Management (by concepts and processes) in Economic Intelligence: nanoMetrology cluster Project

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(FR) Management (des concepts et des processus) par l'Intelligence Économique : Projet du Club nanoMétrologie.

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ABSTRACT / RESUME

Economic Intelligence (EI) is a concept that is the subject of multiple definitions. Undoubtedly, these are due to the confusion on the word "intelligence" (i.e. the "intelligence and espionage" in English, but "knowledge and expertise (or know-how)" in Latin meaning like in French), [1]: "Sometimes equated with economic espionage, sometimes traditional methods of strategy information processing for the benefit of the few companies, (…)". However, most experts in France and Europe seem to agree on the definition of B. Carayon (2003). For this author, doing Economic Intelligence, is trying to master, i.e. seek and protect the critical information necessary to perform an economic activity in a business firm [1]. The key verbs of the Economic Intelligence are: inform, anticipate and defend interests.

One of the challenges of EI, as completed in "The Economic Intelligence: guide for beginners and practitioners - Programme of the European Commission", is "to transform the mass of data available in different forms, from many sources, which is often unorganised, and collected through several channels, into information, and then into knowledge and then into intelligence" [2].

The coordination actions are commonly admitted by EI practitioners as: "search", "processing" and "distribution" for "exploitation". Starting from both both experience and theoretical researches in EI, Information systems (IS) and knowledge management (KM) domains [2][3] are joint with the the use of Natural Language Processing (NLP). In methodology approach NooJ is used to add semantic methods to the EI system allowing a gain of performance in information retrieval, in decision-decision-problem elicitation towards information monitoring.

The first part of our paper consists to provide briefly the definitional framework of what is EI and to present the interest using NooJ Plateform to implement semantic methods towards our new EI system approach.

The second part presents the case study for information monitoring methodology. Hence, we applied our theoretical schema to the project: specifically dedicated to nanometrology cluster gathering both academic labs and industries. Processing with NooJ is (i) to mine on actors linked to information needs in order to get the better management of the project and (ii) to determine the professional classes of each actor in the cluster.

KEYWORDS / MOTS-CLÉS

Economic intelligence (EI); information system (IS) information retrieval (IR); decision-problem; nanometrology cluster; knowledge management (KM), Information Design (ID); Community Manager (CM) activity.

GENERAL INTRODUCTION

The research topics of this keynote cover all phases of “Information Design” (ID) applied to detect and take profit of “Weak Signals” (WS) in the context of “Economic Intelligence” (EI).

The context study on Economic Intelligence (EI) is complex and the concept itself is the subject of multiple definitions. Undoubtedly, these are due to the confusion on the word “intelligence” (i.e. the “intelligence and espionage” in English, but “knowledge and expertise (or know-how)” in Latin meaning like in French), [1]: “Sometimes equated with economic espionage, sometimes traditional methods of strategy information processing for the benefit of the few companies, (…)”. However, most experts in France and Europe seem to agree on the definition of B. Carayon (2003). For this author, doing Economic Intelligence, is trying to master, i.e. seek and protect the critical information necessary to perform an economic activity in a business firm [1]. The key verbs of the Economic Intelligence are: inform, anticipate and defend interests.

First, we should distinguish the two processes involved in the IE and monitoring (or watch in French terminology like “veille”).

In the monitoring/watch process, the functionality of the collection, analysis processing and sharing are integrated into a continuous, cyclical and focused approach by strictly informational needs. Requirements explained in a specification standby receive answers explained in terms of synthesis, resources and sources of information. In no way, the monitoring/watch deliverable standby (output process) will suggest that other information in order to preserve the objectivity of monitoring/watch product and its actors (watchers) in response to a specific need.

Downstream of the monitoring process, strategy , expertise and decision under other processes that are not in the role of watcher and inherent in the standby process.

And in upstream, the sponsor (and decision-maker) of a product standby is not able to disclose strategic issues, preferences or projections decision to preserve the objectivity of the watcher and not bias the responses saver.

In connection to EI, the field of ID concerns the process of translating complex, unorganized or unstructured data into valuable and meaningful information. ID practice requires an interdisciplinary approach which combines skills in graphic design (writing, analysis processing and editing), human performance technology and human factors. ID applied in the context of information system allows end-users to easily detect implicit topics well known as weak signal (WS). In our approach, the integrated process covers the development of “Knowledge Management” (KM) in the EI methodology and managing both behaviors and results.

The first part of our keynote consists to provide briefly the definitional framework of what is EI and to present the interest using NooJ Plateform to implement methods towards our EI system.

The second part presents the case studies for information monitoring methodology. Hence, we applied our theoretical schema to the project: specifically dedicated to nanometrology cluster gathering both academic labs and industries. Processing with NooJ is: (i) to mine on actors linked to information needs in order to get the better project management and (ii) to determine the professional classes of each actor in the cluster.

SECTION 1: DEVELOPMENTS

THEORETICAL AND METHODOLOGICAL FOUNDATIONS

Economic Intelligence is a complex concept and it is is the subject of multiple definitions. Due to the confusion on the word and concept of “intelligence” (i.e. the “intelligence and espionage[1]”

espionage[1]" in English, but "knowledge and expertise (know-how)" in Latin meaning like in French), [28]: "Sometimes equated with economic espionage, sometimes traditional methods of strategy information processing for the benefit of the few companies, (…)". However, most experts in France and Europe seem to agree on the definition of B. Carayon (2003). For this author, doing Economic Intelligence, is trying to master, i.e. seek and protect the critical information necessary to perform an economic activity in a business firm [28]. The key verbs of the Economic Intelligence are: inform, anticipate and defend interests.

One of the challenges of EI, as completed in "The Economic Intelligence: guide for beginners and practitioners - Programme of the European Commission", is "to transform the mass of data available in different forms, from many sources, which is often unorganised, and collected through several channels, into information, and then into knowledge and then into intelligence"[2].

Inherently, the EI process is (i) technological, (ii) strategic and (iii) interoperable:

(i) - EI is technological process because it requires the integration processes of monitor/watch and analyze open information or resources in ethical manner.
(ii) - EI is interoperable process because it requires the hardware and software resources of machines for computability on data logging, their backup, integrity and sharing with security. Prominently, we are talking about information systems, databases and data warehouses , web services to cloud computing.

[1] THE ETHICAL AND LEGAL FRAMEWORK FOR EI (pp.88-96) in Economic Intelligence: guide for beginners and practitioners. Programme of the European Commission. [visited URL in June 2012]: http://www.madrimasd.org/queesmadrimasd/socios_europeos/descripcionproyectos/documentos/cetisme-eti-guide-english.pdf

[2] Introducing Economic Intelligence (pp.14-21) in Economic Intelligence: guide for beginners and practitioners. Programme of the European Commission. [visited URL in June 2012]:
http://www.madrimasd.org/queesmadrimasd/socios_europeos/descripcionproyectos/documentos/cetisme-eti-guide-english.pdf

(ii) - EI is strategic process because its goal is to undertake actions in decision-making in response to to problem. The extent of actions suggests the exploration of possible choices for retaining only those strategic eliminating risk taking and promoting good tactic for saving, sustainability, protection and competitiveness in the organization. organization. Knowledge about the organizational environment is called in this exploration.

(iii) - EI is interoperable process because it requires the hardware and software resources of machines for computability on data logging, their backup, integrity and sharing with security. Prominently, we are talking about information systems (IS), databases (DB) and data warehouses (DW), web services (WS) to cloud computing (CC).

In the context of clarification process, we propose a set of steps in EI:

step	step and characteristics
1st.	*How to define the information needs?* EI in the process must begin with an analysis of information needs of decision-makers, employees and executives within the company.
2nd.	*How to collect "open" information?* we consider that information is valuable to the company published openly (Internet, professional databases and institutional networks).
3d.	*Do not ignore "informal" information:* It is possible to collect, in a legal and ethical framework, by working network (forums, interviews of contacts, professional networks, informal networks) and field (at conferences, trade shows and industry events) and by monitoring new sources of information potentially useful.
4th.	*Analyze and treat the information gathered.*
5th.	*How to disseminate information timely?* It comes to disseminate relevant information to the right person at the right

	time, and as the most appropriate. To do this, it is essential to build a pattern of information flow and create a culture of sharing within a company.
6th.	*Influence the environment:* Measuring the satisfaction of the recipients who will be responsible to undertake strategic actions for the company. The value-added information can also be used as a lever for action to promote its interests in a legal framework (lobbying, influential communication, etc.).
7th.	*Increasing the support of all:* Raising awareness of the information sharing and networking culture is essential for the company.

Each step can be decrypted in a process alone or combined with others. As examples, (i) the steps 2, 3 and 4 can be integrated in a complete one process to build the watch processing; (ii) the steps 1 and 5 can be integrated in the process of information management to build the strategy processing; etc.

Anticipating strategic failures is one of the most issues in EI studies. Market volatility, uncertainty over property and economic change in a crisis or in a re-organization for economic recovery are likely to announce future breaks. These breaks may be opportunities or threats in a changing world economics where the faculty of anticipation becomes a powerful strategic advantage for companies.

In 1970, I. Ansoff discussed the concept of WS in his first paper with the subject entitled “Managing Strategic Surprise by Response to Weak Signals” [1]. He considered the WS as corollary of organizational factors in the company, especially due to environmental turbulence compared to the formulation of corporate strategy. In following papers, he specified the nature of WS, by defining as “a warning (external or internal) events and developments that are still too incomplete to allow an accurate estimate of their impact and/or to determine a full adapted response” [2].

In Ansoff work, WS is a strong “proactive” value: to capture WS by the decision-maker via the channel of intuition (i.e. spontaneous knowledge linked to the environment) to cause a request for additional information (i.e. explicit formulations) on these signals.

Another contribution to the paradigm of WS was made by B. Coffman who worked on various aspects of it. For him, WS can be defined as [3]:

aspect	**characteristics**
1	*Idea?* an idea that affects the way trade and the environment in which we work;
2	*Surprise?* a novelty and surprise in terms of receiving the signal;
3	*Noise?* a noise and other signals, sometimes difficult to detect among noise and other signals;
4	*Opportunity?* an opportunity or a threat to the organization;
5	*Knowledge?* often made fun of by the "knowledge holders" or experts;
6	*Signal?* weak signal with a substantial period of time before it matures and becomes a strong signal;
7	*Learn?* therefore, this signal represents an opportunity to learn, grow and evolve.

For these reasons, decision-makers and researchers researchers found in the WS characteristics of “breaking” (ii) and “discontinuity” (i) in the

information flow and design that any company can engage in a strategic process.

In applicative context, to develop knowledge and exchange knowledge between different actors, we have to think about the catalysts for economic and technological improvement in the responsiveness of the company to face the challenges of tomorrow. Beyond the innovative aspect of this project, we can also note that ID is the projection of an important "Prospective Approach" in the Anglo-Saxon research world.

This point is reinforced by the comparison of the scientific literature on this topic. Since the 70s, research teams have specialized on the connections' study between the graphical representation of information and its interpretation. One of the representation techniques that tends to develop, is the "spatial" information across neural-networks.

Especially in France, this approach has been vulgarized at first and developed by the introduction of mind-maps (i.e. Mind Mapping) in education research. In recent years, this research focus has been applied to data mining from the Web (i.e. Web Mining and Semantic Web). That helps to develop new knowledge from large corpora (text themes). These techniques are increasingly interesting for leaders who have watch responsibility to detect topics that could have been missed in a linear reading. In the field of "Economic Intelligence" (EI) studies, the implicit properties on corpus analysis take on the name of "Weak Signals" (WS) (and respectively, the explicit properties are "strong signals").

The detection of WS allows the watcher in an organization to take better account of its environment in a dynamic sense and foresight (i.e. "prepare today for tomorrow"). However, the connection between ID and WS detection requires the development of complex processes in the context of a performance methodology. These processes represent the applicative topics in this keynote.

SECTION 2: APPLICATIONS

CASE STUDY IN FRONT PROJECT "CHRONISANTÉ"

The applicative context in EI research linked to knowledge management (KM) proposal was to build a KM approach based on noun phrase (NP) concepts and its semantic properties in analysis corpora from watch activities. The NP concepts and its semantic properties are:

(i) - Class relation: (NP$\in$ N) where N is the head noun of NP concepts and N is the constructor of this class;

Example (from ChroniSanté[3] Project) :

maladie = {une maladie, une maladie chronique, une maladie chronique sévère, la pénible maladie d'Alzheimer , etc.};

(ii) - Fitting relation: (NPmax $\supseteq$ NP1 $\supseteq$ … $\supseteq$ NPn) where NPi from levels i=1..n and from specific NPmax (i.e. more informative) to generic NPn (i.e. less informative);

Example (from ChroniSanté Project) :

(la maladie d'Alzheimer en France) $\supseteq$ (Alzheimer en France) $\supseteq$ (France) ;

(iii) - Tree relation: (NPg $\subseteq$ NPmax $\supseteq$ NPd) where NPg: the generic NP in left from NPmax and NPd: the generic NP in right from NPmax and NPg, NPd are disjoined.

Example (from ChroniSanté Project) :

(le protocole des soins en france) $\subseteq$ (le protocole des soins en france sur les maladies chroniques) $\supseteq$

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[3] the chronic diseases project or "ChroniSanté", is to develop the "strategic" health watch process in France. The working group on "chronic diseases management", is initiated by the High Council of Public Health (HCSP) with INIST-CNRS in France. The framework was to establish the "Information System for Decision Support" powered by a strategic watch process on the health resources

(le protocole des soins sur les maladies chroniques) ;

In the KM system implemented, a set of appropriate tools are developed like: NLP (i.e. “natural language processing”) analysis, morpho-syntactic Tree Parser, indexing process using NP filtering (i, ii and iii properties), IR (i.e. “information retrieval”) process based on NP concepts and semantic properties matching between queries and the content-database index, etc.

At first, the treated and discussed project throughout the case studies, is the application of ID process in industrial application on “chronic diseases” (or “ChroniSanté” project), in the Ministry of Public Health in France.

As observation for the analyzed corpora, it stands from NP terms to new NP terms in corpora. We notice the relations that exist between nodes that represent the semantic connections between terms as semantic NP properties.

Then, the usefulness of such “visual structure” document for the watcher, expert or decision-maker, demonstrates the ID process that organizes “data into valuable and meaningful information”. It allows presenting an interactive document likely to bring new knowledge. In such semantic logic, it allows to better understand the complex dimensions to take into account in watch or in EI processes [24].

The visualization of terms in corpora can be positioned relatively to the content logic in bibliographic references. The NP recognition is an important task of information extraction activity in the process of watch/monitoring and corpora analysis. It is to look in text objects (simple or complex NPs) placed in category classes such as personal names, names of organizations or businesses, place names, quantities, distances, values, dates, etc. In application, the graph makes it possible to show relations between NP concepts and document references (cf. FIG.1). In another way, we can see which resources concentrated more concepts and which one is potentially relevant.

FIG.1: CONNECTION BETWEEN NP CONCEPTS AND INFORMATION RESOURCES.

At second, processing on the information visualization, using the ID process, we tested the application with Gephi using Fruchterman-Rheingold algorithm [19]. The Fruchterman-Rheingold algorithm of multi-scale force can calculate the force between two nodes in the graph and mapping complex networks. By its use, there is much emerging nucleus surrounded of satellite subsystems that can be considered non-central themes to the main target. According to the information analysis needs, the watcher can focus attention on these satellites nodes to be considered as “latent warning signs”, themes to give them special consideration, i.e. WS in EI context (cf. Fig. 2).

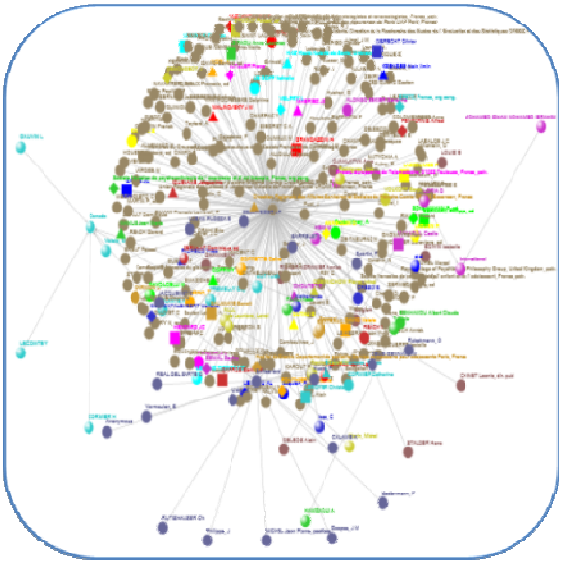

FIG.2: CENTRAL NUCLEUS AND SATELLITE CONNECTIONS IN WS PROCESSING.

Based on the analysis of the semantic networks, we observe that the center of the graph (or the central nucleus) consists of terms related to the decision-making analysis: the process completed at first time in the EI process.

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CASE STUDY IN CURRENT PROJECT “ NANOMETROLOGY CLUSTER”

The survey relied to nano- (science and technology) domain aimed to identify the reasons for the Membership in Nanometrology Cluster in France: the problematic question is how to project new collaborative structure-driven institutions by LNE and C'NANO, to better understand their information needs? and what they expected of such project?

The Nanometrology Cluster in France, (or “Club nanoMétrologie”), is the consortium of laboratories in nanoscience and nanotechnology in (NanoSciences France - C'Nano) and the National Laboratory of Metrology (LNE).

The survey methodology used to reach the most members and ensure to have a maximum responses, was to implement it under the open-source software LimeSurvey (www.limesurvey.org) as online survey to collect responses adherents with secure. We will focus for this case study on two main problems in open questions that have been automatic processing: (i) "What are the reasons for which the respondent has joined the Cluster? ", and (ii)" What specifically expected in such collaborative structure? ". One hundred respondents contributed to the survey responses and specifically to open questions.

The main results of this methodology stand on three levels:

(i) - to treat open-responses in nono survey dedicated to the identification of the “information needs of the members” and the reasons that pushed to “become member in the Nanometrology Cluster”. The answers hierarchization to these questions through hybrid process on NLP and statistics with NooJ platform, returns rather good results with little noise. The identification has been made relatively easily.

(ii) - in our approach, allowing us to obtain a projection at time T of the structuring nanoMetrology Cluster. For this, a network mapping was performed. The mapping projection allows firstly to identify the actors’ positioning in relation to the general theme of the cluster (or centrality notion) and secondly, to identify weak signals, ie. themes completely eccentric but which may prove decisive and determining in the evolution of the cluster.

(iii) – the network mapping is also designed in a logic of diagnosis [22]: it will compare the clusters on a time scale T+24 months and diagnose what themes are highest (number of creation links between actors, themes, etc. [8]) and those in which a specific effort must be made to improve their representation and thus tend to completeness.

General Conclusion

The progress in object studies linked to process applications and methodology is not without complexities. In this keynote the experiences show that the techniques used require high level of automation to achieve a state of performance, robustness and acceptable level in efficiency.

In our findings, we observe:

– For the “Information Design” [1] process defined as the “art and science to preparing information that it can be used by human with efficiency and effectiveness.” In the ID process, we valued our study areas by the aspects: “graph(s)”, “semantic network(s)”, “project(s)” and “connection(s)” to translate into clear, immediate and appropriate information for the end-user.

For us, the useful information is not the increase of information quantity, but contrary is the reduction of it by relevant information clusters to facilitate its reading and its appropriation [17]. As discussed and treated throughout this content explicitly, the application of ID process in industrial application: “chronic diseases” project (or “ChroniSanté”, in Ministry of Public Health in France) demonstrated the relevance through the observed results in this strategic context.

– For the “Watch” process, the information visualization extracted from the NP concepts (or Noun Phrase) is useful to actors in knowledge management project in many aspects:

First, information visualization facilitates the indexing of documents and contents to information system (IS), information retrieval (IR) system and for decision support application. As example, for bibliographic records to analyze and to extract NPs in the contents may be converted into tags. This solution allows any user of this content to present the key-concepts in the information database [17]. This may also encourage a new Logic of “reindexing by users”: the user-tags are automatically stored; the user will add his subjective, creative tags, and up to added-value information [20].

Second, the visualization of semantic networks (based on NP concepts and its semantic properties) enables the production of new knowledge. Viewed nodes in semantic networks can indeed be analyzed in a working group to identify new topics related to business intelligence as convergence and divergence of represented subjects (i.e. decision-maker needs).

Third, in watch, analysis and indexing processes, the visualization logic and the ID process can bring out the most potentially relevant references. On this point, it should refine results by statistical analysis as the use of bibliometric indicators [18] as TF-IDF (term frequency-inverse document frequency).

– For the “Economic Intelligence”, we see clearly that the usefulness of the ID and watch processes is to go beyond a simple and literal translation of IR indicators (i.e. the translation phase of a decision problem into IR problem). For complex and “multilingual” semantic search, we can take for example the conceptual differences between terms, like: “chronic disease” or “chronic disease management” and “management of chronic diseases”. Thus, we can show, by semantic visualizing of these concepts, the connections with the processed information (parsing, analysis and information needs in watch process). Also, we can establish multi-level intersections between “information”, “concepts” and common “morphemes” to get shared meanings.

In synthesis with analysis results, we demonstrate the meaning context between "natural language processing" (NLP) and knowledge organization (KO): (KO): the valuations observed by social re-indexing through new concepts. Open questions in nano survey have been the subject of a specific automatic processing, to observe: (i) "What are the reasons for which the respondent has joined the Cluster?", and (ii) "What specifically expected such in collaborative structure?". At the end of the processing and analysis of the survey that concerned a hundred respondents, recommendations for decision support have been

proposed for the harmonization of the activities, projects and actors combining skills.

These results highlight the need for Community Management (CM) activity: in this practice, the advantage should enhance proactive actors [9], [22] and their cohesion for the emergence of new offers in nano-projects: the combination of activities and skills.

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GUEST SPEAKER / CONFÉRENCIER INVITÉ

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