Changing the change
Design Visions, Proposals and Tools

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HANDLING CHANGES THROUGH DIAGRAMS.

Scale and Grain in the Visual Representation of Complex System.

Abstract

To change towards a more sustainable way of living could means to make decisions not only with a systemic approach, considering and possibly involving all the stakeholders, but also to be able to decide in the right time: the speed of changes is constantly increasing, and at the same time the complexity of the decision is increasing also. We have to be effective in dealing both with time and complexity if we want to move towards a sustainable future.
It seems that, when the discipline of Communication Design integrate a systemic approach with the competences of designers in visualization and representation, it can cope with *dense* situations, providing effective artefacts – *diagrams* - to improve the decision process and making profit from the richness of complexity. In this paper a definition of *Density* is produced. Density could be seen as the relation (the *ratio*) between time and the amount (and often the heterogeneity) of data and information considered in the decision processes. So what we are asked is to make quick decisions for complex problems in situation of *information overload*. To design diagrams (that could legitimate choices in multi-actorial framework), information and data must be gathered from different disciplines and practices. The aim of these artefacts is not only to gather extensive knowledge about a Complex System, but to synthesize it in a goal-oriented way in order to be able to produce changes in the system.
The prior findings of the Complexity Science are here assumed as a theoretical framework to have an interpretative model on how the knowledge about systems and project environments could be organized and depicted. Some of the structural features of Complex Systems present some difficulties in their visual representation. They are usually open systems, so it implies that it is difficult to clearly define the *space* where information should be gathered. The setting of a resolution level, in order to define the Systems boundaries, is the first step in intervening within a complex system and could be useful to set a process of *coarse graining*. *Coarse-graining* is reached by making approximations, by ignoring details on finer scales, smoothing them over and averaging them out. Coping with complexity requires *coarse-grained* images at a resolution that shows the overall pattern of the system and the pattern of the elements in it.
The term *grain* finds its roots in the photographic vocabulary; the Complexity Science uses it to explain some of its conceptual operations, but the term remains a metaphor and is unable to provide operative instructions for a visual representation of the analysed space. Operative instructions, instead, can be mutated from the visual operative tools developed by the cartographic approaches. Thanks to a symbolic, iconic and conceptual coding system evolved during centuries of use, cartography provides a model able to depict human, cultural and immaterial spaces.
Among the various tools provided by the cartographic repertory to draw diagrams, the *scale* is a very useful tool in managing the visualization of Complex Systems. Far from being only a *zoom* of the map, it represents the first step for the process of interpreting information. The setting of the *scale level* consists in an operation that aligns the distance from the observed systems to the communicative goals pursued,

as determined by the observer cognitive and perceptive capacity. The use of the concept of *scale* taken into account as the operative counterpart of the concept of *grain* is considered the first step of a visual representation process. Both *grain* and *scale* act in order to accomplish communicative functions, but the *scale* influences the visual variables of the image: typology and amount of data, ways of projections, level of detail, level of abstraction and iconicity.

In this ongoing research experiments about Complex System visualization have been made with particular attention to the use of *grain* and *scale* setting operation and their relation with other Complex Systems features: dynamical interaction, recurrence, flows, patterns of interaction. Using the opportunity offered by didactic activities, six Complex System have been selected and four month of activity have been dedicated to their visual representation. We explored how the information readability and the ease to highlight systems behaviours could be facilitated or hindered according to the level of scale and grain chosen for the construction of the diagrams.
The results produced seem to confirm the political nature of diagram and the principle of responsibility designers should be aware of.

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