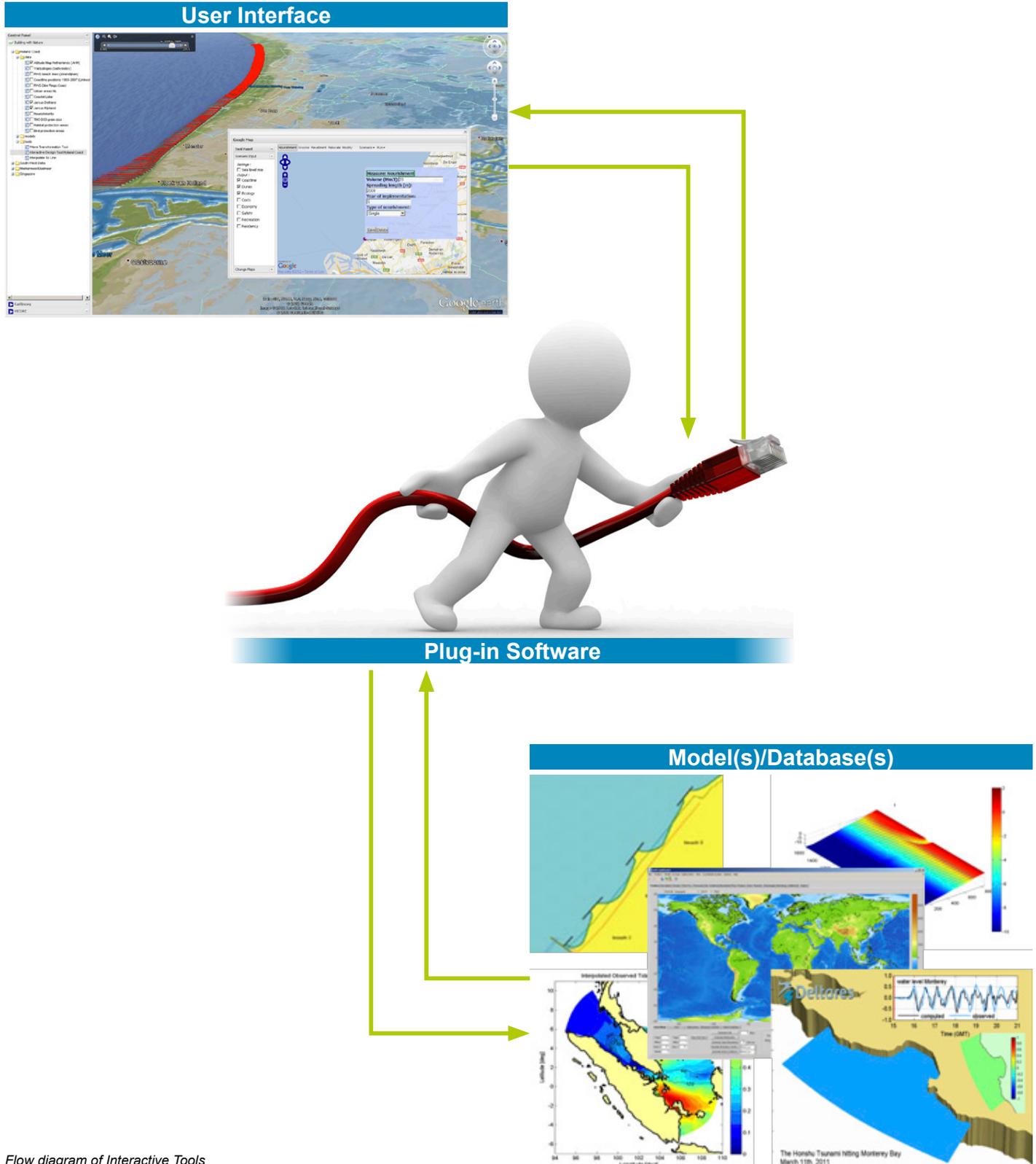
#### **Keywords:**

*Interactive tools, rapid assessment, stakeholders, communication, visualization, web service*

## The set-up of Interactive Design Tools

In its basic form Interactive Tools consist of a user interface in which users can input their decisions, a (train of) underlying model(s) or database(s) and plug-in software to translate the user-input to the model/database and, vice versa, visualize the result in the user interface (see flow diagram). The interface of Interactive Tools is such that it is easy to use by non-experts,

i.e. it strives to facilitate intuitive use by making use of graphics and limiting the number of buttons and actions to obtain a result. Experts are responsible for providing the underlying model(s) and/or database(s). Since the models are generally a trade-off between model accuracy and calculation speed, the assistance of the (model) expert while using the tools is recommended to put the results into perspective.

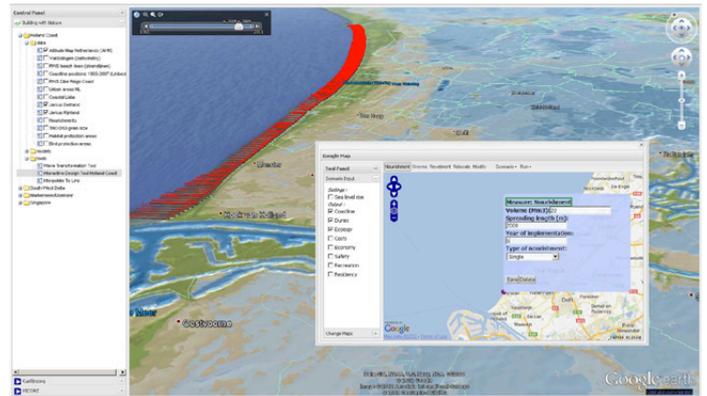


Flow diagram of Interactive Tools

## Interactive Tool Applications

### Interactive Design Tool for the Holland Coast

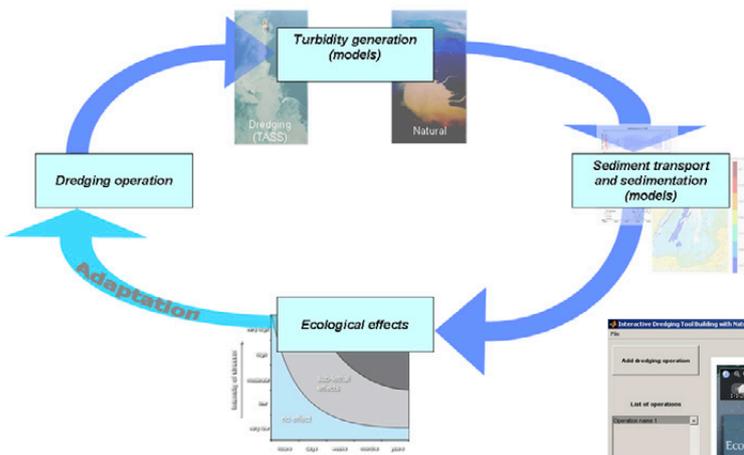
The Interactive Design Tool for the Holland Coast (see figure) is an interactive web application that can give stakeholders an indication of the potential impacts of a considered coastal intervention. Stakeholders can draw coastal interventions (i.e. nourishments, groynes, revetments) on an interactive map and provide their specifications. Consequently, an underlying coastline model (UNIBEST) gives an indication of the impact of these interventions on the coastline development in time (for years to decades). Also the potential impact on a number of coastal indicators, such as dune development, ecology, costs and recreation, can be derived. The results are visualized on a map, which shows the effects in both space and time. The direct feedback of this tool can assist stakeholders in their discussions on coastal development strategies for the Holland Coast. The tool has successfully been applied in a number of stakeholder sessions for long-term visions on the Holland Coast.



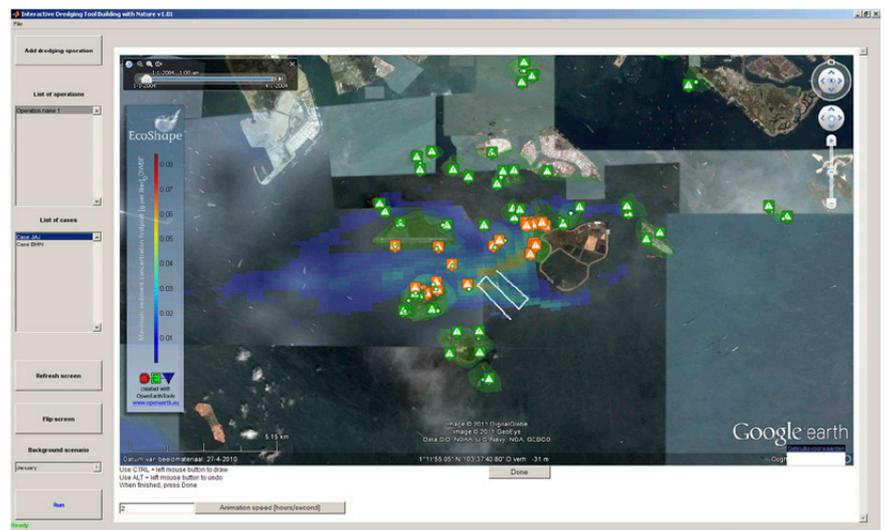
Interactive Design Tool for the Holland Coast: input window (upper-panel) and results (lowest panel)

### Interactive Dredging Tool

The Interactive Dredging Tool (IDT) is an application to perform rapid assessments of the expected, initial ecological effects caused by user defined dredging operations. Users can specify a dredging operation by drawing a dredging track and providing its specifications. This is inserted into a dredge plume model (Delft3D) to assess the turbidity generation of the operation. The results of the turbidity assessment combined with user-selected background conditions determine the stresses for the species present in the area of interest, which are then used to assess



the ecological impacts of the dredging operation (see work flow IDT). The tool can be useful for contractors to (iteratively) design dredging operations by minimizing the ecological impacts. Furthermore, it may contribute to the communication of the expected ecological effects to the different stakeholders involved in a project (e.g. authorities, local communities, etc.). So far, the tool has been applied only in pilot projects.



Interactive Dredging Tool: workflow (left panel) and user interface (right panel)



The sand engine Delfland (The Netherlands) source: Rijkswaterstaat/Joop van Houdt

## Future Developments

Future developments on Interactive Tools for coastal developments focus on increasing the flexibility of the underlying infrastructure and extending the number and variety of applications. Given the large number and variety of stakeholders involved in pilot project the sand engine (see picture), i.e. decision makers, coastal engineers, ecologists, lifeguards, surfers, beach club owners, etc, this may be an interesting case for future applications.

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