Digital forecast
Geographic information technologies for the visualization of possible landscapes

Introduction
The contribution refers to research begun in 2004 in collaboration between the LaRIST (Laboratory for the Identity and Statutory Representation of the Territory)[1] working within the degree course for Territorial and Environmental Town and Country Planning at the University of Florence and the Empolese Valdelsa Administrative District. The research, entitled 'Atlas of Territorial Heritage', attempts to renew ways of describing and interpreting territorial resources and their transformation through the highlighting of enduring territorial identity, allowing a store of virtuous rules to emerge readable within the evolutionary dynamics of the relationship between the environment and settlement structures.

A new approach to the analysis, description and representation of the territory: the Territorialist Information System and the Atlas of Territorial Heritage of the Empolese Valdelsa Administrative District.
The research has highlighted important changes, consolidated and on-going, in the mosaic of the landscape, reconstructing the transformation that has taken place in the territorial context of the research, with the appropriate tools being implemented: the various analytical and descriptive materials have been organised into a "SIT", Territorial Information System (Sistema Informativo Territorialista), where the themes inherent to the "territorial" dimension of planning are intertwined with reflection upon the construction of informative systems that are orientated towards the exaltation of patrimonial deposits and the elaboration of resulting photorealistic images.
The LaRIST has been occupied for some time with the subject of editing the "Atlas" of territorial heritage, paying attention to the identity linked dimension of the local context. This work is based on innovative applications of geographical information technology and renew the construction procedures of territory description through the application of the complex intersection of formalised information layers.
Territorialistic planning[2], that characterises the work group's approach, imposes as its first objective a different attention to the temporal dimension of knowledge of the territory, that has to be formalised through the establishment of diverse informative levels, so that the variations and persistancies in the transformation dynamics of the physical structure of local contexts can be shown and interpreted during the course of the various phases of the subject matter's activity: from the construction of cognitive pictures to the determining of planning aims. A second objective concerns the centrality of the research and the setting out of statutory rules (that is to say founded on a shared social identification) that make fully sustainable, within a wide spectre of meaning, the choices made by governments and the transformation of the territory. Obviously, a "statutory" dimension to awareness entails maximisation when sharing information during the various stages of elaboration and at the more varied levels of communication (in specific, making reference to both the so-called expert knowledge and to that more ordinary). The communication of elaborated material during the course of research in the disciplinary areas is an essential factor, and takes valid part in the process of mutual informative enrichment and of comparison with the inhabitant community, making effective feedback possible.
The inter-related aspects that constitute the keystone to the evolution of the (Sistema Informativo Territoriale) SIT technical structures in the direction of the Territorialistic Information System (SITER), that is a technical apparatus that uses information technology not so much for the management of territorial information as for the valorisation of information in function of the predisposition of sustainable settings, with a prospect that determines strategies of shared transformation because put together through the interaction with the inhabitant community, are essentially two. The first is the widening of the time dimension of the information archive: the diachronic component breaks into the structuring of single levels, vertically enriching the informative capacity (in valuating the dynamics of the metamorphosis o territorial organisation). The second is an attention to the forms of interaction between different disciplinary knowledge, and then between these kinds of knowledge and 'common' (ordinary) knowledge and the life experiences of the inhabitant community (horizontal organisation of the information archive).The technical tool that has been singled out as the transmission connection between the informative system and the local

[1]The LaRIST was established with the Department of Town and Country Planning at the University of Florence in 2005

[2]The adjective 'territorialistic' refers to the theoretical work by Alberto Magnaghi and a research group for years employed in the definition of a new planning paradigm, based on the adknowledgement of the centrality of territorial identity in the definition of strategies and in development/transformation plans and projects; the 'territorialist school' – Magnaghi (2006)

community is the "Atlas of Heritage", a collection of textual, graphic and cartographic material that is able to highlight the enduring territorial identity, that is the laying of virtuous rules that are readable in the evolutionary dynamics in the connections between the environment and the settlement structure. The Atlas, of Heritage developed in the early stages through dialogue between the various forms of technical knowledge organised in the SITER, is destined to leave the restricted group of technical analysts and decision makers, in order to reach the many circuits of public communication and to be present in various publication forms: exhibitions, traditional publishing, electronic publishing, web[3]. Such circulation aims to create the action of active and interactive communication, through which the public process of the growth of consciousness can be developed relative to non negotiable identity values; to construct, therefore, a shared deposit of values, preliminary to decision making in every act of territorial transformation.

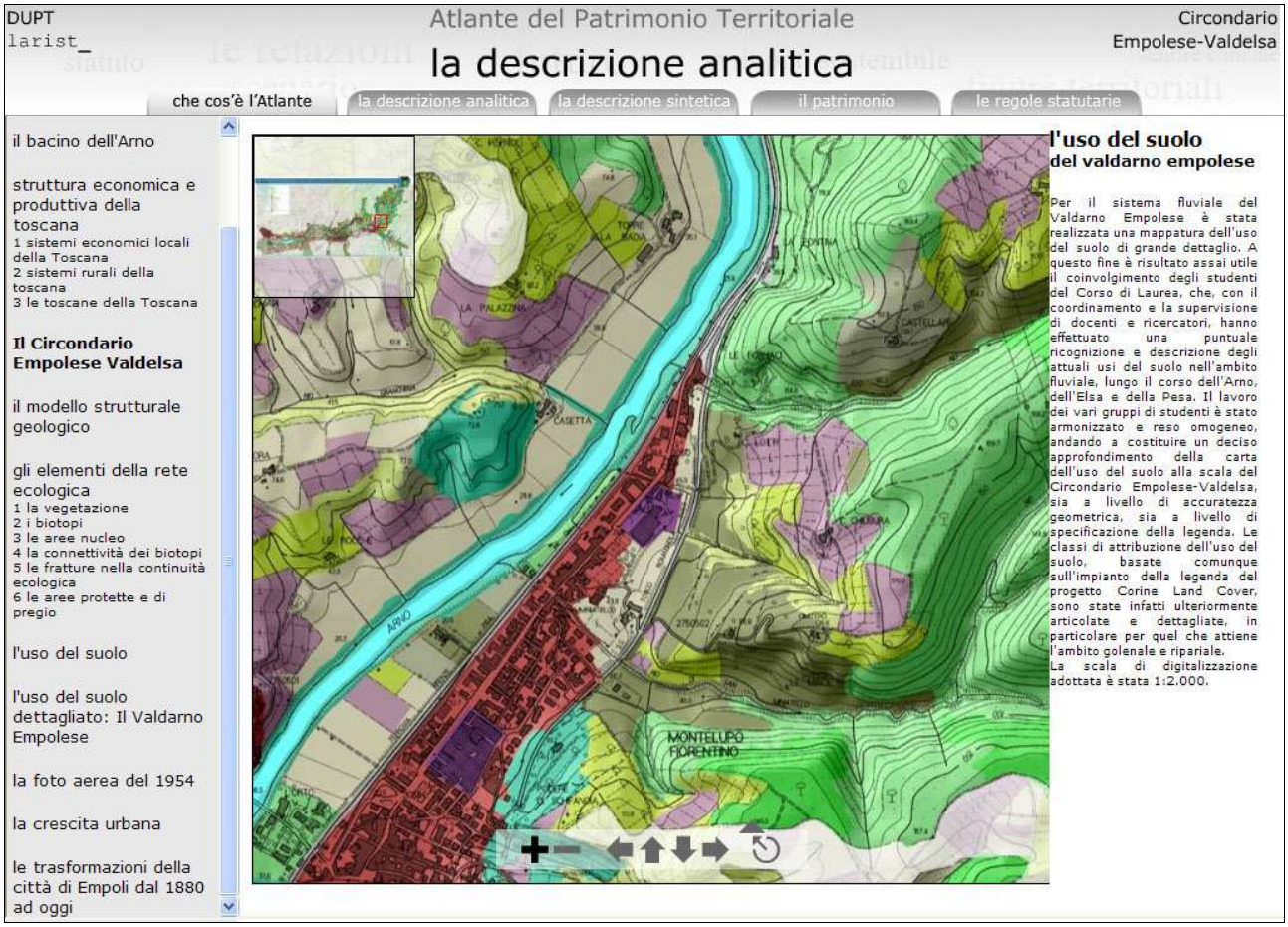

fig.1 – Atlas of territorial heritage: web interface

The Empolese-Valdelsa Administrative District Atlas of the Territorial heritage experience has been set up as an initiative with two essential aims. On one hand, build up a detailed knowledge of the territorial heritage and the 'physical' environment of the territory referred to trying out innovative methods of building up territorial information systems. On the other hand, build up cartographic representations that summarize all the elements that characterise the heritage; such representations are aimed at decision makers, inhabitants and 'aware' visitors to the administrative district.
With these objectives in mind, the SITER has collected and integrated geographical and environmental information with information relative to the diachronic dynamics. The SITER has placed as one of its objectives, in this specific local context, the collection of information relative to the evolution dynamics of the territory, aiming to recognise in the enduring forms of the agricultural landscape and from the settlement structure a fundamental examination of the sustainability of anthropical organisation. Historic cartography on a large and small scale has been collected; photographic and aerial photographic documents useful for the reconstruction of variations in settlement and agricultural structures have been collected. Finally, the information accumulated has been transcribed in technical forms in order to guarantee an efficient comparison of historical data with that of the present.
The objectives provided for in the elaboration of such material have therefore looked again, in the first place

[3] Cfr. www.unifi.it/atlante

at the optimization of the usability conditions of the document in studies relative to the dynamics of persistence and of transformation of settlements and of signs of open territory, and in second place at an improvement to the possibility of public access to the document and to its meaning, to both the areas concerned with the technical structure of administration and with qualified professions as well as in the spheres frequented by political decision makers, by the inhabitant community and in general by the general public interested in the territorial context within the described contexts (also for touristic purposes). In particular this objective has involved the construction of a consultation interface, capable of allowing a simple comparison between historic documents and recent aerial images, the purpose of which being to make evident and comprehensible the entity and the quality of the territorial and landscape transformations that have taken place.
From the continuing research into the metamorphosis of the territorial and landscape context, a series of critical environmental situations have emerged. In particular, the impact of the large infrastructures; the apparent 'casual' nature of the recent industrial settlement; the fraying of urban margins and the break up of equilibrium in widespread settlement; the growing difficulty in tracking down valuable and coherent 'landscape figures' that allow to emerge the statutory rules that have controlled evolution for a long time; the ungoverned distortion of various agricultural and rural production.
A comparison between the organisation distinguishable in 1954 aerial photography and that of today relates the submerging urban sprawl and the progressive specialisation of agricolture, that results in a heavy reduction in ecological connectivity and an extremely simplified landscape.

fig. 2 - confrontation between aerial photographs 1954/2002 in the web interactive interface

These aspects, amongst others, have in specific made a crisis in the relation between the dynamics of ecological cycles and anthropic settlement choices (narrowing or caesura of ecological corridors, loss of biodiversity, difficulty in water management, inability to sustain agricultural production etc.) stand out, witnessed by the loss of quality in many of the landscapes that make up the E-V District.
At the same time, the diachronic analysis witnessed by the Atlas of the Heritage and the identification of resistant structures in the landscape have brought to light the opportunity as well as the multiple and diverse potential to recover and enhance the District territory.

The Arno River Park Master Plan

An important planning outcome resulting from the Atlas is the biennial research applied to the planning of the River Park Master Plan in the lower part of the Arno valley, aimed at determining a shared setting for planning goals for the future River Park, objectivess upheld together with the provinces of Florence and Pisa as well as with the municipalities wthin the E-V District and with a galaxy of social forces ad local participants brought together by the "Associazione per l'Arno".

Among the various local integrated plans of the area that enrich the Master Plan, an example of which is practical planning of great spatial depth (from the vast scale of the whole Administrative District to photorealistic details of a single tree) and temporal (comparison between the mid 50's - the present day and scenes of future transformation), is cited the hypothesis of the ecological requalification of the perifluvial rural land at the confluence of the two rivers.

The area introduced, a tract of the Arno between the mouth of the River Elsa and the Roffia's river basin to the west, will be the object of important intervention mitigating the risk of flooding , through the realisation of a system of retention cases , the main stretch of water will be converted to a rowing lake, with its relative infrastructure. Immediately to the east of the basin is an abandoned industrial plant, on the other side of which is a portion of the territory where the outline of traditional agriculture has been conserved, as far as the mouth of the Elsa river, which is still relatively rich in river bank vegetation.
The redevelopment of the minor ecological network in this area, through a system of hedges, in linear form, bands of vegetation along the field borders and along the canals that have for centuries marked the agricultural makeup, may turn out to be very efficient in terms of biological connectivity, lowering the impedance of the actual agricultural matrix and reconnecting the areas of hilly woodland to the north and south by the Arno's embankment corridor and by the new vegetation provided for by the work relative to the retention cases. Some forms of intervention have been identified that, apart from being functional from the ecological point of view, are beneficial to agricultural activity: linear hedges of interest for honey production and for fauna, hedges that aid the biological effort, hedges for the production of quality wood, double row multifunctional hedges, management of field edge areas, mixed tree planting for the production of wooden biomasses for energy production.

fig. 3 - living tools for environmental design: 1.hedges for biological fight, 2.hedges for the production of quality wood, 3.linear hedges for honey production and for fauna , 4.double row multifunctional hedges, 5.hedges for the production of wooden biomasses for energy production, 6. ecological management of field edge areas

The representation was built with the aims of increasing its own communicative potential and has, in any case, been carried out using a formalised methodology, through the use of a realistic symbol system for the single species foreseen for the planned hedges, in which each plant is associated with a single file in the

relevant geographic database.
From the agriculturalist's point of view the realisation and maintenance costs of such a close weave plan and the difficulties relative to the reduced dimension of the plots of land, would encourage the cultivation not of wheat but of the more valued typical market garden products, biological or medicinal. The idea of a kind of didactic-demonstrative garden/allotment has been thought up for the area, to be realised through grants, distinguished by strong landscape, cultural, production and ecological values. The abandoned industrial building, once destined for other public purposes, will be able to satisfy its own energy needs with systems fed by biomasses, the production of which would come from the woods and the linear hedges.
One of the main topics of the research looked at the representation and the visualization of the landscape's possible transformations, according to the adoption of alternative planning settings, created with two efficiency objectives: to supply an immediate support to planners and designers; create a common feeling among the inhabitants through forms of informed participation in shared planning.
Results of the analysis of ecological connectivity, aimed at a public of specialists, have been mapped using techno-scientific methods of cartography. To exemplify possible redevelopment intervention of the agricultural plot, the technique of photorealistic perspective visualisation has been adopted, in this way illustrating in a 'pictorial' way (also using three-dimensional animation) the agro-fluvial park territory in its present state and according to the plan's view for the future.

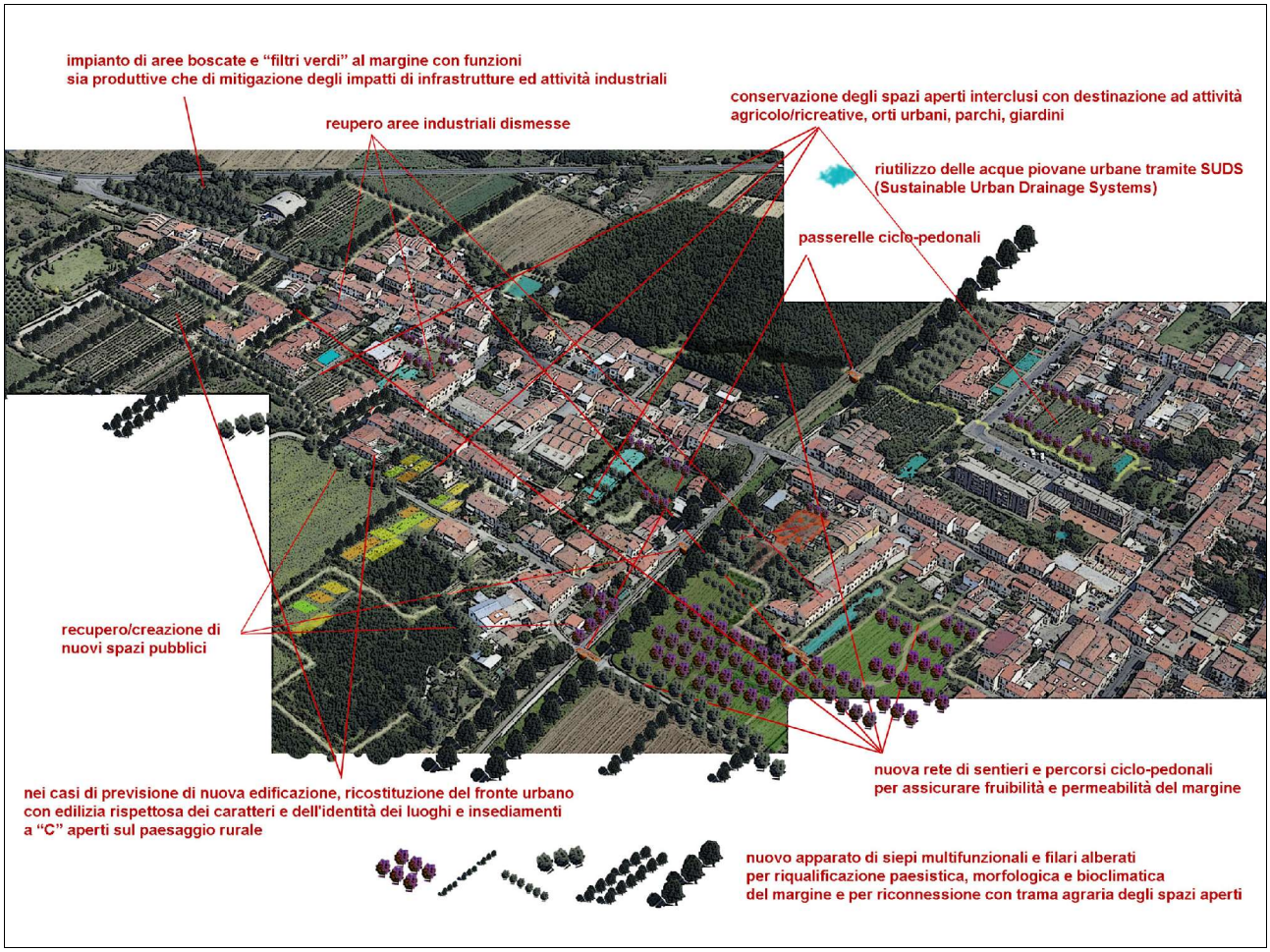

fig. 4 – simulation of interventions of revitalization of the urban-rural front

The technology of territorial information, implementing techniques of visual communication, can result effective to the ends of widening the possibility of sharing the idea of the park with local actors without any scientific training. From farmers to municipality administrators and technicians, from cultural and sporting associations to the schools in the Empolese-Valdelsa Administration District, one of the primary aims of the research is to increase the inhabitants levels of awareness and knowledge in the prospect of greater involvement and participation by these residents in the planning process.

fig. 5 - models of urban redevelopment intervention

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