

# From methods to methodology: towards strategic information in industry

Christian Dutheuil

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Born in 1949, Christian Dutheuil graduated in electrochemistry. An ex-director for development for the National Centre for Chemical Information (CNIC), in 1987 he became the Treasurer and one of the founders of the French Society for Applied Bibliometrics (SFBA). In 1989 he became President and Founder of the French Society for the Development of Chemical Information (SFDIC). He is also a consultant in strategic information management at the Observatory of Science and Techniques (OST), at the company MADICIA, at ACT-Multimédia and at BA Consultants.

Christian Dutheuil is the author of a report on the state of the art in bibliometrics and scientometrics (December 1991), a report commissioned by the Secretariat-General of National Defence (SGDN), a service of the Prime Minister.

As with administrative management or marketing, the management of strategic information relies upon a number of principles and techniques based on theory; more often than not, this theoretical base contains complementary rather than contradictory elements. Every organisation must adapt these principles to its own technological resources, to its own objectives, to its own general 'cultures' and to its own business or industrial environment. Failure to interpret these general principles renders them either inoperative or ill-adapted. This flexibility is particularly necessary in the case of the management of strategic information in order that this information may conform as accurately as possible to the diverse and evolving needs of the organisation.

As a result, the mastering of different techniques, though necessary, is not sufficient to define and put in place a system for the strategic management of information, since to these various techniques it is necessary to add the overall organisational perspective so as to establish links between techniques and their expected functionality. This organisational perspective spreads over several layers.

In general, works discussing technical intelligence and strategic information only describe one particular aspect of methods or techniques in information management — such as data acquisition or data analysis. Such descriptions are useful for the evaluation of information tools that may be used, but their potential users too often do not appreciate their overall relevance since the descriptions are isolated with little vision as to their integration within a general system. However, these various descriptions do reflect a general experience that translates into the successive phases of the evol-



ution of a system of management of strategic information; these phases can be summarised in the following questions:

What can I do with what I have?

What can I do with existing techniques and technologies (within my economic limits)? *methods*

What must I develop in order to cater for the functional needs within my organisation of the management of strategic information? *methodology*

## Operation of the management of strategic information

The first approach to the management of strategic information must be functional [Figure 1]. According to the model elaborated by

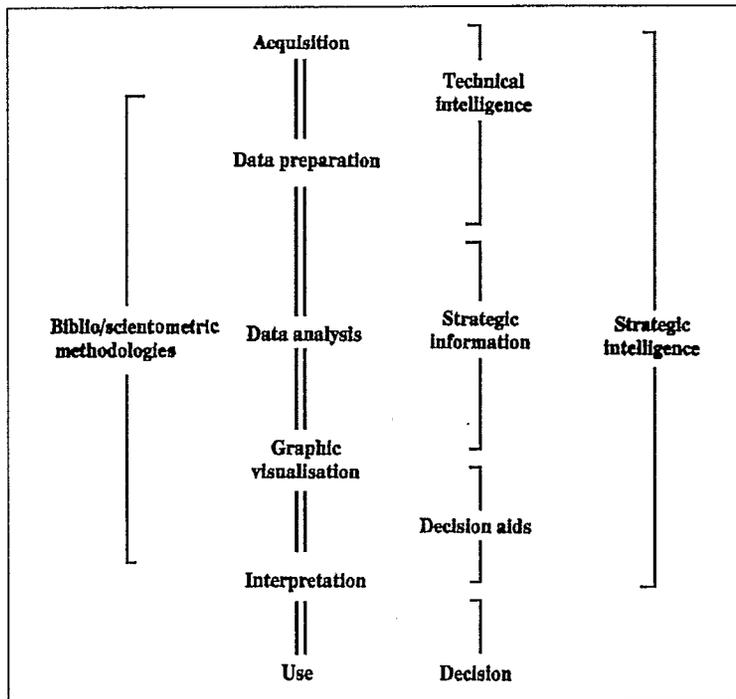


Figure 1

**Data acquisition**

Decision-taking is a complex process that integrates several types of data, including [2,3], [Figure 3]:

- scientific, technical or technological data that may result in the creation, modification or negation of various commercial market sectors. This is the domain of *technical intelligence*.
- technical-economic, economic or commercial data
- legal, social or regulatory data
- sociological data.

Porter [1], the different essential or useful tools in the management of strategic information within an organisation must be identified and defined independently of the technical solutions that may be brought to bear:

- data acquisition
- formatting, processing and preparation of the data
- constitution of a body of documentation
- validation of the body of documentation
- bibliometric-scientometric analysis
- validation of the results
- presentation and interpretation of the results
- communication of the strategic information

The efficient management of strategic information can also be illustrated by the diagram in Figure 2. The organisation consists of the establishment of links and interfaces between the data analysis steps and their interpretation by subject specialists. This management strategy must be in step with the general management policy of the enterprise.

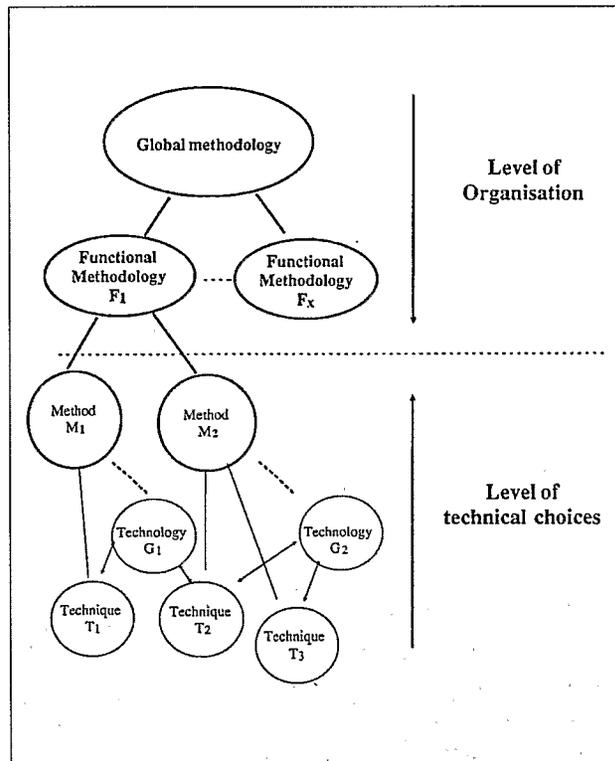


Figure 2

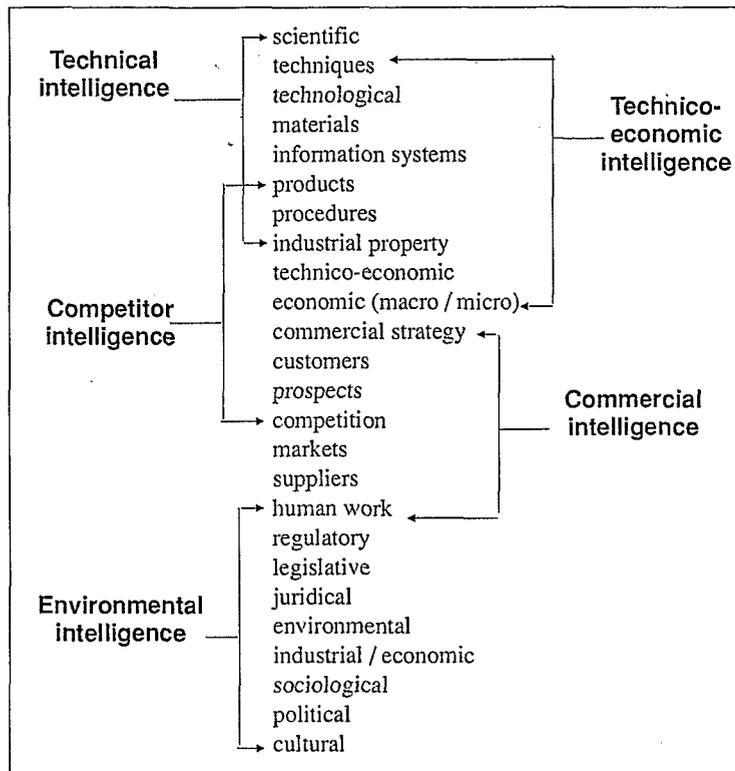


Figure 3

*"A technological infrastructure that is both current and developed must therefore be available, as well as redundancy in data sources; this infrastructure must be at least at the level of an enterprise's principal competitor."*

Decision-taking is also a dynamic phenomenon that takes into account both retrospective and prospective factors in order to anticipate evolution (embracing both extrapolation and simulation). Data must reach decision-takers as quickly as possible but must not contain significant errors (information wheat must be separated from chaff). A technological infrastructure that is both current and developed must therefore be available, as well as redundancy in data sources; this infrastructure must be at least at the level of an enterprise's principal competitor. The information must also allow the sharing of information within an enterprise, both locally and in a decentralised manner, or throughout a profession, and an economic or national community [4,5].

The performance of this element is based on the intellectual organisation of the documentation, information, and intelligence networks, and on the actual means of accessing and dissemination the information. (Figure 4). The intellectual organisation must be stable; in contrast, the physical organisation can follow the evolution

of the technologies used. This aspect does not only involve the documentation service, but also the intellectual property section, the commercial services and numerous individuals with a wide variety of functions within the enterprise.

The transmission of newly acquired data cannot be done in the form of raw data, but only in the form of evaluated information so as to build up a pattern of the evolution of a subject area. Conceived in this way, strategic information allows decision makers to monitor a situation and adapt to it; the strategic information becomes an integral management tool in decision making.

### Data processing and preparation

Much work is needed to identify duplicates, clarify fuzzy information, re-format data into a uniform format, expand highly concise data, and eliminate noise. The methodology used in all this depends closely on the software programs available and on the capacity of the data processing equipment available to the user.

The captured data from every source will be analysed with reference to their origins, their information structure and their translation or elaboration. They will then be added to the body of documentation in a pre-determined format that will be designed to aid the process of analysis; preferably, there will be just one format, or at least just one format per information category. All these operations concern data management and are carried out by the data processing personnel within a documentation framework; the techniques used are integrated within a functional methodology undertaken within the limits of the available technology (hardware and software).

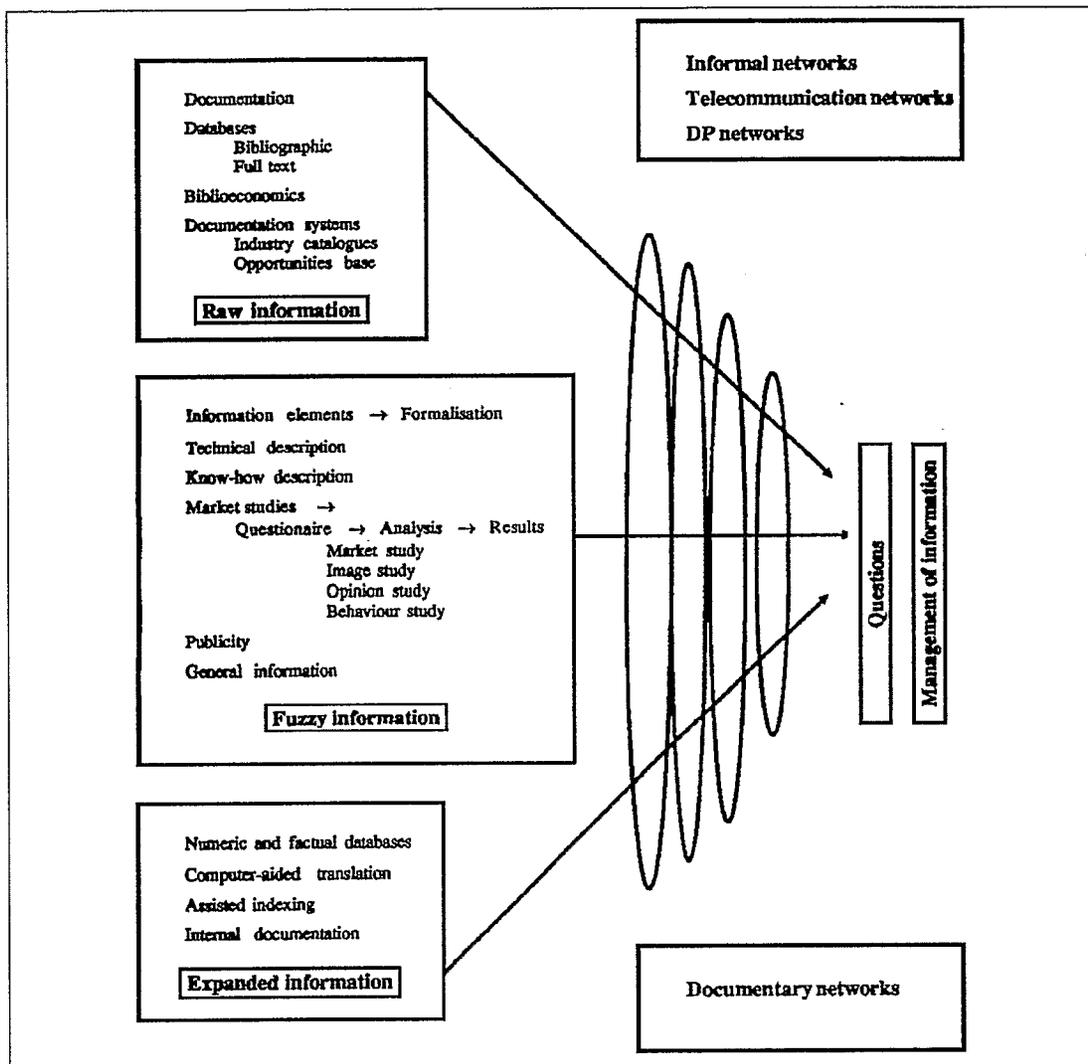


Figure 4

### Constitution of the body of documentation and the verification of the data

All aspects of data preparation are designed to permit the constitution of a body of documentation for analysis; any potential distortion in the analysis is limited by a strict validation of the data. This validation consists of:

- the verification of all the retained documents, ensuring that details of their exact origins are specified and that codes in respect of classification, country of origin, date of initiation, etc. are retained and correctly translated

- determining the exhaustivity and relevance of the documents in relation to the subject area. This evaluation is based on a knowledge of the documentary base used (coverage, selection policy, indexing policy and documentation tools), of the retrieval strategy employed and of the reliability of the informal information circuits incorporated.

### Data analysis (bibliometric-scientometric)

The analysis of data requires various techniques; the use of statistical methods is intuitive and the results of analysis presented in the form

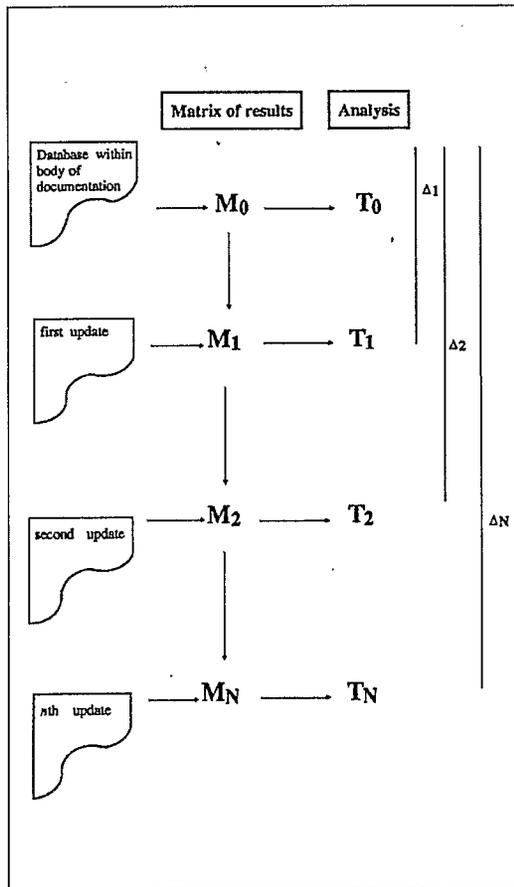


Figure 5

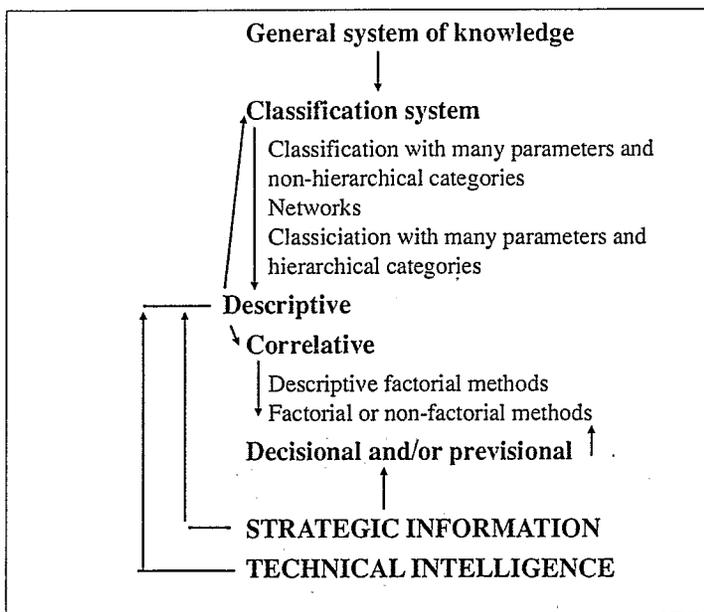


Figure 6

of histograms or pie charts are easily understood and easy to exploit directly. Chronological variations, objects of interest in technical intelligence and in strategic information, can be taken into account at the graphic level as well as at the level of variations in the indicators.

Multiple-variable methods such as clustering and factorial methods are less easy to communicate directly. They involve the sacrifice of some element of the totality of the information in order better to communicate the overall scenario. It may be too limiting to determine either the overall organisation of an economic or technical sector, or the potential correlation between parameters. And it is therefore difficult to imagine the use of multiple parameter analysis in the context of the management of strategic information; into these methods one must introduce a dynamic dimension, one that is usually based on chronology. Complex methods can then become powerful tools for the visualisation of the emergence (or disappearance) and the evolution of competition, of concepts and of technologies. For this, one must compare analyses:

- in chronological slices for a retrospective view
- including new updates for current awareness (Figure 5).

The ability to review the results is enhanced by the differential or comparative representations that hide the stable elements used in the analysis. In this way, at the level of strategic information, the approach is the equivalent of selective dissemination of information (SDI) in classical documentation.

The different analytical techniques can be applied to achieve different aims (Figure 6).

**Validation of the results**

The results of the data analysis methods must be validated to ascertain the level of distortion:

- within the body of documentation
- within the methods of data analysis — limitations, precision, overall information reduction, etc.

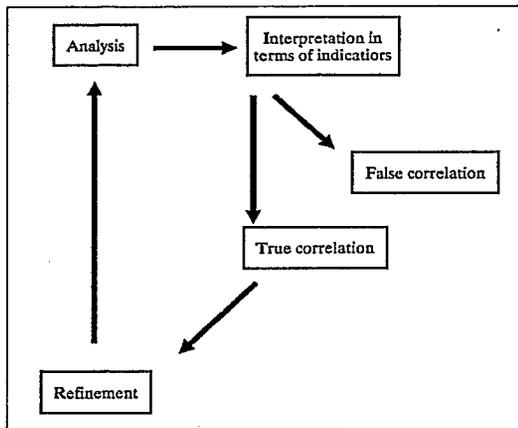


Figure 7

- limitations within the hardware and software used for the analysis.

The statistical weight attached to each piece of information affects the method for evaluating the data; this is an essential step since it will impact good interpretation of the data following the presentation of the results.

### Presentation of the results

The presentation of results is the primary element in communicating strategic information. Graphic techniques enhance efficiency, conciseness and attractiveness — as long as the quantity of information is not detrimental to its quality. The possibilities opened up by graphic visualisation are only now in their exploratory phase; graphic presentation, as it is used in bibliometry, brings back a traditional aspect. Each analytical technique gives precedence to one or more techniques, but these associations through analysis are not exclusive; they are simply made acceptable by usage because they were the most appropriate (at least at the origin of the analysis technique) and often with the smallest reduction ratio. Many complementary techniques and well-conceived graphics can also be used to advantage.

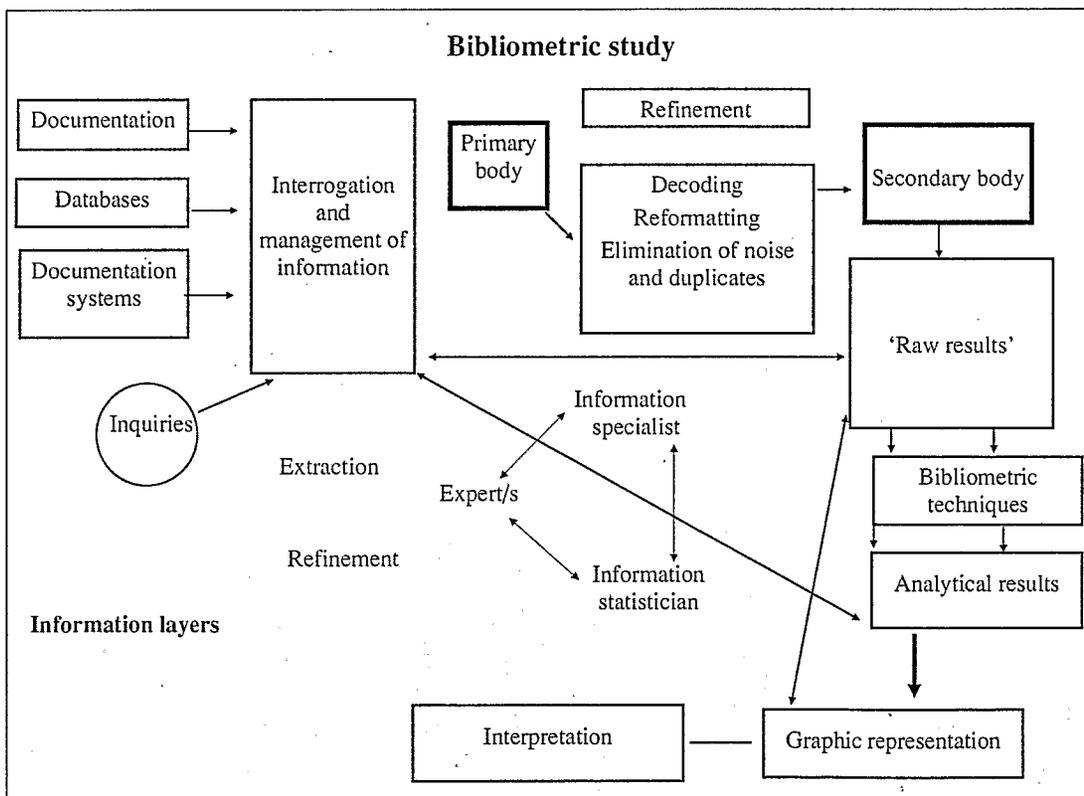


Figure 8

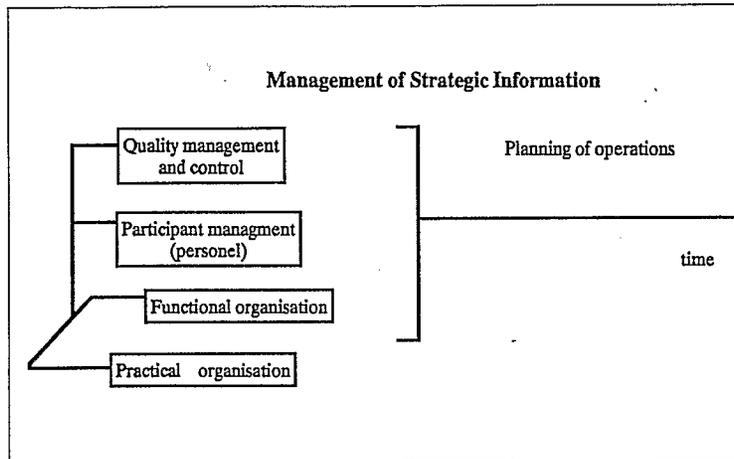


Figure 9

**Interpretation of results**

The interpretation of results can only be a joint action by the different parties involved in the processing of strategic information (information specialists, statisticians and subject experts). Every hypothesis must be the object of justification attempts in bibliographic, scientific and technical terms. Successive refinements of the analyses are the only viable route to take (Figure 7).

**From functional methodology to global methodology**

With this approach, a new fundamental concept of SSDI (Synthetic Strategic Dissemination of Intelligence) takes the place of the old documentary concept of SDI (Selective Dissemination of Information). Strategic information replaces raw or bibliographic data in the process of disseminating knowledge.

The most significant findings and the mathematical properties of their evolution can be introduced into systems of simulation or modelling. It is then possible to construct interactive decision-aiding systems which allow numerous hypotheses to be tested by varying the values of the parameters. Even if decision making still constitutes a risk, it can now be undertaken with more confidence. The modelling nevertheless needs to be calculated and precise.

All operations involved in the management of strategic information are shown in Figure 8

above. It is readily apparent that above the technological and economic choices by the enterprise, it is the human content that takes part at different stages that guarantees the quality of the final information; no link in the information chain may be weak — as in a hi-fi system, it is the weakest element that limits the performance of the whole. In addition, simply establishing an efficient system is not enough; the high level must be

maintained. An operational methodology must foresee operational weaknesses as well as weaknesses brought about by on-going routines. It is therefore advisable to establish a management quality control environment:

- that assures quality control and respect for good operational practices internally and permanently
- that conducts a periodic quality analysis by an external source so as to maintain, and then improve, the performance of the system of strategic information.

**Conclusion**

The objective of the management of strategic information is to manage technical assets, human interventions and the controls on quality of performance (Figure 9). The immediate consequence of the putting in place of a system of management of strategic information is its cost, which must be proportionate to its ambitions, its performance and its results. All trade-offs between resources and ambitions result in a degradation in performance; it is important to ensure that the management of the strategic information system of a given enterprise is at least at the level of the enterprise's known competitors. Power no longer rests with whoever possesses information, since technology has opened up access to information; power lies with whoever knows how to use information. The future will favour the person who knows the value of information.

*Translated from the French by Harry Collier.*

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