



# NEXT

New Exploration Technologies

## DELIVERABLE 4.13

Horizon 2020 Project: **NEXT**

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## About NEXT

NEXT consortium consists of 16 partners from leading research institutes (3), academia (3), service providers (5) and industry (5). The members come from 6 EU member states (FI, FR, DE, MT, ES and SE) and represent the main metal producing regions of Europe, Fennoscandian Shield, Variscan Belt of Iberia and Central European Belt. These economically most important metallogenic belts of the EU have diverse geology with evident potential for different types of new mineral resource. The mineral deposits in these belts are the most feasible sources of critical, high-tech and other economically important metals in the EU. The project consortium has also a vast international collaboration network, e.g. 50% of the Advisory Board members have been invited from outside EU.

In addition to the variable geology, the vulnerability of the environment and the glacial sedimentary cover in the Arctic regions of northern Europe, and the thick weathering crust and more densely populated nature of the target areas in the Iberian and Central European belts influence the mineral exploration in different ways. New environmentally sound exploration concepts and technologies will be optimized and tested on diverse mineral deposit types.

NEXT will develop new geomodels, novel sensitive exploration technologies and data analysis methods which together are fast, cost-effective, environmentally safe and socially accepted. Methods developed reduce the current high exploration costs and enhance participation of civil society from the start of exploration, raising awareness and trust. Moreover, the reduced environmental impact of the new technologies and better knowledge about the factors influencing social licensing will help promote social acceptance of both exploration and mining and therefore support the further development of Europe's extractive industry.

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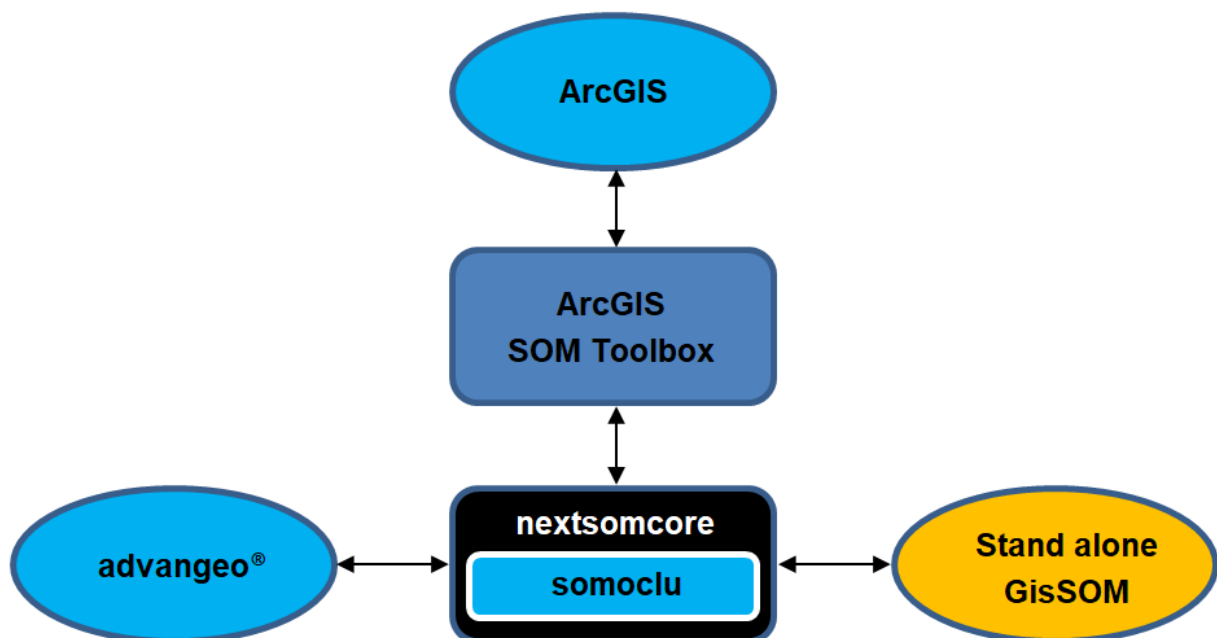
## 1 INTRODUCTION

The purpose of this document is to provide the system concept, software design, class diagram, testing report and user's manual of the open-source stand-alone self-organizing maps (SOM) data analysis software that was developed in the European Union funded H2020 project NEXT.

The following people from Beak Consultants GmbH have been contributed to the software (in alphabetical order): Sven Etzold, Peggy Hielscher, Andreas Kempe and Andreas Knobloch. The following people from the Geological Survey of Finland have been involved in the software planning and development (in alphabetical order): Sakari Hautala, Janne Kallunki, Jaakko Madetoja and Johanna Torppa.

## 2 SYSTEM CONCEPT

Integrating information of a number of different geoscientific datasets is constantly carried out in geoscientific research and in other research fields making use of spatial distributions of various quantities. Self-organizing maps is a powerful method for integration and visualization of large data sets but, up to date, there has been no properly maintained software to carry out the computations, to visualize the results in geospace and to connect the SOM space to the geospace. CSIRO's commercial Matlab-based SiroSOM software has been useful but, due to the lack of maintainance and documentation, it was considered necessary to implement new software with improved functionality as well as a proper user manual and technical specification documents.



**Figure 1.** *Structure of the self-organizing maps software developed in the NEXT project. Blue colour refers to existing software, while green, orange and black components were implemented in NEXT (source D 4.11).*

The software developed in NEXT consists of several components (Figure 1). The *nextsomcore* is the central part of the development. It was developed and provided by the GTK as deliverable 4.11. Based on this, the SOM algorithm was implemented as new analysis method in the commercial software *advangeo*® (D 4.12). Furthermore, the ESRI ArcGIS Toolbox ‘SOM Toolbox’ was developed and is provided as D 4.13.

### 3 DESCRIPTION OF DELIVERABLE

The technical specification of the ESRI ArcGIS SOM Toolbox as well as the user’s manual is delivered in appendix 1 and 2.

#### *D 4.13 Appendix 1: Technical Specification*

The document provides technical description such as the software design, class diagram and testing.

#### *D 4.13 Appendix 2: User’s manual*

The document is the user manual.

### 4 REFERENCES

Deliverable 4.11: Open-source standalone SOM software (D 4.11 in M12)

Deliverable 4.12: SOM tool for *advangeo*® (D 4.12 in M18)

Wittek P., Gao S. C., Lim I. S., and Zhao L., 2013. Somoclu: An efficient parallel library for self-organizing maps. *arXiv preprint arXiv:1305.1422*.