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Greenweb and the landscape. A WebGIS –DRSA valuation pattern for the programs of slow viability in Syracuse Province

The territory of Syracuse is composed of different important natural, cultural and anthropic landscape complexes. As a whole, the territory is affected by an inhomogeneous development pattern, mostly oriented to the waterfront. A greenways land policy based on an effective land marketing pattern might reduce this gap. The study assumes an axiological approach to land planning, combining a qualitative valuation model based on a WebGIS-MAVT tool, and an interactive multicriteria tool based on and a DRSA pattern. The former allows the users to select the preferable path by expressing their preferences within a hierarchic three including the different value functions. The latter generates the preferences structure of the target segments users, and allows the decision maker to adjust the MAVT pattern.

Introduction

The land of Syracuse Province is composed of landscape complexes which are interesting because of the presence of many large areas still keeping signs of the fair integration of production and the rhythms of nature.

The territory is characterized by an asymmetric and inhomogeneous process of increase of land value, due to its extraordinary water front and the architectural quality of its urban centres. Tourism contributes to the increase of land property demand as well, intensively near the sea, and extensively in the countryside area of the old *Masserias*.

Therefore the excessive touristic pressure on the waterfront can be considered a threat, because of the increase in construction of buildings, streets and facilities, and the progressive quality decay of the whole sector, depending on the improvement of the maritime activities and the symmetric impoverishment of the cultural ones.

This current general trend could be rectified providing a complex touristic offer aimed at integrating the attractions of the whole land, which should be meant as a unit, so that the touristic economy could be improved and renovated toward the general issues of sustainability.

The improvement of the touristic facilities and an effective land marketing strategy could contribute to select the demand, defending it from the qualitative decay of the "three S tourism pattern": Sun, Sand, Sea.

A regenerated touristic economy should be inspired by the combination and contamination of the traditional three economic sectors, and occupy the quater-

nary, a sector in which work and spare time are integrated in a global life experience in both the aspects of production and consumption, whose function shares the same substance of value, the (semantic) information (Rizzo, 1999, 2007).

This aim is consistent with a contemporary specification of sustainability, a territorial declination of the general concept, based on the "combination of landscapes" – agricultural, archaeological, anthropological, maritime, urban and even the industrial one, as they include the whole human (psychological, economic, cultural) experience.

The landscape concept is strictly linked to the sustainability one, because of the holistic dimension that characterizes it. Sustainability has a further declination in the local anthropic identity which interacts with landscape (Stephenson 2008), thus confirming its natural and cultural unity (Rizzo, 1998). Stephenson strongly remarks the need for assuming "value-as-a-whole", recognising the importance of assessment in land policies.

Greenways, as both a physical infrastructure and a cultural approach to landscape, strongly improved by virtue of the greenway planning international movement (Fabos, 1995). Many different approaches to the greenways planning recommend the landscape assessment as a preliminary stage on the basis of which decisions are made, particularly aimed at combining natural and cultural factors, and rational and creative approaches (Ahern, 1995; Ribeiro and Bardo, 2006, p. 83, p. 93).

A greenways network can assume a large bundle of functions such as connecting different anthropic land districts, promoting a cultural and economic upgrade of rural land, developing sustainability awareness, renovating the scale of values and preferences, as the Italian Greenways Association, instituted in 1998, declares in its program (Toccolini et al., 2006).

About social land value P. Dasgupta (2000) focuses on the importance of *creating networks* – here meant as a metaphor of the physical greenways network that can be considered the channels which the land information gets through – on the transaction costs (the costs of realizing and maintaining the communication channels), and on the network externalities (trust, relationships, opportunities), that are hardly measurable benefits and thus incomparable to costs, so that an interactive assessment model, involving planners and users, could be helpful.

Our perspective about greenways involves as point of view an axiological approach, and as vanishing point the increase in value of a land system. As a consequence, greenways are assumed as the physical communicative network of land, through which the users push and spread land information: the more users get through the network, the more land social value increases. In reality, the communication process starts before and beyond: who, or what, pushes users preferences? This study proposes a previous assessment and communication WebGIS-DSRA pattern able to create the information the user needs to recreate and increase it into the *GreenWeb* by exchanging it.

Materials

Greenways experiences and general issues

Many different experiences of greenways networks recently developed, and a vast literature exists on the subject, concerning: "multiple-scales; networks for land preservation at the community scale; historical and theoretical greenway issues (Fabos and Ryan, 2006).

Greenways have been made In Italy for about 1500 km, mostly in the northern regions, particularly in Lombardia. Most of them follow the path of abandoned railways and allow the passage by bicycling (Dal Sasso and Ottolino, 2011). The increasing attention around the greenways shows that they are actualized as effective land marketing systems which are helpful to the local economy.

A network of greenways can be considered the land facility by means of which it is possible to realize the most unitary landscape experience, so that it should be assumed in its informational, no more physical, dimension and function. A green-web is the matrix of multiple and mobile points of view of the landscape, that capitalizes the individual and changeable experiences as a general and social substance of value. This substance is the core of the reasons and motivations of the land (re)production and use (or consumption).

Individual points of view and social values can be connected by an information and decision system in which the main data are collected and by means of which it is possible to figure out the users' preferences.

The case study

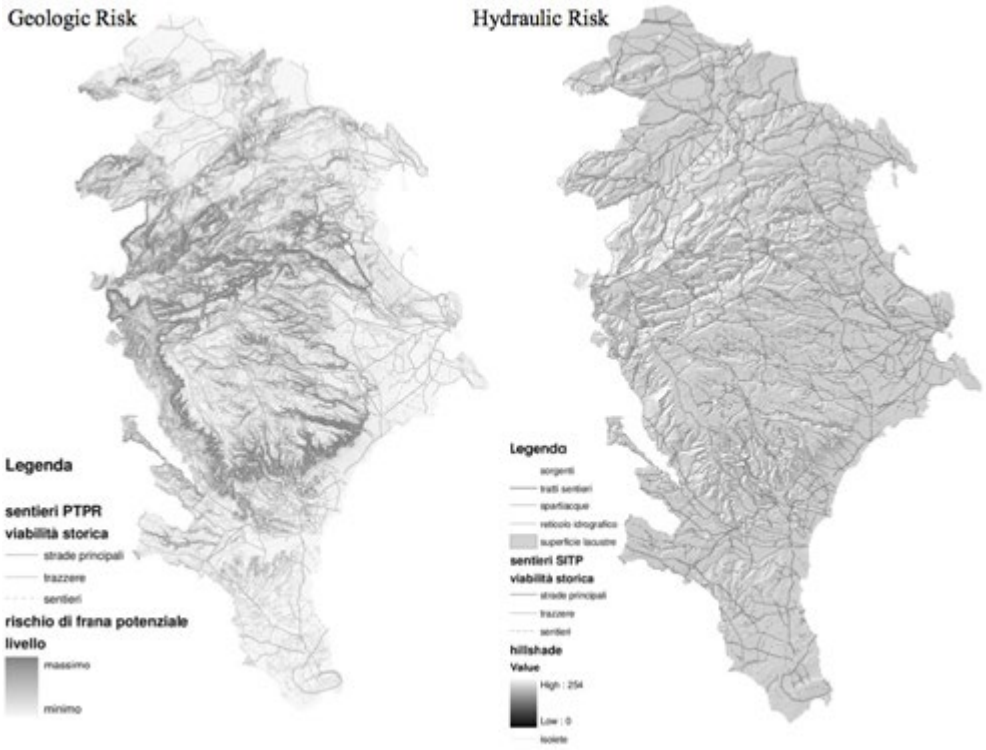
The case study concerns the 17th Ambit of Guidelines of the Regional Territorial Landscape Plan, including the geological support named "Tavolato Ibleo". The area has a tabular structure composed by terraces overlooking the sea; the altitude range goes from 200 up to 600 m above sea level area.

Two different areas can be distinguished: the high Iblean landscape and the waterfront the description of which can be found in qualified literature (DCEH, Sicilian Region, 1996).

The database we used comes from the Guidelines of the Territorial Landscape Regional Plan, (ib.); in fact, the successive Syracuse Province Landscape Plan, approved by the DCHSI Decree n. 98/2012, abolished the previously supposed bind frame that we here however assume in order to have a more complete map of landscape values.

Many other sources have been consulted and other data have been acquired in order to complete the land knowledge as the valuation model as described below and shown in the following Figs 1-2.

Figure 1. Practical features: land "discontinuity" (Sicilian Region, Regional Hydrographical Office (1950-2000); Sicilian Region, Department for Agriculture and Forests (2004).



Methods

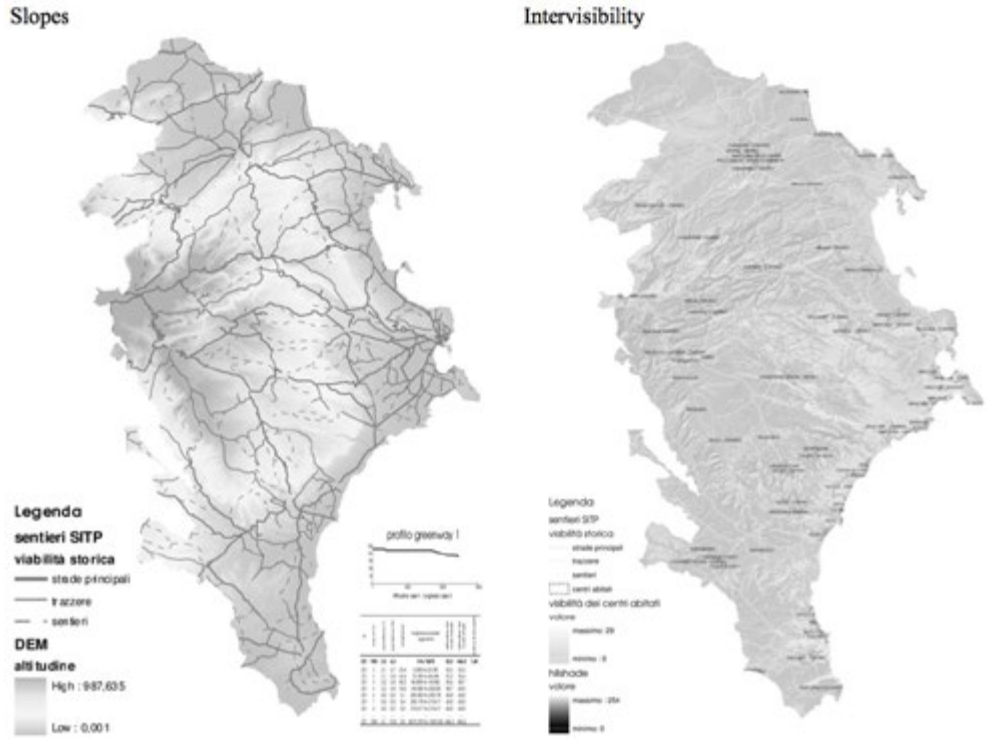
Values, valuations and valorisation: a semiotic viewpoint

A semiotic approach to valuation can be assumed as the basis of an axiological approach to plan and project. It is consistent with the communicative dimension of the landscape *green-frame*, so two questions arise about how (first) and what (second) has to be assessed.

First question: the value of a path. The valuation process connects individual values (on the hand of the cultural, functional, perceptual etc.) with land valorisation (on the hand of the land planning policies). The valuation process gets through the formalization of: some explicit criteria; a set of utility functions aimed at transforming performances into specific valuations; a weight system, a procedure for aggregating all the elementary valuations into the main criteria.

Because the green-web can be defined as a communicative infrastructure able to create land value, its parts can be considered a "signifier units" as well as in a semiotic signification process (Eco, 1976), in which each signifier (the set of char-

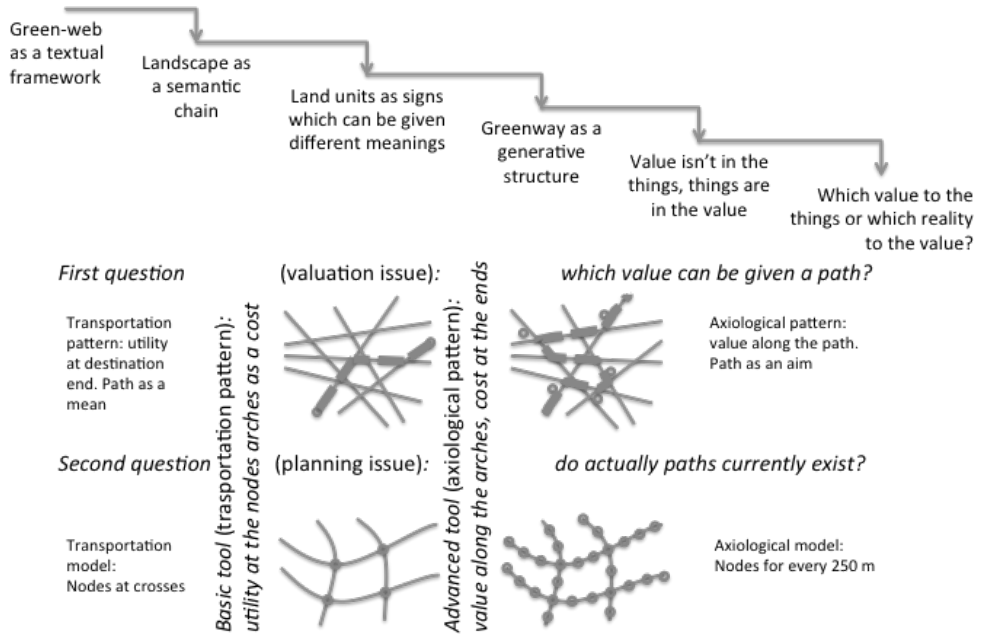
Figure 2. Critical and ludic features. Land "non discontinuity" and "non continuity".



acteristics of a path, not the path in itself) implies a reference (the physical frame and its both natural and artificial components) and a meaning (the importance of them for someone or a specific community). The connection between reference, signifier and meaning is mostly conventional (referential fallacy), so that no intrinsic value can be considered relevant. The value is strongly influenced by the user's profile and moreover by the textual unit in which it takes part. Therefore that the same object or performance can assume different values under the different respects of the varies user's profiles. So, the value of a path is given as the set of the valuation, properly aggregated, from the point of view of the different criteria.

Second question: do actually paths among which to choose, currently exist? The valuation perspective, as above illustrated, is just a part of the whole issue of land planning with greenways communication system. In fact, in the province of Syracuse, just one greenway nowadays exists, therefore the main concern of this study is a preliminary recognition of information, valuations and planning indications aimed at realizing an interactive decision tool. As a consequence, the paths among which to chose have to be composed by using parcels of the existing dirt roads: the system provides the aggregation of parcels that maximizes the function of the landscape-experiential value. The previous concepts are sampled in the scheme of following Fig. 3.

Figure 3. Values, valuations and valorisation. A semiotic approach: a green-web as the vehicle for land information transportation.



An axiological approach

An axiological approach is a value-centred and value-oriented vision, so that land cannot be meant as object and function, but as a bundle of combined values.

Stephenson (2008) considers the structural and dynamic continuity between intrinsic, personal, social and contextual values.

The basic hypothesis is: the land social value can be distinguished into potential and current value: the first one is based on the occurrences (object and performances) which can be observed and measured, and that in some specific contexts are actually appreciated making the land an important quota of the social capital and a significant part of the richness of the community; the second one depends on the appreciation of these resources by the users and then on their psychological and cultural determination, that is their axiological profile their choices are due to.

Therefore, in order to measure and to map this social value, a specific tool has been realized; in the latter the user can express his or her preferences and communicate the satisfaction degree of the experiences, if carried out, so that the evaluator can adjust the tool: the user inputs his or her preferences into a form on the web-gis interface, basing on his or her specific axiological profile. The system proposes a group of paths which the user can further reduce to select the best one, by inserting more specific information about his wishes and expectations.

The input form and the related preference pattern are inserted into three different sections each of them each of them referred to one of three different approaches: *object*, *performance* and *axiological*.

Object approach: according to an object approach the value is considered an intrinsic characteristic of an object or a goods, not an external attribution coming from the user, so that the object is required or rejected by itself. The form to fill in order to select the path proposes a list including all kinds of the objects which are present in that part of land. The user selects the objects or the places –archaeological sites, monuments, panoramas, natural features, and so on – he wants to come across; the system makes a query and composes all the paths containing the kinds of object indicated in the form.

Performance approach: according to a performance approach an object is relevant by the effect of its performances, which are functional or utility characteristics, so that the same group of performances can be achieved by means of diverse objects. The specific section of the performances includes some functional characteristics of the path, that can be 1. *measurable performances*, as like the maximum length, slope, car road crosses, or 2. *valuable performances*, as smoothness, hardness, riskiness etc.; the valuable ones are calculated by using the space analysis web-gis functions; the pattern reduces the previous selection so that the user can refine the query up to select the best path.

Object and performance approaches can (or should) be used together: they actualize the most concrete and specific approach and do not require the involvement of a coordinated value system.

Axiological approach: according to an axiological approach, objects and their performances are relevant only in order to achieve a purpose, only if traced to a value. The value is not attributed to objects or performances but to the capability of the path to satisfy some general instances when they are crossed; thus objects and performances have no value in themselves; the user assigns to them a value once connected by the path whose configuration is defined by assembling a certain number of path units, so that the value function is optimized.

The value of the path is the weighed average score calculated going up the WBS from the leaves (indicators), through arms (subcriteria and criteria) to the roots (values).

The root-criteria of the pattern are taken from the axiological square (Floch, 1995) a general scheme in which four kinds of appreciations are connected by three kinds of relationships, complementary, contrary and contradictory (Fig. 4):

Floch distinguishes between practical (functionality), critical (efficiency and convenience), utopic (mythic, existential), playful (differences, surprise) appreciation, each of them corresponding to specific traveller's profiles, as shown in the following scheme (Fig. 5).

The following lists describe the WBS in which the contents of the valuation pattern are connected and organized by a progressive disaggregation in different criteria (first level) and subcriteria (second level); the third level criteria, the indicators and the 145 indices are omitted (Tab. 1).

Figure 4. The axiological square (Floch, 1995).

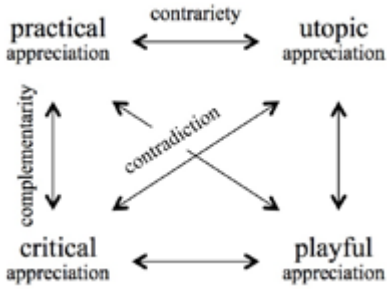
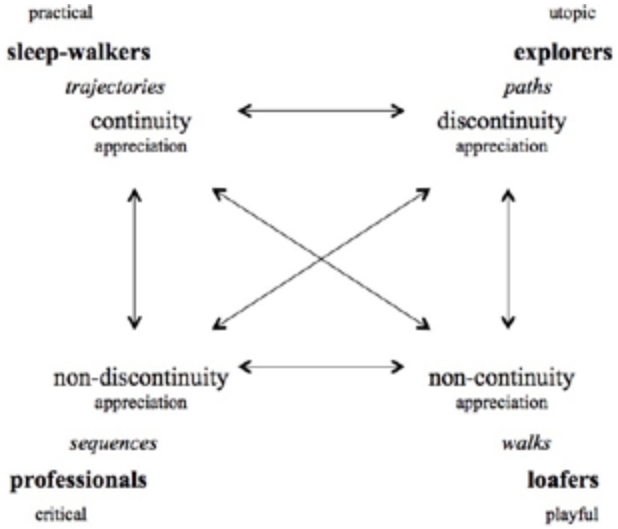


Figure 5. Traveller's profiles (ib. modified).



For each of the indicators addressing the last level of the criteria, one or more indices have been identified in order to turn different performances into the same value scale. Some utility functions are shown as follows (Figs 6-8)

Space analysis and path arrangement

The selection of the path doesn't come from a choice; it results by composing different individual parts of the roads: the chosen path must result continuous and cross the most appreciated areas, landscapes, monuments; it must be comfortable, safe, challenging, and so on.

In order to make the optimal fitting of the path to the specific user's profile, each path has been divided into standard length units. Each segment is a record of the

Table 1. Appreciations and criteria (I and II level) of the valuation pattern.

appraciations	criteria I level	criteria II level
practical	safety	town proximity road proximity path continuity geological risk
	comfort	orography roadbed continuity weather conditions
	accessibility	street and towns proximity trip roundness
	facilityes	facilityes proximity towns proximity
	transportation options	coachs train
critical	duration	time
	lenght	distance
	efficiency	efficiency cultural
	range	naturalistic cultural recreative
	intervisibility	visible surface
utopic	wildness	trafic distance bound areas
	adventure	town distance ways of use orography vegetation
playful	perceptual landscape	quantitative features qualitative features attractors/detractors
	recreation	facilityes

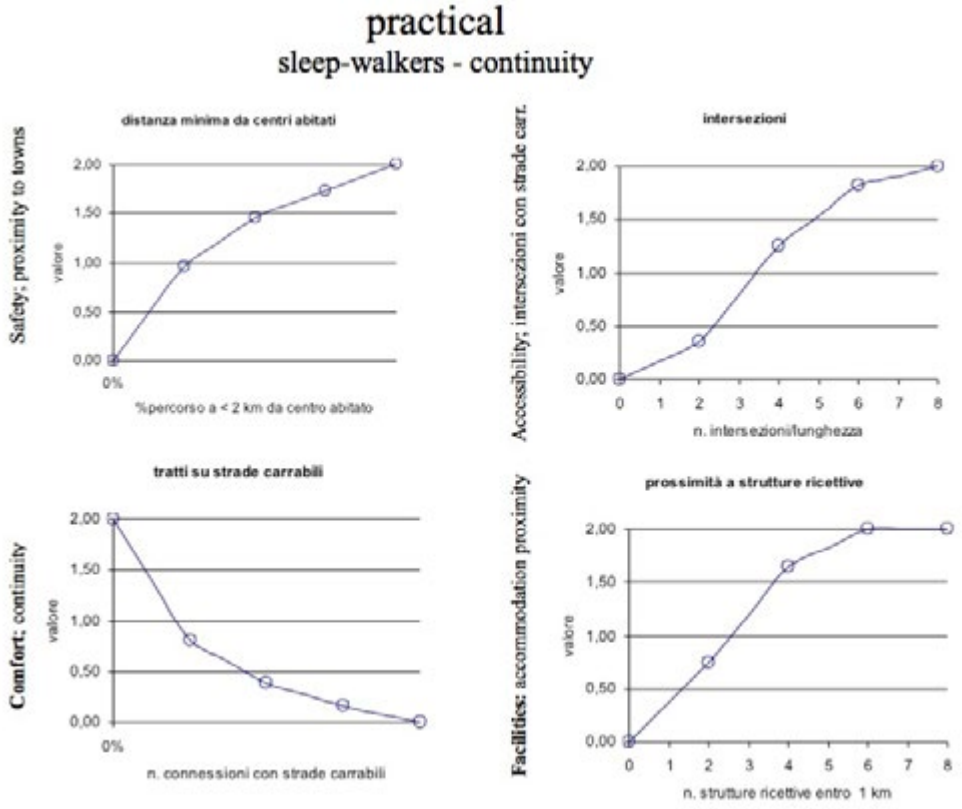
new database and is characterized by 145 attributes each one of them referred to the evaluation pattern. Thus each record can be valued itself and together with the other elements of the path as well. A path is built by joining the single records so that the total value maximizes the preference function expressed by the user, who has inserted the data corresponding to his or her axiological profile. The path must be continuous and should admit an alternative way back to provide a more rich experience.

Space analysis and GIS tools

A *GreenWeb* should be considered, from a topologic point of view, as a set of arcs and nodes linked into a reticular framework connecting the social land fabric. Each node is usually associated to a value function (Correnti, 2003), but in this experience the value is traced to the path as a whole. *Network Analyst* extension is the tool which aggregates the path maximizing this value function (Fig. 9).

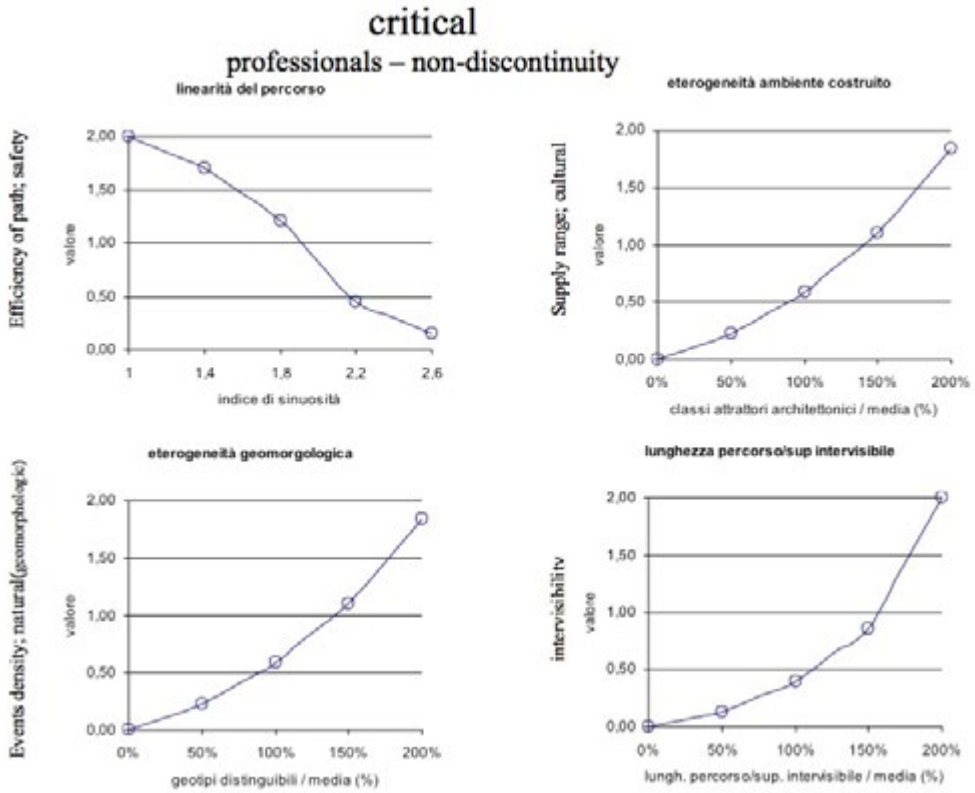
The databank includes the ancient road network (Fig. 8) as shown in IGM 1:50.000 maps started in 1965; some groups have been distinguished: main (consu-

Figure 6. Utility funcions. Practical appeciation.



lar) roads, herds' roads, lanes; 2. ancient railways and baronial shippers along the waterfront (abolished in 1812); all of them have been geo-referenced and featured according to the database coming from the Guidelines of the Territorial Landscape Regional Plan (Department of Cultural and Environmental Heritage and Public Education – Sicilian Region, 1996) and from the Landscape Territorial Plan of the Province of Syracuse (Superintendence of Cultural Heritage of the Province of Syracuse, 2012). By means of the Spatial Join extension and the geoprocessing functions (Biallo, 2005), a new viability database has been implemented by dividing each road into 250 m long segment, so that a continuous greenway can be assembled by joining the arcs which maximize the value function. *Spatial join* and *Range query* are the two geometric operations more frequently used in the geographic data management. The *spatial join* is a relational join in which geometric attribute and space relations are used and imposed instead of alphanumeric ones. There are: *topologic join* that is more speed if the storage structure is based on a set of layers; there are also *join* based on *direction* and *distance*. The general diagram of the information management is shown in Fig. 10.

Figure 7. Utility functions Critical appreciation.



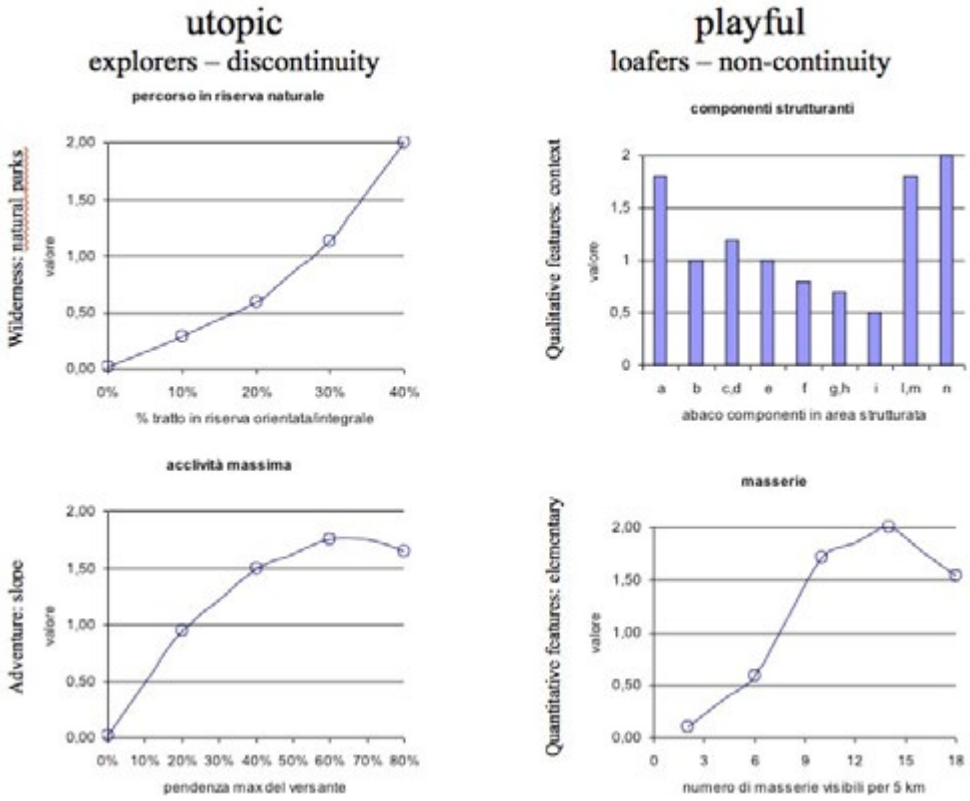
Some of the possibility of the GIS model in a smaller area are exemplified in Fig. 11

Tools: an interactive value adjustment pattern based on the DRSA approach

The greenway can be considered a product-service for the users. To improve a product-service of the recreational type it is necessary to identify an appropriate marketing strategy. The marketing management must coordinate the recreational demand with the local supply, in relation to the target segments of the users.

In this case, the user's target segments can be characterized on the basis of the Floch's axiological square. According to this scheme it is possible to identify four type of appreciations: practical, critical, existential, playful. The traditional marketing strategies, today, often turn out to be unsuitable. In fact, the traditional marketing, in an era characterized by the so-called Web 2.0, shows some critical aspects about the identifying and the management of the user's behaviour.

Figure 8. Utility functions. Utopic and playful appreciations.



These problems become deeper in the transition from Web 2.0 to Web 3.0. A marketing strategy to support the tourism development and to enhance the fruition of the territory by using the green ways, should take into account the evolution of the scenarios and the rapidity of the changes that tourism manifests.

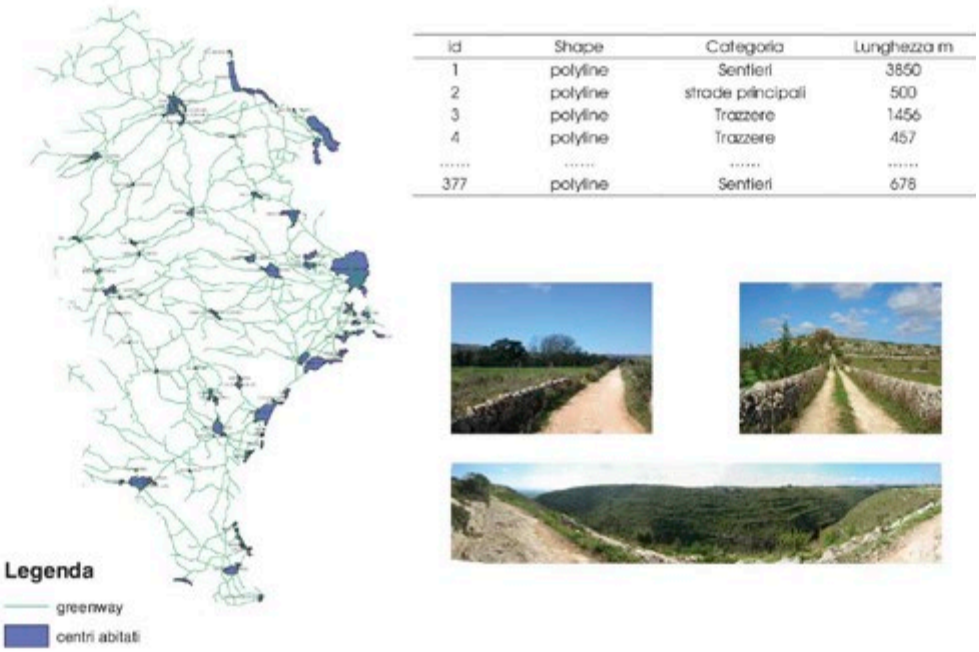
In this regard, today it is possible to define the tourism 2.0 as a way of tourism promotion, which is closely related to the development of Web 2.0.

The development of some new information and communication technologies (ICTs) help to coordinate the supply to demand, which is ever changing and more globalized.

Even today, the researchers are working in order to allow an evolution of the use of the web, to support the transition from Web 2.0 to Web 3.0. In this regard, one could speak of a tourism 3.0. The Web 3.0 fosters the interaction between some different possible paths, allowing a new level of the integration and the interoperability to some applications.

In the case of Web 3.0, there are some fundamental elements creating a Web database which would facilitate the access to the contents of some applications which

Figure 9. GIS database sample and dirt road-net.



id	Shape	Categoria	Lunghezza m
1	polyline	Sentieri	3850
2	polyline	strade principali	500
3	polyline	Trazzere	1456
4	polyline	Trazzere	457
.....	.....	.....	.....
377	polyline	Sentieri	678

Figure 10. Logical scheme of the process aimed at extracting a greenway.

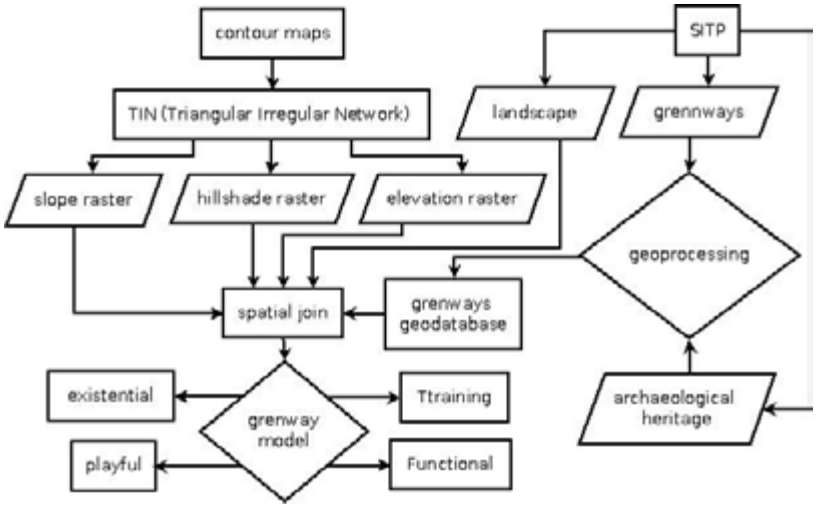
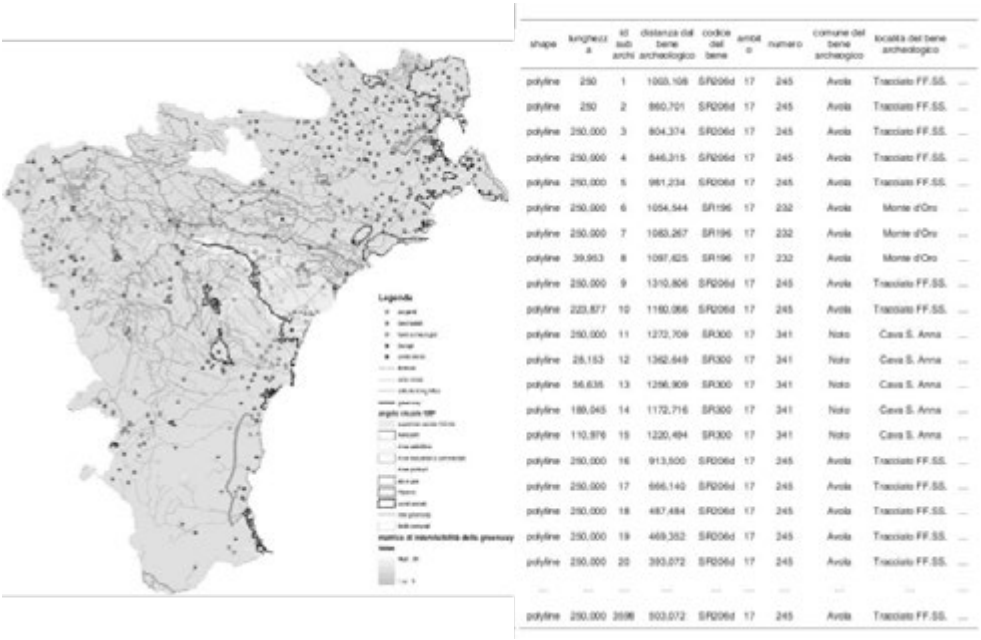


Figure 11. Information system and queries.



shape	lunghezza	id sub archi	distanza dal bene archeologico	codice del bene	ambito	numero	comune del bene archeologico	località del bene archeologico	...
polyline	250	1	1003,108	SR206d	17	245	Avola	Tracciato FF.SS.	...
polyline	250	2	860,701	SR206d	17	245	Avola	Tracciato FF.SS.	...
polyline	250,000	3	804,374	SR206d	17	245	Avola	Tracciato FF.SS.	...
polyline	250,000	4	846,315	SR206d	17	245	Avola	Tracciato FF.SS.	...
polyline	250,000	5	961,234	SR206d	17	245	Avola	Tracciato FF.SS.	...
polyline	250,000	6	1054,544	SR196	17	232	Avola	Monte d'Oro	...
polyline	250,000	7	1060,267	SR196	17	232	Avola	Monte d'Oro	...
polyline	39,953	8	1097,625	SR196	17	232	Avola	Monte d'Oro	...
polyline	250,000	9	1310,806	SR206d	17	245	Avola	Tracciato FF.SS.	...
polyline	223,877	10	1160,066	SR206d	17	245	Avola	Tracciato FF.SS.	...
polyline	250,000	11	1272,709	SR300	17	341	Noto	Cava S. Anna	...
polyline	28,153	12	1362,649	SR300	17	341	Noto	Cava S. Anna	...
polyline	56,635	13	1296,909	SR300	17	341	Noto	Cava S. Anna	...
polyline	189,045	14	1172,716	SR300	17	341	Noto	Cava S. Anna	...
polyline	110,976	15	1220,494	SR300	17	341	Noto	Cava S. Anna	...
polyline	250,000	16	913,500	SR206d	17	245	Avola	Tracciato FF.SS.	...
polyline	250,000	17	666,140	SR206d	17	245	Avola	Tracciato FF.SS.	...
polyline	250,000	18	487,484	SR206d	17	245	Avola	Tracciato FF.SS.	...
polyline	250,000	19	469,352	SR206d	17	245	Avola	Tracciato FF.SS.	...
polyline	250,000	20	393,072	SR206d	17	245	Avola	Tracciato FF.SS.	...
...	...	...	...	...	...	...	...	...	...
polyline	250,000	3598	503,072	SR206d	17	245	Avola	Tracciato FF.SS.	...

are not individuated by the browsers, making the most of the technologies which are based on the artificial intelligence (*AI*): the semantic web, the Geospatial Web, etc.. The web GIS is a ICTs tool that, if properly structured, is able to support the development of a Web 2.0 type, and therefore the tourism 2.0. This tool shows some potentials, which, if exploited, would allow to support a new era of web 3.0 type. The tools to support the development of a web GIS which is able to meet these requirements are: a data mining and an artificial intelligence tool that produces an output of the informational type for the product or service requested by the user.

To support the extraction and the processing data, the study proposes the *DRSA – Dominance Rough Set Approach* and fuzzy sets (Greco, Masahiro and Slowinski, 2006).

The DRSA tool is used to generate the preferences structure of the target segments users. It is used as a basis for the extraction and the processing of the data. It allows to identify the preferences structure to support the GIS tool and the Web GIS tool, to generate the best green way at meeting the user's preferences. DRSA belongs to the algorithms family called rough sets that are developed by the Operations Research. In particular, in DRSA the relationship of discernibility (Greco, Matarazzo and Slowinski , 2004a) that is typical for the rough set (*CRSA – Classic Rough Set Approach*) is replaced by a relationship of dominance that makes this tool more flexible and suitable for the analysis of some multi criteria decision problems.

The DRSA enables to generate a minimal set of decision rules in a neutral way. By means of this minimal set (Greco and Matarazzo, 2004b) it is possible to gener-

ate a preferences structure or perceptual-value (Sturiale and Trovato, 2010) structure for the user.

This algorithm also has the advantage of detecting the inconsistencies and the ambiguities of the input data, and helps to converge towards the minimum information structure on which the choice of the user depends.

In this regard, it is considered advantageous to process the information of a data base which is achieved on the basis of some questionnaires to support the feedback for the institutional web that uses the proposed web GIS tool. The revised information will form the basis for the structuring of the segments of the green way for the different target segments which are considered in the Floch's approach.

Results and discussions

Valuation model results

The value of a single greenway is represented by the four appreciations vectors, whose scores are measured in an a-dimensional scale from 0 up to 2. These scores are given by aggregating the ones describing and measuring all the relevant characteristics of the land crossed by the greenway, and composing the WBS by using the well known weighed average method. In particular, each appreciation corresponding to the more aggregate criterion level is weighed by the user inserting his or her request about the characteristics of the path, thus declaring his or her axiological profile, whereas the weights of the sub criteria are assigned as an hypothesis by the appraiser.

The combined application of the object, performance and axiological approaches is synthesized in Fig. 12.

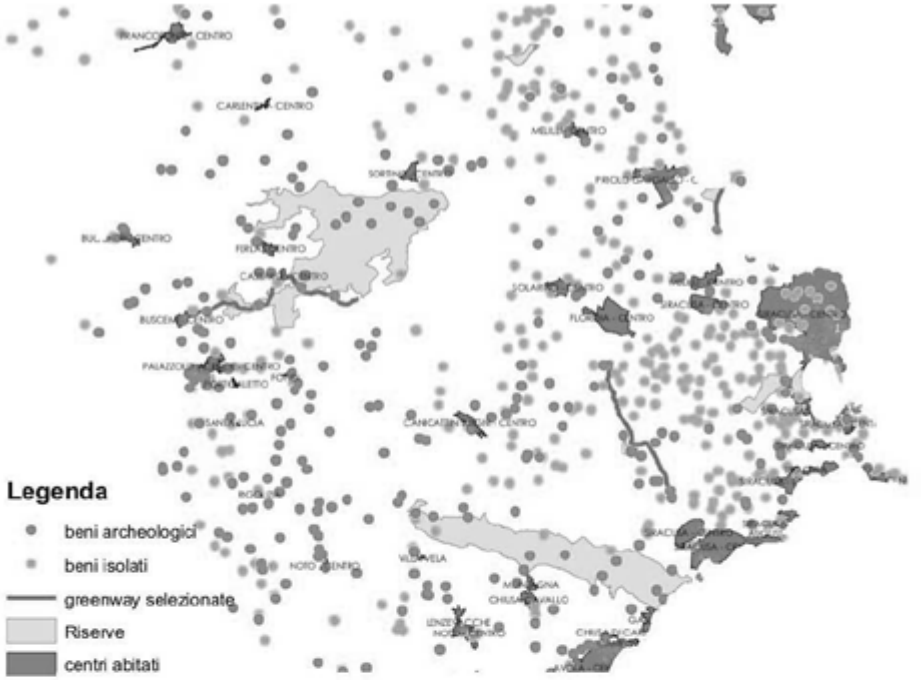
The WebGis model allows to verify the correspondence between the weight system and the appreciation of the users by means of a specific interface, as explained.

DRSA tool results

Some questionnaires were structured in order to identify the mode of the choice for the users. The questionnaires were administered to a sample of users that have connected to the website that hosts the experimental project. In particular, the questionnaires are proposed to users at the feedback button on the GIS Web's site. The obtained data were organized in a data base. The obtained information was processed using the algorithm of the DRSA (Greco, Matarazzo and Slowinski, 2004a). The DRSA tool allows to locate a minimal set of decision rules for the sample. In this case, we report only some exemplary decision rules that are been generated using the DRSA tool (Tab. 2).

Subsequently, on the basis of the obtained information, it has been possible to define the preferences structure for the sample. In particular, in this case, the pref-

Figure 12. The form for the insertion of the requested object, performances and the axiological profile.



objects/items	distance
anthropological goods	400
archaeological sites	
biotype	500
historic towns	
recreational facilities	
accommodations	
natural parks	1000
caves	
mines	
geotypes	
rivers	400
lakes	

performances	**details**
max length	5000
geological risk	nullo
hydrogeological risk	medio
access in km/time	1,5
continuità (tratto su trazzera)	20%

appreciations	**weight**
practical	0%
critical	40%
existential	50%
playful	10%

Table 2. Decision rules.

	Decision rules
1	If the level of importance for the efficiency of the route is medium and the level of importance for the recreational facilities is high then choose the playful profile
2	If the level of importance for the efficiency of the route is medium and the level of importance for the recreational facilities is high then choose the playful profile
3	If the level of importance for the distances is medium, the level of importance for the perceptual landscape is medium and the level of importance for the recreational facilities is high choose the playful profile
4	If the level of the importance for the recreational facilities is high then choose the existential profile
5	If the level of importance for the recreational facilities is medium then choose the critical profile
6	If the level of the importance for the density of the events is medium then choose the critical profile
7	If the level of importance for the adventure is medium then choose the critical profile

erences structure characterizes the user's profile on the basis of the four profile types. The sample was requested to declare its belonging profile. Then the sample was requested to characterize the different profiles according to Floch's approach on the basis of the identified criteria.

The sample was also requested to declare its preferences about the level of importance of the criteria, i.e. the weight or the value that these criteria have at choosing the green way.

The quality percentage of the approximation of classification is in this case the 68%. The quality of approximation of the classification represents the relative frequency of the objects correctly classified by means of the attribute. In particular the quality of the classification satisfies the properties of set functions called fuzzy measures.

A fuzzy measure constitutes a useful tool for modeling the importance of the coalitions. But a fuzzy measure can be used to assess a relative value of information supplied by each attribute, and to analyze the interactions among attributes (Greco, Matarazzo and Slowinski, 2001), basing on the quality of classification calculated from the rough set approach. Then the quality of the approximation of the classification can help to identify the weights as relative value of information supplied by each attribute (Trovato, 2013).

In the end it was possible to characterize three profiles: the critical, the existential and the playful ones. The results showed the absence of a characterization of the practical profile for the user (Tabb. 3-5).

The DRSA tool has allowed to identify the core approximation, i.e. the criteria that are more important for the choice of the different profiles. In this case, the most important criteria are the perceptual landscape and the level of recreational

Table 3. The preferences structure to support the critical profile.

The critical profile
If the level of importance for the recreational facilities is medium then chooses the critical profile
If the level of the importance for the density of the events is medium then chooses the critical profile
If the level of importance for the adventure is medium then chooses the critical profile

Table 4. The preference structure to support the existential profile.

The existential profile
If the level of the importance for the recreational facilities is high then chooses the existential profile

Table 5. The preferences structure to support the playful profile.

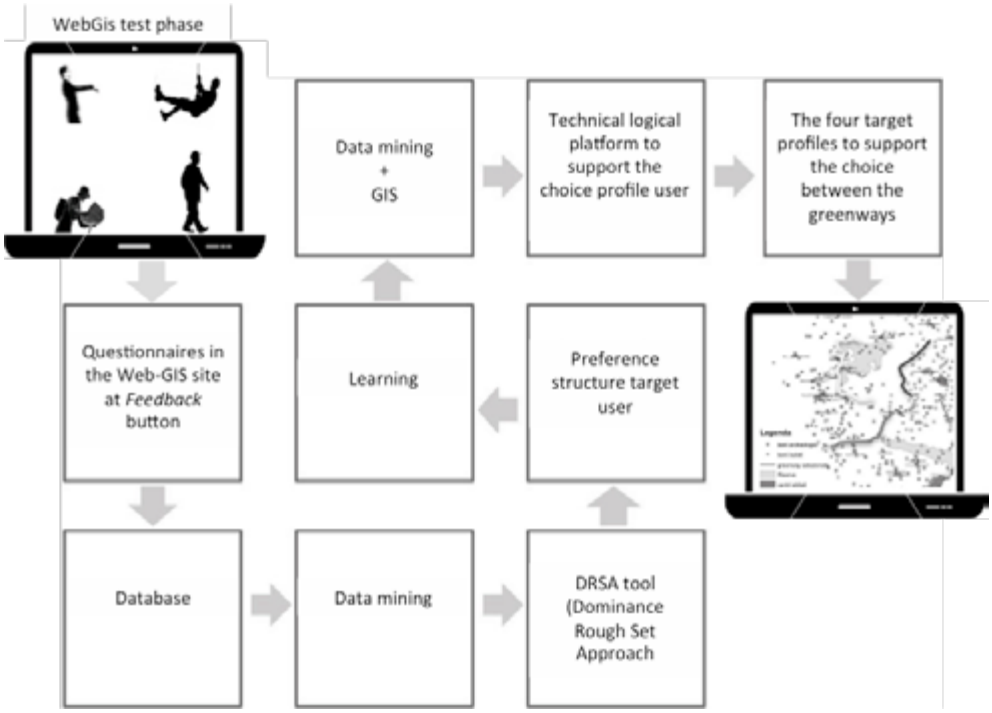
The playful profile
If the level of importance for the efficiency of the route is medium and the level of importance for the recreational facilities is high then chooses the playful profile
If the level of importance for the efficiency of the route is medium and the level of importance for the recreational facilities is high then chooses the playful profile
If the level of importance for the distances is medium, the level of importance for the perceptual landscape is medium and for the recreational facilities is high then chooses the playful profile

facilities. These criteria are present in all profiles, therefore these criteria are those that most influence the choice of the path. The obtained data are still partial and reduced. The construction of the database and data mining to support the choice of the green way constitutes a simplification and a test of the model that we are studying. Surely, when the sample turns out to be more representative, the model will be able to generate a stable preferences structure by means of which implementing the data mining and generating, using an automatic action, an individual more satisfying path. The general scheme of the DSRA-WebGIS participation pattern is shown in Fig. 13.

Conclusions

A green-web is an immaterial infrastructure, a phase of the information cycle – information as "the form that informs" – whose origin is the organization of the land knowledge and the access to it through of a personalized consultation system.

Figure 13. The general DRSA-WebGIS participation scheme.



Therefore the green-web can be considered composed of the knowledge system, the physical land support and the land values as produced by administration, planners, professionals and at last by the users through a recursive process of *signification*, *information* and *communication* (Rizzo, 1999). These three parts, between which the "value/valuation" is the most relevant one, are involved in the feedback process at the three levels of *data/information*, *value/valuation*, *planning/communication*.

1. At the first level the experience we have carried out has been an important test about the connection between data and value, so that the knowledge system has been completely redrawn; values need some specific data, and in particular an appropriate way of turning them into information;

2. At the second level, the valuation one, the value system has been assumed as the matrix of the knowledge whose wide articulation has to be reduced to some axiological relationships, in order to create a shareable communication system: an axiological approach connects the data and plan levels.

3. At the third level, the experimentation of the DRSA method has shown how it is possible to connect a valuation model to a planning approach; the interaction between user and decision-maker through the valuation model provides useful insights about what part of the land has to be enhanced and what supply chains need to be boosted for the general equalization purpose.

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