

## 2. Theoretical background.

The relationship between design interventions and the environment in which they are performed more and more are seen as complex. Some authors as Dosi & Marengo stated that when acting within Complex Systems two kind of awkwardness could emerge: the *knowledge-gap*, the erroneous representation of the reality, and the *problem solving-gap*, the distance between the problem to be faced and the tools provided to solve them. To face this kind of challenges often multi-disciplinary projects and multi organizational teams are established. Two approaches seem to arise: on one hand an approach looking to outer space for macro challenges; on the other hand an approach about the micro at the nano particular level. Both these seem to fail to examine the complexity of our local environment as constituted of places, people and issues. The interactions of these actors are dealt with in a similarly cursory way in the social sciences that focus on the individual versus the mass.

What we sorely missing is a area of study that takes the interactions of groups and locations and their desires seriously. What tools, methods and process can we use to investigate and visualize these communities of interest whose shared language is location?

### 2.1. Looking for new languages: from texts to images.

Due to its linear nature, text tends to describe events and realities through discrete and ordered elements: since the origins of scientific thought, text has been the preferred tool, such as, for example, in the form of the syllogism. In the 1950s, systems theory revealed the inadequacy of this approach for the study of complex systems: since then, awareness has grown that text, not only in the scientific context but also in disciplines like design, is not enough to describe reality. Alongside discourse and text, the *model*, often visual, thus asserted itself, a mode of representation that does not divide or analyse the elements separately but studies them in an interconnected and indivisible manner. Much of systems and complexity theory starts in fact from the assumption that some phenomena can only be analysed as a single corpus and that, therefore, the connections between the elements are more important than the nature of the individual elements themselves. Image thus assumes a role of primary importance: able to describe elements as a whole without dividing them, it becomes an irreplaceable instrument for depicting some qualities of systems otherwise difficult to interpret.

In this context, the forces that are reshaping urban areas not only seem to make textual description obsolete but also the traditional modes of mapping and representing the city could appear inadequate: the representations of the physical and social networks of the city, of individual and collective lives, are a new challenge for the design of communication. The representation of phenomena demands the gradual abandonment of classic visual languages, i.e. of maps that lay their trust mainly in the topological and geographical metaphor. Overcoming these limits means building a new representation of the city: a collective vision capable of defining and visualizing the new concept of urban space and, more in general, social space. The ability to use this new kind of artefact does not refer solely to the communication of quantitative information but also explores the visual narration of values and qualitative data.

### 2.2. Diagrams.

If visualisation is one of the most effective operations for triggering and activating design thinking, two end points can define the role of visualisation within the process of comprehension of reality and design work: on the one hand we find the initial open forms that, through drafts, make the convergence between words and images one of the most

effective resources for defining the idea around which one is working; on the other hand, we have the closed form of the technical expression of the final design. From one type to another, one task is shared by all forms of visualisation and representation: that of transferring knowledge, making explicit the intentions that drive the design group and the work it is doing.

The theme of complexity adds a further level of critical reading to the question, which can be summarised in three general areas of analysis:

- the prevalence of the qualitative and intangible features of design environments and knowledge spaces;
- the conduction of processes of enquiry as processes to define open knowledge;
- the reconfiguration of the design environment as a constellation-based organisation where the work of the single designer is replaced by the involvement of a complex, mixed system of actors.

As regards this last area of analysis, it can be said that diagrams, understood as communication products for the construction of shared strategies, to prefigure the impact of design decisions, possess an enormous potential for the improvement of design processes thanks to the possibilities of involving all the stakeholders, overcoming any barriers created by specialist knowledge and language.

Barry Richmond, an MIT researcher in System Dynamics, talking about design activities and the orientation of change in social systems, says: *“the solutions that we implement reverberate in a fabric of connections, producing a wave of counter-reactions widely distributed over space and time. Only by increasing our appreciation of the increasingly systemic nature of our reality will we be able to start functioning as responsible cohabitants of the social fabric”*

Talking about the aspects and the language and representation of images and narratives, Richmond maintains that they must be a powerful instrument of comprehension that:

- is visual and diagrammatic;
- is able to bring out “perceptions”;
- emphasises “interdependencies”.

Diagrams are usually considered as graphics tools. However, the Greek etymology of the term *διάγραμμα*, from *DIÀ through* and *GRÀMMA sign*, opens up an extremely broad field of possibilities. In the sense that Gilles Deleuze gives of an *abstract machine*, the diagram goes beyond its mere material nature and representation to become an operational conceptual tool. It is both a tool of interpretation and of design, able to weave significant relations between reality, its interpretation and the directions of its transformation.

### 2.3. Maps.

Maps clearly belong to the category of diagrammatic instruments, in part because of the evolution and semantic transfer that the term has undergone over the years.

The first terminological definition of ‘map’ dates back to the 18<sup>th</sup> century and states that *“a map is the morphological representation of the earth or part of it on a plane.”* This definition, that is in keeping with the technological instruments of observation of the time, reveals its limitations in view of the past century’s progress in territorial exploration, above all thanks to satellite and digital instruments. Maps are not and cannot be – either in geography or as a survey instrument that has been transferred to other theoretical or professional disciplines – a faithful and impartial transcription of the object that is represented.

A second definition states that maps are a simplified vision of space that highlights the relationship between various components. In this case, the objective is no longer the earth but space, widening the concept of space to the *“anthropological space”* of Levy: *“What is anthropological space? It is a system of proximities (space) that is part of the human world”*

*(anthropological) and, thus, dependent on techniques, meanings, language, culture, conventions, representations and human emotions.”*

The definition offered by critical cartography during the 1970s has further extended the theoretical dimension of cartography, defining maps as the “*intellectual abstraction*” of a reality, thus implying the authorial intervention of a person. This definition, by introducing into the concept of maps their intention of pursuing an objective, invalidates the presumed objectivity of cartography, even scientific cartography. Instead, maps become a decision-making instrument: based on the pre-determined objective of the “cartographer;” information is weighed and selected and then rendered in a visual form.

A working definition of ‘map’ could be “*an authorial cultural artefact,*” rather than a scientific-objective artefact, that depicts space through a narrative dimension based on an objective.

Like textual narration, maps have a cartographic rhetoric that could be defined as “*the art of intentionally structuring a series of arguments in a certain dialectic form that renders them useful in achieving an objective.*”

In light of this new way of considering maps and the way they are constructed, a new role emerges for people who make use of these artefacts. Despite the fact that the map’s designer has already conducted an operation to trace the boundaries of the represented area and an operation to channel the ways of interpreting this information, the map’s user must make a conscious effort to interpret and orient what is represented, based on logic, knowledge and cultural background. Once the idea of the objective narration of the world is abandoned and, with it, the claim of project perfection, maps become the construction of the best of all possible worlds on the basis of values that are shared at a particular moment and of the opportunities that exist for a project within a given context.

Each representation of reality, and thus, each diagram, from maps to mood boards, storyboards and graphs, is intentionally structured and, as a result, is arbitrary, *anexact* and incomplete. From this characteristic one can infer the political nature of these narrations and the principle of responsibility that should accompany the person who develops these artefacts.

From another point of view, the explicitly political, non-objective nature of maps, in the sense of a subjective artefact that is the result of design interpretations, makes them one of the most useful instruments for tracing processes in productive and decision-making situations.

## **2.4. Diagram and representation.**

A further conceptualisation of the theme of representation and visualisation with regard to the construction of knowledge is offered by Luis Marin who, in *Della Rappresentazione*, suggests a method for interpreting these visualisations. Rather than simply rendering the represented theme explicit, by deconstructing the sense of the visualisation we can, in fact, construct a text that not only describes what is represented but also who has created it, and to use a term coined by Latour, we can describe the “*socio-technical*” networks that have produced them. In this way, three levels emerge that can be illustrated by a diagram:

- the object represented;
- the person who represented it and why;
- the implicit reasoning that, in terms of economic, political, social and cultural interests, have led to the construction of a given map.

Another fundamental discussion in the critical analysis of the artefacts of communication in their complexity is highlighted by Ludwig Wittgenstein, a philosopher grounded in engineering who, thus, pays careful and perceptive attention to studying and reflecting on images and the way they are represented. His reflections originate in the study of language and, in particular, of propositions. To Wittgenstein, the fundamental problem is to



establish under which conditions language refers to the world. He believes that logical form is the condition which permits us to correctly express propositions. Logical form cannot be interpreted but only displayed and thus, in this sense, Wittgenstein returns to the concept of representation by creating a theory of portrayal. He believes that when we portray something we must keep two things in mind: what the representation is trying to reproduce, and if what it represents is true or false. Or rather, in order to be scientific, the representation must pertain to reality. To Wittgenstein, everything that is the result of questions pertaining to abstraction cannot be considered the logical form to use when proposing our language. This concept is very important for project-related disciplines that make portrayal one of their fundamental pillars, clearly separating graphism, facilitated by technology and visualisation software, from scientific truth that should underlie and underpin representations.