

Digital twin of the North Sea, A visual geo tool with computer modelling to support stakeholder engagement, to aid decision makers and support citizen involvement.

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Introduction

The North Sea is very busy and many users like fishery, wind farms, sea traffic, nature, military and recreation are requesting space. This leads to immense pressure on marine spatial planning. The project Digital twin of the North Sea (Digitwin) gives insight into the real data and provides easy modelling in an easy to use platform to assist in discussions with stakeholders and facilitate decision makers.

Digishape (digishape.nl) is a consortium of governments, businesses and research institutes that is promoting the use of digital techniques in the Dutch water sector. We experiment with open data in projects using new data and advanced IT techniques.

Scope

The project created a ready-to-use platform bringing together new technologies such as open source data and mapping services, cloud computing, gaming and virtual reality. This will bring a better understanding of the pressures all stakeholders experience, and will lead to better decision making

Methodology

The platform consists of a landing page where the three tools can be accessed. The Browser is the easiest and most familiar entry for all users. Depending on interest maps can be opened to see the different space claims in the Dutch North Sea (fig 1.).

Much effort was put into finding the best open data and maps and into presenting them in a user-friendly way. Models include a leveled cost of energy model for windfarms, a shipping safety model a fishery model and an ecological model.

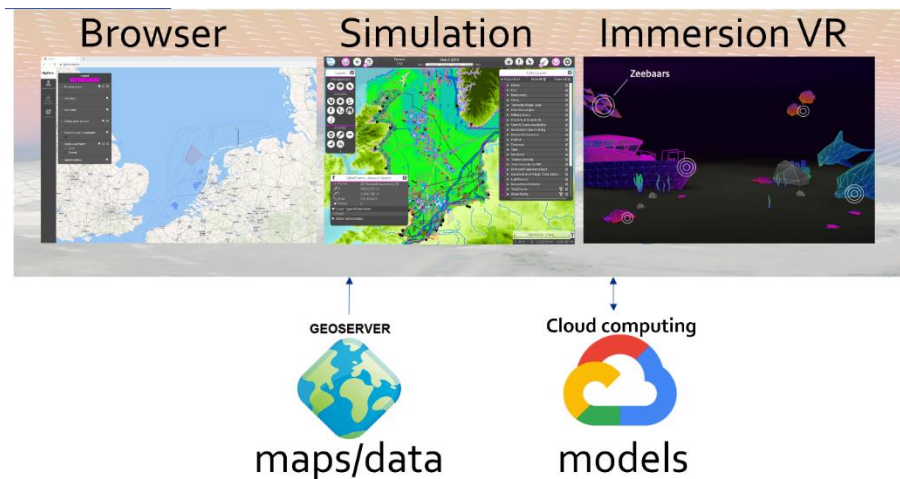


Figure 1: Architecture of the Digitwin. Maps and models feed the 3 user interfaces. A user can make changes in each of the user interfaces by e.g. building wind farms or changing shipping routes. The effects are calculated in the cloud and immediately visualised in the 3 user interfaces.

Results

Starting from the present situation the user is invited to claim new sea space e.g. for shipping or the building of a wind farm. It is likely that conflicts will arise with already existing uses of the sea. It is quite possible that there is already an oil platform or military use in that area. The platform takes all those maps and data from a central geoserver.

Next calculations and simulations are done using Google's high-performance cloud computing. The costs for energy production in new windfarms are calculated using state of the art and well accepted models from the Dutch wind industry. Shipping costs and safety is calculated using state of the art but simplified models from the Dutch institute Maritime Research Institute (MARIN). The platform is designed in such a way that different models and maps can be activated depending on the demands of the users.

A next level is introduced by the simulation platform. The same maps and computer models are available and give the same results. But in the simulation platform stakeholder processes can be played by multiple users. Discussions will emerge and the players must find solutions together or in competition. Conflicts with existing use of the sea cannot be simply neglected as is possible in the browser, and timing of decisions becomes crucial. The simulation tool really brings interaction at a higher level.

Finally, the virtual reality (VR) tool allows the user to immerse in the world of the sea. Citizens and politicians only rarely go out on the sea and have difficulty in understanding the challenges. VR helps you to see the outcome of decisions that are made. With 3D glasses on your head you can be the captain of a big oil tanker or even a sea bird trying to find its way in the turmoil of shipping lanes and windfarms.

Conclusions

An easy-to-use digital twin platform of the North Sea was created successfully. The platform can accommodate any map or model. So, the question is merely which maps and models you choose for your discussion or decision making. The Digitwin can be used in simple stand-alone way or in a more complex multiuser gaming mode. Depending on your question simple or more complex cloud computing models can be activated to evaluate scenarios and facilitate discussions.

Digital twins are still very new for many users. For further acceptance and effective use of digital twins, the maps and data must be reliable, and the models used must gain acceptance. Finally, more people should get acquainted with those tools by just playing with them and by using different VR tools and games that are now available for everyone.