TRANSFORMATIVE AND SUSTAINABLE

A SUITE OF TECHNOLOGICAL BREAKTHROUGHS, MOST OF WHICH RELY ON ACCURATE, PRECISE, QUALITY GEOSPATIAL DATA, IS SET TO RESHAPE HOW THE WORLD WORKS IN THE NEAR FUTURE

The United Nations' Sustainable Development Goals (SDGs), set up in 2015 to be achieved by 2030, serve as a global guide for pursuing a more sustainable future. Numerous indicators have been developed to measure progress towards the 17 SDGs and their associated targets. However, in many parts of the world, reliable data at the local level is unavailable, which is why monitoring of sustainability progress requires greater data availability, data innovation and in essence a "data revolution".

Using geospatial data enables us to recognise spatio-temporal patterns. This provides information to politicians, stakeholders and the public about the progress of SDGs at the scales of countries, regions or continents, at specific times or time intervals. Land cover changes, for example, can be classified from multispectral satellite imagery and statistically computed or further analysed using GIS.

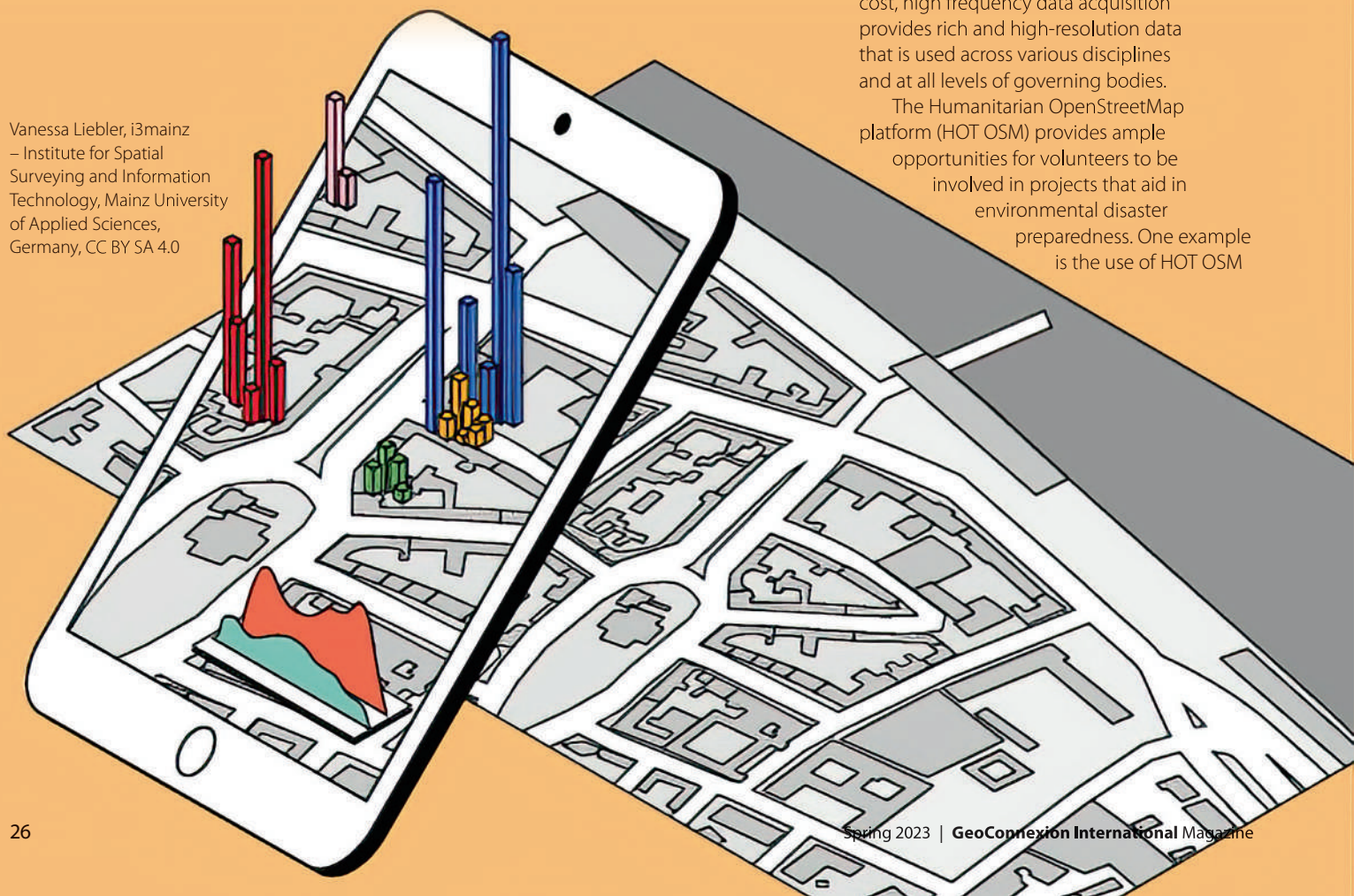
Geospatial data circulation among actors and between different scales opens up new communication channels, for example between public authorities of different federal state levels. Our cities and livelihoods are key in achieving a more sustainable planet. The evolution of smart cities into smart territories and regions requires improved geospatial data circulation, for example data exchange between neighbouring cities and adjacent districts. Spatial data infrastructures (SDIs) can make important contributions to successful data transfer across administrative boundaries. Key to successful SDIs – and consequently data circulation or usage of geospatial data – are commonly accepted rules about the content of the data set, conditions for sharing and interoperability between data sets.

Volunteered geographic information

Open Science initiatives have engaged stakeholders to integrate knowledge and science across society. Public participation innovations in citizen science have empowered anyone with an internet connection, anywhere in the world, to explore the globe from their fingertips. These innovations have launched new dimensions in accessing and producing geospatial information. Technological developments, such as GNSS-enabled smartphones, have bridged the gap between the role of professional surveyors and the role of lay individuals to contribute creating geospatial data.

Geospatial representation of conflict news using AI web crawlers is one way in which geospatial data is used in a humanitarian conflict setting. This low-cost, high frequency data acquisition provides rich and high-resolution data that is used across various disciplines and at all levels of governing bodies.

The Humanitarian OpenStreetMap platform (HOT OSM) provides ample opportunities for volunteers to be involved in projects that aid in environmental disaster preparedness. One example is the use of HOT OSM



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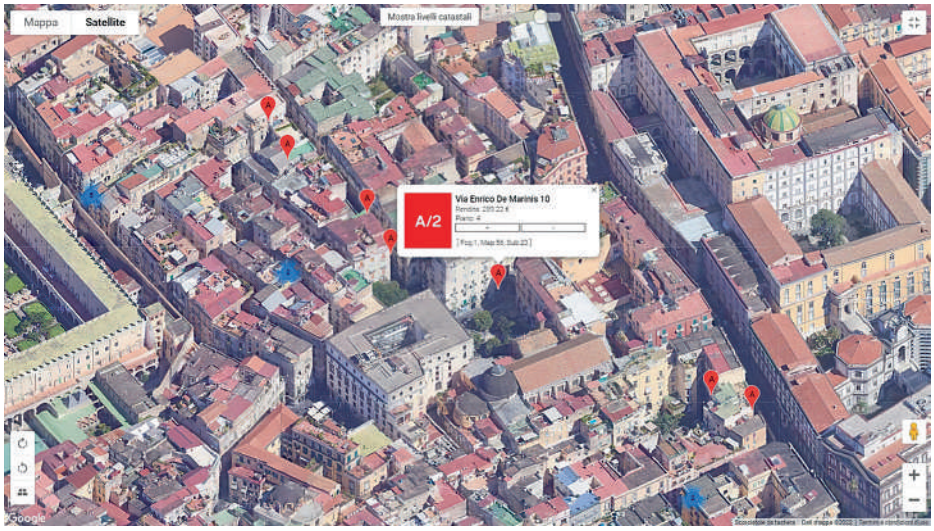
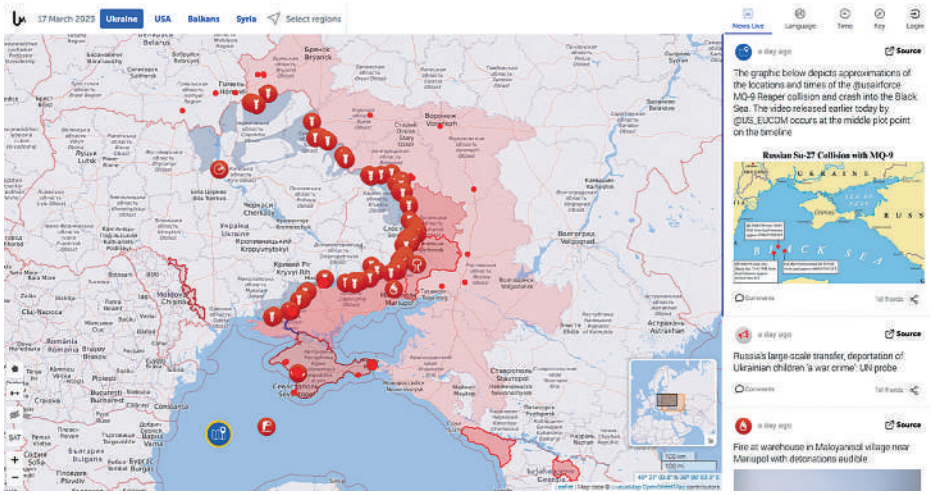


Data and images elaborated from documents published by the company Comparabilitalia.it produced by: Italian Institute of Resources for Economic Development



https://liveuamap.com/en

to map areas that have been severely hit by earthquakes. Many parts of the world that lack technical capacity may find such capacity available online. With e-Volunteering, the FIG Volunteer Community Surveyor Program supports humanitarian projects by providing validated data to enhance the technological position of countries and communities.

FIG's recommendations

The editors and authors of *FIG Publication No. 78*, which is based on the experiences of experts in the FIG community, are convinced that the challenging environment of the 2020s, with its numerous disruptions which we have already experienced, requires urgent further exploration and exploitation of the potential of geospatial information. Here are their key takeaways and recommendations.

Identify and close data gaps

Data is central to monitoring processes, such as the progress of sustainability goals. Sufficient data is often unavailable, so innovative approaches are needed to collect and produce data. Advanced sensors, as well as volunteered geographic information, can complement traditional geospatial data collection.

Strengthen public-private-partnerships

Local non-experts can be enthusiastic about data collection. Stronger networking between data experts and laypersons can help to improve data quality in voluntary data collection projects. If many citizens participate, large volumes of data can be collected.

Make authoritative datasets easily available and accessible

Many datasets continue to reside in "data silos". Government datasets that could make an important contribution in other application areas continue to form a heterogeneous, inconsistent and disconnected data landscape. Such data should be made available for other areas of sustainable development.

Generate innovative data products by data fusion

New data need not only come from new data collection; it can also be generated by combining existing datasets with data analytics methods. As spatial datasets become increasingly available, there is growing potential for such innovations. What is needed is the conversion and fusion of existing data into ready-to-use information.

Integrate geospatial information into user-specific business processes

Innovations in geospatial information must enable professionals from different disciplines to easily integrate them into their disciplinary context. Such users are regularly not (geo-)data specialists. To find starting points for integration, it is critical to start from established business processes in such disciplines.

Integrate geospatial information into pathways to sustainability

Geospatial data usage in research on transformation and transitions to sustainability is promising. Here, too, geospatial information must be integrated into specific processes. An initial step might be necessary to explain the importance of the spatial perspective for domain-specific transformation processes.

Address multi-dimensional quality issues

When data are merged to create innovative new data products, data quality issues become increasingly challenging. Information on data quality should be a mandatory part of the meta-information of any new data product.

Find the balance between data protection and knowledge generation

Geospatial (mass) data and the increasing ability to link it to other datasets raise privacy concerns which threatens to torpedo the enormous positive possibilities of taking human knowledge to a new level. To resolve the trade-off between data protection and knowledge generation, joint societal, legislative and technical efforts are needed.

Find the balance between data-related empowerment and establishment

Official data and voluntarily collected data complement each other. As the importance and availability of data and information increases, power gaps in data collection and algorithmic design become more present and solutions more urgent.

Improve (geospatial) data literacy

Innovations in geospatial data, privacy and ICT security technologies are critical for sustainable data use. Technology development must go hand in hand with human capital development. Capacity building is key to find the right balance between data protection and data sharing.