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Visualisation Method Toolkit: a shared vocabulary to face complexity

(Article begins on next page)

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DRS LEARN X DESIGN 2019
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Fifth International Conference for
Design Education Researchers
9-12 July 2019
Middle East Technical University
Ankara, TURKEY

Editors
Naz A.G.Z. Börekçi
Dalsu Özgen Koçyıldırım
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Visualisation Method Toolkit: A Shared Vocabulary to Face Complexity

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Abstract: With companies, universities, individuals or entire departments, promoting open dialogue, constant interdisciplinary collaboration is a challenge that still meets some resistance. Learning to deal with complexity, with the coexistence of different points of view, learning to work in more heterogeneous teams, in relation to know-how combined in new, sometimes original and challenging formulations, brings particular needs. From the importance of language and a shared vocabulary to the ever-increasing need to work on tools and not just applications, from the constant promotion of collaboration and contamination between different backgrounds and disciplines to the guarantee of a continuous training process through laboratory activities and workshop, this contribution - through the Visualisation Method Toolkit project and its experimentation - investigates the potential of data visualization as a medium to bring design closer to a company's core business as well as support students, institutions and other organizations in communication, both in the analysis and/or scenario phase and in support of dissemination actions towards a more informed quanti/qualitative collective decision making with the aim of enabling new innovative and sustainable good practices.

Keywords: data visualisation; workshop; toolkit, communication; sustainability

1 Introduction

Delineate and define the meaning of the term big data, means first of all to incorporate a new *forma mentis*. Today, the multifaceted nature of information leads to a real paradigm change: the classic vertical social structures leave room for reticular conformations as well as the birth of ever new relationships with the resulting acceleration of the elaboration and transmission of information (Castells, 2009).

What we are experiencing is a period of "*interregnum*", one of those moments in which the ancient ways of acting no longer work, the lifestyles learned/inherited from the past are no longer adequate to the current *conditio humana*,

but still new ways to meet the challenge have not been invented, constructed and implemented (Bauman, 2011). What we are experiencing is a "liquid modernity", in which the only true constant is the continuous change, and the only true certainty is the uncertainty, the not definitive. However, modern enterprise, as well as the academic world, are still conservative and multidimensional organisational forms, represented by a plurality of actors with often opposed interests and individual positions to defend. In what can be defined as a "solid mentality", the philosophical focus lies in the determination to control in detail the definition of the future. A closed innovation, which takes a competitive advantage around the issues of control, the hierarchical perspective and competition, declining all those strategies influenced by activities related to the enhancement of human capital, collaboration and sharing. A closed innovation in which the elements remain point-like in a general system if not connected in a broader project that knows how to dialogue with the actions of individuals and the community.

Today, it is widely accepted that innovation is one of the main drivers for companies in order to guarantee sustainable and profitable development over time (Giannopoulou, Yström, Ollila, Fredberg & Elmquist, 2010). On the one hand, the acceleration of the transmission of information carries with it the risk of a non-communication determined by the complexity of the phenomena themselves. On the other hand, if until recently, among the main factors that greatly influenced the processes of innovation there was, for example, the tendency of organisations to deal exclusively with internal results, today this process becomes more and more democratic, enabling new producers of innovation and involving new interlocutors including end users. An increasingly global process, a complex system of relationships between companies, research centres, universities that act locally with a glocal perspective and dimension.

2 The Visualisation Method Toolkit

For design or entrepreneurship, for web or marketing, for creativity or for structuring the right discourse, the use of tangible and analogue cards and tools, especially in recent times, is increasingly gaining ground by becoming an integral part of participatory decision-making processes. Whether they are developed by the individual or by large companies, these tools become a valid aid to trigger and support discussions within heterogeneous teams with a view to continuous design research. However, what happens to language when it meets a medium that supports it and inevitably transforms the relationship with the language itself? (McLuhan, 1963).

State of the art, however, does not adequately respond to the academic and business needs dictated by today's information revolution, revolution that brings with it an exponential growth of raw data coming from the most different sources and with an ever-increasing speed. Data that require adequate processing to become information, and therefore knowledge and wisdom (Masud et al., 2010).

Visual representation has always been a transversal cognitive tool based on the natural ability of the human being to perceive the structures of phenomena by organising them formally. So, it is exactly the effectiveness of this technique that ensures more effective memorisation and storage of information (Meirelles, 2013). The use of maps, diagrams, graphs and tables is not new; this type of representation accompanies the course of human evolution by addressing historical changes in different socio-cultural contexts, spaces and the organisation of knowledge on the basis of models increasingly suited to the way we *feed* on information. C. J. Minard, W. Darton, J. Snow, F. Nightingale, D.I. Mendeleev, H. Beck, and W. Playfair are just some of the names among the milestones in the history of visualisation. These figures, sometimes scientists, philosophers, sociologists or engineers, show transversality of this medium, starting from various fields. From managers to employees, from professors to students, passing through the individual citizen, everyone is the protagonist of today's evident and silent revolution that is completely changing the relationship with knowledge.

How can we make our ecosystem more communicative and collaborative by aligning all the protagonists towards a common goal? Born in 2018 from a collaboration between the Innovation Design Lab of the Politecnico di Torino and the Digital Society School of the Amsterdam University of Applied Sciences, the Visualization Method Toolkit (Figure 1) is the third of a series that deals with issues that affect the world of design as well as entrepreneurship. For these reasons and with the aim of helping to face the challenges and the contemporary organisational, social and cultural transformations, the project integrates and accommodates the disciplines of data visualisation and graphic design. The aim is also to provide a basic grammar to deal with the understanding and communication of complex and heterogeneous phenomena, contributing to the construction of a shared understanding of the structure and correlations of the investigated system, the factors that influence it, the triggering causes, the futuristic areas of intervention. The Visualization Method Toolkit is born to become a valid aid to enable sharing and understanding during participated sessions, allowing everyone to bring their own experience and their point of view in the planning creating a real collaborative knowledge, supporting a more informed process decision.

Figure 1. The Visualisation Method Toolkit

The Project

Research, selection, organisation, simplification of information, standardisation and graphic/functional restitution: these are the main phases of the design process that led to the development of the real kit. A kit that consists of a series of cards that recall the typical gestures of playing cards, enclosed in a sleeve designed ad hoc by laser cutting techniques. To maintain the aesthetic/material continuity of the series, the sleeve of this toolkit is made of felt, but in this case, the choice fell on a particular felt obtained by recycling PET bottles.

The Cards

A collection of 55 cards. A collection of 55 visual models categorised through different interpretations. A selection of 55 different ways to analyse, explore and communicate quanti/qualitative information. Specifically, it is possible to divide each card into two main operational functions: *select* and *execute*.

The first function, *select*, corresponds with the front of each card and provides all the tricks useful to discriminate the choice of a visual model rather than another, starting from the dataset in possession; specifically, the information is:

- Name and iconographic representation of the visual model;
- Goals of the visualisation, which in this case for all representations corresponds to *communicate*;
- Reference category or *statistic distribution* including Bubble Chart, Chernoff Face and Density plot, *relation* like Arc Diagram and Parallel Set, *comparison* such as Streamgraph, Bar Chart and Glyph Chart, *mapping* as Honeycomb Map and Bubble Map. Treemap, Sunburst Map and Circle Packing instead refer to the category *hierarchies*, *time* represented by examples such as the Condegram Spiral Plot and Timeline, *process* including Flow Chart and Funnel Diagram, to conclude with *text analysis* as in case of the Word Cloud;
- Estimated time for the realisation of the visualisation, both analogical and in a digital version.

The back side of the card, corresponding with the *execute* function, aims to accompany the user step by step in the pragmatic realisation of the visualisation, through:

- A brief description of the visual model;
- Task as a systematic description of all the steps useful for the realisation of the visualisation, from the creation of the Cartesian axes to the right positioning of the elements, from the choice of colours as a means of conveying further variables, to the creation of a clear and explanatory legend;
- Notes on: when it is more appropriate to use the visual model, why use it, the elements to pay particular attention to and therefore the most critical steps, the type of output and possible future developments are finally the recommendations to be taken into account during the development of the visual project.

Using single representations methods such as this can be used to code most different types of datasets. However, beyond single representations, the method can open almost endless dissemination and communication possibilities thanks to the original and creative hybridisation between two or more different views, enabling and perfecting what Tufte defines as *graphic excellence* as the ability to convey complex ideas in a clear, precise and efficient way (Tufte & Graves-Morris, 1983).

3 The Workshop: A Continuous Training Process

Workshops, Summer School, Hackathon and Design Challenge, Training, are just a few names and metamorphoses that in recent years and throughout the world, are representing the broader concept of *laboratory* as a moment of extemporaneous experiential learning. "If I listen I forget, if I see I remember, if I do I learn", with these words Confucius identifies in the planning and in the practical realization, the attainment of a higher level of knowledge and learning; mere theoretical awareness finds consolidation in experimentation in the field that becomes the true essence of a concrete and empirical knowledge. The pedagogical, creative, educational and social relevance of the workshop lies in its intrinsic complexity, dynamism and polysemic nature. The presence, as a tutor, of professionals and designers, the active participation, the sharing of ideas and the collective experimentation of new solutions in a short period, are all elements that make the workshops an innovative tool, an educational experience integrating training of employees, managers, students or researchers.

Experiential learning, as defined by John Dewey and Jean Piaget and subsequently deepened thanks to the contribution of the theorist of education David A. Kolb, is a process in which knowledge is created through the transformation of experience. This transformation takes place from concrete experiences, in which learning takes place through the perceptual act and then through the personal interpretation of practical experimentations, or through the understanding of meanings through observation and listening. In a context of experiential learning, students can be asked to visit and organise manual work sessions, experiments in the laboratory, reflect on their experiences, communicate them and share them. By this perspective, learning and teaching are above all a social process, an integral part of daily life, as well as facilitators for the transfer of behaviours, learned in future life and work. Holistic learning, in which the participant learns using all of their learning channels: cognitive, emotional, physical; the more the three are involved in a consistent way, the more the level of experientialness is raised. By integrating this concept with the definition of system, understood as a complex reality whose elements interact with each other, a circular model on the basis of which each element conditions the other and is in turn conditioned, it derives a meaning where each single element it is not to be sought in the element itself but in the system of relations in which it is inserted (Bistagnino, 2009). In this logic, the training system is enriched with new perspectives aimed at creating a logic of interaction, comparison, and constant sharing. The first step to enable conscious design participation with a sustainability perspective is to identify the relationships between the components of the workshop system, ensuring non-hierarchical horizontal communication, flexibility, focus on innovation and personal expression. The enhancement of the quality of relationships is favoured by a horizontal approach with the aim of favouring positive relationships for each participant, integrating where possible expansion of the network of the actors involved with the purpose of strengthening interaction and exchange between the training and social system.

The Visualisation Method Toolkit Workshop

The training, conceived as a continuous cycle between acting, evaluating, conceptualising and applying, as an opportunity to expand the present conversation in an inclusive and collaborative way, becomes not only an innovative and technologically sustainable opportunity, but, above all, a social and cultural one. It is precisely the extemporaneous experience that allows the enhancement of the essential function of the toolkit, which goes from being a deck of cards that can also be consulted individually, to a real tool for the project. An experience that in the specific case underlies a specific approach: the Systemic Design. An approach that investigates the behaviour of a complex system not through the simple sum of its constituent components but through the dependence and the strength of the relationships and interactions between them.

The first experimentations of the toolkit took place within the Innovation Design Laboratory and the second level Master in Design for Arts in the Department of Architecture and Design of the Politecnico di Torino. The Innovation Design laboratory is a multidisciplinary training course within the Master Degree in Systemic Design "Aurelio Peccei", which educates students to an innovative and sustainable design starting from a careful analysis of the territory and the reference context. A data-driven design, where the collection, analysis and then the visualisation of data becomes a fundamental part of the design process, as well as an aid to the development of the concept and the project itself. Design for Arts is a structured training / professional program that addresses, through a multidisciplinary approach, the strategic/functional and innovative aspects of creativity in the disciplines of design culture and visual art.

Forty-two students in the first case, eleven in the second, took part in these experiments. Experimentation that has seen the definition of a specific format for the development of the workshop, a structure that sees the consequentiality of the following steps:

1. *Contextualisation*. A fully-fledged introductory overview from the historical and applicative/functional point of view of the data visualisation discipline. A compelling presentation in all those contexts unrelated to the world of data processing, graphics and design.
2. *Introduction to the Visualization Method Toolkit*. An illustration of the project in general, but above all a detailed account of its layout and use.
3. *Reading and analysis of the starting context*. Whether it is a particular dataset, a journalistic article of current affairs, scientific research, an extract of a novel or a statistical report, the starting points may be the most original and different. At a pragmatic level, this phase requires a thorough reading of the starting material with the aim of identifying the possible areas and topics of discussion as well as the possible paths to be undertaken starting from the information present.
4. *Finding the reading key*. Closely related to the previous phase, this moment requires the selection of the identified themes and therefore the actual definition of the starting point around which the visual project will be constructed.
5. *Identification of the message*. Once the key has been identified, to capture the reader's attention it is necessary to identify a message as well as the main narrative and therefore the point of view that will be conveyed by the visualisation (Lupi & Aesch, 2012). This particularly delicate phase will inevitably condition future spatial and chromatic/formal choices as choices that will necessarily have to contribute to the clear transmission of the message.
6. *Data search*. Open data, market research, still newspaper articles or monitoring and observations in the first person. This phase of documentation considers the search for further data useful for the story, of the message previously identified, from the most varied and different sources. To all effects a process of contextualization. A context that becomes an integral and significant part of the main information to be conveyed.
7. *Organization, filtering and creation of the dataset*. This is not a simple list of data. It is precisely at this stage that the assumptions of Systemic Design see an application, both theoretical and practical. All the participants are motivated to see the phenomenon investigated as a complex system of data. A system that sees data as components appropriately selected, organised and filtered on a purely quantitative level as a fundamental input. Input that will find an answer and a value in the visual representation of the system itself and therefore of a qualitative output.
8. *Identification and selection of the visual model*. The choice of the most appropriate form and type of graphic representation to transmit one or more quantities becomes fundamental to bridge the "*black hole between data and knowledge*" (Wurman, 1989). At this point, the participants begin the actual physical exploration of the toolkit. Organising by category, grouping by the number of variables, comparing by similarity, comparing by diversity, deepening with examples or directly verifying the tasks necessary for implementation are just some of the possible strategies and actions that determine or not the choice of a visual model. The choice must necessarily fall on a form that can visually support the information to be communicated. It is not excluded that there may be more valid forms to fulfil this communicative function, not even the possibility of hybridising two or more visual models. (Figure 2).

Figure 2. With the help of the cards, the students begin the search for the right visual model to convey the message.

9. *Playing with data*. Entered into the heart of the workshop, all the participants begin to organise and code their data set according to the selected visual model, as well as experiment and explore the elements involved, such as the composition of the main architecture, number of elements in play, proportions, positions, etc. (Figure 3).

Figure 3. First formal explorations starting from the created dataset.

10. *Playing with shapes, colours and sizes*. Participants are asked to free their creative and original inspiration by looking for the right shapes and the most coherent colours to highlight the internal relationships between the elements. Also, yet to create multiple levels of reading, from general to detail, determining the most appropriate hierarchy in content; continue experimenting by adding all the tangential elements useful for contextualisation as well as supporting numbers and therefore the label, reaching the almost final creation of the actual visualisation. (Figure 4).

Figure 4. Students start playing with shapes, colours, spaces and dimensions.

11. *Simplify, simplify, SIMPLIFY*. "*Ornament is a crime*" (Miller, Ward, 2002). At this point, all that remains is to stylize, refine and "clean" the visual model from any purely aesthetic and decorative vein, not useful for communicating the message. The goal is not so much to create an aesthetically beautiful visualisation, but rather a visual model functional to the conveyance of the message (Cairo, 2012). Finally, all that remains is to create a clear legend, to guide the reader in understanding information and finding the right title for storytelling.

Although all the phases of the workshop are consequential, they see the possibility of activating continuous iterative processes, in the re-identification of the reading key, in the re-definition of the message, in the search for new data, and above all in the research and experimentation of the right visual model.

Results

In order to evaluate the effectiveness and validity of the tool and the practical experience in its entirety, the 53 participants were asked to fill out an anonymous questionnaire, whose answers allowed to outline the strengths and weaknesses of the project.

Almost all the participants (99%) expressed a positive opinion about the clarity of the contents contained in the cards, qualifying the Visualization Method Toolkit as intuitive and straightforward. The motivations supporting this figure are the most varied: from graphic immediacy to the degree of detail of the procedures to be performed, to the practicality of use and consultation. The negative opinion recorded prefers the use of a manual or more traditional ways to consult the graphic forms proposed.

When asked what could be the possible measures to improve the actual tool, the ideas were varied and interesting. For example, it has been suggested the insertion of practical and illustrative examples and case studies, whether analogue or digita; to predict a specific order *a priori*; the development of a digital version of the toolkit that offers the possibility on the one hand to consult the instrument on various portable devices and on the other that allows to download the visual models in vector format. Finally, among the future steps, the suggestion to widen the anthology of the visualisations, as well as to implement the project from the linguistic point of view through the multilingual translation of the same, to conclude with the insertion of an ad hoc appendix as an aid to consultation. The same percentages emerged to the question: do you think that the Visualization Method Toolkit is a useful tool for the design process? In particular, the prevailing opinion verifies the potential of the instrument in question as valid support for the communication of data and information, as well as analysis during the whole design process. 46% of the participants responding to the test identified the research phase and scenario like the one that could benefit most, followed by the final communication and presentation of the project to 40%, the concept to 10% and the remaining 4% to the phase of data collection.

The last moment of the survey saw the participants' suggestion, on the possible contexts and sectors of use that could most benefit from this tool: economy, marketing, design, sociology, statistics, journalism, publishing, education to name a few.

4 Conclusions

Starting from the design and then from the development, as well as from the subsequent experiential experimentations of the Visualization Method Toolkit, this contribution investigates the importance of creating new tools, practices and processes to facilitate and enable a more agile, collaborative and shared participation.

Deepening the so-called "learning outcome", it is interesting to highlight how contamination processes, multidisciplinary approaches and co-planning can be qualified through the creation of a shared vocabulary, to all effects of a basic grammar made of shapes, colours, symbols, positions and dimensions, for the codification and representation of information.

Representation useful for the recognition of the most diverse variables that influence a problem, an event or a phenomenon, yet the possibility to investigate these variables in a holistic way enabling on the one hand new strategies of intervention, on the other the sharing of decisions and choices among all the actors involved in the design process, creating a sense of community and participation aimed at a real "*interconnected knowledge*" (Celaschi, 2016).

In fact, we are in a phase of total change and transformation. An intrinsically complex, articulated and dynamic reality. A reality characterised by always new perspectives in which the contribution of design renews itself every day, but also and above all the relationship with the world of entrepreneurship, education, communication, becoming synonymous with innovation of processes, services and products, in a specific territory or context of interest. (Yee & All, 2017). Precisely in this scenario, the Visualization Method toolkit is an aid to enable a growing awareness of contemporary complexity, awareness in which design as a cultural catalyst imagines scenarios aimed at greater responsibility, transparency and sustainable innovation.

References

Bauman, Z., (2011). *Modernità Liquida.* Bari, Italy: Laterza & Figli Spa.

Bistagnino, L. (2009). *Design Sistemico: progettare la sostenibilità produttiva e ambientale*. Ed. Slow Food, Bra.

Cairo, A. (2012). *The Functional Art: An Introduction to Information Graphics and Visualization*. Berkely, USA: New Riders.

Castells, M. (2009). *La città delle reti* (C. Rizzo, Trans.). Vicenza, Veneto, Italy: I libri di Reset, Marsilio.

Celaschi, F. (2016). *Non industrial design: contributi al discorso progettuale*. Luca Sossella Editore

Giannopoulou, E., Yström, A., Ollila, S., Fredberg, T., & Elmquist, M. (2010). Implications of openness: A study into (all) the growing literature on open innovation. *Journal of Technology Management & Innovation*, *5*(3), 162-180.

Lupi, G., & Aesch, M. (2012). Non-linear storytelling: journalism through info-spatial compositions. *Parsons Journal for Information Mapping,* IV. URL: http://pjim.newschool.edu

Masud, L., Valsecchi, F., Ciuccarelli, P., Ricci, D., & Caviglia, G. (2010). From data to knowledge-visualizations as transformation processes within the data-information-knowledge continuum. *14th International Conference on Information Visualisation*, IV 2010, 26-29. July 2010, London, UK.

McLuhan, M., (1963). *The Gutenberg Galaxy.* Toronto, Canada: Toronto University.

Meirelles, I. (2013). *Design for Information: An Introduction to The Histories, Theories, and Best Practices behind Effective Information Visualizations.* Beverly, USA: Rockport Publishers.

Miller, B., & Ward, M. (Eds.) (2002). *Crime and Ornament: The Arts and Popular Culture in the Shadow of Adolf Loos* (Vol. 1). Toronto, Canada: Yyz Books

Tufte, E.R., & Graves-Morris, P.R. (1983). *The Visual Display of Quantitative Information*. Cheshire: Graphics Press.

Wurman, R.S. (1989). *Information Anxiety: What to Do When Information Doesn't Tell You What You Want to Know*. New York, NY: Doubleday.

Yee, J., Jefferies, E., & Michlewski, K. (2017). *Transformations: 7 Roles to Drive Change by Design*. Amsterdam: BIS Publishers.

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