

## ***THE EDITORIAL FUNCTION OF THE TERRITORIAL INTELLIGENCE SYSTEMS***

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**Abstract:** Whilst the knowledge society is developing, the editorial function is also developing within the territorial intelligence systems. It is directly linked to the promotion of partnership and participation.

The territorial intelligence systems develop as an instrument of the second-range actors of territorial development: agencies, town planning agencies, settlement services, socio-economic observatories, etc. They are shared and cooperative systems. During the latest years, they allowed the information mutualisation and their processing. The growing importance of the editorial function implies that lots of present evolutions continue: Internet accessibility, integration and automation of the data processing and integration of expertise and experiences. Besides, the editorial function implies the harmonization of meta-data and the interface between man and computer, so as to make the data and results of their processing accessible to the partners and inhabitants.

The communication makes an updating of our thinking about the editorial function of the systems of territorial intelligence. Computer science and information systems aim at increasing the communication between the human beings. A territorial intelligence system is an instrument at the service of the actors who ambition to control the equitable and sustainable development of their territory. Since the irruption of data processing, we led research activities to design friendly software, then to model the structure of a territorial information system that is at the service of a network of territorial actors, and more recently to integrate the data analysis functions. They led us to presently consider the territorial intelligence system from the prospect of a digital edition chain, which is animated by a partnership of territorial actors at the service of a territorial community.

**Keywords:** Territorial intelligence, Information systems, Geographical Information Systems (GIS), Data analysis, Digital edition, Territorial governance.

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## THE EDITORIAL FUNCTION OF THE TERRITORIAL INTELLIGENCE SYSTEMS

An information system is a structured whole of data bases that gather a defined set of information and functions that allow establishing relations between these information, defining the direction of these relations or, better, measuring them. In a Territorial Information System (TIS), the information concerns a territory, that is to say a geographical space and its community. They are referenced in space and time. Functions of statistical and spatial analysis aim at helping the territorial actors producing knowledge on this territory.

Thus, a TIS allows:

- Gathering and regrouping information;
- Analyzing them according to scientific protocols, especially in a spatial prospect;
- Interpreting the results of these analyses;
- Representing the information and the results;
- Drafting decision-making scenarios;
- Managing and valuating the policies, programs, devices, projects and actions that result from the decisions.

A territorial intelligence system is a Territorial Information System that is at the service of a partnership of territorial actors that want to develop democratic governance at the service of sustainable development.

- It favors the information sharing within a territorial development partnership;
- It instruments the data cooperative analysis and the results participative interpretation
- It introduces the citizens' participation in the process of decision-making;
- It provides the actors with the useful information to draft projects, and then to manage them and valueate them.

It exploits the potential that computer science offers to gather information, share this information, favor the actors' partnership from the information cooperative analysis, and to increase the citizens' participation by improving their information and their access to information. It respects the constraints that sustainable development, particularly participation and partnership, imposes to information processing and publication protocols.

This article shows how we converged, from the friendliness notion toward the editorial chain one, through accessibility of information systems and integration of information analysis functions. This

evolution is linked to the information technologies diffusion but also to the permanent concern of making them accessible to a great number of people without any prejudice for the information quality.

The computer science, information systems, digital networks, and then digital edition via Internet development allowed us designing and progressively making solutions that appeared to be useful for the territorial information systems. Computer science firstly allowed constituting important data sets and then analyzing them with quantitative statistical methods. It made possible the application of statistical qualitative methods as well as the factorial analysis or classification [BENZECRI, 1982]. The data sets developed, and then it was the case of the information systems. Information that was conserved on different supports, were digitalized so as to be massively stocked on a same support within which they lose their readability. Internet popularized the information sharing, their collaborative processing and the massive publication at the world scale.

We suggest summing up our research activities history about the territorial intelligence systems, the present results and our prospects.

Doctor in Economics, engaged in a laboratory of mathematics, statistics and computer science in a Humanities and Social Sciences faculty, I developed convivial data processing solutions during the 1970's to diffuse the data analysis protocols that came from the Matter and Nature Sciences among the researchers in Humanities and Social Sciences.

Thanks to collaboration with computer science researchers, the SITRA, Territorial Information Systems for Actors Network, research action allowed completing the data statistical analysis by tools of spatial analysis and cartography.

ICASIT, Integration of Analytical Chain of the Territorial Information Systems, started updating and making the software of data statistical and spatial analysis that were previously developed evolve.

There was a communication of these works during the ICTAMI conference in ALBAC (Romania) in September 2006 and there will be another two presentations in Taiwan in November 2007.

By doing this work, we became aware of the importance of the editorial function of this convivial analytical chain that is directed towards online edition of the results. In the context of the territorial intelligence systems, this editorial chain concerns production of digital documents that should be shared within an actors' partnership. It is also a work flow that can not be organized only according to the technical protocols of data analysis, but also so as to allow participation within the partnership, but above all beyond it, within the territorial community. That is why we call them Territorial Intelligence Community Systems (TICS). Deepening and instrumenting the TICS editorial function is our present research prospect.

## 1. THE DEVELOPMENT OF „FRIENDLY” SOFTWARE OF DATA ANALYSIS

It is important to go back to software that are recently the fundamental modules of the TICS. They are based on a notion that constitutes a base of the editorial function of the TICS: friendliness.

The software ANACONDA – Analyse CONViviale des Données (data friendly analysis) was published in 1981 to diffuse the data qualitative analysis methods (factorial analysis and classification) in Humanities and Social Sciences.

PRAGMA, which is quantitative analysis of questionnaires software, was made in 1991 to facilitate the drafting of the data tables so as to make a data statistical qualitative analysis.

The concept of friendliness that is fundamental in their conception implied the ideas of economy, simplicity in the use, accessibility, sharing and cooperation. During their development within the research group “Techniques Nouvelles en Sciences de l'Homme” (new techniques in humanities and social sciences), the conception of these software took into account specificities that are proper to:

- Humanities and Social Sciences (HSS);
- Multi-discipline uses;
- Systematic and collective gathering of large data sets;
- Complementarily with spatial analysis.

### 1.1. Anaconda

It was developed in 1981 [GIRARDOT, 1982], and its main objective was to provide a cheap and accessible solution to analyze data. They are multi-criteria methods that allow analyzing statistical individuals who are described by a set of multidimensional characters. The factorial analysis determines the structural factors or trends, of an

important data set. The classification dissociated its main classes. These methods imply important calculations that impose to use a computer, contrary to the quantitative tables that we can “manually” make [BENZECRI, 1982]. During the 70's, these calculations were made in calculations centers, what cost much money for the HSS laboratories. As soon as the characters were more than one hundred or the number of individuals was higher than one thousand, we had to go to PARIS to process data. Indeed, there were frequently data sets composed by more than a thousand of individuals in geography. ANACONDA allowed analyzing data sets until one hundred characters and one thousand individuals on one's desk with an Apple II (48k). These limits were quickly pushed back.

ANACONDA combines Jean-Pierre BENZECRI's Correspondences Factor Analysis with Michel ROUX's Hierarchic Ascendant Classification<sup>57</sup> [ROUX, 1985]. It is based on a matrix diagonalization algorithm that was designed by Jean-Philippe MASSONIE and initially programmed by Xuan LUONG.

ANACONDA is directed to the HSS researchers; it was designed as free and easy-to-use software for users without computer science qualification. Microprocessing allowed simplifying the use. Of course, it was possible to make data analysis on one's personal computer. It presented a very simple interface in comparison with the data processing software. It was interfaced with the usual office automation module. ANACONDA was designed to import the data in the form of a data table<sup>58</sup>, that is constituted by a word processing or a spreadsheet and it is saved in a file that is in format “text”<sup>59</sup>. It is totally automated for a current use. It applies a principle that was popularized by Jean-Pierre FÉNELON [1981]: “do we need a thesis in thermodynamics to drive a car?” It does not need any other knowledge in mathematics than the ones that are useful to understand the results. The choices are defined by parameters with initial values that correspond to 99% of the uses. It is enough to indicate the name of the file that includes

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<sup>57</sup> It is based on the distance of the Chi2 and on the aggregation by the focused moments of order two.

<sup>58</sup> The data table presents the individuals on lines and their characters on columns. The first line is reserved for the characters identification codes and the first column is reserved of the individuals' indicators.

<sup>59</sup> Suffix txt. Each line of the table is separated from the continuation by the “return” character (ASCII 13). In each line, each column is separated from the following one by the tabulation character (ASCII 11).

data to analyze so as the calculation of contingences (the whole cross sorting from a data set), the factorial analysis and the ascending hierarchic classification are made. Then, the "NUAGE" software simplifies the results analysis and interpretation thanks to a 3D animation.

But, ANACONDA is above all adapted to the main methodological specificity of the HSS where the analysis mainly concerns the individuals in comparison with the characters. The experimental methods that come from the Matter Sciences focus on the relations between the variables, whilst neutralizing the individuals. More than in the Nature Sciences that are characterized by the variety, the HSS are singularized by the individuals diversity and by individuality. The main interest of the qualitative analysis consists in its ability to study this diversity. We chose the correspondences factorial analysis that allows analyzing not only the relations between the variables but also the relations between the individuals, and the relations between the individuals and the variables. The classification allows studying the individuals' diversity by determining the main classes of individuals and their characters' profiles. ANACONDA allows associating both approaches by the representation of the classification in the factorial space.

Thus, the ANACONDA friendliness is based on:

- Automation of functions which knowledge is not indispensable to the results understanding;
- Choice parameters definition with initial values that cover the usual situations;
- An interface with the most popular office automation standards;
- An adaptation to the specificities of Humanities and Social Sciences.

ANACONDA received the Golden Apple award, in the Research and Development category, in 1981. We followed its diffusion during a decade. When we had to stop this follow-up because we lack of means and time, it there were more than one thousand specimens. ANACONDA was used in diversified fields: in the scientific research on the landscapes analysis in geography and on the structure and dynamic of the archaeological establishments. In diversified research activities fields of applied research and research-action: studies of the structure of the museums collections and of the audiences of cultural manifestations, diagnosis of the variety and of the complexity of the needs of underprivileged people and evaluation of the actions that aim at improving these persons' situation, etc.

## 1.2. Pragma

PRAGMA consists in software of analysis of questionnaires surveys that is directed towards the quantitative processing. It was initially developed in 1991 [GIRARDOT, 1991] to make the coding operations that are necessary:

1. To make simple and cross quantitative sorting;
2. Then, to make the data table in the prospect of the data qualitative analyze that will be made by ANACONDA.

Besides, PRAGMA design answered several needs that it was possible to jointly satisfy thanks to the fabulous intuitive and interactive potential of the HyperCard software. Since 1984, the micro-computer "Macintosh" by Apple popularized a graphic interface that notably simplified use of computers. With HyperCard, it became possible to develop intuitive applications that are closed to the working practices.

### 1.2.1. An intuitive use

PRAGMA shows each question on the screen with a similar presentation to which it has on the paper questionnaire. We key in an answer by clicking on the modality that corresponds in the modalities list that is on the screen. In the case of an open question, we key its value in, as we usually do with a word processor. At any moment, we visualize the list of answers made by a person, by clicking on its code. It is only possible to go back to a question to consult the modalities frequency or to establish an index of the values that allow consulting the persons who made the same answer. To code a question, it is only necessary to select values the meanings of those are close and then to constitute a new modality with some clicks. In the same way, we gather several modalities in a new one. The answers are summed in real time at each question level: by consulting, or possibly printing, the screen of a question to have a corresponding counting table, for all the people or for a selection. The simple or cross tables are registered in files at text format. A spreadsheet such as Excel, allows reading them, completing the calculations and drawing varied kinds of histograms.

PRAGMA affirmed itself as a simple to use software. The keying in has become an operation that can be made by any person who know how to use a word processor. The researchers and the professionals could make the coding, recoding, selection, statistic sorting operations, and then complete the exploitation and communication of the results thanks to usual office automation tools.

### 1.2.2. A collective tool

PRAGMA was designed for a collective use, to mutualize and share the data upstream, and to collectively analyze the results of the data-processing treatments downstream. With the diffusion of the micro-processing, the data-processing users circle notably widened and the size of the data bases strongly increased. At the beginning of the 1980's, important data sets were collected "on the ground" thanks to surveys or observations. The laboratories of Geography, Archaeology and Chronoecology were particularly specialized in the systematic gathering of data sets about several thousands of persons or observations. The gathering needed the coordination of several teams. The new users of data-processing were neither data processing specialists nor experienced users of software. They worked in varied data-processing environments. The shared keying-in allowed constituting voluminous bases that combine skills of several disciplines or of several activity sectors. Analysis and interpretation of results have also become multi-discipline and multi-sector cooperation. The HyperCard, and then ToolBook software, had the advantage to gather in a same file all the software functions and data. It allowed gathering data entries that were made by uncollected users without any complication, very closely to the survey or observation places.

Thus, PRAGMA allowed leading the gathering of data about more than 2155 descriptions of archaeological establishments, so as to cross them with environmental bases corresponding to an area of 15000 km<sup>2</sup> in the Rhone Valley (in a triangle between Lyon, Nice and Montpellier in France), in the framework of the Archaeomedes programme of fight against soils desertification in Europe (1992-2000). Then, it was used to establish the social map of HUELVA (Spain) with multi-sector data about 3852 households; the diagnosis of the Departmental Plan of insertion of Doubs (1994) about 8897 households or the evaluation of 16 Boutiques Solidarité of the Abbé Pierre Foundation concerning 5895 homeless in France (1995). These bases were constituted by tens of teams of researchers or actors. They defined and validated a common questionnaire that integrates several disciplinary themes or several sector approaches. This questionnaire was registered in PRAGMA. A virgin specimen of data was distributed to each team. Each of them gathered and keyed in its data in a partial file. These files were gathered in only one PRAGMA basis, that is similar to the partial bases but that includes all the statistical individuals. There were global and partial analyses and possibly a confrontation with other data. The teams that

shared their data were associated to the data analysis and interpretation.

The PRAGMA friendliness lays on the reproduction of the usual working environment by the data processing tool. Then, it is based on the integration of PRAGMA in the office automation environment. Thus, it prepares a transition towards new uses that the usual working environment cannot provide.

PRAGMA also emphasizes the collective dimension of friendliness that is based on the concepts of sharing and cooperation. Presently, we become aware of its implications.

1. It implies the constitution of a community that is united by a common project.

2. It needs a partnership organization to define the tasks that contribute to the objective execution, to make an inventory useful means, to establish a working calendar and to implement a communication. Nevertheless, a decision-making hierarchy does not always structure the community. Communication is not channeled from the top to the bottom. It also works upwards and in a transversal way. The members' rights are equal, what implies a proposition and validation process in decision making.

3. Each community member should find its advantage in cooperation without prejudice for the global added value. Thus, beforehand it is imperative to define each ones' right on the shared information. The information contribution and the time that is devoted to it imply a restitution that has interest for the participants on a collective and personal basis. The participation to the analysis and interpretation of results are the complement of the information sharing.

4. The improvement of the information accessibility, data and results, is another condition of the community members involvement,

5. As well as the transfer of scientific and technical skills about the methods, protocols and tools of analysis that are used.

PRAGMA should also provide the possibility to statistically exploit databases. Diffusion of micro processing in the 1980's also contributed to the important development of databases. Many firms and administrations constituted bases that can be used to make statistical analyses. Nevertheless, they were not designed in this prospect. It was necessary to restructure them to respect the constraints of a statistical processing.

### 1.2.3 Robustness and automatic control of the data quality

So as to favor the access of an increasing number of users to the information quantitative and qualitative analysis techniques, but also to face the demand of statistical exploitation of databases, PRAGMA integrates control procedures of data quality.

These controls essentially concern the questions form. They are based on the one hand on the questionnaire specificity and on the other hand on the contradictions resolution that characterize its two complementary functions: communication and processing structuring.

The questionnaire is an interactive document of gathering of information that structures the latter so as to simplify its treatment. It allows making the same number of questions to all the surveyed people, in the same order and with the same formulation. When the statistical individuals are not people but items, the most important constraints are the questions number and meaning. The meaning of each question is established before the data gathering and it should not be modified afterwards. It is indispensable to define a language that is common to all the people who will be associated to the data gathering, analysis, interpretation and publication. PRAGMA considers that the design and drafting of the questionnaire constitute a preliminary question. It allows digitalizing the questionnaire when it is drafted. It controls the questions form, and not their formulation.

Communication and processing structuring, can be contradictory. The opened question, that appeals an individualized answer, is particularly preferable as far as communication is concerned. The closed question, that offers choosing among a pre-defined modalities list, is appropriated to the treatment as it allows directly making statistical sorting, making graphs and geographical maps, and then preparing the qualitative analyses. Nevertheless, PRAGMA is not normative software. It does not oblige to only use closed questions. It does not freeze the questions form as it considers it is evolutionary: it is possible to close the opened question by coding its answers. Thus, PRAGMA allows keying in and importing questions under opened form and closed form. PRAGMA controls the questions form so as to offer then assisted coding functions.

The automatic controls concern:

- Answers absence.
- Answers unicity or multiplicity.

PRAGMA locates and systematically accounts the answer absence by automatically dissociating situations where the question becomes without

object. It precisely checks the keying in of the questions with “only one answer” or with “multiple answer”, and especially if the modalities are exclusive or can be used once or several times.

The questions to which answers are missing and those that accept several answers are more complex to sort and analyze. In both cases, the total number of answers is different from the number of surveyed people. It is inferior when answers are missing. It is superior if it is possible to indicate several answers. It leads to confusions according to the fact percentages and histograms are calculated according to the number of people or to the total of expressed answers. To limit these confusions, PRAGMA calculates both percentages, on the quantitative global balance that is exported under the “text” format.

In addition to the control of manipulation errors at the data processing level, these formal controls make PRAGMA a robust tool. It could be used in extremely diversified conditions, closest to the observation situations by people without any data processing or statistical qualification – what does not mean without training and follow-up. In return, these experiences allowed improving PRAGMA robustness, what constitute an important friendliness factor.

PRAGMA completes the automatic controls by coding and recoding functions that provide help to the user according to a data qualification protocol:

- Management of the missing answers;
- Coding of the opened answers;
- Recoding of the closed questions;
- Selection of questions and modalities;
- Coding in the prospect to make data analysis.

These functions that need more expertise are strongly assisted to avoid as many errors as possible.

The missing answers management concerns at the same time individuals and questions. As a principle, it would be necessary to eliminate all the individuals for which an answer is missing. Nevertheless, the cost of acquisition of the data or the concern not to introduce bias in a sample can oppose to a drastic information loss. In this case, we should be careful to eliminate the questions and individuals for which the missing answers rate is too high.

Insofar as the control of missing answers leads to the elimination of individuals and questions, it is the first step of the protocol of data qualification, at the end of which, as well as at each step, the global quantitative balance will be able to be easily updated.

The opened questions coding aims at transforming them into closed questions that is to say the answers that are expressed under values form into codes. PRAGMA simply offers to gather values according to a new modality. It is also possible to directly code a value which meaning already corresponds to an existing modality. Thus, when the keying in is made, it is possible to directly code an answer or to indicate its value in case of doubt. Then, it will be able to be coded either by affecting it to an existing modality or by creating a new modality.

The recoding of the closed questions is a similar re-gathering operation that does not concern values any more but answers that already have a codes form. It concerns the modalities which frequency is too low to be considered as representative. PRAGMA allows removing these modalities, or when the modalities meaning allows it, gathering them with other modalities or some of them so as to avoid the information loss.

Recoding is also a mean of questions or modalities selection according to the stage of analysis, exploratory or deepened, or a mean to prepare the results communication.

These coding, recoding and selection functions were particularly developed to select the characters that will constitute the Boolean data table in the prospect of the data qualitative analysis. PRAGMA allows globally selecting the questions to be processed and then to choose and define the characters to be analyzed from modalities, possibly by gathering several modalities. This “data table” constitutes an important link for PRAGMA and ANACONDA integration. Conversely, the typology that is determined by ANACONDA can be imported in PRAGMA as a question which classes constitute the modalities, so as to calculate the frequencies of the original modalities in each class, by a cross sorting.

These operations are also useful for the results communication; to associate the partners who participated to the data mutualization to the results interpretation and to diffuse the results on Internet. In both cases, the gross results of the quantitative analysis can not be published in their state. There should be a selection among them and specific recoding.

We emphasized the need to make restitution the results to the partners’ network who accept to share their data. With PRAGMA, this restitution is made at an individual level, since the keying in, since each partner can make the quantitative and qualitative analyses he wants from his data,

including before putting them in common. But restitution has above all a collective dimension, after the data gathering. The partners can participate to the analysis, direct the processing progression and enrich the results interpretation through the contribution of experience data, information or specific knowledge. This restitution implies an animation that is based on the results communication.

As regards the publication of the results on Internet, it implies a progressive drafting of the documents under a digital form. These documents have many particular characteristics. They are new in information systems that are generally designed for more traditional documents. They are automatically produced, but they are also re-made by human interventions according to technical or communicational imperatives. They are also very varied.

### 3.3. Nuage

NUAGE is software of representation in three dimensions of the results of the Correspondences Factorial Analysis of and of the Hierarchic Ascendant Classification. It was developed in 2003 so as to replace the American software MACSPIN which development had been stopped since 1991. The software of data graphic analysis allowed making a three-dimension representation of the ANACONDA results. This representation was much simpler to use than the representations through maps on sheets of paper. It was above all more intuitive and allowed the collective interpretation of the results of the qualitative analyses in small groups. But MACSPIN could also be used on Apple computer and it became almost impossible to use it after 2002, because of the generalization of the exploitation system “X” of APPLE.

NUAGE that was developed in JAVA by Hervé FEHNER is multi-platform software. It makes the restitution of all the graphic functions of MACSPIN, but its interface is specifically adapted to the double representation of the factorial analysis and of the classification, and to the interpretation of the data qualitative analysis. Indeed, it automatically integrates a series of operations that had to be manually made before. It also memorizes the results of the analyses and representations. Despite an important work on the interface, it essentially produces work documents. The thinking should presently direct to the production of documents that can be published.

#### 4. SITRA

The research action « Territorial Information Systems for Actor Network » was led from 2002 to 2004, so as to model convivial territorial information systems that are accessible online to networks of local actors of the sustainable territorial development so as to develop their ability of mobilization, decision, action and evaluation. The objective was especially to define a TIS architecture that is adapted to the work in network and to complete the data statistic analysis with convivial cartographic solutions. The SITRA results were applied to draft the ADRI (Agency for the Development of the Intercultural Relations) resources management system, the resources management system of the Inter-ministries Delegation of Town (DIV) and to make the territorial "CATALYSE" observatories evolve.

The word « network » referred to the reality of actors who cooperate on a common project, but working in different organizations at the institutional level, without any hierarchic link and being geographically far away the ones from the other ones. It prefigured the concepts of partnership and of community that constitute a fundamental economical principle of sustainable development. The latter one advocates the use of local resources in a spirit of cooperation rather than the creation of new structures. It implies a multi-discipline and multi-sector approach. Partnership is presently a current word at the level of territorial action. The European programme of social-economical action "EQUAL" funds for example actions that are led by consortiums that are called "development partnerships". Because of the development of cooperation at the level of the data analysis thanks to PRAGMA friendliness, the SITRA stakes always concerned the information sharing and its cooperative exploitation. From now on, we had to mobilize in coherent way extremely varied information that is referenced in space and time. They should be statistically analyzed or be used for something else. The SITRA action gathered researchers in Humanities and Social Sciences and Computer Science, whereas we used to make software of data analysis inside the organizations. We wanted to use the Internet potential and it implied wider knowledge and skills in computer networks, modeling of information systems and databases.

SITRA allowed:

- Starting the integration of functions of statistical and spatial analysis by designing friendly cartographic tools.
- Defining a procedure of global management of all the documents, despite their variety.

-Designing a system of rights that would be appropriated to a partnership management.

The word « territorial information systems » (TIS) refers to a project that would be at the same time more ambitious and simpler than the one of « geographical information system » (GIS). The GIS allow geographically referencing the information, making spatial analyses, analyzing them and mapping the information and results. From this point of view, a GIS is the TIS basis module. Nevertheless, the experience of the "ARCHAEOMEDES" project and of the "CATALYSE" observatories shown the data bases of the GIS could not manage in a coherent way neither the very varied involved documents, nor the actors diversity nor the documentary flow. Besides, their use remains expensive and complex and the performances poor as regards digital edition on Internet. If this cost and this complexity could be justified for these specialized spatial analyses, it was not the case to make simples spatial analyses and to edit maps, functions for which there was a free and more friendly offer. It was necessary that the TIS architecture is inspired by a GIS structure to integrate these functions. ARCHAEOMEDES uses a GIS to make spatial analyses, whereas the bad called SIGVILLE draws maps according to the demand as regards public social-economical indicators that are appropriated to the territories observation and to the evaluation of devices on all the territories of the town policy (around 700 infra and inter communes zones) thanks to a cartographic online tool (ALOVMAP). The manipulation is extremely simple as it is enough to select the zone and the data to map. This friendly solution is also used for the cartography of the diagnoses and of the territorial indicators on the "CATALYSE" observatories, by using in particular files in format text to map the results that come from PRAGMA and ANACONDA. Indeed, SITRA kept making the integration of the statistic software with the new cartographic functions. It started the execution of a free and multi-platform version of ANACONDA in Java, and a free online prototype of PRAGMA, epragma, in PHP/MySQL.

A TIS manages the access online of a great variety of documents in Extranet secured network or on Internet. SIGVILLE also manages the documentation that is linked to the actions of the town policy (contracts, maps, reports). It is an element of the website of online resources of the town policy : books, magazines, circulars, reports, maps, conventions, numbers tables, graphs, experiences cards, links to partners websites... This variety is also enriched by the multi-disciplinary and multi-sector approach that characterizes territorial action. The website of the ADRI (that has become National City of the Immigration History)

offers a simplified system of metadata so as to improve the accessibility of the data through Internet. Whilst it offered several researches according to the kind of document, SITRA modeled for the Resources of the Town Policy a TIS that references and that manages in the same way referenced and digital documents. Thus, we have access with only a key-word to the whole documents that are linked to a theme, whatever their original support, their digital format, their kind or their function is... A TIS is characterized by the production of new documents from other documents. The documents management also concerns the referencing of the new documents and the management of the analytical flow.

SITRA also started the modeling of a security system that is adapted to the partnership networks, by offering a procedure that has generalized from this moment. The administrator offers a login and a password that can be modified by the user. SITRA has the same organization of individuals in groups that PRAGMA. This notion offered the possibility to gather the persons who are informed by a same structure or who live in a same territorial zone... SITRA introduced the differencing of the accesses in function of the groups, what allowed, by defining the groups according to an organization for example, limiting to the users of this organization the right to have access to the persons who belong to this group. The works of secure of the TIS led to deepen the link between metadata, document and information, according to the information updating. We can illustrate this thinking as follows. We can constitute for the cartographic representation of indicators a table which columns are the indicators and the lines the geographic units to be mapped. We can consider that this table is a document and attach to it metadata, as the updating date, and rights. It will be insufficient if each indicator or each zone can be independently updated by different users. In this case, we should attach the metadata and the rights to the column or the line that corresponds in the table. If we are susceptible to independently modify each piece of information, we should attach metadata to each piece of information of the table.

Thus, SITRA allowed making a first list of specifications to make TIS and experimenting them with important executions as SIGVILLE.

## 5. ICASIT.

The ICASIT action "Integration of the Analytical Chain of the Territorial Information Systems" followed SITRA from 2004 to 2006 by emphasizing the notion of analytical chain that will eventually lead to the one of editorial chain. SITRA

put the bases of an analytical chain that integrates the software functions within the TIS, from the data gathering with PRAGMA until the online publication of the results, mainly maps. ICASIT followed the integration effort of the software of analysis with two practical objectives:

1. Making integrated, free and multi-platform versions of the TIS software functions.
2. Putting these functions online.

NUAGE was developed in multi-platform version Java to represent in 3D the ANACONDA results. The specifications of a multi-platform version of PRAGMA were established. The cartographic functions were extended with the flows representation.

A beta version of online PRAGMA, epragma, was experimented in the framework of the ACCEM migrations observatories.

This effort of evolution and integration was made and will continue with the constant concern to improve the accessibility of the software tools in different ways:

- By using and making free software that are widely opened to the developers community.

- By making multi-platform versions, which work on all the computers, on all the exploitation systems and independent from their evolution.

- By automating, as it was initiated with ANACONDA, all the functions of which neither the expertise nor the technical control are indispensable to understand the results. The operational and decisional steps remain; they need an intervention of the users via the man-machine interface. The pursuing of the processing implies new information that is generally transmitted through documents or decisions that are transmitted under the form of parameters that condition the treatment.

- By integrating the expertise. Initial values are usually attributed to the parameters by the experts. The user has a proposal that corresponds either to the usual uses or at expert advice, and that they can modify. For example, in SIGVILLE, the user can request the representation of a map by indicating the zone and the indicator. Experts define the choices of the classes and of the colors representing each indicator as parameters. They integrate an expertise on the one hand that is adapted to each indicator and on the other hand to the cartographic representation.

- By memorizing the users' decisions. The evaluation and observation steps often imply the

repetition of decisions from a period to another one. The parameters are used to memorize the decisions.

The definition of a multi-sector guide of diagnosis and evaluation, that is coordinated within the CAENTI, aims at offering a selection of questions and for each question a protocol of processing according to the expertise and experience of the CAENTI partners.

The research activities that are led within SITRA on the integration of the functions of information analysis emphasized the documents flow that is gathered and produced within the TIS, from the gathering to the data publication. As we previously underlined, a TIS references and digitalizes a great variety of documents, among which some remain few usual (statistical tables and graphs, maps...) that is widens by the production of the production of digital documents. ICASIT put the bases of the modeling of the documentary flow, by starting the inventory of the used (input) and produced documents (output) by the analytical chain. The objective is to define a metadata system that describes the information source and the made processing, if possible in an automatic way. In the continuity of the effort of simplification that was initiated by SITRA, these research activities aim at integrating the "DUBLIN CORE" standard, especially the norms that are presently developed for the geographical information. It is also a condition for the metadata to constitute vectors of communication with other systems.

ICASIT emphasized the TIS editorial function and their community dimension.

The integration of the analytical process on Internet is conditioned by the online publication of the results. The knowledge production and the information documentation are inscribed in a "workflow" of digital scientific and technical edition that organizes the continuity of the technical functions from the information gathering to the results publication, via the data sharing, the results analysis and interpretation, the documents drafting and documentation and their validation.

Thanks to the digital edition on Internet, the TIS offer a huge potential for the sustainable development. The cooperation online tools are indispensable to the partnership. Digital edition allows informing the territorial community, guaranteeing the visibility of its identity and developing participation by the means of interactive services. This potential makes the TIS systems of territorial intelligence that offer concrete solutions of instrumentation of partnership and participation. Nevertheless, this potential is initially controlled by the experts. Territorial information accessibility and

conviviality of processing are the conditions to release this potential at the service of the collective intelligence of the territorial community. Their ambition is to constitute territorial intelligence community systems of territorial intelligence (TICS).

This orientation implies the categorization of the TICS users – *a priori*; experts, actors, partners and community, and the study of their uses. Which functions need an expertise? Which functions are transferable to the users? According to which pedagogy and with which accompaniment? How to organize the sharing of the territorial information, and then the cooperation at the level of their analysis and their edition? Which are the actors, partnership, territorial community functions? How to associate the community by the means of the participative interactive systems? This modeling implies an adaptation of the steps of the data analysis and of the results interpretation, as well as of the editorial flow, to the communication, animation objectives of the partnership, the participation and of governance of the territorial community.

## CONCLUSION

The development of the methods friendliness and of the generic tools of wide-applicability of information analysis towards the researchers in Humanities and Social Sciences presently leads to the opening of the TIS to the partnership of the territorial actors and to the participation of the territorial community.

This evolution reflects the friendliness one that at the origin essentially referred to the simplification of the individual access to the computer technologies. Then, it got a collective dimension in the framework of the information sharing and of its cooperative processing. In this case, it progressively includes accessibility to information and its analysis, interpretation and edition tools.

Thus, the research activities on the territorial intelligence community systems (TICS) presently concern:

- Modeling of their architecture and definition of their functional specifications according to logics that are proper to analysis, documentation, edition and communication in the partnership and participation framework;
- Modeling of the contents, documents and editorial workflow by integrating the human individual and collective interventions;
- The metadata specifications;
- The description of the processing protocols;
- The uses evaluation;

- The modeling of the decisional, governance, partnership and participation process within the The word « territorial community » does not refer to the biological, historical or religious dimension. It assigns a set of people that are united by a common project. It is also the meaning that is used in computer science to name a users community. This meaning covering will allow studying the conditions in which the territorial community can constitute the TICS users community. We should also take into account the fact that if the information analysis can constitute a project for the TICS: it is an intermediary step at the service of an objective of sustainable development for the territorial community, or more simply for the local actors who want to plan, lead and evaluate actions of local development.

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