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Need for a European Geological Service responding to societal challenges on Energy, Mineral and Groundwater resources.

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Geosciences for energy and mineral resources have a well-established basis in the exploration and production (E&P) industry and are to a large degree steered by challenges on technology development, economic growth and resource demand. Groundwater, being a primary requisite for life on earth, is strongly linked to scientific investigations on the protection and sustainable use of existing resources. The unlocking of new potential uses of the subsurface, on-going maturation of the various E&P areas and growing focus on the exploitation of unconventional energy and critical raw materials resources, are increasingly pushing technological developments to higher levels. Such developments may result in further competition for subsurface space and eventually jeopardize environmental sustainability, groundwater resources, biodiversity and safe living conditions. The exploitation of subsurface resources is therefore becoming more and more connected to societal challenges existing within the water-food-energy nexus. Our dependency on energy and mineral resources on the one hand, and the need for preserving a healthy environment, clean groundwater resources and safe conditions for growing populations and ecosystems on the other hand, urges national and international governments to ensure that exploitation takes place in a sustainable and responsible way in order to prevent that such activities lead to irreversible and adverse effects. These objectives not only require new types of subsurface information, but also rely on the integration of knowledge across different technological and societal domains. As new stakeholders and policy areas are often less familiar with the technicalities of subsurface exploration and exploitation, information and knowledge must be tailored to their specific needs and decision processes.

The national geological surveys of Europe collaborating under the flag of EuroGeoSurveys, are among the main institutions who provide subsurface information and knowledge under the mandate of their respective governments. One of their common and on-going main tasks is to gather and maintain information from in-house and third-party subsurface operations in order to establish maps and 3D models representing the structure and properties of the subsurface as well as to assess the associated potential to provide various types of resources. In response to the new societal challenges and under guidance of national and EU policies and regulations, new workflows, knowledge products and web based information platforms are being established for regional, national, cross-border and even pan-European areas. The aim of these products is to extend the applicability of core geoscience intelligence to both public and private stakeholders, and to improve the basis for innovative, sustainable and integrated surface and subsurface spatial planning.

With this paper we present several concrete examples of developments in the field of geo-energy, groundwater and mineral resources that will pave the road towards future establishment and management of applied, pan-European geo-scientific information. These examples relate to the new

information and knowledge requirements described above as well as to the implementation of such results in policy decisions and the public debate. We will specifically highlight the technical challenges related to the scope, spatial definition and uncertainties of future geoscience information including our ideas on dissemination approaches. These advances are finally incorporated in the envisioned development of a sustainable geological service for entire Europe to the benefit of existing and future European and global citizens.

