GENERATIVE DESIGN, a possibility to teach design by improving students' creativity and their subjective vision

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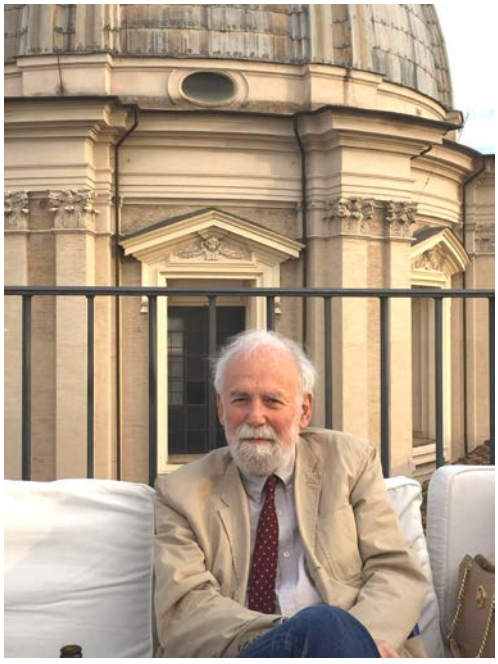


Celestino Soddu

PREMISE
Teaching to design is a discipline that is still at the center of a very heated debate. The main references are still based on Vitruvius and Bauhaus.
Since the mid 80's, in the wake of the work done to develop the generative software ARGENIA created to manage generations of urban, architectural, and industrial design events, I realized that I had identified also a logical approach to design events. These works always as different but recognizable for belonging to a subjective idea. But what I consider highly innovative and surprising is the fact that, together with Enrica Colabella, I used this generative approach in design teaching by developing a new discipline, which we have called Generative Design. This approach has achieved some of the primary objectives of teaching design, regardless of the practical tools, computer or not, that everyone can use.
The results have been extremely positive. This has been confirmed too by the students themselves, once they entered the world of work. They thank us too for the contribution we have given them in the ability to manage design processes and in improving, in progress, the quality of their design work making it more and more in tune with their identity as architects and designers.

ABSTRACT
The specificity of the generative software that I developed is to have organized the design path starting from the subjectivity of the idea and vision.
The basic reference of this approach to design is Piero della Francesca. Although he was Leonardo da Vinci's main reference for mathematics and geometry,

Piero has only recently been re-evaluated thanks to the books by Eugenio Battisti. The discovery of a geometrical logic that Piero developed and systematized to represent the world in perspective, radically changes the approach taken until that moment in the logical design processes. These were, and still are today, largely based on the collection and analysis of objective data and their cataloging, following what was systematized by Vitruvius in his ten books on architecture.

The passage from "objective" representations to perspective highlights the potentiality of the *point of view,* of subjective vision. ***Perspective is an open door to complexity***.

The subjectivity of the point of view can also represent infinity, unlike non-perspective representations, like axonometric drawing, which is limited even if more easily measurable and analyzable.

Based on these possibilities, the generative software ARGENIA is a progressive tale of subjective discovery in design. The algorithms written for this software tell, through the progression of explicit logics, the non-linear dynamic system of a subjective path that starts from the representation of the idea to the realization of a project. The fields of interest are architectural, the urban, scale of the object, or evolution of art as Picasso and Bacon.

Today, unfortunately, most of the theories on design are still only related to the Vitruvian structure of objective cataloging and are not able to logically support the design path that is based on the dynamics of non-linear systems and the unpredictability of the architect's subjective uniqueness.

This is reflected in the didactics of the project. The traditional approach has difficulties to interact with the students on the specifics of their logical process, it can only support their work with the analytical acquisition of typological and formal data from past experiences.

The past is not only data but can also be interpreted by the designer. This interpretation can follow the specific logic of research and design discovery.

The great teaching of the ability to interpret the past comes from Francesco Borromini, the greatest Baroque architect. He interpreted the classical canons not as forms but as a starting point for possible transformations. To work on transformations and not on forms is to follow the natural logical process of design.

Transforming is like working with algorithms that are the logical structure of the transformations themselves. This means not only abandoning shapes as a specific terrain of creativity but moving into the field of transformations. Not only that, but it also means abandoning the objective logic of typologies to adopt the creative potential of topology.

In this field, Palladio has given us great teaching. He used, in an explicit way, topological paradigms and not typological ones.

With the use of topological paradigms, he explicitly built a reference system for the development of the project that defines the construction of a suitable engine for the development of the project as a complex non-linear system. Rudolf Wittkower has systematized the structure of these Palladian topological paradigms that have contributed to the quality, uniqueness, and complexity of his architecture.

Instead, the use of typological references, as it was developed in the last century, has contributed to pushing the architectures to lose the ability to communicate an idea. This is the structure that supports the symbolic function of the relationships between events, such as the relationship between the outside and the inside, between the public and the private as it had been dominant since the Greek temples. In these ancient architectures, the topological paradigm defined the progressive discovery from outside to inside. It structured the relationships with the progressive passage from the sun of the outside, to the sun/shadow of the columns until the darkness of the sacred cell.
Many of the buildings built in the last century, but also some recent architecture, have lost this "sacredness". The functionality, so dear to an objective vision of the design approach, has also been diminished, losing the ability to identify the relationship between man and space, the logic underlying spatial sequences that facilitated not only practical use but also the existence of a symbolic functionality.

THE BIRTH OF GENERATIVE DESIGN AS A POSSIBLE DESIGN DISCIPLINE

At the end of the 1980s, once my generative software ARGENIA was not only operationally effective but had also developed through successive layers of complexity, I realized that its structure was an accurate and exhaustive account of the design process that stems from a subjective vision of the city, architecture and design objects. The design of this software had followed the path of the development of a project, telling explicitly, through dedicated algorithms, all the progressive steps that lead from a first sketch to the final project.
This progressive story of how the design logic is developed linked to an idea, to a subjective point of view, was transferable also to the teaching approach to design by expanding and making explicit and communicable the logical steps of the design path.
At this point, with Enrica Colabella who taught, like me, at the Politecnico di Milano, we wrote a book, "Il progetto ambientale di morfogenesi" *(English version: GENERATIVE ART & DESIGN Theory, Methodology, and Projects Celestino Soddu, Enrica Colabella. Free downloadable at https://www.artscience-ebookshop.com/GenerativeArtDesign.htm),* essentially dedicated to design students and their teachers. It retraced, theoretically and operationally, the path developed in generative software but also expanded it to make it didactically effective and such to pursuing the goals of teaching design.
This completely revolutionized what was the teaching of design, mainly based on re-proposing the "workshop", the "studio" of the architect where the teaching was not aimed at the construction of a possible cultural and design identity of each student designer, but it was based on his ability to repeat what the architect-professor did, his ideas. Moreover, these design courses were developed essentially on the acquisition of "Vitruvian" data such as the distributive characters of buildings, the morphological and typological structure of architecture, and the history of architecture. This was taught as the objective acquisition of categories of data and not associated with a logical interpretative path of growth

of the subjective identity of the student-designer.
We applied this approach not only in the teaching of design in our courses but also in the master theses, more than a hundred, that we followed together as tutors since the 1990s years. (www.generativism.com). The discussion of these theses allowed us to present and discuss this redefinition of the approach to design with colleagues from the master degree committees of the Faculty of Architecture of the Politecnico di Milano.
The path developed in generative software, with its algorithms that tell the logic of the construction of a project, had become an opportunity for a theoretical and practical redefinition of the discipline of design, both in the field of architecture and the city and industrial design. This disciplinary redefinition is based on the logic underlying the creative process. In other words, this approach structures the awareness of the progression of logic and a complex and non-linear dynamic system as it is, and should be the progressive procedure of design invention.
The basis of this approach is the interpretation, therefore the subjective evaluation of one's references and the creative choice to operate not in the direction of "discovering" new forms but to identify the logic of progressive transformation of forms by linking these dynamics to one's architectural vision. Not only that, the explicit expression of the designer's creativity, following Poincaré's definition of creativity, is proposed in the subjective identification of new relationships between events (topology) and not in the "discovery" of new forms.
We have called this disciplinary approach "Generative Design" and we founded the Generative Design Lab at Politecnico di Milano University. This "new" discipline has been included in the study program of the Faculty of Architecture, Engineering / Architecture, and Design of the Politecnico di Milano. It has also been exported to some universities abroad.

TEACHING THE DESIGN
The disciplinary hypothesis on which we have operated is based on the definition of certain purposes of design teaching:
1. To support the construction, in every designer, of his own design identity and make it operational and recognizable in the operational practice of the project.
2. To teach designers to read, interpret, and use operationally their cultural background and to build their imagery by interpreting the past to support specific design acts.
3. To build and structure, in progress, the quality of one's design in a conscious way, such that it can be increased and not lost in the progressive project opportunities.

Nodal elements of the discipline of generative design and its educational path are:
1. Identification of the characters of the identity in the progress of each student designer;
2. The inter-changeability of forms as a verification of the design idea and its potentiality and complexity. Abandoning formalization, as a search for "new" forms, the student designer is oriented to define the project as a progressive transformation, as a definition of logic applies to any previous form and is identified through the possible achievement of a character. All this logically retraces what happens in the design process;

3. Face the white sheet, the initial moment of the design by re-proposing the project sketches through the use of catalysts and progressive transformations of the same in topological paradigms, the basis of creativity in the project.
4. Develop the project by progressively applying the logics of transformation subjectively defined as able to characterize the project itself. The logics of transformation is adopted as responding to the characteristics of subjective identity and applied to specific design acts of progressive transformations, such as transformation to define how it ends, how it bends, how it divides, etc.
5. The results of the design process as possible variations. The structure of variations follows the logic of identifying the idea through its multiple formalizations, implemented through the inter-changeability of forms, performed through possible and interchangeable progressive paths of transformation.

IDENTIFICATION OF THE CHARACTERS OF THE SUBJECTIVE IDENTITY

The initial moment of the training course of this “new” design discipline is the identification, by each student, of his or her subjectivity as a designer. It is, definitely, the most difficult moment, not so much for the complexity of this first step but for the difficulty of the student to answer subjectively to the didactic requests. The student is accustomed, especially in this period of supremacy of tools and technology over subjective logical thinking, to respond objectively to requests. He finds himself perplexed to have to abandon a linear path for a non-linear interpretative path.
Once overcome these perplexities in the field of subjectivity, the student can make the best use of his creativity and design skills.
Enrica Colabella proposed to ask each student to identify his or her own possible identity as a designer through three adjectives, which may be in contrast with each other, but which can capture the complex and still hidden character of each student's design vision. This first step defines the goal to be achieved and makes possible a student-teacher interaction to activate a logical path in this sense.

FROM FORMING TO TRANSFORMING

The next step was to link these adjectives, these characteristics of each designer's vision to processes of formal transformation. Operationally, the student designer is asked to experiment with possible transformations of events, first simple and then more complex, so that the results of these transformations lead to an increase in the character indicated.
The transformation logics identified as possible transformation processes are not structured concerning specific previous forms but are proposed as adaptive to any previous form. Transformations, in fact, unlike shapes, define a process, an increase in complexity, and not a static structure, even if defined parametrically. This leads the designer to build, in progress, specific subjective logic of transformation that become the tools that can be used in many different occasions of design, a sort of collection of logical tools related to their design vision.
The project opportunities to which the transformations refer are common to the various design themes and can be

identified as acts that lead to an increase in complexity. Each design occasion involves an increase in complexity managed by a transformation process. The creation and evaluation of this process become relevant to the increase of one of the adjectives chosen as representing the student's vision.
All this is aimed at building one's own identity as a designer, and the tools of transformation that make it recognizable.
This first operational step is not directly related to a specific project but contributes to the construction of a growing background of operational tools that can be used in subsequent projects too.

THE INITIAL MOMENT OF THE DESIGN PATH, FROM THE CATALYST TO THE TOPOLOGICAL PARADIGM

When we have to face a specific design theme the first logical operation comes from how to "dirty" the white sheet. Every single project is born from a sketch and is progressively transformed until it becomes an executive project.
This phase, so important for every single project, is performed in Generative Design through the use of catalysts linked to the interpretation of student's cultural references. These references are not only related to architecture or design objects but also extend to literature, poetry, music, everything that can be interpreted as a system of relationships between events.
The choice of catalysts therefore became, through subjective interpretation, the choice of a system of relationships between events that opens to the possible construction of a topological paradigm capable of triggering and controlling the design process.
Referring to Poincaré creativity is connecting existing events in different and surprising ways. In other words, creativity is made explicit by identifying a topological structure that reflects one's idea.
To implement this initial phase of the project, the student designer identifies his reference and interprets it as a system of relationships between the parties. As Poincaré states, the quality of this creative act can only be evaluated in terms of beauty, and therefore it is strongly connected to subjectivity.
Once interpreted as a system of relationships, and having associated to each component event and to each relationship between the parties one of the adjectives chosen as able to reflect own vision, the designer is faced with a topological paradigm that can be used as an engine for the development of the project. The paradigm needs extensions and increases in complexity to adhere to the theme of the project, but this does not affect the organic structure that has been identified as the carrier of the idea.
As often happens in every project path, often the paradigm adopted initially proves insufficient to manage the progressive development of complexity.
At this point, referring to Renè Thom, the non-linear dynamic system presents a discontinuity, which we could call catastrophe. The designer will have to make a paradigm "jump", identifying a new more complex one, capable of defining an advanced organicity of the project. This new paradigm will have to include all the work already developed (the progressive sequences of the transformation of the events and their

achievement of the adjectives sought) and open new fields of development.

THE DEVELOPMENT OF THE PROJECT THROUGH POSSIBLE PARALLEL PATHS OF PROGRESSIVE TRANSFORMATIONS

The transition from the topological paradigm, essentially non-formalized, to the first formalized changes. The progressive transformations achieve the "final" results implemented through the systematic use of previously identified transformation logics. Each event of the paradigm will grow in complexity through the subsequent transformations. These manage, in this way, the progressive increase of functionality associated with the progressive increase of the characters responding to the subjective vision of the designer.

THE RESULT AS POSSIBLE PARALLEL VARIATIONS

This logical path towards complexity, and therefore towards the possibility of responding to project requests is not linear and univocal. The transformation logics (algorithms or identified paths of transformation) can be used in series and parallel, in a different order, and with mutual contamination. This creates different formal scenarios even if they all respond to the same design vision.
In other words, the inter-changeability of possible forms is accepted, maintaining the peculiarity of the design response to the designer's vision. On the contrary, the production of parallel scenarios, different but recognizable in the idea, defines the possibility to verify the quality of the idea itself.

An idea is not communicable through only one result. The last is only one of the possible representations of the idea.
The idea can be communicated only through a series of almost infinite variations. Each variation is a possible facet, all together represent the idea in its potentiality.

THE GENERATIVE DESIGN MANUAL

To support the design work of the students, to whom we have always asked to develop in succession different design themes for verifying the quality of the defined transformation logics, we have written a small manual of Generative Design, clarifying and structuring ten subsequent steps of the design path.
http://www.generativism.com/tiki-index.php?page=GDDM

GDDM
Generative Design Digital Manual

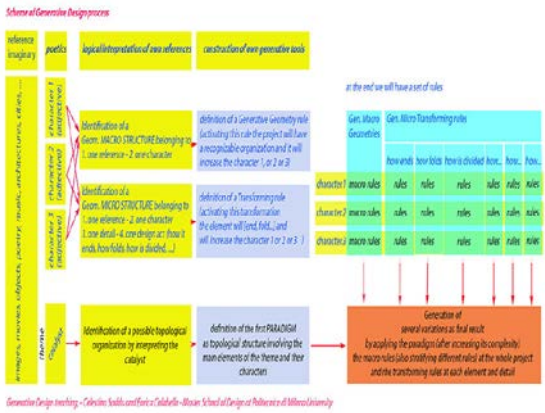
Celestino Soddu and Enrica Colabella

This Digital Manual is built for the first time for supporting the managing, step by step, of the Generative Design process.
Following the schedule of lessons, we will be published in the journal GASATHJ for more widespread use in Generative Design teaching activities.
It will be implemented during the teaching process with different materials: examples, theoretical and practical references, dedicated papers, lesson movies, etc. used in each lesson and in each teaching exercise.

Why generative Design?

The main aims of a Generative Design process are to identify a possible vision and to construct our performing way for developing ideas in design. There is not a question to find out unexpected and fascinating forms, but to find the possibility to communicate at the best our design ideas. Operatively, Generative Design helps us to construct and develop an idea following a scientific

process and not by representing it with only a singular result, with a "solution" as a simplification of the complex possibilities in act. Generative Design is how we can plan a transforming process, by following a poetic logic able to bring us from first sketches to several possible variations as final results. All together these variations can communicate our subjective idea, our peculiar vision as designers, open to a possible identifying style.



1st step: identification and definition of aims as design characters.

We cannot run progressive paths if we haven't clear aims. These aims are not only practical aims, configured only for identifying functions. The main generative aim is to reach possible results able to represent our subjective vision for gaining complexity.

For this, a good tool is to define some characters of our performing aims as characters that we love to rediscover in our design results. Operatively we can identify these characters with three adjectives.

Number three is very useful for easily controlling them in our first steps. Only one is too much axiomatic, two are many times in opposition or alternatives and more than three are too much for controlling them in our first operative procedure. One example: smart, baroque, exciting. Our chosen adjectives might be also in their significance, in contrast, one each other. They stay together in a performing way for defining a not linear system, open to complexity

2nd step: constructing own reference imaginary world

Imaginary references: as just said, interesting examples of design, of objects, of music pieces, of poetry, of architecture, of cities, of movies, of faces, of animals, and so on.

When we chose a reference, soon after the choice we must associate to the reference one (or more) of the characters that we identified. That is: we must have a clear design vision able to drive us when considering them.

Our 3 adjectives identify deeply our first peculiar points of view as attractors of the real world. The character expressed with our 3 adjectives is a very good key for interpreting the world of images, poems, music, movies, drawings, postcards, etc. that we choose for subjectively discovering in them our defined characters.

In this way, we are performing a selected imaginary world as a representation of our references for gaining the world of our incoming generative design results.

So we start by performing aims as characters of an imaginary world of references.

This is a selection made for association in resonance between attribution/word (character) and images, sounds, word, etc (reference world).

A double moment in a discontinuous process.

Suggestion: collect several references for each character, paying attention to each reference difference from all others, covering a particular aspect of our impressions. The process is in discovering the character significance of our attributions.

The reason why we identify several references for each adjective is in the plurality of possible poetic logic for each adjective/attribution. By performing this associative process, we are collecting in our mind a plurality aspect of the same significance. So we become able to focus on a plural useful formalization of the same adjective for performing our generative process.

With this process, we are delineating in deep our aims.

Two ways to approach these references:

1 - Considering the whole reference or

2 - Considering only a part of it.

Whole reference / macro level: we consider the global geometry, the whole structure, and organization, performing a complex system that we can focus on by interpreting our reference.

1st example: looking at Milano we could consider its peculiar global geometry as a system able to connect everything in subsequent circles and, at the same time with transversal straight lines belonging to different main locations. This is not

only a peculiar static form, this is a "Generative Geometry", able to perform a great open number of connections, all belonging in a congruous way to our generative Milano system.
2nd example: looking at the Bach fugues, we could consider the structure of a global system created by subsequent repetitions, following well-identified rules, where each repetition is a variation of the same theme. This structure of an organization is well identified as a "Generative Geometry" too.
Details - Fragments of the references / micro level: Operatively we identify one (or more) peculiar detail(s) of our reference as a particular discovered aspect of our characters at micro-scale, by itself, or in its connections.

For doing that, we must identify the role of each detail. If it belongs to "how" this event ends, "how" it folds itself, "how" it is divided into several parts, and so on, by performing geometric rules of connections. In practice, we can associate each reference to:
a) one of the characters that we identified,
b) a particular aspect that belongs to a particular "design act" that we can interpret as performed in the design process that constructed these results,
c) a peculiar "Generative Geometry" able to represent our interpretation of the geometric structure of our reference in a reasonable way.
1st example: we choose a reference to the Chrysler Tower in NY. The detail is the cup of the tower. The "design act" is " how it ends". The adjective is "exciting. Now we made a logical interpretation of this detail and we "discover" that the tower ends by repeating the final geometry (in this case an arc) several times progressively reducing the dimension and putting the reduced arc over the previous one. This logic performs all the sides of the tower. Following this peculiar (and subjective) approach we can identify a possible rule able to perform the "how to end" aspect, as a rule, applicable to other and different occasions. We can do that also if the "arc" is configured as a different geometric event or also if the event is not geometric but a word, a note, a decoration, and so on. This rule is similar to a fractal geometry, where each event is repeated reducing it in a scalar way and generating it in a definite process until it will be so little at minimum scale, but always following the same geometric logic, as in nature. This rule is a rule of Generative Geometry. We can associate this rule to our character (exciting) and a peculiar "design act": how ending one of the events of our projects (ending a communication, a dress, an architecture, a pen, and so on).
We haven't found a form but a rule able to manage possible progressive transformations fitting a peculiar character defined as our aim.
It's clear that; the logical interpretation, expressed as a poetic logic is a subjective and plausible hypothesis related to a possible design path and it is not the objective reconstruction of the real design process, that can happens also following other rules. Each design result of good quality is performed in a complex way, where the possibility of discovering hidden rules is always open. Our site of interest is our logical interpretation because we are looking for the possibility to construct our design process related to our design vision. Performing these expressions of poetic logic we are learning how we can gain the complexity of our time, starting from our singular vision. These "design acts" are the results of decision moments that we normally perform during our design activity: how to end an object, a communication, a piece of music, a dress, how to divide it into two or several parts, how to fold it or to change the tonality, or to move from one material to another, how to make a skin, how to open a hole, and so on. Each one can identify these possible "design acts" following their own identity as a designer. It involved the micro-scale too of our reference with the same logic of Generative Geometry.

3rd step. Constructing our Generative Tools.
We are constructing our Generative Tools when we identify the "Generative Geometry" discovered by the geometric logics (rules, geometric progressive transformations, and exceptions) that we like to read in our references. These Generative Tools can involve the whole project process.
We can call them "Logics of Transformation" as our logical hypothesis of a progressive transformation (folding, dividing, and so on) able to perform a possible form characterized by one of our adjectives.
"Generative Geometries" and "Logics of transformation" are like operative algorithms applicable to the generative design process. We can write real algorithms too if we can represent with algorithms each transforming process. In any case by drawings or by algorithms, they are our generative design tools that we can use in all our design activities.

4th step. Choosing (or accepting) a design occasion.
The step of starting with a new design project is a very important moment.

In our teaching experience, each student can identify the theme of his/her design experiment. This decision is not important because it belongs to an activity that is not proper for designers, but proper for clients. After this occasion, soon we will have the theme to develop. We are working as a designer.
The only thing that we must follow when we choose the design theme is that we need to find out in the theme a possible complex structure with many unexpressed questions to answer. This because each designer needs to effort questions: each question can generate a design answer. More are the occasions where we have to gain an answer with our design act more the quality of results can increase in complexity.

5th step. Identifying a catalyst for interpreting it as a possible topological structure
Design is a transforming process with a progressive increase in complexity. The first act of a design process is not a transformation because there is not anything existing. So we need to make complex our empty sheet.

We can do that using a sketch that we will consider as a catalyst or using an image as a catalyst. How can we choose or make an appropriate catalyst?
It must not represent a "formal" idea, because forms are interchangeable and they cannot be identified in this too early moment. They might gain only a simplified solution of our generative process, as an easy result. This becomes very dangerous, stopping our process. In this way is very hard to find out another solution.

Better, the catalyst could be a reference for the organic structure of our project; it could help us to identify a first topological structure. So we will use this catalyst for transforming it into a paradigm, able to make a first identification of the parts of our project and their relations. No forms must be identified because if a form will early emerge, it will be too dangerous for the progressive design process. This early choice can kill the creative process.
example: Our theme is a poster. If we like organic structures, we can use, as a catalyst, an image of an animal, i.e. an elephant. This is only a catalyst and, after using it for starting our project, we have to forget it. We don't use the elephant as a form! Our logical interpretation of this catalyst could be: there are 4 parts in my poster, like the legs of the elephant but there is a free event (like the proboscis) focused on the "last news" that we intend to communicate with the poster. I can define that the four parts are "baroque", the free event is "smart". A final event, where I will communicate a peculiar detail, will be "exciting" and will be at the end of my poster, it will be little like the code of the elephant. Now I will forget the elephant and I will have the first "topological" structure of my project: the organization paradigm.

6th step. Toward the paradigm
In a few steps, it is possible to organize our moving from a catalyst to the paradigm. Firstly, we must make a logical interpretation of our catalyst, identifying some events (that we interpret as belonging to some parts of the project as a performing connection) and their direct or indirect relationships.
Secondly, we can associate with the entire object and to each event and each relationship a peculiar character, choosing it from the three characters that we previously identified.

Representing together events, their characters, and their relationships we will have the first paradigm of an organization that we can directly use for going ahead in our design process.

This is only a "first" paradigm because the object that we are going to design needs an increase of complexity that we can obtain repeating the same process (catalyst and characterized paradigm) for each event inside the first paradigm. And so on.

7th step. Performing first formalization at the macro and micro scale.

Looking at the just defined paradigm, we can make a logical interpretation of this structure and we can apply to this topological structure a geometrical structure. Practically we will apply to this paradigm one of the "Generative Geometries" that we identified in one of our references belonging to the characters. We will apply it at the macro scale, involving the entire project. If we like to apply more than one character, we can apply more Generative Geometries. This work starts in transforming the previous structure, so we can apply these geometries one after the other, transforming the previous transformation.

Looking at each event, we will identify the "design acts" necessary to perform the event itself, their functions, and characters. Following that, we will apply the "transforming rules" that we identified through our logical interpretation of our references at a micro-scale.

In the end, we will have the first formalization of our

project. More we can gain a sequence of variations applying different "Generative Geometries" to the whole project and different "Logics of Transformations" to each event.

8th step. Increasing Complexity

Looking at our project, we will need to develop it toward the complexity, in a way that the results will satisfy the complex needs of our times. We can do that by increasing the complexity of the paradigm by developing new paradigms for each event and subsequent formalization of these new events.

9th step. Changing the paradigm

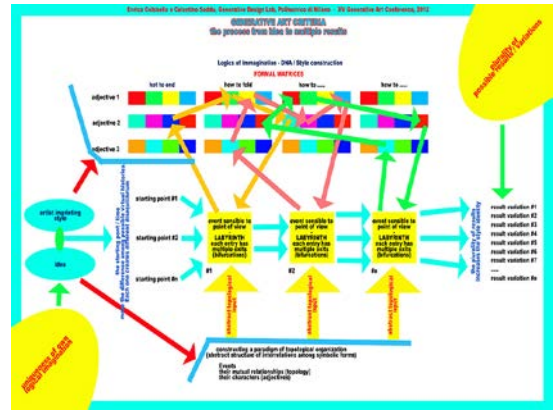
However, it's possible that the adopted paradigm doesn't work well: it is not able to manage the increasing complexity, the increasing functions, and requests of the project. For this reason, we can change the paradigm, but we are not losing our already made work.

Being a topological structure, it is possible to run in changing the paradigm, not transforming it, but jumping from a paradigm to a new one (starting from the catalyst and so on).

The interesting matter is that we don't lose our previous work. Each event can be generated again using the same transforming rules and the same characters that we used in the previous paradigm

10th step. Final results

The final result is not unique. Each possible result is one of the representations of our idea, but cannot fully represent our idea, never our vision. It's necessary to generate a set of variations, each one different but all together representing the same idea.
The variations are like different individuals of the same species. Different olive trees, with completely different forms but all recognizable as olive threes. Altogether, they communicate the character of the species, as our variations will communicate the uniqueness of our design vision.



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