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Global Earthquake Atlas. Investigating information design strategies to visualise earthquake data: a didactical perspective.

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Abstract:

An earthquake is a natural phenomenon characterized by a rapid energy release within Earth's crust, regularly caused by the movement of the tectonic plates. The effects of an earthquake depend on several factors: the geological characteristics of the ground, the magnitude of the earthquake, the depth of the hypocenter, the distance of the epicentre from settlements etc.

Areas with high population density are particularly vulnerable: the adoption of preventive measures, the promotion of scientific research, and public awareness are all fundamental to dealing with the effects of earthquakes and ensuring the greater resilience of communities affected by these natural events. In this context, information design can contribute, to a clear and effective type of communication, and even play a critical role in processes of decision-making regarding policy.

During the summer semester 2023, students of the bachelor's degree in Graphic and Information Design at New Design University, investigated multiple visual narratives to communicate earthquake data in an effective and engaging way. The class was divided in seven groups, with 3–4 students each; each group was assigned a continent, which was investigated using a 'modular cyclical' model (Bravi, 2022) based on four levels of analysis. The Meta level offers a global perspective, providing an overview of tectonic plates dynamics, and on planet Earth's internal structure; the Macro introduced the context of each continent, featuring the strongest earthquakes in relation to the plate tectonic boundaries; the Meso level delves into the seismic activities of single countries or regions; finally, the Micro focuses on a single earthquake, within the chosen region.

Several thematic maps and visualizations, were produced for each analisys layer by each student. During the Meta level, the whole class worked on the same exercises, only to split up for the analysis of the Macro level and the assigned continent. Closer to the end of the project, each student worked independently by choosing an area and a single event: this ensured the presence of a common phase of both theoretical and practical training, as well as a more individual and dedicated path in the second part of the semester. While this division enables planning and structure, from a design process perspective the confines between levels are much more blended than one might think: through an iterative process, with each new task the main design decision had to be constantly tested and eventually updated, enabling a flexible mindset and a readiness to consider and apply changes.

For each level several assignments were formulated, some were mandatory, other optional, giving the student the possibility to select and filter the available data and, if necessary, to expand the dataset in order to react to the peculiarities of the analyzed area. The focus was put on those types of data (such as time, location, magnitude, depth, intensity, etc.) which would make comparisons possible. Earthquake and geographical data came from different online open-source platforms such as the United States Geological Survey and Natural Earth.

Starting with this premise, most of the assignment revolved around the concept of visual variables, Bertin (2010), and how to make use of them in order to encode and convey information through a set of graphic dimensions. 'The Fundamental Principles of Analytical Design' stated by Edward Tufte (2006) also represented a valuable framework.

A selection of the students' most representative works have been collected in an 'atlas'. Through the different maps and visualizations, this atlas offers the reader insights about earthquakes and their context, providing a comprehensive understanding of their effects and relevance.

The publication (Figure 1) also includes a glossary, an interview, and short introductory texts for each continent. The glossary, with its selection of scientific terms, is meant to provide a broad and cross-domain audience the vocabulary

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necessary to approach the content. From a didactic point of view, the choice of the semester topic turned to offer an ideal setting not just to develop skills in the field of data visualization and cartography, but also in strengthening the science-based approach underlining the course.

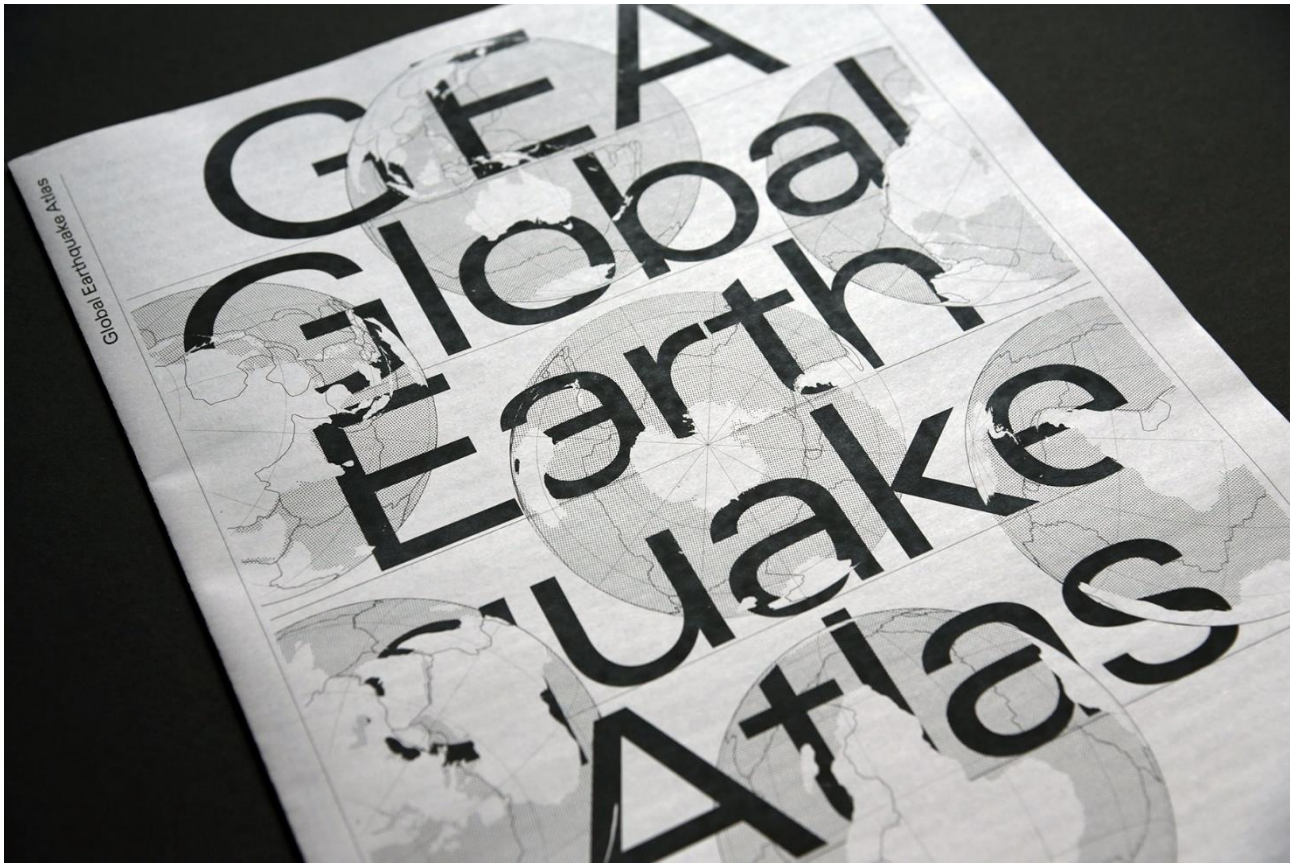

Figure 1. ‘Global Earthquake Atlas’, Project documentation, 136 pages.

The didactic project ‘Global Earthquake Atlas’ is meant to encourage design students, educators, and practitioners as well to embrace a broader view of knowledge, going beyond their own field. A ‘scientific approach’ to information design (Pontis and Remington, 2021) can offer educators a more accurate framework and a broader set of tools; furthermore, it can increase interest and motivation among students as they discover the importance of engaging with scientists and researchers active in other fields of knowledge.

Through this project we aimed to generating awareness about the responsibility of visualising and communicating scientific data, and to lending confidence to the design student in dealing with complexity. It will hopefully serve as inspiration and as a reference for future teaching practices in the information design field and beyond, contributing to the opening of a dialogue between disciplines.

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