Unlocking Heritage Data through a Flexible Data Model and Geo-Application

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Preserving our archaeological heritage for the future is of great importance given the numerous human and natural threats, either malicious or inevitable. Even the archaeological excavation process itself is destructive by nature (Stal et al. 2014). As a result, the collections of archaeological finds, field nodes, archaeological databases, photographs, reports and all other research outcomes have an indispensable value for future research (Snow et al. 2006). However, the research value of these data outreaches the domain of archaeology. Archaeological data also form a part of research, policy support and policy implementation in cultural heritage management, spatial planning, tourism, etc. A multiplicity of actors are thus involved both during and after the archaeological research process. To provide all of these actors with proper data and information and preserve these data for future reuse, a complete digital documentation of archaeological research is aimed for by many researchers (Snow et al. 2006; De Roo et al. 2015; Stal et al. 2014). Such a digital documentation is underpinned by a digital information flow between different actors and domains (Forte 2011). Realizing this digital information flow can entail a

more collaborative and interdisciplinary character for archaeological research and will enable the transfer of knowledge between different parties occupied with archaeological data (McKeague et al. 2012). However, the creation of such a complete digital archaeological documentation and digital archaeological information flow is challenging, e.g. due to the involved costs, training requisites and data characteristics.

Archaeological data are highly diverse and mostly typified by a geographical component. These two data characteristics ask for a flexible data model in which spatial data can easily be incorporated. Such integration of semantic and spatial data is realized in archaeological practice, by the use of GIS since the early 1980s. However, further exhausting the potential of this integrated approach is hampered by the complexity of archaeological data. Furthermore, the increasing use of 3D acquisition techniques in archaeology calls for strategies to integrate, store and handle 3D spatial data.

Besides focussing on dealing with archaeological data within one project or organization, the reuse and thus integration of data across projects or organizations should be central in the development of a digital archaeological workflow. Currently, archaeological data are stored in organization- or site-specific databases, due to the variety of archaeological objects, research questions and methodologies. Using different data classes, terminologies, data standards and strategies makes integrating data from different projects or organizations difficult, if not impossible. Therefore, a digital archaeological workflow should be based on a flexible common geodata model.

In this project, an easy, flexible and linkable data model is proposed to describe the highly diverse archaeological data: Archaeological DAta Model (ADAM). ADAM consists of objects (called nodes) and links (called relations). Nodes correspond to archaeological objects in a broad sense: an archaeological site is a node and even an archaeological organization can be conceived as a node. The characteristics of these nodes can be described by the relations. These are either attributes (e.g. colour, type and geometry) or links to other nodes (e.g. relative spatial location or functional parts). The absence of a rigid structure to describe and analyse data makes the data model suitable for several application domains in which heritage information is dealt with.

This paper shows the utilization of the data model in the case of marine archaeological heritage. In the SeArch (Archaeological heritage in the North Sea) project, one of the main objectives is to gather more information about the submerged cultural heritage in the North Sea (www.sea-arch.be). This information will form a valuable asset to our knowledge about the broader cultural heritage in the region and thus merits to be preserved and reused in the future. This data can be particularly valuable for heritage management and protection, marine spatial planning, raising public awareness on underwater heritage and scientific research on the North Sea. To integrate and share these data, a web application is being developed in the course of the SeArch project through which both the project partners (Ghent University, Flemish Heritage Agency, Flanders Marine Institute and Deltares) and the future actors can access all relevant information.

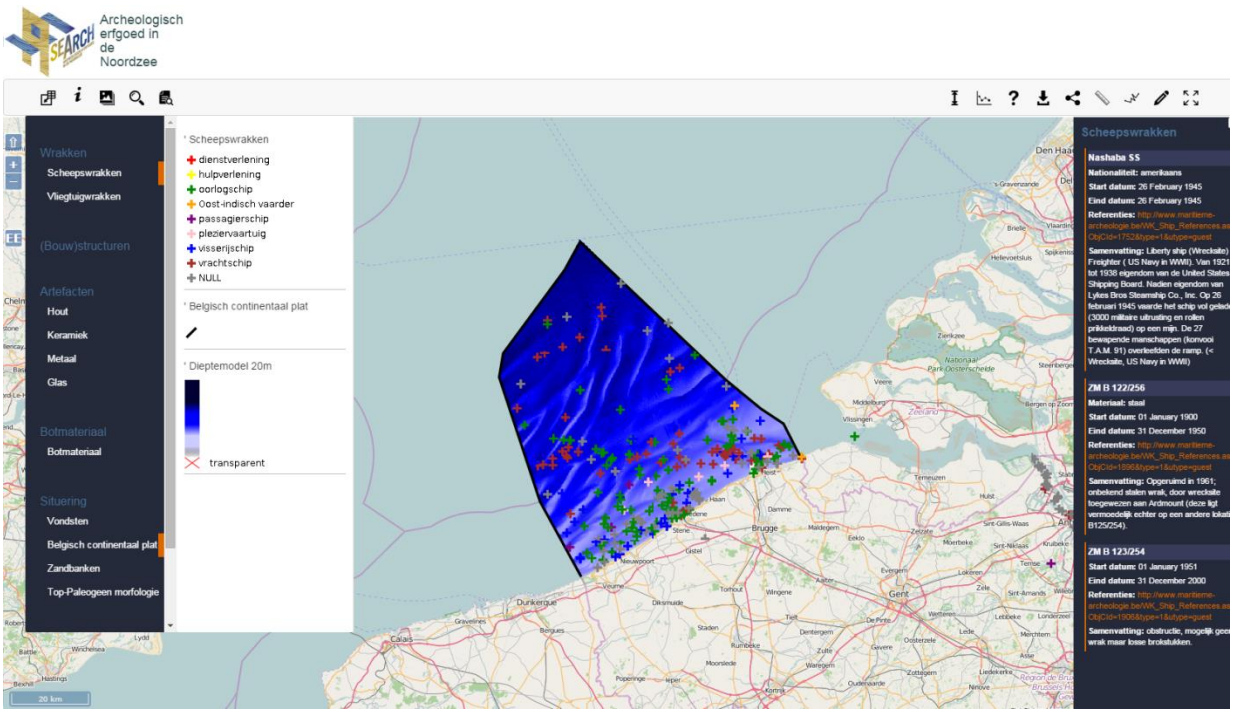

Figure 1: Screenshot of SeArch web application

The SeArch web application is based on a PostGIS geodatabase that implements the data model described above, consisting of nodes and relations. This data model allows describing the wide diversity of marine heritage, which ranges from shipwrecks over arrowheads to bone fragments, in an uncomplicated and flexible way. The SeArch geo-application allows the presentation of these archaeological data in combination with other spatial data, such as depth models, the continental shelf, etc (Figure 1). Besides viewing the location of the different heritage objects (nodes) stored in the database, users can access additional information on these objects (relations). Figure 2 shows an information screen containing a specific node's description and its relations popping up when asked by a user. This way, the geo-application provides a better understanding and monitoring of the underwater cultural heritage by the project stakeholders, potential actors and the broader public.

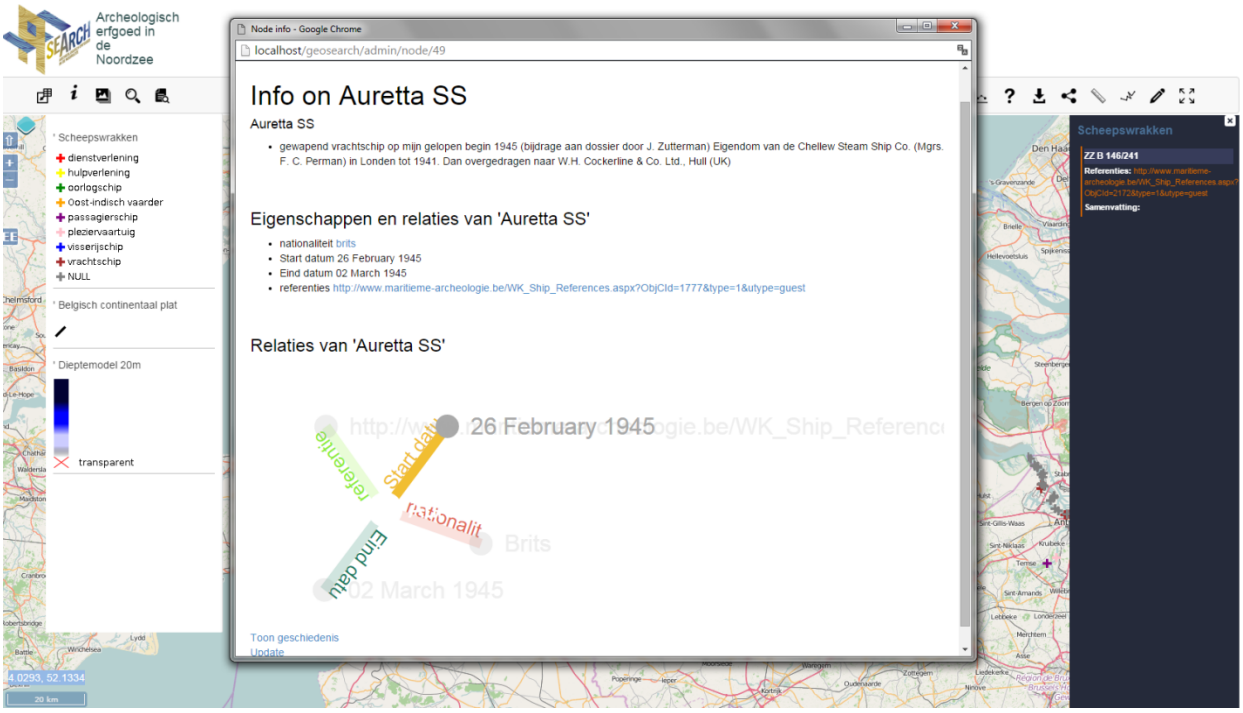

Figure 2: Info screen containing specific data on a object (node) in the SeArch application

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