

## Storytelling through data visualization

Gumersindo Feijoo<sup>1\*</sup>, María Teresa Moreira<sup>1</sup>

(\*gumersindo.feijoo@usc.es)

<sup>1</sup>Universidade de Santiago de Compostela, Departamento de Ingeniería Química, Escuela Técnica Superior de Ingeniería, Rúa Lope Gómez de Marzoa s/n, 15782 Santiago de Compostela, España

**Keywords:** Communication and data management, Big Data, Infographics

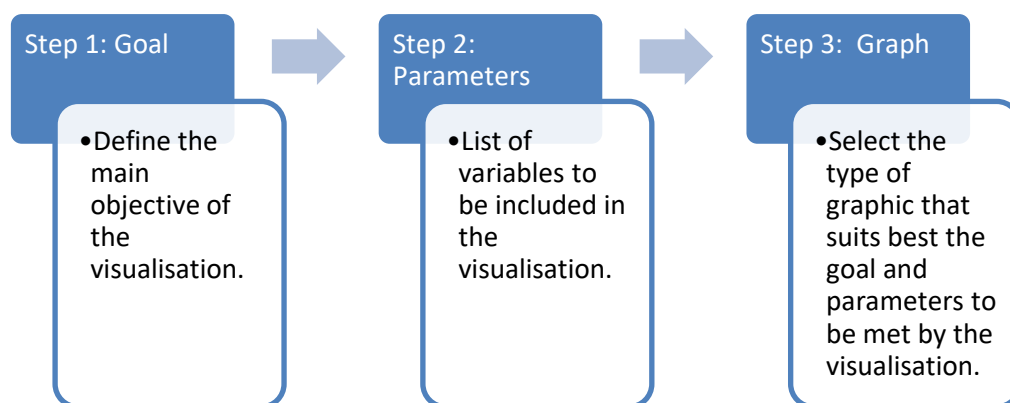
### Abstract

The current changes in the field of data visualization are fundamentally driven by two driving force: (i) the large amount of data being generated in any discipline, reaching in some cases "Big Data" values; (ii) the availability of tools that allow the effective integration and visualization of data to achieve effective data management. Excellent visualization expresses "complex ideas communicated clearly, accurately and effectively". Storytelling through clear images and illustrations helps the viewer understand the data. Just as good storytelling involves telling a story with words, good data visualization involves telling a story with data, making it an art in which it is necessary to follow a procedure that combines both story design and the right tool.

Most widely used spreadsheets such as MS Excel include data representation functionalities; for example, in the latest versions most of the updates have been made in the sections related to visualization. However, knowing other specific design tools can allow data representation beyond the capabilities of "Office" tools, introducing the world of infographics. In disciplines such as Journalism or Communication Sciences, this type of tool is included as a basic element in their training. The open platform Flourish, developed by Duncan Clark and Robin Houston, is a good option for undergraduate and postgraduate students in Science and Engineering disciplines as it easily allows a greater variety of options when making a presentation or article through the evolution of the type of graphics, allowing to extend the capabilities to those provided by MS Excel or similar programs

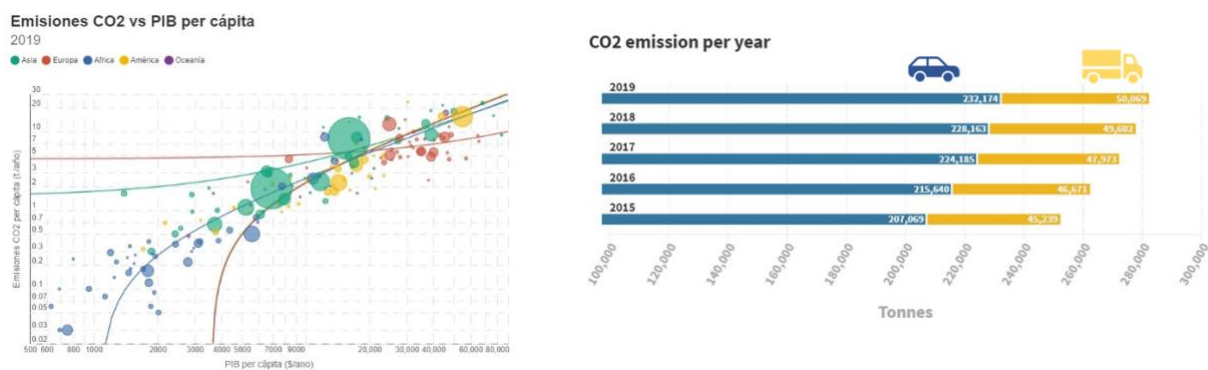
To introduce graduate students to this tool, a Simplified Manual for the use of Flourish has been elaborated during lockdown in several languages with the title: Telling a story with data: The Art of Visualization [1]. It includes several practical examples of graphs: relational, radial, maps, bubbles, etc. The number of downloads in Spanish and Galician version were 3,497 and 1,259, respectively.

During the 2020-2021 and 2021-2022 academic years, a "Data and Indicators" subject (2 hours) was incorporated into the compulsory subject of Ecological Design of Products and Processes in the Master's Degree in Environmental Engineering and in the optional subject of Life Cycle Management in the Master's Degree in Chemical Engineering, where the handling and visualisation of data was addressed. A simple three-step visualisation process (Figure 1) is exemplified with several case studies: (i) goal, (ii) parameters and (iii) graph. The continuous assessment activity (3 hours of personal work) consisted of each student carrying out a visualisation based on open access data that allowed correlating parameters included in the monitoring of the actions included in the SDGs (Figure 2). The number of students involved was 60, and the overall satisfaction with the activity, between 1 (very unsatisfied) and 4 (very satisfied), was  $3.75 \pm 0.19$ .



**Figure 1.** Three-step process in the development of an appropriate data visualisation.

This same activity was replicated with PhD students from the Chemical and Environmental Engineering programme (2 h face-to-face course and 3 h of personal work). In this case, the homework consisted of reworking with Flourish some of the graphs published in scientific articles that they had already published (preferably) or that they had read, critically analysing the "before and after" result. The students involved were 22 and the overall satisfaction obtained was  $3.33 \pm 0.22$ .



**Figure 2.** Some examples of data visualisations made during the activity.

## References

- [1] Feijoo, G.; Moreira, M.T. Contar una historia con datos: El arte de su visualización. Research Gate, 2020, Doi: 10.13140/RG.2.2.28107.13608