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Harnessing information, knowledge and intelligence for development and decision making*

ECONOMIC COMMISSION FOR AFRICA

HARNESSING

INFORMATION, KNOWLEDGE AND INTELLIGENCE

FOR DEVELOPMENT AND DECISION MAKING

Addis Ababa, 4-7 September 2001

Keynote Speech

Prof. Mohamed BEN AHMED

DATA – INFORMATION – KNOWLEDGE

- **Data:** A fact, note, or command represented by a conventional code used in communication. A manual or automatic interpretation or treatment process. This is the form of information, of the representation, within a specific code, of an objective or subjective reality.

- **Information**: Any data that can be interpreted within a space that gives it meaning; a frame of reference within which the identification and characterization of data become possible.

- **Knowledge:** In addition to informational content, knowledge is intentional, that is to say potentially active or a proposal. Knowledge is an information source that informs action. Knowledge becomes meta-data when it is reflexive (I do not know that I do not know).

1. Knowledge operates at three levels to inform action:

   (a) It first of all influences the selection and acquisition of data. Only meaningful data are incorporated into the memorization scheme;

   (b) Knowledge operates in the processing of stored data into information; and

   (c) Knowledge helps to summarize all available information and, by so doing, facilitates decision making.

2. As shown in the diagramme below, the action and knowledge loops may be perceived as a set of interactions of cause and effect. Speeding up the knowledge acquisition loop is naturally reflected in increased capacity for action and this speeds up the decision-making process.

Information as abstract strategic capital

3. Because of its intangible and abstract nature, information has quite distinctive characteristics, located as it is on the borders of economics and business science, where material and immaterial goods, products and services consumable, but non-degradable, costly to assemble but easy to duplicate, have a considerable but diffuse impact (often far removed in time and space but, at times instantaneous) on transactors who are generally not easy to identify. Information is difficult to pin down, defies measurement, falls beyond the control of economists and can be quite a discouraging prospect.

4. This observation shows how difficult it is to analyze information using the conceptual framework of conventional economic thinking, namely: the micro-economics of self-interest and the holistic approach of macroeconomics. A more rewarding pursuit capable of reconstituting the complexity of information processing would appear to be the systemic approach which, as a mode of comprehensive representation, is the one through which economic intelligence comes into its own.

5. Information, considered not as a product but as a factor of the use made of it and the way it fits into decision making may be defined as follows: information is an actual or potential action which must be processed and analyzed but raw data have meaning only for the knowing who place it in perspective.[1]

6. This short quotation summarizes several specific features of information and allows us to stress some essential points.

Informed action

7. First of all, information is, by nature, a dynamic concept closely linked to action, which is the result of information flows that, in turn, open the way to new opportunities for action.

8. In other words, action, that three-dimensional space at which the three variables of time, space and object converge, is both a consumer of informational energy (intelligence in the sense of acting knowingly) and a liberator, at the same time of the dynamic force of information flows understood as the encounter between time and space. In this dynamic, actions and decisions are mere epi-phenomena which are then defined as the meeting focal point of these two elements.

9. It is from this self-sustaining process of retro-action that we can distinguish the more comprehensive notion of informed action which then becomes defined as four-dimensional space combining the freedom to act on the variables of time, space, object and information.

Economic Intelligence

10. The issues raised by economic intelligence are pragmatic in that they establish a strong relationship between competitiveness (the domain of action) and the strategic management of information. In this context, information is not considered as power but as a dynamic, which is to say the capacity to act with a view to influencing the environment. What Roland Meyer refers to as 'power' contrasts with 'power over' (symbolized by the power of A over B = Capacity to make B act in line with the intentions of A) and is therefore considered as a process of change.

11. It must be clarified that in addition to informed action, the concept of economic intelligence also involves the notion of corporate action. The rationale behind this expression is that the synergy created by the interaction of knowledge and know-how would be more effective than the mere sum of individual skills. This leads us to the coordination of corporate memory, activities, learning and the management of complexity.

The value of information

12. What we have just seen points to the fact that when dealing with cognitive resources, value is determined not so much by scarcity (which refers to the notion of availability) as by the perception/interpretation dynamic.

13. Indeed, the informational end product (directly informing the action) will generate more value for a business enterprise than unprocessed information which is hard to interpret.

14. The snag to avoid in dealing with the value of information is to assume that information has an intrinsic value. What really happens is that information gains value in a complex process of interaction among various actors taking place in a time, space and vector continuum. With all apologies to those of the positivist school of thought, there is no objective and definitive definition of the value of information!

15. It was Anne Mayere (a research fellow of the French National Council for Scientific Research – CNRS) who very early caught on to this fact. In her view, three major factors influence the value of information, more specifically, its economic value.[2]

16. The first point is that information does not exist by itself but becomes so in a process actively involving the acquiring system. This means that in sharing information, the receiver is in fact a co-producer and the relationship between concept and object becomes asymmetrical and therefore degenerated. What was information (the external object or data) is not the information (internalized object). The map, so to speak, is not the territory. It is enriched by the subjective knowledge of the map – maker or receiver. In other words, information is data immersed in a meaningful frame of reference by the subjective user.

17. The second point, closely related to the first, is that information is relative to the system acquiring it both in terms of meaning and use. The meaning and use are jointly defined and relate to systemic action and the time frame for such action. Indeed, a comprehensive and well – conveyed message (without bias in meaning between transmitter and receiver) remains inorganic and degenerate to a receiver as in the different meanings that a bishop and a boxer would give to the injunction "It is better to give than to receive".

18. The third point has to do with the uncertainty as to how any information or message should be understood. The purpose, validity and, to some extent, the credibility of information need to be decided for action to be taken.

19. In economic intelligence, where the edge over the competition often means getting information before other competitors do, time is of considerable essence and plays a part in inparting value to information since all sources of information are not equal. Books and data banks disseminate obsolete information (depending on the time of publication and entry into the database) while media dispatches or confidential letters may contain more current information. Be that as it may, the more official the source, the more obsolete the information.

20. All the foregoing can be summarized in the words of Jean-Louis Levet[3] who felt that the strategic dimension of economic intelligence lay **in** the **reception/interpretation/dynamic** whose implementation comprised of the operational objectives to be known and the strategic objectives to be pursued using organizational and substantive resources. To him, economic intelligence was a dynamic process which could not, in any way, be reduced to a mechanistic approach.

Strategic information and the value paradox

21. The most important resources of organizations are those of sustainable, strategic and competitive advantage. These must be resources whose dissemination if at all necessary, must take place slowly and not be replicable or accessible in the market place. These particular assets are not physical in the sense of capital, land or labour but intangible or abstract -- the specific property of the company because they have been developed in-house and are protected from dissemination to third parties. Such resources are of great potential value because they cannot be replicated. Informal, uncodified information, just like tacit knowledge, has this property but the conversion of

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2 In «Pour une économie de l'information», published by CNRS, Paris in 1997.

3 President of the Association française pour le developpement de l'intelligence economique: (AFDIE) : **l'intelligence economique : fondement methodologique d'une nouvelle demarche, in la Revue d'Intelligence Economique No. 1**

its potential value (in the Marxist sense of the word) into money or real value for the organization, implies codification and, for that reason, promotes dissemination.

22. In fact, the specific and non-specific notions of immaterial assets and the formal/informal nature of information are not fully equivalent but partly cross-cutting. Indeed, uncodified information stored on a support system cannot be easily exploited by third parties and is in most cases specific to a company. In contrast, official information can be unspecific (in the majority of cases) because it is accessible to all or specific if protected from dissemination to third parties (as in the case of patents).

23. The strategic management of information therefore raises the issue of converting informal, potentially high value-added information into official information that can be used in decision making. But then, the value paradox appears in the fact that the codified information becomes more easily accessible to competitors and loses its potential value. In more economic terms, the official information, once it is not being used exclusively to stay ahead of the competition, is now considered subject to such externalities as the term 'public good' implies.

24. In conclusion, it should be stressed that our purpose here is not to give a definitive and absolute response to the issue of information value but rather to say that the most important consideration lies, not in the response itself, but in the manner the issue is raised. Put differently, the idea is not to give correct answers but, more modestly, to ask the right questions.

25. The essential point, if we were to agree on only one thing, is to remember that information has no value in itself, but should be considered in terms of a process where it gains value within a specific and dynamic context.

26. Like the steam boat in turbulent waters, the company facing fierce competition must find its balance in countervailing movement.

The information cycle

27. As considered in the comprehensive process of economic intelligence, information seems to be subject to a cyclical movement going from data gathering to decision making. This can equally be considered as the information cycle.

28. Henri Martre states in his report that economic intelligence can be defined as the set of coordinated research, processing and distribution activities which package information for use by business transactors[4].

29. Like Alain Bloch, we can clearly distinguish two phases in the information cycle: the data-gathering or research phase (R) and the action phase (A) when the processed information is disseminated to target receivers through a number of activities.

30. Another way of looking at this is to consider the information/knowledge/action dynamic.

4 in CGP.«Intelligence economique et stratégie des entreprises», La documentation française, 1994.

The knowledge economy

31. In the developed countries, knowledge has become the main strategic resource but its creation, dissemination and use in the various economic processes raise the issue of the role of institutions, universities, research centres and businesses.

32. If we look at the underpinnings of the new theory of economic growth, we can see that:

(i) Knowledge is not reducible to technology alone; and

(ii) Knowledge is not exogenous. It responds to new ideas, know-how, and to technical, social, legal, political or organizational skills.

33. In the mid-1950s, Robert Solow explained productivity in terms of technological input, stating that the causes and growth of productivity in the American economy were a function of global productivity. He concluded in his study[5] that gross per capita output in the private non-agricultural sector of the United States of America had doubled from 1909 to 1949. Technological changes had accounted for 87.5 per cent of such growth while increased use of capital accounted for the remainder. In 1961, Kendrich's findings would lead to the same conclusion.

34. This proved that the productivity increase was due to the influence of technology, not labour and was only slightly attributable to the use of additional capital. While this explanation pursued the neo – classical logic of the two decades following the publication of Solow's work, economic research into productivity growth sought to explain the remainder (without quite clarifying the issue) by putting forth reasons that had to do with energy use, education and other factors.

35. It was Richard Nelson[6] who first, while following Solow's intuition, reformulated the question, placing more emphasis on the origins of change than on the causes of productivity. As Manuel Castells[7] asserted, it is the economics of technology which provides an explanatory framework for analysing the sources of growth, linking as it does production to technological know-how, research and development.

36. Economists of Sussex University (United Kingdom) working under G. Dosi[8]demonstrated the basic importance of the institutional environment and the course of history in the birth and nurturing of technological change and, in the final analysis, the origin of productivity growth.

37. At the origin of growth is a dialectical relationship linking sociology, ideology and technology: productivity creates economic growth because it is based on knowledge (the

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5 Robert Solow. A contribution to the theory of economic growth, Quarterly Journal of Economics. No. 70, February 1956, pp. 65-94.

6 Richard Nelson. Productions sets, technological knowledge, and R & D : fragile and overworked constructs for analysis of productivity growth? American Economic Review, vol. 70 (2)1980. pp. 62-67

7 In «L'ere de l'Information». three volumes published by Editions Fayard, 1999

8 Giovanni DOSI et al. Technical Change and Economic Theory, Pinter, London, 1988.

marriage of wisdom and know-how) which constitutes the basis of technological innovation and change which, in turn, determine economic growth.

38. The question of defining knowledge then arises. Nelson and Romer[9] define it by everything human but we see it as the sum of wisdom, know-how and aptitude. In brief, the whole panoply of information, wisdom, intellectual, physical and psychological skills.

39. The taxonomy of knowledge, as defined by the new theories of growth, distinguish two types of knowledge:

- **Ideas (software) or codified knowledge stored outside the human mind in books, encyclopedias, CD-ROMs, networks and other support systems; and**

- **Skills (wetware) or knowledge which cannot be separated from the individual but is stored in each individual human mind. Here, skills are generally understood to mean convictions, aptitudes, dexterity and talent.**

40. The basic difference between the two types of knowledge is that while ideas can be officially processed, skills are inherent.

41. In the new theory of growth, the accumulation of capital or such hardware as raw materials, products and other objects remains essential but the source of sustainable growth is knowledge. On the one hand, innovation produces new objects and/or allows for the organization of existing objects more efficiently while new skills generate new ideas, the way they are implemented and the manner in which objects are to be used.

42. According to Paul Romer[101], the father of the new growth theory, it is the expansion of innovations and new skills and competences that are driving economic growth. In a world where natural resources such as energy are in finite supply, human development can only be achieved through the creation and accumulation of knowledge.[11]

43. In the knowledge economy, knowledge feeds knowledge and the more we learn, the more capable we are of discovering new things, so while physical resources may be limited, the number of things we can discover is limitless.[12]

44. Knowledge accumulation takes place in the most appropriate form of learning. Not only individual learning but also corporate learning by companies and by society as a whole.

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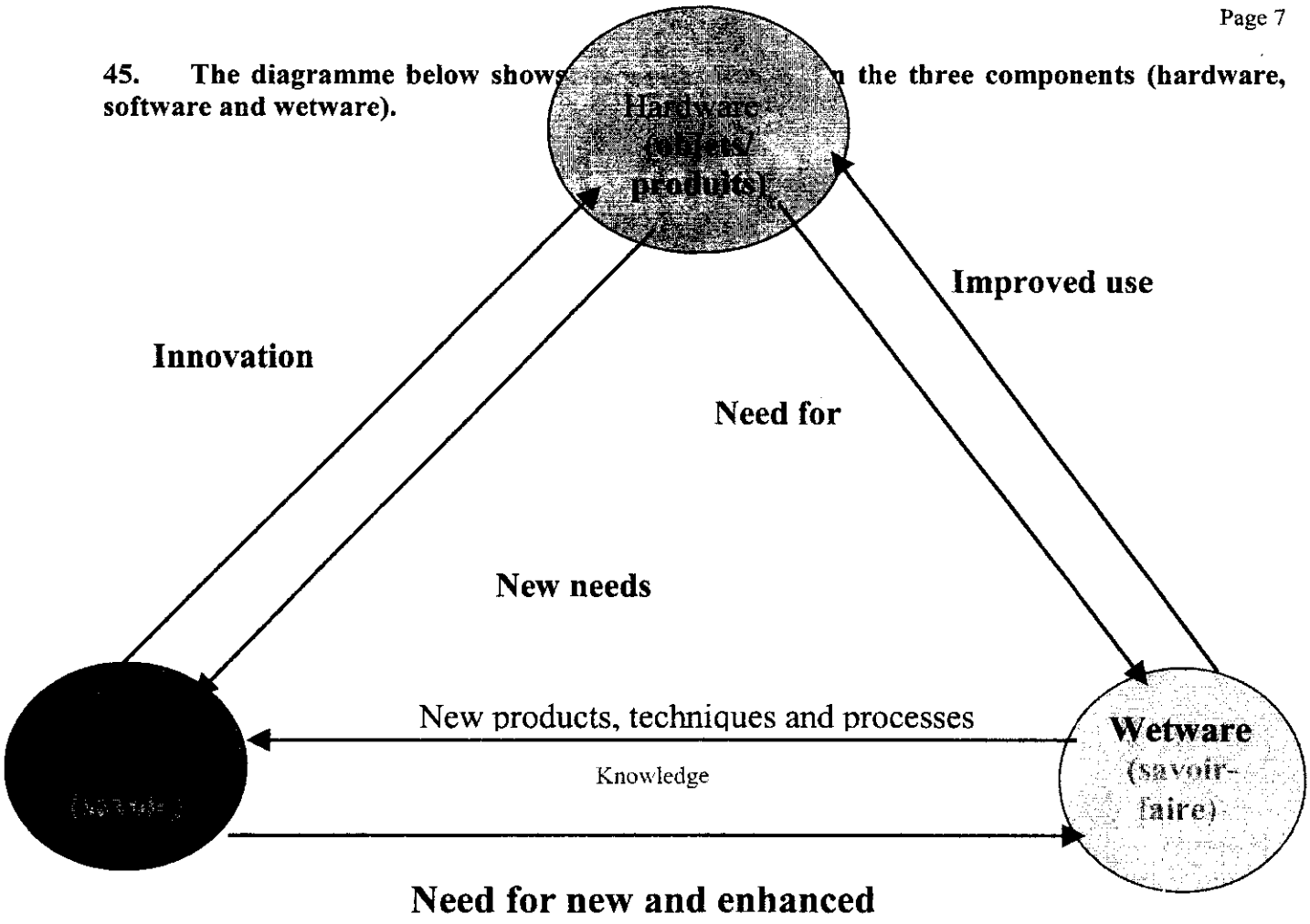
9 Richard R. NELSON and Paul ROMER. Science, economic growth, and public policy in B. SMITH and C. BARFIELD Technology, R & D and the Economy, Brookings Institute, Washington D.C. 1996.

10 Paul ROMER is one of the most brilliant American economists along with Paul KRUGMAN and Lester THUROW and others. At the age of 44, having graduated from the most prestigious American Universities (Chicago, MIT, Berkeley), he is lecturing at the Stanford University Graduate School in Palo Alto, California. His work which began in the early 1980s, led to the new growth theory. Some people see in him a future Nobel Prize laureate in Economics. **Wired** considers him the economist of the technological age. By his theory, he has ennobled a profession which, in American eyes, had fallen as low as meteorology because of how often its forecasts had been wrong

11 Paul ROMER Two strategies for economic development : using ideas and producing ideas, in L. H. SUMMERS and S. SHAH (editors) Proceedings of the World Bank Annual Conference on Development Economics 1992.

12 From an interview of Paul ROMER by the French daily newspaper **Le Monde** of 10 June 1997, pp. 16.

45. The diagramme below shows [illegible] the three components (hardware, software and wetware).



Interaction between knowledge (wisdom and know-how) and manufactured products - The new theories of economic growth

Source: article by Pedro Conceição (University of Austin Texas) and Manuel V Heitor (University of Lisboa, Portugal) : **On the role of the university in the knowledge economy**, in *Science and Public Policy*, Beech Tree Publishing, February 1999, pp. 37- 51.

46. Learning helps to accumulate knowledge so that productive efficiency and economic productivity can be enhanced. Learning takes place formally (education and research) and informally (experience and social interaction). Both the formal and informal processes of learning must be part of the comprehensive life-long process for all individuals.

47. As we have just seen, knowledge is created and developed through the interaction of ideas and skills. While ideas are a non-competing, non-exclusive public good, skills are personal, competing and exclusive attributes.

48. Both knowledge and skills follow two cycles: the first is devoted to codification (multimedia, compression and networking give an additional dimension to the codification exercise) while the second is devoted to the skilled interpretation and assimilation of codified knowledge which is reflected in enhanced competence. Knowledge is accumulated through education or learning (learning by learning), research (learning by exploration) and experience (learning by doing).

49. Knowledge has become the only source of long term sustainable comparative advantage because education, learning and experience take much time in an environment ranging from the educational system to working life. The comparative advantage acquired in terms of skills can be based on the things learned at school and in university but also on those skills which are not taught in the formal educational system but acquired only through experience.

50. Herein lies the importance of a society which gives value to corporate intelligence by refusing a vertical hierarchy of power and replacing it with a horizontal networking of wisdom. The networks cross-fertilize each other through interaction and the cumulative building of corporate memory based on the principle of free access to common knowledge resources and the responsibility of each person to make a contribution that enriches the corporate wisdom.

From operational to decisional informatics

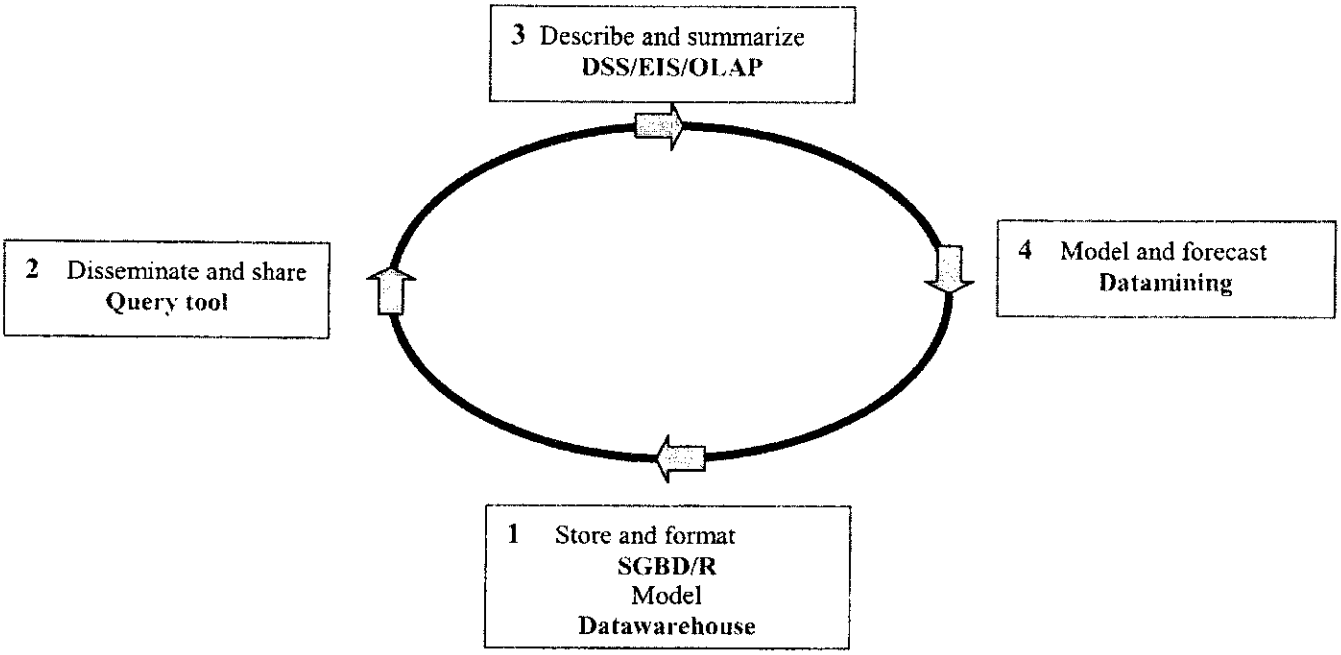
51. Computer applications are divided into two major categories: operational data- management and production informatics and strategic decisional informatics.

52. In the first case, the idea is generally to automate essentially repetitive processes in order to improve productivity. This gives the company a presence on the market but does not confer on it any real competitive advantage. Automation is not a major distinguishing factor because of the very fact that the process is easy to replicate.

53. In contrast, strategic informatics encompass all applications that can really make a difference. Decisional informatics include all those systems that assist decision making and policy direction. These are all those distinct systems of operational informatics connected to each other by dedicated interfaces.

54. The main components of decisional informatics are:

- Database drives for data storage and formatting;
- Query tools for reporting and interrogating the databases;
- OLAP tools for multidimensional data analysis; and
- Datamining tools for extracting facts from the data.



The datawarehouse approach

Definitions

55. A datawarehouse is:

- A collection of integrated, subject-oriented, fixed and chronological data consolidating information from various operating systems and organized to support decision making (William INMONN, using the Datawarehouse 1995; and

- A set of chronological data constituted by extraction from application databases or files. They may be organized by specific subject, consolidated into a single database and managed within a specific archiving environment to help corporate decision making.

DIFFERENCES BETWEEN OLTP AND OLAP

	OLTP (on-line text processing)	OLAP (on-line analytic processing)
Design	- Application oriented - Static structure	- Subject oriented - Evolving structure
Data	- Detailed, current - May be maj - Individually accessible	- Summarized, aggregated - Chronological - Comprehensively accessible
Users	- Agents - Thousands	- Managers - Hundreds
Use	- Repetitive - Simple queries - Performance sensitive	- time-bound - complex queries - non-sensitive
Memory size	- 100MB – 1GB	- 100GB – 1 TB

Database knowledge extraction

56. Database knowledge extraction is a highly interactive and iterative process which supports decision making. The data available are initially converted into information out of which meaningful, helpful and contextual intelligence will be extracted for an informed decision.

57. Before talking about database knowledge extraction, it must be stated clearly that information experts already knew how to extract useful information from stored data. By observing the data, they noted associations and specific features which enabled them to advance a hypothesis that they went on to check against the data set. This process relied somewhat on manual analysis and the interpretation of the expert. For this reason, the process was slow, cumbersome and highly subjective. It also became inpracticable with the vast increase in the volume of data acquired and stored everywhere (estimates are that the global volume of such data doubles every twenty months).

58. An initial step towards automation began with On-Line Analytic Processing (OLAP) which is used for multidimensional, evolving and interactive data analysis. While this technology can be used to answer questions and check far more complex hypothesis than data base query systems, it has no imagination of its own. For example, it cannot be used to discover new associations without user or expert intervention. But the time has come when there are not enough experts and even if there were, the best of them could not possibly handle the volume of data so notice was taken of the Golden Nugget which provided a corporate edge.

59. This is how attention shifted to datamining which is a set of tools and techniques that on automatically detect trends, models, hidden correlations in the data and which, using statistical techniques and artificial intelligence, can identify what is worth considering beforehand and what should be left aside. Once the new information was extracted, it needed to be interpreted, evaluated and proposed as a valid input to decision making.

60. In summary, the process helps to identify, within a database, new, valid and potentially useful patterns in understandable and useable form.

61. At an abstract level, the process can be developing methods and techniques which make sense out of data.

62. The basic issue that it addresses is that of converting low level data which is too voluminous to be easily understood and analysed into more compact (summarized or reported) form or abstracts (data-generating model description) which can be helpful (models for predicting future outcomes).

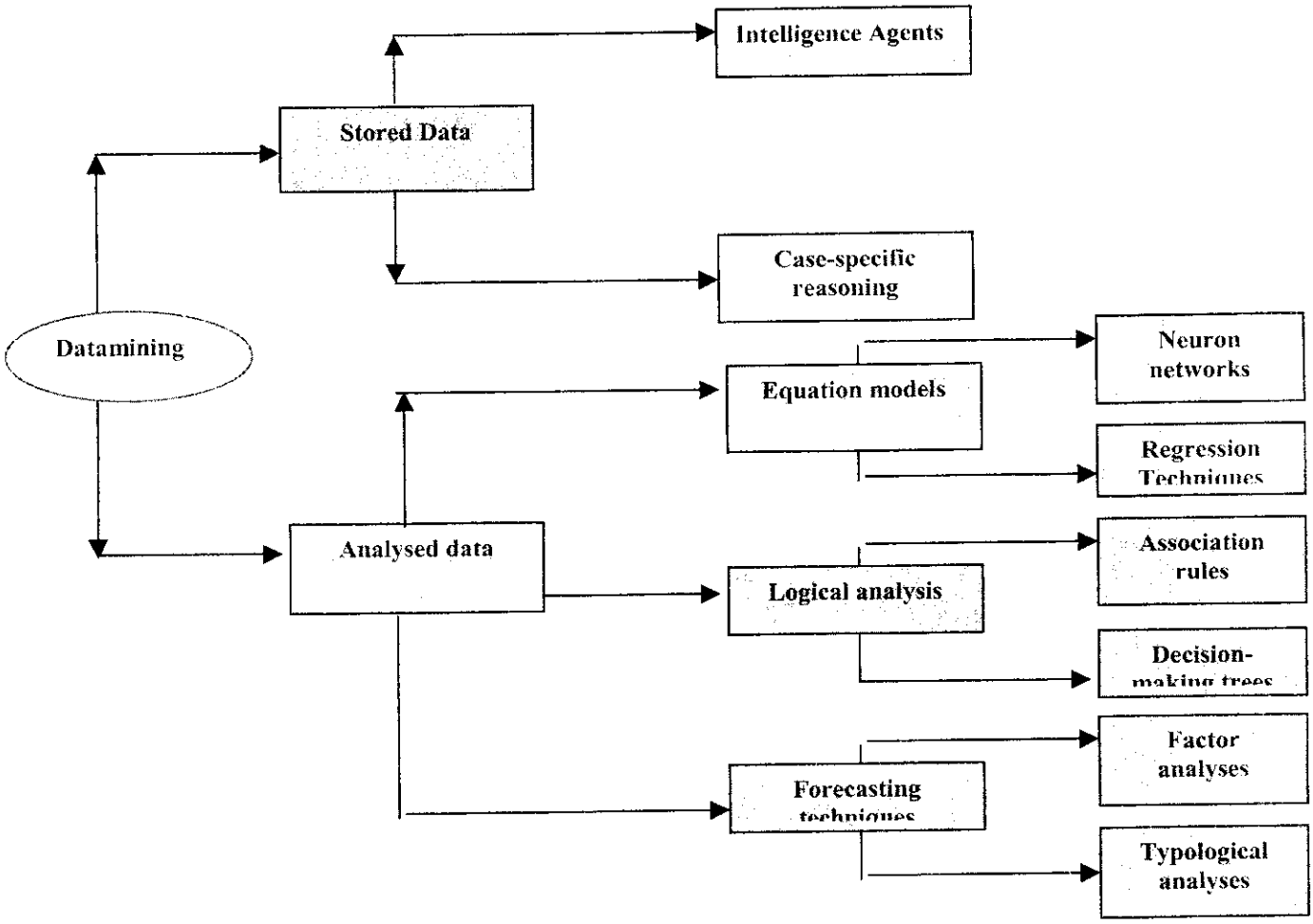
Datamining

63. Datamining is a mix of several statistical techniques for data management and automated learning processes. There are also search methods for finding stored or analysed data. Below is a diagramme describing the methods.

64. In theory, datamining is quite different from statistics because it is an exploratory search method while statistics confirm or are used to verify a hypothesis. Datamining is, first of all, a type of modelling to extract useful knowledge from a mass of raw data. The extracted knowledge has to be presented in summarized form. The exploratory search in datamining is conducted without preconceived ideas or prejudice regarding the relationship and correlation of the data.

65. In general, modelling relies on a learning phase as much as 80 per cent dependent on a learning base. Quite distinct from the testing base, where 20 per cent of the data are used for generalization.

66. Obviously, the construct depends, to a great extent, on the data quality of the learning base -- which is why the modelling phase includes the interactivity needed to improve the rationale for building the model.

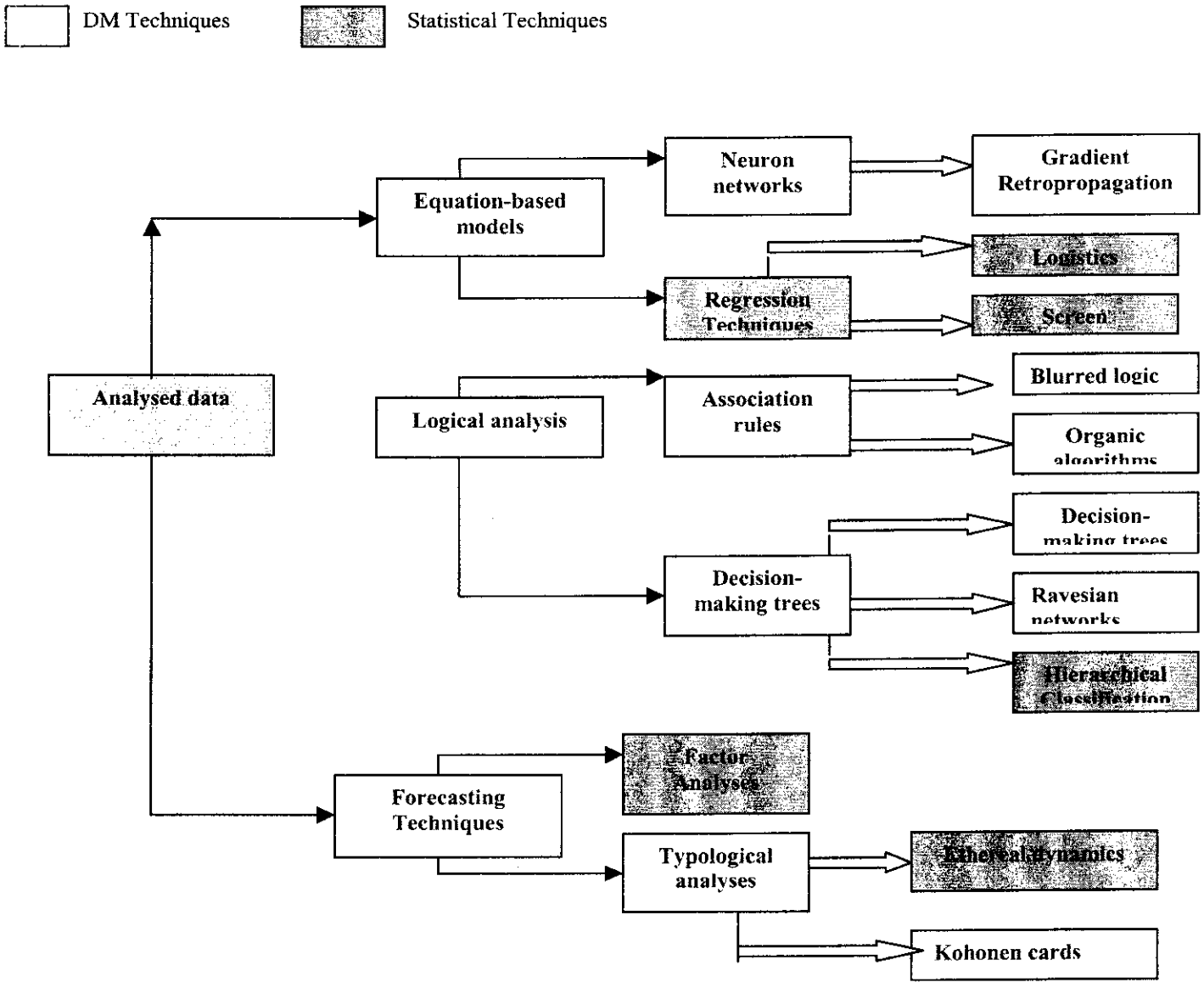


67. Regarding algorithms, the datamining tools use statistical tools that have been successfully extended to create new techniques.

68. Three main poles underpin the modelling process:

- The equation-based model search where the decision maker bases action on a more or less complex function that generally combines several variables;
- Logical analysis where the problem is broken down into successive subsets from which a reasoning construct can be built; and
- Projection techniques where the initial complexity is reduced by highlighting the main explanatory factors.

69. Referring to the diagramme above, we can see how statistical techniques differ from datamining techniques on the basis of the aforementioned poles.



DM softwares complement each other:

70. In the realm of forecasting, the various Datamining tools and software complement each other and are jointly used to improve the quality of results. Accordingly, three phases are considered, namely the data preparation, modelling and model implementation phases.

From Information Management to Knowledge Management

71. **In a complex, uncertain and highly competitive environment, companies which want to maintain an edge need to mobilize their corporate intelligence and manage all their knowledge. This requires sharing arrangements among a number of transactors and poses major cultural, organizational and strategic challenges for the company.** The big question becomes how to articulate the creation, sharing, and accumulation of corporate knowledge and any attempt to answer this merely raises others, such as:

- The distinction to be drawn between the Information System and Knowledge Management;
- What to make of knowledge, the mechanisms for creating new knowledge, sharing it, what should be corporate memory and what should be the interface between tacit and explicit knowledge?
- How to manage know-how within the corporate memory;
- How to facilitate corporate learning and what tools to use for Knowledge management;
- What added value will a Knowledge Management approach bring to the company and to individuals?

72. The comprehensive knowledge management approach takes into account:

- New changes in the organization;
- The synergy of occupational groups and business activity within the company's own specific context;
- The use of knowledge, practices and skills to best advantage;
- New challenges and evolving functions.

73. The guiding principles of knowledge management, corporate memory, technologies harnessed by a new organization and their impact on the modes of communication, the creation of value in the working environment by identifying and exploiting knowledge, are all described below:

The guiding principles of Knowledge Management

- From Information Management (of documentation, archiving systems, ...) to Knowledge Management;
- Guidelines to business methods and models;
- Identification of vital information and analysis of internal and external resources by controlling the acquisition process;
- Optimum use of the useful life of information from when it is produced to when it is used;

- Content management: consolidation, capitalization, access, circulation and sharing;

- Adding value to implicit and explicit knowledge and skills (through wisdom, know-how, innovation and environment) indispensable to decision making, daily activities and other value creation; and

- Institution of a live system promoting the development and sharing of new knowledge.

74. Because knowledge is human, knowledge management takes roots in human resources but goes on to change radically the human input into economic development. The knowledge management dynamic is one of dynamic upheaval of the human resources function in the work place and is completely changing organizational dynamics as it sets off a revolution in working methods. Knowledge management may be considered from three essential viewpoints: that of people, organizations and tools delivering a four-component model in terms of:

- Knowledge formalization methods;

- New information and communications technologies (ICTs);

- New teaching arrangements and learning methods; and

- New occupations and forms of organization.

75. It can even be maintained that knowledge management is the core of the knowledge economy which has been termed the 'new economy'. If there is any such thing as a new economy, it is the one based on knowledge which crystalizes the unique interface between historical trends and the increase in factor inputs as well as the transmission of knowledge. It is the advent of a new technological system, an economy in which the external features of knowledge hold powerful potential but where the cost of creative destruction (depreciation of old technologies as new ones emerge) is stronger than ever.[13]

76. Knowledge may be defined as:

- A difficult product which engenders externalities (machines are easier to control than knowledge);

- A non-competing product (as Romer said in 1993 – he who cultivates an orchard provides his bee-keeping neighbour with a positive externality); and

- A cumulative asset which is the principal factor in the generation of new knowledge.

77. This way of describing the externality of knowledge creates conflict between the need to maximize the well-being of society (by selling knowledge at its marginal cost of distribution) and the private interest of people who want to make money through the knowledge they have produced. This type of knowledge can be found within the corporate world as well as in the real world.

78. The impact of the Internet on knowledge management enables various Internet-related technological advances, high speed networks and multimedia to demonstrate more effectively the

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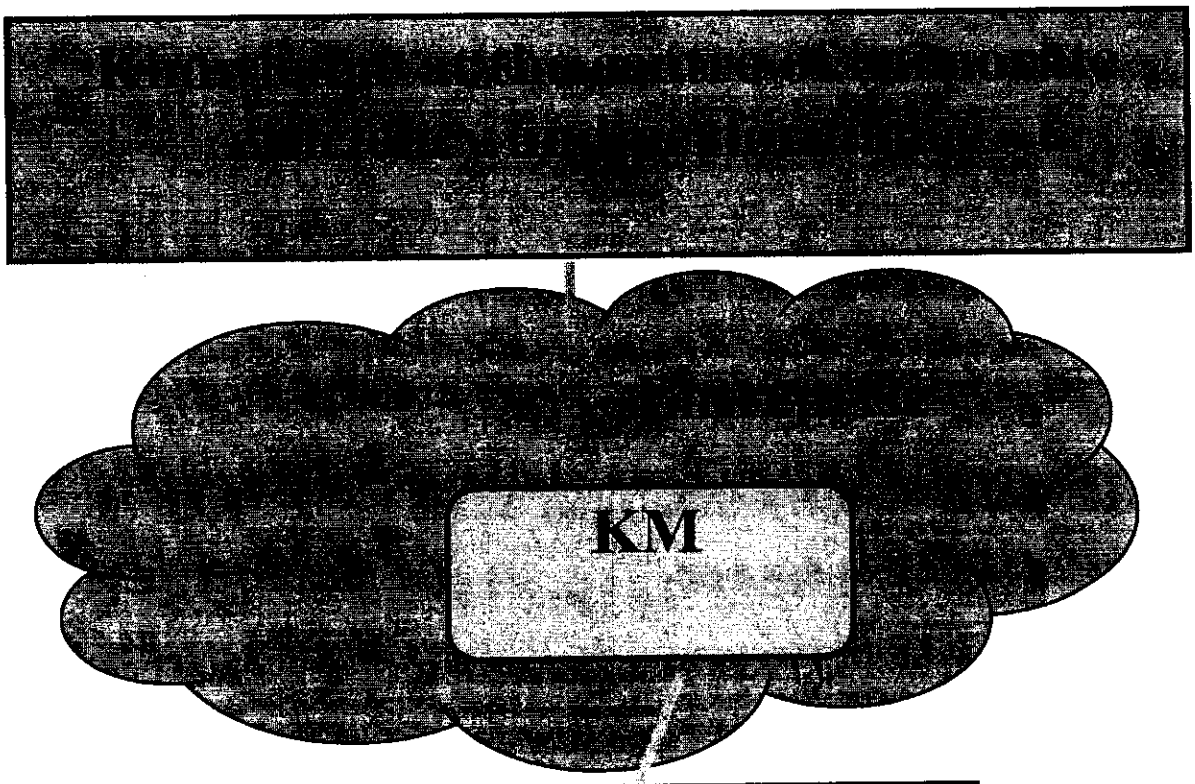
[13] Dominique FORAY "**L'Economie de la Connaissance**", Editions La Découverte, collection Repères, 114 pages

noncompeting but cumulative properties of knowledge. By so doing, they give the knowledge economy a solid physical basis even as they aggravate the problems of copyright and compensation for the producers of new knowledge.

STRATEGIC PERSPECTIVE

Tactical Perspective	Intellectual Asset Focus	Enterprise Effectiveness focus
PEOPLE FOCUS	INFORMATION Management	OPERATIONAL



Corporate intelligence [14]

79. Corporate intelligence is that dynamic whereby people are mobilized to pursue shared goals through a change in their corporate culture and the mastery of new ICTs.

80. Corporate intelligence is driving change in the corporate world and requiring the institution of educational, development and cultural changes of attitude. Internet and Intranet logistics may be used to effect such changes but a modicum of bonding should be established among the actors. Such changes require a set of interrelated accompanying measures to be led by managers, internal and external consultants who help to articulate common visions, coach and teach teamwork and provide strategic leadership.

The challenges of corporate intelligence

81. **The first challenge has to do with**: corporate survival, sustainability and growth. Three zones can be perceived in the global market place: one protected, another competitive and yet another hyper-competitive where the rules of the game are dictated by the speed of change. About 30 per cent of the corporate world operates in this hyper-competitive zone.

82. **The second challenge** is for the information society to build on the achievements of the industrial society and get the two conflicting trends to live together. Two sets of logic are super imposed. One is the industrial society of Taylorism in which pyramidal and hierarchical principles operate while the other is the information age where the paradigms of systemic thinking and networking operate. Each player acts within a dynamic of subsidiarity rendered possible by inter-connectivity and becomes one neuron within a potentially global brain known as the corporate intelligence.

83. **The third challenge is that of** permanent change wherein the company must continually reinvent itself since the only thing permanent is neither the products nor the organized occupations, but a potential to be realized. The goal concerns all levels of activity within the company-with the local complexities being of the same magnitude as the global. This process of corporate intelligence requires that corporate strategy be not pursued by managers alone but by the company as a whole.

84. The result is a management revolution in which managers have become (or should become) **pilots of the process**. They are impelled by a dynamic that is at once reactive and proactive, which imposes on them a client-oriented culture and by dint of which they must act to determine the future. Corporate capital is now a matter of brainpower and management one of developing innovative capacities, building on corporate experience and a know-how that guarantees timely initiative.

85. **The fourth challenge lies in combining the** order of logic with that of disorder. The strategic stakes can no longer be articulated within the logic of planning to meet targets but must shift into the logic of an emerging process where strategy is pursued, not at the top of the pyramid but at the multi-level. All managers should now think and all directors must now manage even to the extent of typing on their personal computers. The logic of delegated authority must now be

[14] This chapter is largely inspired by the article which Vincent LENHARDT and Claude ROCHET wrote on the

transformed into that of subsidiarity since corporate intelligence has become a necessity for corporate survival and growth.

86. **The fifth challenge has to do with both being within and outside the test tube. Corporate leaders must address the paradox of two conflicting management visions and avoid the risk of being trapped by it.**

87. On the one hand, the advocates of job security, continuity, and quality control are right to insist on directives and managerial relations based on finding best practices, audits and permanent monitoring of situations in order to keep fine-tuning remedies and providing legal protection. What they fail to understand is that such management practices are underpinned by Mc GREGOR's X-type theory that people are not made for work, cannot be trusted and therefore have to be externally controlled, motivated and organised. Another practice they tend to believe is that a Cartesian-type best and therefore singular practice exists that can be demonstrated by the use of explicit algorithms.

88. On the other hand, the advocates of confidence-building, creativity, subsidiarity, networking, and innovation, are calling for managerial practices based on people's ability to control, organise, empower and trust themselves. Indeed, people are more of a growth than a production factor and the evidence of this can be adduced from Mc GREGOR's Y-type theories which hold that they are naturally imbued with a love of responsibility, liberty and work which they seek to do as naturally as their other pursuits. Accordingly, their self-sustaining dynamic of motivation, creativity and self-control is largely sufficient, falling as it does within the new paradigm where there is no best practice but a succession of hypotheses (validated or invalidated) leading to the formulation of more workable hypotheses that more effectively enable each iteration to enrich the corporate intelligence.

89. Most times, both positions conflict but live with each other, generating those paradoxes in which corporate leaders get trapped.

90. Management is not about describing a doctrinal statement that prescribes so-called «good management». It is becoming a matter of leading a process which gives pride of place to shared solutions, the creation of corporate intelligence and the collective management of situations through a holistic approach, in which trial-and- error is the rule and the sin of commission becomes overcertainty.

In what conditions does corporate intelligence thrive?

91. For corporate intelligence to thrive, there must be a modicum of trust among the partners, an empowerment dynamic and the creation of an enterprising spirit. How do these things come about?

- Corporate leaders must articulate a vision sufficiently clear and reliable for the people, a mobilizing set of stakes or build in the trust and protection needed in an emerging process.

- They must act out a number of values because without defining the rules of the game, everything would appear arbitrary.

- Taylorian logic, which narrowly attributes to corporate leaders the right to think and to others that of implementation becomes, in the final analysis, inhibiting and castrating. It does not allow for delegation of power gradually from the center and what will need to be done is to develop the principle of subsidiarity whereby conditions are instituted to empower

each person. The recognition of the fact that, beyond institutionally recognised competences, each player carries potential, is one of the premises on which corporate intelligence is built.

- Generating the spirit of enterprise allows each actor to see the internal and the domestic challenges for the company. The empowerment of people becomes a sharing of the understanding as to the challenges, the process of action to be initiated and the joint articulation of the vision. From this perspective, corporate leaders do not consider themselves as the most competent in all areas of activity, but elicit the competence of staff, generating a dynamic of communication, expression, initiative and sharing, which leads to a collective act of creation, namely the **learning company.**

92. Corporate intelligence will not be achieved by mere organisational restructuring, a change of the management team or result from an attempt to institute a new management method.

93. The accompanying work of management teams is a process that addresses various levels of change. In systemic change, type I seeks to effect an attitudinal change that optimizes the use of the existing system, all other things being equal. The change is therefore limited to the internal complexity of the system and may prove insufficient to address the complexity of external realities impinging on the company.

94. Type II involves both attitudinal and structural changes within the organization. This means two things: a change in the belief and value system as well as a change in the representational system, or the way the players perceive the management.

95. Currently, changes in the external environment compel organizations to reinvent themselves by incorporating complexities that exclude simplistic logic. Managing the complexity of the external environment may impel competitors to co-operate – what has been termed co-petition?

96. In the organisation, there are several layers of culture. Taylorian logic is not compatible with the logical matrix in which each team leader must report to two bosses. Neither is it in consonance with the principle of cross-cutting issues or even with the resilient logic which makes each project a Gallic village at odds with its environment.

Moving from the logic of obedience to that of empowerment

97. The logic of delegation involves a change of attitude in which power remains within the hands of the hierarchy. The logic of subsidiarity involves a change of attitude in which power flows from the free action of each player because they share a common vision which makes the system coherent. In type I, the corporate leader has only to make everybody swallow his pill of a vision. In type II, he articulates a vision built around discussed challenges in a collective endeavour to address the problem.

98. In the team, while technical expertise remains important, it is subordinated to a cross-cutting process of concerted action. Team members continually show each other how far they have gone but do not consider the best technical solution as the right one. What they give credence to is a jointly articulated substantive solution.

99. The high-performance team goes beyond professional and occupational competence and elicits every player's participation in shared goals where the whole is not merely a sum of the parts, both being mutually reinforcing. The sensible manager seeks to demonstrate coherence in each of

his actions or projects (where the overarching vision is concerned) in what may be the most comprehensive demonstration of corporate intelligence.

100. **Coroporate intelligence relies on information-sharing.** The sharing of information, the updating of knowledge and business practices require behaviours that have equally to do with listening and speaking. The processing of information is basic to the building of corporate intelligence. The idea is to move from corporate noise (the cacophony of signals received from the internal and external environment) to uncluttered information.

101. The change should not only be about behaviour, but also about attitudes. The players must reflect on the belief system, their perception of management and the manager and their own values.

102. This requires a minimum of systemic training in the principles of seeing the whole in every part and every part in the whole so that the players have a sense of what each local action means globally.

The Resources

103. Since it is not enough to identify the challenges but also the resources, we may look at four resource examples:

- **Institution of educational processes** to develop the practice of listening, information and knowledge sharing. This must be a process and not a one-way teaching experience.

- **Articulating a shared vision.** This is an evolving vision born only out of a process of sharing perceptions and reaching agreement on the goals. Recognition and reward, performance and organisational achievements are common grounds for articulating this vision. What is original and specific, is what this means to the organization. Beyond substantive content, building and articulating the vision together counts.

- **Instituting information flows which enable the sharing of knowledge.** Information flows can now be sustained by computerized (intranet or groupware) systems that enable the players to keep in constant touch and to build on their experiences.

- **Developing the principle of subsidiarity.** This may be done by adopting the project approach organization-wide. It enables the use of simultaneous and interactive processes based on knowledge-sharing and capitalization.

Four accompanying measures

(i) **Strategic direction.** This requires the organisation of steering committees, preparation of flow charts and the articulation of specific indicators for measuring success and evaluating the process itself.

(ii) **Organisational Development.** This is an organic way of reflecting on organisational needs for ongoing education that leads increasingly to greater autonomy and interdepedence. It includes time for training and more time for problem solving. The emphasis is on solving problems rather than finding solutions and every manager should bear this in mind. It also includes time for sharing and communicating on matters which give meaning to the institution.

(iii) **Team spirit.** Within each team and among several teams, a corporate dynamic must be established specific to each situation.

(iv) **Coaching**. This dynamic involves philosophy, attitudes, behaviour and procedures and is aimed at building individual character and gaining insights into the management of corporate relations and decision making.

104. Currently people are perceived more as growth than as production factors and, for that reason considered capable of changing themselves.

105. These four accompanying measures rely on participatory tools and techniques which make sense within the comprehensive design of the process. A common mistake is to believe that the tool will generate the goals by itself. When isolated from the comprehensive planning process, an employee becomes a gadget and the tool becomes nothing more than a prop that blocks corporate thinking.

Goals

106. There are many factors that encourage the building of corporate intelligence. Among those factors are globalisation, the opening of national borders and information access.

107. Organisationally, the use of corporate intelligence provides an opportunity for groups and individuals to develop competencies in listening, serving and appreciating the common good to a degree.

108. Individually, the resources linked to the information revolution and the invitation to develop intersubjective dynamics provide a tremendous opportunity for self-education, freedom and empowerment.

109. The complexity of the challenges, the urgency of the changes required and the multiplicity of meanings that can be read into things, call for some ethical reflection.

110. The important thing is to place the essential at the heart of the substantive.

111. Corporate intelligence becomes possible only when the players share not only what is important to them in the strict professional sense but also put a bit of their soul into the performance of the essential task.

112. In eliciting the creativity of people, their personal lives, psychology, family and other values should not be excluded by the organization.

113. Corporate intelligence as an organisational enterprise is finally a gamble on human worth and community value. It can boost the human spirit which, at the end of the day, is what we all want.

Glossary

best practices (Bonnes Pratiques)- methods of performing a process or sub-process that have been identified inside or outside of the organization and which are validated, codified, diffused, and shared with others to encourage reciprocity and knowledge sharing.

business process re-engineering (BPR) (Réingenierie de Processus d'Affaires)- a methodology that aims to reorganize work in order to increase productivity and/or decrease costs. Also known as BPR, it is often a companion or by-product of knowledge management initiatives.

collaboration (Collaboration)- a key tenet of KM, given that knowledge sharing--among colleagues and customers within and outside of the organization--is an effective means of transferring "know-how" or tacit knowledge between individuals and therefore critical to competitive advantage.

communities of practice (COPs) (Communautés de Bonnes Pratiques) - a self-organized, deliberate collaboration of people who share common practices, interests or aims and want to advance their knowledge. When the community proves useful to its members over time, they may formalize their status by adopting a group name and a regular system of interchange.

competitive advantage (Avantage Compétitif)- a term popularized by Michael Porter of Harvard Business School and author of the business classic "Competitive Strategy", it is the unique blend of activities, assets, relationships, history, and market conditions that an organization exploits in order to differentiate itself from its competitors, and thus create value.

competitive intelligence (CI) (Intelligence Compétitive)- according to the Society of Competitive Intelligence Professionals, CI is a "process of monitoring the competitive environment to enable senior managers in companies of all sizes to make informed decisions about everything from marketing, R&D, and investing tactics to long-term business strategies."

corporate memory (Mémoire d'Entreprise)- the practices of organizations, embodied in its members, which influence its current behavior--good or bad. Technologies that enhance corporate memory include (but are not limited to) datawarehouses, document management systems, and expert systems. A complementary concept is "learning to forget", where entities strive to retire traditional, but no longer optimal, competitive strategies.

data mining (Fouille de Données)- a type of application with built-in proprietary algorithms that sort, rank, and perform calculations on a specified and often large data set, producing visualizations that reveal patterns which may not have been evident from mere listings or summaries.

data warehouses (Entrepôts de Données)- a separate, centralized, integrated (i.e., cleaned up, merged, and redesigned) repository of information optimized for data retrieval and reporting. Usually, data warehouses are read-only analytical tools, and as such contain data that is historical, stable, and adjusted for errors that may have occurred in the transaction systems (i.e., day-to-day business applications).

decision support systems (Systèmes d'Aide à la Décision)- business applications that usually contain summaries of large amounts of strategic decision-making.

document management systems (DMS) (Système de Gestion de Documents)- a family of applications which facilitate the management of compound documents, including storage/archiving, cataloging/indexing, search and retrieval, analysis, workflow, routing, aggregation, diffusion, and distribution.

explicit knowledge (Connaissance Explicite)- knowledge that has been expressed in words and numbers and shared in the form of data, scientific formulae, specifications, manuals, etc. It is easy to distribute and it is "slippery". Explicit knowledge, which is also known as "codified" knowledge, is the opposite of tacit knowledge.

innovation (Innovation)- a primary focus of KM given that innovation, or the ability to craft often radically new solutions/products, is often viewed as one of the sole firm.

intellectual capital (Capital Intellectuel)- the sum of everything the people of an organization know which can be converted into value or formalized, captured, and leveraged to produce a higher-valued asset. This is actually one of a family of terms--such as social and process capital--used to identify types of knowledge assets.

knowledge (Connaissance)- justified belief that increases an entity's capacity for effective action (Nonaka); the highest degree of the speculative faculties, which consists in the perception of the truth of affirmative or negative propositions (Locke).

knowledge creation (Création de Connaissances)- as defined by Ikujiro Nonaka, it is a spiraling process of interactions between explicit and tacit knowledge where ideas form in the minds of individuals; interaction with others is usually a critical step in developing the ideas. Nonaka's model of this process is composed of 4 steps: socialization (tacit to tacit); externalization (tacit to explicit); combination (explicit to explicit); internalization (explicit to tacit).

knowledge management (Management de la Connaissance)- the strategies and processes of identifying, capturing, and leveraging knowledge to enhance competitiveness (adapted from the American Productivity & Quality Center.)

knowledge maps (Cartographie des Connaissances)- guides or inventories of an organization's internal and external information and knowledge sources. The sources of information include files, web pages (in intranets and extranets), document management systems, recordings of best practices, databases, data warehouses and data marts. Sources of knowledge include subject experts, business rules, workflow charts, procedure manuals, "cookbooks", and diagrams.

knowledge markets (Marchés de la Connaissance)- a concept developed by Laurence Prusak which sees knowledge in firms behaving like a traditional, tangible commodity which can be exchanged, bought, bartered, found, and generated. The main price mechanism of the knowledge market is reciprocity, the expectation that one will receive valuable knowledge in return for giving it. Additionally, the knowledge may have either present or future value for parties to the transaction.

knowledge repositories (Entrepôts de Connaissances)- collections of knowledge "nuggets", the contents of which are characterized by having the authority of a best practice (which in turn implies a review for quality and validity) and having been organized according to some scheme to facilitate visualization, manipulation, and navigation. Examples of repositories include: threaded discussion databases that hold "lessons learned" and which must be created with--at a minimum--a date, author and subject classification; product marketing materials and methods, which represent a distillation of product knowledge; competitive intelligence; and people(!).

metadata (MétaDonnée)- "data about data," it provides information about resources, such as title, author, location, and date of creation of the information being described, like a book or a website, for example.

OLAP - stands for "online analytical processing", a type of application that attempts to facilitate multidimensional (i.e., data that has been aggregated into various categories or "dimensions") analysis. That is, OLAP should help a user synthesize enterprise information through comparative, personalized viewing as well as through analysis of historical and projected data.

tacit knowledge (Connaissance Tacite)- knowledge that is not made explicit because it is highly personal, not easily visible or expressible, and usually requires joint, shared activities in order to transmit it. Examples of tacit knowledge include subjective insights, intuitions, and hunches. Also known as informal knowledge, it is the opposite of explicit knowledge.

Excerpts from a large glossary of Knowledge Management at
http://www.sims.berkeley.edu/courses/is213/s99/Projects/P9/web_site/glossary.htm

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Knowledge Management Magazine. A monthly magazine. E-mail: mikek@curtco.com, Subscribe online at www.kmmag.com.

FastCompany. A magazine on organisational excellence published 10 times each year.

KM Metazine

Journal Of Intelligent Systems

Data Mining and Knowledge Discovery

Intelligent Data Analysis

Applied Intelligence

Web Pages

www.dwinfocenter.org
A Web site serving as an information centre that lists all sources dealing with Datawarehousing and decisional support systems.

http://info.gte.com/~kdd/
A Web site built by the Data Mining guru, Gregory Piatetsky-Shapiro.

http://www.datamining.org/
A Web site of the Data Mining Institute.

http://pwp.starnetinc.com/larryg/index.html
A Web site listing most sources on Data Warehousing and Data Mining.

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A Web site for spiders, knowbots and other intelligence agents.

http://www.brint.com **the premier portal on Knowledge Management.**

The Premier Business and Technology Portal and Global Community Network for E-Business, Information, Technology, and Knowledge Management recommended by Business Week, Fortune, Wall Street Journal, Fast Company, Computerworld, Information Week, CIO Magazine, KM World, and, Harvard Business School Publishing. Fast Company

http://www.knowledgecenters.org/

Web Site on DataWarehousing technologies.

http://www.prosci.com/

Online learning centre on business process re-engineering.

Some Data Mining Products

IBM Intelligent Miner

A genuine integrated DM software package which covers segmentation, differentiation, forecasting, time-bound or other associations and which is used to compare time series (from $42,000 to $150,000).

ISL Clementine

A tool serving as an integrated system of decision making trees, neuron networks, association drives and Kohonen networks. ($20.000)

SAS Enterprise Miner

Comprehensive library for building regression functions, factor and typological analyses. An integrated tool containing decision making trees, neuron networks and segmentation techniques.

Cognos 4THOUGHT

A Windows product dealing with learning about continuing or time series data. It has a powerful statistical module for analysing variable distribution and self-correllating phenomena. (FF 120.000).

Complex System Strada

Windows Explorer software having neuron networks and organic algorithms for building association search modules. (30.000 FF)

PMSI SAXON

A comprehensive DOS operated tool dealing with options for neuron network design. It is adapted to supervised learning about classification, forecasting, categorization, time series projections as well as teach-yourself automated segmentation. (FF 60.000)

Neovista Decision Series

This product incorporates several modules: neuron network, clustering, association analysis and organic algorythmic simulation tools with data access. (from $45.000 to 500.000).

Some Knowledge Management Products

Autonomy Knowledge Server from Autonomy Inc
www.autonomy.com

BackWeb Server Foundation from BackWeb Technologies
www.backWeb.com

Dataware II Knowledge Management Suite 2.0 from Dataware Technologies Inc.
www.dataware.com

RetrievalWare from Excalibur Technologies Corporation
www.excalibur.com

Intraspect Knowledge Server from Intraspect Software Inc.
http://www.intraspect.com/

Livelink Intranet from Open Text Corporation
www.opentext.com

DOCSFulcrum from PC DOCS/Fulcrum
www.pcdocs.com

Plumtree Corporate Portal Server from Plumtree Software
www.plumtree.com

DocuShare from Xerox Corporation
www.xerox.com

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