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Possibilities for futurecasting: designing a digital map of trends

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Abstract

This article suggests a new approach to developing instruments for futurecasting, presenting the methodology for creating a digital map of trends based on the discipline of design. To achieve this goal, the article proposes a set of processes that lead to establishing the elements, components, and interactions of a trend visualization system. The result of the application of the described set of processes is the creation of an automatic interactive visual map of trends, which helps users to interpret and predict changes in society, and thus becomes a tool offering solutions to complex problems and generating opportunities for innovation. In addition, this paper presents the tangible results of the described methodology, detailing a specific case: the digital map of trends known as Deflexor.

Keywords

artistic research; art and technology; STS; laboratory; ignorance; collaborative learning

Posibilidades de futurecasting*: diseño de un mapa digital de tendencias*

Resumen

Este artículo sugiere un nuevo enfoque para desarrollar herramientas de previsión del futuro (o futurecasting*), presentando la metodología para crear un mapa digital de tendencias basado en la disciplina del diseño. Para ello, el artículo propone un conjunto de procesos que conducen al establecimiento de los elementos, componentes e interacciones propios de un sistema de visualización de tendencias. El resultado de la aplicación del conjunto de procesos descrito se traduce en la creación de un mapa visual interactivo y automático de tendencias, que ayuda a los usuarios a interpretar y predecir los cambios en la sociedad y, por lo tanto, se convierte en una herramienta que ofrece soluciones a problemas complejos, lo que genera oportunidades de innovación. Además, el artículo expone los resultados tangibles de la metodología descrita, detallando un caso específico: el mapa digital de tendencias llamado Deflexor.*

Palabras clave

estudios del futuro; tendencias; visualización de datos; metodologías de diseño; transformación digital, design thinking

Introduction

In a period of such dizzyingly rapid changes as those of the late 20th and early 21st centuries, futurecasting has become an essential tool for understanding changes in society. In this context, the discipline of design has grown and expanded beyond its natural sphere of creating products and styles of expression to take on an increasingly important role in the field of futurecasting. This is attested to by the evolution of the use of design methodologies for meeting new challenges (Julier 2013), as design develops methods and techniques which shape systems, environments, ideas and values (Buchanan, 1998; Dürfeld, 2018). In this sense, we can state that design has evolved as a field of study enabling us to tackle future problems in order to foster strategic innovation, not just in products but on a larger scale (Bucolo & Wrigley, 2014).

In this framework, design seeks answers to problems. To achieve this goal, the discipline has developed tools for detecting and analysing trends based on the methodologies of design itself, as trends have a strategic impact on the process of designing present and future products and services. Here, we must highlight the importance of data visualization in the design thought process, and, more generally, the importance of visualization tools for easier understanding of the complexity of the times we live in (Jarauta 2006). Some very important examples of this intensive use of visualization include the map created since 2004 by the team of expert in megatrends and future scenarios Richard Watson; the World Economic Forum project of a dynamic map and strategic intelligence platform developed to detect the trends with the greatest impact in terms of changes for companies and organizations; Next Atlas, an Italian startup which has developed its own trend prediction algorithm with results displayed via a dynamic map; and the Institute for the Future in Palo Alto (California), which uses different visual maps to help companies and institutions understand the entire process of analysing and predicting a trend. In addition to these initiatives, we might mention, for example, the blog of the futurist Ross Dawson, a business consultant who uses different methodological tools for visualizing trends, megatrends, scenarios, and so on, and the Atlas of Weak Signals, which uses visualization to detect the potential basis for the emergence of trends, developed as part of a training programme on emerging futures at Elisava School of Design. These are just a few examples which attest to the fact that visual trend maps are commonly used in the field of design as tools for explaining all kinds of complex processes.

In the context of the prognosis and analysis of the impact of trends through visual maps supported by design methodologies, we decided to generate the visualization of a constellation of trends in digital format in order to encourage innovation and deal with complexity in organizations. This tool, which we call Deflexor, helps to drive strategic innovation processes in organizations in order to reveal areas of development and opportunities of which use has not been made. With this goal in mind, this paper defines the concepts, processes and elements needed to create a digital map of trends in order to provide an automated, interactive tool for imagining and exploring the different future scenarios a designer may face.

1. Previous Considerations

Before we start establishing the requirements and obligatory processes for a digital trend map, we should understand and define a series of concepts enabling us to share a framework for discussion. The goal of this paper is not to debate these terms, but rather to use the conceptual context they suggest to develop the proposed methodology for the digital system.

1.1. Deflexor Concept

Deflexor methodology applies mixed research methods in combination with design practices to open up new routes for studying the evolution, impact and behaviour of trends in future scenarios. Deflexor is based on the analysis of qualitative data from secondary sources and interviews with experts associated with the design thinking process (Manetti *et. al.* 2022), which we transform into quantitative data using fuzzy logic models for semantic projections applied to uncontrolled Internet data environments. The mathematical characterization of what is a semantic projection, together with the use of the theory of Lipschitz functions in metric spaces, provides a broad-spectrum predictive tool (Manetti *et al.* 2021).

1.2. Concept of the anatomy of a trends map

The process of imagining a trend map requires a study of the structure, form and relationships of the elements making up a graphic representation of a behaviour pattern in a particular environment, during a given time period, and marking a particular direction or route (Vejlgaard 2008). To achieve this, we introduce the concept of the anatomy of a trend map. Here, we find three terms which must be studied separately: anatomy, map, and trend.

When we speak of the concept of anatomy, we refer to the study of the structure and shape of an element and the relationships between the various parts of which it is composed (Petitot & Stephen 2017). We use the term 'anatomy' to establish a structure of the components of a system and their relationships in the universe. Meanwhile, the word map refers to a simplified graphic representation of a series of elements making up a science or given area (Maffei 2019), as well as constituting a way of seeing the world, even a deterministic one, which involves values and ideologies. Thus, maps are not neutral; rather, reading them depends on the observer's position and the observable element (Harley 2001). Maps are compiled by accumulation; in other words, they are the visualization of a sum of elements represented briefly and concisely in order to assemble their substantial cartographical features.

Finally, the term 'trend' is defined as something which leads people to act in a certain manner (Caldas 2004). In the discipline of sociology, trends are understood in terms of a future event. Thus, they do not refer to something that has already happened, but rather are a prediction of something which will happen at a specific time (Vejlgaard 2008). Thus, the definition of trend that best suits this paper is found in the discipline of economics (Erlhoff & Marshall 2008), as it introduces the study of temporal or chronological series which are sets of data measured at certain times and ordered chronologically (Gandomi & Murtaza 2015).

1.3. The concept of digitalization of a trend map

Before studying in depth the structural components of a digital map, we think that it is important to define the concept of digitalization, due to the mass uncontrolled use of this term in recent years. The traditional and accepted meaning of digitalization refers to the action and effect of digitizing or recording data in electronic format – in other words, continuously converting and codifying information in numerical format in order to facilitate its computer processing. In this paper, the use of the term 'digitalization' refers to the general process of digital transformation. Here, we combine the digitalization concept with those of automation and interaction, necessary in the digital environment, which must enable us to create a system in which data can be automatically acquired, updated and processed, and in which users can also interact with them. Thus, we can understand digitalization as an act of digital transformation (Leinwand & Mani 2021). The digital transformation process must go beyond the combination of data and algorithms to become a tool which lets us know where to focus our efforts, discover the technologies which are changing the world, and help answer questions for the future success of businesses and companies (Debernardo 2021).

2. Methodology: process of digitalization of a map

At this point, we find ourselves ready to establish the different steps for generating a digital trend map. To reach this goal the following items have been defined: anatomy, digitalization, automation, design and interaction, and functions.

First, we begin to study the anatomy of the trend map, enabling us to identify the elements we should digitalize, the structure the system should have, and how these elements relate to each other. The process begins by applying knowledge deconstruction techniques: a procedure which allows us to dissect a concept and its construction through its structural analysis, exposing any contradictions or ambiguities (Greimas 1966, Derrida 2008). After the structural analysis, we analyse reverse engineering, helping us obtain information on a product and determining what its components are and how they interact with each other (Otto & Wood 1998). We finalize the study of the map's anatomy with an analytical reflection on the elements identified. At this point in the process, we must check whether the selected elements need to be adapted and whether we need to generate new elements. This strategic reflection enables us to meet the requirements set in the development of the digital system.

The next task is digitalization, which allows us to understand the set of interactions among the different components making up the map while simultaneously discarding any unnecessary parts in order

to render the future digital system consistent. For this reason, when digitalizing, we must understand and take into account the medium to which we are bringing the elements. In this case, digitalization of the data creates the dataset (Jensen 2018): a process which enables us to automate data collection and in turn make the different elements of the tool interactive (Gandomi & Murtaza 2015).

After this point, we begin the design and interaction operation. This is a key part of the development of the tool, as it directly affects how the end user understands the management of the system. This phase focuses on establishing the user experience strategy through which the tool must respond to a logical sequence. To reach this goal, the application must react to a given interaction, which must respond to the user's expected logic and allow for flow in the user experience. The user's interaction with the tool triggers reactions such as reordering the data, the appearance of relationships between them, and running functions. The definition of the **functions** brings us to the last process in generating the digital system: the stage at which we define the characteristics of ease of use, utility and convenience of the digital tool, which render the system practical and intelligible to users.

3. Results

We choose an existing physical map, called Deflexor, in order to test the validity of the method. The original Deflexor (Figure 1) was conceived as a physical trend map based on the design process used in creative methodology in order to assist, promote and apply innovation in companies and organizations. Deflexor is the result of applying creativity techniques and Design Thinking. Building Deflexor in this way paved the way for the generation of an automatic, interactive digital trend map, while affording us the opportunity to generate new knowledge based on design.

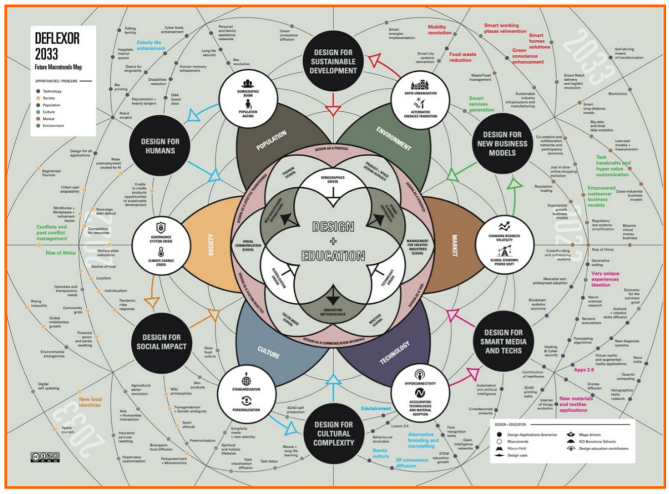

Figure 1. Deflexor map
Source: Alessandro Manetti, IED Barcelona

3.1. The digital transformation process of the trend map

Upon studying the Deflexor map, we observe that it is made up of the driving factors known as global drivers: the factors of transformation on a global scale, megatrends, macro-fields, and a set of interlaced and interconnected trends. The map proposes a visual reflection of the elements prioritized in the generation of changes in lifestyle and interactions between humans, artefacts, and spaces in the present, and with a high likelihood of maintaining their effect over the medium and long term. It is precisely this involvement which makes these phenomena particularly important to the community of designers, teachers in the various design disciplines, and all the professionals who come into contact with the design process as systematized by IDEO and later by the D-School (Design Thinking), complementing it with analysis and trend forecasting. The sources used to generate the universe of trends present in Deflexor are based on research into secondary sources mainly derived from studies and reports by the main strategic consulting companies.

3.2. The anatomy of the Deflexor map

First, the process begins of dissecting the map (figure 1) to identify the basic components. To do this, we use the deconstruction technique, taking the object apart for structural analysis. The aim of studying the anatomy of the Deflexor map is to understand its shape and layout and the relationships between its various constituent elements.

The analysis identified 5 zones; zones 2, 3 and 4 are the main elements of the map. Next, we analyse its composition:

Zone 1: centre. This corresponds to the start of the exploration of the map, beginning with the question: What happens if…? What else?

Zone 2: macro-fields. This is the first major categorization: the areas of interest around which megatrends and trends are clustered, in this case represented by the concepts of Technology, Culture, Market, Society, Population, and Environment.

Zone 3: design application scenarios. The possible design application scenarios appear according to context.

Zone 4: megatrends. A prolonged, large-scale change in users' interests or lifestyle in the economic, cultural, human, technological or environmental spheres. The megatrends represented are standardization, personalization, governance system crisis, climate change crisis, demographic boom, ageing population, rapid urbanization, alternative energies transition, changing business volatility, global economic power shift, hyperconnectivity, accelerating technologies, and the adoption of materials.

Zone 5: Trends. Defined as a change, anomaly, or detectable deviation from the norm in a given entity over a certain period. In the case of Deflexor, they relate to megatrends via connecting lines in the form of spheres of information that are more or less distant from the centre along a temporal dimension. Trends are divided into technological, environmental, social, market, cultural, and human behaviour trends.

The relationships of the Deflexor map simulate a constellation, where trends relate to Megatrends, which in turn relate to Macro-fields. Similarly, a trend may belong to two different fields, sharing many of the characteristics of both macro-fields. Trends are either closer to or further from the centre of the map in accordance with their temporal dimension; the nearer they are to the centre, the more current the trends are.

The data which appear on Deflexor are produced by applying qualitative research techniques. Here, the gathered data shown on the map are selected by a group of experts in the various areas of design, who used creative methods to share all the trends they considered important, which are then classified and grouped into different fields and added to the map.

3.3. Digitalization

To begin the digital transformation stage of Deflexor, we assume that the digital universe is much larger than the paper version. The objective is both to show all the information of the physical document, and simultaneously to add other related elements to enrich the digital system in order to improve and increase usability. In the adaptation of the map, we study what new components we need to generate. For each of these components, we identify the additional data we need so that the adaptation to the new medium satisfies users' needs and adds value. At this point, we are ready to create the dataset, which we divide into four types:

- **Deflexor areas**. We divide the types of information to be shown into macro-fields, megatrends, and trends.
- **Tags**. The tags are sets of keywords which we will associate with Deflexor areas, and which help us classify each of these and then relate the different types of data.
- **Additional information components**. Information of interest for the end user relating to the Deflexor areas - in other words, each trend, megatrend and macro-field will have a related dataset and tags according to their activity.
- **Information from trend studies**. A collection of studies of the year's trends. We digitalize and classify all the trends which appear in each. This enables us to assign a qualitative ranking number to each trend based on how often it appears in each of the trend studies.

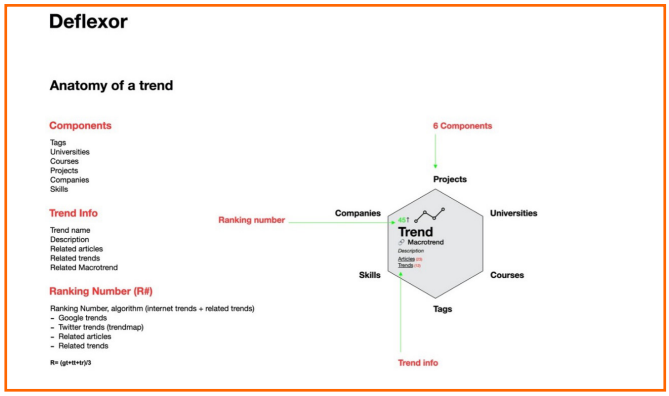

Figure 2. Anatomy of a digital trend with added data.
Source: own creation

When these new data are added, the original anatomies are changed to adapt them to the digital environment, as shown in Figures 2 and 3.

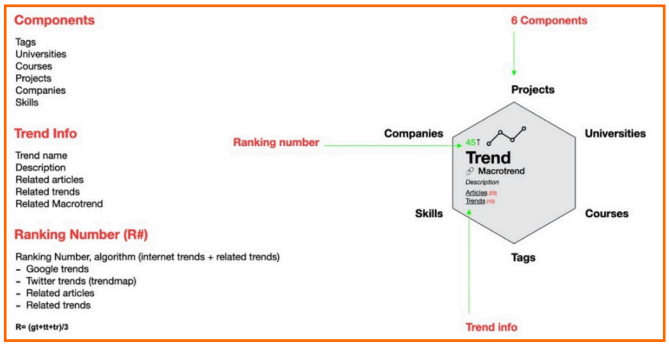

Figure 3. Anatomy of a digital Megatrend
Source: own creation

3.4. Structure

Based on the results of the map anatomy and data digitalization, both the structure supporting the data and the arrangement of the elements are considerably different in the paper and digital versions. All the elements described above are superimposed in a **structure of concentric circles** (Figure 4), represented as follows: central circle, macro-fields circle, and megatrends circle, together with the tag-trend connection lines and the trend connection lines relating the information.

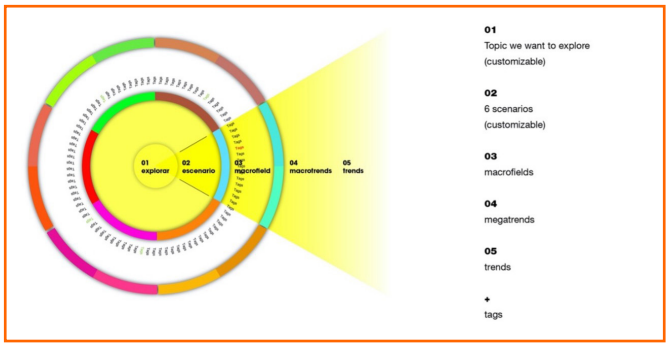

Figure 4. Base structure of the digital Deflexor
Source: own creation

The result of the digital trends map structure is as follows:

1. **Centre**: the central zone can be personalized by the user and is the starting point for exploration.
2. **Macro-fields**: there are six macro-fields corresponding to the first major categorization of megatrends.
3. **Tags**: the elements connecting the different trends.

4. **Megatrends**: the twelve megatrends, grouped into pairs, correspond to users' interests or lifestyle in the economic, cultural, human, technological or environmental spheres.
5. **Trends**: there are 217 trends appearing at varying distances from their connection circle.
6. **Trend Card**: a card showing all the information on a trend.

3.5. Automation

In this paper, the automation process refers to quantitative data collection by software without human intervention, comparison with qualitative data, and the application of a classification algorithm, enabling us to sort and position the data on the digital map. To this end, the automation process follows the below steps:

1. automating the quantitative data collection process,
2. using the "Deflexor Ranking Number" algorithm, and
3. data structure, positioning and functions.

First, the trend studies are introduced in the creation of the map database, having been selected, classified, and associated with the corresponding tags. Next, the relationship between trends and the most closely related macro-fields is established. After introducing all the data, we obtain an overall qualitative view of the map.

The next step is to associate each trend in the original Deflexor – as a reminder, these trends were created from creative dynamics with experts – with the trends gathered in the reports. To do this, we use the algorithm we developed: the Deflexor Ranking Number (DRN) (Figure 5), which offers a weight for the trend and determines its position on the map. The DRN comprises the indicated variables gt (numerical value of Google trends), tt (numerical value of Twitter trends) and tr (numerical value of mentions of a trend in reports), represented by the formula: $R = (gt+tt+tr)/3$.

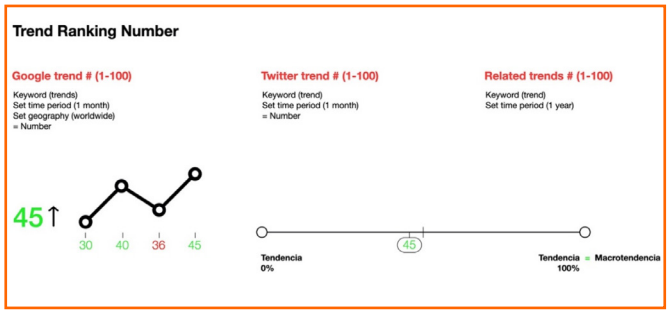

Figure 5. Trend ranking number
Source: own creation

Consequently, we obtain trends that are always dynamic and changing in real time and that respond to the oscillations of the data gathered online.

When a trend reaches 100, this is an indicator that it can be considered a megatrend. The process of assimilating a trend into a megatrend is done with the help of experts on the subject. It is important to add this qualitative component to this type of decision, as the tool, algorithm and behaviour of trends must be studied in order to avoid biases and ensure the trend is not merely a short-lived change.

Finally, once the elements of the anatomy of the digital map are identified, the study of the articulation of the elements begins. To do this, we ask the following questions: How can we relate trends to megatrends? How are trends and macro-fields articulated? How can we relate trends to other trends? How can we measure a trend? To answer these questions, we used the laws of attraction concept, inspired by the physical sense of trends as an idea of force or attraction, which spread after the 18th century (Caldas 2004). In this paper, we understand the laws of attraction as the form of physical relationship between the data on the map: in other words, trends joining up with other trends, and trends with megatrends. These laws of attraction define the force, effort, and drive or dynamism in a given direction among trends (Figure 6).

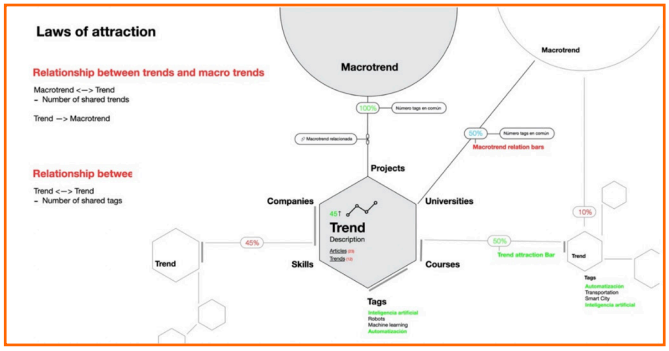

Figure 6. Laws of attraction
Source: own creation

In the design of attraction, all the elements on the map must relate to each other. This relationship is determined by a number expressed as a percentage (% attraction number) and visually on the map by an attraction bar, which brings objects closer together or further apart according to their attraction number.

- **Trend attraction bar**: the line connecting one trend to another or a trend to a megatrend.
- **Trend attraction number**: a number expressed as a percentage showing the attraction between different trends or to their megatrend.

3.6. Design and interaction

A crucial stage in the development of the system is adapting the graphic design of the physical version of Deflexor to a digital, automated and interactive version. First, it is important to choose the shape of the trend

map. The premise is, on one hand, to design a visualization that gives an idea of the complexity of the map as a whole, and on the other, for the chosen design to allow us to highlight the specific part we want to explore, through the idea of focus points.

For the design of the map, we used infographics and schematics techniques. The use of these techniques enables us to give form to ideas in the process of imagining the design (Costa 2003, 2008, 2019) and to work with usability methodologies centred on the user experience, prioritizing the user's interaction with the platform (Figure 7).

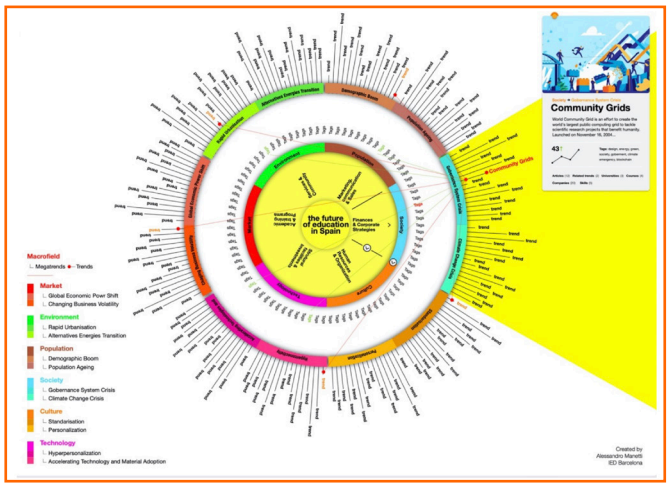

Figure 7. Proposed design for the digital Deflexor map
Source: Alessandro Manetti, IED Barcelona

The choice of a circular form in the design development responds to the idea of a sequence of concentric circles which are interlaced based on the user's interaction with the application. The circular shape also enables us to add or take away elements in each part of the map without losing view of the whole and without altering the overall design.

Another aspect of the design to take into account is the interaction with the user. The map reflects the different connections between the elements and the position of an element in relation to its peers and its subsidiary elements. Similarly, it visually reflects the laws of attraction with the trend attraction bar and the trend attraction number. The goal is for the visualization to allow the user to understand the complexity of the map, while simultaneously facilitating interaction according to the expected visual logic and providing maximum flow in the user experience.

To achieve the desired level of interactivity. we designed two alternatives: one sequential (drilling down) and the other random. In the sequential interaction, the user selects elements consecutively until they reach a final result, according to the following sequence:

1. selection of the macro-field,
2. the circle turns and focuses on the two megatrends belonging to that macro-field,
3. selection of one of the megatrends,
4. the circle turns again and focuses on the trends belonging to that macrotrend, each at a distance from the macrotrend depending on their Ranking Number, and
5. the next logical step is to select a trend and see its content file.

Random interactions are those that occur without any sequential route. At any time, the user may select a trend and see the associated trends. They can also select a tag and see the associated trends (Figure 8).

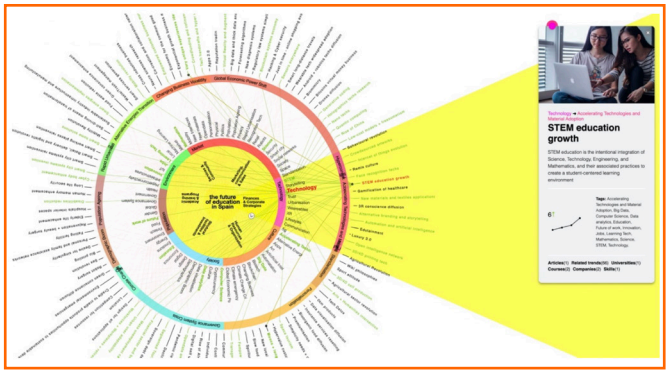

Figure 8: Final design of the Deflexor Digital Interactive map
Source: Alessandro Manetti, IED Barcelona

3.7. Functions

To facilitate the use of the digital trend map in different contexts and with different target audiences, the following functions have been identified:

a) Personalizing the centre. This makes the tool our compass, showing where we want to go or the scenario we want to explore to find the path to a result.
b) Personalizing scenarios. This allows us to select up to six scenarios, which are pre-set in the Design Thinking phases.
c) Selecting tags. Users can directly choose one or more tags and see the trends associated with each one.
d) Selecting a trend. The application enables us to choose a trend and see the trends which relate to it, along with the numerical value (attraction number) of the relationship.
e) Selecting binomial trends. The tool shows all the trends relating to both and compares them.
f) Associated data. When the user selects a trend, they have direct access to information relating to it – companies, articles, universities, courses, and so on, all in one place and easily accessible.

Conclusions

In summary, the design of an automated, interactive, digital trend map is a complex process which enables us to obtain tangible results thanks

to the application of design methodologies and the integration of new technologies. The design and technology binomial increases the uses and contexts in which we can apply the trends tool. Among its uses, we can highlight Deflexor as a map of future megatrends, like a compass that shows the direction of trends in each macro-field. As a map, Deflexor offers a visualization of the future which varies according to the fluctuations of the internet, providing a living, real-time guide to trends and a map of the near future. Second, Deflexor can be used as a brainstorming tool. Using the tags to group concepts, one can establish relationships between different elements which would not otherwise be visible. This association of ideas and concepts helps generate creative solutions. Third, Deflexor is a method in innovation processes. Fourth, Deflexor is an instrument for trend macrostudies, given that the application combines quantitative data, updated in real time, and trend studies that complement the experts' qualitative data.

Finally, we would like to cite a real example of how the Deflexor tool has been used to classify and rank different kinds of art, fashion, communication and design academic research projects developed by students on undergraduate and postgraduate programmes at the IED (Istituto Europeo di Design) school in Barcelona. The principal goal achieved through the use of Deflexor's classification of students' projects was to provide a logic and trend-oriented structure to the yearbook published to celebrate fifteen years of the IED campus in Barcelona (Manetti 2018). The editorial board, comprising art, fashion and design teachers, professionals and trend experts, strongly believes that art and design have the power and the responsibility to change the present in order to imagine not only the most probable or plausible future but the most preferable. Following this idea, the editorial board decided to use the Deflexor map as a compass to check the consistency of the research project in relation to trends and megatrends. Another goal of the classification was to establish an internal ranking to measure the ability of a design school to produce meaningful future trends and megatrend-driven academic research projects over the years. In this sense, Deflexor is a strategic tool for driving the desired positioning of an academic institution through the production of academic studies and speculative design proposals developed over a consistent time period.

In context, the use of Deflexor as a trend map in innovation and brainstorming methodologies to create a path to follow by associating ideas that, in principle, seem impossible to relate to each other, expands our creativity and, thus, our options for creating new business spaces and future opportunities. For example, in the academic environment, Deflexor would enable students to identify the educational offers that best suit their interests, or the skills required for future professions. For their part, universities could use it as a strategic ally in the creation of their future educational offering in relation to knowledge and market needs. In the business context, Deflexor is a strategic planning compass which allows us to identify companies which are trending in the market. It also enables us to detect new opportunities which, in principle, would not have otherwise been identified as possible fields of action. In summary, this automated and interactive tool, based on design trends and methods, helps to drive strategic innovation processes in organizations in order to reveal areas of development and opportunities of which use has not been made.

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