

'Khrôma' the first software for management of the Color and Decoration Plan for small historic villages

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ABSTRACT

The 'Khrôma' project is aimed at creating the first software for the management of the Color and Decoration Plan that can be applied to small historic villages. As is well known, Italy is made up of many small historic villages that are described as "minor historical towns". They have been suffering for decades from a state of abandonment.

The total lack of awareness of the importance of buildings within a wider historical-artistic context has generated the development of a methodology that can guide the qualitative and cultural appearances of the construction sites: namely, the Color Plan. However, the drafting of the Color Plan always requires competent professionals who are able to read and interpret the indications provided by the plan: this is the most important critical issue that makes the color plan an ineffective tool in the hands of nonexperts.

An integral management on a digital platform would enable the application of the color plan for small historic villages, and would thus permit improved accessibility to the application of the plan as compared with the methodology currently in use.

The proposed 'Khrôma' software has the possibility to customize the functions and the database adjusting them to a territorial application on a specific area in question; its features include simple and intuitive graphical interface, independent functioning and accessibility that does not depend on any digital device.

Thanks to 'Khrôma' software, it will be possible then to introduce a simplification in any given technical-bureaucratic procedure that can then be communicated to citizens as information regarding the upgrading process to their territory.

KEYWORDS color, plan, digitization, architecture, Khrôma, software

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1. Introduction

Italian cities have been in crisis for decades because the resident communities have not been able to express the real potential that has been recognized for centuries in urban areas and that is linked to the value of local identity. The ancient cities were required to represent the power of those who governed both them and the social (and therefore economic) level of the inhabitants: the image of a rich, lively and powerful city corresponded to high levels of care and exploitation of the urban fabric, and the role of cities in extensive areas was declared by means of urban quality.

In the modern cities, this awareness for the collective heritage has re-proposed ancient meanings of belonging and identity for all citizens, who find in the safeguarding of their traditions and in the promotion of their specificities an effective response to the banalization processes of the global market. For several decades, however, there has been a gradual loss of these types of knowledge in all parts of Italy and also in many parts of Europe: industrial processes have proposed materials and techniques that have simplified traditional local regulations, thus changing the appearance of buildings, which have gradually been stripped of their "skin" and consequently made them more commonplace; this inevitably leads to the cancellation of the ancient language of architecture. It then seems evident that the authentic appearance of the complex and varied language of architecture will be respected only if the original techniques and materials that are still present and testified to are re-appropriated.

The protection of these values was already identified and well described in the 1987 Washington Charter [1], which complemented the 1964 Venetian "International Charter on the Conservation and Restoration of Monuments and Sites" [2]. Therefore, it is of fundamental importance to preserve the authentic aspect of the complex and varied language of architecture that is respected only if the original techniques and materials, still present and witnessed in the historical centers, are re-appropriated.

A "preventive maintenance program" is necessary in order to safeguard the entire heritage of knowledge and languages and to determine a qualitative outcome for the restoration of every single building.

At present, the complete lack of awareness concerning the importance of buildings within a wider historical-artistic context has generated the development of a methodology that can guide the qualitative and cultural appearances of the construction sites: namely, the Color Plan. The 'Color Plan' recognizes the historic rules of "doing" by re-approaching the material culture and a

respect for traditions and for experiences handed down for centuries but abruptly interrupted starting from the post-war years in the name of a "modernity" that, from this point of view, has only impoverished us in cultural and qualitative terms.

Moreover, as also recommended by UNESCO in its guideline, 'the Historic Urban Landscape,' implemented on 10 November 2011 [3], it is not only a question of protecting the intrinsic aspect of a single building or a small village / complex of houses but in a more general sense preserve that historical / urban aspect that characterizes Italian landscape.

The Color Plan is still the most suitable instrument for developing the valorization and promotion policies of historical architecture [4].

2. The Color Plan

The drafting of a Color Plan, whether it be for a very small village or for a large city, involves levels of knowledge of the place, the (overall) buildings and the materials that can only be attributed to an expert technician. These re-qualification plans develop issues that concern the maintenance status of the historic center, indicating critical points and unexpressed potentials.

It will thus be necessary and essential to define how a Color Plan is drawn up and implemented. In addition to a knowledge of the place in historical-artistic and architectural terms, the research involved generally collects also traditional models of reference in order to reconstruct rules for the maintenance of the historical urban background.

These elements can be briefly summarized as follows:

- an abacus of materials and techniques
- an abacus of the ornamentation elements
- an abacus of the elements of urban decoration
- a color abacus
- a technical report
- etc.

This classification, which may seem reductive, actually makes it possible for a room, a space or even a single building to be correctly coded.

If we take into consideration the color plans for the smaller historical centers (both those under UNESCO's protection and those that are not), where the number of variables is less than that of large urban cities where elements of other cultures have always been incorporated, it is possible to think up a digital

transposition of the Color Plan. The software in question, i.e. the subject of this project, is known as 'Kroma'. It is important to remember that in Italy the number of small, inhabited centers is extremely high (about 6000 villages have less than 5000 inhabitants) and these small hamlets often are not protected by any specific legislation, although the distinguishing characteristics of the building type and urban specificities to be protected may be recognized.

2.1. The Color Plan: critical issues

Color plans count on graphic tables, reports and rules, for a correct application of these methodologies. These may "range" from rough indications to specific ones.

However, it is obvious that the critical aspects of this approach are indeed inherent in this system.

In fact, the drafting of the Color Plan requires competent professionals who are able to read and interpret the indications provided by the plan. In addition, the application phase of the plan itself requires various meetings with the Municipal Administration in order to identify and find a point of agreement between the 'request' of the citizens/ technicians and the 'requirements' of the indications indicated in the plan.

One of the most important critical issues of the Color Plan is based on this last step. This 'necessary' step with the Local Administration often slows down the procedures, and at times discourages citizens from participating in an improvement to the place in which they live.

3 Objectives of the Khrôma software

The mission of the 'Khrôma' project is to make the application of the Color Plan accessible to non-experts as well as professionals (in a first moment exclusively for the smaller historical centers, where the number of variables is lower).

By digitally fixing the constraints indicated by the Color Plan, the goal is to enable accessibility to this plan by maintaining an active participation of the citizens involved. Thus, even in the absence of qualified experts, individual citizens could become active participants in the redevelopment process, by going to operate independently but at the same time guided, on a digital platform.

4. Description of the project

Managing the final results of the analyses of the graphic tables, of the relationship between the Color Plan, of the abacus of the elements and of the colors, is often quite difficult for those who are not qualified experts.

The 'Khrôma' project aims to achieve the 'participation' objective through a flexible, but controlled, interaction between the citizens and the program itself. In any case, the software needs an existing Color Plan that can indicate the general or specific constraints on the territory and the types of architecture submitted to analysis. This is necessary because the indications regarding colors, façades, type of materials, the various abacuses of the elements, and the decorative elements need to be previously analyzed and selected by the experts. Therefore, it would be necessary to interpolate these elements, link them together, and then transfer them to a digital platform.

The goal is to design a 'digital' container (not content) that would incorporate the analytic which can and must pertain only to a professional in charge of drawing up the color plan; it is the task of the professional to dictate criteria and rules with relative variations that the plan imposes and the program accepts.

The program is structured within three macro areas.

The first macro area is characterized by the identification and collection of data, by means of the compilation of a questionnaire, of the citizen / professional worker / company who assumes responsibility for the entire work process (fig. 1). The process takes place by means of digital procedures that by now already exist in most of the so-called digital administrations (digital signature, etc.).

The second phase, the most important one, consists of identifying the building that is the object of the construction works, and of loading the graphic interface by means of which the user can manage the guided design process (fig. 2).

At a subsequent stage, however, it would be necessary to develop a rigorous integration with the GIS software, which already contains the most common operations related to geographical analysis, including a direct connection to the Khrôma software. This would allow the gathering of all data concerning the Color Plans loaded on the platform and would provide the graphic interface necessary for the users' participation in the redevelopment process.

Some examples of interaction between GIS and color plans already exist (particularly interesting is the project for the municipality of Priverno in Lazio [11]) but none of the programs include a study concerning the interaction with users by means of a graphical interface such as the Khrôma.

1 log-in 2 pick your building 3 what do you want to edit? 4 edit 5 preview and print

Log-in

the undersigned	
social security number	
born in	at
live in	
street/plaza	
city	
office in	
street/plaza	
phone number	
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Accept

Fig. 1. First screenshot 'Khrôma' the first software: data collection and responsibility assumption.

1 log-in 2 pick your building 3 what do you want to edit? 4 edit 5 preview and print

What do you want to edit?

choose one or more options:

- Background color
- Baseboard
- Windows
- Doors
- Entrance hall
- Decors

Facade preview (to be edit)

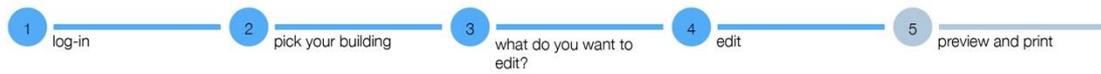
Fig. 2. Preload of graphic interface with iron wire visualization and selection of elements to be modified.



Edit



Fig. 3. Preloading elements of the Color Plan.



Preview and Print

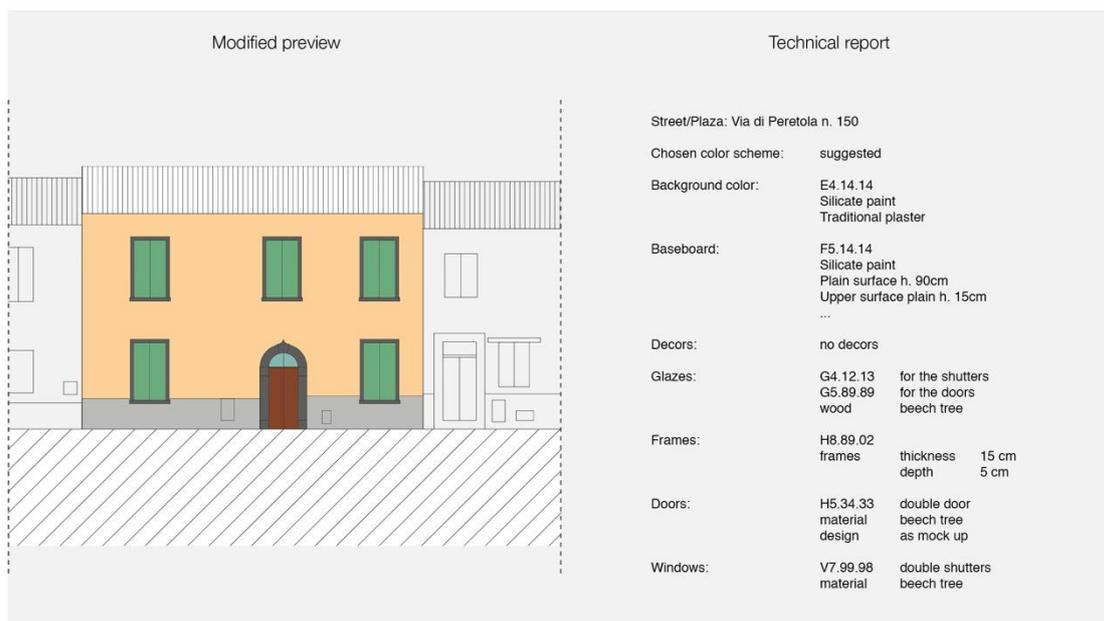


Fig. 4. Facade unit diagram and related technical report.

Once the building has been identified, the program automatically uploads a schematic diagram of the façade so the user can immediately receive graphic correspondence on a screen.

The following step provides the possibility of selecting only the elements that need to be modified in such a way that the program can automatically preload all possible permitted variants (colors, decorations, etc.) only for that façade. It is also possible, by means of the drag and drop system, to choose from among this series of elements, thus providing the user with a guided procedure that is already pre-authorized by the Local Administration (fig. 2 and fig. 3). The third and last step makes it possible to summarize data by printing a diagram of the façade and the design indications to be followed during the execution phase (fig. 4). The printing of the final report is very important, because it contains all the technical data necessary for performing a perfect job. The color codes and the relative coding system, materials and application techniques, any attentions to be taken into account during the work phases, etc., will be indicated in the said report. The main idea is, in fact, to provide a complete package with which, by printing both the façade color scheme and the technical report, the user can provide any operational-type company with all the details necessary for carrying out the work.

It seems evident that more than the color printing of the facade, which serves merely as an example, it is the technical relationship that is of fundamental importance. It entails all the details that range from the colorimetric indications to materials to be used in the intervention to those that guide how the work should correctly be realized. It is worth remembering that the program would be implemented in small villages with mostly significant technical-administrative inadequacies.

Moreover, since these small villages are not directly under the protection of specific regulations, unlike, for instance, the historic center of Florence safeguarded by UNESCO, they risk losing their distinctive features due to bureaucratic inertia.

It then becomes the task of the professionals in charge of specific projects, together with the Municipal Administration, to control that the work performed corresponds to the requirements indicated in the technical plan.

Moreover, the software application has the following characteristics:

- the possibility of customizing the functions and the database based on the territorial application area in question (the possibility of introducing any element of an

abacus, color, single elevations and multiple façade units, etc.)

- independent functioning (cloud software available 24/7)
- accessibility from any digital device
- simple and intuitive graphical interface

5. Conclusions

The 'Khrôma' project is aimed at creating the first software for management of the Color and Decoration Plan, i.e. one that can be applied to all small historic villages. As we have seen, starting from an analysis of the territory, it has been verified that the smaller historic villages have common characteristics that depend on the location of the place (for purposes of colors, abacus, materials, etc.). These characteristics, which are easily identifiable and classifiable only for these particular types of small towns, would enable an integral management on a digital platform and thus permit improved accessibility to the application of the plan as compared with the methodology currently in use.

Thanks to this software, it will be possible to introduce a simplification in a given technical-bureaucratic procedure that can then be communicated to citizens as information regarding the upgrading process to their territory.

6. Conflict of interest declaration

All authors declare that they do not have any conflict of interest related to this paper.

7. Funding source declaration

All authors declare that they have no grant was received related to the activity published in this paper.

8. Short biography of the author(s)

Filippo Cherubini - is a technician at the "Nello Carrara" Institute of Applied Physics, National Research Council, Italy. He has a Bachelor of Science degree in Architecture and two postgraduate courses at the University of Florence. His interests include environmental restoration and architectural color studies.

Andrea Casini - MSc in Physics in 1968, has been a researcher at IFAC-CNR from 1972 to 2010. Expert in signal and image processing, for many years he has been developing imaging spectroscopic methodologies for the study of works of art in the "Integrated spectroscopic methods for the diagnostics and monitoring of cultural and environmental heritage" project, with which he continues to collaborate as associate researcher.

Costanza Cucci - got her Physics "Laurea" and Ph.D. in Conservation Science at the Florence University.

Currently she is a researcher at IFAC-CNR. Her research focus is on spectroscopic techniques and data-processing algorithms applied to the fields of cultural heritage, environmental monitoring, and safety food controls.

Marcello Picollo - Ph.D., is a researcher at IFAC-CNR. His interests include color measurement, Vis-NIR Hyperspectral Imaging, and spot size UV-Vis-IR spectroscopic investigations of 2D polychrome objects.

Lorenzo Stefani - is a technician in telecommunications at IFAC-CNR. He is in charge of the development of hardware and software for computer-controlled instrumentation for the non-invasive and in situ study of artworks.

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