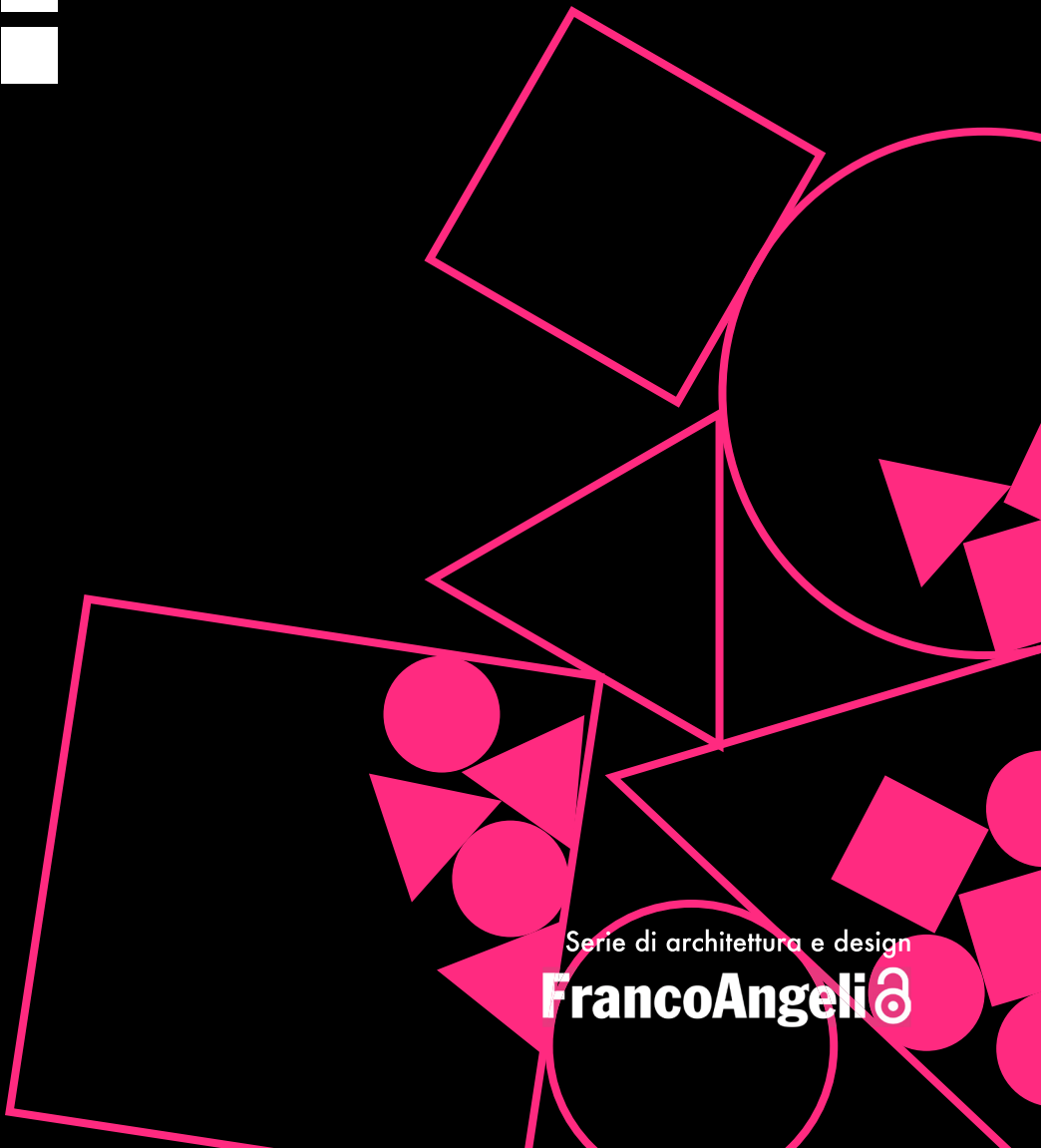
2CO3-COmmunicating COmplexity

Selected contributions to the Conference
September 8-9, 2022

Edited by Nicolò Ceccarelli



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The present publication contains the communications presented at the 3rd edition of the International Design Conference 2CO-COmmunicating COmplexity, which took place from 8 to 9 September 2022 at the Department of Architecture, Design and Planning (DADU) of the University of Sassari, in Alghero, Sardinia, Italy.

The conference was organized by the Department of Architecture, Design and Planning of the University of Sassari.

All contributions where reviewed and selected through a blind peer-review process by the Conference's Scientific Committee.

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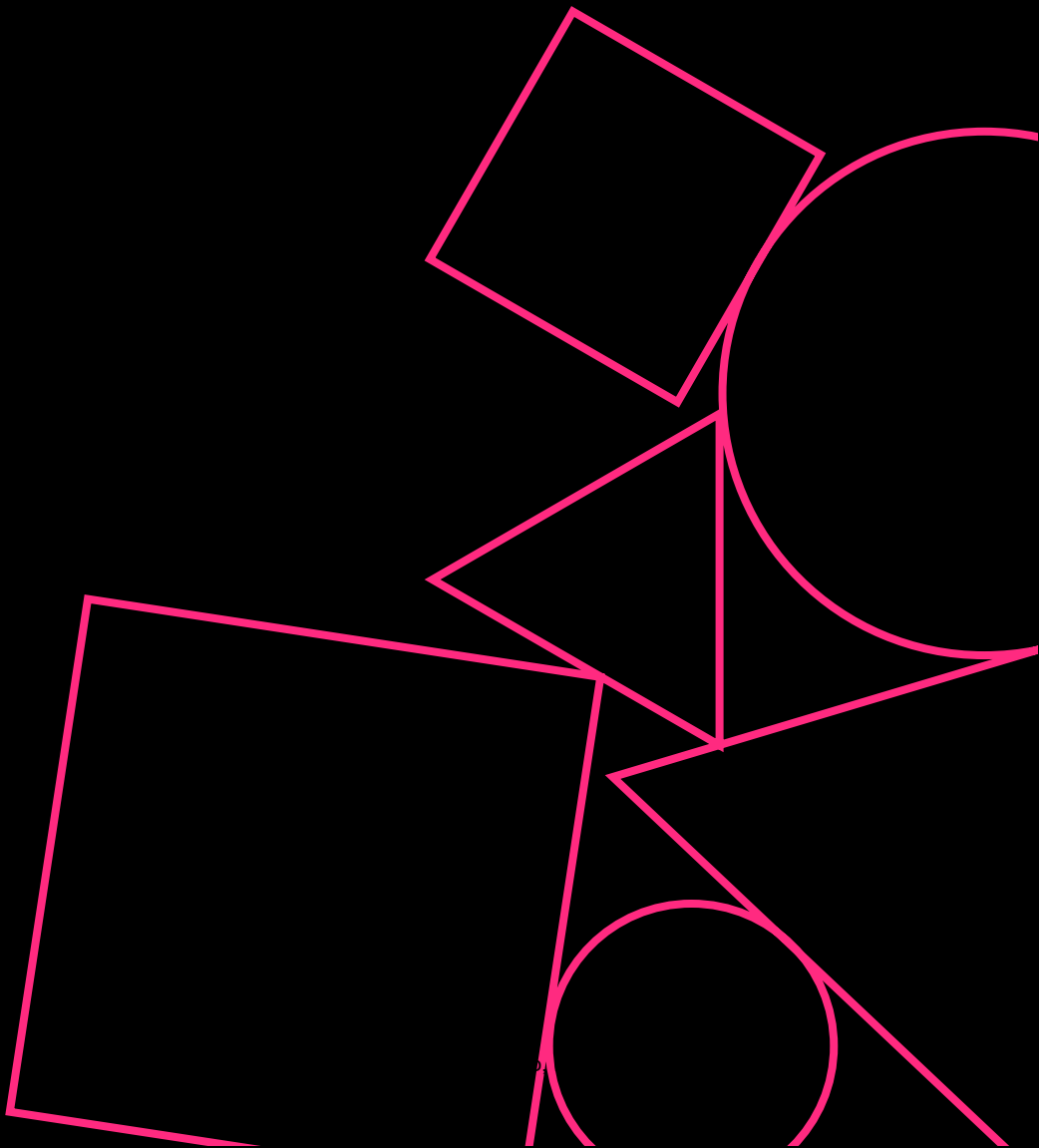
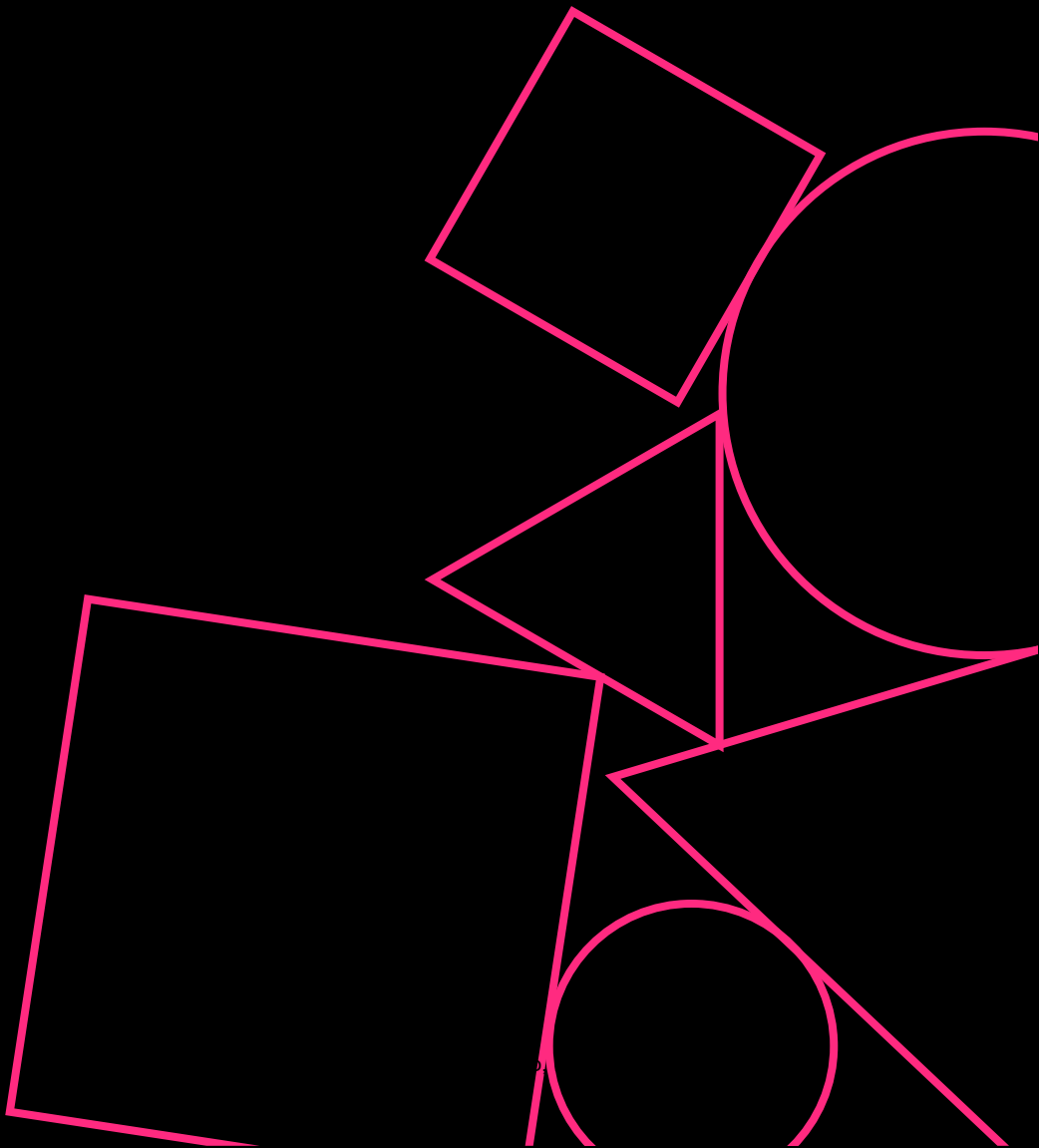


1.1 Infographics



Sitting around a table. Data visualization for cross sectoral exchange in European Projects

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Abstract. Since the most ancient times, the visual display of information has been applied in a broad array of disciplines as a vehicle to address sector-specific epistemology. However, this interpretation should not be considered as exclusive, especially in today's day and age: in fact, the exponential increase in the quantity and quality of information that we are experiencing brings to attention the cross-sectoral potential of data visualization. This contribution applies such perspective to the dimension of European Projects, where the heterogeneity in stakeholders' backgrounds often prevents a mutual understanding between those involved. A specific example is brought: that of the RIStyling project, promoted by the Universities of Padua, Verona, Venice Ca' Foscari and Iuav, in agreement with the Veneto Region, in order to redefine the local Research and Innovation Strategies for Smart Specialisation (RIS3). In particular, we will focus on the work carried out by the Iuav University design team, aimed at identifying, and transposing into a visual form, the most relevant concepts which came to light within the multiple opportunities of discussion and debate arranged within the project. The contribution will firstly dwell on the technical tools used for producing the data visualization outputs, and secondly highlight the difficulties and criticalities encountered during the process; finally, the impact of the methodology on the whole RIStyling project will be presented and discussed.

Keywords. European Projects / Cross-sectorality / Focus groups / Project language / Qualitative research

1. Introduction

Since the most ancient times, the visual display of information has been widely applied in a broad array of disciplines, spanning from mathematics to linguistics, from engineering to architecture, going up to biology, geography, astronomy, sociology, psychology, and many others. As stated by Jean-Paul Benzécri, a pioneer in the field of contemporary data management, the analysis of data – including the processes

related to their visualization – should be considered not only as a means of knowledge, but first and foremost as a mode of being (1980). It is therefore no coincidence that this particular branch of visual communication has been historically practiced across such a wide range of disciplinary fields, finding its prominent usage in the form of a vehicle instrumental to address sector-specific epistemology.

However, this interpretation should not be considered as exclusive, especially in today's day and age: in fact, the exponential increase in the quantity and quality of information that we are now experiencing (Floridi, 2017) brings to attention the cross-sectoral potential of data visualization. Through the design of infographic outputs such as tables, graphs, charts, diagrams, and maps, data visualization formalizes a taxonomy whose inherent principles can be somehow considered as universal, since they "are not tied to unique features of a particular language or culture" (Tufte, 1990, p. 10). This prerogative can proficiently come into play in determining the "common lexicon" that digital transition would inherently require, in order to make explicit and decodable the relational dynamics, whether human or structural, that come into play into such a transition (Nanda et al., 2021).

Moving from these premises, this contribution applies this perspective to the specific dimension of European Projects, which is increasingly establishing itself as one of the most relevant contemporary sources of operational sustenance for researchers, professionals, and organizations. Despite a high diversification from a thematic and contextual point of view, the setting of European Projects determines, on a case-by-case basis, actual "actor constellations" characterized by a complex competence distribution and multiple coordination modes (Braun, 2015).

On such assumptions, and through the presentation of an inherent case study, this contribution will argue how data visualization can play an important role in enabling these actors to transfer knowledge across cultural, translational, and disciplinary boundaries (Lima, 2013).

2. Data visualization for, and within, public projects

In the last decades, European Projects have become more and more established as a "funding and policy space of research activities and actors, within which the rules of knowledge production, knowledge legitimacy and knowledge use are negotiated" (Wedlin & Nedeva, 2015, p. 4). By their own organizational setting, European Projects are often characterized by a high compositional complexity, involving highly articulated networks of stakeholders among whom "collaboration is increasingly being incentivized (funded) and governed (controlled)" (Mangez & Vanden Broeck, 2014, p. 111). Nevertheless, the heterogeneity in stakeholders' backgrounds, on the one hand, and the scarcity of shared protocols aimed at properly managing and addressing this heterogeneity, on the other hand, often prevent a real mutual understanding between those involved.

Such communication issues arise also on behalf of a widespread principle of "projectification" which "has directly affected the terminology of European policy

making, including the emergence of a particular *vocabulary* of European funding policy" (Büttner, 2019, p. 177). Widely encompassing concepts which are characterized by a high rhetorical value (just think, for instance, of those of *innovation*, *sustainability*, or *digitalization*), the establishment of such terminologies mirrors a lexical paradigm which often risks resulting more divisive than cohesive.
Assuming that each single project configures a language system of its own (De Sardan, 2008), more structural and conscious efforts are needed in order to facilitate the stakeholders involved in European Projects in dialoguing with – and actually understanding – each other. From this point of view, if appropriately integrated within individual experiences, the enactment of data visualization processes can fruitfully take part in assisting those participating in such experiences in semantically and contextually situate concepts as those mentioned earlier.
Indeed, the value of data visualization is beginning to be rather acknowledged in the field of public policy-making, especially with regard to aspects that are strongly related to emerging technologies, such as Big Data, Artificial Intelligence, web-based access and dissemination (Raineri & Molinari, 2021). In contrast, less attention tends to be paid to the involvement of data visualization in supporting qualitative data processing: this is the main issue the present contribution points out, highlighting the need to define methodologies for enhancing its basic interpretation as a shared ground for exchange.

3. The experience of the RIStyling Project

In support of these arguments, a specific example is brought: that of the RIStyling Project, promoted by the Universities of Padua, Verona, Venice Ca' Foscari and Iuav, in agreement with the Veneto Region, in order to redefine the local Research and Innovation Strategies for Smart Specialisation (RIS3) for the seven-year period 2021-2027.
In accordance with the reformed European Cohesion Policy, RIS3 are place-based economic transformation agendas aimed at enabling regions to turn their needs, strengths and competitive advantages into marketable goods and services (European Commission, 2017). Aimed at the distribution of funding which are programmatically meant to enhance and empower the specificities that characterize European territories, the definition of RIS3 implies a research approach that should necessarily be articulated through an active involvement of local stakeholders.
On this basis, the RIStyling Project has been connoted by an extremely articulated structure, both in terms of composition and expertise: in this contribution, we will focus on the work carried out by the Iuav University research team, emphasizing its breakdown according to two main layers. On the one hand, a general team has been constituted gathering experts in European Project Management, whose planning skills would have been useful in detecting RIS3 best practices at regional, national, and continental levels, as well as in handling the interactions with the involved administrations.

On the other hand – and here we get to the point – a specifically-oriented design team has been constituted, in order to facilitate, through co-design techniques, the interactions between the actors involved in the project, starting from the Iuav general group to the other actors involved in the project.
In light of the expertise of the group's composition, as members of the Iuav University design team we chose to handle this task precisely through the support of data visualization, with the goal of defining a methodology aimed at fostering communication and mutual understanding between the participating actors. In particular, such methodology was designed in order to identify, and transpose into a visual form, the most relevant concepts which came to light within the multiple opportunities of discussion and debate which have been arranged during the course of the RIStyling project.
In fact, while European programming agendas increasingly need cross-discipline academic work, collaboration across different industries, and new forms of partnerships between the public and the private sectors (Mazzucato, 2018), data visualization could eventually play an important part in this respect.

4. A multiplicity of tables

As previously clarified, the processes addressed towards the definition and the review of RIS3 cannot be separated from a direct involvement of the stakeholders who are active in the target territories, and the RIStyling Project has been no exception in this regard. One of the most relevant methods put into play was the focus group, a qualitative research technique that derives information from in-depth team discussions attended by eight to twelve participants, selected on the basis of the ability to bring knowledge arising from their own expertise (Zammuner, 2003).
Starting from these premises, two distinct series of focus groups were held – both managed with online tools due to the restrictions imposed by the Covid-19 pandemic – which internally within the overall working team have been referred to as *discussion tables*.
A first series of focus groups has involved the organization and the conduction of three main discussion tables, each of them addressing a targeted topic consistent with one of the current European medium and long-term programming priorities, namely:

- innovation and Digitalization;
- industrial Transition;
- european Opportunities and Partnerships.

Labeled as *institutional tables*, these focus groups engaged stakeholders corresponding to the four major categories of actors identified in the innovation framework known as the Quadruple Helix Model (Carayannis & Campbell, 2009): academics, government entities, industrials, and citizens.

A second series of focus groups has involved the organization and the conduction of nine main discussion tables, each one addressing a targeted topic consistent with a significant aspect emerged from the implementation of S3 in Veneto during the 2020-2014 seven-year term, namely:

- industry and Digital Transformation;
- circular Economy and Green Chemistry;
- communication, Cultural Industries and Entertainment;
- technologies for Culture and Tourism;
- technologies for Sustainable and Inclusive Living Space;
- technology and Services for Creative Industries and Made in Veneto;
- energy, Climate and Sustainable Mobility;
- food: Agriculture, Fishing and Farming;
- technologies for Health.

Labeled as *thematic tables*, these focus groups engaged stakeholders corresponding to the most relevant categories of actors involved in the Veneto region's knowledge economy, such as companies, academic institutions, networks, associative forms, foundations.
The multiplicity of themes and stakeholders, on the one hand, and the management issues brought by the online holding of the focus groups, on the other, determined a condition of extreme complexity, in which it was very difficult for those attending to effectively communicate with each other.
These are, in summary, the preconditions underlying the definition of the previously mentioned methodology proposed by the Iuav University design team. The following paragraphs will go into more detail about the development and the implementation of such approach, firstly dwelling on the technical tools used for producing the data visualization outputs, and secondly highlighting the difficulties and criticalities we encountered during the process; finally, the impact of the methodology on the whole RIStyling Project will be presented and discussed.

5. The proposed methodology

The concerns associated with not having a concrete opportunity to interact in person have definitely been one of the main factors that guided us in setting up our approach within the RIStyling Project, both internally to the design team and towards the overall working group. That's why, from the very beginning – even before the arrangement and holding of the two series of discussion tables described above – we decided to implement into the general workflow a set of tools which were, at the same time, highly connoted in visual as well as in collaborative terms (Fig. 1).
Afterwards, having noticed the communication issues that emerged during the conduct of the focus groups, we have consolidated and encouraged this approach

even more, coming to the definition of a reporting process articulated according to two main methodological stages.

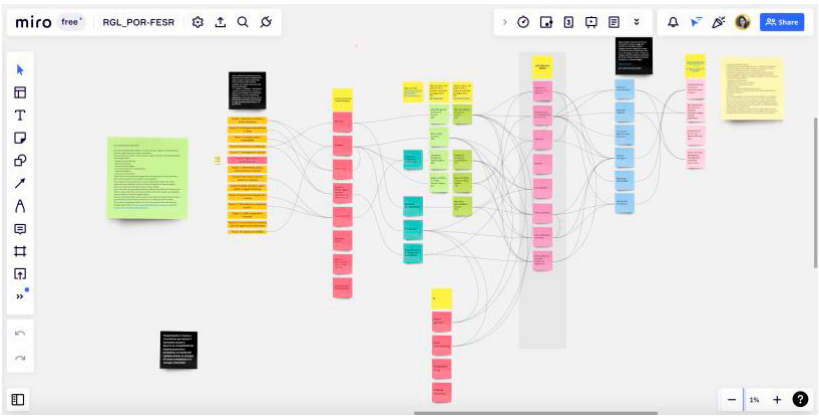

Fig. 1. Screenshot of the Miro.com board through which we catalogued, and shared with the overall working group, the keywords deriving from the RIS3 literature analysis.

A first methodological stage involved the analysis of the textual reports resulting from the various working sessions, in order to identify the most recurrent keywords emerging from the tables as a whole, as well as the tables in whose context these concepts appear to have been most frequently mentioned. In the face of a rather uneven textual reporting, the use of professional tools for carrying out the keyword extraction could not have been considered as a viable option: an online free tag cloud generator was employed, which allowed to obtain clean spreadsheets indicating the keyword frequency (Fig. 2, 3).

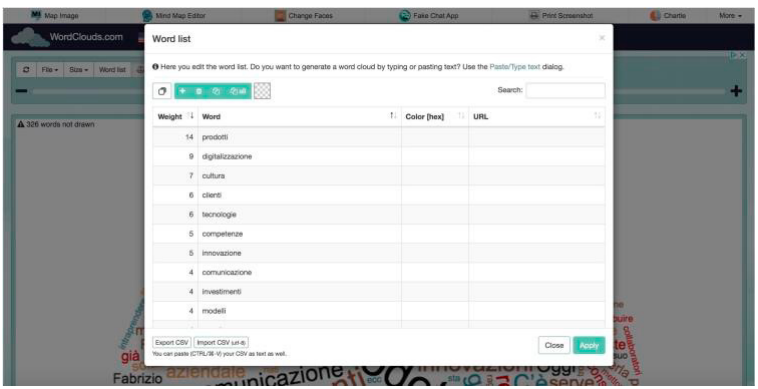

Fig. 2. Screenshot of the WordClouds.com interface, through which we processed the focus groups' textual reports, in order to detect the most frequently mentioned keywords.

	Tavolo	Keyword	Frequenza	Enti regionali	Fondazioni	Forme associative	Imprese	istituzioni accademiche
2	Comunicazione, industrie culturali digitali ed entertainment	arti	11	0	3	0	0	4
3	Food: Agricoltura, pesca e allevamento, trasformazione e derivati	bandi	4	0	0	0	1	2
4	Energia, clima e mobilità sostenibile	cambiamento	3	0	0	0	0	0
5	Tecnologia e servizi per le imprese creative e il Made in Veneto	clienti	5	0	0	0	4	0
6	Food: Agricoltura, pesca e allevamento, trasformazione e derivati	competenze	6	0	0	0	2	4
7	Comunicazione, industrie culturali digitali ed entertainment	competenze	5	0	2	0	0	1
8	Industria e trasformazione digitale	competenze	4	0	0	0	0	1
9	Tecnologia e servizi per le imprese creative e il Made in Veneto	competenze	5	0	0	0	3	1
10	Tecnologie per l'ambiente costruito e spazi di vita sostenibili e inclusivi	competenze	7	0	0	0	2	0
11	Tecnologie per la salute	competenze	7	0	0	0	5	1
12	Energia, clima e mobilità sostenibile	competenze	3	0	0	0	0	0
13	Industria e trasformazione digitale	competitività	3	0	0	0	1	1
14	Cultura e tecnologie per il turismo	comunicazione	4	0	0	1	1	2
15	Comunicazione, industrie culturali digitali ed entertainment	comunicazione	4	0	0	0	1	1
16	Tecnologia e servizi per le imprese creative e il Made in Veneto	comunicazione	4	0	0	0	0	2
17	Tecnologie per la salute	comunicazione	3	0	0	0	3	0
18	Food: Agricoltura, pesca e allevamento, trasformazione e derivati	contabilità	5	0	0	0	0	0
19	Tecnologie per l'ambiente costruito e spazi di vita sostenibili e inclusivi	costruzioni	7	0	0	0	1	1
20	Cultura e tecnologie per il turismo	cultura	4	0	0	0	0	2
21	Comunicazione, industrie culturali digitali ed entertainment	cultura	7	0	1	0	1	3
22	Tecnologia e servizi per le imprese creative e il Made in Veneto	cultura	7	0	0	0	3	3
23	Cultura e tecnologie per il turismo	dati	12	0	1	0	4	3
24	Comunicazione, industrie culturali digitali ed entertainment	dati	4	0	0	0	1	1
25	Industria e trasformazione digitale	dati	4	0	0	0	1	1
26	Energia, clima e mobilità sostenibile	dati	3	0	0	0	0	0
27	Cultura e tecnologie per il turismo	digitalizzazione	8	0	1	0	3	3
28	Comunicazione, industrie culturali digitali ed entertainment	digitalizzazione	20	0	4	0	3	3

Fig. 3. Screenshot of the spreadsheet, compiled in Google Docs, through which we categorized the keyword deriving from the focus groups' text analysis.

A second methodological stage involved the production of a series of infographics aimed at revealing proportions and hierarchies between the identified keywords, as well as their correlations with the various categories of stakeholders which attended the focus groups (Fig. 4, 5, 6, 7, 8). In this case, instead, a specialized tool has been used: RAWGraphs.io, a web-based open-source software, widely known and used by those operating in the field of data visualization, which made it possible for us to obtain a set of diagrams illustrating, in different ways, the focus groups' outputs.
It is important to remark that, again, the advancements in this process have constantly been shared with the overall RIStyling team: although it has not always been simple to obtain meaningful and constructive feedback, it is possible to consider our final work as the outcome of a collective effort.

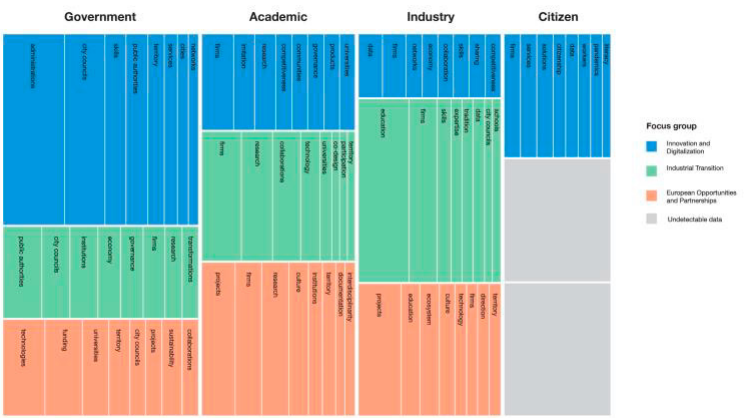

Fig. 4. Treemap depicting the 8 most recurring keywords within each *institutional table*. The degree of documentation available for each table is also illustrated.

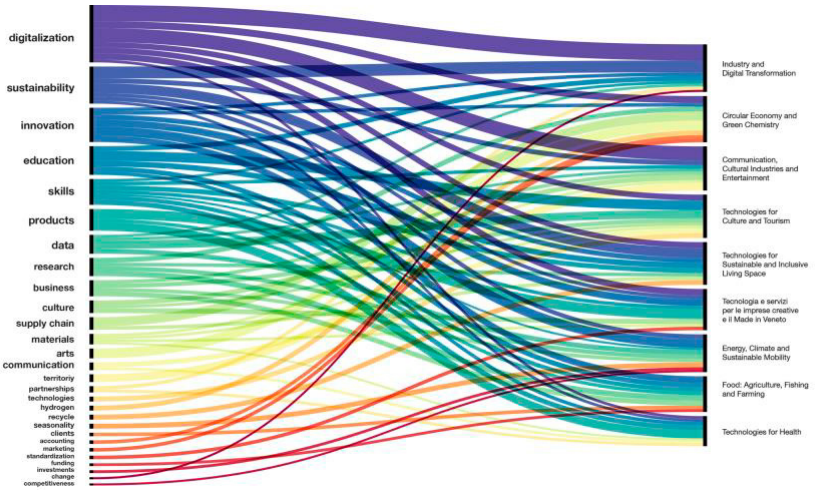

Fig. 5. Alluvial diagram depicting the 8 most recurring keywords within each *thematic table*, as well as their correlation with the tables where they appear to have been most frequently mentioned.

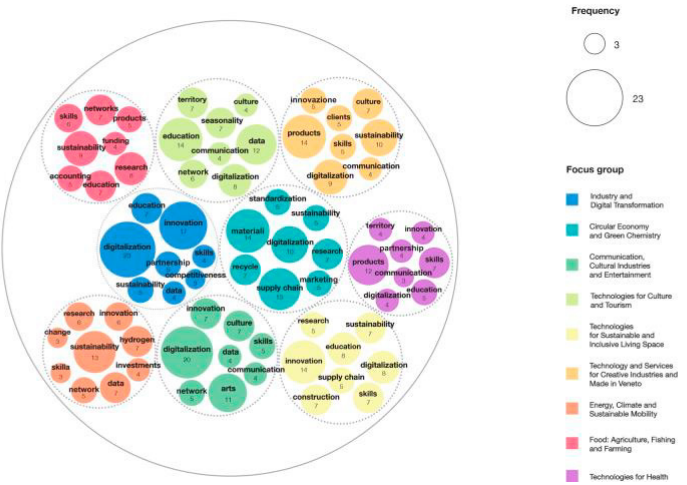

Fig. 6. Circle packing depicting proportions and hierarchies of the 8 most recurring keywords within each *thematic table.*

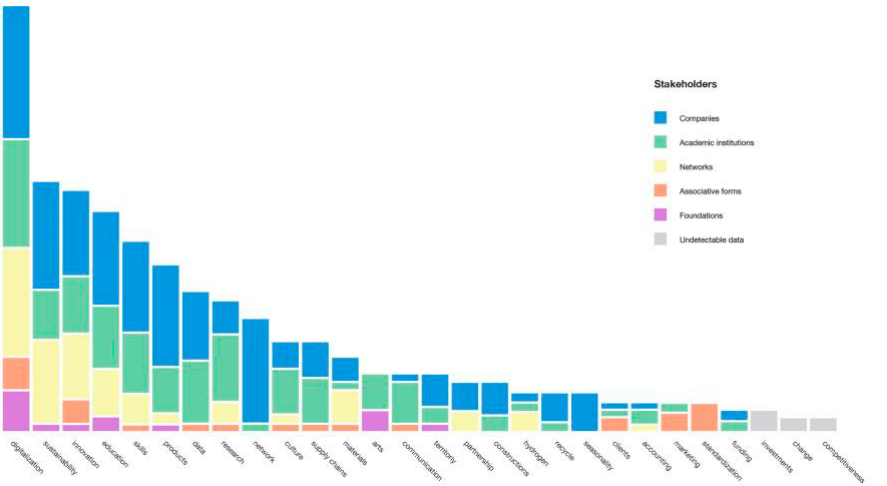

Fig. 7. Bar chart depicting the distribution of the keywords in relation to the interventions made by the various categories of stakeholders involved within the *thematic tables*.

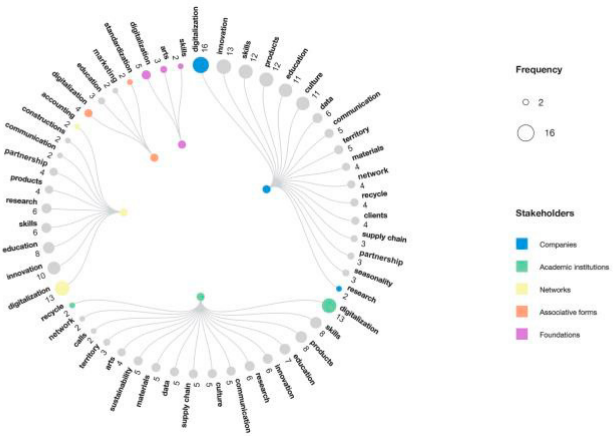

Fig. 8. Circular dendrogram illustrating the total amount of the keywords that the various categories of stakeholders respectively mentioned.

6. Conclusions

As seen, in frameworks characterized by a high degree of sectoral heterogeneity – just as the RIStyling Project was – data visualization could establish itself as a practice around which an effective informative and relational ecosystem might be built. Albeit according to basic modes of visual representation, and following a rather artisanal

procedure, the diagrams we realized clearly relate the identified keywords to the discussion tables from which they emerged, as well as to the different categories of involved stakeholders.
Furthermore, this kind of approach could enhance the understanding of patterns and trends in the area of RIS3 literature, facilitating unlocking interesting research in a domain which covers a diverse area of research and represents various disciplines (Janik, Ryszko & Szafraniec, 2020).
Ultimately, our visualizations have represented a significant operational tool for surveying and interpreting the results of the focus groups organized within the RIStyling Project, taking an active part in the process geared toward defining the new Research and Innovation Strategies for Smart Specialisation of the Veneto region. In particular, they contributed to the identification of strategic elements for a greater inclusion of communication design in the regional research system, affirming culture and creativity as factors to be enhanced in order to strengthen the region's competitive advantage (Regione del Veneto, 2022)
In addition, the use of an Open Source toolkit throughout the whole process fosters the replicability of the proposed methodology within similar projects; certainly, it would be appropriate to employ tools that are more specialized, especially with regard to those related to the dimension of textual analysis. With the present contribution we also take the chance to strongly address the need for a more consistent and structured approach in drafting the textual reports associated with public discussion opportunities, in order to make them more suitable for infographic display. In this sense, if traditionally the outcomes of qualitative, participatory processes find their expression in oral and written form (Krueger, 1997), it would be useful to systematically integrate into this framework also the research on how to visualize data that emerged from such experiences. While the importance of understanding the audience during the data visualization process is often overlooked (Pontis, 2019), it is desirable that European projects – or public projects broadly – equip themselves with the best tools to properly understand what emerges from the tables around which it is so commonly used to sit and discuss.

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This volume presents the contributions presented during the last edition of the 2CO International Design Conference in Alghero (8/9.9.2022), in the two conference tracks Full Paper and Junior Track and the sub-topics informative-animation; interactive data visualization; info-graphics; informative environments.

Following a double-blind selection process based on submissions in the form of long abstracts, the contribution's authors presented their papers at the Conference and, after a further selection step by the conference's Scientific Committee, were invited to submit the final contributions that you will find in this volume.

The volume collects various classes of contributions presented during the event: long papers, short papers/junior track, posters, on the conference's four main areas of interest:

_informative-animation;
_interactive data visualization;
_info-graphics;
_informative environments.

All contributions where reviewed and selected through a blind peer-review process by the Conference's Scientific Committee.

This volume showcases the contributions presented during the last edition of the 2CO International Design Conference in Alghero (8-9.9.2022), in the two conference tracks Full Paper and Junior Track, the sub-topics infographics, informative animation, interactive data visualization and informative environments.

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COmmunicating COmplexity is the international Conference aimed at exploring languages, approaches and technologies to respond to the emerging need for making complex information accessible through design.

FrancoAngeli
La passione per le conoscenze