

## Weak Signals for Strategic Intelligence

# **Weak Signals for Strategic Intelligence**

*Anticipation Tool for Managers*

Humbert Lesca  
Nicolas Lesca



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## Introduction

Why take an interest in weak signals? Weak signals are a means of helping managers of businesses (or other organizations) anticipate, in order to make strategic decisions in the context of a turbulent environment that requires them to “see things coming early enough”. Numerous recent examples in the world of industry and finance, as well as in the public sector, have shown that this ambitious objective is more pressing than ever, given the characteristics of the economic, technological, social, and political environment. The central concept is that of a “weak signal”, the first *concrete example* of which is provided at the very beginning of this book.

How should we go about it? A concept is not sufficient *to act*; it is not operational. This book chiefly proposes actionable knowledge, that is, *a method and some tools* to search for, identify, and interpret weak signals. These were gradually constructed within the scientific context of CNRS and university research. They have been applied and validated in the field on numerous occasions.

NOTE.— The phrase “weak signal” has been retained for historical reasons; we are actually dealing with early warning signals, harbingers of changes that matter to the decision-maker.

### **I.1. Introductory example: a surprising encounter on the corner of an alley: Tata**

The following is narrated by A, a sales engineer employed by the German car manufacturer X, who is passing through Cuneo (Italy).

Cuneo is a city in Piedmont of which few foreigners have heard, including non-Piedmontese Italians. Still, this city and its province are rather wealthy: agriculture, viticulture/enology, many SMEs in various industries. It is certainly not seen as a “showcase” by Italians or foreigners. And yet...

### **I.1.1. Sales engineer A, on a July 2006 morning**

“Departing entirely from habit, I go through one of Cuneo’s side streets, in a rather remote district, to go and visit someone who has been hospitalized in that neighborhood’s hospital. As I am about to cross the street and enter the hospital, a shop sign catches my eye, a Tata sign.

Surprised, I cross the street again to have a closer look at it. It is a Tata car dealership. I cannot resist going in to look around. The premises are quite small, with three cars on show. The attendant looks at me and smiles politely.

I ask:

- “Have you been here for long?”
- “It’ll be a year in a few days.”

I go out of the shop and, finally, into the hospital opposite. My mind is quite intrigued.

I remember, as any European very well knows, that Fiat has been on the brink of economic disaster, arguably in a worse situation than its European peers/competitors.

On leaving the hospital, I deliberately pass through the Cuneo business park in search of a Fiat dealer. I go in and, after a short while, I ask the store manager whether he is aware of the Tata brand being present in the city:

- “Yes”, he replies.
- “That’s a new competitor for you, right?”
- “Yes, but we’re not overly worried. Tata is unknown to Italians. In fact, I doubt that shop will survive much longer, especially in that location!”

- “Didn’t the management at Fiat express any concern?”
- “No, neither concern nor anything else. They have other fish to fry.”

#### **I.1.2. Salesman C (from the German car manufacturer X), late August**

Having had a chat with A on a train during August, C declares: “I know someone in Turin who works for Fiat. I’ll ask him about Tata, with caution ... he holds a high-ranking position.”

A few days later, C telephones A: “I spoke to my pal in Turin. He was a bit embarrassed with my question, and then he said that Fiat was aware of Tata’s presence in Cuneo (Fiat’s foremost province) and that it was actually a good thing, which Fiat wished for. But he asked me not to talk about it, and he wouldn’t say any more.”

#### **I.1.3. Financial executive B (an employee of the German car manufacturer X), some four months later**

“I read in my daily paper that Fiat is doing better now, toward the end of 2006.

In an interview excerpt, Sergio Marchionne, the head of Fiat’s automobile arm, said in reply to a journalist’s query that Fiat favors a strategy of *ad hoc* alliances with businesses that are likely to share specific competences which Fiat lacks. He mentioned Ford by way of example.”

#### **I.1.4. Post scriptum**

*December 2006*

Fiat and Tata Motors announced in sequence a few months later, namely in December 2006, the setting up of their jointly owned subsidiary, which represents a 665 million euro investment (source: *Les Echos*, 12/15/2006, p. 18).

*August 2010*

Tata *Motors* discloses its wish to reinforce its alliance with Fiat in the field of trucks as well as automobiles (source: *La Stampa*, 08/13/2010, p. 25).

## I.2. Conclusion

Through this introductory example, we have pursued the following objectives, with regard to the reader:

- to arouse the reader's interest in this book;
- to offer an intuitive approach to the concepts of anticipative information and weak signal;
- to provide an example of what will hereinafter be referred to as “information originating from field people”.

# Chapter 1

## Concepts, Issues and Hypotheses

### **1.1. Introduction: governance and radar**

Let us begin with a metaphor, namely the radar, and its likeness, that is, the detection of weak signals by the enterprise.

Generally speaking, *governance* denotes the art of governing, whether it is a country, a company (*corporate governance*) or indeed a ship [LES 08a]. In the latter, the main instrument of governance happens to be the rudder. In the following, we shall be comparing the business to a ship in order to introduce the concept of a “weak signal” in the most illustrative way possible, as that concept constitutes the core of this book. Let it be noted that, in the remainder of the text, we will use the word “enterprise” in a very general sense. It will refer to all forms of organization, including industrial, commercial or service companies; government bodies (ministries, etc.); local authorities; public bodies (for example Family Allowances Funds), etc. [LES 02b]. The examples given originate from research projects performed by our team in those different types of organizations.

#### **1.1.1. *Steering the ship***

The principal objective assigned to the ship’s captain is to accomplish the mission assigned to him/her and to reach the destination safely. This has always been and still remains true. In order to fulfill that objective, the ship and its crew need a good captain. A good captain possesses human qualities

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and technical competences suitable to his/her role. Such human qualities include, among others, humility (the opposite of arrogance), the ability to scrutinize his/her environment, including but not limited to the sea, also to listen to crew members, to exercise curiosity, vigilance, and *scanning*, to demonstrate anticipation and responsiveness. However, the captain is not the only one involved in enabling the ship to accomplish its mission. So is the ship's owner. Is he/she prepared to ensure that the ship is in good condition and properly provided with suitable instruments? Let us now venture a metaphor and attempt an analogy with the enterprise.

### ***1.1.2. Corporate governance and strategic decision-making***

The word “governance” refers to a way of exercising and sharing power among various stakeholders, as well as defining its strategy. Strategy, in turn, designates the formulation of a policy for the enterprise (its objectives, structure, and operation), defined on the basis of its strengths and weaknesses, on the one hand, and taking into account the threats and opportunities identified in its environment, on the other hand. The term “governance” refers among other things to the process of designing the strategy and to the means utilized for governing: various instruments, decision rules, relevant information, supervision and monitoring, relationships and responsibilities established between the managers, the directors and the shareholders, where applicable.

The word “strategic”, applied to a decision regarding corporate governance, means that the decision has the following characteristics:

- it is made in a situation of uncertainty, of incomplete information, in a complex, variable/mutating environment (as opposed to “all things otherwise being equal”);
- it is not recurrent, therefore the decision-maker is relatively deprived;
- the decision-maker does not have experience-proven models (they cannot resort to “turnkey” mechanisms);
- it may have far-reaching (favorable or adverse) consequences that could jeopardize the survivability of the enterprise;
- it is systemic (many elements with many intra- and inter-organizational relationships);

- the environment is complex (great many elements and relationships);
- the environment is changeable, volatile, altered by discontinuous evolutions. It is turbulent in the sense specified by Emery and Trist: “the dynamic properties arising not simply from the interaction of identifiable component systems but from the field itself (the “ground”). We call these environments *turbulent fields*. The turbulence results from the complexity and multiplicity of the causal interconnections...” [EME 65, p. 19];
- lastly, the *choice of the time* when the decision is made, and more importantly implemented, may have a decisive influence on the success [SCO 73].

EXAMPLE.– “In 2001, the entry of the first competitor onto the local market came as a surprise, especially as our company was experiencing quality and stock-out problems. That was the perfect time for the competitor to penetrate the market. We hadn’t seen it coming...” The manager of an SME in Tunis.

Examples of strategic decisions:

- selecting a new supplier (non-recurrent decision) is of strategic importance for an industrial enterprise, whereas placing an order (a recurrent decision) is not of strategic importance. The selection of a new supplier is therefore a strategic decision;
- in the military domain, the choice of a new combat aircraft (for example the Rafale plane) is a strategic decision for a government. It is a huge commitment for the country concerned, in terms of costs, competences, and technology transfer, and that commitment is long-lasting (30 years or more).

EXAMPLE.– An *anomaly*... on the platinum market. For a number of years, the world price of platinum has ceaselessly and considerably increased. This metal is currently indispensable for fuel cells in, among others, electric cars. China is the world’s largest buyer, and thus drives up the price. Meanwhile, in September 2010 a headline in the French newspaper *Les Echos* read: “Anomalies on the platinum market [...] the latter remains very far from its historical highs of March 2008 [...].”

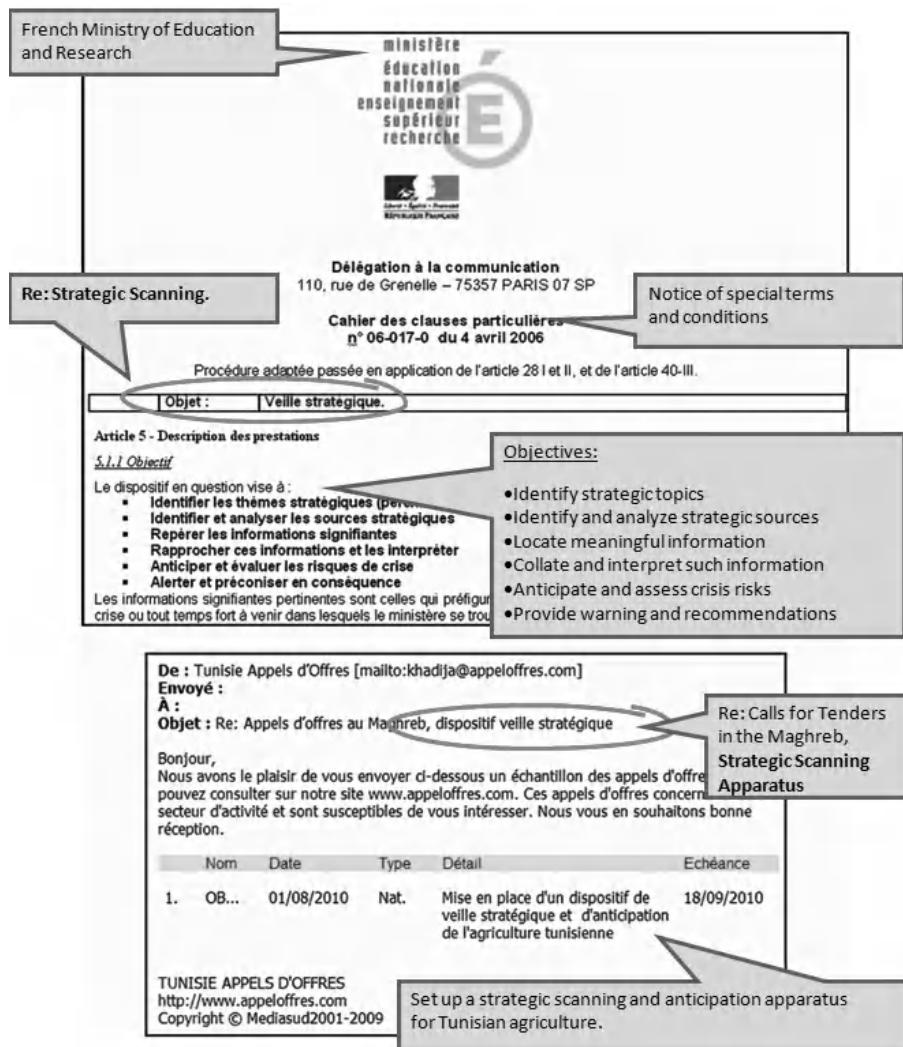
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*A warning.* Could this anomaly be interpreted as constituting a warning? Might some Chinese automobile manufacturers have found a substitute to platinum? Could the manufacturer BYD be one of them?

The strategic decision-making process is a long chain of steps, each of which requires information about the environment and its evolution. This chain is called *environmental scanning*. “*Environmental scanning* is the monitoring, evaluating, and disseminating of information to key managers within the organization” [AGU 67, p. 1]. “It is an important aspect of strategic management because it serves as” [KUM 01, p. 1] “the first step in the ongoing chain of perceptions and actions leading to an organization’s adaptation to its environment” [HAM 81, p. 299]. In this book, we shall use the phrase “anticipative strategic scanning”.

Governance implies that we know which way to go. In this book, the “pole star” will mainly be sustainable competitiveness or, more specifically, *sustainable competitiveness capability*, at least where the enterprise in the usual sense of the word (or an economic sector, for instance the agri-food industry or the like) is concerned. “An enterprise demonstrates future-oriented sustainable competitiveness capability when it is capable of keeping its status, durably and deliberately, in its competitive, evolving market of choice, while achieving a profit ratio at least equal to the ratio required for its businesses to adapt and survive” [LES 82, p. 13; LES 89, p. 12]. The competitiveness to which we are referring here is therefore a question of mindset, forward-looking approach, motivation, true will, watchfulness, and scanning. However we will also present examples relating to ministries, wherein the objective is different, for example the ability to make decisions at the right time and in the interest of the country.

In all cases, “scanning” means the ability to scrutinize the environment and pay attention to the signals that are picked up, which may constitute early warnings. An *early warning* denotes either formal information (provided as text, by an electronic sensor or otherwise), or sensory information (visual, auditory observation, etc.) which is sensed by a human and leads us to think that a potential, relevant and significant “event” may occur within such a time horizon that there is still time for action.



**Figure 1.1. Examples of calls for tenders for setting up an anticipative strategic scanning apparatus**

This is termed “warning-mode” scanning [LES 03b]. In other words, a sustainable competitiveness capability is not compatible with confessions such as: “We didn’t see it coming!”, especially from business leaders or boards of directors, or from managers in the economic sector. Consider the following examples.

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EXAMPLE 1.– “Stock markets seem to be generating tornadoes much more often than would be expected from observing *past movements* [...] The markets appear to generate more of those sudden stock hurricanes, at least much more frequently than the observation of past movements would suggest. Investors and managers will therefore have to learn to live with the ‘Deans’, the ‘Katrinas’ and the like, that sweep the financial world and generate volatility in various asset classes” (source: *Les Echos*, 08/23/2007, p. 23).

EXAMPLE 2.– “Crisis communication from the establishments concerned has been focused on irrational disturbances in the market and on the liquidity crisis. It has not dwelt on the responsibility of managers who invested in the asset class in question and *did not see anything coming despite the forewarning signs*” (source: *Les Echos*, 09/10/2007, p. 38).

### **1.1.3. *The ship’s radar (radio detection and ranging)***

In order to be able to accomplish its mission, *adapt to ocean conditions* at all times, and arrive safe and sound, any ship nowadays has a tool that serves the captain (and therefore the ship’s governance): the radar (typically several of them). Conning the ship takes into account, on a continuous basis, the signals supplied by the radar and the interpretation thereof. We might say that the governance of the ship relies, at least for a large part, on a tool provided by the ship’s owner and on the human technical skills available on board. Thus, at any point in time, competent people watch the sea and remain alert. That was not the case for the Titanic, which was not equipped with radar. And we all know what became of the Titanic, a brand new ship! Back to our metaphor, we now propose to look at enterprises. Do they possess a tool that could be likened to radar?

### **1.1.4. *The organization’s “radar”, a tool for its governability***

Countless authors, in whichever language, have compared the business leader to a ship’s captain, the ship being, in this metaphor, an organization and the crew being that organization’s staff. Such a metaphor was suggested by Aguilar as early as 1967. Why not take the comparison a little further and derive some new, simple but fruitful, avenues of thought?

Thus, regarding businesses, a number of English-language authors explicitly use the word “radar”. These include, for example, Narchal: “Business Environment Scanning (BES) System consists of a set of radars to monitor the important events in the environment which may create opportunities or threats for the organization. [...] A good BES system will receive the weak signals and generate early warnings for the organization by developing a set of scenarios indicating the effects of these events on the organization” [NAR 87, p. 97].

An organization’s radar is, in fact, the instrument that allows it to observe its environment, perform constant scanning, pick up signals that may serve as an early warning to the business’s leaders and provide them with the necessary elements for decision making. Under such conditions, managers can make the decisions warranted by the situation, and make them early enough to avoid potential catastrophe. In other words, organizational radar, referred to above as a *BES*, and below as an *Executive Information System*, is the instrument of vigilance.

Vigilance is another component of corporate governance when it is oriented toward the organization’s sustainable competitiveness. “Vigilance refers to:

- being alertly watchful for the detection of weak signals and discontinuities about emerging strategic threats and opportunities in the organizational environment and [TUS 86];
- initiating further probing based on such detection” [WAL 92, p. 47].

In each of these citations, note the phrase “weak signals”, which we shall consider in more detail throughout this book. Additionally, let us recall that H. Simon (1978 Nobel Prize in Economics) denoted by “intelligence” (*intelligence gathering = search environment for condition calling for decision*) the first stage in his decision-making model. We will see the link that unites the concepts of intelligence and weak signals. We will also see why the adjective “weak” is used and which human skills, as well as methods and tools, are useful in picking up and interpreting a “weak” signal.

To conclude this stage, the reader might ask him/herself the following questions:

- 1) can it be asserted that any organization possesses a scanning apparatus, which might be likened to radar, to assist its decision making?

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2) is the organization aware of the need to have, among its staff, men and women who are capable of detecting then interpreting the signals collected by suitable anticipative intelligence means?

If the answers are negative, let us then think about the Titanic and its fate.

### **1.2. The organization's environment and its governance through a "storm"**

Let us briefly revisit the ship radar metaphor to introduce the topic of the organization's environment and its scrutiny. We shall recount, in the final section, the table from Daft and Weick [DAF 84] presented hereafter, in which the characteristics of the environment are set along the ordinate axis while the characteristics of the scrutiny carried out by the enterprise are set along the abscissa axis (*organizational intrusiveness, scanning characteristics*), enabling the reader to locate the domain covered by this book.

#### **1.2.1. *The ship, the ocean, and any danger to be faced***

In order to succeed in its mission and arrive safely, the ship must constantly exercise vigilance and ceaselessly scrutinize its environment, that is the surface of the ocean, but also the latter's depth if necessary, as well as the skies.

What surprises might the ocean's surface have in store? A number of cases may be cited by way of illustration.

It may be an enemy boat or an aggressor ship, for example off Somalia. It might also be a floating object liable to strike the ship and cause serious damage, for example a ship wreck, a "lost" floating mine. It could also be a barely emerging reef, unmarked on nautical charts, or moving sandbanks. Not to mention possible icebergs, as was the case for the Titanic. It might also be thick fog patches that negate all vision. All this can be compounded by the approach of a possible storm, etc. There is therefore a large number and variety of reasons to exercise extreme vigilance and be constantly on the lookout. By analogy, can the same be said of an enterprise?

### ***1.2.2. The enterprise, its environment, uncertainty, hazards, and opportunities***

The enterprise is not a ship, but it, too, has a mission: to be competitive and survive in conditions that are sometimes very difficult. While the organization's environment is not the ocean, it may be simple or complex, static or dynamic, so that most of the hazards and risks discussed above may be retained by way of analogy. We define the word risk as follows: it denotes the possibility of occurrence of an event that is uncertain or has an undefined time horizon, does not depend exclusively on the will of a person, and is contrary to their expectations or interests. The risk may be accepted, when the person acts in spite of their awareness of that possibility.

The terms generally used to denote the threats that are likely to originate from the organization's environment include: *competition, technological rupture, country-specific national regulations, lack of visibility, volatility, instability, turbulence* [EME 65], *uncertainty, discontinuity* [LES 03a], *fracture, government overthrow, change of majority...* the list does not stop there.

EXAMPLE.— “Our strategy is aimed at becoming, in due course, a major integrated provider of solar power, from the purification of silicon to the installation of panels,” says Philippe Boisseau, director of the gas and renewable energies division. However, in order to reach that objective, Total is obviously banking on developing a *rupture technology* (source: *Les Echos*, 06/10/2010, p. 19).

Let us briefly go over some of those points again, to try and grade the difficulties they raise. We shall limit ourselves to a few examples.

#### ***1.2.2.1. Examples of causes of hazard***

##### **1.2.2.1.1. Competitors**

As the word competition is more of a statistical term that designates an anonymous and fuzzy phenomenon, we will refer instead to identifiable competitors. These may be current or potential competitors. There is little point in dwelling for long on the fact that every competitor is likely to constitute a hazard to the enterprise. The attention paid to those should be active and deliberate. But the question becomes less trivial when the following remarks are taken into account:

– The potential threat from a competitor should not be confused with the size of that competitor. During our interventions in businesses, we have often heard this: “We don’t have to worry about our competitors, as we are the leaders on the worldwide market. They are the ones who should be worrying about us!” The companies where this objection was leveled at us include IBM during the 1980s, for example. Yet many fearsome competitors did emerge and take significant market share from IBM. They also include Pechiney, the world-class French flagship in aluminum. Not many years later, that group no longer existed, having been merged into Alcan, a foreign group. And what of the UBS bank in the years 2007-2010? The list could go on and on. Arrogance in governance can be a deadly flaw. Warning signals may come from where we have put our blinkers on, hence the importance of the *peripheral vision* concept [DAY 06].

– A “current competitor” should not be confused with a “potential competitor.” The latter appear suddenly. For example, in China, the BYD company, a manufacturer of electrical batteries, suddenly burst into the car manufacturer market. In other cases, an SME could rapidly become an inconvenient competitor, to say the least, if it possesses a rupture technology in a given domain, albeit a familiar one for a large corporation. Alternatively, a major corporation may quickly leap forward by acquiring an SME that holds a specific innovation or know-how.

EXAMPLE 1.– Essilor, world leader in ophthalmic lenses, will invest 130 million dollars in the purchase of a 50% share in the Israeli group, Shamir Optical, that specializes in innovative technologies applied to corrective lenses (source: *Le Monde*, 10/16/2010, p. 16).

EXAMPLE 2.– Suez Environnement has just announced it was setting up a scheme to identify promising techniques emerging from its activities. The idea is to assist the development of start-up companies thus identified, on the basis of exclusivity agreements or preferential marketing [...] This goes to show what a key scanning instrument this represents (source: *Les Echos*, 12/1/2010, p. 25).

Let us be content with the above, regarding the hazard brought about by current or potential “competition”. Signals that may be indicative of danger could come from unexpected places... because nothing was done to watch for them. The enterprise is then like a ship without a radar, akin to the Titanic.

#### 1.2.2.1.2. Instability, volatility, turbulence

The instability and volatility of pointers in the environment are other factors that make its continuous scrutiny necessary. Such events lend themselves to an analogy with a storm that an ocean-going ship has to weather. We need to take into account, not only change and its complexity, but also the faster or slower *rate* at which it occurs. In one extreme situation, authors speak of turbulence [EME 65]. But whatever the degree of uncertainty in its environment, the organization's *ability to remain maneuverable* is a necessary condition for survival.

At the end of the day, corporate governance might want to acknowledge the validity of St. Matthew's advice when he recommended: "Watch therefore, for you know neither the day nor the hour" Matthew 25:13.

#### 1.2.2.1.3. Lack of visibility

By analogy with fog on the sea, the enterprise can suffer from a lack of visibility, meaning the ability of the enterprise to see its environment, which is often a global one nowadays. Such a lack of visibility may have various origins:

- lack of a sufficient *spatially extensive* visibility: again, an analogy can be drawn with warships that are equipped with several radars, some with a short range, but which is more precise, and others which are less precise but with a longer range; the same holds for a car whose headlights would use low beam where long-range, high beam should be used. As for the enterprise, the reason for the lack of visibility lies in the recklessness, unawareness, or incompetence of the management in charge of governance;

- lack of visibility due to the *discontinuity* of the space to be scrutinized. The organization was used to looking conventionally in one direction. However, things have changed since then in the economic and social environments (among others) and the organization of scanning has not evolved accordingly. The reason for this lies in the drowsiness of the organization's management. Governance has fallen asleep. For example, the enterprise stays on top of the technologies it currently uses, but a technological *rupture* could mean that the enterprise is watching the wrong space;

- we would like to detect early warning signals of a threat (or opportunity), but no one knows where to focus attention [DAV 00, DAV 01]

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or what to monitor. This case is more difficult than the previous ones. It requires a more detailed method and a proactive organization.

Observing the behavior of business leaders has shown that such behaviors can be distributed into two groups, based on the more or less acute concern for visibility that is evidenced:

- the leader seeks, first and foremost, to know his/her environment, identify its specificities, the players within it, etc. Then, based on the findings, they construct a strategy that seems likely to lead to success. For this, knowledge of the terrain is crucial. The approach is oriented from the environment towards the strategy;
- the leader defines a strategy *a priori*, according to his/her wishes and ambitions, then strives to implement it. The approach is then oriented from the strategy towards the environment.

### 1.2.2.2. *From the environment to the strategy*

The leader(s) pay attention to the environment of their enterprise, seeking to anticipate change and potential hazards. They want to discover as soon as possible the advent of potential situations that may offer opportunities or, on the contrary, pose threats to their enterprise. Moreover, they wish to be the first (or among the very first) to make that discovery to gain an advantage from it. The leader requests immediate notification of any signal that might trigger a “warning”. The strategy will therefore be designed on the basis of detected signals and may be redirected when it is both necessary and possible. The emphasis is on responsiveness. The leader is unable to describe in a precise and detailed manner the information that might be discovered. They require their scanning department, or what functions as such, to remain constantly alert and to inform them immediately. The leader is a *requestor* of weak signals, which he/she will undertake to interpret with his/her aides. But this is not the only possible case.

### 1.2.2.3. *From strategy to the environment*

This new case is the opposite of the previous case. In this instance, the leader or leaders design a strategy from scratch, *a priori*, and *plan* it. Only then do they consider environmental conditions. Environmental specificities are taken into account when the strategy is applied, taking into consideration strategic limitations. It is at this time that the leader requests information about the environment. They place an “order” with their scanning

department, or what functions as such. The leader is in a position to describe his/her needs precisely. They do not want any other information than that requested. Information that confirms the merits of maintaining the set strategy will be favored. The leader is *averse* to weak signals that might challenge his/her views.

EXAMPLE.— J.-M. Messier forced onto his group his choice of a communication-oriented strategy. A few years later (2009/2010) he admitted to failing and causing very substantial damage to his shareholders. He explained he had been “too far ahead” of the environment. This admission was made in the course of the lawsuits to which he was subjected by his former shareholders. Late in 2010, those lawsuits against him are still far from being over.

### **1.2.3. Scrutinizing and interpreting the environment**

Daft and Weick [DAF 84] proposed a distinction between four cases concerning the scrutiny and interpretation of an organization’s environment. Those four cases are depicted in Figure 1.2. One of them pertains specifically to this book. The reader may take some time to check that he/she is already able to “guess” which case that is.

Our answer is as follows:

- with regard to the vertical axis, the characteristics we have presented above, in relation to the organization’s environment, allow us to locate the scope of this book at the *unanalyzable* level in the top part of the table;
- with regard to the horizontal axis, *Organizational Intrusiveness*: our domain lies in the right-hand-side column. Given what we wrote about corporate governance, the argument developed in this book, regarding the use of weak signals from the environment, can only relate to an enterprise whose governance is purposefully proactive.

In summary, this book concerns those enterprises that demonstrate a sense of purpose and proactivity, and whose environment has characteristics that preclude the use of many tools, among them economic forecasting, which are commonly, but incorrectly, used.

A lack of proactivity in governance can exist in unexpected places. Here is an example concerning Toyota.

EXAMPLE.— “Undesirable accelerations have been reported for a long time on a number of Toyota vehicles in the United States. However, the group did not appreciate the extent of the problem [...].

		Relationship Between Interpretation Modes and Organizational Processes	
		Passive	Active
Assumptions about environment	Unanalyzable	<b>Undirected Viewing</b> <i>Scanning Characteristics:</i> 1. Data sources: external, personal. 2. Acquisition: no scanning department, irregular contacts and reports, casual information. <i>Interpretation Process:</i> 1. Much equivocality reduction. 2. Few rules, many cycles. <i>Strategy and decision making:</i> 1. Strategy: reactor. 2. Decision process: coalition building.	<b>Enacting</b> <i>Scanning Characteristics:</i> 1. Data sources: external, personal. 2. Acquisition: no department, irregular reports and feedback from environment, selective information. <i>Interpretation Process:</i> 1. Some equivocality reduction. 2. Moderate rules and cycles. <i>Strategy and decision making:</i> 1. Strategy: prospector. 2. Decision process: incremental trial and error.
	Analyzable	<b>Conditioned Viewing</b> <i>Scanning Characteristics:</i> 1. Data sources: internal, impersonal. 2. Acquisition: no department, although regular record keeping and information systems, routine information. <i>Interpretation process:</i> 1. Little equivocality reduction. 2. Many rules, few cycles. <i>Strategy and decision making:</i> 1. Strategy: defender. 2. Decision process: programmed problemistic search.	<b>Discovering</b> <i>Scanning Characteristics:</i> 1. Data sources: internal, impersonal. 2. Acquisition: separate departments, special studies and reports, extensive information. <i>Interpretation process:</i> 1. Little equivocality reduction. 2. Many rules, moderate cycles. <i>Strategy and decision making:</i> 1. Strategy: analyzer. 2. Decision process: systems analysis, computation.

**Figure 1.2.** Relationships between the characteristics of the environment and the modes of scanning performed by the enterprise (excerpt from [DAF 84])

Toyota seems to have realized only a few days ago the extent of the problems that affect it. It is as though they had neglected a whole series of signals that have lit up over the past few years, foretelling the enormous bug that now affects it across all continents.

“Toyota has known that those vehicles were experiencing a problem with undesirable accelerations since May 2003, when the first customers requested that the NHTSA [Editor’s note: the American road safety authority] investigate the problem,” according to the Safety Research &

Strategies Consultancy. "These concerns seem to have been downplayed by the carmaker [...].

[At Toyota,] nobody seems to have considered back then that the matter *might be much more far-reaching*" (source: *Les Echos*, 02/05/2010, p. 26).

Finally, it is therefore the *enacting* quadrant, at the top right, that best delineates the subject matter of this book.

### **1.3. Anticipation (act of looking forward)**

Anticipation, as defined in this book, is about microeconomics. It considers *individual* agents, or *singular* events and facts, which may represent a risk to a given agent.

#### **1.3.1. *Anticipating: definition and examples***

Anticipating, in the present context, means that:

- we know that a number of things may happen, even though we are unable to designate precisely what will happen: we therefore have to be on alert;
- we must be aware that several alternative situations may arise, rather than a single one, although it is not possible to draw up a comprehensive list of such situations;
- we have to be in a position to pick up the forewarning signals of a threat (or of a good opportunity), in order to get ready to act very quickly and at the right time;
- we must create the conditions or circumstances that will enable rapid action at the right time (responsiveness).

This was not the case at Alcatel in the following example.

EXAMPLE.– President Tchuruk had stated: "As a result of late decision-making regarding color screens, Alcatel lost market share in portable telephones" (source: *Les Echos*, 10/31/2003, p. 20).

EXAMPLE.– Conversely, the following case involving Suez is a better example to follow:

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– In 2004 the management of Suez was pondering the risk, incurred by the group, of a possible takeover bid from another company.

– A list of potential aggressors was drawn up.

– For each of those potential aggressors, research was carried out to assess their ability to launch a takeover bid sizable enough to be a concern for Suez.

– The list of potential aggressors was ranked from the most redoubtable to the least.

– Suitable decisions were made by Suez to protect itself in anticipation.

– Arrangements were made to capture any sign that might lead to the belief that one of the potential aggressors was possibly preparing a takeover bid.

– By the end of 2004, Suez had done all it could to shield itself from a hostile bid.

Anticipation goes through three stages:

– *stage 1*: the first stage of anticipation consists of being aware that a plurality of situations need to be considered, one of which is liable to occur, within a varying time horizon;

– *stage 2*: the second stage can be stated in two ways:

- to put ourselves into such conditions that, should any of the situations previously listed arise, at least one way out would be possible;

- to avoid putting ourselves into such conditions or circumstances that, should any of the situations previously listed arise, we would be *trapped* without any possible way out;

– *stage 3*: being on the lookout, listening for any signal that might suggest that we are headed for one or the other of the situations or circumstances listed above, or even an entirely different, unlisted situation that might prove problematic or, on the contrary, very favorable (threat or opportunity). This kind of precursor signal is usually referred to as a “weak signal” following a suggestion made by I. Ansoff [ANS 75].

EXAMPLE.– Interview with Barry Sternlicht, Chairman and CEO of Starwood Capital, owner of the second-largest luxury hotel group in France, which includes among others the hotel Martinez in Cannes (France).

QUESTION.– How did you end up acquiring Groupe Taittinger?

B. Sternlicht: “We were in search of opportunities in France, a very difficult market to penetrate. First we heard rumors about a possible divestiture of the group by the Taittinger family. As soon as we obtained confirmation of that, we decided to put all our resources into the operation. It was not a foregone conclusion. At the beginning of the process [...] there was little information about the group in our ‘Data Room’. Moreover, everything was in French, and we only had one expert who spoke that language! Then we sought to make contact with the management of the group [...] We eventually prevailed because we were able to select our targets better than other competitors did” (source: *Les Echos*, 07/27/2005, p. 20).

#### 1.3.1.1. *Summing up*

With regard to anticipation, an enterprise can find itself in one of the following cases:

- no anticipative scanning at all;
- passive anticipative scanning;
- proactive anticipative scanning.

The reader may ask himself/herself in which of these cases their enterprise (or institution) is. This book is about proactive, anticipative strategic scanning.

#### 1.3.2. *Do not confuse anticipation with forecasting*

Economic forecasting, as referred to in this book, pertains to *macroeconomics*. Generally speaking, it considers a *collection of numerous* agents, events, or facts that are understood through quantitative data, *statistics* and charts. For example, forecasters produce forecasts about financial markets. However, a market is not an individual who can be identified and whose actions may be of interest to us [LES 08a].

## Market days

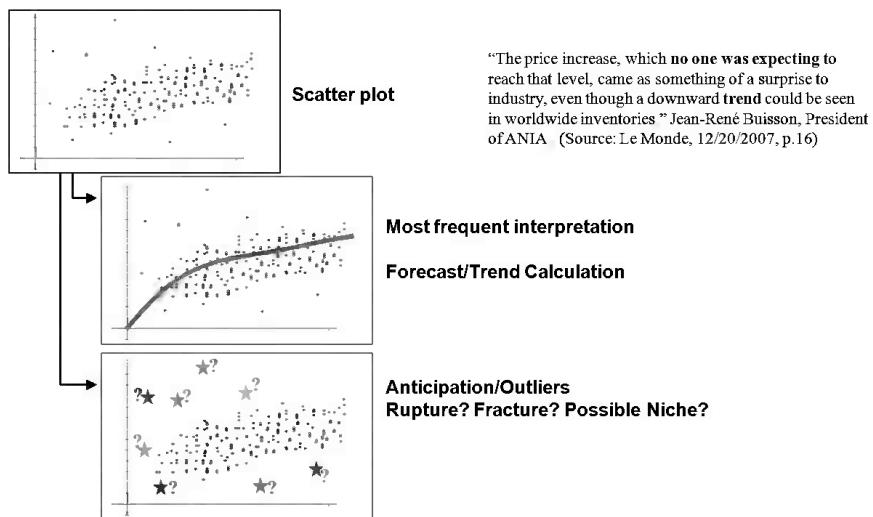
It was crucial to "reassure the markets". The whole weekend was spent at their bedside, with herbal tea and sweet talk, trying to soothe them. These are fragile, feverish beings, driven to distraction by the slightest alarm. They fall, lose their footing, dive, plummet... A real heartbreak.  
Markets are greedy. It took several hundred billion euros to persuade them to stop acting the goat. "We cannot afford to disappoint the markets", declared the Swedish Finance Minister.

Markets are volatile, even fickle. But they are not inclined to sentimentalize. Little do they care about the Common Market, now known as the European Union. Their only concern is to line their pockets. And if, in the bargain, you try to thwart their speculation, you're in for a shock! Markets are demanding: they would trample their own mother to make a few millions. As soon as they open for trading, they are prone to mood swings, and quite able to turn this bazaar into a hectic souk.  
By the way, who are the markets?

(after an opinion column by Robert Sole)

**Figure 1.3.** "Who are" the markets? (source: *Le Monde*, 05/11/2010, p. 28)

Let us look at Figure 1.4. Usually, a forecast is based on quantitative data. This is collected over a previous period, for example one or two years. When plotted on the graph, the data generates a scatter diagram. On the basis of this scatter diagram, the equation of a curve is computed and the curve is plotted. This expresses *continuity*. Such a curve represents the evolution that took place over the previous period. By extrapolating the curve over a year, or further than that, it is possible to represent the *forecast* of the phenomenon being studied.



**Figure 1.4.** Trend versus outliers

EXAMPLE.– According to the FIEV (Federation of vehicle equipment industries), the cumulative turnover of equipment manufacturers had risen by 4% in 2004. It was still stable during the first half of 2005, and the FIEV *was then expecting a prolongation of that trend* (4% increase) throughout the whole of 2005. However, the second half of 2005 saw an abrupt trend reversal, which the FIEV had not anticipated (source: *Les Echos*, 04/28/2006, p. 15).

Statisticians are careful to discard points that lie too far out at the periphery of the scatter diagram. They call them “spurious points” or “atypical data”: they do not take them into account, because those points are too marginal.

From the viewpoint of anticipation, as discussed in this book, it is precisely those outlying points that capture our attention, rather than the curve. It is the outliers that are likely to constitute *weak signals*. The interpretation of outliers can highlight anticipative warnings, surprises, inflexions, ruptures, fractures, *discontinuities* [LES 03a], etc. This is illustrated below by the example of the BYD company.

EXAMPLE.– BYD was initially, in China, a manufacturer of electrical batteries. These go into various pieces of equipment, including cars. In 2007, BYD suddenly bursts into the automotive sector as a carmaker. Surprise: until then, BYD had never built cars. They are a totally unexpected new entrant. Thereafter, events – and successes for BYD – follow one another at incredible speed.

Figure 1.4 makes it possible to visualize the difference between forecasting and anticipation. The key to the figure explains that anticipation and forecasting have different objectives. They can, however, complement each other. In some cases, forecasting on its own can lead to the management being blinded, when they are unaware that their enterprise is being “governed/driven by looking into the rear-view mirror”. This is illustrated by the following example, among others.

EXAMPLE.– “Long neglected by the majors, the production of non-conventional gas has been multiplied by four in the United States since 1990, thanks to the efforts of independent producers. This increase turned the forecasts of the oil and gas industry upside down [...].

Why did the majors *not anticipate* this revolution, while they were investing billions of dollars into gas production in Qatar in the early 2000s? [...] Non-conventional gas reservoirs have long been known to the industry [...] The ramping-up of conventional gas has been gradual. Why did the majors *not react* faster to the build-up of non-conventional gas? [...] Why such *myopia*? [...] The development of non-conventional gas reservoirs by independent producers has relied on a *radically different culture* from that of the majors [...] The decision-making process of independent producers is faster and mobilizes less capital [...] The major oil corporations were *not able*, either, to *anticipate* the potential for improvement in the *technologies employed* by independent producers, even though those methods had long been known to the whole industry [...] This came as a total *surprise for the majors* [...] The majors' experts and consultants were also *unable* to *anticipate* the phenomenon [...] The revolution in non-conventional gas was led by a few hundred very flexible independent operators [...] This *lack of visibility* on the part of the majors prevented them from waking up to this phenomenon" (source: *Les Echos*, 07/08/2010, p. 12).

If we revert to the “enterprise = ship” metaphor, we may say that the captain, before leaving port, plots on his nautical chart the route he is about to follow, taking into account the data available to him at that initial time. In other words, he plans the route he will follow, on principle. Then, as soon as the time comes to get underway, he starts keeping watch, using radar, for events that might influence the realization of his forecasts and require him to make rapid decisions (signs of a possible storm, presence of another vessel in distress, risk of a terrorist attack, etc.). In other words, he puts himself in a position to anticipate any potential threat before it is too late. The Titanic, however, had no radar, the ship followed the initially planned route... and sank.

The word “forecast” is widely used in large corporations, administrations and local/regional authorities: it is probable that the managers of those organizations are *confusing two things*.

EXAMPLE.— A regional authority may be concerned with maintaining economic activity in its territory. To that end, it may produce forecasts (projections from the past) to infer what urban development works it should conduct and what procedures it should initiate. However, it may at the same time be unaware that serious trouble is dawning on the horizon, for example:

- the general management of a particular company located on the territory is preparing to close down its facility within three years; or
- the capital of another enterprise may be taken over by a foreign pension fund, which aims for short-term speculation and will sell off the company in bits and pieces at the earliest opportunity, etc.

As it happens, such possible future events can often be anticipated, not by relying on “forecasts = projections of the past” but by focusing attention on searching for and interpreting “weak” signals.

### ***1.3.3. Anticipation and scenario-based prospective: possible complementarity***

In order to clarify the future, some organizations use a scenario-based method (*Scenario Planning*) [GOD 06]. What are the relationships and differences between this and the method of anticipation using weak signals, as presented in this book? For brevity’s sake, let us note that these two methods differ sharply, but may fruitfully complement each other. This complementarity was well evidenced by Carvalho [CAR 10b]. More specifically, that author shows how and why weak signals, when they are first picked up (“warning-mode” scanning) by the enterprise, can form the basis for the construction of scenarios.

The author goes on to show how and why scenarios, once constructed, can be used to direct the search for new weak signals and facilitate the interpretation thereof. He builds upon experiments that he conducted at two companies in Portugal.

If the enterprise is accustomed to using the scenario-based method, experience suggests that it should be easy for it to accept using the weak signals method. The latter does not cause particular upheaval in the enterprise, except for some behavioral changes. The reverse is more problematic, as the scenario-based method is relatively burdensome and time-consuming to implement; whereas managers increasingly monitor short-term warning indicator panels, requiring rapid responses. Furthermore, the scenario-based method generates substantial costs.

	<b>ANTICIPATION</b>	<b>FORECASTING</b>
<b>Concept</b>	<b>Microeconomic</b>	<b>Macroeconomic</b>
Goal	Detect the possibility of an odd, non-recurring event – a “surprise” – before it is too late	Highlight a confirmed trend
Time Horizon	A few weeks to a few months	A few months to a few years
Basic Elements	Qualitative information Few weak signals	Quantitative information Statistical figures from past periods Data in large amounts
Method	Induction Interpretation of weak signals	Software-assisted extrapolation Construction of mathematical curves Bulk processing
Objective	Involves an individual/targeted being: a specific agent (or several) within the environment (client X, competitor Y) or a defined phenomenon (for example: fuel cells, CO <sub>2</sub> , photovoltaic power)	Involves a collective being, a statistical entity (for example: demand, market, competition, the automotive industry, etc.)
Theoretical Foundation	Interpretative/heuristic rationality	Dogmatic/algorithmsic rationality
Implicit Assumption	Assumes instability, change, uncertainty, discontinuity	Assumes stability and continuity, which enable predictability

**Table 1.1.** Anticipation versus forecasting

### 1.3.4. Anticipating odd events, discontinuities, anomalies, etc.

In the remainder of the text, we shall use the phrase “anticipative strategic scanning”. This phrase means that we are interested in the search for, and interpretation of, anticipative information. The idea is to anticipate, as much as

possible, odd, non-recurring events that might have serious consequences on an enterprise. Such information can therefore be crucial for strategic decision making.

#### **1.4. Anticipative information: two types**

##### **1.4.1. Definition**

An item of information is said to be anticipative if its interpretation leads us to think that an event may occur within a time horizon that is relevant to the interpreter. Such an event should be likely to have significant impact. In short, anticipative information makes it possible to “see in advance” a potential danger (or a potentially good business opportunity). In corporate governance, strategic decisions are most often based on anticipative information, while day-to-day managing decisions hardly employ any anticipative information: they are of a very “mechanistic” nature, which is why they can easily be computerized.

An item of information is regarded as anticipative on completion of an interpretation process, to which we will return later (see section 1.5.2). Such a process can be *triggered* by a weak signal. However, anticipation will not be triggered without it. A weak signal is therefore a *necessary condition* for anticipation, but not a sufficient condition.

##### **1.4.2. Difference between strategic information and day-to-day management information**

This example was submitted to the manager of a Brazilian shoe-manufacturing company. The column in the middle of the table regards information about day-to-day operations (accounting, purchases management, sales management, etc.). The latter are highly repetitive and relate to a very near time horizon (for example a week or a month); any error will be quickly located and its consequences corrected. The column on the right regards information that is not very repetitive and relates to a much more distant time horizon; if an error is committed, it will only be discovered much later and its consequences could be serious. The reader is invited to indicate, for each information item in the left-hand column, whether that information relates more to day-to-day management or to strategic management.

Proposed information items	Day-to-day management information?	Anticipative information?
1. Inventory replenishment from usual supplier.	X	
2. Considering creation of a new shoe design.	?	?
3. Possible new competitor from China.		X
4. Replacing a machine in our shop.	X	
5. Keeping abreast of new machine models for the production of shoes.		X

**Table 1.2.** Day-to-day management or anticipative information?

### 1.4.3. Two types of anticipative information

There are two types of anticipative information: “weak signal”-type information, which may trigger a warning, and information of the “capability information” type [LES 03b].

#### 1.4.3.1. Capability information

This informs about the capabilities, strengths and weaknesses of operators that are within the organization’s environment and relevant to it. For example, an operator is relevant because it can modify the environment. Depending on its interpretation, capability information informs us about the *ability to act* of a relevant operator in the environment.

EXAMPLE.—

- Capability information regarding the operator Bonduelle.
- Net profit up 31% in 2006-2007.
- Successful acquisition of Carrière, a Canadian company. This represents an opening toward the United States (East Coast) (source: *Les Echos*, 10/10/2007, p. 21).

Capability information is relatively *stable* in time; it changes rather slowly. Capability information has a *static* character. Indeed, just because an operator possesses a certain potential doesn't mean they will necessarily use it in the short term. In other words, capability information tells us nothing about the imminence of an event generated by that operator. It informs us of the possibility of such an event.

Capability information is rather easy to access from formalized, often official sources (for example company registration filings, patent offices, etc.).

#### 1.4.3.2. *Information that may trigger a warning*

These constitute a second type of anticipative information, and include *weak signals*, which lie at the heart of this book. We shall discuss them hereafter, but let us state at once that they are highly *dynamic* and *furtive*, i.e. harder to obtain.

### 1.5. Weak signals

The search for weak signals is made difficult by the fact that we do not know, *a priori*, what to look for, at least not precisely. Consider the following testimony.

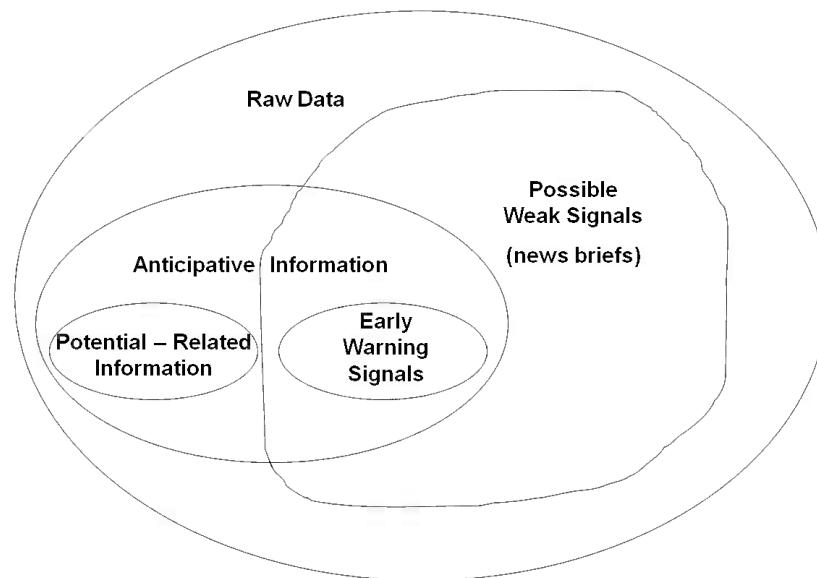
TESTIMONY.—“Regarding research in optical lenses, there may be university laboratories, somewhere in the world, whose *work in progress* might be of interest to us. How could we detect that?” (Essilor).

The ambition of this book is to equip the reader with concepts accompanied with knowledge “for doing things”, referred to by Argyris as *actionable knowledge* [ARG 96, BER 94], in order to put them into practice. This is a delicate undertaking, as the phrase “weak signal”, suggested by I. Ansoff [ANS 75], was not actually defined by that author. Moreover, there is no known working method that answers the question “How can a weak signal be identified and interpreted?” Meanwhile, it is now widely recognized, in academic as well as managerial circles, that weak signals bear information that is sometimes of the utmost importance in a variety of domains, including strategic management. We shall therefore start by providing a definition, and subsequently provide some necessary specifics to exploit this concept.

### 1.5.1. Definition of a weak signal

A “weak signal” is a decision-support “tool”. It occurs as an ordinary-looking “data” item, albeit one whose interpretation could *trigger a warning*. Such a warning indicates that an event could occur that may have considerable consequences (in terms of opportunity or threat). Upon interpretation, the signal becomes characterized not as weak, but as an early warning signal [LES 01]. Figure 1.5 illustrates the categorization among concepts: data, information, weak signal, etc.

The relevance of a possible weak signal is not immediately obvious. In addition, a signal is often embedded in a multitude of raw data that “generate noise” and result in a form of myopia sometimes referred to as “technological myopia” [WYM 85]. This is especially true when dealing with digital data, among others [EDM 00]. Depending on the interpretation of it, a weak signal can provide, within a pertinent time horizon, a glimpse of a strategic surprise, which we define a little further on, of a discontinuity [LES 03a, AND 90] in the environment, of a radical change (for example a technological change), a fracture, etc. It has a possibly anticipative character, provided it is interpreted properly.



**Figure 1.5. Categorization of information**

EXAMPLES.— *Verified* weak signals, therefore called early warning signals:

- Mrs Ch. Bénard is appointed as Purchasing Manager of the Valeo group [LES 01];
- researchers at the University of Saint Louis (Missouri) have developed a battery that runs on sugar, has a lifetime that is 4 to 10 times longer than that of a conventional lithium battery, and only gives off water.

We will come across similar examples in Chapter 2. Further explanations will then be provided.

Igor Ansoff suggested the phrase “weak signal” inspired by *radar*, following a visit to a Philips facility in The Netherlands [ANS 75].

A strategic surprise [ANS 79b] is an event which:

- Arrives unannounced, which means that it is filtered out [SCO 73] by the ESOs environmental scanning activity until after the impact is felt by the ESO.
- Is not only sudden but novel (which is one of the reasons why the filters exclude it).
- Implies a major impact on the performance of the ESO.
- Develops rapidly, leaving little time for trial, error and experimentation.

Ansoff coined the term “weak signal” in the field of strategic management. It was more of a metaphor to him. He subsequently qualified it, writing that a weak signal is “*a development about which only partial information is available at the moment when response must be launched, if it is to be completed before the development impacts on the firm*” [ANS 90, p. 490]. Yet this was too imprecise to be operational.

### **1.5.2. An example of weak signal as the trigger to a warning**

The following example is meant to embody the foregoing statements in a concrete way.

Let us imagine a business manager in his office. A subordinate has forwarded him a data item, a very short text, which she regards as

interesting. The manager, who happens to be in a good mood, actually bothers to read the text. He engages in a thought process, the stages of which are depicted in Figure 1.6.

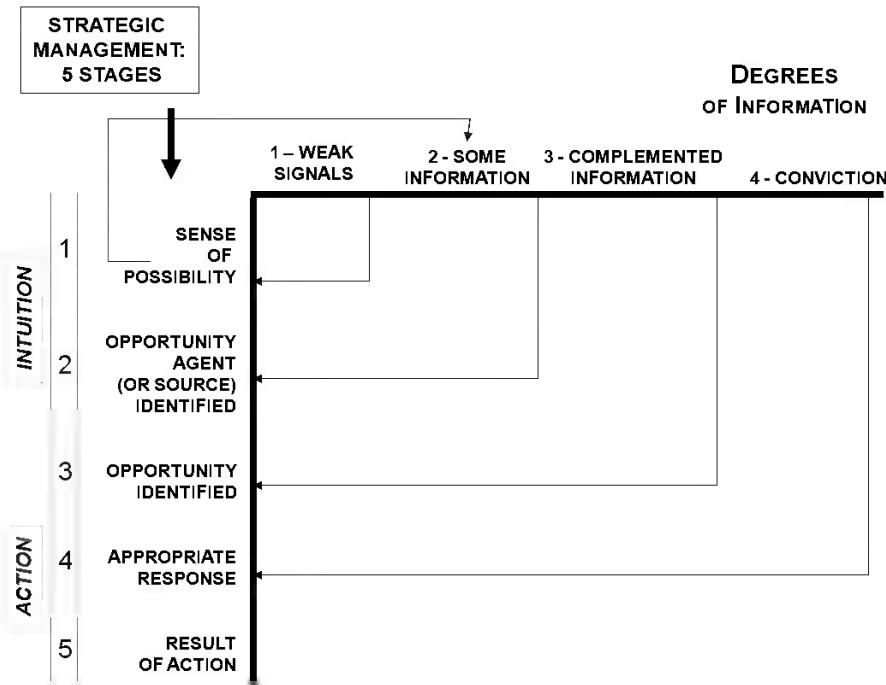


Figure 1.6. From a weak signal to action

### Stage 1

On reading the data item, the manager gets the feeling that an event might be about to start in his company's environment, or that something is beginning, involving a current customer, or a company that may be a client; or a competitor; in a technological field that matters to him; or else in the domain of possible decisions by public authorities, etc. That feeling, akin to intuition, is caused by small bits and pieces, weak signals. These weak signals act as a trigger; they alert the manager.

### Stage 2

The manager then seeks to learn a little more. He obtains some additional information. Reviewing that information encourages him to heighten his

attention. He may want to know “who is behind” the phenomenon that intrigues him, which operator instigated it. He is thus led to discover the cause of the phenomenon, as well as the nature of that phenomenon: does it come as a surprise to him? Can he glimpse a radical change in his environment? Does he scent a potentially good opportunity? etc. He tries to link this weak signal to other elements, other knowledge that he retrieves from his memory [CON 02]. Thus, he constructs a kind of “mental puzzle”. The weak signal therefore takes on more and more meaning.

#### *Stage 3*

If he deems it useful, the manager will obtain further additional information. This time, his information is as comprehensive as possible and more reliable. The manager is then able to discern whether he is faced with a good opportunity or a threat to his environment.

#### *Stage 4*

His mind is now made up. He makes a decision, which he thinks is the adequate response to the situation.

#### *Stage 5*

Later on, he will know what result his decision and action have had, and he will also know whether or not he demonstrated “flair” from the outset... thanks to his subordinate.

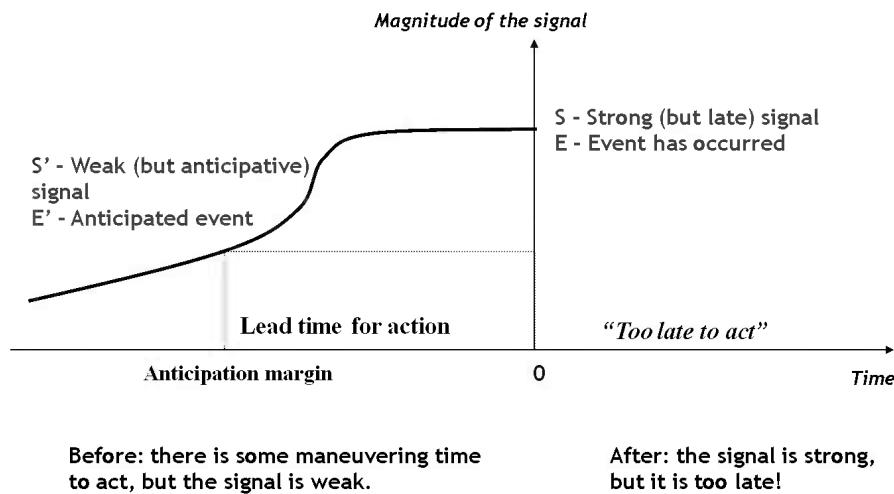
We wish to emphasize a specificity of weak signals: because a weak signal is first and foremost a *warning trigger*, it does not need to be immediately assessed, corroborated, complete, or even “quantified”. We are outside the framework of day-to-day management (see section 1.4.2). What matters here is speed, responsiveness, agility. It is the warning that matters, corroboration only happens afterwards.

### **1.5.3. Should we prefer a “strong” but backward-looking signal, or a “weak” but forward-looking signal?**

It is not easy to make a business leader understand that a “signal” can be simultaneously weak (in its appearance) and strong by its importance for strategic decision making (see section 1.1.2). Many have a *preference for* what they call “*strong signals*”: “Sir, I do not manage my company based on

weak signals: I, sir, want strong signals!” They are averse to weak signals. Perhaps it is a question of fear in the face of uncertainty, or maybe simply in the face of information whose *reliability is not yet certain*.

In order to help explain and visualize the inverse relationship between the “small size” (weakness) of the signal and the “large size” of the signal’s significance, we offer Figure 1.7.



**Figure 1.7.** Inverse relationship between anticipation margin and signal magnitude

#### 1.5.3.1. Commentary

Being on the right-hand side of Figure 1.7 means that the event of interest is happening; it may even be complete. Signals indicative of this are strong signals, but it is too late. Conversely, being on the left-hand side of the figure means that the event of interest has not happened yet; it may even not have started yet. Any signals that could be picked up in this regard are very modest/weak, but they are precious in forewarning us. The signals are weak, but they are anticipative.

Figure 1.7 above therefore illustrates two successive moments in the life of an event. If Figure 1.7 is used to complement the interpretation of Figure 1.6, it may be said that:

- when the assistant (in the example of Figure 1.6) forwards the data (a very short text) to his/her manager, we are in a situation that corresponds to the region on the left of Figure 1.7. The manager has time to maneuver if necessary;
- the same is true of the examples provided by the box in section 1.5.1 (“Bénard” and “University of Saint Louis”). There is room for maneuvering;
- when an engineer, back from a mission outside the office, reports to his/her manager: “I’ve noticed a planning permission sign bearing the name of the subsidiary of a competitor”, they are probably in the left part of Figure 1.7. Their field-gathered information may not have great significance, but it may, nonetheless, lead to thinking that this competitor is preparing something significant for the future and is, therefore, possibly dangerous.

As for the demand for “definite information and nothing else!”, Clausewitz stigmatized this preference for definite information, writing: “[...] for whereas all manuals teach us that we should only trust definite information, and never let go of a general mistrust, that is purely bookish advice, belonging to that sort of wisdom in which, for want of something better, scribbling authors of systems and manuals seek refuge” [CLA 55, p. 107].

The left part of the figure lies much further *upstream* in time. The factory does not yet exist (it may never even exist). However, a weak signal was picked up implying that the competitor might build a factory. Perhaps this data item is a rumor, a sentence overheard at a trade show, a sentence read in a modest daily paper local to the place where the factory construction site might appear, a demonstration of preventive opposition from the local inhabitants, etc. Such a data item is a weak signal in the sense that it could be regarded as not very serious, not very solid: it is of *minimal size*, but it is *anticipative*. This signal, as it is, already provides a strong warning. There remains to corroborate it as soon as possible.

The general preference, on a manager’s part, for strong signals or for weak signals, should depend on the type of decision to be made: preference for reliable information in day-to-day management, tolerance for weakness when it comes to strategic warning. However, we have found that preference is largely directed to strong signals, while a weak signal generates aversion instead. This preference for a strong signal is an example of cognitive bias

[LES 00c, BLA 03b] producing an adverse effect. We will return to cognitive biases later.

#### 1.5.3.2. Ignored strong signals

Sometimes business leaders do not perceive even strong signals. Here are two examples, one relating to the *subprime* affair, the other relating to Toyota.

Regarding *subprime*, the crisis led to losses totaling hundreds of billions of dollars. A few examples of strong signals that were either not perceived or ignored are listed below, going back in time.

EXAMPLE.— As far as the French are concerned, the subprime crisis broke out on August 8, 2007, when BNP announced a freeze on several of its investment funds. *That was a strong signal*. Yet other signals existed long before. “However, indicators of risk as perceived by the markets were abnormally low *before the onset of the crisis*, with historically low volatility on stocks and very low credit spreads”, recollects Roland Lescure, Director at Groupama AM (source: *Les Echos*, 09/10/2007, p. 38).

- New Century Financial filed for bankruptcy on 04/02/2007 (second largest subprime lender).

- According to the newspaper *Le Monde*, BNP Paribas sent out, on the intranet of its business department, an internal memo dated 03/27/2007, warning that: “A drop in performance has occurred, and it will take several months to make good on this gap [...] After the month of March, both funds will resume similar performance to their managing index” (source: *Le Monde*, 09/28/2007, p. 33).

- A note from the AMF (French financial markets authority), dated April 2007, advises of liquidity problems on some assets backed by *subprime*: such problems allegedly appeared as early as February-March 2007 (source: *Le Monde*, 09/19/2007, p. 12).

- “The beginnings of this crisis can be traced back to the disclosure by HSBC of its difficulties in the United States in February 2007” (source: *Les Echos*, 08/17/2007, p. 24).

- “At Crédit Agricole, we foresaw, from the very beginning of the year 2007, that something was about to happen. In February (2007) we stopped

our activity on CDOs, and decided to be very cautious on LBOs.” Interview with René Carron, President of Crédit Agricole SA (source: *Les Echos*, 10/01/2007, p. 13).

– “Since late 2006, there have been a number of signs foretelling the crisis. Still, agencies took some time to react,” notes an expert at the Directorate for the interior market in Brussels (source: *Les Echos*, 08/09/2007, p. 22).

– “Nicolas Weill states that Moody’s had pointed out credit risks by November 2006” (source: *Les Echos*, 08/09/2007, p. 22).

– As early as February 2006, Quilvest & Associés was worrying about the acceleration of the mortgage bubble.

Either none of these signals were seen or they were all (deliberately?) ignored.

Regarding Toyota, it is surprising that the management of this group turned a blind eye when the first signals, which were strong and definite, reached them about the problems raised by their automobiles. The signals, while getting stronger and stronger, were repeated several times. And the eventual consequences resulted in enormous financial losses for Toyota, along with a degradation of the group’s image.

EXAMPLE 1.– “More than 8 million vehicles worldwide have been recalled by Toyota for problems linked to the throttle pedal [...] This defect caused 275 accidents and 18 deaths since 1999 in the United States [...] 2.3 million vehicles recalled [...] The incident comes as a warning signal for the carmaker [...]” (source: *Le Monde*, 01/30/2010, p. 13).

EXAMPLE 2.– In an editorial dated Saturday, January 30, 2010, the daily paper *ASAHI* judged that “the way the manufacturer managed the recall issue reveals worrisome *signs* of self-satisfaction and complacency [...]” (source: *Le Monde*, 02/25/2010, p. 01).

#### **1.5.4. Conversion, transformation of a weak signal into an early warning signal**

A weak signal, *a priori*, does not tell much. It is its interpretation that makes it possible to lend meaning to the weak signal and transform it into an

early warning signal. This transformation is a process of *amplification* of the weak signal [LES 01, BLA 03b, LES 06, LES 07c]. The transformation is carried out by means of interpretations of the weak signal and sense-making. The transformation/amplification process involves holistic reasoning, heuristics, interactions among several people, searches for complementary information (including so-called “adjacent” information, which we shall introduce later in Chapter 4), but also some imagination. The next chapters in this book will offer methods and examples for transforming a weak signal into an early warning signal. For example, we shall see in Chapter 2 how to go about recognizing the anticipative nature of a weak signal.

The result of that transformation consists of plausible yet supported hypotheses. These throw some light on the future within a foreseeable horizon. They are indispensable to a manager who wishes to govern his/her enterprise in a “*forward-looking*” way, without waiting to be faced with accomplished facts. Examples will be presented in Chapter 2 of this book.

QUESTION.– Who, in an organization, should need to be “fed” weak signals?

### **1.5.5. Should we refer to a “signal” or a “sign”? Intentionality of the sender**

The difference lies in the information sender’s (or source’s) intention.

The term “signal” can imply a deliberate transmission of information by its sender: said sender intentionally transmits a signal. Actually, in most cases, it is not what the sender wishes to inform us of that is of interest to us, as it could be a decoy or even a lie. Thus, information collected on the Internet may have been deliberately planted on the network by its sender. Is that sender trustworthy? There are numerous examples, in recent years, where misleading or even deliberately untruthful information was transmitted, even when the sender was a manager of a large industrial or financial corporation.

EXAMPLE 1.– “The AMF (financial markets authority) has accused EADS of publishing false or misleading information”. Moreover, the AMF blames EADS and its finance director, Hans Peter Ring, for not disclosing quickly enough the difficulties in manufacturing the A380 aircraft (source: *Le Monde*, 04/02/2008, p. 13).

EXAMPLE 2.– The former finance director of Altran Technologies (Alain Rougagnou) has been arrested and is under investigation for “disseminating false information [...] accessory to the falsification of the company’s accounts” (source: *Les Echos*, 06/23/2004, p. 18).

EXAMPLE 3.– BAE holds a 20% shareholding in EADS’s capital. This shareholding is valued at 3.5 billion euros in EADS’s annual report. In April 2006, BAE wished to sell its shares to EADS. However, BAE then learned that its shareholding was worth only 2.75 billion euros, according to an appraisal by the Rothschild bank (that is, nearly 1 billion less than the amount posted in EADS’s balance sheet). “This difference prompts the thought that the bank uncovered more serious problems than the mere delays in the manufacture of the A380 announced by Airbus.” On 07/05/2006, BAE requested an audit of Airbus (source: *Les Echos*, 07/06/2008, p. 18).

Conversely, what we are interested in is not necessarily deliberately disclosed by a sender. We may also take an interest in involuntary, unintentional transmissions and manifestations. In that case, we say that we are picking up *signs*. The sender’s intentionality leads us to discuss the case of decoys and misrepresentations on the part of the information source [LES 11].

#### **1.5.6. Weak signals... or decoys, deceptions, and information asymmetry**

When a signal is intentionally emitted by its sender, the issue of the latter’s intention arises. For example, the signals could be emitted with a malevolent intention towards the environment. The goal is to mislead the receivers targeted by the sender. In that case, such signals are referred to as decoys, lies, deceptions, etc. These signals are emitted with the aim of taking advantage of the information asymmetry at the expense of certain agents in the environment. Instances of misleading information being disseminated have become quite numerous since 2008-2010.

Systematic use of the Internet facilitates the spread of misleading information. Fighting untruthful information is one of the activities of *competitive intelligence*. This topic is not discussed in this book. The interested reader may peruse the book by Nicolas Lesca and Marie-Laurence Caron-Fasan [LES 06]. On the other hand, the issue of the reliability of

captured weak signals, and how to corroborate them, will appear several times in this book.

### **1.5.7. Characteristics of a weak signal: “stealthy information”**

We distinguish between two families of characteristics, namely useful characteristics and regrettable characteristics.

#### *1.5.7.1. Useful characteristics*

Once selected, a weak signal should, to be useful, possess the following characteristics. It should be:

- anticipative;
- relevant to a manager’s concern or, more generally, in relation to the scanning target [LES 00a].

#### *1.5.7.2. Regrettable characteristics*

These are more numerous and can be grouped under the term “stealthiness”. The main regrettable characteristics are presented in Table 1.3.

<b>Reason for “weakness”</b>	<b>Justification for the word “weak”</b>	<b>Difference with day-to-day management information</b>
Fragmentary	The situation is one of incomplete information. Only a fragment of information is available, from which we may venture inductions in a holistic-type approach, for example.	Day-to-day management information is comprehensive
Drowning in an ocean of raw data	Dispersed within a multitude of useless, raw data that “generate noise”, the weak signal risks going unnoticed. The vast majority of people overlook this information.	Clear and distinct

**Table 1.3. Main regrettable characteristics of weak signals**

Unclear meaning, equivocal	A weak signal does not speak for itself. Its signification is often unclear and ambiguous. Some authors use the term “equivocal” <sup>1</sup> [WAG 97].	Expressed in a language “codified” within the organization
Odd, fortuitous, unexpected	The unusual character of a weak signal makes it more difficult to detect. Its appearance is unexpected.	Repetitive, familiar
Without apparent usefulness, useless, unnecessary	No obvious/apparent link with a current concern. The same weak signal may engage a first person and appear to lack obvious interest for their business associates. Its usefulness is not plain to see; the consequences of the “signaled” event are not self-evident. The “value of this information” is not obvious at first glance. <sup>2</sup>	Indispensable to perform a task or solve a (usually recurring) problem
Not very visible, difficult to notice	A weak signal easily goes unnoticed: it is stealthy, fleeting. The detection of a weak signal not only consists of searching for information, but also requires learning [CHO 01] and an ability to discriminate.	Solicited by its user

**Table 1.3 (continued).** Main regrettable characteristics of weak signals

---

1. “Equivocality means ambiguity, the existence of multiple and conflicting interpretations about an organizational situation. Equivocality leads to the exchange of existing views among managers to define problems and resolve conflicts through the enactment of a shared interpretation that can direct future activities. Equivocality is a measure of the organization’s ignorance of whether a variable exists in the space. Uncertainty is a measure of the organization’s ignorance of whether a value for a variable exists in the space” [DAF 87].

2. “The value of information implies its effectiveness and usefulness. Information conveyed to a receiver should induce the desired conduct. Usefulness implies a relationship to a purpose or a goal, and the value of information is determined by the changes caused through the use of information in pursuit of purpose. The value of information is measured by comparing the outcome of the actions of the decision maker before and after receipt of the information” [BED 66].

Isolated, singular	We do not know what the weak signal should be related to, in which “mental category” or folder to file it; far from present concerns.	Part of a comprehensive ordered dossier
Dubious (lack of confidence)	The source and trustworthiness of the weak signal are immediately questioned	Verified (on principle)
Random, unforeseeable	A weak signal does not appear when we wishes for it. To a sensor, a weak signal appears in a random fashion. The source, or the sender of the signal, is entirely independent from the sensor. Moreover, two (or more) weak signals regarding a common subject do not necessarily arrive in a logical or chronological order <sup>3</sup> .	Element in a workflow where tasks are coordinated
Subjective	A weak signal deemed interesting by one person, may seem devoid of interest to others.	Governed by objective procedures
Qualitative	Most often qualitative.	Quantitative most of the time
Format	The most diverse forms: writing, drawing, photographs, smell, touch, sound, taste, etc. Unspoken, silence, etc.	Writing, increasingly often digital
Needs to be sought in an environment prone to discontinuities	It is very difficult to construct algorithms enabling the automatic detection of weak signals.	

**Table 1.3 (continued).** Main regrettable characteristics of weak signals

Taking into account these “regrettable” characteristics, we suggest replacing the term “weak signal” with the term “*stealthy information*”. This new wording would have the advantage of being more evocative and less confusing to business leaders. A survey would need to be conducted to test this hypothesis, in relation to various institutions and a panel of businesses.

---

3. “Information tends to come to the executive in bits and pieces arranged not logically but in chronological sequence depending on the timing of his contacts with various sources” [AGU 67].

It may even be the case that a weak signal lies in *a silence* or in *unspoken-words*. The transformation then consists of eliciting the early warning starting from silence. The following is an intentionally caricatured example.

EXAMPLE.— The Dupuy de Lôme is a very new and highly specialized French warship. Let us imagine that it is of interest to a foreign organization or to an agent whom we shall call X.

Let us also imagine that X is a keen reader of the official weekly *Cols Bleus*, which provides, in a totally open manner, details in its section, “Current missions of the Navy – Ships’ position”.

Let us imagine, additionally, that the Dupuy de Lôme is sometimes mentioned and sometimes not mentioned, whereas all other units are regularly mentioned.

X is thus presented with unspoken information (unwritten, in this instance).

This void, this silence, is in itself a possible “weak signal”, so weak it does not exist, apparently at least.

Yet it does exist, by its absence: the fact of not mentioning this ship is a possible foretelling signal for those who know how to uncover it. All that remains then is for our agent X to seek, by other means, the location of the ship Dupuy de Lôme somewhere on the planet... This location, in conjunction with *Cols Bleus*’ official silence and also some other information items, will enable X to construct a “puzzle” that might lead him to discover many things. That is, provided X is willing and able to monitor weak signals.

EXAMPLE.— As evidence of misconduct, the American legal liquidator (Irving Picard) notes the insistence with which Mr. Madoff requested that “his name never appear in any disclosure document”. Mr. Picard judges that “by granting this request for secrecy, UBS intentionally ignored a *warning signal*”, adding that he (Irving Picard) had to fight a constant battle to obtain information from UBS (source: *Le Monde* 20/11/2010, p. 18).

As the reader can see, the characteristics of a weak signal are, *a priori*, very far from the qualities that authors “require” from *competitive intelligence* information, qualities which we reiterate below.

Quality of competitive intelligence information: accuracy, completeness, currency/freshness, importance, relevance, reliability, timeliness, understandability, usefulness [TEO 01, p. 75].

This difference is probably owing to the fact that these authors confuse “anticipative information” with “day-to-day management information” (see section 1.4.2) or that they are uncertainty-averse.

The characteristics mentioned above entail many practical consequences, which should be taken on board by any enterprise wishing to enrich its governance with a weak signal-oriented apparatus. The following are a few examples:

– the approach of listening to the outside environment should be continuous, not discontinuous. Wakefulness should be constant. A weak signal does not appear on demand;

– a newly captured weak signal should be collated very quickly to other *information* that is “*adjacent*” by its contents, so as to perform cross-checks, build a kind of “puzzle” in order to increase its reliability, etc.;

– the interpretation of a weak signal should be done collectively, by several people able to consider the signal from various angles, under various lights, based on their knowledge and experience.

The following chapters in this book will provide examples, methods and feedback from experience, which will be useful in meeting the requirements discussed above.

#### **1.5.8. Sources emitting weak signals: examples**

Anticipative weak signals have several sources (or possible senders): documentary sources (databases, publications, Internet, etc.) and “field” sources.

#### 1.5.8.1. *Field sources*

##### *Definition*

The phrase “field information” denotes information whose source is a person working on the ground. He/she picks up an item of information, for example a fortuitous observation made during a trip to an outside location. Such information is usually of sensory origin: a visual observation, an overheard sentence, an odd smell, etc. The information sensor is therefore one (or several at a time) of the five senses of the person doing the sensing.

Examples of people who are “field sensors”: salespeople, buyers, technicians, researchers when they take part in scientific conferences, managers by virtue of their contacts, etc.

An item of “field information” is dependent on the perception or notice of a person [STA 88]. We use the word “gatekeeper” to designate the person who perceives, notices and becomes aware of such sensations. Field information is usually captured in real-time, and it is brief, which greatly contributes to its *value*. The following are a few meaningful testimonies.

EXAMPLE 1.– “The incoming data indicate that the economy continued to expand at a moderate pace into the summer, despite the sharp correction in the housing sector. However, in light of recent financial developments, economic data bearing on past months or quarters may be less useful than usual for our forecasts of economic activity and inflation, stated the Chairman of the Federal Reserve (Fed), Ben Bernanke. The Fed will be paying particularly close attention to real-time information. It will focus more on *information gathered from its business and banking contacts* around the country” (source: *Les Echos*, 09/05/2007, p. 30).

TESTIMONY 1.– “In our company, we don’t write. In order to write, you need to think, and that takes too long. We talk a lot, on the telephone for example. It’s easier, you don’t have to think: we are not wordsmiths. If you ask somebody to write, they’ll frown... and they won’t do it... We have a predominantly oral tradition.”

TESTIMONY 2.– “Could we not switch directly from oral to digital without going through the writing stage?”

Lastly, information originating from field people comes in vastly smaller amounts than digital information, and each item is typically much shorter, capable of being reduced to a few key lines.

TESTIMONY 3.– “In terms of field-generated information that is escalated up to us from our staff members, about 1,600 sheets (*watch notes*) have been accumulated in three years, after being validated” (Essilor).

#### 1.5.8.2. *Digital sources*

##### *Definition*

Digital sources are those that can be accessed through a computer, most often via the Internet. For example: the enterprise’s own databases, information banks outside the enterprise, websites, etc.

Initially, there was a radical difference between so-called “informal” field information and digital data, which are by definition “formal.” However, this difference tends to fade away gradually under the influence of relational practices linked to the Web 2.0 or social Web phenomenon. These technologies supply digital data resulting from spontaneous human exchanges within forums, blogs or social networks; yet these are also *field* data. Indeed, they can provide customer opinions, consumer sentiment, or even staff experiences, etc. These data can be *very numerous* and *very voluminous*, whereas field-generated information, in the traditional sense of the word, are *brief and rather numerous*.

#### 1.5.8.3. *Weak signals provoked by the receiver himself*

##### *Definition*

These are signals, the transmission of which by the sender is triggered by the gatekeeper himself. The gatekeeper takes the initiative in triggering the transmission of the signal he is about to receive. Without that initiative, the provoked signals would not have existed.

The gatekeeper *draws the attention* of an external agent onto something; he/she induces, in the external agent, a desire to make contact with them and express a request for a complement about something that the gatekeeper will have made known. For example: the elicitation of information can be carried out by means of a suitably built website. In her thesis, Janissek-Muniz [JAN 04] used the metaphorical phrase “fly-catcher.”

EXAMPLE.– An SME specializing in the design and sale of software installs on its website a sizable portion of a software product it will thereafter seek to sell. Let us say it is offering a software module to visitors on its site. The visitors may use the software module free of charge. The SME hopes that the visitor/user will thus demonstrate some interest and indicate what additional features would meet his/her requirements. In that case, the visitor sends the SME “signals” they would never have sent without being “provoked” by the SME.

## 1.6. Detecting weak signals

TESTIMONY 1.– “I do not want an information graveyard.”

TESTIMONY 2.– “I have gone over the documents you sent me, but none of them prompted any pertinent question on my part.”

Detection is the first step in the process of exploiting weak signals in order to anticipate. Various terms may denote this step, such as: weak signal recognition, identification, perception, discrimination, tracking, filtering, and noticing. Each of these words contains interesting nuances, which we will not, however, discuss herein.

The person tasked with detecting weak signals, among digital information items, can be in one of the following three cases:

- S/he is able to completely describe the information s/he is searching for;
- S/he launches the search for a piece of information s/he is able to describe, and finds, by chance, another piece of information that s/he was not looking for, but which is of interest;
- S/he launches a search without being able to describe what s/he is looking for, but s/he is able to recognize it when s/he sees it on screen.

As far as weak signal search/detection is concerned, the first case does not occur. The third case is the most frequent.

Detecting a weak signal is an action that owes to both *will* and *chance*. We have seen earlier that such a signal is typically unusual, fortuitous, unexpected, random, etc. For these reasons, capturing a weak signal requires

a great deal of continuous, sustained, and deliberate (proactive) attention [DAV 00, DAV 01].

Let us recall that we refer by “gatekeeper” to a person whose mission is to detect weak signals/signs. This designation reflects the deliberate and proactive aspect of their mission. The gatekeeper’s mission demands, in addition to enduring will, a capacity for discernment, and proven individual intelligence. The gatekeeper’s effectiveness in picking up weak signals/signs is conditional upon three factors: individual intelligence, cognitive style, and fear. Let us consider each of these factors.

#### **1.6.1. Individual intelligence (in the Latin sense of the word): a definition**

In this book, the word “intelligence” is used in accordance with its Latin etymology, that is, “*intelligencia*”. *Inteligencia* is comprised of the verb “*ligere*”, which means “to choose”, to distinguish among several possibilities (this is also found in French words such as “élire” – to elect – and “élite”, etc.) and of the prefix “*inter*”, which means “to connect” them together in order to extract an overall meaning. Thus “intelligence” simultaneously denotes the ability to recognize, locate, compare, and link information, to synthesize and construct a representation.

For Latin speakers, there was no need for long orations, quite the contrary. They would readily say “*Inteligencia pauca*”, that is, “*for those who can understand, few words suffice!*” Usually, one refers to the intelligence of one person considered separately. Indeed, the detection of a weak signal/sign is usually carried out by an individual, at least to begin with. In addition to proper intelligence, that person’s cognitive style also plays a part in detecting a weak signal.

#### **1.6.2. Cognitive style of a person**

A person’s cognitive style [LES 00c] is the assortment of individual differences in the way an individual perceives, thinks, solves problems, and processes information. It is also the manner in which the individual selects, memorizes, interprets and uses information. The cognitive style is identified by means of characteristics (also termed dimensions) whose number varies from one author to another [CHE 00]. Among these, the following pertain more specifically to our topic:

– *Scope dependency*. A scope-dependent person prefers to be given a precise framework, whereas a scope-independent person reorganizes data in his/her own way and is more concerned with the task at hand than with precise instructions to be followed scrupulously. S/he demonstrates self-reliance.

– *Degree of scanning* (Focusing versus Scanning), depending on whether the person's attention is spontaneously more or less focused on one aspect or, on the contrary, open onto a wide scope.

– *Tolerance for unrealistic experiences*, or even curiosity towards them. Also tolerance to ambiguity. In that case, the person is not stymied by an information item that may have several meanings, among which s/he is unable to choose at the time.

– Greater sensitivity to *spoken words* or to *imagery*, that is, a tendency to represent information to oneself in a verbal or written form (language), or rather in a visual form (image).

– Preference for an *analytical approach* (organizing and using information one piece at a time) or, on the contrary, a preference for a *holistic approach* that consists of representing the whole based on a partial aspect (aggregating information items, establishing links among them to arrive at an overall embodiment using inductive reasoning) [ORL 95].

All these characteristics will be highly important in collective creation of meaning (CCM), which is presented in Chapter 3 of this book.

### 1.6.3. *Individual cognitive biases*

In practice, cognitive bias results in the affected individual being ill-prepared to perceive a weak signal, or to interpret it to induce plausible anticipative hypotheses. A list of the main individual *cognitive biases* is presented hereafter. Of course, no single individual will be plagued by the entire set of cognitive biases listed. However, just a few of these cognitive biases are enough to make the person hostile to any “weak signals-oriented” approach. The main individual *cognitive biases* are those that lead the individual to:

- 1) set their representation of a situation and ignore those signals that foretell changes in that situation;

- 2) favor information items that conform to his/her mental process;
- 3) favor items of information that substantiate his/her belief and ignore others;
- 4) accumulate redundant information to artificially “validate” his/her assumptions and favor confirmatory information;
- 5) be averse to all things qualitative;
- 6) generate few hypotheses and be content with the first one, thus demonstrating bounded rationality [MAR 78];
- 7) reduce the range of possible solutions (bounded rationality);
- 8) be locked in a single paradigm (according to T. Kuhn, a paradigm is a vision of the world, which is shared by the members of a given community and on which they necessarily or even obligatorily rely in formulating their reflections);
- 9) limit themselves to information sources they are accustomed to;
- 10) base their forecasts on an extrapolation of the past without incorporating new elements that bring changes;
- 11) despise information that is not yet verified;
- 12) regard information as reliable;
- 13) be averse to novelty;
- 14) be unable to bear ambiguity;
- 15) be unable to tolerate uncertainty;
- 16) regard what is written as true (uncertainty absorption phenomenon);
- 17) be unable to bear inconsistency (new information should be consistent with the knowledge and information already held). Any inconsistency makes the individual uneasy, and they will seek to make it disappear, more or less unconsciously. There are many ways to go about this, including by denying the new information.

Again, and fortunately, it should be extremely infrequent for all these biases to afflict one and the same individual. But conversely, the above list is

probably very incomplete. It only represents the accumulation of cases encountered during experiments that have been conducted.

#### **1.6.4. Fear**

The person asked to contribute to the collection of field data, during their travels or through their contacts with external agents, may exhibit some reluctance to carry out that task, because they may be experiencing a certain *fear*. The same goes for the person tasked with detecting weak signals among digital data, including on the Internet. What fear is that?

It may be one of the following:

- fear of having misunderstood what is to be done, of not having understood what a weak signal/sign is;
- fear of collecting an information item that might prove uninteresting;
- fear of not knowing when it is appropriate to be curious;
- fear of discovering what everybody else may already know, and ultimately fear of being “ridiculed” in the eyes of colleagues, of the hierarchy, etc.;
- fear of being the bearer of bad news and suffering for it.

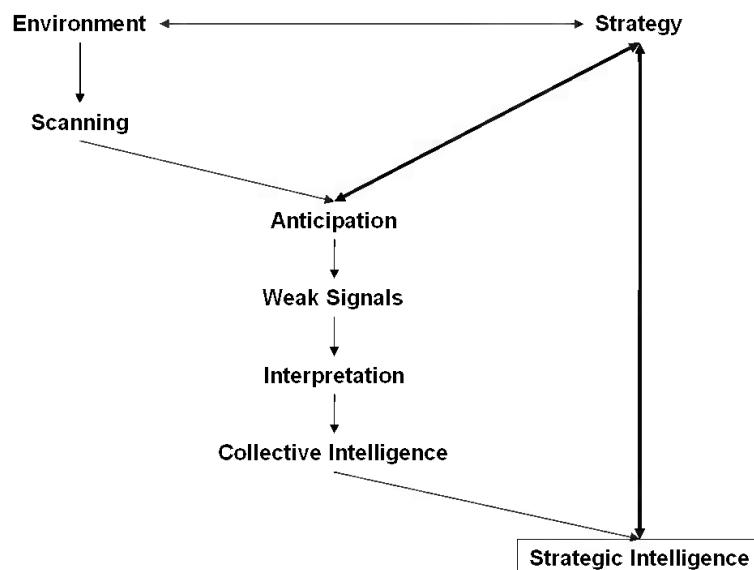
Whichever the case may be, fear should be taken very seriously. The person feels a need to be guided step by step in order to know what they are expected to do, and whether what they have done was properly done. In a way, they need to be taken “by the hand”, at least in the beginning. Cooperative *feedback* may solve this problem.

#### **1.7. Interpreting, amplifying and exploiting weak signals to support strategic decision making**

In this section, we specify the link between the concepts presented in the book, namely “environment”, “strategy”, “anticipation”, “weak signals”, and the exploitation of weak signals to inform strategy. The goal of the approach is to provide support for strategic decision-making, taking into account environmental intelligence. We call this support “*strategic intelligence*”.

Figure 1.8 below illustrates the sequencing of the concepts and methods that will be successively presented in this section.

*Link between the concepts presented in the body and title of the book*



**Figure 1.8.** Issues and steps to go through in order to exploit weak signals

### 1.7.1. Need for collective intelligence (CI) for interpreting weak signals

Due to the “regrettable” characteristics of weak signals (see section 1.5.7.2), such a signal will be difficult to detect and interpret by a person working alone or isolated in his/her work context. There is a strong likelihood for that person not to perceive its potential significance. The testimonies below confirm this likelihood.

TESTIMONY 1.– “In our company, we do not usually reflect in common about what this or that information could mean. Each of us thinks alone, in his/her office. We are very much compartmentalized, which I deplore”.

TESTIMONY 2.– “We salespeople have a partial view of things... not to mention all the disinformation we get from the clients. They keep feeding us red herrings. Boy, the cheek of these people!”

TESTIMONY 3.– “We call one another to compare information, so that we have a more complete vision. Otherwise, we have no way to tell truth from lies. But it's all on an *ad hoc* basis: nothing organized”.

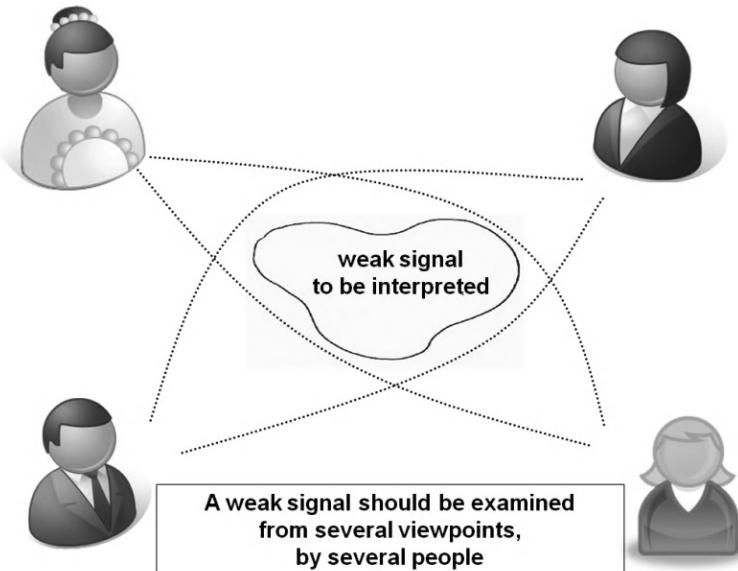
TESTIMONY 4.– “In this company, we don't normally get together to analyze a piece of information. We had never done the things you make us do. It's truly amazing what we can achieve!”

This leads us to formulate the following hypothesis, which has guided our laboratory's research and is denoted by Hccm (hypothesis of collective creation of meaning).

HYPOTHESIS (Hccm1).– *IF* a possible weak signal is interpreted collectively, simultaneously, by several people selected in an *ad hoc* fashion, *THEN* several aspects of the weak signal can be highlighted and debated.

The experiments conducted in order to validate this hypothesis will be presented in Chapter 3 of this book. For the moment, this hypothesis leads us to think that the risk of ignoring or rejecting an interesting weak signal will be limited. Likewise, the degree of reliability of the weak signal will be increased. Consequently, we introduce the concept of CI to *denote both a process and its result* [ZAR 01].

The process *is not linear*. It is comprised of interactions, sometimes also of backtracking, among the people who are collectively examining the weak signal during a debating work session. During the interactions, intermediary results emerge, which may re-launch fresh interactions. The concept of CI is consistent with the publications by Nonaka [NON 91, NON 98, NON 00]. The new issue is to know *how to go about* initiating and operating CI. The latter emerges in the course of the CCM work, which we shall now present.



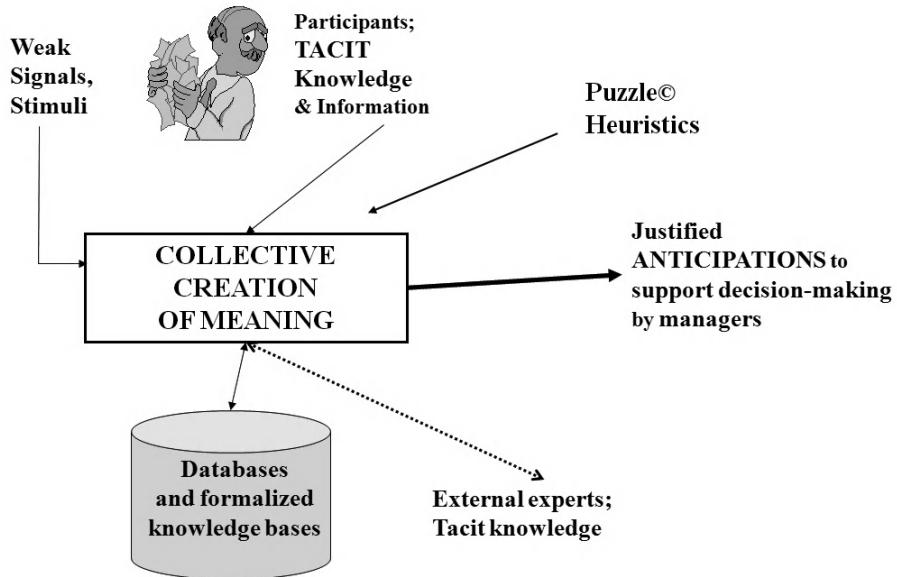
**Figure 1.9. Looking from various angles**

### 1.7.2. CCM: justification and definition of the process

#### 1.7.2.1. Definition

CCM is the operation of collective and consultative interpretation during which “added sense” and knowledge are created from weak signals. Creation of meaning is produced using interactions [HUB 10], the externalization of tacit knowledge, and deliberations among participants in the work session. The examined weak signals act as inducing *stimuli*; without them, nothing would happen. Figure 1.10 illustrates the conceptual model of CCM as defined above. Heuristics are mentioned in the figure; we shall discuss these later.

NOTE.— The word “externalization” has a meaning very close to that of the word used in Nonaka’s SECI model. However, in CCM, externalization is an operation performed throughout the collective work session, not at a specific and unique point in time during the session.



**Figure 1.10.** Conceptual model of CCM

The closest English term to “collective creation of meaning” is simply *sensemaking* [GIO 91, THO 93]. *Sensemaking* requires attention when a person judges that:

- what they had perceived as a signal is nothing but noise; or, on the contrary;
- what they had perceived as noise is in fact a weak signal.

In both cases, they have to adopt a new interpretive framework. “Sensemaking involves a form of noticing when a perceiver reclassifies remembered signal as noise, or remembered noise as signal, in order to fit a new interpretive framework” [STA 88].

#### 1.7.2.2. Deliverables expected from collective creation of meaning

CCM leads to the following outputs:

- the emergence of key questions to which answers will have to be found;

- the highlighting of fresh information to be sought after (often capability information);
- an increase in the collective creativity of participants, directed in particular toward innovation;
- an incentive for participants to become curious about weak signals (active curiosity), i.e. sowing into decision-makers' minds the seeds of curiosity, interrogation, and openness, where some gray areas were being ignored;
- the development of participants' ability to make connections between facts that were hitherto ignored because information and knowledge fragments were scattered among different people;
- suggestions to support strategic decision making;
- the reinforcement of transverse CI within the organization.

Each of these deliverables can give rise to measurement indicators.

Going into more detail, results also include:

- plausible hypotheses regarding the anticipation of possible future events;
- the precise designation of checks to conduct to corroborate warning signals;
- searches for information which has turned out not to be available at the moment.

TESTIMONY 1.– “I was not aware that we did not know that... In fact, we had not even asked ourselves that question. Deep down, we did not know we would need to ask that question, which overlies a serious problem. I am very disturbed by this finding!”

- the focusing of attention onto certain gray areas evidenced [DAV 00, DAV 01];
- a widening of observation and attention, a stimulation of lateral thinking [DEB 85, DAY 06];

- a correction of the “managerial myopia” [CHO 96] or technological myopia brought about by the excessive volume of digital data [WYM 85], or even blindness;
- an immediate warning to the manager concerned that an event is being initiated (or has already started), so that s/he can react as quickly as possible (increase in the organization’s responsiveness);

TESTIMONY 2.– “The graphical representation we are currently building clearly shows that we risk losing this major client”.

- the discovery of an opportunity or threat that would not have been visible without CCM;
- suggestions of potential weak signals, the possible appearance of which will need to be monitored.

EXAMPLES OF *OUTPUT*.— Imagine/anticipate:

- a new product or a new use for an existing product;
- a new potential client;
- a new potential supplier;
- a new component for a piece of equipment;
- a new potential competitor at whom attention will need to be directed;
- a new potential partner in an unusual field.

Conclusive hypotheses from the work session need to be either confirmed or clearly disproved subsequently. This need re-energizes the tracking of new confirmatory signals.

#### 1.7.2.3. *Thought process carried out during collective creation of meaning*

During the CCM session, it can be observed that various thought processes are spontaneously carried out.

##### 1.7.2.3.1. Inductive reasoning

In order to understand the inception of such reasoning, it is necessary to recall that we are considering the case where the enterprise (or other organization) is placed in the following conditions: on the one hand, it practices a proactive/purposeful strategy (*organizational intrusiveness/active*)

and on the other hand it exists in a competitive and changeable, even turbulent (*unanalyzable*) environment (see section 1.2.2). In Daft and Weick's model [DAF 84], we are situated in the top right quadrant (see Figure 1.2). Under these conditions, those authors admit that analytical and linear reasoning is not adapted to the analysis of information exhibiting the characteristics of weak signals. We therefore have to turn to other methods.

For their part, Feldman and March [FEL 91] have indicated that the information exhibiting weak signal characteristics (see section 1.5.6) requires inductive rather than deductive reasoning:

– *inductive* means that observations and data are collected and explored, without a well-defined pre-existing idea. The environment is scanned, *without asking a very precise question*, in order to uncover therein possible *surprises* (or to be reassured by their absence). The analogy with radar reappears. It is known that the data found will be fragmentary and incomplete. Collected data are then examined in order to inform possible future decisions;

– *deductive* would mean that we ask *precise questions, a priori* (which is not the case as far as we are concerned, unless the idea is to validate or invalidate a hypothesis), and that precise answers are sought. We strive to find the complete collection of necessary data, which is not our case either.

#### 1.7.2.3.2. Heuristic reasoning

CCM calls on heuristics [LES 03a, LES 03b, LES 09b] that is, exercises in search and discovery which proceed gradually, without seeking to know immediately whether the intermediate result, which is only adopted on a provisional basis, is true or false. Heuristics is based on a gradual approach to a given question, using provisional hypotheses and successive assessments.

In the present case, heuristics are often spontaneous on the part of participants. They are originally tacit: participants express the reasoning and idea chains that they “improvise” under pressure from the interactions and deliberations. They delve into their memory and use implicit reasoning.

#### 1.7.2.3.3. Lateral thinking

The process of lateral thinking [DEB 85] plays an important part during a CCM session. It is often the case that a participant, listens to what the

others are saying, then remembers what s/he had previously been able to observe in the field, to hear, or to read, and had subsequently forgotten (deep memory). S/he then feels the need to share what s/he had “forgotten” and now seems important to her/him. Sometimes s/he may even want to express something that s/he has recalled, although it may have *no obvious connection* with the topic being discussed by the group. Quite often, the connection does exist, but it is hidden, unconscious. Participants should exercise patience, attention and tolerance towards one another, as well as tolerance to ambiguity. The following are a few noteworthy sentences, recorded during CCM sessions.

- “Listening to what you’re saying, it comes to my mind that... No, I’ll keep quiet since there’s no connection, but ...”
- Another participant (or the session animator): “Go ahead and say what you wanted to say, we’ll see...”
- “All right, what you should know ... OK, right now I don’t have it in writing, but I’ll say it now because it just came to my mind...”
- “I’ll tell you something, maybe it’s got nothing to do with it, but...”
- “What other keywords should we use to broaden our exploration of this avenue of thought? Even if the information above does not concern us, does it at least make us think of something, does it bring up a reflection, even a totally disconnected one? Does it stimulate our thinking?”
- “I hadn’t paid attention to... But now that you’ve said this, it changes everything in my view of things...”

The emphasis on lateral thinking processes enables the emergence and retrieval of information and tacit knowledge, which may sometimes be very important but had gotten lost in individual memories [LES 07b].

#### 1.7.2.3.4. Associative memory

Associative memory is referred to when gathering different fragments of information, recollection, or tacit knowledge. This fragment-gathering is activated in certain circumstances, due to triggering elements. The more numerous the connections between a fragment of information and other fragments, the easier it is to recover that fragment: it will be accessible from several entry points.

EXAMPLES OF TYPICAL PHRASES.–

“I’m associating what you just said with what someone told me last week  
...”

“By the way, speaking of... I’ll seize the moment and chip in with another bit of information: I’ve heard that...”

“Hearing what you’re saying, I’m going to tell you something I had forgotten, which is...”

“We know things, but we’ve got them at the back of our heads and ultimately they get lost. This working meeting brings up a lot of important things ...”

#### 1.7.2.3.5. Bounded rationality

The notion of bounded rationality, proposed by H. Simon [SIM 47], expresses the difficulty for an individual to perceive, store, and process information in a reliable manner. Although they may want to act rationally, the individual can only do so in a limited way. This limited way consists of acting on the basis of available knowledge rather than complete knowledge (the satisfaction concept), of simple rather than laborious rules to seek a solution when a problem occurs (search in the immediate vicinity of the problem), and in taking shortcuts whenever possible [WEI 79, p. 20]. In the case of CCM, it is clear that, based on the information available at a given moment, due to the very fact that the information cannot be complete, several puzzles are conceivable. And it is not certain that one of them is more true or false than the others. This situation explains the importance of traceability of the reasoning performed and of the arguments expressed.

EXAMPLES.– The following examples illustrate the interactions between participants, during a session of CCM:

– “Do we already possess information items “adjacent” to this one, which might support it?”

– “The conjunction of this information item with that information item leads me to think that...”

– “These two adjacent information items seem inconsistent, unless...”

- “What you’re saying usefully complements what’s on the board... It is the *missing link* between the two bits of information.”
- “But there is one thing that should make us think that...”
- “Seeing what we’ve written on the board reminds me that last week someone told me...”
- “This would need to be complemented by searching for...”

### **1.7.3. *Definition of CI as the emergence of CCM***

CI, in the context of this book, is the ability to collectively perceive anticipative signals, to bring them together, and to create links between them in order to collectively build a representation that makes sense. The goal is to provide support to strategic decision making. [LES 96, BLA 03a].

EXAMPLE.– The following testimonies provide examples of the content of interactions and deliberations between the participants in a session of weak signal interpretation.

- “It’s important that we can have a dialog based on information like this. See, it brings out questions from Paul, for which I have some answers. I think we’ll be able to collaborate more closely on this matter, to everyone’s gain”.
- “I’m going to say something, it may be totally unconnected but...”.
- “I wouldn’t have said that five minutes ago, but now I think that...”
- “By the way, speaking of... I’ll seize the moment and chip in with another bit of information: I’ve heard that...”
- “Hearing what you’re saying, I’m going to say something I’d forgotten, which is...”

NOTE.– CI has a more specific and more operational meaning than the phrase “organizational intelligence” used by many authors. CI is that which emerges within a small group of people, in clearly specified conditions. Let us recall that a controversy had arisen within the academic community as to whether an organization, as such, could possess intelligence.

CI occurs during collective work sessions (CCM) according to three possible modes, depending on the organizational context:

- participants are present in person, at the same time (synchronous/face-to-face);
- some or all of the participants are off-site, in different locations or even different countries, but in real-time (synchronous/remote); videoconference may be used, for example;
- participants collaborate remotely and with a time lag (asynchronous/remote).

During the experiments we conducted, the first two modes have been used, but not the third, as it did not appear suitable for the intended objective.

#### **1.7.4. From CCM to knowledge management**

CCM is a creative process that can be performed according to two chronological modes: either in a discontinuous fashion, during sessions that are spaced apart in time, or in a continuous fashion as and when a possible weak signal is picked up.

The “discontinuous” mode, the most commonly used, is discussed in this book. Let us just say a few words about the “continuous” mode. The latter will become more and more desirable for three reasons: the existence of technologies that encourage remote conferences and collaborative work; the spatial dispersion (often in several countries) of staff within one enterprise (or other institution), including when the latter is small; lastly, the growing need for managers to make more and more responsive decisions. We, however, have not had the opportunity to put this mode into practice.

##### *1.7.4.1. Discontinuous mode of collective creation of meaning*

In this case, CCM is thus performed during sessions that are spaced apart in time. The person in charge of organizing a CCM session has to answer the following questions:

- Why is the session being scheduled? With what agenda?
- Whom to invite/summon to the collective work session?
- When should the date of the session be set, bearing in mind diary-related difficulties?

#### *1.7.4.2. The need for mobilization and knowledge management*

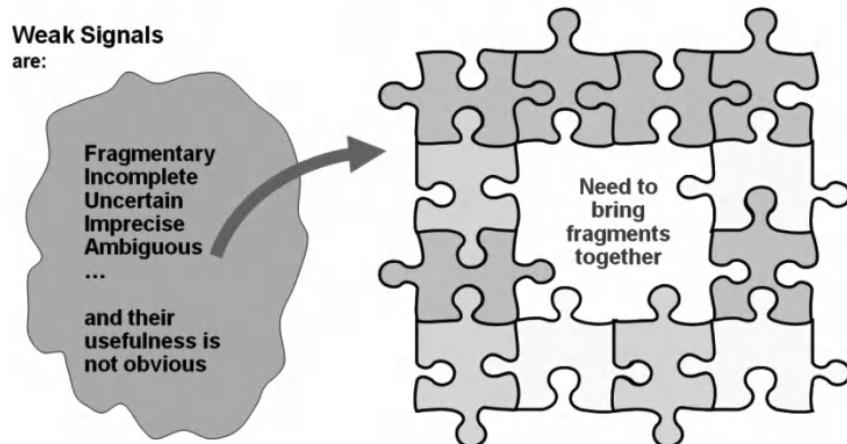
The second question above leads us to discuss knowledge management. Indeed, the matter at hand dictates which people should be invited. First of all, we should involve the manager(s) who is/are in a position to make decisions relating to the discussed topic. But we should also invite those people, within the enterprise, who are likely to hold tacit knowledge relating to the discussed topic. Their knowledge will be tapped during CCM. This begs the question: who has knowledge in the field to be discussed? Answering this question is usually tricky. Yet it is easy to do so if the person setting up the session has access to a tool enabling them to answer the question: “who has knowledge of what or whom?” [LES 07b, p. 243]. This is effectively a tool for managing knowledge, more specifically managerial knowledge, which is essentially tacit and very difficult to articulate. We shall not develop this topic further in this book.

It now remains to consider “how to...” conduct a session of CCM. Our laboratory has provided its answer by creating and experimenting with the Puzzle® method (see Chapter 3).

### **1.8. Puzzle® method for the operationalization of CCM**

Our laboratory has devised a method for making collective creation of meaning operational. The name of this method is Puzzle®. The idea from which this method originated is the *puzzle metaphor*, as illustrated in Figure 1.11, based on field observations and on a trial-and-error-type approach. The first version of the method, and the prototype of its computerized implementation, formed the basis for a doctorate thesis in management sciences, completed in 1993.

HYPOTHESIS (Hccm2).— *IF* we seek to put CCM into practice, particularly for the exploitation of weak signals, *THEN* the Puzzle® method is an adequate solution.



**Figure 1.11. The puzzle metaphor**

This hypothesis subsequently gave rise to numerous experiments. At the time of writing, more than a hundred such experiments had been conducted in various enterprises, in France and in a number of other countries [LES 00b]. Since 2007, experiments have also taken place in public-sector organizations, at their request, in France and in several other countries.

### 1.8.1. Issue: why the puzzle metaphor?

The issue at hand can be expressed by means of the following quote.

TESTIMONY.– “A single slide with three key items of information – that’s what a manager wants!” (Essilor interview).

Most of the time, few weak signals will have been sensed regarding any given topic. Actually, the contrary would be surprising. We therefore tend to agree with leaders and managers who often express expectations in line with the quote above. Thus, a CCM session will start with a few signals, say five or six. Each of these signals is examined as if it was one of few pieces in a puzzle. That piece has the characteristics presented earlier (see section 1.5.6). The objective is then to initiate the collective creation of a puzzle in order to help interpret available signals. Participants know full well that they do not have all the pieces in the “game”. Besides, we do not know what “having all the pieces in the game” could mean. We are aware of being in a

situation of incomplete information. Note that the puzzle metaphor has also been used by Weick, albeit in a different context [WEI 02].

Perhaps it would have made more sense to use the kaleidoscope metaphor. “Managers can take a set of data, phenomena, and assumptions, and then bend them, shake them, and observe them upside down or under any other angles, or alternatively from new directions” [COU 93]. We had to forgo the word kaleidoscope because it “did not go down well” with businesses.

#### 1.8.1.1. *A puzzle without a model*

In the present case, we are dealing with a puzzle whose model is not available to us. There may even be several possible models rather than a single one. Furthermore, we shall never have the total number of pieces necessary to build it “completely”. This metaphor allows us to realize that constructing the puzzle bars us from reverting to algorithmic methods of reasoning, which computers could undertake. We need to turn to methods and techniques that are likely to stimulate *creativity*, *imagination*, and *intuition* [SIM 87, WEI 02]. We are in the realm of *heuristics*.

TESTIMONY.– “This way of doing things is very fecund. It really helps anticipate. In order to anticipate, one needs *imagination*. If you don’t have imagination, you can’t anticipate, you can’t put information to use. And imagination knows no limits”.

When only a handful of weak signals (for example half a dozen) is available, it should be expected that more than one puzzle will emerge from the reflections, deliberations, and proposals put forward by participants in the work group. In French, this kind of group is often called a *Comité d’exploitation des informations* (committee for the utilization of information), or *Codexi* for short. This is probably because business leaders are used to working in committees.

#### 1.8.1.2. *Definition*

A Codexi is an *ad hoc* group made up of people deemed capable of collectively examining and interpreting information in order to create some sense that will prove useful for decision making. It is constituted according to the topic to be discussed. It typically includes approximately eight people (eight plus or minus two). This empirical number accounts for the fact that

we need to bring together participants who hold different views, and that those people should not be too numerous if the exchanges are to be fruitful.

The make-up of the group is as follows:

- at least one manager in a capacity to make decisions;
- potential users of the session's results;
- gatekeepers invited in this instance because they bring experience relating to the matter being discussed;
- experts invited because of their tacit knowledge regarding the matter at hand;
- an animator trained in the Puzzle® method.

### **1.8.2. *Definition of the Puzzle® method***

A Puzzle® is an argumentative graphical construction, made up of a small number of information fragments [LES 92, LES 95b]. These information items fulfill the following preconditions (see Figure 1.12):

- they pertain to a common issue agent which is relevant to (some of) the managers;
- they are expected to enrich one another with meaning, or perhaps contradict one another;
- they suggest relations that may connect some information items to one another;
- they may reveal hitherto unknown information gaps: we then realize that we did not know, and that we are at risk for not knowing.

The problem to be solved is as follows: how to move from “weak signal”-type information to an evocative *visual representation* capable of generating thoughts and inductions in the minds of an enterprise's (or another organization's) leaders?

The Puzzle® method consists of collectively constructing a puzzle (or several, if necessary), on the screen in the work room, using, on the one hand, weak signals as pieces and, on the other hand, suggestions and tacit

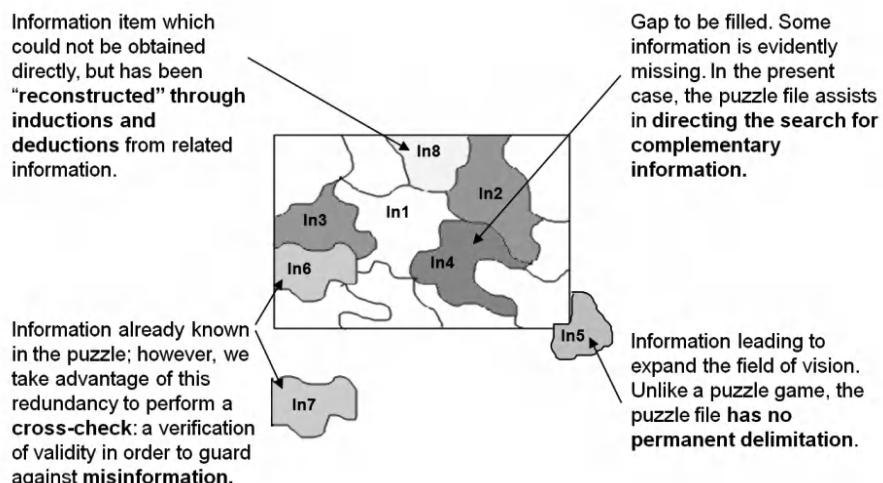
knowledge that are then externalized by participants. A key difference with the puzzle game lies in the fact that, in the present case, participants have to come up with two things:

- the positioning items of information in relation to one another, stating the reasons for doing so;
- the type of potential link that is suggested between two items of information, where applicable.

#### 1.8.2.1. Positioning information items in relation to one another

Figure 1.12 below schematically depicts a puzzle and indicates various situations that may arise.

- a) Let us assume that a new information item, In1, is obtained. In1 is used to continue a previously started puzzle. This leads to a finding: In1 fills a gap between In2 and In3, which had been obtained previously.



**Figure 1.12. Principle of the Puzzle® method**

- b) The puzzle thus drawn highlights the existence of a gap between pieces of information In1 and In4. “*We did not know that we did not know!*” If this knowledge gap is detrimental, a search will have to be initiated for such information, either in the field or on the Internet, or by any other means (within the bounds of ethics and professional conduct).

c) However, information In5 does not fit into the nascent puzzle. It lies outside the current layout. Should In5 be rejected or does it prefigure an extension that had not been thought of? Our field of vision is expanding, our blinkers are moving aside.

d) Information In7 has also recently come to light. While trying to position it on the puzzle, it was found that there already exists a “similar” item of information. In7 is probably a duplicate. Should it be rejected? That is not certain. On closer examination, the In7 “duplicate” enables cross-checks that may enhance the reliability of In6 (different sources? different dates? etc.).

e) In8 is a piece of information which is sorely needed, but which is known to be impossible to obtain, regardless of the research done. It therefore has to be “constructed” by inductions and deductions from information already available or to be obtained subsequently.

#### 1.8.2.2. *Constructing potential links among items of information*

Links between pieces of information are established as the puzzle is built up. They are proposed and debated by participants. The main types of links are: confirmation, contradiction, complementation, causality, inconsistency, and analogy [SUL 88, LES 02c].

The construction of the puzzle is conducted according to specific rules (toolbox). These are enriched iteratively, using new feedback from experience.

The work session is coordinated by an *animator* conversant with those rules. The animator sets out the rules as the session progresses. S/he ensures that these are complied with, and that participants behave properly (for example by avoiding polemics). They themselves bring no knowledge regarding the issues to be discussed: such knowledge is only brought by the participants.

The purpose of the puzzle is to foster an overall *visualization*, to activate the *imagination* of participants in the CCM session, to incite questions that they would not have thought of outside this collective work. It also aims to promote the formulation of answers that might help decision making.

The same information (the same puzzle pieces) may lead participants to imagine different puzzles. Two cases may occur:

– the same puzzle evolves during the session, but is not wholly challenged by all participants. There is no conflict. The successive versions of this same puzzle are recorded for traceability reasons. We have been known to record up to forty-nine successive versions of the same puzzle, in the course of a single session. No proposition should be rejected without grounds that are *externalized* and acceptable to the working group. Such a collection of successive versions can lend itself to a variety of uses.

NOTE.– The meaning of the word “externalized/externalization” is very close to that used in Nonaka’s SECI model [NON 00];

– it may happen that participants split into two groups, with some preferring, based on a certain argument, puzzle A, and the others preferring, based on a different argument, another puzzle, B. In that case, both puzzles are recorded on a computer and stored for as long as necessary. Either a single one of those puzzles is continued until the end of the session, with both groups accepting this provisional decision, or both competing puzzles will be presented to the hierarchy for arbitration, since some decisions will still need to be arrived at. Such a situation is not very serious as, in any case, the tracking of weak signals will have to be continued in order to reinforce or abandon the conclusions obtained, enhance their reliability, and reduce the uncertainty inherent to strategic decision-making.

#### 1.8.2.3. *Storing successive puzzles for an audit and/or for possible future modeling of the treatment of weak signals*

Computerized storage of successive versions of a given puzzle is a fundamental element for the traceability of the performed reasoning. It may prove invaluable, should an *audit* of the decision-making process subsequently become desirable. Such an audit would require:

- the enterprise to possess a reference document setting out how the puzzle method should be applied;
- each session of CCM to give rise to the production of evidence of the session’s progress, the intermediate results obtained at each of the steps;
- recorded evidence of “who said what”, not to challenge individuals but to recollect the various options that have been contemplated, bearing in mind that there is no *a priori* obviousness.

The 2010s abound in examples showing the results of decisions, made by organizations, which led to catastrophes, without the possibility of knowing, after the fact, how the decisions were made. On a different note, computerized storage of successive versions of a single puzzle is an exceptionally rich “raw material” to possibly assist in modeling the decision-making process. Such modeling could pave the way for progress in the computer-assisted utilization of weak signals; we shall return to this in Chapter 4.

#### 1.8.2.4. *Avoiding confusion between the graphical representation of the puzzle and the drawing of a mindmap obtained using software*

The puzzle concept, as defined above, should not be confused with what is sometimes called a *mindmap*.

A *mindmap* is underpinned by a piece of software that enables a classification and prioritization of ideas that the user types using the computer keyboard. Whenever the user writes in a new idea, s/he can link it to the ideas written previously. The user chooses what the new idea should be connected to. A kind of star thus gradually appears on the screen. Spokes radiate from its center and form *tree-like structures*. Concatenation occurs in a *linear* fashion. A relationship between two ideas is a *mother-daughter* relationship.

The *mindmap* chart is a very convenient tool when the user is preparing a conference, for example. S/he classifies and prioritizes her/his ideas. It is very easy to carry out any desired modifications and corrections. If the user is preparing their conference in cooperation with another person, they can forward their mindmap to that other person via the Internet. The other person introduces the changes and complements they wish. They then return the new mindmap to the first user, and so on.

As for puzzles, relations are not tree-like, but systemic; they are not linear, but of various types that we will specify later. Examples and applications will be provided in Chapter 3. The main differences between a mindmap and a puzzle are as follows.

Mindmap	Puzzle
Used to prepare a conference, therefore <i>upstream</i> of the latter.	Used <i>during a collective work session</i> , to bring forth questions and plausible answers.
The mindmap may be modified during the conference, depending on the user's requirements. User is typically an <i>individual</i> .	The puzzle is constructed <i>collectively</i> and gradually during the work session. It is modified as much as necessary. Each new version is recorded. The sequence of all recorded versions enables the evolution of reflections to be visualized.
Relationships between ideas are linear and tree-like, of the "mother-daughter" type. There are no gaps.	Connections amongst ideas are systemic. There are often <i>gaps</i> . Identifying them is part of the result to be achieved.
The <i>meaning</i> of a relationship is <i>unique</i> : it is a descent relationship from a parent idea to a child idea.	<i>Links</i> are of a different nature. A link is expressed by means of a symbol or color. The following links are used: confirmation, contradiction, complementation, causality, etc.

**Table 1.4. Mindmap versus puzzle**

### 1.8.3. Fundamental hypotheses of the *Puzzle®* method

These hypotheses, denoted by Hp, are as follows:

Hp1.– The interpretation of weak signals is a process that involves imagination, induction, and creativity.

Hp2.– To business leaders, visual representations are more evocative than reams of written information.

Hp3.– Visual representations incite creativity more than reams of written information do.

Hp4.– The spatial order in which information items meet the eye has an influence on evocative power and the triggering of reflections.

Hp5.– It is preferable to be looking at only a limited number of essential pieces of information in order to facilitate comprehension and the emergence of meaning.

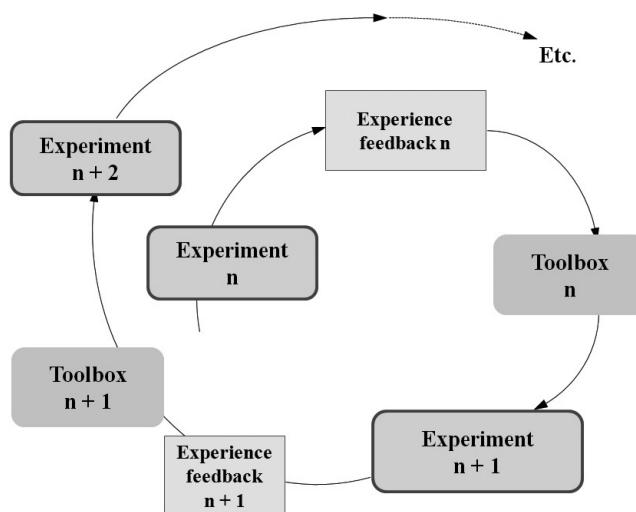
Hp6.– A comparison between two puzzles corresponding to different moments helps perceive an evolution.

Hp7.– Participants have in mind, in a more or less conscious manner, information and tacit knowledge. Its externalization is stimulated by the construction of the puzzle.

Hp8.– The Puzzle® method incites participants to imagine links between weak signals, elicit meaning, imagine different eventualities and debate them. These eventualities can lead to the construction of scenarios, where appropriate.

Hp9.– The Puzzle® method helps uncover gaps in the participants' knowledge of the issue discussed during a CCM session.

Hp10.– The Puzzle® method helps raise awareness of ambiguities that may affect the information used in the CCM session, depending on the participants' knowledge of the issue discussed during a CCM session.



**Figure 1.13.** Inductive generalization of the Puzzle® method by successive reiterations

The Puzzle® method constitutes actionable and “situational” knowledge. While it cannot be proclaimed to be “accurate” in all contexts (besides, what would “in all contexts” mean?), it has already had numerous applications – about 100 – and in a variety of contexts. Its validity is thus gradually extended based on an inductive and cumulative process illustrated in Figure 1.13. Following each application, feedback from experience is memorized in a knowledge base. A number of applications are presented in Chapter 3 of this book.

#### **1.8.4. Work group and CI**

The work group (Codexi) made up of the people called upon to take part in a session of CCM is put together in an *ad hoc* fashion, according to the topic to be dealt with. It therefore varies with each session. Contextual and organizational conditions do not always afford the desirable degree of choice. This is one of the limitations of the proposed method.

### **1.9. Global VASIC process for detecting, recognizing and utilizing weak signals**

In the previous pages, we have mentioned various operations concerning the detection, selection, and utilization of weak signals. The central operation is CCM. However, that operation would not be possible without carrying out other operations located upstream. Moreover, there is also an operation located downstream: the dissemination of the results from the utilization of weak signals.

In the following pages, we will show that all these operations chain together to constitute a global process called the VASIC process (for *Veille Anticipative Stratégique et Intelligence Collective* – anticipative strategic scanning and collective intelligence). This denomination was chosen because we do not know of any appellation designating such a process, which puts the emphasis on weak signals and places CCM at the heart of the process.

This process is illustrated in Figure 1.14, where solid-line rectangles indicate where the subject matter of this book is. English-speaking authors use a variety of terms (see Table 1.5), but those only pertain to parts of the VASIC process. For example, the phrases *environmental scanning*, *business environmental scanning*, *strategic information scanning system*, *business*

*intelligence, competitive intelligence* mainly designate the search for information about the environment.

Let us briefly comment on this figure by following the chronological order of operation blocks.

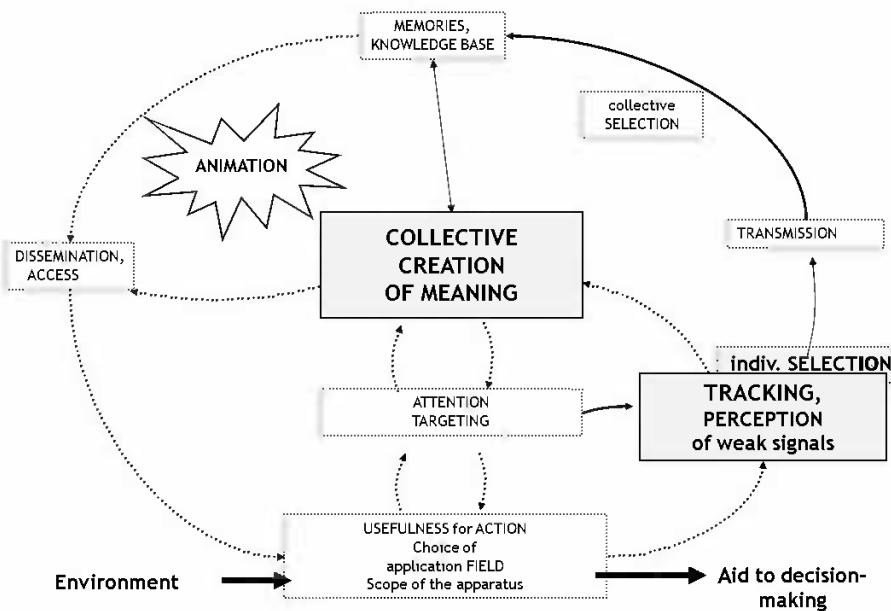
Type of scanning	Terminology used by authors to denote the scanning apparatuses they study	Historical authors and references
Competitor intelligence	Business competitor intelligence ..... Competitor intelligence ..... Competitor analysis .....	Sammon <i>et al.</i> (1984) ..... Fuld (1985) ..... Ghoshal and Westney (1991)
Competitive intelligence	Competitive analysis ..... Competitive intelligence ..... <i>Prospective scanning</i> ..... <i>Competitive scanning</i> .....	Prescott and Smith (1987) .... Ghoshal (1988) ..... Antoine (1992) ..... Delbes (1995) .....
Business intelligence	Business intelligence ..... Business environmental scanning ..... Business scanning ..... Intelligence program .....	Greene (1966) ..... Kefalas and Shoderbeck (1973) Calori (1989) ..... Fuld (1991a) .....
Technological scanning	Monitoring the environment ..... Documentation ..... <i>Technological scanning</i> ..... <i>Scanning</i> ..... Information scanning .....	Bright (1970) ..... Jakobiak (1991) ..... Lainée (1991) ..... Dou <i>et al.</i> (1995) ..... Vandenbosch and Huff (1997)

**Table 1.5.** A (non-exhaustive) list of terminologies associated with scanning in academic publications (extract from Lesca N. and Caron-Fasan [LES 06])

Environmental scanning	Environmental scanning ..... Mixed-scanning ..... Organizational intelligence ..... Multinational scanning ..... Environmental analysis ..... Corporate intelligence ..... Global scanning .....	Aguilar (1967) ..... Etzioni (1967) ..... Wilensky (1967) ..... Keegan (1974) ..... Diffenbach (1983) ..... Tomioka (1990) ..... Davidson (1991) .....
Social intelligence	Social intelligence ..... Techno-economic intelligence ..... <i>Competitive intelligence</i> .....	Dedijer and Jéquier (1987) ... Radosevic (1991) ..... Martre (1994) .....
Strategic scanning	Strategic information scanning system ..... Strategic scanning ..... <i>Strategic information management</i> ..... <i>Surveillance of the environment</i> ..... Chief executive scanning ..... <i>Strategic scanning</i> ..... <i>Vigilance</i> ..... Strategic environmental scanning ..... Strategic intelligence system ..... <i>Strategic intelligence</i> ..... <i>Anticipative strategic intelligence –collective intelligence (VAS-IC)</i> .....	Aaker (1983) ..... El Sawy (1988) ..... Lesca (1986) ..... Marteau and Lesca (1986) ... Daft <i>et al.</i> (1988) ..... Calori <i>et al.</i> (1988) ..... Walls <i>et al.</i> (1992) ..... Stoffels (1992) ..... Montgomery and Weinberg (1998) ..... Revelli (1998) ..... Lesca (2003) .....

**Table 1.5 (continued).** A (non-exhaustive) list of terminologies associated with scanning in academic publications (extract from N. Lesca and Caron-Fasan [LES 06])

The first stage, upstream of the VASIC process itself, should be carried out by the leadership. The latter should indicate which of the organization's functions they wish to reinforce first and foremost by means of anticipative scanning (for example marketing, R&D, etc.). They usually select a function that represents a value-creating process for the enterprise. The VASIC process then starts.



**Figure 1.14.** Generic model of the VASIC process

### 1.9.1. Targeting of anticipative scanning and information sources

Targeting is the construction of the target to which weak signal detection will be directed. That is the part of the environment on which the enterprise's leaders saw fit to primarily focus their attention over a given period. The target comprises names of topics and names of agents in the environment relevant to the enterprise. The four basic types of agents are: current or potential competitors, current or potential clients, current or potential suppliers, and current or potential partners.

However, this typology should be adapted to the specificities of the organization. The target also indicates the information sources that should be scrutinized. The target is changeable, as leaders cannot specify precisely what weak signals they are expecting, since weak signals are by definition erratic.

Thus the definition of sources is a successive approximation process. We start out with a few sources that are deemed relevant, then gradual learning

takes place along the way: the choice of sources is more and more pertinent. This stage is sometimes called “sourcing” in the English-speaking world.

### **1.9.2. Tracking and individual selection of weak signals**

This step designates several sub-steps:

- selecting and nominating the people (*gatekeepers*<sup>4</sup>, see also [TUS 80]) who will have to be on the lookout for information that may contain weak signals;
- assigning those people to the sources designated within the target;
- actually searching for weak signals;
- escalating weak signals to the databases.

Gatekeepers can be different people depending on whether the goal is to collect anticipative information from the field, or whether it is text or digital information. Authors do not usually discuss this difference, which is nevertheless a fundamental one in the organization and operation of the VASIC process.

Gatekeepers need to be able to “notice/recognize” what, in raw data or in their field observations, is likely to contain possible weak signals. The noticing/recognition of relevant information is called “noticing” by some English-language authors.

“Noticing is an act of classifying stimuli as signals or noise. Noticing results from interactions of the characteristics of stimuli with the characteristics of perceivers. In particular, some stimuli are more available or more likely to attract attention than others” [STA 88, p. 2]. “Noticing is

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4. *Gatekeeper*: “Individuals who maintain consistent, ongoing contact outside their organization, who understand the way in which outsiders differ in their perspective from their own organizational colleagues, and who are able to translate between the two systems.” “Individuals in the communication network who are capable of understanding and translating contrasting coding schemes. With the help of these key individuals, external information can flow into the system by means of a two-step process. First, gatekeepers are able to gather and understand external information, and subsequently they are able to translate this information into terms that are meaningful and useful to their locally oriented colleagues” [ALL 79, p. 420].

influenced by perceivers' habits, their beliefs about what is, and their beliefs about what ought to be"; "Noticing requires distinguishing signal from noise, making crude separations of relevant from irrelevant" [STA 88, p. 29].

NOTE.— Certain English-language authors use the word "scanning" to denote solely the search for information.

"Scanning is a process that collects data." [STA 88]

Detecting and tracking weak signals requires a number of abilities in people whose task it is: attention, vigilance, discernment, curiosity, a quick mind, a flair for noticing relevant detail, etc. The second chapter deals with these issues and describes applications.

Tracking is a fundamental operation in that it also constitutes a first phase whereby information is selected or even filtered [SCO 73, p. 188]. "The processes that amplify some stimuli and attenuate others, thus distorting the raw data and focusing attention, are perceptual filters" [STA 88, p. 5/29]. This is individual selection, since it is performed by the gatekeeper on his/her own. If it is poorly carried out, weak signals can be irretrievably lost.

In practice, a first step in implementing the detection/tracking of weak signals consists of training people and inciting their attention and curiosity towards weak signals [CAR 01, MEN 05].

### **1.9.3. Escalating information, collective/centralized selection and storage**

Information gatekeepers can be more or less numerous (from a few people to several hundred, or even more) and more or less scattered (sometimes in several countries). This is especially the case for field-based gatekeepers. As for tracking text or digital information, gatekeepers may be scaled down to a single person, in the case of a small enterprise, or they may include several people on the basis of one (or more) per geographical location, in the case of a large company.

In all cases, it is necessary to escalate the captured information to one or more central databases. This operation is called "escalating" information.

The receiver(s) of the information is often the animator of the VASIC process, who is entrusted with a number of tasks:

- performing checks and a centralized selection of the information to be stored. This task is called centralized selection in Figure 1.14 to indicate that it may be based on comparisons with other “adjacent” information already escalated previously, as well as with opinions sought from experts as required by the matter at hand;
- providing feedback to the gatekeepers who are sending information up to him/her. She/he also has to answer any questions they may ask to help them in their task;
- store the received information in databases.

#### **1.9.4. Dissemination and preparation of information for CCM sessions**

The animator directly disseminates information to potential users, on the one hand, and prepares the information used in CCM sessions, on the other hand. Lastly, the animator may disseminate information to users for whom it is deemed useful.

#### **1.9.5. Animation**

The animator instills life into the VASIC apparatus, and needs to constantly ensure that it operates satisfactorily. Such an apparatus tends to run out of steam if it is not continually stimulated. Insufficient energy and motivation on the part of the animator are one of the reasons that cause VASIC processes to wither. The same is true of a sudden, unprepared change of animator: this is one of the factors in the failure or abandonment of scanning processes, generally speaking [LES 08b, LES 08c].

NOTE.– Animation can be direct when the animator is on site. However, it is common for the animator to be off-site. This can be the case when the company is a large one, with premises distributed over the national or international space. The latter case is termed *remote animation and support* [LES 07a].

### 1.9.6. Measurements: performance indicators of the VASIC process

“How to measure the performance of a VASIC process?” is a recurrent question from business leaders. It arises even before the process is put in place. In fact, the answer to this question will lead to the decision, or to the rejection, of setting up the future, “weak signal-oriented” apparatus for anticipative scanning.

Satisfying the management is a necessary condition, but not a sufficient condition for the process of capturing weak signals to operate effectively and durably. We also need to measure the degree of satisfaction felt by the gatekeepers in carrying out the difficult task asked from them. Consequently, the table below offers some indicators regarding both ends of the VASIC process, namely: the management end and the weak-signal gatekeepers’ end.

A number of authors, especially English-speaking ones, have offered suggestions to carry out measurements concerning the performance of all or part of a scanning process [TEO 01]. However, it was frequently the case that the managers we dealt with judged such proposals to be too complicated and scarcely applicable. It is therefore desirable to offer measurement indicators that are *acceptable*, being simple and understandable. This led us to suggest indicators whose core is presented in Table 1.6.

<b>1 Measurement indicators of the usefulness and satisfaction observed, at a given point in time, by managers who are sent possible weak signals from gatekeepers.</b>	
<b>Questions</b>	<b>Answer</b>
1.1 Number of decisions actually initiated following signals supplied by the anticipative scanning apparatus, over the period of interest.	
1.2 Number of unpleasant surprises spotted thanks to warning signals escalated to the leadership, over the period of interest.	

**Table 1.6. Performance measurement indicators of the weak signals-oriented VASIC process**

1.3 Number of significant opportunities brought to the fore		
1.4 Number of CCM sessions scheduled and actually held, over the period of interest.		
1.5 Percentage of CCM sessions scheduled and actually held, over the period of interest.		
1.6 Percentage of participants in attendance, based on the number of participants invited to CCM meetings, over the period of interest.		
<b>2 Measurement indicators of the satisfaction felt by gatekeepers of weak signals.</b>		
<b>Would you say that the following sentences correspond to your situation?</b>	<b>Rather</b>	
2.1 I never receive any acknowledgements following possible weak signals that I escalate.	Agree	Disagree
2.2 I am never told whether what I escalated was useful for something or someone.	Agree	Disagree
2.3 I never receive any feedback allowing me to know whether I am on the right track after I select a possible weak signal.	Agree	Disagree
2.4 I am never told whether the possible weak signal I escalated checks out with other information already in the central database.	Agree	Disagree

**Table 1.6 (continued).** Performance measurement indicators of the weak signals-oriented VASIC process

<b>Questions</b>	<b>Rather</b>	
	Agree	Disagree
1 I think that some in our shop confuse “weak signal” and “strong signal”	Agree	Disagree
2 <i>Weak signals</i> -oriented anticipative strategic scanning could be useful for the governance of our enterprise	Agree	Disagree
3 I recall an example where we didn’t “ <i>see anything coming</i> ” and we suffered for it.	Agree	Disagree
4 I can cite an information item that could be an example of a “weak signal”.	Agree	Disagree
5 If we were able to pick up and interpret weak signals, it would really help us.	Agree	Disagree
6 We sometimes get together to collectively interpret anticipative information.	Agree	Disagree
7 To our enterprise, only scanning information obtained on the Internet matters.	Agree	Disagree
8 Anticipative information – we already have too much of it!	Agree	Disagree
9 In our organization, none of our employees would agree to take part in collecting anticipative information from “the field”.	Agree	Disagree
10 Top-down feedback, toward gatekeepers of anticipative information, would be of no use in our enterprise.	Agree	Disagree
11 Our “roaming” employees are already provided with laptops (or some other technology) that would be handy to capture and escalate information from the field.	Agree	Disagree

**Table 1.7.** Reader self-assessment questionnaire

The basic core of measurement indicators above has been validated in a number of organizations, with slight adaptations for the organizational context: additional indicators were added when managers requested it.

## 1.10. Conclusion

The *objective* of this chapter was to present the concepts that will be useful in the remainder of the book: “changes in the environment”, “anticipation”, “anticipative information”, which includes “weak signals.” These concepts are an indispensable scientific foundation, yet they are not “operational”. Nevertheless, this book aims to make a contribution to the junction between “conceptual” and “practical” matters. Some steps have already been taken toward operationalization in this chapter.

### 1.10.1. Results on completion of Chapter 1

The main, directly useful concepts have been defined and explained.

First results of operationalization have been put forth:

- definition of “anticipative information” and examples from the real world;
- conversion of a weak signal into an early warning sign; examples;
- characteristics of a weak signal; examples;
- CCM from a few weak signals;
- Puzzle® method to implement CCM;
- performance indicators for the process of searching for and utilizing weak signals.

Lastly, a “self-administered questionnaire” was proposed to the reader.

## Chapter 2

# Detecting, Recognizing and Corroborating a Weak Signal: Applications

We now reach the chapters of this book that are devoted to applications and the presentation of working methods, also referred to as “actionable knowledge”, providing answers to “how-to” questions. Chapter 2 answers the questions: “How to recognize that a raw data item is a possible weak signal?” and “How to make a weak signal reliable?”

For each of the applications presented, we indicate: why we recognize the data item as a weak signal, then the approach through which we come to regard the latter as being an early warning sign.

Some of the examples derive from data collected in the field, others from raw digital data researched on the Internet. We put ourselves in a situation where each weak signal is processed separately, by a single person using his/her individual intelligence. We then present methods intended, as and when a weak signal is recognized as such, for making it reliable.

## 2.1. Recognition of a weak signal: examples

### 2.1.1. *A lady heading up the purchasing function at a car equipment manufacturer? How bizarre!*

#### 2.1.1.1. *Context*

The scene is set in the office of Maurice, marketing director of an industrial company within the automotive sector. This company is a tier-2 equipment manufacturer, which means its own clients are larger manufacturers, called tier-1 equipment manufacturers, such as Valeo.

On that day, in the economics page of his favorite newspaper, which typically numbers about 40 pages, Maurice read the following sentence among a clutter of other articles: “Mrs. Ch. Bénard has just been appointed as purchasing director for the Valeo group.” He started and exclaimed: “*How about that! Now that’s bizarre!*”

#### 2.1.1.2. *Dialog*

“What is bizarre?” asked Maryse, his secretary.

Maurice: “What is bizarre is that a woman is appointed to head up the purchasing function, and at the holding company level, of a major equipment manufacturing group in the automotive sector.”

Maryse: “And why is that so bizarre?”

Maurice: “Valeo is a large company, with a presence in many countries, in the automobile equipment manufacturing sector. You obviously don’t know the professional circle of automobile equipment manufacturers. It is traditionally a very “macho” environment. Women very rarely make it into positions of responsibility, much less into senior posts such as a functional directorship at the holding company level”.

Maryse: “No, I didn’t know; I am new to this industrial field; therefore I don’t have the knowledge that would allow me to react as you are doing.”

Maurice: “That’s not all: the purchasing function is itself very “macho”. Very few women hold senior positions in that function, especially in the automotive sector or in related sectors.”

Maryse: "So what do you make of it? Does it really matter this much?"

Maurice: "I think it is possibly very important, especially for Valeo's suppliers, as well as for subcontractors in tier two, tier three, etc. If I were them, I would be seriously worried right now. If this information is reliable, then it heralds a true rupture! In that case, the consequences of this event could be very ominous for our own enterprise, since we are a supplier of Valeo's."

Maryse: "I don't see what you mean. Would you please explain to me why that is?"

Maurice: "I am certainly willing to explain my reasoning to you, but it is understood that I am going to state *hypotheses* and not certainties. However, these hypotheses will be easy to validate and confirm later on. It will only take a few telephone calls. Here is my reasoning, with a drawing to illustrate it (see Figure 2.1): the data item above is an *odd association* of words."

Maryse: "I don't see what you mean."

Maurice: "There: "Mrs", "purchasing" and "automobile equipment manufacturer" are words that don't fit together.

1) Appointing a lady to such a position, in such a company, is a definitely *odd* occurrence. There must therefore be an *unusual reason*.

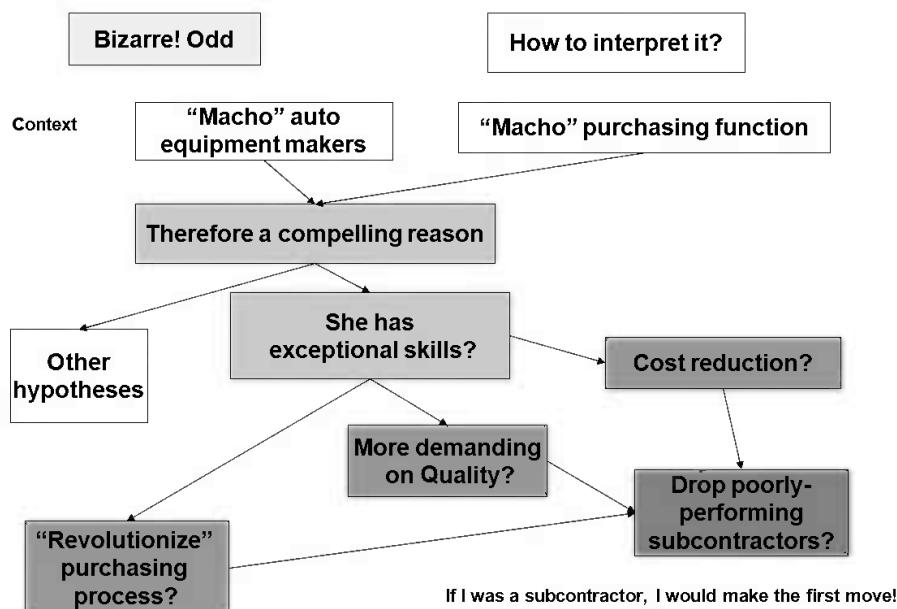
2) It can be one of two things: either that lady is in extraordinarily high favor or she possesses extraordinary qualities in relation with her new post.

3) I'll rule out the first eventuality and countenance the second one. I therefore hypothesize that this lady has *exceptional competences* that perfectly suit her new capacity. Under this hypothesis, it could mean that she will go on to implement profound changes in the purchasing function of the whole Valeo group, from the very top to the very bottom of the organizational chart; a sort of rupture with the customs of the profession.

4) I also formulate the hypothesis that the ultimate aim of all the changes I anticipate is to *reduce costs* by any means, while *driving up the quality* provided by Valeo's suppliers.

5) Given the very large number of subcontractors Valeo has, I therefore anticipate that some serious “*housekeeping*” will be done among Valeo’s suppliers and subcontractors. Many of them could be discarded if they do not satisfy the new criteria that Madame Bénard will perhaps create.

6) In summary, Valeo’s suppliers should immediately ask themselves numerous questions about their enterprise’s competitive advantages, and particularly about the weaknesses they will have to remedy as soon as possible. In that case, they will need to demonstrate acute responsiveness.



**Figure 2.1.** *Mrs Bénard: interpretation*

That sums up my reasoning”.

Maryse: “I am astounded. But this information is not anticipative, since Mrs Bénard’s appointment has already happened!”

Maurice: "The data item seems retrospective because Mrs Bénard's appointment has already taken place; granted, that is now in the past, but what Mrs Bénard will do is situated in the future. This woman will probably undertake major reorganizations in purchasing. These reorganizations remain entirely to be carried out, rather than being already done. Consequently, they are in the future. Moreover, they will take some time: in the order of two years, I reckon. So their effects are totally future ones, and so are the consequences of those effects. Therefore the information does have an anticipative character."

Maryse: "No offence, sir, but all this is rather based on imagination. How could you prove that you are on the right track?"

Maurice: "I could prove it by telephoning the general managers at a few of Valeo's suppliers and listening to their reactions. Some of them will not be aware of anything yet; others, incidentally the majority of them, will be skeptical, but a few of them will very quickly understand what this is about and the threat that looms over them or, on the contrary, the opportunity that is opening up before them if they are the first to react in a constructive way."

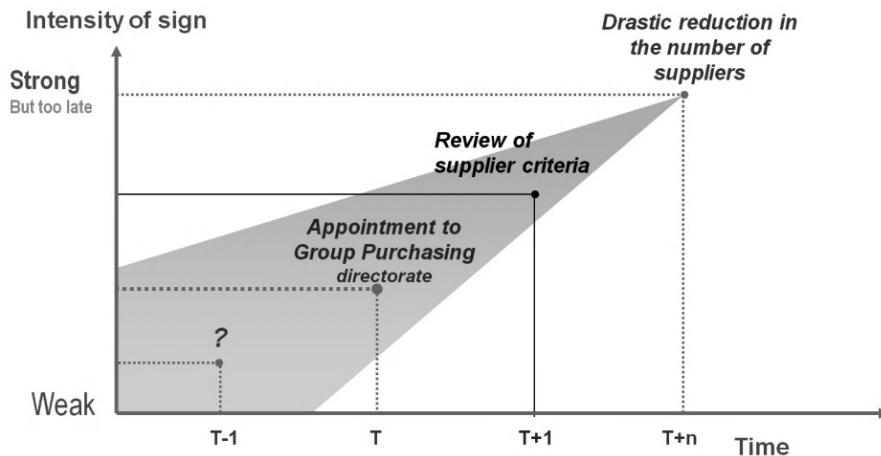
Maryse: "I'm a bit bewildered by your reasoning: starting from a tiny fragment of information, at least in my opinion, and you draw conclusions about very serious consequences, even a *rupture* inside the purchasing function of a major equipment manufacturer. And, what's more, consequences that will have an impact over several months to come, maybe even years."

Maurice: "If I have impressed you, good for me. But that wasn't my goal. My reasoning is called *heuristics*. And that minute detail, as you call it, is precisely known as a weak signal. I shall certainly have other opportunities to give you new examples on other occasions".

Maryse: "May I ask you one more question, please?"

Maurice: "Please do."

Maryse: "What is it that enabled you to quickly notice that sentence, that weak signal as you say, inside that thick newspaper?"



**Figure 2.2.** Consequences of Mrs Bénard's appointment

Maurice: “It is precisely the juxtaposition of the words that constitute the sentence. The words in that sentence are very rarely associated together. That is perhaps the *odd* character of the *association of words* that immediately caught my eye. Of course, it is a question of habit, and of professional experience, with the knowledge that derives from it.”

Maryse: “If I understand correctly, it is not one word or another, considered separately, that can be odd. It is rather the association itself.”

Maurice: “That is correct.”

*Post scriptum 1:* a few weeks later, Maurice was asked to articulate the above-mentioned heuristics, in order to formalize it and make it teachable.

#### HEURISTICS USED TO INTERPRET AN APPOINTMENT.—

Step 1) Is it an isolated appointment?

Step 2) Is it a succession at an existing position?

Step 3) Is it a newly created position? If it is, then..., or else...

Step 4) Why did the previous person leave?

Step 5.– Differences and similarities between the two people succeeding each other ?

Step 6.– What plausible hypotheses can be inferred from this comparison?

Step 7.– What is the type of post created? (Rather high up in the hierarchy?)

Step 8.– Is such a type of position usual in this kind of enterprise?

Step 9.– What anticipative and plausible hypotheses can be formulated, based on the previous answer?

Step 10.– Do the characteristics of the appointed person hint at some ability (potential) to cause “surprise” change? To lead change?

Step 11.– Does the act of appointment portend changes?

Step 12.– Does this appointment indicate: continuity? or rupture?

Step 13.– Does the potential of the appointed person foretell an ability to lead such changes?

Step 14.– What opportunity, or what threat, can be anticipated for our enterprise?

Step 15.– What *action* would you recommend taking?

Step 16.– What new information should be sought?

Step 17.– Is it an outsider? If it is, then..., or else...

Step 18.– What should we make of this? → *What do we decide to do?*

*Post scriptum 2:* three years after Mrs Bénard’s appointment, the number of Valeo’s subcontractors had already been more than halved: among the ones eliminated were those who “did not see a thing coming”.

### 2.1.1.3. Conclusion

This example has highlighted:

- a data item from the field (although it then appeared in a daily paper, two days later);
- a possible weak signal interpreted as an early warning signal;
- the relevance of that signal (to Maurice's company);
- the anticipative character of that signal;
- the possibly considerable importance (to Maurice's company) of the anticipated consequences;
- an avenue of research to detect a weak signal by means of future software: an “*odd association*” of words appearing in a data item;
- an example of heuristics used, in the Bénard case, to interpret an appointment. Only the steps of the reasoning performed are indicated: the user retains significant leeway as to interpretation.

### 2.1.2. When a weak signal is displayed on a sign in the street!

Looking at the planning permission sign up on his right, Mr Knocker, while driving his car, did not realize he had just caught a weak signal that was to prove very important to his company. Here is how he told the story.

TESTIMONY.—“While driving in town, I pass a palisade behind which is a construction site. On the palisade, a planning permission sign is affixed. Intrigued, as a matter of fact *without a precise reason*, after a few seconds I retrace my steps. On the sign, I think I vaguely recognize the permit recipient's name. This could well be the name of one of a competitor C's subsidiaries. I stop, park, and walk up to read the sign. What is it about? Planning permission for a building. The size of the plot seems rather large to me, but it shouldn't be a factory, given the location. Back at my desk, I call up the head office of my company to find out if someone knows about this site of a subsidiary of competitor C. Nobody seems to know... or care very much. However, my curiosity aroused, I conduct a little investigation of my own. That is how I learn (from the municipal services) that it will be a prestigious building for the town, as it will house a research laboratory,

among other things. A few weeks later, I happen to learn entirely by chance, while chatting on a train, that the same competitor C is apparently recruiting one or more research engineers in a very “cutting-edge” field. I easily confirm that this “cutting-edge” field also concerns my company. I then make the connection with the building site I had spotted. This time, I ask for an audience with our company’s R&D director and share my observations and reflections with him. He seems interested and tells me he’ll look into it...”

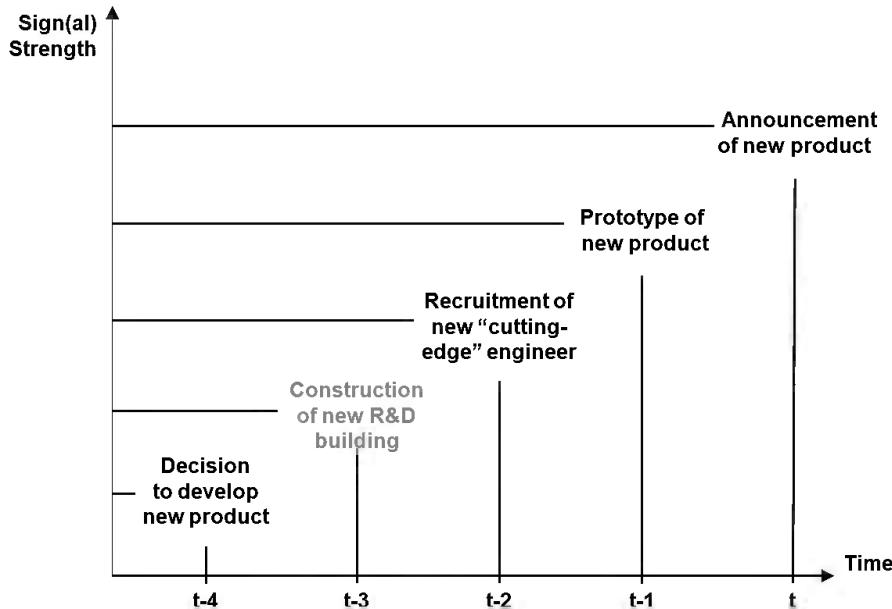
*Post scriptum:* about 15 months later, a new product hit the market, from the new laboratory of competitor C. This came as a surprise to many people. However, the R&D director had put to good use the information supplied by Knocker.

Figure 2.3 illustrates the anticipative character of visual information perceived by Mr. Knocker, whom no one had asked to do anything.

#### 2.1.2.1. Conclusion

This example has highlighted:

- an item of data from the field *of visual origin*;
- an item of data sensed as being a possible weak signal;
- the character of *relevance* of that signal (for Knocker’s company and its R&D director);
- a warning capable of *anticipating*, long in advance, that the competitor is about to “do something” which will have to be watched carefully;
- the possibly considerable *importance* of that weak signal;
- a data item from a *reliable* source;
- the importance of *attention* and *curiosity* in a person as far as the detection of weak signals is concerned;
- the importance of tenacity on the part of gatekeeper who spots a weak signal, his/her willingness to validate information and not to forget it: on the contrary, Knocker “escalates” the information to his hierarchy;
- the hierarchy’s behavior, based on listening: the R&D director did not fall for the apparent weakness of the signal.



**Figure 2.3. Consequences of weak signal on a sign**

### 2.1.3. A research center at EADS: why Singapore?

We now present an example that builds on an item of *digital data* obtained by means of the Internet.

#### 2.1.3.1. Background

The company “CO2” (an industrial concern in the chemical sector) is thinking about diversifying its activities. More specifically, it is considering the expediency of making the most of CO<sub>2</sub> by using it as a commodity. The animator of the scanning process in the “CO2” enterprise has received from his hierarchy a request to collect information that may be used by the Board of Directors during an upcoming work session. The animator has obtained, among others, the following *FULL text* data item. The question is whether this data item might contain a relevant weak signal to answer the hierarchy’s query.

The European aerospace industry giant, EADS, *is considering the creation of a research center dedicated to biofuels*. Its chief technical officer, Dr Jean Botti, stated that Airbus and Eurocopter's mother company *is considering collaborating with the Singaporean government agency A\*STAR (Agency for Science, Technology & Research)* with the aim of *working jointly on the development* of bio-kerosene from algae. An agreement *should be adopted* in February 2010. This initiative *would be carried* at the EADS Innovation Center, an R&T center inaugurated in 2006 in Singapore, and *would mainly set about* the cultivation of algae *by injection of carbon dioxide (CO<sub>2</sub>)*.

According to Mr. Botti, the production of traditional biofuels from biomass does not use CO<sub>2</sub> sources and therefore does not contribute to the reduction of the amount of CO<sub>2</sub> in the atmosphere. He also judges that Singapore has already made interesting progress in the fuel cell sector, including in SOFC (*Solid Oxide Fuel Cell*)-type technologies, solar-powered cells, and those enabling heat recovery. According to him, such technologies could power jet aircraft.

EADS also intends to reinforce *its links with Singaporean universities*, as the group also signed an agreement with the *Economic Development Board* (EDB) to fund six *thesis projects* that will be conducted at the *Nanyang Technological University* and the *National University of Singapore*. The first selected projects *should be* in the fields of electromagnetics, signal processing, and *data stream mining*, but the group already envisages putting in place the same kind of agreement to jointly fund *theses* concerning the biofuel sector.

**Box 2.1.** *EADS is considering the creation of a hub dedicated to research on biofuels, while reinforcing its links with Singaporean universities (<http://www.bulletins-electroniques.com/actualites/61302.htm>)*

#### 2.1.3.2. Reasoning performed by the animator (it is he who italicized words in Box 2.1)

- 1) Is this “item of data” *relevant* to the diversification issues being explored?

Yes, because we are (newly) interested in the valorization of CO<sub>2</sub>, which would be regarded as a possible resource that we wish to valorize. The item of data does concern the issues stated by the hierarchy. The significant words are: “*by injection of carbon dioxide (CO<sub>2</sub>)*”.

2) Is it *anticipative*?

Yes, for the following reasons: several words, including verbs, indicate that the event mentioned in the item of data, has not been accomplished yet:

- is considering the creation;
- is considering collaborating with;
- work on the development;
- should be adopted;
- would set about;
- its links with Singaporean universities... thesis projects (therefore situated far upstream of an industrialized process).

Consequently, it is not too late for the Board of Directors, should they wish to learn more and see what they could decide.

3) *Odd*. Does it *intrigue us/warn us* about “something”?

Yes, because we discover that the industrial group EADS, in cooperation with the Singaporean agency ASTAR, is also interested in this strategic axis, with a view to developing bio-kerosene from algae. Perhaps ASTAR is also cooperating with other industrial groups, but which ones? Would we have thought of looking toward Singapore and ASTAR if we had not caught this weak signal?

4) Is this data item recent, or is it already outdated?

It is recent (at the time when it was found).

5) Who might possess other fragments of information that could be brought together with this one?

We shall seek to identify all the information sources that might inform us further: internal sources (some of our employees are in contact with Singapore) as well as external sources, starting with official sources.

6) Is this data item easily verifiable?

Yes. We will alert all directorates and all “authorized” employees whom this information may concern: we have a knowledge management base which is connected to the *intranet* and suitable for this kind of search. We may also get in touch with the official services of the French embassy in Singapore. This will be quick.

#### 2.1.3.3. Conclusion

This data item, obtained in *FULL text* on the *Internet*, contains a weak signal that can now be characterized as an early warning signal, based on the interpretation presented above. This information can be presented to the Board of Directors to help inform its strategic thinking. We summarize the early warning signal by the formulation of the following news brief.

NEWS BRIEF.– EADS considers working in cooperation with *A\*STAR Singapore* on bio-kerosene from algae fed with CO<sub>2</sub>.

#### 2.1.4. *Danone*

##### 2.1.4.1. Background

The French Ministry of Economy is worried about job losses on the national territory. It wishes to anticipate, that is, “see sufficiently early on”, the danger of a company closure, in order to try and avoid it. It has realized that anticipating the danger of a company closure cannot be done using forecasting methods with which it is familiar. It has sought to experiment with the “method of weak signals” to ascertain whether this would be better suited to its issues (this case will be continued in Chapters 3 and 4).

##### 2.1.4.2. Beginning sequence of the experiment

The experiment requires that possible weak signals be collected, so as to be subsequently utilized (see Chapter 3). It has also required the setting of a target enterprise, at least to initiate the process of anticipation. The company Danone was chosen. Research led, among others, to the discovery of the following item of raw digital data.

Danone is *experimenting* with an anti-crisis setup with French milk producers. In order to build loyalty among its producers and secure its supplies in France, Danone *offers* cattle raisers a multimillion-euro outreach plan. The idea is to *prepare* them for the end of quotas and the price

variations that are set to multiply... Farmers and industrials need to *prepare* for *greater and greater* volatility in prices with the *announced disappearance* of quotas in 2015 and increased speculation by financiers on agricultural commodities... Danone *wishes to be able to continue* to operate the five production plants it owns in France... and to maintain a strong export flow... and does not wish to concentrate them in a single location. In order to secure its supplies by building loyalty among the 3,300 farmers supplying it with their milk, Danone says it is *prepared to spend* several million euros over five years.

The group *intends to enable them* to be more competitive, train themselves in organic farming, make zero-interest investments, etc. Danone is far from being the largest milk collector in France, with less than 5% of the volume offered by farmers. However, the cost of milk is fundamental to the whole economics of its dairy products business. It has in fact suffered from both falls in the consumption of dairy products and in prices brought about by the crisis (source: *Les Echos*, 30/11/2010, p. 24).

#### 2.1.4.3. Interpretation

The question is now whether this data item has the characteristics of a weak signal. If that is indeed the case, then it will be subjected to interpretation:

- is the data item *relevant*? Yes, because it regards Danone;
- is the data item *anticipative*? Yes, because it contains several characteristic verbs and/or words suggesting that the event concerned has only just started unfolding. These characteristic verbs/words (in italics in Box 2.1) are: experimenting, offers, prepare, greater and greater, announced disappearance, wishes to be able to continue, prepared to spend, intends to enable;
- is the data item *obsolete*? No, because it was published at the very time the experiment was taking place;
- is the data item *reliable*? This question is generally premature at the time a possible weak signal is picked up. However, in the present case, it would be very easy to verify the reliability of the data item, including by contacting Danone directly.

#### 2.1.4.4. Conclusion

This data item, obtained in *FULL text*, in an economic newspaper (electronic version), contains a weak signal that can now be characterized as an early warning signal, taking into account the interpretation presented above. The latter signal may be presented to the ministerial work group to help evaluate the weak signals method with respect to its issues (see Chapter 3). We summarize the early warning signal by the following brief formulation.

NEWS BRIEF.– Danone is experimenting with an anti-crisis setup to secure its supplies by building loyalty among French milk producers.

## 2.2. Making a new weak signal reliable

As soon as a weak signal has been recognized (let us denote it by  $WSn$ ), the question of its reliability arises. It is not usually possible to quickly obtain total certainty. However, some first steps towards reliability are still possible. We present three of these, continuing with the Danone case.

### 2.2.1. Reliability of the information source

Confidence in the source of the weak signal already constitutes a surmise as to the greater or lesser reliability of the weak signal. The first step therefore consists of questioning the quality of that source. In the Danone example above, the apparent source is the newspaper *Les Echos*. The actual source is certainly the Danone company itself. This would be easy to check. We can therefore assume the weak signal to be totally reliable.

### 2.2.2. Comparing the weak signal with other information obtained previously

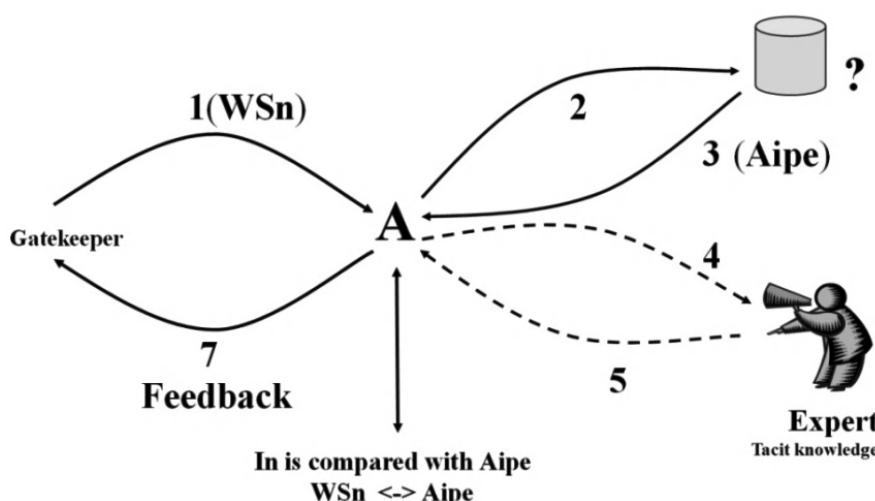
This new weak signal,  $WSn$ , will be compared to what is already known. For example, a search will be conducted in the database for pre-existing information items that are “adjacent” to the weak signal to be made reliable. We shall denote those by *Aipe*, for “adjacent information previously escalated”. If they do exist, such information items have already been made reliable, so far as they could be.

The word “adjacent” means that an information item, already present in the database, has a *meaning* which is close to that of the weak signal *WSn*. However, it is possible that *Aipe* has very few words in common with *WSn*. Consequently, the search for “*adjacent*” information may necessitate special software employing semantic rules (recognition of synonyms, polysemes, etc.).

The weak signal *WSn* is therefore converged with the possible adjacent information item, *Aipe*, in order to perform a comparison. The approach to be used is illustrated in Figure 2.4.

Commentary:

- let *WSn* be a new information item, escalated by a gatekeeper (arrow 1 in the figure);
- let us assume that *WSn* is a weak signal that needs to be made reliable. Let us also assume that the corroboration is performed by the animator (*A*) of the scanning apparatus. The animator (*A*) queries the database in search of possible information (*Aipe*) adjacent to the weak signal (arrow 2 in the figure).



**Figure 2.4.** Process of corroborating a weak signal

The animator may then encounter one of the following cases:

– no *Aipe* was found in the database. The animator cannot draw any conclusions regarding the reliability of the weak signal *WSn*. He/she will then have to turn to another method of corroboration;

– at least one *Aipe* was found (arrow 3 in the figure). The animator compares *WSn* with *Aipe* (one or more items). He/she then encounters one of the following cases:

– *WSn* and *Aipe* are similar, or even virtually identical. They may be duplicates, one of which can be discarded. But are they really identical? For example, when looking at their date of issue, several cases are possible, as indicated by the following heuristics:

HEURISTICS.– If two information items “look alike” (are similar) we then have to ask the following questions to assess whether they are actually *duplicates*:

Step 1. Do they come from the same source?

- if they do, nothing can be concluded regarding the reliability of *WSn*;

- if they do not, then the reliability of the *WSn* information item seems to be reinforced.

Step 2. Were they issued on the same date?

- if they were, nothing can be concluded;

- if they do not, then the repeated issue should be interpreted with caution.

Step 3. Do they have the exact same wording?

- if they do, nothing can be concluded;

- if they do not, then the difference can point us to an avenue of thought.

Step 4. What is the degree of resemblance/similarity between the two information items: what is the percentage of words common to both data items (if software is available to perform that calculation)? What does a difference, even a minute one, teach us?

- *WSn* and *Aipe* are definitely *contradictory*. However, *Aipe* was corroborated at the time of its admission into the database. In that case the weak signal *WSn* is *suspect*. Should it be rejected? If in doubt, the animator (A) should seek to verify it in some other way;

NOTE.– The observed *contradiction* could call into question the reliability of *Aipe*;

- *WSn* and *Aipe concord*. In that case, the weak signal *WSn* is deemed reliable. *WSn* can enrich the database. Still, seeking an expert's opinion about it should not be ruled out;

- *WSn* and *Aipe* are *inconsistent/discordant*. *WSn* cannot be introduced into the database without additional precautions. However, it is an interesting *inconsistency*. In itself, this inconsistency could constitute a weak signal that warns us. The inconsistency/discordance may have a meaning, which remains to be found;

- converging *WSn* with *Aipe* could highlight a *void*. It may appear that there is probably a “missing link”, that is, missing information. The animator has therefore just discovered a dark area. He now knows that this void must probably exist. He cannot describe it accurately, but he can at least designate it. He notifies this missing information to those gatekeepers that are likely to be in a position to find it. At the same time, the gatekeepers complement their own information.

### 2.2.3. Consulting with an “expert”

“Expert” here means a person likely to hold formal or tacit knowledge that may help corroborate the weak signal *WSn*. This expert could be internal or external to the enterprise. The animator communicates *WSn* to the expert(s) and receives an answer. The expert may validate *WSn* or, on the contrary, express doubts (arrows 4 and 5 in the figure). This method presupposes that the animator knows very well “*Who has knowledge of what/whom*” (see Chapter 3). The animator needs quick access to the expert(s).

The following testimonies draw on feedback from experiments in various enterprises.

TESTIMONIES.— “I’ve received information indicating that we could easily win a big contract with... But I’d really like to get the opinion of other salespeople who are in contact with that client.”

“We call one another to compare information, so that we have a more complete vision. Otherwise, we have no way of telling true from false.”

#### ***2.2.4. Feedback from the animator to the gatekeeper who provided the weak signal***

The corroboration of weak signals, as presented above, leads the animator to interact with experts, including internal ones (arrow 7 in Figure 2.4). These include information gatekeepers other than the one who escalated *WSn*. This interaction, or *feedback* from the animator, usually has a positive effect on the gatekeepers. This statement is based on the following hypothesis.

HYPOTHESIS.— *IF* the animator sends the gatekeepers *feedback* that tends to reassure them as to the reliability of the information collected, and thus help them in their work, *THEN* the gatekeepers are motivated to detect/collect weak signals in the course of their habitual activity.

This is due to several reasons:

— *feedback* is a kind of thanks, or recognition for the work performed by the gatekeeper;

— when the gatekeeper detects a possible weak signal, he/she may experience some worry, even fear, about his/her own ability to recognize the signal. *Feedback* from the animator is likely to subsequently guide him/her;

TESTIMONIES.— “I personally wouldn’t have collected that piece of information. But based on what you have told me, I realize it is important after all.”

“It is true that we all have different interpretations when faced with the same information. What is interesting is the enrichment that we derive from the confrontation of opinions.”

“It is true that a raw information item and an annotated information item (feedback from the animator) are hardly comparable, especially when the information is to be acted upon.”

“Anyone can be wrong about the anticipative character of an information item. That is why one should never think: I won’t forward this information, since the others have probably got it already. One shouldn’t be afraid, as they may not have noticed it.”

– having been reassured about the reliability of the weak signal, the gatekeeper will be encouraged to put it to good use in his/her main activity (sales, for example), and will find him/herself in a more comfortable position;

– where the weak signal proves to be *inconsistent* with *Aipe’s*, communicating that inconsistency to the gatekeeper may stimulate his/her *curiosity* and desire to search for other complementary information. He/she can thus avoid errors: this reduces his/her uncertainty, and possibly stress at work (which is quite important for salespeople).

TESTIMONY.– “We salespeople have a partial vision of things... not to mention all the disinformation we get from the clients. They keep feeding us red herrings. I’m telling you, these people aren’t afraid of anything!”

The hypothesis regarding the gatekeeper’s motivation, following *feedback* from the animator, is largely borne out by feedback from experience:

– When the gatekeeper feels that his/her work is useful and appreciated, we can observe how willingly he/she performs information collection.

TESTIMONY.– “I now have a different way of listening for, and being curious about, information.”

– When the gatekeeper feels that his/her work is pointless and despised, he/she very quickly ceases to collect, and more importantly forward, any information.

TESTIMONY.– “I’ve tried on several occasions to escalate information that I thought interesting. I never got the slightest thanks, or even a mere acknowledgment of good receipt! You’ll understand why, under such conditions, I didn’t keep it up.”

### 2.3. Conclusion

The *objective* of this chapter was to answer the question, “*How to recognize a weak signal?*” We have proposed a methodological approach to recognize whether a raw data item contains a relevant, anticipative weak signal, and also to assess the reliability of that signal. Both approaches have been presented by means of “life-sized” examples, and a flow chart is provided at the end of this conclusion.

#### 2.3.1. Result

The reader should by now be familiar with the concept in a concrete way, and capable of finding by him/herself examples of weak signals in their domain of interest.

TESTIMONY.– “Since your CCM intervention at our premises, I’ve caught “the bug”: I can no longer read a newspaper like I used to, I look for possible weak signals unthinkingly, in spite of myself... it’s quite annoying! But I thank you very much for that training.”

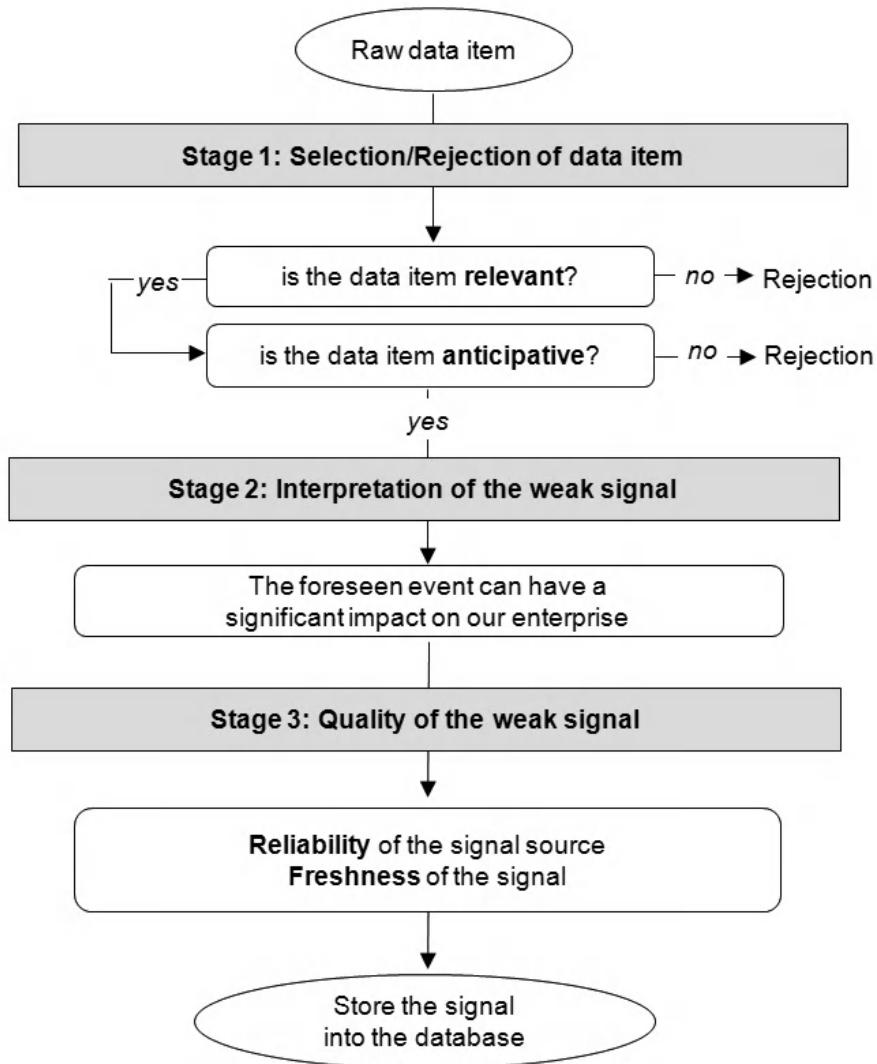
The reader may reflect on the current practices in his/her own enterprise, using the questionnaire provided hereafter.

Questions	Rather	
1 I myself have in mind an example of a weak signal.	Agree	Disagree
2 The concept of weak signal is very familiar to our enterprise.	Agree	Disagree
3 Our hierarchy would never accept to rely on weak signals. They want strong signals.	Agree	Disagree
4 The priority of our hierarchy is the reliability of information; its anticipative character is truly secondary.	Agree	Disagree

**Table 2.1.** Reader self-assessment questionnaire

In Figure 2.5, we propose a flow chart that makes it possible to visualize the main steps in the selection of a weak signal.

The reader is invited to answer, for his/her own benefit, the following questions and to draw lessons from his/her own answers.



**Figure 2.5.** Main steps in the selection of a weak signal [LES 02a]

<b>Concepts from Chapter 1 acted upon in Chapter 2</b>	<b>Sections of Chapter 2</b>
Anticipation	2.1.4
Attention	2.1.2
News brief	2.1.3, 2.1.4
Scanning target	2.1.4
Confidence	2.2.1
Contradiction/contradictory	2.2.2
Curiosity	2.2.4
Field data/information	2.1.2
Digital data/information	2.1.3
Reliable/reliability/corroboration	2.1.2, 2.1.4, 2.2.1, 2.2.2
Feedback	2.2.4
Heuristics	2.1.1, 2.2.2
Anticipative information	2.1.1
Inconsistency/discordance	2.2.2
Fear	2.2.4
Forecast	2.1.4
Rupture/Disruption	2.1.1
Signal/early warning	2.1.3, 2.14
Similar/similarity	2.2.2

**Table 2.2.** Concepts acted upon in Chapter 2

Source of a weak signal	2.2
Adjacent/ <i>WSn, Aipe</i>	2.2.2
Volatility	2.1.4

**Table 2.2 (continued).** *Concepts acted upon in Chapter 2*

Lastly, we recapitulate the concepts that have appeared in the applications presented above, so as to make the connection with Chapter 1.

In this chapter, we have placed ourselves in a situation where each weak signal is processed on its own, by a person also working alone, using his/her individual intelligence. Chapter 3 will be about a group of people who work collectively and process several signals at a time.

## Chapter 3

# Utilization of Weak Signals, Collective Creation of Meaning: Applications

This chapter introduces two novelties by comparison with previous pages. On the one hand, several weak signals are now processed simultaneously, as an archaeologist would bring together ceramic fragments to lend them some meaning, and on the other hand several people intervene simultaneously to interpret weak signals.

We are now applying collective creation of meaning (CCM) and the Puzzle® method, the concepts of which have been presented in Chapter 1. We shall present three application cases, based on feedback from experience.

### **3.1. The Roger case: should we fear this new entrant to our industry? (the banking sector)**

#### **3.1.1. *Issues for Roger as a company***

The general management of the Roger *bank* is following, with interest and a tinge of foreboding, the emergence of a new player entering its industry sector, namely La Banque Postale (LBP for short, in the following text).

### 3.1.2. *Context*

The management at Roger has arrived at the following two findings:

- a large amount of “data” is probably available internally regarding LBP, but this is scattered over different services in the various directorates. As a result, this data is difficult to utilize;
- what little data has nevertheless been pulled together is lacking in content and banal (*raw data*). It does not help leaders to see clearly, rather the contrary.

TESTIMONY.— “We have an enormous volume of information in all forms: scanned press clippings, magazines, faxes, RSS feeds, etc.”, “The texts we receive are not directly exploitable” (Ht1).

Meanwhile, the management at Roger has learnt about the existence of a CCM method, aiming to enable the exploitation of the weak signals that an enterprise can collect about its environment. They have decided to find out about this method, not by taking part in a conference, but by requesting an experiment on the LBP case. The CCM session presented hereafter was thus set up.

The subject of the work session was set by the general management. It can be summed up as the following question: faced with the player LBP, what strategy should we adopt? The session is intended to last for three hours.

### 3.1.3. *Codexi*

The Codexi (*comité d’exploitation des informations* – committee for the utilization of information) numbers eight participants, plus the animator.

The context of the meeting is as follows:

- it is a *transversal* meeting, that is, composed of people who belong to different directorates within the Roger bank. These people are not used to working together. Consequently, collective thinking is entirely foreign to them. Participants therefore have cause to wonder;

– as for the data collectively examined, each participant possesses a small part of it, but none has it in its entirety. In summary, each of them has only a few pieces of the puzzle (or puzzles) to be constructed/imagined and interpreted. The participants' surprise is therefore compounded by their being faced with all of the information gathered on this occasion.

### 3.1.4. Information to be used

A *dozen* short information items have been prepared beforehand, upstream of the CCM session. Each of them comes in the form of a sentence from which the least useful words have been expunged. Each of the sentences can thus be projected on a wall screen, without taking up too much space.

9. LBP to sell consumer credit over the counter by end 2009	7. Should LBP carry out "interesting operations" in external growth, <i>it might also need support from its shareholder.</i>	1. LBP is broadening its offering to all consumers
3. LBP enters consumer market for non-life insurance		
2. LBP was ahead with creation of DD savings book	8. With consumer credit, LBP hopes to reduce by 5 points its operating ratio, which was still as high as 89% at the end of 2007.	12. End of monopoly on "A" savings books
4. A new player in the non-life insurance market (LBP)	6. A network of contact points, i.e. tellers, numbering 17,000 units and 11.1 million current accounts	11. La Poste = trusted by the public + competitive advantage thanks to "A" savings books
5. LBP to enter potential partnership	10. La Poste made the prevention of over-indebtedness a key criterion for choosing its partner.	

**Figure 3.1. Table of news briefs**

### 3.1.5. Conduct of the collective work session

#### Step 1

The animator has distributed *all the news briefs* to each of the participants. The discovery of that list is a *surprise* to them. Each of them only knew two or three of those news briefs: those that are related to his/her usual activity, but not the whole set. The animator invites participants to

exchange thoughts and questions among themselves, for ten minutes or so. The idea is to perform a kind of “socialization” whereby participants get acquainted with one another and discover the instruments of collective work that will be used.

### *Step 2*

The animator states that the news briefs displayed on the screen are possible weak signals. However, he points out that only the collective work to be done will confirm whether they actually are weak signals whose meaning is important and anticipative.

The news briefs are therefore exploited somewhat like the pieces of a puzzle, the pattern of which is not known. The puzzle has to emerge from exchanges among participants.

### *Step 3*

The animator will fulfill his role by mentally following a guiding thread, which he will have to adapt as the session progresses. The participants do not know this guiding thread: they let the animator lead them. They are unaware that he will be guided by the way interactions evolve among participants, adapting his guiding thread as much as he will deem necessary. This guiding thread has more to do with heuristics than with a set procedure.

The animator asks: “Which information item shall we start with? We will place it in the center of the “upstream-downstream” table (see Figure 3.2), it being understood that the *spatial layout* of information may vary as much as necessary, based on your thoughts and suggestions”. The following information was picked (with some consensus): “The postal bank is broadening its offering dedicated to consumers”.

The animator asks for a volunteer to come forward and say what he/she makes of that information. This is an externalization/socialization step. Four or five participants communicate in sequence and question one another. Others merely listen, their faces expressing mainly surprise.

Across	upstream	A	B	C	downstream
Level 1					
Level 2					
3					

**Where should the next news brief be positioned?**

**Figure 3.2.** Spatial upstream-downstream table

EXPLANATION.— This table aims only to facilitate exchanges between participants. Information items that seem to be *logically connected* to one another will be placed at a common level. In that case, an item of information that appears to come logically after another one will be written to the right of the former (because we are used to writing from left to right).

Let us imagine that a first information item, I1, is written in the table. When the animator writes in the second information, I2, he asks: “Where should I position it with respect to I1?” *If* participants “feel” that I2 can be logically connected to I1, *then* I1 and I2 are written on the same level in the table. Furthermore, *if* I2 regards a fact that occurred somewhat later than a fact denoted by I1, *then* I2 is written to the right of I1. And so on. However, the positioning order of information may vary as much as desired by the participants, provided they make their case, which is recorded as a reminder.

Let us assume that the animator ends up writing information item I11 and that the latter does not seem to have any logical relationships to previously written information; the animator will then write I11 on the next level in the

table. Level 2 may differ from level 1 either because the information group located on level 2 has nothing to do with group 1, or because the group located on level 2 might pertain to a later time. In that case, the stacking of information items written into the table derives more from *chronological order*. The table merely brings “visual” convenience for participants to express themselves. Again, should the use of the cross-ruled “upstream-downstream” table prove to be more of a hindrance to the participants, the animator should then use a regular table.

#### *Step 4*

The animator asks: “What new information item shall we now position on the screen/table?” Information item 4 is proposed: “A new player in the non-life insurance market (La Banque Postale)”, as well as information item 9: “By the end of 2009, LBP will be selling consumer credit over the counter”.

#### *Step 5*

The animator asks how he should arrange the two new information items on the screen, or which *spatial layout* he should use. He points out that each of the participants who wish to make a proposal will have to make the case for his/her proposal... and that participants need to let whoever is speaking express himself/herself fully. The animator reminds them that the whole work session is being *recorded on tape*, for reasoning (spontaneous heuristics) traceability purposes, which will be explained. He adds that the recording will be tangible evidence of the *emergence of collective intelligence* (CI) within the work group.

#### *Step 6*

##### Collective creation of meaning

Interactions among participants demonstrate that choosing a spatial layout for the information items in the table greatly contributes to *the collective interpretation* of information and to the emergence of overall meaning. There have thus been, on several occasions, exchanges regarding the positioning of this information item in relation to that one. Little by little, a puzzle is delineated. However, more than one version can be envisaged and constructed in parallel, while a puzzle goes through several successive versions. Here are a few examples of sentences we have recorded.

EXAMPLES.—

“I would put 8 *above* 9 because...”

“I’d still put it *above* because...”

“We can’t put one before the other; they are *concomitant* and [therefore] I propose the ↔ arrow“.

“4 should be placed *on the same level* as 8 because...” (Hp4).

Gradually, based on interactions between participants, and in accordance with the appearance of a fresh news brief, the whole set of displayed information is *reconfigured* into a *dynamic puzzle*, making it possible to visualize the progress of collective thinking. Each version is recorded on a computer for traceability purposes.

Over the course of the exchanges, it emerged that information item number 1 should occupy a central position, as other information appeared as either causes or consequences of the broadening of LBP’s offering. Some of those consequences are potentially important to the Roger bank. By way of reminder, the goal is to provide elements of a synthesized answer to the question: “*is La Banque Postale a potential competitor or a potential partner?*” from *initial fragmentary news briefs*.

For example, the fact that LBP, on the one hand, and the Roger bank, on the other hand, both possess a wide network of contact points with (current and potential) clients, could put Roger and the *new entrant* in competition with each other. Here are examples of comments voiced by participants.

“Does that tell us something new, or is it already known to all of our decision makers?”

“That much is already known. Especially as the DD savings bank book has already been developed by all the banks. So it is not exceptional; LBP is doing pretty much what everyone does.”

“I don’t have any additional information to contribute regarding this sentence.”

“Should we take the date of the information into account?”

“Precisely, if we consider the date, LBP were ahead with the creation of the DD savings bank book.”

“Are they still ahead?”

“No, they’re no longer ahead” (Hp7).

LBP does appear as a potential competitor for the Roger bank.

Information items numbers 4, 8 and 9 *cause surprise* and fear in some participants. They interact about the spatial layout that should be applied to this information in the table, and about the proper interpretation of the spatial layout itself. Here are a few examples of sentences uttered.

“Item 4 should be put on the same level as item 8.”

“Items 8 and 9 should also be put on the same level, as it changes the interpretation” (Hp4).

Participants collectively become aware that LBP is *also* entering the consumer market for non-life insurance.

“There is a danger, since there is a new player in the non-life insurance market. Some market share will be taken away.”

“Yet one might surmise that major operators like us will be less impacted.”

“If it is new, what will it do? What can be expected from its intervention in this business?” (Hp7).

One of the participants speaks up to express what follows.

“What you are saying moves me to be more specific. LBP will enter a potential partnership, they won’t do it themselves. That potential partner is not known at the moment.

However, we now know that the Roger bank is unlikely to partner with LBP, since a *shortlist* has now been put out" (Hp7).

Another participant then asks:

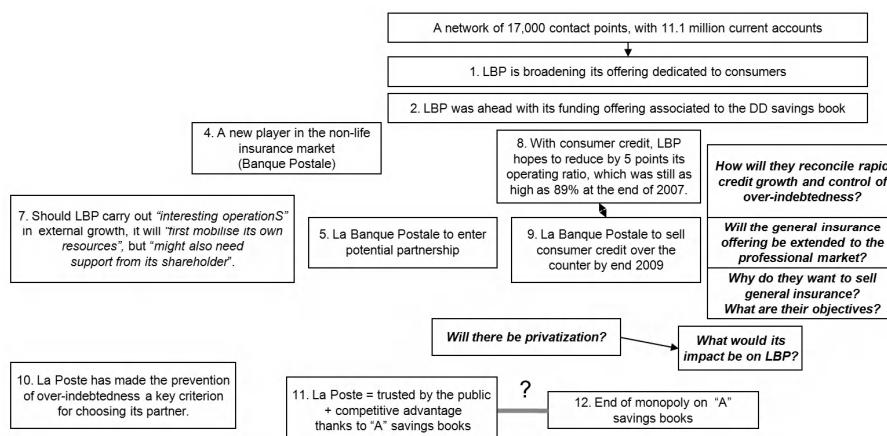
"If it isn't Roger, who could the other partner be?"

At that point, one of the participants ponders the potential and assets that LBP might have, for it to venture onto this market, which is new to it. He asks his question and obtains the following answers.

"Are there dynamic and competent people at La Banque Postale?"

"Yes, their Managing Director is shrewd, both politically and as an executive."

"At LBP, quite a few people are insiders, from the inner circle. Others have come from the outside, but it is mostly insiders who are acknowledged within LBP" (Hp7).



**Figure 3.3. Roger Puzzle**

Collective thinking brings up important new questions. The animator writes those questions down and projects them on the screen, because they have just added a new perspective to the information already posted. These

questions are *written in bold* in Figure 3.3. Now is the time to reflect on LBP's possible strategic intentions as a potential competitor.

*Another view*

At that point, another way of viewing things emerges, which is expressed as follows.

“An enterprise may have some potential and not be hostile. Why not ask ourselves about a possible *partnership* and look at LBP not as a competitor, but as a partner?”

Another participant adds:

“The way I see it, LBP used to be rather partnership-minded. They preferably enter partnerships (seek expertise outside). This is the first time they've talked about expanding externally. There is a project behind this that hasn't been disclosed.”

Other information items, which had hitherto remained *tacit*, are now being *articulated*:

“I read in *Les Echos* that LBP is looking for an insurer... It's a blank page for candidates who can demonstrate *imagination*.”

“For its part, AGEFI has let it be known that LBP is inviting tenders to create a joint venture in non-life insurance” (Hp7).

One of the directors, who is taking part in the work session, declares:

“Why do they want to sell general insurance anyway? What's in it for them? We need to search for information about that.”

We have only exhibited one of the successive versions in Figure 3.3. All the arguments articulated by speakers are recorded on tape in order to have subsequent access to the genesis of the puzzle and its successively formulated interpretations, and to serve as the basis for the final conclusion of the CCM session, which conclusion will be forwarded to Roger's general management.

### 3.1.6. Results

#### 3.1.6.1. Emergence of CI

The following sentences illustrate what we term collective intelligence.

Significant sentences recorded during the “Roger” session (selected examples):

- 1) “It seems to me there’s a discussion topic focusing on...”
- 2) “I feel there’s some antagonism between the two information items #...”
- 3) “Upstream, I would position information item #... because it has a strategic character... and downstream, on the right, information item #... because it regards operations.”
- 4) “What’s your reason for placing information item #... upstream of information item #...?”
- 5) “I’m putting information item #... upstream, on the left, because it is a general query. And information items... and... downstream, on the right, because they are, in a way, specializations of that query.”
- 6) “Let’s use color codes to express things that are not predefined in authorized links...”
- 7) “As for me, at the moment, I’m trying to start from the core we have started to build, and reasoning as follows... which leads me to place information item #... at this location.”
- 8) “I would insert a proximity link between information items #... and #...”.
- 9) “Personally... I’d actually reverse my judgment somewhat and swap...”
- 10) “I’d point the arrow the other way...”
- 11) “This might be a confirmation link between information item #... and information item #...”

- 12) "... and ... the explanation for that would be as follows..."
- 13) "So... and... would be in the rightmost position, as far as I'm concerned".
- 14) "So it would also be in contradiction... item... would be in contradiction with..."
- 15) "That's it, we could... Yes, I see what you mean, but it's..."
- 16) "As for... and..., we can put them together because..." (Hp4)
- 17) "I don't like this link between 8 and 12".
- 18) "Me, I've been wanting, for a little while, to connect information items #... and #..."
- 19) "... this interpretation paves the way for a few propositions that we can formulate like this..."
- 20) "I can see a lot of differences with the meaning I would have extracted from this information if I had done the puzzle on my own" (Hccm1).
- 21) "... because, at the same time, I'm thinking of information items... and... someone corrects me, saying it may be between... and... And I correct my reasoning again at once, in real-time... If I'm thinking alone, I can do one puzzle, or ten like this, but it doesn't enrich me. Instead, this immediate *feedback*, I think it is... all it takes is a look at the answer. We all respond, we are present... *This is the positive aspect*".
- 22) "At the end of the day, the Puzzle® method enables us to formulate a concept, even if we end up reworking the whole thing... There may be a search for complementary information afterwards based on the formulated concept, in order to validate... Because, obviously, each of us here has expressed some ideas. Those ideas were sometimes different. But no one can say they have the solution" (Hp2).
- 23) "The result of the session also depends on the information available at the time. So maybe it'll take a second session, and a third one, to redefine things as and when we get new, additional information".

### 3.1.6.2. A surprise to participants

Participants are surprised at the fact that the *same news briefs* can lead to *different interpretations*, depending on the order (the positioning assigned to them on the screen) that is decided upon. Some find it arbitrary. The animator then points out that this is always the case anyhow, but dramatically more so when each executive only has access to part of the information and combines/understands it alone, in his/her own way, to arrive at a decision without much consistency (to say the least) with decisions made by other colleagues.

#### 3.1.6.2.1. Bounded rationality

The animator adds that while the meaning which emerges from collective interpretation of all the news briefs is admittedly a “shaky” construction, at least it is argumentative. *Traceability* exists and is recorded in the present case. He mentions the concept of bounded rationality and adds that the result obtained at the end of the CCM is probably of a less bounded rationality than what takes place every day in banks, be it Roger or another one. This prompts some muttering in the room.

#### 3.1.6.2.2. Positive end result: creation of meaning has been performed collectively

At the close of the session, the following thoughts are expressed which show that a collective emergence of meaning did happen.

“We come out of this collective work session having done some serious housekeeping. We know what should draw our attention, knowing what to say/what to call the attention of our managers to; knowing what to look for”.

“We know now that two strategic options are open before us: the onus is on general management to select a strategy”.

“And let us know about it!” adds another participant.

“This is the first time we have done such collective work. We should do this every once in a while. Our activities are too split up and compartmentalized. For example, I didn’t know Mrs... had such information as she mentioned. That changes everything!”

“Each one of us is straining under a large volume of fragmentary data items which, when viewed separately, are of no great interest. It is the synthesis of those items that matters”.

“Yes, but it’s difficult for someone to synthesize all alone. Besides, what would qualify us to draw conclusions? You have to mobilize several different competencies, as we have done today” (Hccm1).

“That’s how we exploited weak signals to arrive at a robust conclusion”.

“And in such a short time!”

Discovery of Roger’s situation of corporate blindness... and of the danger looming “ahead”.

“I didn’t know we didn’t know this... In fact we hadn’t even asked ourselves that question. Deep down, we didn’t even know we should have been asking that question, which hides a serious problem. I am very disturbed by this realization!” (Hp9). One of the directors participating in the CCM session.

“The Puzzle we are putting together clearly shows that we risk losing this type of customer, at least a large part of them”.

Another director who took part in the session adds, in a musing tone:

“I am very surprised by the number of interesting questions that emerged during our collective work, whereas none of those questions had come to my mind when I read the preparatory documents, alone in my office. This unsettles me somewhat” (Hp9).

### 3.1.6.3. *Stimulating regrets: an interesting lead*

Here is what the director who brought about the experiment narrated above had to say.

“This way of exploiting weak signals is truly very interesting and the results obtained are astonishing. We would like to take ownership of it all, however I have two concerns:

– I do understand that the animator's role is very important to the implementation of the Puzzle® method. How are we going to find an able animator, with the know-how to conduct CCM sessions?

– I also understand that you must have spent a lot of time, upstream of the CCM session, to search for and prepare the news briefs that we have used. This in spite of your possessing suitable skills. As for us, how could we go about it? Is there software that could assist us?" (Ht1).

These questions are covered in Chapter 4 of this book.

### **3.2. The case for “valorizing CO<sub>2</sub> as a commodity”: a preliminary study for the selection of a new strategic direction**

Industrial group GI, to be discussed in the following, owns plants in various industries, located in various countries. These include plants in the chemical industry. GI's general management is concerned about the future and pondering it.

“In what new direction might we direct the group's governance for the next 10 to 12 years? What should we invest in? In which direction should we direct our R&D? Is sustainable chemistry something we should get involved in?”

#### **3.2.1. *The main problem: how to “give birth to an idea” within the Board of Directors (BoD)?***

The director of R&D for the GI industrial group offers a suggestion. Here is what he says: “We could explore a new avenue of activity directed toward sustainable development, more specifically ‘green/sustainable chemistry’. For example, a new approach would be to exploit CO<sub>2</sub> as a plentiful commodity.” However, it is not for the R&D director to make such a suggestion: that is the role of the BoD.

“The difficulty is that, in our GI industrial group, we have no idea of the field in which we would use CO<sub>2</sub> as a raw material. Everything remains to be explored... including the views of our Board of Directors, who are currently unaware of anything! The first thing to do is therefore to obtain its green light!”

### **3.2.2. Challenge: arousing the interest of the BoD**

“I chose an approach that is unusual in our industrial group. I asked an expert in the method of weak signals to come and deliver a talk to our BoD. He is supposed to be neutral and objective, since he is a researcher in a CNRS laboratory. That should help the members of the BoD relax. His presentation of the concept of CCM, by utilizing weak signals, should enable the triggering of collective thinking on the BoD, in a domain that is new and quite fuzzy to them. The challenge is to make the BoD feel like they’re discovering the field by themselves, not following a conference delivered by an external speaker”.

It was thus decided to hold a session that should lead the BoD to make a double discovery:

- discovery of a possible avenue of strategic development in the field of green/sustainable chemistry;
- discovery of the CCM method, using weak signals.

It is crucial that the BoD get the feeling of having discovered the “green/sustainable chemistry” strategic axis on its own.

The hypothesis formulated here is as follows.

HYPOTHESIS.– *IF* leaders have the feeling that they are discovering possible strategic options on their own, *THEN* they will be more inclined to pay attention to them.

### **3.2.3. Preparing for the session (which will prove to be the first session)**

The group director for R&D is the character occupying center stage. He is accompanied by an expert in CCM, an outsider to the GI industrial group. The expert is to act as the animator in using the method.

Prior to the session, and in order to prepare for it, the animator performed the following operations:

- preparing definitions of the “sustainable chemistry” and “green chemistry” concepts;

- preparing the definition of the “weak signal” concept, accompanied by two simple, concrete examples;
- preparing a short explanation linking the concept of “weak signal” with the concepts of innovation and disruptive technology;
- searching for information that may be used during the work session. This search is conducted with various information sources, including field information. The most relevant information will be selected to get the BoD interested (without the animator knowing how the discussion will work out among the members of the BoD). He will endeavor to ensure that each information item can be regarded as a possible weak signal;
- shaping information items (written briefly) so that they can be projected onto the screen in the meeting room.

NOTE.— The animator is by no means supposed to be a specialist in sustainable chemistry, or even in chemistry generally speaking. It is not that skill the R&D director expects from him. However, he should be capable of arousing the interest of the members of the BoD, to induce thoughts and interactions among participants (about ten of them), so as to reach a concise conclusion: *approval* for exploring the route of green chemistry (with a focus on CO<sub>2</sub>), or else: *refusal* for the GI group to follow that course.

We can reveal at once that the process, which was intended to take place over a single session, actually ran in two sessions, spaced apart by several weeks, as will be seen in the following.

### **3.2.4. Background of the experiment (first session)**

The R&D director is set in front of the BoD, whose members have almost opposite behaviors: some are in favor of continuity, other are proponents of innovation, making the most of possible mutations or disruptions, which would need to be discovered in time. Indeed, a few earlier exchanges among members of the BoD have established that opinions are divided, *a priori*, roughly into two groups:

- a group of members who are rather partial to a continuation of the past, that is, carrying on with the same activities, in the same businesses, while

capitalizing results achieved to date and seeking to make incremental progress. The operative words are “optimization” and “cost reduction”;

– a group of members who are rather keen on investing a significant portion of the GI group’s resources into activities to which it is new, that are innovative on the world market and possibly represent a departure from current activities. According to those members, new directions need to be defined for research and development (hereafter denoted by R&D) and new scientific competences should be acquired if necessary. The operative words are “innovation in new fields, including for example sustainable/green chemistry”, and “investment in disruptive techniques”.

However, the entire BoD chose to demonstrate future-oriented governance (“Let us look forward, not in the rear view mirror”, said one of them), and to generally embrace sustainable development. Some members have taken part in colloquies, including in English-speaking countries, on this sustainable development concept, about which they only have a few general notions. The concept appealed to them, but they admit they have very few clear ideas regarding its application by their GI industrial group.

That is why the R&D director has convened this collective CCM session, a novel kind of gathering at GI. He hopes to cast some light on this important strategic matter, which is likely to impact the group’s future.

This meeting will be attended by: the members of the BoD, the chairman and CEO of the GI group and, obviously, the R&D director, assisted by the CCM animator already presented earlier.

The R&D director is convinced his speech should be clear, limited to bare essentials, and should avoid all technical explanations, since none of the board members is, or wants to become, a specialist in the field to be discussed. The goal is simply to convey the guiding principles that can support governance in the GI group. Moreover, the duration of the session will be limited to about two or three hours, at most.

For these reasons the R&D director made the following choices, which are deliberately restrictive so as to prevent discussions from wandering aimlessly:

– to place himself within the field of “sustainable/green chemistry”; more specifically, direct attention onto biofuels that are “more environment-

friendly”, on the one hand, and, on the other hand, onto carbon dioxide ( $\text{CO}_2$ ) as a potential raw material for uses to be discovered;

– to avoid delivering an instructional, hardly inspirational lecture. On the contrary, he wants to induce the board members to express themselves, to question themselves aloud, to discover together, step by step and interactively, the different facets of a governance direction to be elicited collectively.

#### *3.2.4.1. Ideal objective*

The R&D director would like the session to end with a conclusion along the lines of: “Mr. Director, what you have presented is of interest to us. However we wish to learn more, in a concrete fashion. We therefore ask you to conduct exploratory research into... the results of which you will present to us”.

### **3.2.5. Conduct of the session (first session)**

#### *3.2.5.1. Targeting*

The R&D director has suggested that “sustainable/green chemistry” was far too vast a domain. On a provisional basis, he has chosen a scope that is more restricted but may still be of interest, provided the BoD goes along with this. This will cover the production of “more environment-friendly” fuels that do not compete for land with food crops, and the use of “carbon dioxide” ( $\text{CO}_2$ ) regarded as a possible raw material that might be valorized over the next few years. The session will therefore be targeted accordingly. Participants state their agreement to this provisional delimitation.

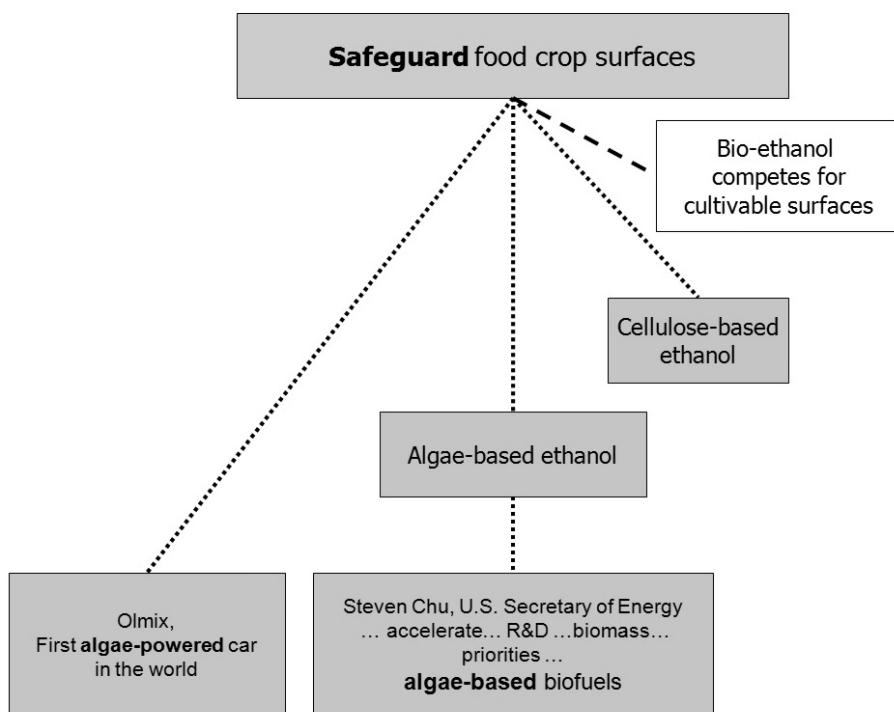
*Step 1 (first session). Development path: to produce agri-fuels while protecting food crop surfaces*

The R&D director, together with the animator, presents a first lead that could give rise to a development strategy into sustainable/green chemistry.

One after the other, the animator displays the news briefs he has prepared. For each of them, he briefly explains why it can be regarded as a possible weak signal.

The animator suggests that each new weak signal displayed be placed relative to the previous ones. He is careful to ensure that the participants offer suggestions and explain their points of view.

Eventually, the layout depicted in Figure 3.4 is agreed upon. Participants are mindful of what it means and how it has been constructed. They also understand that other versions of the figure could be envisaged, provided that a case for them could be made just as robustly.



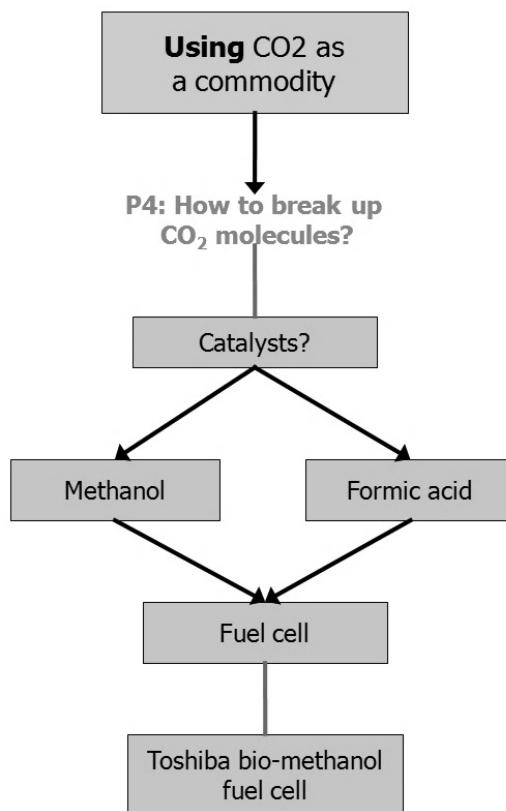
**Figure 3.4.** Lead #1 presented to the BoD

#### *Commentary*

The guiding idea would be to exploit biomass (for example wood cellulose, etc.) and/or algae to produce fuels while saving cultivable areas for food production. The board members absorb this information and discuss the pros and cons of this route among themselves. For example, it would not be

desirable to enter a conflict with defenders of cultivable areas. However, the Board members do not yet resolve the debate: that is not the outcome being sought. They do however ask the R&D director for specifics, which he either has with him or promises to have researched later on. In what follows, the thinking is centered on CO<sub>2</sub>.

*Step 2 (first session). Development route: exploiting CO<sub>2</sub> as a possible raw material*



**Figure 3.5.** Lead #2 presented to the BoD

The animator sequentially displays fresh news briefs. Meanwhile, he explains how they were selected. He also states the reasons why these are possibly weak signals.

As before, the animator invites the participants to say how the news briefs should be placed relative to one another, so that an overall meaning gradually emerges. The participants agree to play by these rules.

This route, depicted in Figure 3.5, suggests that CO<sub>2</sub> could be regarded as a raw material to be valorized.

#### *Commentary*

The idea would be, for example:

- to use CO<sub>2</sub> for the production of formic acid and/or methanol;
- both these compounds are in turn useful for various productions, including, again, fuel cells (FC). Example: Toshiba is already very far advanced into the production of methanol-based FCs;
- however, some hurdles remain to be cleared. Indeed, turning CO<sub>2</sub> into methanol and/or formic acid requires, in the current state of the art, a suitable catalyst. At the moment, this obstacle has not been overcome, at least not satisfactorily in terms of cost and feasibility on an industrial scale. Again, board members listen, ask for particulars and exchange views among themselves about the pros and cons.

#### *Outcome of the session: a pleasant surprise!*

The BoD has been led to collectively discover the “sustainable/green chemistry” domain, or at least a small part of that domain, and to ask itself questions. The answers to those questions are only partial and provisional. However, they have attracted the participants’ attention and sparked their desire to know more, possibly in order to subsequently make strategic decisions. This is in fact the challenge the R&D director initially set himself.

The surprise came afterwards. Following a short deliberation of the BoD, the chairman and CEO of the GI group expressed his satisfaction and formulated the request presented below.

Mr. Director of R&D, we have just decided the following.

We wish to look in more depth into the route involving the use of CO<sub>2</sub> as a possible raw material for sustainable/green chemistry. To that end, we will give you a three-month period and an exceptional budget of X thousand

euros. At the end of that period, you are to deliver to us a new, more targeted and more persuasive presentation, indicating to us:

- what additional particulars you have uncovered the stages along the “CO<sub>2</sub> valorization” route;
- which possible competing industrial groups are interested in this avenue of innovation;
- which laboratories around the world are currently working in this direction;
- possible *start-up* companies existing around the world and working along this route;
- the names of the directors for environment or sustainable development in the industrial groups engaged along this route;
- what “weak, but forewarning signals” might, from now onwards, alert us to a possible breakthrough, or even an impending disruption, either technological or scientific, regarding this path of innovation;
- what information sources will have to be continuously monitored to “see” sufficiently early on the precursor signs of opportunities for our GI group, as well as threat warnings.

Lastly, what new scientific skills should our group possess in order to steer the indicated courses? And where can they be found?

An appointment is thus set in three months’ time.

### **3.2.6. Second session, three months later**

This time, too, the experiment can only have limited ambitions. The R&D director has assigned himself two objectives:

- to create greater anticipative visibility in the domain chosen for the experiment within sustainable/green chemistry, that is, the use of CO<sub>2</sub> as a raw material with potential for valorization. The results the R&D director needs to provide, while not necessarily numerous, should be sufficiently concrete and explicit to inform the reflection of the GI group’s BoD;

– prove to the BoD that a “weak signals”-oriented scanning apparatus can be an effective tool to support the group’s governance.

This time around, the R&D director has had enough time to commission a wide-ranging search for additional weak signals. Examples are provided below.

[...] making plastics using CO<sub>2</sub> [...] replacing fossil raw materials (oil, gas, etc.) with CO<sub>2</sub> [...] search for a suitable catalyst.

*Liming DAI* [...] Replacing platinum (as a catalyst) in the electrodes of alkaline fuel cells [...] nitrogen-doped *carbon nanotubes* [...].

Other possibility of CO<sub>2</sub> valorization: speeding up the growth of *algae* dedicated to *livestock feed* or to the production of biofuels. “In total, 5 to 10% of the generated CO<sub>2</sub> could be reused”, estimates Geogreen’s Managing Director.

*Total* and *ESPCI ParisTech*... have set up a chair in “sciences related to energies, carbon and the environment”, entirely funded by Total. Inaugurated in September 2010, it has plans for several complementary research projects within different laboratories at *ESPCI ParisTech*... thesis scholarships and laboratory facilities.

CO<sub>2</sub>, an alternative to *hydrochloric acid in swimming pools*? Researchers at *Universidad Autónoma de Barcelona*. (UAB) [...] replacing the hydrochloric acid used in swimming pools with CO<sub>2</sub>: enables avoidance of accidental mixing of hydrochloric acid with sodium hypochlorite [...] used in swimming pools, and whose reaction gives off a large amount of toxic gas, among other advantages [...].

*EADS* considering work in cooperation with *A\*STAR Singapore* on bio-kerosene from algae fed with CO<sub>2</sub>.

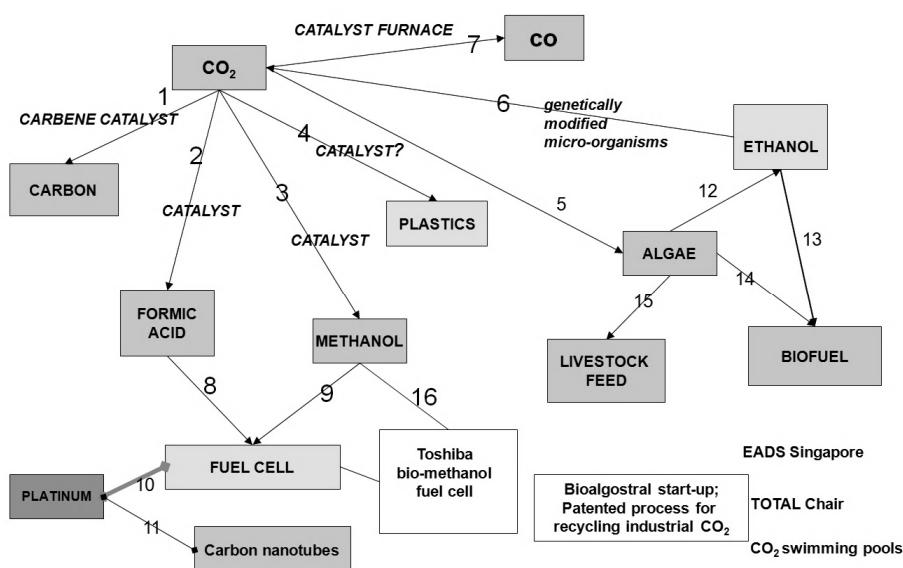
### 3.2.6.1. Conduct of the session

As stated earlier (see Chapter 1), CCM, relies essentially on interactions between participants, on the externalization of their tacit knowledge of the subject matter, and on the use of heuristic that are either spontaneous or based on feedback from previous experience. We are typically in a situation

of incomplete information, despite all the effort to detect relevant weak signals.

It is therefore not surprising that collective thinking goes through various attempts, “trials and errors”, and hesitations. The result often translates, not into a single puzzle to be regarded as “Gospel truth”, but into two or maybe three competing puzzle versions. One of those has to be selected in order to make decisions and take action, even on an exploratory basis. The obtained puzzle is given in Figure 3.6.

### 3.2.6.2. Commentary



**Figure 3.6.** Puzzle constructed during a CCM session (one of successive versions)

The puzzle suggests several paths and reminds of some obstacles:

- $\text{CO}_2$  used to produce carbon, which would in turn serve as a raw material (1). The catalyst would be carbene;

– CO<sub>2</sub> can be a raw material to produce plastics (4). But here the question arises again: what catalyst could be used, in economically viable conditions, while opening the door to some innovations?

– CO<sub>2</sub> used to feed algae (5), which would in turn be used to produce fuels (14) or feed livestock (15);

– some laboratories have shown that petrol and/or ethanol can be produced from algae (6) (13), the latter being fed using CO<sub>2</sub>, among others. But where does such research currently stand? What economic advantages can be expected? What would the probable competition be like?

– CO could be produced directly from CO<sub>2</sub> by means of a catalyst oven (7). That avenue of research has already led to important work, notably in California (United States), but it seems like a lot remains to be done;

– the FC (fuel cell) raises a number of unresolved problems from the industrial and economic viewpoints: the problem of the optimal catalyst (10), compounded by the problem of currently nonexistent urban infrastructures, etc. At the moment, the industrially used catalyst is platinum: a very expensive metal, whose few deposits are mined with adverse environmental consequences. Moreover, China, the largest buyer, is able to considerably influence the price of that metal, thus creating unacceptable uncertainty.

One participant expressed surprise at the words “swimming pools” written on the screen. The animator pointed out that this was not a joke, rather an unusual example of CO<sub>2</sub> utilization: he explained what that was about. According to another participant, this example goes to show that CCM requires a very open mindset, even if it means subsequently pruning the proposals that have emerged.

Figure 3.6 illustrates only an intermediate version of the puzzle collectively constructed during the session. The paths thus presented are not set. They are only plausible hypotheses. Each of them can, in turn, be refined on the basis of the knowledge and arguments offered by participants. They are interactive, and their final form, at the close of the session, is the result of collective thinking by the members of the BoD.

The R&D director’s and the animator’s goal is for the final form of each figure to come across as a collective construction of which each board member can claim ownership. During the work session, news briefs will

have been brought in and added, while others may have been deleted to reflect the interactions among participants, in order to accurately express the collective vision that emerges from their exchanges.

Toward the end of the session, one of the participants noted: “I support the principle of exploring the recycling of CO<sub>2</sub> as an innovative path for our group. But I’ll voice a query: many start-ups, including but not only in California (United States), may have already gained a good head start. Wouldn’t our *late start* along that route constitute a danger for us?”

Another participant: “Our group could always *acquire* one of those *start-ups* at a suitable time. That would enable us not to start from scratch and waste time and resources if we had to start our own research”. All participants then approve this point of view and conclude: “Then let us initiate systematic ‘weak signals’-oriented anticipative scanning, aimed at those start-ups” (Hp11).

### **3.2.7. Conclusion and post-scriptum**

Sustainable chemistry is a recent concept which can be thought of as opening up immense potentialities for innovation, and consequently for the economic growth of those industrial groups that will be able to act purposefully. However, this concept is still quite fuzzy, and there are few certainties in that domain.

Most innovation windows will probably stem more from scientific and technological mutations and disruptions than from the optimization of what already exists. If this hypothesis is correct, the resolve and governance towards sustainable chemistry require leaders to be forward-looking and keep their “eyes and ears wide open” in order to detect as soon as possible any *signal carrying an early warning* that might reveal some indication to whoever is capable of interpreting it.

For his part, the animator sets about building a tool for assisting in the amplification of weak signals; we refer to this tool as a “connection/amplification table”, and will return to it in Chapter 4.

*Post-scriptum:* in the ensuing months, several early warning signals were detected.

EXAMPLE.–

I1) Pilot project for the production of biofuel from marine algae consuming CO<sub>2</sub>: the project brings together “*Phytololutions/Jacobs University* (Germany; Prof. Ben Zeelie)” and “*Nelson Mandela Metropolitan University* (Eastern Cape province)”. Conversion of CO<sub>2</sub> into biomass.

I2) *Bioalgostral*, company located on Reunion island innovates in micro-algae biotechnology. Its goal: to become the first European center for the production of algae-based fuel in the Indian Ocean. Its (patented) process enables the extraction of nutrients contained in wastewater and the binding of CO<sub>2</sub> given off by the methanization unit, without causing pollution or a degradation of the natural environment; it allows CO<sub>2</sub> emissions, including industrial emmisions, to be recycled.

I3) While there are still comparatively few players in the field of algae-based biofuels, the potential seems to be promising and looked on favorably by the American authorities. The *Sapphire* company, for its part, is already well into the deployment stage: one of its products has already been flight-tested by an airline... In fact, we cannot help but be surprised at this start-up's breakneck pace of growth: 130 employees, a research center and a pilot plant in New Mexico, all in a mere two and a half years of existence. It is probably not by chance that *Bill Gates* got involved with it...

**3.3. The Danone case. The ministry is worried: are there signs showing that companies will destroy jobs over the next two years? Could Danone leave France?**

**3.3.1. *The issue at hand***

We shall restate it, as it has been first encountered in Chapter 2, section 2.1.4. The French government wishes to be able to predict, sufficiently early on, a danger of closure of an industrial facility, in order to take measures that may avert it. It has set up a task force named “inter-ministerial hub for anticipating economic mutations”, or “*pôle interministériel pour l'anticipation des mutations économiques*” – PIPAME for short. This hub is comprised of a number of representatives from various ministries. Its goal is to discover suitable methods for economic anticipation, besides usual forecasting methods that are ill-suited to the issues it tackles. The guidelines of PIPAME state that the aim is to anticipate singular events,

not to forecast in the macro-economic sense of the word. The set objective was as follows.

“To elicit the germs of change for the benefit of targeted sectors, with the aim of safeguarding and developing employment. To anticipate economic mutations. To enable decision-makers to act/react quickly, ‘upstream’. To explore the possibility of arriving at a tool to aid intervention, called an *interventional tool*”.

### **3.3.2. Fresh interest in weak signals**

The person in charge of PIPAME identified the Puzzle® method, which is precisely weak-signal-oriented. “Is it possible, using your method of weak signals, to glimpse sufficiently in advance the danger of company closures and job losses, so as to be able to react in time?” He asked for this method to be presented before the members of PIPAME. Afterwards, once the presentation had been successfully delivered, it was decided that an experimental application would be conducted on the above-mentioned problem. The goal of the experiment is to use the Puzzle® method to assess whether it is suited to the detection and exploitation of weak signals that may announce an impending closure, or relocation abroad, of an enterprise currently located on national soil.

### **3.3.3. Background: lack of cross-disciplinarity**

As an inter-ministerial hub, PIPAME brings together, occasionally and on an *ad hoc* basis, various organizations and services belonging to different, rather unconnected ministries. This also means that people who will be part of the experimental group are absolutely not used to working together, and indeed do not know one another. That is why the first two sessions, spaced apart by about three weeks, aim for “socialization” of the work group: the group members need to discover each other, discover one another’s usual missions, the types of information they typically use, their work methods, etc. The PIPAME coordinator, by resorting to the Puzzle® method, implicitly indicated that the goal of the experiment was also to initiate *transversal collaboration* between hitherto partitioned units. This promised a formidable challenge for the animator of the experiment.

### **3.3.4. Organization and conduct of the experiment**

At the outset of the experiment, it was agreed that eight collective work sessions would be scheduled, which was actually the case. The sessions would be about three weeks apart. Between two sessions, participants would be invited to collect *FULL text* information according to indications provided by the animator. Furthermore, the animator invited participants to make contact with one another, when they see fit to do so, in order to cooperate and help each other with the search and selection of *FULL text* information. Each participant therefore needs the e-mail addresses of all the other members in the work group.

It is worth noting that, in this case, the animator is an academic who specializes in the Puzzle® method and is therefore outside the organizations represented in the work group, hereafter referred to as the Codexi. It is comprised of about 15 people representing a dozen organizations or services reporting to different ministries.

### **3.3.5. Targeting of a field of study**

“Start small, and then gradually expand in scope, as inductive collective learning progresses, learning by doing” [LES 03b, p. 45].

The goal of the experiment is to make the Codexi members discover the concept of a “weak signal” that potentially foretells the above-mentioned dangers. It is also to make them discover the Puzzle® method for exploiting weak signals in order to create meaning and formulate plausible anticipations regarding the appearance of “economic mutations”, the latter phrase being that used by the Ministry of Economy.

As the Puzzle® method relies, among other aspects, on the principle of “*having people do things to learn by doing*” the animator requested that a domain in the economy be selected by all participants, so that they would know what the subject was. This operation of targeting the field of study took place in several iterations, taking into account the following demands:

- the target should be familiar to all participants, so that they would be motivated to work collectively and make a contribution;

- the target should be as small as possible, so as to allow meaningful results to be obtained after a small number of work sessions;
- furthermore, the target should be sufficiently interesting to attract the attention of hierarchies, when the obtained results would be presented to them on completion of the experiment.

The fields successively considered were the agri-food industry, then the meat sector, then the milk sector. The latter was retained, given the recurring problems posed by milk production and its price in France, as well as the government's concerns regarding this sector and livestock farmers.

### **3.3.6. Selection of Danone as an agent**

As the animator noted that this “milk sector” target was still too wide, at least for an introductory experiment, it was elected to focus on one agent of the milk sector: Danone.

This agent was deemed pertinent for the following reasons: it directly or indirectly affects a large number of jobs; it concerns many cattle farmers; it is already well established abroad. Moreover, Danone is known to all the participants in the Codexi and, therefore, constitutes a subject on which each of them should be able to bring information using their usual sources.

### **3.3.7. Conduct of the CCM experiment**

#### *3.3.7.1. Initiating interest in weak signals*

##### *Sessions 1 and 2: review of FULL text and selection of news briefs*

During the first two sessions, the animator presented the concepts of the Puzzle® method, which would be useful in subsequent work. At the close of session 1, he asked the participants to search for and bring examples of information related to Danone and likely, in their view, to contain possible weak signals. He specified that those information items should have an anticipative character. Such examples will be used for the “practical work” during the following sessions. The animator pointed out that the requested examples would probably present themselves in the form of texts that will be exploited collectively. Some of them will probably be short, while others may number several pages, such texts being referred to as *FULL text*.

The animator also stated that participants, should they wish to do so, could directly fill in a sheet called a “collection sheet”, the template of which was provided. In that case, the information gatekeeper will write the news brief he/she will have extracted from the *FULL text*. Figure 3.7 presents an example of a filled-in collection sheet.

GATEKEEPER: Arnaud Camuset	DATE collected: 06/02/2008
SOURCE: Direct Matin – 06/02/2008 (Page 15)	IDENTIFIER of this sheet: FC0053
AGENT: DANONE	TOPIC: Milk Sector

**INFORMATION** (very concise, short sentence without extra words)

Danone announces the signature of a joint venture with Weight Watchers International to create a business specialising in “weight management in China”.

**Gatekeeper's COMMENTS**

- 1 – Information relevant to our Agri-Food set of issues? **Milk Sector**
- 2 – Is it anticipative ? **Just announced**
- 3 – Does it warn us? **Reinforcement of Danone's policy in “emerging countries”**
- 4 – What could be done on the basis of this information?
- 5 – Can I say it is a weak signal? **Yes**
- 6 – Can I correlate this information with other, previous information? **Two Chinese dairies bought out by Danone**
- 7 – Whom should I alert?

**Figure 3.7. Information collection sheet**

### *Session 3: continuing the selection of news briefs from within FULL text*

The animator invited participants to engage in the following exercise: which short excerpt of particular significance can we extract from *FULL text* data point number 1?

#### *Turmoil*

One participant causes a stir by reporting the following news brief: “It is no longer in France that our Danone performance is progressing”. This sentence was uttered by the chairman of the Danone group during the last general meeting of shareholders. A lively discussion ensues among the members of the Codexi.

The animator uses this *brief* sentence to illustrate the concept of anticipative information. Does this information item, thus abridged, have an *anticipative character*? If it does, then we shall retain it for the continuation of our work. If not, then we shall reject it (actually, we set it aside, in case it may be of use). He also asks whether such an information item can be said to possess the characteristics of a weak signal.

This information item is at the heart of PIPAME's problem. Some participants judge that it should be escalated to the PIPAME hierarchy. To others, on the contrary, this could be a misleading piece of information that would need to be *corroborated* before it is escalated.

### *Conclusion*

Other, complementary information items need to be searched for.

### *Learning more*

The same exercise in *FULL text*, raw data search, most often originating as text on paper, and in the extraction of short, meaningful sentences, was repeated by participants. This gradually yielded news briefs, some of which appear in the following box.

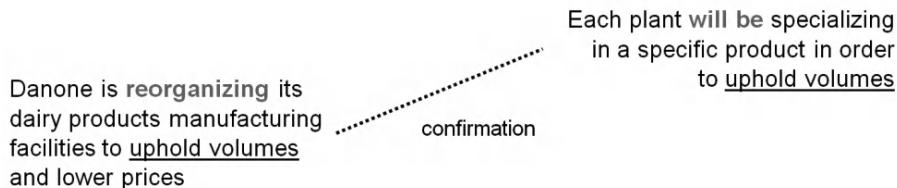
NOTE.— By way of reminder, we have previously presented, in Chapter 2, the following news brief: “Danone is experimenting with an anti-crisis setup to secure its supplies by building loyalty among French milk producers”.

#### *3.3.7.2. Puzzle Links: alleviating initial data fragmentation, and consequently Danone's low visibility*

The animator then proposed establishing links, where appropriate, between news briefs thus obtained in order to bring out a meaningful representation (or several). Each proposed link will have to be justified by the participant proposing it.

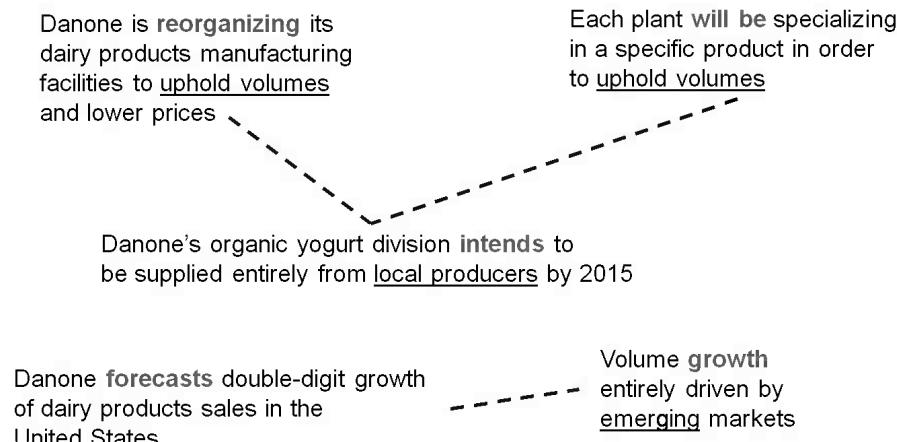
Complete information: “everyone has fragments of it; no-one has it in its entirety”. This step aimed to remedy the scattering of *FULL text*, and therefore of possible weak signals, among the various units to which participants belong. For example:

Figure 3.8 shows that two news briefs were brought together because they pertain to the same idea. In addition, participants judged that a *confirmation* link, or at least a corroboration link, existed between them;



**Figure 3.8.** Confirmation/corroboration link to remedy weak signal fragmentation

Figure 3.9 provides a new example. This shows that participants brought together two news briefs for the following reasons: they pertain to a common idea and are associated by a *contradiction* link therebetween. This apparent contradiction is likely to constitute an early warning sign in the eyes of the ministry, mindful as it is of anticipating possible strategy shifts at Danone.



**Figure 3.9.** Contradiction link to remedy weak signal fragmentation

It can thus be seen that a news brief is a possible “weak signal”.

If interpreting the possible weak signal leads participants to acknowledge it as an anticipative weak signal, it takes on the status of an “early warning signal”.

Otherwise, the proposed weak signal is rejected. Bringing weak signals together is therefore a step that follows the recognition of a weak signal examined in isolation (Chapter 2).

Eventually, it appeared necessary for the participants to search for new *FULL text* data to feed into the thought process thus initiated. Participants distributed the work among themselves according to the information sources with which they are usually in contact.

#### *Sessions 4 and 5*

All participants brought fresh, *FULL text* raw data.

They took care to record the full reference of each text for traceability purposes. They used a variety of sources: mainly messages exchanged with other colleagues who were not Codexi members, as well as *field information* collected from roaming colleagues (for example in meetings with livestock farmers, but also with large retail stores, etc.).

The animator invited the Codexi to extract those news briefs deemed essential by participants. Such a learning process is not straightforward, because:

- participants are accustomed to using long texts, the length of which reassures them;
- some participants offer to write a summary of a *FULL text* raw data point;
- the animator prohibits the writing of summaries, in order to avoid *interpretation bias*;
- the animator demands that a news brief be extracted without adding anything to it that was not already written in the original *FULL text*.

A few of the news briefs thus obtained are presented in the following box.

EXAMPLES.– News briefs, possible “weak signals” collected by the Codexi:

22. Priority given by distributors to suppliers capable of supplying them everywhere under the same terms.

49. Danone allegedly bought two dairy plants in China, one in Beijing, the other in Shanghai.

53. Danone announces signature of joint venture with Weight Watchers Inter to create weight management business in China. New sector for Danone.

58. Danone to build giant farms abroad.

59. French Ministry of agriculture worried about milk sector.

67. Emirati investment firm Eiic plans to build large dairy farm in Algeria.

73. It is no longer in France that we drive up our performance.

80. Essensis will continue to be marketed only in Spain and Italy.

49. Danone forecasts double-digit growth of dairy product sales in the United States.

### 3.3.7.3. *Danone weary of obstacles encountered in France?*

#### *Session 6*

As the list of news briefs is now relatively long, participants request moving on to the construction of a Puzzle that may provide an answer to the issues facing PIPAME: the idea is to look simultaneously at several news briefs and to position them in relation to one another so as to elicit some collectively understandable overall meaning.

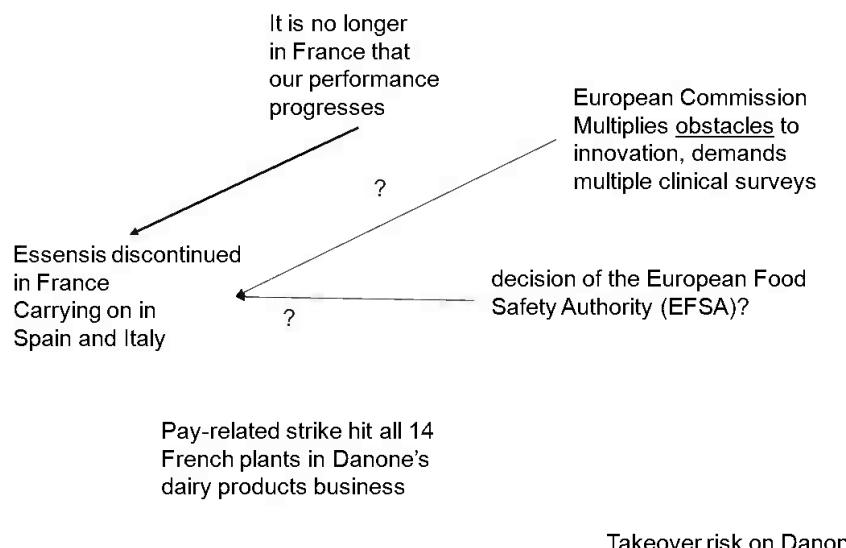
One participant proposes grouping together the weak signals that seem to express a *threat* to Danone at home, and therefore a possible reason for this economic agent to relocate abroad:

– the animator brings/groups together the weak signals indicated by participants;

– he then asks how the news briefs should be located with respect to one another so that the layout helps reveal some meaning;

– he asks that the proposed positioning be justified, it being understood that the argumentations offered will be recorded on tape for traceability purposes.

Several layouts are proposed by the participants, including the one depicted in Figure 3.10.



### **Is Danone being “threatened / discouraged” in France ?**

**Figure 3.10. Repellents in France**

#### *Interpretation*

Danone could be discouraged from staying in France (at least its Milk arm, which is considered here). A number of factors act as repellents. The closure of the Essensis branch seems to be the conclusive sign. For one thing, it is no longer in France that Danone's performance is progressing. Consequently, not much growth can be expected there. Conversely, obstacles that hinder a growth strategy for Danone in France seem to be multiplying. It is possible to formulate the following plausible hypotheses:

– *IF* Danone has to conduct multiple clinical surveys to demonstrate that its “Essensis” product brings health benefits, *THEN* Danone ceases to manufacture Essensis in France;

– *IF* social unrest and staff strikes incited by trade unions in France, along with protests from milk producers, keep multiplying, *THEN* Danone could grow weary of staying in France;

– all of this is topped off with the risk of a takeover bid, which seems to be overshadowing Danone (Figure 3.11). *IF* such a risk was to come true, *THEN* the new management might want Danone to settle in other, more favorable countries. This takeover eventuality should therefore be a cause of concern to the French government.

PRESS: French Senate identifies 24 potential takeover targets

92 words

28th June 2007

11:03

DJ Bourse

PARIS (Dow Jones)--The French Senate has identified 24 French companies likely to be targeted by takeover bids, La Tribune stated on Thursday.

Of those companies, nine are part of the CAC 40 index: Accor SA (12040.FR), L'Air Liquide SA (AI.FR), Compagnie de Saint-Gobain SA (12500), Groupe **Danone** (12064.FR), Lafarge SA (12053.FR), Schneider Electric (12197.FR), Société Générale (13080.FR), Vallourec SA (12035.FR) and Vivendi (12777.FR).

**Figure 3.11. Takeover threats to Danone**

The collected early warning signals thus (possibly) enable the prediction of events liable to drive Danone out of France. Admittedly, these events have not entirely become factual yet, but warning signals are rather numerous. And the catalog is not exhaustive, since it was only composed as an exercise.

#### *Partial conclusion*

There is indeed a *risk* of Danone closing industrial facilities. This risk is part of the concerns expressed by the French government. This is the very

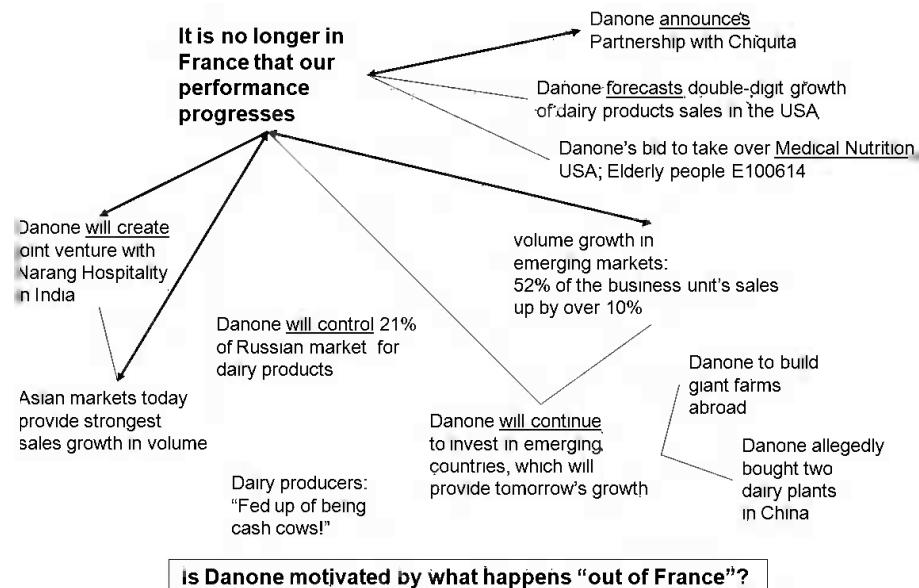
reason it is interested in the weak signal method, in order to foresee *threats* sufficiently early on to guard against them... where possible.

### 3.3.7.4. *The sirens' call from abroad*

#### *Session 7*

However, not all the weak signals proposed by participants have been exploited. Several more remain. Considering these, one participant proposes building a second Puzzle, complementary to the first. The new puzzle could pertain to *attractors* of Danone overseas.

The animator invited participants to propose a spatial layout of the weak signals so that an overall meaning could emerge from these fragments of information. Proposals from the participants included, for example, that depicted in Figure 3.12.



**Figure 3.12. Overseas attractors**

It is clearly visible that Danone's performance is making rapid progress in emerging countries. Growth is substantial in sales volume as well as in turnover.

However, emerging countries are not the only ones of interest to Danone. The United States could also attract Danone.

Looking forward and considering relocated facilities:

- Danone has already made investments, which it hopes will be beneficial;
- the collected signals suggest that Danone will carry out other investments abroad, either to expand investments already under way or to create new plants and penetrate new markets.

#### *Conclusion*

Each of the signals we have collected is weak and hardly conclusive in itself. But the ordered set of collected signals plainly reveals a risk likely to disquiet the French ministry of economy and PIPAME. There are many attractors that could lure Danone out of French territory... And lead to job losses in France.

#### *Reliability*

We might wonder whether the collected weak signals are reliable. But it should not be difficult to launch a search for new information items that would confirm or disprove the signals currently being used.

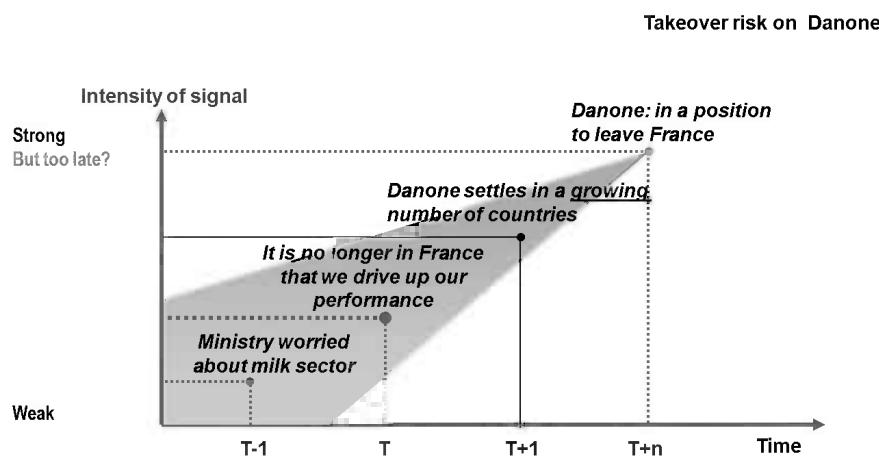
### ***3.3.8. Conclusion at the close of the last session: huge plausible risk on the horizon!***

#### *Session 8*

The last session took place in the presence of coordinators from PIPAME (who had ordered the experiment), in addition to the members of the Codexi and the animator.

The main conclusions were as follows:

- regarding the milk sector, the government should really be worried. One of the main players in this sector, namely Danone, could be led to close down several of its facilities in France in order to expand abroad. A departure of Danone is a *plausible risk* (Figure 3.13). A risk of job losses, both direct and indirect, is to be expected from that quarter;



### DANONE's DEPARTURE? A plausible RISK!

**Figure 3.13.** Answer to the initial question: “Is there a risk of future enterprise closures and job losses?”

– the experiment involves only one agent, Danone, but this agent is a world leader. It is highly significant. *The experiment* should now be *replicated, targeting* the collection and interpretation of anticipative weak signals on other agents in that same sector;

– the experiment has proved *conclusive*. It is clear that numerous weak – but anticipative – signals exist in various ministerial departments. At the moment, they are still fragmentary, dispersed, and they end up being ignored. They are not harnessed to the *governance* of economy and employment;

– in addition, the experiment has shown that other weak but portentous signals may be accessible in the *field* using the *networks* that the central administration maintains with regions and territories. Yet those networks are not currently being used to collect foretelling weak signals;

– the Puzzle® method is well suited to anticipation on the part of organizations that had, up till now, exclusively used macroeconomic forecast methods. As it happens, such methods do not enable the detection of signals foretelling events that are singular and microeconomic, yet of very great importance to economic and social *governance*;

– lastly, the experiment showed that instilling a *culture of transversal communication* between different departments in a single ministry is not an easy thing to do.

It was not in the remit of the Codexi, or the animator, to determine whether public authorities would be able to clear away the obstacles highlighted using the “method of weak signals”, or whether the public authorities’ responsiveness is consistent with the anticipation lead time afforded by anticipative scanning.

Answer given to PIPAME, following the issues that it raised:

There is indeed a risk of Danone closing some industrial facilities in France. There is also a risk of Danone relocating abroad. These two results, obtained separately, complement each other.

#### *Origin of the FULL text used*

Participants searched for *FULL text* mainly in the documents available within their units. That is what the animator asked them to do. They also used clippings from daily newspapers. They sometimes requested documents from correspondents outside their own units, for example trade bodies.

#### *Relative paucity of collected documents*

On the whole, collected *FULL text* proved rather lacking in anticipative information. It also proved wanting as far as the targeted agent, “Danone”, was concerned.

#### *Onset of motivation for weak signals*

The participants have grasped the concept of weak signals. They took in the basics of the Puzzle® method. They demonstrated motivation for continuing to work together on the Danone target.

Such motivation for working together on weak signals was one of the main objectives of the experiment called for by the director of PIPAME. The hypothesis is as follows:

HYPOTHESIS.– *IF* the transversal motivation lasts, *THEN* it becomes possible to detect and interpret those weak signals that are likely to alert

relevant public authorities so that they take appropriate action to limit job losses (in the case considered here).

*Post scriptum: new clouds!*

Indeed, further clouds appeared afterwards. For example, the following signals have been picked up.

“... The group could be forced to *re-evaluate its strategy* for growing its dairy business, which accounted for nearly 60% of its turnover last year” (04/01/2010).

“On Thursday Danone gave up on claiming health benefits for two of its flagship yogurts in its advertisements in Europe, a decision that further *undermines the French giant’s marketing strategy*” (04/15/2010).

“Danone and Russia’s Unimilk announced the *merger of their fresh dairy products businesses* in Russia, the Ukraine, Kazakhstan, and Belarus. Danone, which holds 57.5% of the new company’s capital, will be its operator” (*Le Monde*, 06/19/2010).

### **3.4. The Opel case: initiating collective transversal intelligence to aid strategic decision-making**

#### **3.4.1. Issues and background**

The aim of the following experiment was to see whether CCM is suitable for *preparing* strategic decision-making, by the public body concerned on the one hand, and for bringing about the emergence of CI between people belonging to administrative units (ministries) that had virtually no communication between them, on the other hand. The units in question are assumed to have access to information that regards a common target (agents or topics) and is possibly complementary. Such information is currently fragmentary and captured according to the specific activities of each department. Each of those information fragments, as long as they are scattered, is of little interest, especially in an anticipation perspective. However, they might be synergetic, if they are brought together and, more importantly, discussed within a collective, *transverse* work group.

Moreover, the people are probably connected to information networks that are in contact with “the field” and independent from one another. The goal is therefore to *initiate* an approach intended to lead to the sharing of information and its enrichment, including its greater reliability, for the benefit of political decision-makers.

The experiment briefly presented hereafter numbers five steps (including the upstream step).

The issue proposed for the experiment is as follows: “*Could Opel (a German carmaker), currently present in Belgium, leave the country?*” It is, again, about anticipating a threat.

### **3.4.2. CI**

As presented in Chapter 1, CI is regarded here as the collective ability to distinguish signals (in the sense stated in Chapter 1), even when they are weak and very unobtrusive (as opposed to an advertising placard), to perceive them, bring them together and link them to each other in order to elicit meaning.

Several people pool their individual abilities to enhance their capability for distinguishing, memorizing, and linking signals. In the case of a group of people, agreeing to contribute to CI means empowering oneself to *transform weak signals*, collected on the environment, *into driving forces* for strategic decision making.

### **3.4.3. *Organizational context***

Also in the Opel case, the context was as follows: people had no experience, or even knowledge, of the weak signal concept; they belonged to different, very compartmentalized departments; they had no experience in exchanging views about the information they use; on a common topic, they had only fragmentary information, probably different from one department to another; even when they are concerned with a common topic, the point of view they adopt is different, because of the purpose of their department. Such differences can be viewed as *handicaps*, but they can also be viewed as *strengths* if one is capable of developing a synergy.

That is why a senior official at the ministry has reflected on the possibility of developing communication and cross-disciplinary intelligence.

### **3.4.4. Preparatory step upstream of the first CCM session**

Prior to session 1, the animator announced the subject that would be treated during the CCM session described hereafter. The subject is focused on the automotive industry and the economic problems that impact employment. This subject is defined by the name of one agent: the carmaker *Opel*, and by the name of one industrial plant: *Antwerp*.

Participants in the CCM session were chosen by their respective hierarchies. They therefore volunteered more or less, but as the experience will show, they always demonstrated their good will.

The animator asked the participants to collect information, about the subject to be treated during the sessions, delving into the reservoir of information available to them in the course of their usual activities. The animator expects three possible cases:

- the participant brings a few information items relating to the designated subject, which he/she extracted from his/her files;
- the participant failed to find any information regarding the subject in the stock of information accumulated in his/her office;
- the participant thought it interesting to obtain some information items from his/her networks, said information not being normally available in his/her office due to his/her usual activities.

The animator indicated the period to which the requested information should relate. In this instance, that is the period from January 200x to the end of June 201x.

The animator pointed out that the requested information should have an anticipative character. This information is of the *FULL text* kind, that is, their format can range from a few lines to several pages. In this form, the information is unusable during CCM sessions. Consequently, the animator asked for the collected information to be sent to him a few days before the first collective work session. He himself extracted the news briefs displayed in the box, of which a few examples are presented below.

Opel: examples of news briefs used (dates are deliberately omitted, but available during a session if necessary).

G1a) Opel has indeed *announced* the withdrawal of its requests for guarantees from European governments after A Merkel's refusal. ("Oldest" news brief in this list).

G3a) Since the unions, employees, and management successfully reached a lasting agreement on the future of the Opel plant in Antwerp, all the effort is now being concentrated on the search for a buyer.

G3b) Equipment manufacturer Magna *reportedly* interested in Opel's plant in Antwerp.

G7) Germany will not *back* General Motors in its restructuration of Opel.

G10) Sustainability [...] energy issues and the record on sustainable entrepreneurship [...] Antwerp *might* take on a pioneering role [...] adopting a new vision in the fields of energy and transport [...].

G11) Chinese carmaker Geely *does not seem* to be interested in acquiring Opel Antwerp.

G12) Opel set the 30<sup>th</sup> of September (2010) as its deadline for finding a buyer for its Belgian plant, which *would be* scaled down and in which Opel *might* retain a minority stake. In case of failure, shutdown *will take place* toward the end of the year.

G15) Opel Antwerp: 16 candidate investors have expressed *interest in* the facility [...] stated Flemish minister-president Kris Peeters on Wednesday.

G16) Opel Antwerp: Nick Reilly satisfied at the approval of the winding-down programme [...] "the factory is situated in a strategic location within the port of Antwerp, an element that should attract many interested parties", said Nick Reilly.

### 3.4.5. Conduct of the CCM session

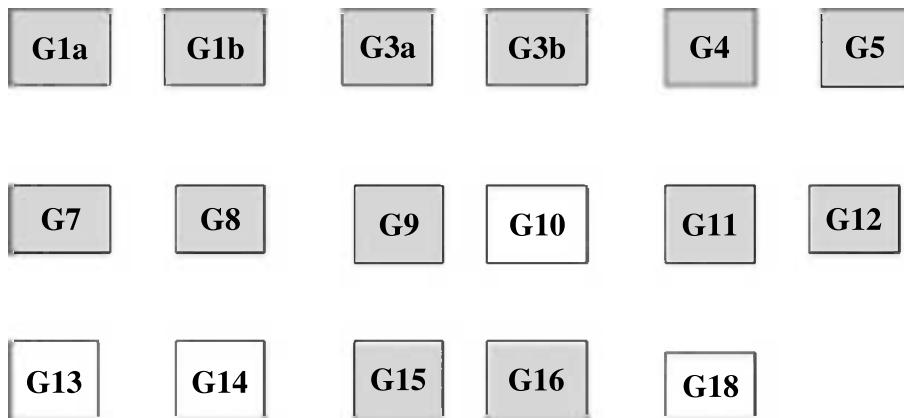
#### Step 1. Are the prepared news briefs anticipative?

The animator issues the participants, who number approximately 20, with a list of the news briefs he has prepared, the list being in written, paper form to facilitate reading. He points out that it will always be possible to refer back to the original *FULL text*, should the need arise. Participants thus collectively discover the information brought by each and every one of them. Some express surprise and questions are tossed across the room, such as: “I didn’t know that [...] Who supplied this information? [...]” (Hp9).

The animator asks participants whether the news briefs about to be used actually have an *anticipative character*. Every news brief is examined and discussed in turn (Such work is an integral part of the process of learning the method for the discovery of weak signals.). The word that reveals the anticipative aspect of the news brief is written in italics.

Each news brief is identified by a number written at the top of the news brief. That number makes it possible to go back to the original *FULL text*, if necessary.

The news briefs are projected *in bulk* on the workroom’s wall-mounted screen (Figure 3.14). For some of them, it is possible to click on them to display the corresponding *FULL text* if necessary.



**Figure 3.14.** News briefs presented in bulk

The animator asks: “Which brief would you like to *start* with?”

A participant replies: “I suggest we start with *G3a*”

Animator: “As you wish, but why?”

Participant: “Because the deal has now been struck between the employees, the unions and the management; that is a fixed point on which to build our reasoning”.

Animator: “That’s a good reason; let us start with *G3a* then, if everyone agrees. Otherwise, we’ll also listen to the other proposals ...”

*Step 2. Are there any “adjacent/similar” news briefs?*

The animator asks: “Let us start by looking at possible news briefs that could be ‘adjacent’, that is similar, to *G3a*. If there are, we shall write both news briefs side by side and see what we can infer from them”.

Animator: “How might we continue, with what other news brief?”

A participant: “I suggest we bring *G12* closer”.

Animator: “Why?”

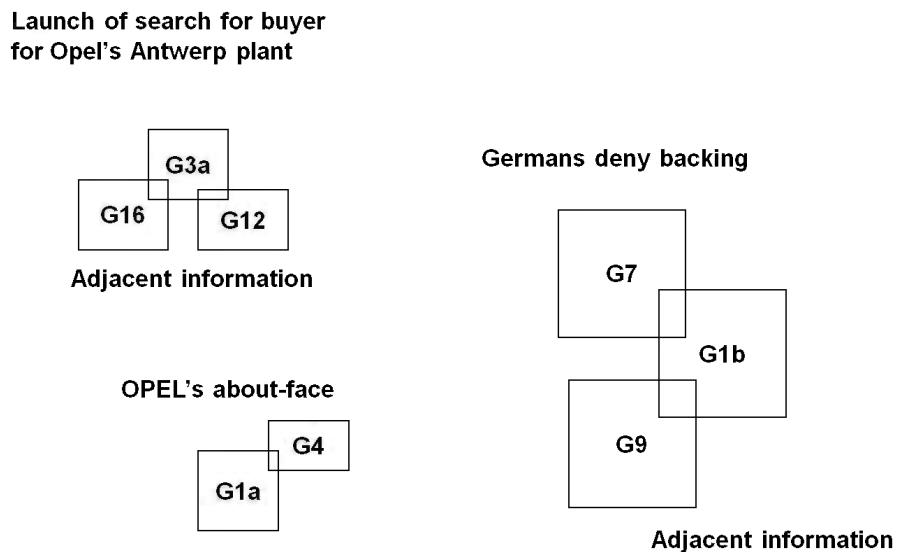
Participant: “Because it also regards the willingness to look for a buyer, but it also indicates the deadline by which that potential buyer has to be found” (Hp2).

Animator: “How do we position *G12* in relation to *G3a*?”

Participant: “Roughly on the same level, or perhaps slightly lower. That way I’d show that *G12* stems from *G3a*” (Hp2).

Participant: “At the same level as *G16*. It, too, seems to stem from that”.

The three adjacent news briefs are displayed on the screen (Figure 3.15).



**Figure 3.15.** Clustering of “adjacent” items of information

Animator: “each time we constitute a link in the puzzle, we need to articulate the main idea associated with that link. The articulation should be such that is accepted by all participants. What could we formulate here?”

A participant: “Launch of the search for a buyer for Opel’s Antwerp plant”.

The animator writes this proposal on the screen. On the screen, he places the three information items, which are “adjacent” in terms of meaning, contiguously so as to visualize the previously expressed idea of them being “somewhat akin”.

Animator: “Would there be another group of mutually adjacent/similar news briefs?”

A participant: “I’d propose grouping *G1b*, *G7*, and *G9*”.

Animator: “Why? What is your train of thought?”

Participant: "All three indicate the Germans' refusal to back Opel".

Animator: "When two news briefs are 'adjacent/similar', we shall write them with an *intersection between them*".

The three news briefs are displayed on the screen with the caption "Germans refuse backing" (see Figure 3.14).

*Step 3. Are there two news briefs such that one confirms the other?*

Animator: "Do you think there are two news briefs (or more) that confirm each other?"

A participant: "Yes, G15 confirms G16, in my view".

Animator: "Please articulate your point of view; what reasoning leads you to this statement?"

Participant: "G16 formulates a *hypothesis*, namely that Antwerp's (supposedly) strategic position is bound to attract many interested parties. And G15 indicates that sixteen candidates allegedly came forward. If G15 is correct, then the G16 hypothesis is validated. Therefore G15 confirms G16".

Animator: "In the puzzle, we express confirmation by the == symbol; for example, G15 == G16. If the proposed link is hypothetical, we use dashed lines === If we could use colors, the confirmation link would be green-colored".

Animator: "Let us come back for an instant to 'adjacent' information items. Given that the question of information *reliability* is a recurring issue in the field of strategic scanning, it would be interesting to know that the adjacent news briefs confirm each other. But is that correct?"

Participant: "Information items G1a, G7, and G9 are 'adjacent' to one another in their meaning; they seem similar. On the one hand, they could be regarded as redundant, but on the other hand, they can be regarded as useful because they corroborate one another, they confer some reliability onto one another".

Another participant: “*G3a*, *G12*, and *G16* also appear to confirm one another. But these are special cases. There’s no proof that this is always so”.

Animator: “Perhaps we might still keep in mind that, when information items are ‘adjacent’, this adjacency constitutes a *lead to be explored* with regard to the reliability of those information items”.

Animator: “How shall we summarize the main idea of what we have drawn on the puzzle 3 version?”

Participant: “I don’t know how to put this, it seems to me that ...”

The animator observes that *moving from visual expression* (on the screen) to *verbal expression is challenging* for the participants. It seems that “visual-related thought” is faster than the thinking that is dependent on verbalization (Hp2). This will be the case throughout the present collective work session, but this observation has also been made in other experiments not detailed in this book.

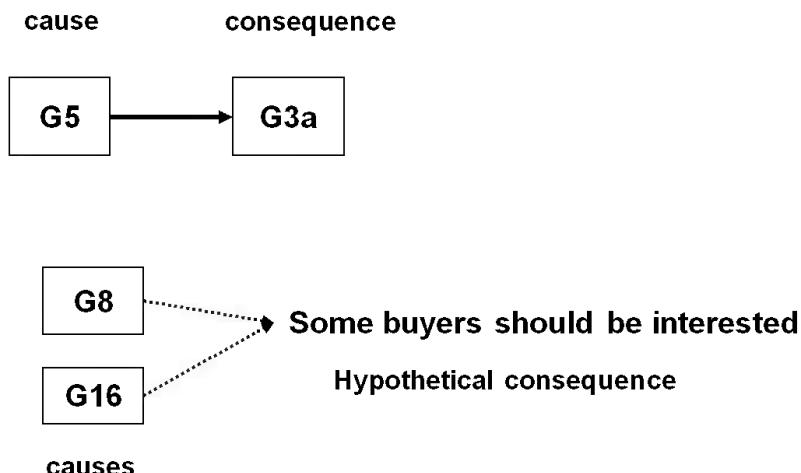
#### *Step 4. Are there two news briefs such that one is the “cause” of the other?*

Animator: “Are there, in the list of news briefs (Opel news briefs box), two (or more) information items, one of which is the cause of the other one (in other words, the latter would be the consequence of the former)?”

A participant: “Yes, I think it can be said that *G5* is the cause of *G3a*, in other words *G3a* is the consequence of *G5*. *G5* states that partners succeeded in reaching a permanent agreement, as a result of which collective labor agreements have been signed. At least, this is how I understand things. If necessary, we could go back to the original *FULL text*”.

Animator: “On the puzzle, we shall represent causality with the symbol → (see Figure 3.16). Let me remind you that we need to move *from visual to verbal*: you have to use a sentence to express the main result of that piece of puzzle”.

### Search for buyer becomes possible



**Figure 3.16. Causality link**

#### Step 5. Are there two contradictory news briefs?

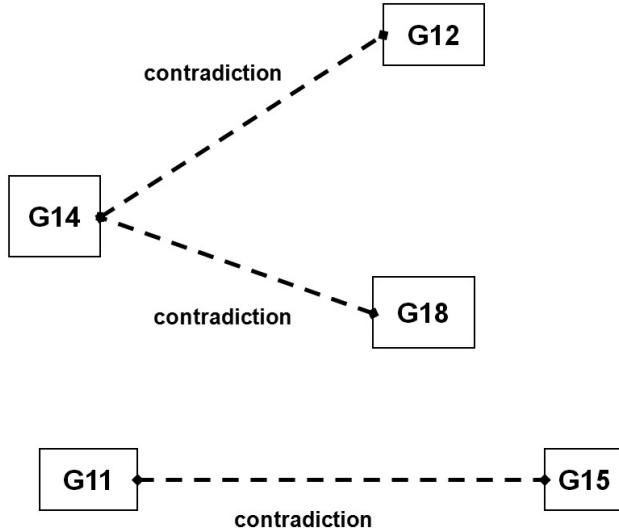
Animator: “Are there, in the list, two news briefs (or more) that are in contradiction with each other?”

A participant: “Information items *G14* on one hand, and *G12* as well as *G18* on the other hand, seem to contradict one another or to be inconsistent. Indeed, *G14* mentions a (complete) closure of the Opel facility, whereas *G12* only refers to a scaling down of that plant”.

Animator: “To signify contradiction, we use the <>-<> symbol, as we can see in the figure (see Figure 3.17). It may be necessary to search for new information that might answer the query you have raised”.

Another participant: “I would be inclined to say that *G11* and *G15* are contradictory”.

**Are there really any candidates to acquire OPEL?**



**Figure 3.17. Contradiction link**

Another participant: “I wonder if *G14* is also in contradiction or inconsistent with *G18*, although, in this news brief *G18*, it is said that the total closure of the plant would take place in two stages. What do my colleagues think of that?”

Animator: “I would like to draw your attention to something interesting, a singular case that can occur when looking out for weak signals, which may be invisible at first glance. Here’s what it is. When you are presented with two contradictory information items, it is useful to ask yourself the following questions:

- is one of the two information items incorrect?
- are they both incorrect?
- are they both correct?

It may seem surprising for two information items to state the contrary of each other, yet for both of them to be correct. However, it can happen. It takes an additional effort of investigation to highlight such a case. But that

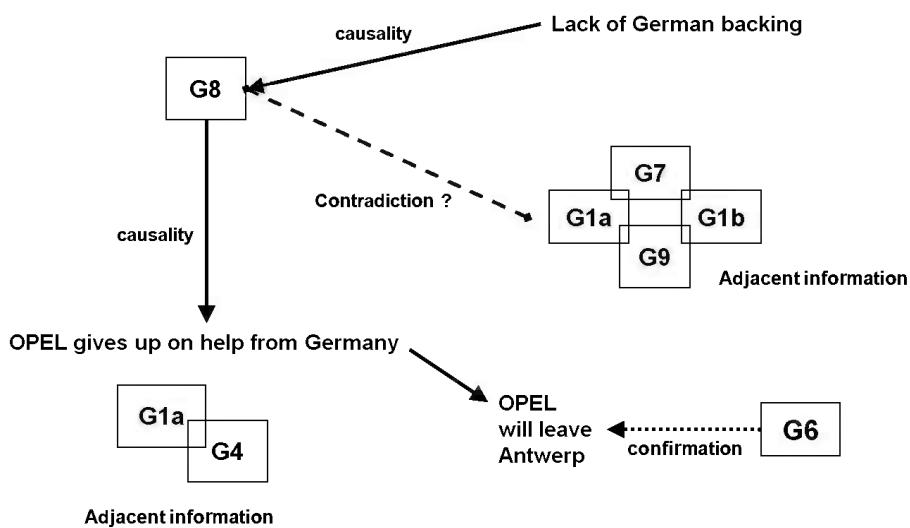
effort may lead to *revealing* a previously hidden *weak signal*. Perhaps you'll have an opportunity to find such an example later on".

*Step 6. Opel in Antwerp, it's over!*

A participant: "But aren't the chances of Opel being taken over by another manufacturer linked to financial help from Berlin, as suggested by G8?" (Hp4).

Another participant: "Several information items demonstrate that Berlin will not provide its support. Indeed, I think that *G1a*, *G1b*, *G7*, and *G9* are '*adjacent*' information items; they tell us roughly the same thing: Berlin will not provide support. In a way, they are contradictory with *G8*".

Another participant: "But GM/Opel has forsaken Berlin's help. That is what information items *G1a* and *G4* say. It does look like Opel is determined to close down the Antwerp plant and leave permanently" (Figure 3.18).



**Figure 3.18.** *Opel in Antwerp, it's over*

Animator: "*Opel at Antwerp, it's over!* But what about other manufacturers? And how are we to understand the word 'buyer'?"

Participant: "That's true, one needs to distinguish between two cases:

- the buyer of the industrial assets (factories, offices, etc.);
- the buyer of the 'geographical' site, of the actual location (the vacant land)".

Another participant: "As for the factories, Opel seems to have made some effort to reduce costs (*G8*)... perhaps to modernize the productive assets in order to sell them off".

Another participant: "*G3b* indicates that Magna was interested at some point. Could we add, on the puzzle, *G8* → *G3b*?"

Another participant: "But it doesn't seem to be a good bargain, since the Chinese auto maker, *GEELY*, didn't want it (*G11*). This despite the Chinese being on the lookout for an entry point into Europe".

Another participant: "*G6* does seem to confirm that Antwerp, as far as Opel and GM are concerned, is well and truly over".

*Step 7. An "outlier" (in the statisticians' sense of the word) among news briefs, suggesting a break with the past for Antwerp? (Figure 3.19)*

A participant: "We have totally left aside information item *G10*. Besides, I think this item has nothing to do with the others: *G10* regards the geographical site at Antwerp, not Opel, whereas other information items regard Opel".

Animator: "Would you say, then, that *G10* is an outlier among information items (in the statisticians' sense of the word)?"

The participant: "Yes".

Another participant: "Still, information item *G10* is worthy of attention. Would the particular position of the port of Antwerp, its assets, and the human skills that can be found there make it possible to set a course for another economic future? The term "sustainability" has been mentioned in connection with economy, energy and transport".

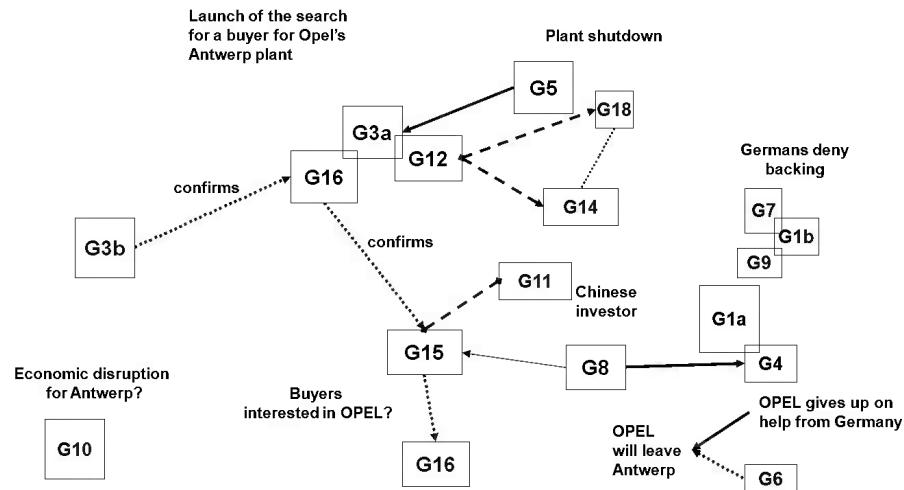


Figure 3.19. Complete puzzle

Another participant: “At the end of the day, what are the outcomes for the Antwerp economy? I can *imagine* three of those; my colleagues can correct me afterwards:

- a “conventional” automotive buyer for Opel? A carmaker that would use the site, the industrial facilities and perhaps some of Opel’s human skills to build “conventional” automobiles, Opel-style;
- an “innovative” automotive buyer? A car manufacturer in a technological break from “conventional”, Opel-style automobiles. They would use the site, but tear down the whole plant to build another, totally different one, and call on human skills different from Opel’s. The problem of redundancies remains;
- an industrial, non-automotive buyer? For an *industrial* activity *totally different* from car manufacturing, in a *break* with the past. They are only interested in the geographical location of the Antwerp site. They tear down the whole Opel plant and build another one, dedicated to a wholly different activity” (Hp3).

A discussion starts among participants. Some think it is pointless now to cling to Opel and GM, as this solution would probably only be a short-term solution.

Thus the participants in the CCM session, described above, gradually discover a kind of thinking to which they are not accustomed at all within the Ministry. They find that information fragments, apparently of little interest, can constitute the pieces of a puzzle, whose collection is rich in meaning. They also discover that each one of them probably possesses information fragments that they are not in the habit of sharing with colleagues in other departments: why would they? Besides, the receiving colleagues would not understand why they were being sent such information fragments.

Further, they discover that true information can hide where one is not prepared to look. It is therefore not surprising that some managers admit: “*We never saw it coming!*” about this “crisis” or that. Lastly, they discover the importance of the heuristic mode of reasoning, whereas in their work environment only reasoning of an analytical kind is used.

### **3.4.6. Conclusions**

#### *3.4.6.1. Emergence of transversal CI*

Animator: “We are approaching the end of this session of CCM. Let me remind you of its objectives. They were as follows:

- to experiment with the Puzzle® method with regard to the issues brought up by your hierarchy;
- to foster *transversal CI* by using material based on a real issue (Opel in Antwerp). The idea was not to discover a solution to the Opel problem: that is not what your hierarchy expects from this *experiment*. Each of you occasionally encounters or holds information regarding that issue. However, such information is obtained in the course of your usual activities, which differ from one another. Consequently, the information items that reach you concerning a particular issue, Opel for example, are fragmentary: each of you holds a part of them. It is virtually impossible to get an overall view. Transversal communication and collective thinking are very rare between your different departments. This probably affects decision making: just for the past two years, we could draw up an ominous list of the catastrophic consequences that have resulted, whether it’s in banking, in the oil industry, etc.”

### *3.4.6.2. Methodological findings reached by the animator, lessons learned and leads toward new enrichments for the Puzzle® method*

Did the experiment succeed? Have the hypotheses (presented in Chapter 1) been confirmed?

The answer, on the whole, is yes. Indeed, during this stage, the animator has observed that the participants were questioning one another. This seems to have been an exceptional opportunity for them to obtain some specifics that they were lacking (hypothesis Hp9 presented in Chapter 1) and bridge some ambiguities that would otherwise have remained ignored.

*Examples* of questions asked: “When referring to the Opel site, does it mean the factory premises, or does it mean the land on which the factories are built?” (Hp10) Another participant adds: “When speaking of a buyer, are we referring to a buyer for the Opel factories (including the production equipment and workforce), or to a buyer for the land?” The participant who brought in information item G18 specifies that it is in fact about “divestiture from the factory”; in his view, there should be no ambiguity (Hp10). From the ensuing discussion, it appears that the search for a buyer would definitely not raise the same problems depending on the answer to the question “premises or (disused) land”.

Thus it becomes clear that the session of CCM has enabled the removal of many ambiguities, misunderstandings, and inconsistencies that are often encountered when civil servants work in a compartmentalized fashion inside their offices, whether they are far apart or separated only by a mere wall.

As a reminder, every successive version in the construction of the Puzzle is recorded (all 24 of them) on a computer: each time the puzzle under construction is altered, the computer automatically records the previous version. Only a few key steps in the construction have been presented above. The tape recording also proves very useful when writing up a report, if this is required.

The participants were very active during the session. They appear to have taken *pleasure in working together*. They had the revelation that their work, besides being very productive, could have an entertaining and congenial side that they had not suspected. “Days would seem shorter if work went on with similar moments to what we have just experienced. Our motivation for work would be much higher”.

It does seem that a *curious* mindset has been instilled into the participants.

The experiment also amply demonstrated that the participants were using the possibility of positioning information items on the board space to elicit interpretations and meaning (Hp4 and Hp8). They also uncover gaps and specific grey areas, of which they were unaware, in their knowledge of the Opel problem (Hp9 and Hp10).

#### 3.4.6.2.1. One observed difficulty

It has appeared that participants have great difficulty formulating synthetic sentences at each stage of the session. Going from visual to verbal is not spontaneous. The articulation/socialization of thoughts and of the mental reasoning performed by participants introduces minor hurdles in the course of the session. Perhaps the cause lies in the fact that people are used to working in silence and isolation.

#### 3.4.6.2.2. A new problem

The experiment has also highlighted a new problem that will have to be solved. That is the preparation of news briefs prior to sessions of CCM using the Puzzle® method.

Indeed, when the initial raw data is *FULL text* obtained using the Internet, the task of preparing the news briefs turns out to be time-consuming and tedious. It could lead to the abandonment of the method. If, however, the initial data is “information originating from field people”, the problem is almost non-existent. The preparation of news briefs, based on *FULL text* obtained using the Internet, leads us to Chapter 4 of this book.

### 3.5. Conclusion

The *objective* of this chapter was to answer the question, “How to go about collectively creating meaning (CCM) from a few weak signals?”

*In order to answer* this question, we have proposed the Puzzle® method. It embodies the concept of “actionable knowledge”. We have applied it to four real-life cases. Numerous testimonies have been provided to help the reader understand how a CCM session is conducted.

### **3.5.1. Results**

As the reader will have observed, the implemented Puzzle® method is rather an exploration and discovery method: it calls upon heuristics. The conclusions of CCM are plausible, argumentative conclusions, of which a record is kept. If desired, heuristics can be partially formalized by building on feedback from experience. The reader will also have observed that the animator of CCM sessions needs to possess a number of skills and personal qualities matching his/her task.

It has been confirmed, during a large number of applications, three of which have been presented above, that collective creation of meaning (CCM) carried out with the Puzzle® method does prime participants' curiosity towards weak signals.

TESTIMONIES.— “I thank you for your CCM interventions within our administration. You have taught us, in the process, how to structure a mode of reasoning that I previously only thought of as a form of intuition. After reading professional (agri-food) notes, I constructed a Puzzle “for fun”, which I am forwarding to you. [...] For the sake of confirming the interest and merit of your method, as applied to the case recalled in the attachments, I call your attention to the following information [...]”.

“Today I will start working on a presentation of the CCM method, which our Director would like to show to the Americans, at our group headquarters, as a first acquaintance, and I shall send it to you as soon as possible.”

“[...] You may remember that we worked together a few years ago on the CCM method applied to our competitive scanning issues [...] Since then, we have regularly and successfully reused. Its name is unchanged internally: Puzzle. I am now about to start providing internal consulting on this method, at our international training center in Bangalore, India [...]”.

The visualization of reasoning, enabled by the Puzzle® method, is typically appreciated by participants.

TESTIMONY.— “This link between the two information items... could not have been established that easily had we not used this visual representation” (Hp2).

The Puzzle® method stimulates free associations between formal information items brought at the start of a session and tacit information items that were there, buried in participants' unconscious memories. *Associations of ideas* are materialized by links, of which several types are proposed.

TESTIMONIES.— “In the new puzzle I just glimpsed...”, “This puzzle brings to my mind ” or else: “I hadn’t made the connection between the two information items... although I knew both of them. It just hadn’t occurred to me to connect them together” (hypotheses Hp1 and Hp3 seen in Chapter 1).

It is confirmed that the CCM session is propitious for associating ideas.

TESTIMONY.— “Free-associating doesn’t happen on demand [...] being alone in your office is not beneficial. Some environments are more favorable than others. Here, it is very favorable...”

In another application not presented here, at the end of the session the director emphasized a valuable benefit: *time saving*.

TESTIMONY.— “Thus we have exploited weak signals to reach a compelling conclusion. And in so little time!”

“This session has just gone on for a little over 3 hours and we have achieved:

- results very close to those of the ‘IRMA’ work group;
- whereas the work of IRMA lasted *several months*;
- we have access to the traceability of the collective work we have just performed;
- it is a good primer for CI;
- several concrete proposals for action have emerged and are going to be escalated to general management;
- lastly, you have made us work with much less information without this being a hindrance: it was better selected”.

This testimony substantiates one of the hypotheses on which the Puzzle® method is based, namely the hypothesis which states that it is preferable to

have only a limited number of essential, *well-chosen* information items to look at in order to facilitate comprehension and the emergence of meaning (Hp5, see Chapter 1). Chapter 4 will deal with the issue of searching for and selecting “possible weak signals” (or news briefs).

The cultural context (corporate culture, individual cultures, etc.) plays a pivotal part in the success of the CCM.

TESTIMONY 1.– “This is a professional domain that we are discovering and learning alongside you. I thank you for that. At the end of this experiment I realize that the obstacles to work are of a cultural nature: open-mindedness, the ability to accept being unsettled In order to change one’s perspective and build new things. I think you are onto something with your approach. But the path is a difficult one. I imagine that wherever you have ingrained it, you must have gone through a ‘crisis’ stage. Will we be able to overcome that?”

TESTIMONY 2.– “You may remember that we worked together a few years ago on a method for analyzing client value, based on your analysis method for competitive scanning. Since then, we have regularly and successfully reused. Its name has remained unchanged internally: Puzzle...”

*Post scriptum:* “Upon reading a general-purpose newsletter, I delve again into the collective work you helped us perform... for the sake of confirming the interest and merit of the method, as applied to the case recalled in the attachments, I call your attention to the following information... Consequently, this information item about rising meat prices was in fact an anticipative and potentially strategic one, even though around the table at the Ministry in February... the main agri-food experts saw it as a mere fluke. Therefore, I thank you for teaching me, in the process, how to *structure a mode of reasoning* that I had previously only thought of as a form of intuition”.

<b>Concepts of Chapter 1 acted upon in Chapter 3</b>	<b>Sections in Chapter 3</b>
Interpretation bias	3.3.7.2
News brief	3.1.4, 3.1.5, 3.2.5, 3.3.7, 3.4.4
Target/targeting	3.3.5, 3.3.6
Codexi	3.1.3, 3.3.4, 3.3.5, 3.3.6, 3.3.7, 3.3.8
Culture	3.3.8, 3.5
Externalization	3.1.5, 3.2.6, 3.4.5
Reliability/corroborate	3.3.4, 3.3.7
Governance	3.2.4, 3.2.6, 3.2.7, 3.3.8
Heuristics	3.1.5, 3.2.6, 3.3.7, 3.4.5
Imagination/imagine	3.1.3, 3.1.5, 3.4.5
“Outlier” information	3.4.5
Causality link	3.4.5
Confirmation link	3.3.7
Contradiction link	3.3.7
Proximity link	3.1.6
Puzzle	3.1.3, 3.1.5, 3.1.6, 3.2.6, 3.3.2, 3.3.3
Bounded rationality	3.1.6
Plausible risk	3.3.8
Disruption	3.4.5
Signal/early warning	3.2.7, 3.3.7, 3.4.6
Socialization	3.1.5, 3.3.3
Traceability	3.1.5, 3.1.6, 3.3.7, 3.5

**Table 3.1.** Concepts acted upon in this chapter

## Chapter 4

# Preparation of Weak Signals for Sessions in Collective Creation of Meaning: Applications

### 4.1. Introduction: two starting situations

Based on the previously presented applications, the reader will have observed that the session in collective creation of meaning (CCM) requires *upstream preparation*. Such upstream preparation is conducted, for example, by the animator of the “weak-signal-oriented process” within the enterprise. In particular, we have seen that the construction of a puzzle is carried out using very short information items called “news briefs”, likely to contain possible weak signals, which will then need to be interpreted.

Regarding the preparation of the news briefs, one of the following two situations may occur:

– The *FULL text* data was obtained *manually* by reading reports, proceedings, newspapers, etc. Such text documents have always been read by one or more people within the enterprise. In that case, the novelty lies in the fact that the reader needs to make an effort to identify, in the text being read, what might constitute a news brief bearing a possible weak signal. He/she must then indicate what they consider to be a news brief.

To that end, he/she could simply underline the text of the news brief with a marker, or else copy the news brief onto a file open for that purpose. The additional effort, relative to that person’s usual work, lies in the

identification of news briefs. Little additional working time is required. However, the reader needs to have received a minimum of *training* regarding the identification of weak signals (see Chapter 2). We shall illustrate this first situation with the *ROGER* case and, to an extent, with the *Danone* case;

- The *FULL text* data was *searched using the Internet*, on electronic sources. The situation is then radically different. This difference results from the volume of obtained *FULL text* that needs to be processed. In a few minutes, several hundred, or even several thousand *FULL texts* may be found regarding any given issue. We are in a (*raw*) *data overload* situation [HEM 09].

It is unreasonable to expect someone (or several people) to devote many hours of work to the search for a few possible weak signals drowned in such a volume of raw data. The preparation of news briefs then becomes “mission: impossible” for time and cost reasons. This can truly be termed an *Internet trap* [LES 09a]. The enterprise will then give up on the practice of searching for and exploiting weak signals. To remedy this possible *setback* to the anticipative knowledge of the environment, the solution consists of turning to new computer-based tools. The question then needs to be asked: is there, on the market, a piece of software capable of recognizing possible weak signals in a digital document? Of carrying out a “distillation” (or filtering) to retain only possible weak signals? We illustrate this second situation using the *CO<sub>2</sub>/valorization* case and the *DANONE* case.

#### **4.2. The Roger case (continued): how are the news briefs used in the Roger CCM session prepared?**

We return to the Roger case to continue its presentation.

##### **4.2.1. Preparation of the news briefs used in the CCM**

We are in the situation where the data *FULL text* is obtained manually from reading reports, proceedings, newspapers, etc. The approach adopted here requires the participants in the CCM session (or the animator) to have:

- searched for the *FULL text* raw data regarding the subject matter of the CCM session;

– selected the news briefs that appear to them as possible interesting weak signals.

The steps prior to the CCM session have therefore been as follows.

#### **4.2.2. *The search for raw data: a substantial task***

In the Roger case, 40 items of *FULL text* raw data were collected by the participants. These texts vary in size from about 15 lines to several pages. It is therefore a large volume of raw data. If they were to be used “as is” in a work session, it would take a considerable amount of time. It is unlikely for high-ranking executives to devote any time to such a task. In other words, there may be some *inconsistency* within an organization between the number of collected raw data items and their actual use.

TESTIMONY.– “If the end result of scanning is for me to be swamped with press clippings, almost all of which are of very little interest, then I have no interest in it” (source: a business leader).

To them, those stacks of documents on their desks, or those multitudes of attached files received in their mailboxes, seem discouraging, of little interest, and perhaps already outdated. Those documents do not spark any *emotion* or induce any *imagination* or any impulse *to act*.

TESTIMONY.– “I don’t want an information graveyard.” “The texts we receive are not directly exploitable...” “Information should be concise: 2 to 3 lines... not long-winded narratives...”

In the Roger experiment, the participants, invited by the animator to collect raw data, merely delved in the stacks of papers accumulated on their desks. They were not expected to do more for this experiment.

#### **4.2.3. *Extraction of news briefs: a time-consuming, delicate task***

Still upstream of the CCM session, the animator had asked each of the participants to select and underline a key excerpt within every item of *FULL text* data collected by them, so as to highlight the most important sentences. Those *underlined excerpts* will need to be proposed as *possible weak signals*. A dozen news briefs were thus proposed for the CCM work session.

The participants thus found out that the stacks of documents taking up space on their desks can contain a few “gems”. This came as a surprise to them, and they were to be even more surprised during the CCM session.

However, the participants also found that searching for “possible weak signals” is very time-consuming, depending on the number of *FULL texts* to be reviewed, and requires a great deal of *attention* as well as a strong *ability to perceive/notice* details that may be important but are drowned out by a large volume of sentences generating *noise*.

TESTIMONY.—“I am astounded at the amount of work required to select and prepare ‘news briefs’. This requires a great deal of skilled staff time, therefore it generates costs and requires a dedicated budget. We will probably be unable to put the VASIC method into practice, much to my regret” (source: Director at Roger).

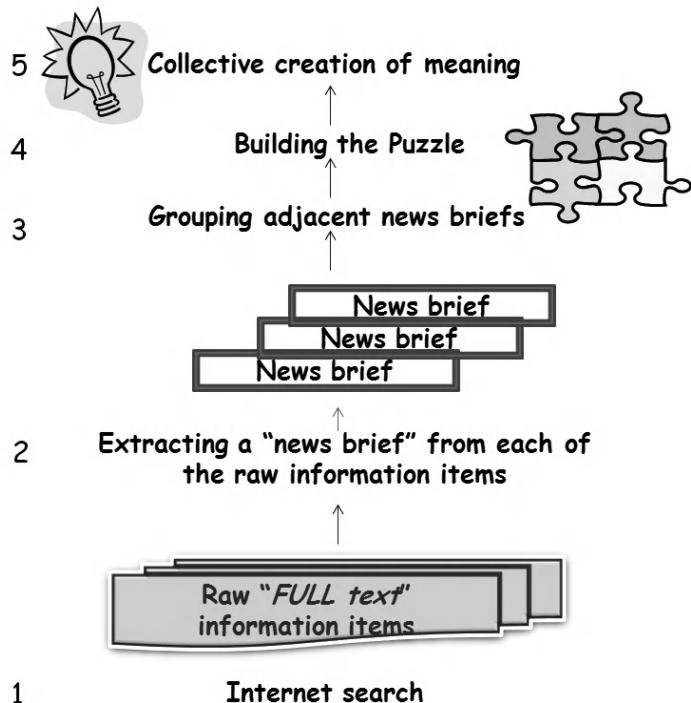
It is easy to understand why this type of news brief extraction task does not meet with much enthusiasm from the employer who pays the salaries... But the reality is even worse, as the next finding shows.

#### **4.2.4. *The Internet trap***

The search for *FULL text* raw data is made considerably *easier* if it can be conducted using the Internet (digital data). Through a query using a few keywords related to the subject to be documented, it is possible to obtain hundreds of *FULL text* items in a matter of minutes. But the flip side of the coin is that the *bottleneck* problem, caused by the information overload (*data overload*) of the weak-signal-oriented process is considerably worsened (see Figure 4.1).

Having been obtained almost instantaneously, the innumerable *FULL text* items collected need to be examined with close attention, and therefore with suitable training of the personnel responsible for that task. Consequently, the problem of extracting “possible weak signals” leads to an *unsolvable contradiction*, at least under the usual technical and economic conditions [LES 09].

TESTIMONY.– “This way is burdensome to manage.” “We have understood the approach, but... the manipulation of *FULL text* is not convenient to use.” “We are... capable of manipulating software; don’t you have a product that could make thing easy for us?” (source: Director, Tunis).



**Figure 4.1.** Bottleneck caused by the flood of *FULL text* items supplied by the Internet

This testimony, along with many others similar to it, which we have been able to record following the interventions we conducted, leads us to formulate the following hypothesis.

HYPOTHESIS.– *IF* the search for news briefs can be conducted automatically, *THEN* an interest in weak signals is acceptable to organizations.

It is therefore necessary to find out whether the latest information technology might help solve this dual problem of required skills and costs by

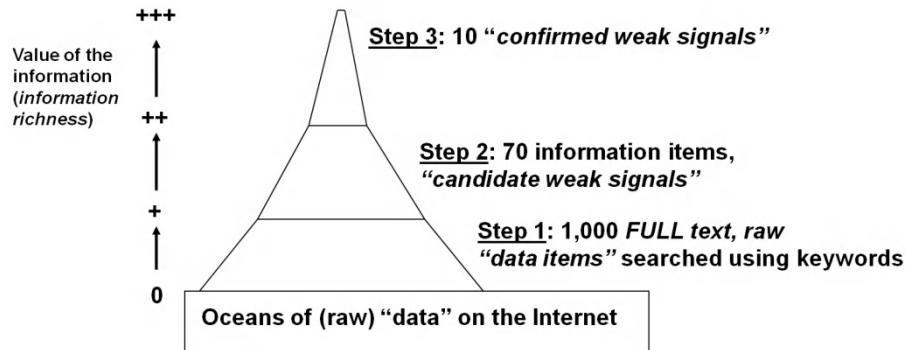
providing “turnkey” software modules. That is what we attempt to do in the following.

### 4.3. CO<sub>2</sub> valorization case: automatic search for “news briefs”

#### 4.3.1. Guiding idea: “*FULL text*” distillation

The question thus arises of what help any suitable piece of software could be in the automatic search for news briefs within a large volume of raw digital data. To illustrate the issue, we use the “*distillation*” *column metaphor* (see Figure 4.2). Just like crude oil is distilled to extract refined elements from it, the raw data likewise needs to be “distilled” to extract from it the news briefs that may contain a weak signal.

No turnkey software enabling the extraction of weak signals from the data seems to be commercially available, as far as we are aware [BON 10]. This absence led us to develop a prototype software product called Approxima, which we shall use as a *demonstrator*. While this does exhibit some useful features for directly extracting news briefs from among a considerable number of *FULL text* items, it does not presume to be perfect.



**Figure 4.2.** Distillation of raw data to extract news briefs, in three steps

The goal of the Approxima demonstrator [CAR 10a] is to provide an understanding of our set of issues to enterprises that will be potential *users*, on the one hand, and to *vendors* in the software market, on the other hand. If Approxima is able to extract, from a text, only news briefs that have an

*anticipative character* based on specifications that we provide to it, then it will become possible to test the following hypothesis.

HYPOTHESIS.– *IF* Approxima (or some other software) enables possible weak signals to be directly obtained derived from raw data (*FULL text*) obtained on the Internet, *THEN* the CCM by the Puzzle® method will be acceptable and durably practicable in an enterprise. This is a necessary condition.

Thus it should be possible to overcome the Internet trap, as well as the driver for abandoning the exploitation of weak signals for strategic management.

#### **4.3.2. Steps in the search for “possible weak signal” news briefs**

##### **4.3.2.1. Using Approxima in the “CO<sub>2</sub> valorization” case**

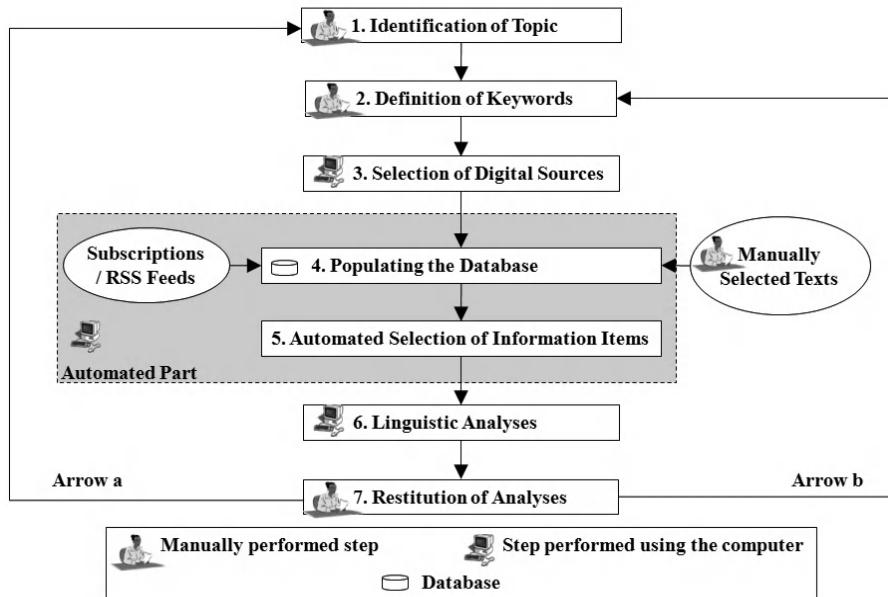
The steps performed with the help of the software are indicated in the following table, in the left-hand column. The right-hand column indicates whether the step is performed automatically in Approxima or whether it needs to be performed manually.

##### *Step 1. Designating /identifying the field and subject*

The first step in the APPROXIMA process (see Figure 4.3) consists of designating the field in which the research will be conducted. It is frequent that the subject of the research cannot be defined in a conclusive fashion from the outset: some trials and errors may be required (also called reiterations). This is the case here: the initially indicated field was: “sustainable chemistry”. This was subsequently narrowed down to “green chemistry”, then to “valorization of CO<sub>2</sub> as a commodity” for the purposes of the experiment already presented in section 3.2 of Chapter 3.

Figure 4.3 is only intended to illustrate the sequence of steps. These being too technical, we shall not discuss them in detail in this book. Interested readers may contact the authors.

In order to select digital sources on the basis of the RSS feeds, we use the Google Reader<sup>1</sup> web service, which makes it possible, starting from a combination of keywords, to find a list of candidate sources.



**Figure 4.3.** Steps performed using the Approxima demonstrator

#### Step 2. Selecting keywords to initiate the search

The keywords chosen to start the search for raw data are: (1) green chemistry, (2) carbon, (3) carbonic, (4) dioxide, (5) CO<sub>2</sub>, (6) valorization, (7) algae. It was agreed that this step would be reiterated if necessary.

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1. Google Reader is a free web service from Google®, which continuously checks whether new content is being added to blogs and/or informational sites that have been selected from a user's account. For more information, visit <http://groups.google.com/group/google-reader-help>.

*Step 3. Selecting the digital sources to be used*

The user needs to set out a strategy to search for relevant sources. To that end, he uses the list of keywords and formulates his choice using Boolean equations. He also chooses the types of data access (or feed): (1) database, (2) Internet search meta-engines, (3) websites, (4) social networks and (5) RSS feeds.

Steps	How the task is performed
1. Designating /identifying the field of the news brief search	Manually
2. Choosing/defining the characteristic keywords to search for <i>FULL text</i> and subsequently for news briefs	Manually
3. Selecting the digital sources to be consulted	Automatically
4. Searching for <i>FULL text</i> in the sources used (local and national newspapers' web pages, blogs, websites, etc.) and “populating” the database	Manually for one part, automatically for the remainder
5. Automatically selecting <i>Full text</i> information items	Automatically
6. Linguistic analysis of the <i>Full text</i>	Automatically
7. Displaying results: news briefs are available to the user	Automatically

**Table 4.1.** Steps in the automatic search for news briefs using the Approxima demonstrator

While the possibilities in searching for sources are diverse, we have chosen, for this experiment, to use RSS feeds in order to automate part of the Approxima process. The technology of RSS feeds enables the management of alerts thanks to computer-based tools called “aggregators”, which are available *free of charge*. Moreover, RSS feeds are increasingly “supported” by *free* or paid-for web services that incorporate other types of information flows, such as databases or search engines.

We have decided to select only those sources that are being updated at least once a week and supplied with at least 10 data items per month.

#### *Steps 4 and 5. Populating the database*

Populating the database using Approxima can be done in two ways:

- Texts selected manually from the enterprise’s internal databases. These are texts that the enterprise already holds in its in-house databases: for example, texts from the *intranet* or from document databases, or else from emails and meeting minutes.

- Subscriptions and RSS feeds from sources outside the enterprise. It is possible to combine computer-based tools relying on different technologies to obtain the full content of text-based data. The Google Reader web service, for example, allows users to subscribe and unsubscribe at any time to/from sources, and peruse the data supplied by those sources. The content “captured” by Approxima corresponds to a data item that typically comprises a title, a paragraph and an image, that is, composed of text-based data and non-text-based data. Only the text-based data is retained for the next steps: Approxima carries out content “cleaning”. To that end, it processes every data point in order to isolate the text-based, information-bearing content from the other content in the Internet page, such as, for example, advertising, links to data or to other sections in the same newspaper or blogs.

NOTE.– Approxima will carry out automatic filtering on the *Full text* information, thanks to the keywords, and will only store the data resulting from the filtering.

#### *Steps 6 and 7. Automatically selecting news briefs*

Approxima automatically performs linguistic/semantic analyses and, lastly, displays the news briefs that have been found.

#### *Results*

The filtering – or “distillation”, as mentioned earlier – led to the following results being obtained over the period between January 1<sup>st</sup> and May 30<sup>th</sup>, 2010:

- 19,543 raw *FULL text* items were identified and “captured” by Approxima, from which were extracted;

- 1,527 *FULL text*, from which were extracted;
- 80 *FULL text*, eventually resulting in;
- 35 *news briefs*. These were used in the Danone experiment.

Here are a few of the latter, by way of example:

Keywords: CO <sub>2</sub> ( <i>mandatory</i> ), valorization ( <i>mandatory</i> ), ^bio, ^nano, algae, carbon, fuel, chemistry, dioxide, electric, photosynthesis	
Sources	News briefs obtained automatically
ADEME/Green growth: Stakes and perspectives for pathways to the <i>valorization</i> of CO <sub>2</sub> in France (12/10/2010). <i>Source: News Press - NPRESS</i>	The <i>valorization of CO<sub>2</sub> would then provide alternative solutions to petrochemical products, thus opening up an opportunity to develop “green” chemistry from CO<sub>2</sub>.</i>
ADEME/Green growth: Stakes and perspectives for pathways to the <i>valorization</i> of CO <sub>2</sub> in France (12/10/2010). <i>Source: News Press - NPRESS</i>	The use of CO <sub>2</sub> as a commodity and a source of carbon <i>could thus contribute, through the development of carbon chemistry, to tipping our society toward a model less dependent on fossil fuels.</i>
Air Liquide_ 2009 net profit is up (15/02/2010)	Technological advances: innovation in the sequestration and storage of CO <sub>2</sub> , commissioning of latest-generation standard units, <i>projects for demonstrating renewable energies (hydrogen, second generation biofuels, etc.).</i>
Creating 600,000 “green” jobs by 2020 (26/04/2010). <i>Source: YONREP – L’Yonne Républicaine-Nord; l’Yonne Républicaine-Sud</i>	The Environment ministry has identified 18 <i>up-and-coming</i> sectors in green growth: ... the storage and <i>valorization of CO<sub>2</sub></i> , ... metrology and instrumentation, industrial process optimization.

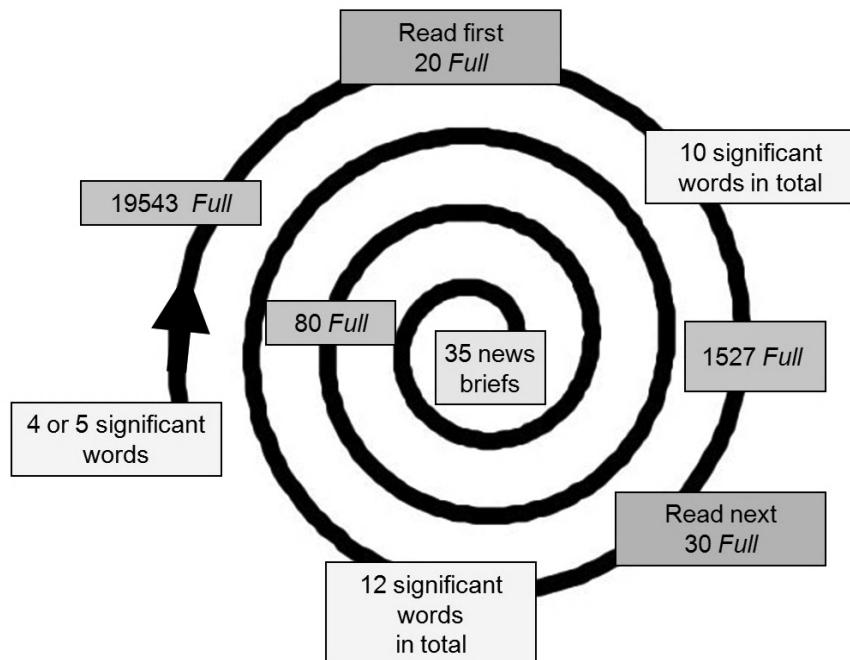
**Table 4.2.** Results for the CO<sub>2</sub> topic. Date: 10/21/2010 09:55:32 pm

#### 4.3.2.2. *The importance of learning*

Certain steps alternately involve man and the Approxima software. The human user refines the new query based on the previously obtained result. The process of searching for news briefs is a dual learning process:

– *Learning on the part of the person* using the software to search for weak signals. Such learning requires some casting about, in other words a “trial and error” approach. It is a *heuristic* approach involving progressive discoveries. It is also an approach founded on *bounded rationality*: we should be able to stop searching at some point, without being certain of having explored all possibilities.

– *Learning on the part of the software* itself. However, it is desirable here that the software used be able to do its learning in a way that leads as directly as possible to the potential weak signal sought. The interested reader might wish to enquire as to whether satisfactory software is commercially available, in view of the rapid evolution in techniques.



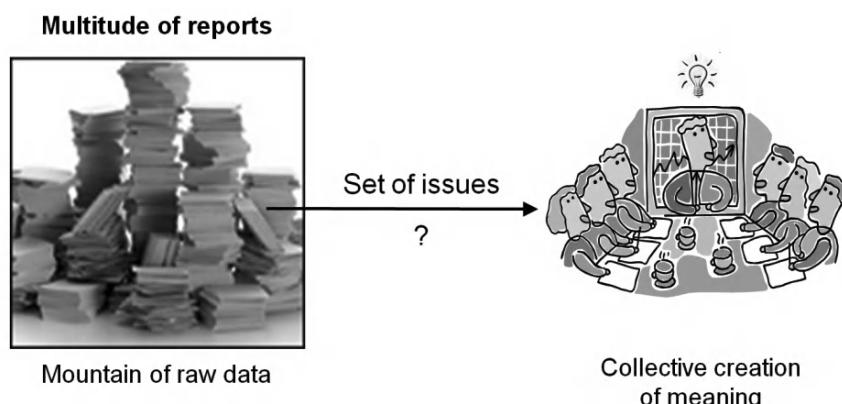
**Figure 4.4.** Converging spiral of results. Learning how to choose characteristic words by reiterating the search for FULL text

Figure 4.4 illustrates, in the shape of a spiral, the combination of both hypothetical learning forms (on the part of the human and of the technology) when using Approxima. Hopefully, technologies with higher performance than those currently on the market will appear and enable learning on the part of the technology. We shall return to this point hereinafter, and discuss the use of software modules and their integration into platforms.

#### 4.4. The Danone case: preparation of the weak signals

In Chapter 3 (section 3.3) we presented the Danone case. This was related to issues raised by PIPAME, an inter-ministerial body, which included the French Ministry of Economy. That experiment gave rise to several sessions of CCM. During those, we used brief information items, that were likely to contain anticipative weak signals. The question being tackled now is as follows: “*How to...*” obtain those news briefs?

##### 4.4.1. “Manual” search



**Figure 4.5.** Issues with *FULL text* data overload

The search for *FULL text* was performed manually. The collected documents are mainly “paper”, text-based documents from various ministries, or other bodies, to which the participants in the experiment belong (see Figure 4.5). *FULL text* items are also message texts that are printed out and exchanged by participants with outside associates. In that case, it is more of a “field”-originating information item. This manual search

was part of the experiment: it aimed to start from participants' usual tasks and lead them to gradually discover the weak-signal-oriented process. However, toward the end of the experiment, *FULL text* items were also searched for, using the Internet, in order to round off the experiment.

#### 4.4.2. “Manual” extraction

On the basis of their own *FULL text* documents, participants extracted news briefs likely to contain possible weak signals. It was unavoidable for the extraction to be performed manually, given the origin of the raw data. But manual extraction also had a pedagogical aim: that aim was to gradually *train* participants in the concept of “weak signals”. Every news brief was formalized into a collection sheet (see Figure 4.6) that can be inserted into a future database.

GATEKEEPER: Ton Hu	DATE collected: 01/04/2008
SOURCE : Les Echos – 01/04/2008 (Page 13)	IDENTIFIER of this sheet: FC
AGENT: DANONE	TOPIC: Milk Sector

**INFORMATION** (very concise, short sentence without extra words)

“We are facing a difficulty: these days, it is no longer in France that we drive up our performance.”

**Gatekeeper’s COMMENTS**

- 1 – Is this information relevant to our Agri-Food set of issues?
- 2 – Is it anticipative?
- 3 – Does it warn us about “something”?
- 4 – What could be done on the basis of this information?
- 5 – Does this information make **me** think of another, previous information **I** could correlate it with?
- 6 – WHO might possess related / adjacent information fragments?
- 7 – Whom should I alert?

**Figure 4.6. Information collection sheet: Danone case**

These news briefs were used to initiate the experiment. *FULL text* data obtained on the Internet were then added.

#### 4.4.3. Automatic news briefs search and extraction

In a very short time, nearly 800 *FULL text* items were obtained regarding the issue “Could Danone leave France?” The experiment therefore moved to an entirely different scale. Manually extracting news briefs was no longer an option. The animator proposed using the Approxima prototype software to extract news briefs, of which some examples follow.

Information sources	Extracted news briefs
<i>Danone</i> divests its stake in its former Russian partner, Wimm Dann Foods (10/19/2010) <i>Source: 02/18 – DJ Bourse</i>	By merging its own Russian dairy activities (worth 7% of the market) with those of Unimilk (14%) and by being a majority shareholder in the new conglomerate from the outset, <i>Danone</i> will become the leading player in the former USSR, with a 21% market share ... it will control 21% of the Russian market for dairy products.
<i>Dairy producers: “Fed up of being cash cows!”</i> (10/19/2010) <i>Source: 02/18 – DJ Bourse</i>	...Not to mention that industrials, such as <i>Danone</i> , are forcing upon us a 15% rise on their products. Producers say they are at the end of their tether: “Between processors and retailers, we’re fed up of being treated as cash cows!”
<i>French stocks; Danone fails to convince; results; perspectives</i> (07/31/2010) <i>Source: Le Journal des Finances – JOURFI</i>	Asia remains the most dynamic region, with 15.3% organic growth in the second quarter; Europe lags behind, with only a 1.4% rise over the period.
<i>Danone: Danone sells its 22.98% stake in Huiyuan SAIF Partners</i> (07/28/2010) <i>Source: Hugin Southern Europe Press Release – CPNYFR</i>	Firmly determined to speed up its development on the Chinese market, <i>Danone</i> will continue to focus on growth opportunities for its four businesses in China.
<i>Danone: Results for the first half of 2010</i> (07/27/2010) <i>Source: Hugin Southern Europe Press Release – CPNYFR</i>	While volume growth remains chiefly driven by emerging markets (54% of the business unit’s sales), Western Europe also recorded a positive evolution in volume, as evidenced by good performance in France and Germany.

Table 4.3. *Danone news briefs*

Approxima was designed to extract only news briefs of an *anticipative character*. Starting with the 800 *FULL text* items, which would represent around 600 pages had they been printed out, a search conducted using Approxima led to the selection of 136 *news briefs*, each of which comprised between one and four lines. The bottleneck constituted by the 800 *FULL text* items was thus overcome. However, each of the news briefs thus obtained still needs to be examined in order to determine whether or not it is worth keeping. We have presented in Chapter 3 the use of those news briefs.

#### **4.4.4. Conclusions on the “CO<sub>2</sub> valorization” and “Danone” cases using the Approxima prototype**

Two conclusions arise from the experiments presented above:

- it is actually possible to automate the search for news briefs. The Approxima prototype was designed and built in order to demonstrate that it is possible to automate the search for news briefs in an unlimited volume of *FULL text*. The handicap of the amount of man-hours to devote to this task when it is performed manually, as well as that of the cost of this operation, no longer apply;
- identifying the anticipative character of a news brief is also possible.

The performance of the Approxima prototype is perfectible. Solutions will undoubtedly appear on the market: the concerned reader will probably not fail to look out for their appearance (see Figure 4.7).

List of steps upstream of a session of collective creation of meaning (CCM) to exploit collected weak signals	Steps performed by the APPROXIMA Demonstrator	Comprehensive, commercially available “turnkey” solutions
1 – Selection of sources that potentially emit relevant weak signals		
2 – Search for relevant <i>FULL text</i> raw data of <b>anticipative character</b>		
3 – Identification of relevant news briefs with <b>anticipative character</b> (potential weak signals)		?
4 – Bringing together “adjacent” news briefs to prepare the CCM session		Computer technologies are rapidly evolving. What does the market currently offer?

**Figure 4.7.** Is there a commercially available “turnkey” solution that automatically performs all Approxima’s functions?

#### 4.5. Software modules for assisting in the automatic search for news briefs

##### 4.5.1. *Lookup table of characteristic words for the field being explored. Continuation of the “CO<sub>2</sub> valorization” case*

Let us assume we launch a query on the following characteristic words, as indicated earlier:

CHARACTERISTIC KEYWORDS.— CO<sub>2</sub> (*mandatory*), valorization (*mandatory*), ^bio, ^nano, algae, carbon, fuel, chemistry, dioxide, electrical, photosynthesis.

We then obtain, for example, the following *FULL text* (abridged for space considerations):

EADS, is considering the creation of a research center dedicated to biofuels [...] collaborating with the Singaporean government agency A\*STAR (*Agency for Science, Technology & Research*) in order to work jointly on the development of bio-kerosene from algae [...] cultivation of *algae* by injection of carbon dioxide (CO<sub>2</sub>) [...]. EADS also intends to reinforce its links with Singaporean universities [...] fund six thesis projects [...] at the Nanyang Technological University and the National University of Singapore [...].

**Box 4.1.** *EADS is considering the creation of a hub dedicated to research on biofuels, while reinforcing its links with Singaporean universities (<http://www.bulletins-electroniques.com/actualites/61302.htm>)*

Now *names of agents* appear, of which we were entirely unaware at the beginning of the search: EADS, A\*STAR, Nanyang Technological University, National University of Singapore. These agent names can now be added to the list of significant words to launch a new query. This could highlight some new leads for the valorization of CO<sub>2</sub>.

Likewise, a query launched with the addition of the agent name Arkema yields new results containing the words *Acrolein* and *Acrylic acid* (see Table 4.4). The person conducting the search will decide whether or not these two words, of which he/she did not initially think, are worth keeping. He/she might also ask more qualified experts for their opinion. He/she thus gradually deepens his/her exploration of the possible leads for CO<sub>2</sub> valorization. In fact, the expert will merely check if the leads being discovered are relevant. The final choice will be the prerogative of the CCM group.

Thus the characteristic words used to search for news briefs/possible weak signals undergo a connection process that can be used on a computer. Table 4.4 illustrates this connection between the characteristic words used. It is a square table with a vertical margin on the left and a horizontal margin on top. The margins contain the characteristic words regarding the “CO<sub>2</sub> valorization” case. Some of the words encountered in Chapter 2 (section 2.1.3) and in Chapter 3 (section 3.2), which also discusses this case, can be recognized.

The same words appear in both margins and are listed in the same order. In the cells, crosses indicate connections between two words. For example: CO<sub>2</sub> “connects” us with formic acid, EADS “connects” us with “ASTAR/Singapore.” Such a table is *empirical* and built up as and when new words are discovered that are deemed to be relevant characteristic words for detecting a weak signal. Its construction therefore involves *discovery heuristics* within a specified field, for example “Valorization of CO<sub>2</sub>”.

Characteristic words	CO <sub>2</sub>	Formic acid	ASTAR Singapore	Biofuels	Carbon	EADS	Ethanol	Graphene	Methanol	Nano-carbon	fuel cell	TOSHIBA	Singapore Uni.	Instit Néel Grenoble	Algae	Bioalgastral	Arkema	Acrolein
Characteristic words	X X					X												
CO <sub>2</sub>																		
Formic acid																		
ASTAR Singapore																		
Biofuels				X														
Carbon										X								

**Table 4.4.** Lookup table for characteristic words of the field being explored (partial example)

Characteristic words	CO <sub>2</sub>	Formic acid	ASTAR Singapore	Biofuels	Carbon	EADS	Ethanol	Graphene	Methanol	Nano-carbon	fuel cell	TOSHIBA	Singapore Uni.	Instit Néel Grenoble	Algae	Bioalgostral	Arkema	Acrolein
Characteristic words			X															
EADS			X															
Ethanol																		
Graphene										X								
Methanol												X						
Nano-carbon																		
Fuel cell																		
TOSHIBA							X			X								
Singapore Uni.																		
Instit Néel Grenoble								X										
Algae																		
Bioalgostral													X					
Arkema																X		
Acrolein																	X	

**Table 4.4 (continued).** Lookup table for characteristic words of the field being explored (partial example)

In summary, the “connection and association” table is a tool to help amplify the interpretation of a weak signal and lend it more meaning. The interested reader might wish to explore the market for possible “turnkey” software modules that suit his/her context.

#### **4.5.2. Enhancing the anticipative- and characteristic-word bases**

##### **4.5.2.1. “Anticipative” words**

These are the ones that enable the selection of *FULL text* items, as well as news briefs, which carry anticipative information, generally speaking, or more specifically a weak signal. Anticipative words are independent from any field in which the search for anticipative information is conducted. For example, they are identical in the Roger case, the “CO<sub>2</sub> valorization” case, and the Danone case.

The database administrator in the weak signal-oriented scanning apparatus populates the base of anticipative words as and when he/she discovers new examples of those in the *FULL text* or news briefs he/she is led to handle. Examples of anticipative words or verbs are provided below. In the case of a verb the tense in which it is conjugated (e.g. future, conditional) also comes into play.

<b>Anticipative words (examples)</b>	<b>Anticipative verbs (examples)</b>
researcher/scientist	build
resignation	create
sudden departure	start/will start
recruitment	resign
laboratory	develop
appointment	hire/recruit
possible/possibility	launch
project	set up
prototype	troubleshoot/debug
replacement (of an executive)	appoint
start-up	enable/would enable/will enable
university	leave
...	...
<i>downturn</i>	<i>Acquire/acquisition</i>
<i>potential</i>	<i>Consider</i>
	<i>able to/might</i>

**Table 4.5. Examples of “anticipative” words, verbs and conjugations**

In the Danone case, following the search for *FULL text*, then for news briefs, five anticipative words or verbs were added to the initial list: these words are italicized in the table above, on the right. Examples of news briefs featuring these words/verbs are provided below.

NOTE.– The tense used in the conjugation of verbs is important.

Data sources	Obtained news briefs
Danone is expecting from Brussels an important decision for its strategy (04/01/2010) <i>Source: L'AGEFI Quotidien - AGEFIF</i>	In case of rejection, the group <i>might</i> be forced to re-examine its growth strategy for its dairy business, which accounted for nearly 60% of its turnover last year.
To sell its waters, Danone reminds us that hydration is good for health (05/11/2010) <i>Source: 15:37 - Agence France Presse</i>	In 2009, industrialized countries “witnessed a sharp <i>downturn</i> ...” while growth remained “robust” in emerging countries, according to the 2009 annual report.
Danone and Chiquita join forces to market fruit-based beverages (03/31/2010) <i>Source: 06:49 - Agence Belga</i>	Danone sees this agreement as a possibility to “complement its health portfolio of fresh dairy products and increase its growth <i>potential</i> in Europe”.
Danone overhauls its strategy; agriculture and food (02/12/2010) <i>Source: La Tribune - TRDS</i>	In order to energize growth, the Chairman & CEO is considering small-sized <i>acquisitions</i> in the child nutrition, dairy products, or medical divisions.

**Table 4.6.** Examples of news briefs of an anticipative nature

#### 4.5.2.2. “Characteristic” words (or keywords)

These are the words that enable a search for *FULL text* and news briefs regarding a given field or topic, for example: “CO<sub>2</sub> valorization” or “Will Danone leave France?”

In the “CO<sub>2</sub> valorization” case, the following characteristic keywords were used with the Approxima software:

KEYWORDS.– CO<sub>2</sub> (*mandatory*), valorization (*mandatory*), ^bio, ^nano, algae, coal, fuel, chemistry, dioxide, electrical, photosynthesis.

In the Danone case, the following characteristic keywords were used with the Approxima software:

KEYWORDS.– Danone (*mandatory*), ^afric, ^ameri, ^asia, ^emerging, ^emerge, ^europ, ^milk, <Country><<^([^fran])>>, Asia.

EXCEPT.– ^water, ^olymp, Adidas, drink, bottle, cemex, world cup, EFSA, swiss group, kraft, nestl, oréal, unilever.

Building up and enhancing bases of characteristic words are empirical operations: the result depends on the person (or people) selecting the words. The result is also the culmination, at a specific point in time, of the *learning* and experience-gathering *process* of that person.

#### **4.5.3. Semantics problems: synonyms, polysemes and related matters**

Problems of language in general, and of vocabulary in particular, arise continually when searching for *FULL text* or news briefs. Synonymous and polysemous words are two of the causes for such problems. Let us remind ourselves of the basics:

- a polysemous word is a word that can have several different meanings, depending on the context in which it is used or the person who is using it;
- two synonyms are two different words that have the same meaning.

##### *4.5.3.1. Automatic search for “adjacent” information items*

Two “adjacent” information items are two information items written using different words, but whose meaning is very close.

The necessity of searching for “adjacent” information items arises in a variety of situations. For example:

- When the animator needs to prepare the useful news briefs for the next CCM session. In that case, he has to extract and group all the news briefs contained in the enterprise’s database(s) regarding the subject to be discussed. Yet it is possible that those news briefs which should be extracted are not all written using the same words;
- When the committee for CCM (Codexi) is faced with an information item whose reliability is problematic. The following question then arises: *“Do we already have other elements in the database that might help us substantiate the problematic information item or disprove it, or alternatively highlight an inconsistency? Etc.”.*

In other words, the problem arises of searching for possible “adjacent” information items, previously escalated into the databases. The idea is therefore to search for information items that may not share any keywords, but whose meaning is very close. The hypothesis reads.

HYPOTHESIS.– *IF* the preparation of weak signals is supported by “adjacent information items” search software, *THEN* the exploitation of weak signals becomes a more easily sustainable operation.

#### 4.5.3.2. *Associative computer memory*

When used in a computerized setting, *associative memory* (*associative storage* or *associative array*) is also referred to as “*Content-Addressable Memory*” (CAM). This is a special type of computer memory used in certain very high speed search applications.

In associative memory, unlike in traditional computer memory, stored items of information are not identified using the address of their location, but directly using their contents: the actual information items and the connections that exist among them (hence *content-addressable memory*). An item of information is found all the more quickly, the more numerous its connections are, that is, the more *association links* it has with other information items: this enables it to be located from several entry points.

Regarding the search, corroboration, and interpretation of weak signals, associative memory is sometimes spontaneously implemented among

participants in CCM sessions. However, such implementation is an occasional and highly random occurrence: it does not operate on demand. On the other hand, a “systematic”, computer-based implementation would be of great benefit. The following hypothesis is formulated:

HYPOTHESIS.– *IF* CCM is supported by an associative-memory assistance software, *THEN* the exploitation of weak signals becomes a more easily sustainable operation.

#### 4.5.3.3. *Searching for odd associations of words or information items*

We have previously encountered examples that illustrated the notion of an “odd association” of information items. These included such phrases as “*Mrs Ch. Bénard is appointed as purchasing director for the Valeo group*” and “*male nanny wanted*” in the body of an announcement posted inside the lobby of a Family Allowances Fund, or “*CO<sub>2</sub>[...] swimming pools*”.

Likewise, it is odd to see the name of Bill Gates associated with algae, and yet this association is featured in example “*I3 [...] field of algae-based biofuels [...] Bill Gates*” already encountered in section 3.2.7. Here are a few other examples that will enable the reader to reflect on whether the proposed news brief contains an “odd association” of words.

##### 4.5.3.3.1. IBM

EXAMPLE.– “IBM is due to install, at a research center in Jülich, Germany, a supercomputer [...] the most powerful in Europe. Its uses will include research on batteries for electric cars, the origins of the universe, and weather forecasting” (source: *Les Echos*, 05/27/2009, p. 21).

##### *Commentary*

- An odd association of words? Yes, namely the words “supercomputer” and “batteries for electric cars”. It is not common to come across news briefs or *FULL text* items in which these words are associated. The frequency of this association is sufficiently rare to attract attention.

- An anticipative news brief? Yes, because the research mentioned is at its very beginning.

#### 4.5.3.3.2. MACAO

In *Les Echos* on 01/04/2011, p. 23, an article can be found, the following excerpt of which is of interest here:

“Gambling: *Macao* is worth four times as much as Las Vegas... former *British colony* ...” signed: Gabriel Gresillon, *Beijing* correspondent.

##### *Commentary*

We have italicized the three words whose association seems “odd” to us. Indeed, it is surprising to associate “Macao” with “British colony”. This phrase is repeated several times in the full text of the article. But it is even more surprising to associate the first two words with the third, that is, “*Beijing* correspondent”. This should be the kind of association that arouses the curiosity of a weak-signal gatekeeper who is concerned by the subject of the article published in *Les Echos*.

In the cases presented above, the news brief was noticed and extracted by a person. Such human detection work, if it was to be performed on thousands of *FULL text* items, would hardly be feasible. Accordingly, the preparation of news briefs for sessions of CCM is greatly facilitated by using software that is suitable for such work.

HYPOTHESIS.— *IF* the preparation of news briefs is supported by software that searches for odd associations among information items, *THEN* the exploitation of weak signals becomes a more easily sustainable operation.

#### 4.5.3.4. *Creation of noise*

When one word can have several meanings, it is a polysemous word. When there are polysemous words in the database, the search for “adjacent” information items can lead to the extraction and grouping of information items that appear to be about the same topic when they are not. As a result, some of the extracted information items generate confusion and noise, which are particularly regrettable when it comes to interpreting weak signals.

Employing software to help identify polysemous words can therefore be very useful. The hypothesis is as follows.

HYPOTHESIS.– *IF* the preparation of weak signals is supported by polysemous words search software, *THEN* the exploitation of weak signals becomes much more effective.

#### **4.5.4. Software enabling “event searches”**

Lastly, let us point out the existence of software modules that enable searching for an *event* in a database.

EXAMPLES OF EVENTS.– “Who was seen with whom?” “Who was seen in such and such a place, on such and such a day?”.

Knowledge of such events can prove useful during a session of CCM, to answer questions that arise when constructing a puzzle, for example, amongst other questions regarding double-checking and validating information.

The hypothesis reads:

HYPOTHESIS.– *IF* the CCM session is supported by event search software, *THEN* the credibility of weak signals exploitation is greatly enhanced.

Event search software already exists on the market.

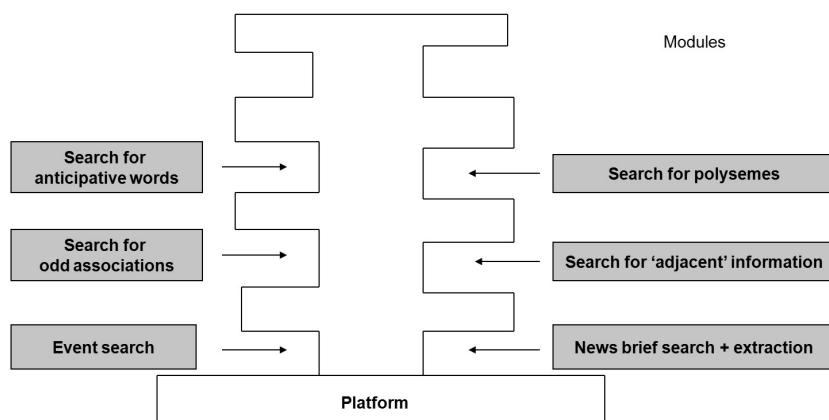
#### **4.5.5. Integration platform for commercially available software modules**

A platform, in computing, is a working basis enabling a software suite to be written, read, used, or developed. It allows different software modules, such as those mentioned above, to be integrated and operated together (Figure 4.8). Examples of platform include WEBLab (EADS, Cassidian).

Here, the WebLab platform enables the features proposed by a set of software to be assembled, combined, and utilized through one common application, accessible via a Web portal. As such, it makes it possible to interoperate the different existing software components, commercial or Open-Source, in order to improve the processing of multimedia information (text, audio, video, etc). In the case of a search for weak signals, many integrated software modules existing within the WebLab platform can be

utilized. For a search of possible weak signals, some of these modules seem particularly pertinent:

- Modules for automatically collecting information on open sources (collection of websites, RSS feeds). These modules are based, for example, on the “HTtrack” or “Heritrix” open-source tools; they enable the automatic retrieval of available content from identified sources of interest, and assist the gatekeeper during the *search* phase.
- Software modules dedicated to the *automatic analysis* of text. Such modules can, for example, automatically extract relevant entities and keywords (people, places, etc.), the events or relationships between entities within texts. These modules are based, for example, on the “Gate” or “Temis” tools, and enable some tedious analysis tasks to be automated, in addition to setting up alert systems.
- Modules for indexing, *searching* and viewing information. These modules enable, among other things, complex text searches on collected documents in order to facilitate access to, and diffusion of, relevant information. Likewise, software modules dedicated to the discovery of adjacent information or to the search for similar resources are available. Lastly, many presentation modules allow extracted information and knowledge to be represented in different forms, to facilitate manual analysis and promote the emergence of possible weak signals (highlighted text, events timelines, graphs, pivot tables on extracted entities, etc.).



**Figure 4.8.** Computer platform and software modules for weak signal search and exploitation

## 4.6. Conclusion

In the previous chapter, weak signals (summarized as news briefs) were already available at the beginning of a session. This implied that the news briefs had been prepared upstream of the CCM session. The objective of this chapter was to answer the question, “*How to go about preparing news briefs?*”

### 4.6.1. Result

The answer to this question is different depending on the resources available. If those resources are exclusively human ones, the initial (*FULL text*) raw data have to be read by a person, who extracts those news briefs that carry a possible weak signal. This traditional approach is no longer realistic as soon as raw data is obtained by means of Internet searches: their volume is much too large. The solution then consists, resources permitting, of using software that is capable of automatically searching for and extracting news briefs.

We have presented and used the Approxima software. We have seen that the result obtained with Approxima is satisfactory. It remains to be seen whether other software exists on the market.

Other, complementary solutions have been indicated:

- searching for information items that are “adjacent” to a specified information item, within a database;
- searching for verbs and modes of conjugation of verbs indicating anticipative character;
- searching for “odd associations” of words within large volumes of full-text raw data;
- using associative memory;
- identifying polysemous words.

These solution complements can take on the form of software modules that can be integrated into a software platform.

Progressive acquisition of the above-mentioned solutions is likely to enable CCM on a sustained basis, systematic use of the Puzzle® method, and the exploitation of weak signals to support strategic decision-making.

## Conclusion

The question to which this book attempts to provide an answer is: “*what can we do to recognize and exploit weak signals in support of strategic decision-making?*” The verb “*to do*” is the operative word, as the purpose of this book is to provide the reader with “*actionable knowledge*”, that is, usable for action.

Chapter 1 presented the concepts that are useful for understanding the core position of the concept of a “*weak signal*” in the strategic decision-making process. The latter pertains to a typically distant time horizon, from a few months to several years, depending on the circumstances. Consequently, decision making requires the anticipation of possible changes that will affect the enterprise’s environment and the behaviors of the relevant agents populating it.

“*Anticipation*” is also a core concept in this book. It should not be confused with the concept of “forecasting”. The techniques used for forecasting may even prove entirely unsuitable when the enterprise’s relevant environment changes in a *fast* and *discontinuous* fashion. In that case, the enterprise’s problem is to illuminate what is liable to spring up in front of it, beyond its control, and not what it would wish to happen if the future was the continuation of the past.

*The need is more about having radar than having a rear-view mirror.* As it happens, the “*weak signal*” concept originates in the very radar metaphor proposed by I. Ansoff. The concepts that are useful in the remainder of this book were presented in Chapter 1. Those concepts are indispensable, but they are not “*operational*”. Accordingly, the next chapters all propose

methods and applications thereof, said applications having been conducted in “actual size” in the field.

Chapter 2 answers the question: “*how to go about recognizing a weak signal?*” Answers are provided by means of practical applications that the reader will be able to replicate in his/her own field of interest. These examples have also been presented before the academic community in *Management sciences* during the defense of doctoral theses and in communications at colloquies held in France and abroad. The same goes for the examples presented in Chapter 3.

Chapter 3 answers the question: “*how to go about exploiting weak signals, corroborating them, and creating meaning from them?*” Answers are also provided by means of practical applications that have all been carried out in the field. These hold a surprise: some of the experiments presented originate from requests from public bodies: in this instance, French or foreign ministries. Such requests confirm that the difference is now clearly understood between “anticipation” using weak signals and “forecasting” using classical methods.

By the end of this chapter, the reader will have understood how collective creation of meaning (CCM) is carried out in order to exploit weak signals and how the Puzzle method, which renders CCM operational, is implemented. This method has been used in several dozen cases. It is well received, but there is nothing magical about it: it, too, has its demands, which justify the following chapter.

Chapter 4 really answers a question of the “*how to go about the execution?*” kind. Indeed, detecting and recognizing weak signals within the ever-increasing volumes of raw data easily supplied by the Internet, among others, requires man-hours, hence costs, and skills that currently remain rare, especially with regard to the animator of the “weak signals”-oriented apparatus [KRI 10]. Costs to be met and skills to be found “automatically” prompt the following question from business managers: “*Isn’t there some software that could do all of this?*” The answer is rather inconclusive: yes and no.

The purpose of Chapter 4 is to answer these questions. The applications in Chapters 3 and 4 presented methods “for doing things”. For some of them, which are more heuristics-based, humans are currently irreplaceable;

however, for a few others, pathways to automation appear and suggest using this or that piece of software available either commercially or from some university laboratories. Chapter 4 aims to help the reader find his/her way around the abundant offering of specialist consultancies and encourage him/her to pursue the exploitation of weak signals.

## Glossary

**Act:** refers to a manifestation of will, action, or behavior: a choice, a decision, a declaration, a gesture, etc.

**Actionable knowledge:** refers to knowledge that can be used to act. It can take on various forms, for example: a procedure, a method, an algorithm [ARG 96].

**“Adjacent” information:** refers to two information items that relate to the same topic, but have few or no words in common (despite being written in the same language).

**Amplification:** refers to the operation whose goal is to make more visible and meaningful a weak signal that is difficult to perceive.

**Animation/animator:** refers to the person tasked with running the strategic scanning process, “bringing it to life” and making it endure [KRI 10]. Animator inaptitude is a factor of abandonment of strategic scanning [LES 08b, LES 08c].

**Anticipate/anticipation:** refers to the process of imagining the sequences of possible consequences of an event that has been announced or barely started, and taking action before those consequences are realized, in order to influence their progress, take advantage of them or, alternatively, guard against them:

– putting ourselves in a position to pick up signals that we will interpret as being possible harbingers of a danger (or of a good opportunity), in order to prepare to act quickly and at the right time;

– creating the conditions or circumstances that will make it possible to act quickly and at the right time.

**Anticipative information:** refers to an information item, the interpretation of which suggests that an event could occur within a time horizon that is pertinent to the person doing the interpreting. An anticipative item of information enables a possible danger, or a potentially good business opportunity, to be “foreseen in advance” [LES 03b].

**Associative memory:** refers to a way of storing information in a memory and the way in which such information can be accessed. The stored items of information are connected to one another in such a way that accessing one of them immediately provides access to the other information items that are associated with it. An information item is easier to recover, the more connections it has: it will then be accessible from several entry points. Stored information items are recovered, not using their addresses but directly through their contents: information items themselves and relationships between them (*content-addressable memory*).

**Attention:** refers to the ability of a person to direct and focus their mind on an event, an object, or another person likely to constitute an informational clue.

**Audit/auditable/auditability:** (regarding collective creation of meaning – CCM), means that:

- the enterprise possesses a reference document setting out how the Puzzle method should be applied in the context under consideration;
- each CCM session entails producing records of the session’s progression, of the partial results obtained at each of the steps (traceability);
- records of “who said what” are kept, not to implicate individuals but to store in a memory the variety of alternatives that have been considered, bearing in mind that there is no *a priori* self-evident truth.

**Benchmarking:** consists of searching for, comparing, and analyzing the results of inventories from other entities operating in the same business sector. The goal is to update current best practices in the sector in order to apply them, adapting them to our own context.

**Bounded rationality:** refers to the difficulties faced by an individual in obtaining, memorizing, and processing information in an actionable manner. Although he/she may want to act rationally, the individual can only do so in a limited way, without being able to take into account all desirable information or all possible options. This limited way consists in acting on the basis of knowledge that is deemed acceptable and sufficient, rather than complete knowledge, and of simple rules, rather than a comprehensive method; and in taking shortcuts whenever possible [SIM 47].

**Capability information:** refers to an information item that informs about the capabilities, strengths and weaknesses of operators that are within the organization's environment and relevant to it. Depending on its interpretation, capability information tells us about the ability to act, or impediments to action, of an operator in the relevant environment [LES 03b].

**Codexi** (*comité d'exploitation des informations*: committee for the utilization of information): refers to a group of people deemed capable of collectively examining and interpreting information in order to create some sense that will prove useful for decision making. Its constitution depends on the topic to be discussed.

**Cognitive bias:** refers to a departure of judgment or reasoning from a norm. “The norm reflects what the answer should be if the task was carried out according to a certain rationality. A distinction is made between judgment bias (the norm often being the theory of probability, based on which the probability of an event occurring is estimated) and reasoning bias (the norm often being logic, which provides valid inference rules)” [BLO 97, p. 155].

**Collective creation of meaning (CCM):** refers to the operation of collective and debated interpretation during which “added meaning” and knowledge are created from weak signals, among others. Creation of meaning is arrived at through interactions, exteriorization of tacit knowledge and deliberations among the participants in the work session. The examined weak signals act as inducing *stimuli* [LES 03b].

**Collective intelligence (CI):** refers to both the process and the result of interactions between people who collectively interpret, for example, weak signals, including during a debating work session. During the process,

participants bring signals together and create connections between them in order to collectively derive a representation that makes sense to them [LES 03b].

**Competitive advantage:** refers to one of the factors resulting from the implementation of a competitive strategy, which enables an enterprise to win market shares over its competitors. Michael Porter proposed a formula to determine how enterprises – and countries – can gain competitive advantages [POR 85].

**Competitiveness:** expresses the ability of the enterprise to “sustainably” confront competition.

**Complex/complexity:** refers to an entity comprised of rather numerous and sometimes diverse elements as well as (many) relationships among those elements. Interactions can also occur with the entity’s environment. Consequently: “the notion of complexity implies that of unpredictable possibility, of plausible emergence of new things and meaning within the phenomenon that is considered complex” [LEM 90, p. 3].

**Connection table:** refers to a two-way table, physical or stored in a computer, which enables the mapping of one word to another without those two words being connected, semantically or otherwise. The two words are connected via an empirical link established by an expert in a given field. For example, the expert may see fit to establish a connection between “ASTAR Singapore” and “Ethanol.”

**Corporate radar:** refers to the instrument that enables the enterprise to scrutinize its environment, to perform constant scanning, to pick up signals that may serve as an early warning to the organization’s leaders and provide them with the necessary elements for decision-making.

**Curiosity:** refers to an aptitude to easily ask questions of oneself on the basis of perception.

**Discontinuity:** refers to the outbreak of an unexpected event, totally at odds with the extrapolations that could be made from the previous situation. Usually, discontinuity simply denotes the opposite of continuity, which is associated with the notion of continuum, whose origin is geometrical. Its meaning is close to that of a disruption.

**Disruption:** refers to a break in an element or in the flow of a process. Synonymous with discontinuity.

**Early warning:** refers to a formal information item (in text form, provided by an electronic sensor, or the like), or to a sensory information item (visual or auditory observation, etc.) felt by a human being and leading to think that a possible, relevant, and significant “event” might occur within such a time horizon that there is still time for action, either to take advantage of the event or to guard against it (when it constitutes a risk, for example).

**Early warning signal:** refers to a signal that announces changes in the enterprise’s environment, which might significantly influence its prospects. This usually results from the interpretation of a weak signal [LES 01].

**Enterprise:** refers to an organized and structured gathering, with a common objective, of resources (human, financial, material and intangible) owned by a natural or a legal person, under public or private law.

**Environment:** refers to all the agents and events that are likely to interact with an enterprise, at present or in the reasonable future, in accordance with its activities and businesses. This explains occasional references to current or potential agents (for example current or potential clients, current or potential competitors, etc.).

**Environmental scanning:** refers to “the monitoring, evaluating, and disseminating of information to key managers within the organization” [AGU 67, p. 1]. “It is an important aspect of strategic management” [KUM 01, p. 1] “because it serves as the first link in the chain of perceptions and actions that permit an organization to adapt to its environment” [HAM 81, p. 299].

**Fear:** refers to a feeling that can paralyze the person who discovers an information item, but does not forward it because he/she is worried about misunderstanding what is to be done, or about forwarding an information item of no interest, or about having just discovered what others already knew, or alternatively about being the bearer of bad news and suffering the consequences.

**Field information:** refers to an information item that originated from a person acting in the field. Such information is typically of sensory origin.

However, the person is aware that he/she is recording/noticing that information. The latter may result from a visual observation or from feeling something by touch, or alternatively a smell, etc. Thus, a “field” information item is usually a “first-hand” information item, and is therefore distinguishable from an information item of documentary or digital origin, read off some medium or other. The information sensor is usually one of the five senses (or several at a time) of the person.

**Filtering:** an ambiguous term that can have either a positive or a negative connotation. Negative connotation: getting rid of some information items, which we do not wish to make known; a meaning that borders on “censorship.” In some cases, filtering explains why the hierarchy “did not foresee anything” despite strong signals being sent to it. Positive connotation: isolating a relevant information item drowned in irrelevant data. Accordingly, we avoid the word ‘filtering’ in this book.

**Forecasting:** refers to the operation responding to a wish to “see in advance” what will happen later in a given field. Forecasting methods typically rely on data from the past to make forward-looking extrapolations; they assume continuity with possible inflections based on expert opinion(s).

**Forward-looking:** refers to a type of approach for “anticipating to inform action.” “This intellectual indiscipline (Pierre Massé) endeavors to see far, widely, and deeply (Gaston Berger) but also differently (innovation) and together (co-ownership)” [GOD 06].

**FULL text:** designates a data item generally presented in the form of text, or a table, whose length may vary from a few lines to several full pages.

**Gatekeeper:** refers to a person tasked with being on the lookout for anticipative information in a field specified to him/her by his/her hierarchy.

**Governance:** simultaneously refers to the art of governing, of running an enterprise and of defining its strategy. This term denotes the process of practicing this art, as well as the means implemented for governing: decision rules, suitable information, supervision and checks, relationships nurtured between leaders, administrators, employees and shareholders, where applicable. By extension, governance can be expanded to cover a wider circle, including for example suppliers.

**Governing:** refers to the exercise of governance.

**Heuristics (or heuristic method):** refers to a search and discovery approach, in which we proceed gradually, without trying to find out immediately whether the partial result, which is only adopted on a provisional basis, is true or false. This method is founded on a gradual approach to a given question, using provisional hypotheses and successive evaluations.

**Holistic:** refers to a mental approach that leads to envision a whole, starting from a fragment. For example, an archaeologist who finds a fragment of ancient pottery may be able to imagine the whole article. He does not confuse the fruit of his imagination with the reality he does not have before his eyes: he knows that his imagination provides him with a plausible hypothesis, which he will subsequently seek to validate.

**Hypothesis:** refers to one of the fundaments of the method for recognizing and exploiting weak signals.

**Inductive reasoning:** refers to a thought process that relies on induction, i.e. starts from an isolated observation or a singular fact, and then rises up to match the singular case to an explanation or a more general theory.

**Information:** refers to all or part of a raw data item, which, on examination, turns out to be of interest. Such interest can be justified by means of explicit criteria. Also denotes an observation conducted in the field.

**Information asymmetry:** refers to a situation where two interrelated agents do not have the same amount of information relating to a common topic. The one who has less information is at a disadvantage.

**Intelligence:** from the Latin *inter-ligere*, denotes the ability of a person to perceive, notice, and distinguish things around them that go unnoticed by other people placed in the same context. In addition, that person establishes connections between what he/she perceives, said connections being meaningful to him/her. In that sense, intelligence is linked to an aptitude for being surprised and self-questioning.

**Interpretation:** refers to the action that leads to ascribing meaning to a sign, a signal, a gesture, an utterance, a visual, olfactory, tactile or auditory observation, etc.

**Lateral thinking:** refers to the mental process during which speaking of one thing may lead to think of another thing which has nothing to do *a priori* with the first; in the process, the scope of thought regarding a given topic is widened in an apparently discontinuous manner. This process is usually involuntary. However, E. de Bono has offered a number of techniques that help voluntarily stimulate/induce lateral thinking and imagination [DEB 85].

**Learning:** refers to the process that enables knowledge to be acquired through practice, through the acquisition of experience. In an organization, it is also the acquisition of a language, of codes and information, derived from the organization's history. Learning may be intended to serve the future development of the organization.

**Managerial knowledge:** refers to the knowledge used by a manager to make a decision, including a strategic one. This results from the manager's accumulated know-how and experience, and is therefore specific to that person. It also depends on the decision to be made and on the decision-making context both inside and outside the enterprise. It is virtually impossible to formalize in a precise and detailed manner, unlike operational knowledge, which is formalized by written procedures.

**Mindmap:** refers to a technique for the graphical representation of information items, enabling visualization. A *mindmap* has a radial structure: it is constructed by starting from a central information item, around which other information items are organized like rays from a star, except that each ray can in turn be subdivided in a plurality of finer rays, and so on. The "rays" are linear, going from an upstream point to downstream, more secondary points, and so on.

**News brief:** refers to an information item reduced to its essential words so as to be very short. This size constraint results from the fact that a news brief is intended to be projected onto a screen (using a video-projector, for example) along with other news briefs. The news briefs, thus brought together, help elicit meaning during a session of CCM, using the Puzzle® method. A news brief results from the extraction of a few essential words

from a data item, typically a document, which may number several pages (*FULL text* data item) [LES 03b].

**Noise:** refers to the fact that a relevant information item is drowned out inside a large volume of irrelevant data. The relevant information item may well go unnoticed; much like a voice can be inaudible in a very noisy setting.

**Odd information:** a distinction is needed depending on whether the phrase involves the singular or the plural:

- in the singular, an odd information item is any information item that causes puzzlement or surprise due to its unusual character, which goes against custom or rules;
- odd information designates an odd *set* or *association*. It is not the individual information items, taken separately, that are odd, but their association, their assembly. In other words, the probability of those information items appearing together is very low. For example: an executive from the Grenoble Family Allowances Funds (Caisse d'Allocations Familiales, CAF) noted the following expression, posted in the lobby of his CAF, “*Male nanny wanted*”. He was intrigued by the odd character of the association between “nanny” and “male”.

**“On-demand” mode:** refers to a way of searching for anticipative information. The search is conducted on order, for a potential user who has clearly expressed, delineated, and specified his/her informational need [LES 03b].

**Perception:** refers to sensory information. One of our senses (or several at a time) delivers an immediate information item to us. For example, during an important meeting, I perceive that the manager has a slight smirk when one of the collaborators says this or that. This visual sensory information could instantaneously “tell me a lot”.

**Peripheral vision:** refers, in the context of this book, to the ability to see somewhat more than meets the eye. When we are presented with a written information item, being able to see only that item is evidence of very weak peripheral vision. Conversely, being able to also see other, related information items, either actual or retrieved from memory, is evidence of a certain degree of peripheral vision.

**Plausible hypothesis:** refers to an outcome of the CCM.

**Puzzle:** refers to a justified graphical construction, comprised of a small number of information fragments pertaining to a common set of issues (agent and/or topic) and deemed able to enrich one another [LES 92, LES 95a].

**Puzzle links:** refers to five types of links used by the Puzzle® method:

- *confirmation link* (alternatively *substantiation*, or *concordance*), to signify that one item of information confirms or reinforces the other;
- *complementation link*, to signify that an information item bring an addition to another information item (reduction of uncertainty);
- *contradiction* (or *opposition*) *link*, to signify that the two information items are contradictory, clashing;
- *inconsistency* (or *discordance*) *link*, to signify that bringing both information items together engenders questioning, or raises an issue;
- *causality link*, to signify that the event mentioned in one item of information is the cause of the event mentioned in the other information item. It should be noted that probabilistic causality, not deterministic causality, is being referred to here. Indeed, as a comprehensive list of possible influencing factors is not known, it would be difficult to assert that one cause determines an effect, to the exclusion of all other causes.

**Puzzle® method:** refers to a method for exploiting weak-signal-type information. A weak signal, considered in isolation, is rarely meaningful, exceptions aside. The Puzzle® method helps bring several fragmentary information items together and interpret them to create meaning. The idea is to draw formal information items as well as tacit ones (the latter, however, being spontaneously expressed on the spot), along with formal and tacit knowledge, to derive conclusions which lead to action to be taken. Practicing this method gives rise to the construction of graphical representations, also called Puzzle (by analogy with the homonymous game). The Puzzle® method is more fruitful when used within a group for CCM [LES 92].

**Raw data:** refers to a text or image (on paper, digital medium or electronic messaging), alternatively to a sound recording, which reaches us without us voluntarily seeking it. A raw data item can also result from a

search performed with keywords (sometimes referred to as *Full text*). It may prove to be of no interest (*Raw data*). But it may also turn out to contain a weak signal lost in the volume like “a needle in a haystack”.

**Responsiveness:** refers to the ability to act either as a result of an event that has already happened or as a result of a sign that foretells an event that has yet to occur. In the latter case, responsiveness is anticipative, though the phrase may seem paradoxical.

**Risk:** refers to the possibility of occurrence of an event, whether uncertain or of undetermined term, which is not entirely under the control of the people involved and is contrary to their expectations or interest. Risk can be voluntary, when a person acts despite being aware of that possibility.

**Scenario:** refers to a plausible and detailed representation of different conceivable futures, obtained using information and reasoning conducted according to a suitable method. There are many ways of constructing scenarios.

**Scenario-based method:** refers to an approach whose goal is to construct representations of possible futures and roads to reach them. The scenario-based method is one of the tools being frequently used by proponents of the forward-looking approach [GOD 06].

**Signal:** refers to a message that may come in various forms: quantitative or qualitative, linguistic or otherwise, written or spoken. It is deliberately and voluntarily emitted by a source that may be, depending on the case, a natural or a legal person, or alternatively a technical device. When a signal is emitted by a person without the latter’s intention, or even awareness, this is preferably referred to as a “sign”. For example, in a work meeting, a participant may start on hearing certain words. That start is a sign to those able to see it and interpret it.

**Stealthy information:** refers to an information item that is difficult to detect due to its characteristics. For example, the characteristics of a weak signal make it a stealthy information item, which will go unnoticed by most people.

**Strategic decision:** refers to a decision that exhibits the following characteristics:

- it is made in a situation of uncertainty, of incomplete information, in a complex environment, variable/mutating environment (as opposed to “*all things being otherwise equal*”);
- it is not recurrent, therefore the decision maker is relatively deprived;
- it may have far-reaching (favorable or adverse) consequences that could jeopardize the survivability of the enterprise;
- it is systemic (many elements with many relationships among them);
- the decision maker does not have experience-proven models (we cannot resort to “turnkey” mechanisms).

**Strategic surprise:** refers to an unexpected event, which comes as a surprise and whose consequences can be significant for better (unexpected opportunity) or worse (sudden danger). The surprise may come either from the fact of the event itself or from the point in time at which it happens. Such a surprise results in an emotional state that could cause conflict, for example within a Board of Directors (freely adapted from [ANS 79a]).

**Strategy:** denotes, by an extension of military language, the development of a policy by the enterprise (its objectives, structure, and operation), defined on one hand on the basis of its strengths and weaknesses and, on the other hand, taking into account threats and opportunities identified in its environment.

**Sustainable competitiveness capability:** refers to the ability of an enterprise to maintain itself, durably and deliberately, in the competitive and evolving market of its choosing, while achieving a profit ratio at least equal to the ratio required for its activities to adapt and survive [LES 82].

**Tacit information/knowledge:** refers to an informal, unarticulated information item (or a knowledge item) that a person may have in mind without even realizing it, without being aware of it. Such tacit information can also be of a sensory origin (heard, seen, touched, smelt etc.); tacit knowledge is often the result of experience.

**Target:** refers to that part of the environment (*Business Environment*) that the enterprise wishes to put under surveillance. It comprises a list of agents in the environment and a list of topics (objects or events). The target is the result of the targeting operation. Scanning targeting is the operation

that consists of delineating that part of the enterprise's external environment that is a common interest to potential users of the scanning information. Targeting is performed using the Target® method and leads to the production of deliverables [LES 03b].

**Turbulence:** denotes the fact that: "the dynamic properties [arise] not simply from the interaction of identifiable component systems but from the field itself (the "ground"). We call these environments *turbulent* fields. The turbulence results from the complexity and [multiplicity] of the causal interconnections..."[EME 65, p. 199].

**Uncertainty:** refers to the difference between the amount of information required to perform a given task, and the amount of information already possessed by the organization [GAL 73].

**VASIC® Veille Anticipative Stratégique – Intelligence Collective (Strategic Anticipative Scanning – Collective Intelligence):** which refers to the collective, proactive process through which members of the enterprise deliberately track down, interpret and use relevant anticipative information items relating to their outside environment and to the changes that may occur in it. VASIC® aims to enable greater responsiveness, increased innovation and differentiation capabilities, a greater ability to adapt, and a general reduction in uncertainty.

**Vigilance:** refers [WAL 92, p. 47]:

- to being alertly watchful for the detection of weak signals and discontinuities about emerging strategic threats and opportunities in the organizational environment; and
- to initiating further probing based on such detection.

**"Warning" mode:** refers to a way of searching for, and disseminating, anticipative information. The search is conducted without a very specific pointer. The gatekeeper has received no other instructions than being watchful, on the lookout, in a designated field, for any information whose interpretation might trigger a warning to his/her hierarchy. The potential user of the information does not formulate, *a priori*, a specific, detailed informational need [LES 03b].

**Weak signal:** refers to a decision-support “tool.” This would appear, at first glance, as an unremarkable “data item,” but its interpretation can trigger a warning. This warning indicates that an event may occur, possibly with considerable consequences (in terms of opportunity or threat). Upon interpretation, the signal is no longer referred to as weak, becoming instead an early warning signal [LES 03b].

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