

A COMPUTER -AIDED TOOL FOR  
CASE STUDY TEACHING AND ANALYSIS

by

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**Abstract**

Significant advances in information technology are offering new possibilities for improving the process of learning and the process of analysis of unstructured problems in a variety of fields. However, the impact of these developments on academia is still limited.

The thesis presents the concepts and ideas that have driven the design of a computer aided tool for case study teaching and analysis. The software is presently at an experimental stage and will be used in fall 1990 in an introductory course in strategic management.

The broad purpose of the software is to provide a starting point for an integrated learning environment that allows the student and the analyst an easy navigation among different pieces of information and among different perspectives on the problem and permits him to conceptualize, annotate, test and simulate throughout the task of analyzing.

The software uses a hypertext environment for navigation among information in a case study and can be used as a support for unstructured data manipulation, it provides tools for graphic representation and statistical analysis of the data in the case and provides facilities for entering the case and structuring it from several perspectives. The software design is based on Hypercard™ and a description of the software is provided in the thesis. The program can be easily extended and customized for other related applications.

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## **DEDICATION**

I would like to dedicate this thesis to the memory of my parents. They have been always here encouraging me to go further

I also dedicate this thesis to my wife Kalthoum without whose love this would not have been possible.

I would like also to dedicate this thesis to my sisters Olfa and Fairouz. They have given me a lot of support throughout my studies.

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# **1. Chapter 1: Advances in information technology and their impact on education**

## **1.1. General Impact of information technology**

Advances in information technology are bringing high performance technology that even mainframes could not provide fifteen years ago to the desktop of each student, teacher, analyst at prices that are exponentially decreasing. New standards for computing technology are emerging. High-function work stations that costs less than five thousand dollars within the next year <sup>1</sup> will provide an environment with characteristics that were available only for mini and mainframe computers two or three years ago. Some of the characteristics are :

### **A high resolution bit mapped environment for text as well as graphics:**

Resolution that are close and even exceed in some cases a hundred dot per inch and the ability to display simultaneously a palette of several hundred up to several millions of colors allow displaying text with resolution that matches a quality print and graphics that are close to real life pictures. Bitmap display offer a wide range of graphic possibilities including intensive use of icons and other graphic metaphors to convey information to the user.

Furthermore, large screens that are equivalent in size to one and two pages of paper associated that provide also high resolution display are removing some of the disadvantages of print media over electronic media in term of accuracy and area of visual presentation.

As a result, te presentationa nd display of information are attractive and metaphores for simulating the printed media are removing existing limitations of computer for displaying and carrying the message.

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<sup>1</sup> Technologies offered by vendors such as Apple, and certainly the NEXT computer are offering the described characteristics for less than \$5000 as of MAy 1989

### **Support for very high speed networking**

development in communication technology are removing physical barriers to communication. A team can work together from remote areas. A new realm of possibilities for teaching is appearing. applications such as remote teaching, group assignments, in class simulation and analysis of complex problems and situations are becoming more and more widespread.

### **Very large peripheral storage devices**

An exponential decrease in size and cost of storage devices combined with an exponential increase in the storage capacity is allowing virtually any information to be stored at the desktop of the user. For instance, CD Rom and Erasable Optical Disk Drives technology allow storing the equivalent of a million page book on media that is smaller in size than a printed book. Combined with high speed networking, and database technology, storage technology allows a fast access to a virtually unlimited amount of information.

### **An intuitive user interface**

An increasingly intuitive user interface is removing psychological barriers for contact for beginners and novices in the area of computing and reducing the cost of learning tools and applications. A user interface that is becoming increasingly standardized is a mouse and multi-windowing environment where using and switching among applications is very intuitive. The computer is becoming more accessible to people with limited background in computer and graphic metaphores are removing people biases against the computer.

### **High speed processing**

Very high speed processors are permitting a quick answer to real time , real time and display and animation of color pictures, games and simulation and fast access and manipulation of different type of information. As a result, the analyst and student are provided with an increaing a mount of tools for breaking the complexity of problems and getting real time answers.

## **Multi-tasking**

Multitasking allows several applications to run at the same time. Multi-tasking permits real time data input and manipulation in the background. thus data coming from databases such as Dow Jones data can be processed while the user is working on other applications.

## **Optical character recognition technology**

OCR is the conversion of characters printed on paper into editable text files. OCR technology is permitting an easy entry of most books, magazines and newspapers in a format that is both compact and allows efficient search, retrieval and manipulation of the information that they contain.

## **Object Oriented Environment**

There is an increasing tendency to provide for the programmer an environment that is closer to human conceptual thinking. the main assumption is that people work with problem/domain concepts while hardware works with different concepts such as operator/operand. Some of the conceptual burden in translating from problem domain to computer domain should be carried out by the machine by making the machine work in terms of concepts closer to everyday world. such environments are facilitating programming and provide an increasing degree of code reusability. As a result programming is becoming easier, more productive. Combined with an intuitive user interface, object oriented environments are making programming accessible to users without an extensive knowledge in computer science.

## **Open architecture, Interprocess Communication**

The problem of compatibility between applications is gradually being reduced. Applications are being more easy to customize and thus more able to be easily adjusted to the user needs. Furthermore, information generated by one application would be easily send to another application allowing a high versatility in the use and processing of information and a greater depth in analysis.



the advances in computer hardware and software have permitted the development of an increasingly powerful set of applications and tools for gathering, analyzing and integrating information. Some of these applications are:

### **Hypertext**

Hypertext is a model based on the assumption that human idea processing occurs through associations. A hypertext system uses electronic capabilities to overcome the linear nature of the printed text. A hypertext system would be a high speed, machine supported linkage between data chunks in a non-hierarchical data structure (Conklin).

hypertext systems allow the user to organize the material in different ways and from different viewpoints Hypertext is thus a tool that helps in the thinking process and the organization of idea

### **Expert systems**

Expert systems are programs that manipulate knowledge to solve problems efficiently and effectively in a narrow problem area. These systems use symbolic logic and heuristics to find solutions. Expert system applications have been in several applications such as interpretation or inferring situation description from sensor data, prediction or inferring likely consequences of a given situation and diagnosing, debugging and monitoring system behavior. Expert systems are becoming an effective tool for organizing and analyzing complex and large scale problems within a narrow domain range.

### **Statistical and simulation tools**

Simulation tools are providing the ability of modeling with an increasing accuracy the dynamic behavior of complex systems thus allowing the definition of a more accurate representation and understanding of complex systems and situations and a better capacity of predicting behavior. In particular, increasingly user friendly System dynamic modeling tools are allowing the student and analyst to model decision making processes.

## 1.2. Impact of information technology on education

Despite the wealth of innovative applications and the increasing power of affordable hardware and software, Few innovations in the educational software have matched the innovation that has taken place in the business market. Few new educational paradigms have been developed and we did not see a dramatic change the education environment (CERI,1986).

Several researchers in the Center for Educational Research and Innovation argue that Much of education is about information processing, definition and transmission of knowledge and skills. Since information technology is also about information processing, about translating instructions into actions, about memorizing and communicating, its important evolution should have impacted education in the same way : "*just as immense communication and information processing abilities of computers transform most processes of which they become part , so does the nature of education and the function of teachers and schools*".

They also argue that "*the conceptual overlap between the nature of the new information technology and the process of delivering and acquiring knowledge makes it product especially relevant to the learning process. Moreover its versatility enables it to perform equally for the managerial and the pedagogical function.*

While it is not the purpose of this thesis to discuss the reasons of the inability of the academia to catch up with the developments in information technology, different explanations for this lag are:

- Human ability to understand th learning process is less developed than his ability to understand the software development process (Rockart and Morton)
- A "natural inertia" exists in the academia and is due to institutional constraints (CERI)
- Courseware has largely been developed amateurs, to wit-middle school teachers and university professors who may be experts to some educational subject but are new to the computer medium.

- The cost in term of hardware and software for development of high quality courseware has been very high until recently. However, even if the material for development is affordable, a high quality software requires a team incorporating area experts, talented teachers, graphic artists, software experts and educational psychologists. Such a team is not easy to gather.

We consider that an important amount of useful work is to be done in the educational field. Thus Brands points : "it appears that computer technology may be far more advanced than our ability to apply it to problems around us , If such is the case , then the current challenge for businesses and school of businesses may well be that of developing better educational procedures for applying the technology to the problems of the world"

### **1.3. Impact on the field of strategy**

A growing number of tools are being developed to help strategists make decisions. As Roberts points out : "Although computer technology does not provide leadership or decision making, it does offer a mean for expanding the reach and grasp of a leader and the speed with which the leader plans for and the speed at which that leader plans and responds to the environment with plans and actions."

Fredericks and Venkatraman consider that the manager's ability to understand the relationships among the various dimensions in analyzing different areas in strategy such as competition or market segmentation is ultimately limited without support tools that can help them examine these dimensions interactively. They consider that present information systems such as the spreadsheet are limited in manipulating several dimensions of analysis and that a system that allows the understanding of multiple complex relationships should have several capabilities such as ease of navigation across different dimensions of a problem, flexibility in customizing the dimensions of navigation, logical consistency and multiuser orientation.

#### **1.4. The challenge of an Integrated learning environment**

How can the educational community take the opportunity to create new educational environments that rival the new hardware and software base ?

Studies by the Center for Educational Research and Innovation show that typical computer aided instruction systems do not *integrate* all the facilities that would create a favorable learning environment (voice and music output, multi-windowing...) these facilities are not enough to create good teaching but it is noteworthy that when properly used, they are of great help in getting the educational message across.

Such an environment allows students and analysts **an easy navigation among different pieces of information and among different perspectives on the problem and an access to a truly exploratory environment that permits and even encourages reflection, that allows the student to simulate, test, conceptualize and annotate throughout the task of analyzing a complex model or system.** Once the student gains a truly exploratory environment allowing all key activities to be performed together, seamlessly, than we may speak of a real new learning and teaching environment . The spillover of such an environment would certainly be effective in fields that have to deal with complex , multidimensional, ill structured and broad such as the area of strategy .

## **2. Chapter II : Description of the objective of the software and the concepts underlying its design.**

### **2.1. Presentation of the case method:**

the case method and class discussions associated is utilized heavily in schools of law and management. This method assists the learning process by involving the student in the material to the depth necessary for him to engage in a discourse about it.

For a business case, the student is generally presented with an actual situation usually with no particular guidelines to his expected behavior. He is faced with an important amount of information not all equally reliable or relevant. This information is ill-structured and mastering the facts involves a clever restructuring of the information and making any possible calculations and comparisons that will help analyze the case. The student must also add to the facts by making reasonable assumptions regarding many aspects of the situation. The next step is to identify several alternative course of actions and evaluate each of these alternatives. The student is usually required to analyze all the facts for each alternative, he has to use the available qualitative and quantitative data and simulate different scenarios. He is usually then asked to make a decision concerning a specific course of action. The plan would have been gone through a thorough analysis, would be internally consistent and would have a high probability of meeting the manager's objective. Once the strategy has been determined, he would consider issues related to the implementation of this strategy.

The case is followed by a class discussion where the student must defend his analysis and plan of action against the criticism of others. The objective of this process is a clearer perception of the problem, the recognition of the existence of different views and

conflicting interpretations of facts and events and a greater awareness of the complexities with which management decisions must be made.

The case method thus require a high degree of participation and involvement, and an important amount of work iis required in preparing it. The case provides a simulated world in which the student can gain experience in decision making without suffering possible consequences (Rockart,1977)

The case method develops some important analytical skills. For example:

- Being able to identify his own assumptions
- Experimenting with different methods for rearranging data to make them analytically meaningful
- Being able to organize case facts to back up his views on an ill-structured material

## **2.2. Some limitations of the present case method**

### **2.2.1. Lack of flexibility of the media**

The case is given to the student on a paper media, when reading the case, the student frequently follows the text to the footnote and then go to the exhibit or table that the text was referring to, he tries to keep track of the many places in the text to which he wants to refer to, he rapidly runs out of bookmarks, fingers and short term memory. The way he manages information is by leaving annotations in the book margins, highlighting with a yellow marker, bending page corners or using different colored bookmarks. Because he has to "torture" the information in the text from so many facets, the case is even torn in different pieces and presents a multi-color graffiti aspect

In order to alleviate the task of analyzing a complex set of information, the case writer or designer has to structure the case in a manner that reflects a set of relationships among the relevant concepts. A good teacher, a set of questions or the authors can help provide

connections and cross references to seemingly distinct sections and ideas. However, the case in a printed format provides only one perspective of structuring and organizing the information; The lack of flexibility for relating parts of the case to each other implies that when the organization and perception of subject domain does not match the one provided, the task of analyzing becomes more difficult and may even be frustrating.

### **2.2.2. Lack of "handy" tools for manipulation of quantitative data**

An important part of the analysis has to be devoted to quantitative analysis. However, in general, the human mind can not handle more than five to seven variables simultaneously. When an increasing number of variables is introduced the tendency is to aggregate some of the variables and discount some of the variables over others. The human mind is further weak in assessing statistical correlations and analyzing trends unless some orderly system for recording the variables is developed such as putting the variable in writing, drawing diagrams or schematics or entering the variables on some form of matrix..

Several software packages offer tools for quantitative analysis. The first obstacle for using a computer is the task of extracting the data from multiple tables and inputting it in a spreadsheet or a statistical package. The second difficulty is the important cost of learning several packages that currently lack a user friendly interface. Finally, the format incompatibility between the packages significantly increases the time required for analysis.

### **2.2.3. the long time of the feedback**

Since during the classroom case discussion, only one or two students at a time can speak in a class of an average of fifty. Unless the teacher has very good skills for animating discussions, the student easily "tunes out " of the case.

## **2.3. Objective of the software**

Case preparation and analysis is, as we have seen, a non linear-process where the student has to go back and forth between different pieces of information, structure this information from different point of views, use different methods for data representation and analysis, simulate different scenarios for outcome. Consequently, if we were to provide an environment where the student can simulate, test, conceptualize and annotate throughout the case, where he can navigate in a non-sequential manner throughout any data an environment which would provide an instantly available general set of tools for this purpose, the productivity of the student in preparing the case can be significantly increased. More particularly:

- It would reduce the time required to analyze the case. This amount is particularly substantive for case studies as compared to other learning methods
  - It would provide the student with the ability to analyze each of the alternatives in more depth with the help of advanced analytical tools
  - It would allow a faster feedback for example by incorporating in the software statistical pattern recognition and tutorial tools that help guide the analysis of which facts are relevant.
- Such an environment would of course be helpful for the policy and strategy analyst and the decision maker in general

We have designed a software that attempts to provide some basic tools for the creation of such an environment. The software will be tested in the fall of 1990 for an introductory course in strategic management.

Some of the specific objectives are:

### **2.3.1. Support for Manipulation of ill-structured material**

One of the objectives of the software is to provide the student and analyst with a tool that helps him manipulate a material that has many facets and can be considered from many points of views and for which a "correct solution" depends upon several contingencies.



The tool would ease the structuring of ill structured/complex materials. This is mainly accomplished by creating a structure that allow at the same time a focused navigation among pieces of data from different perspectives that are defined by the teacher and by allowing also free navigation between data. The focused navigation allows for the professor to impose to the student a line of thought or a perspective that is relevant in the case and to tune the discussion of the case so that the feedback is easier and the discussions more focused in class. Free navigation among data allows the students to combine information and restructure to generate new information and ideas.

In summary, the case entered in a computerized format is not a new kind of container for information *but also a collection of methods for accessing this content through many formats or maps* that would help the reader in searching and navigating the case through different perspectives.

### **2.3.2. Support for unstructured data manipulation**

Another objective of the software is providing a wide and handy range of tools to better structure the learning /analysis environment and to manipulate the analysis variables within that environment for greater comprehension. the ultimate objective being the base of development of an instantly available general set of tools that are utilized in the process of obtaining, verifying and creating knowledge.

While several tools of applications that usually provide one way of representation are available on the market . These packages are usually:

- Require a significant amount of learning, they correspond to different learning environment and for each package, the student has to learn a new "language".
- Very sophisticated in the sense that they provide an important amount of features that the student does not require but he still has to pay in learning or in speed the cost of such features.
- At the present time, the output of each package is in a format that is usually incompatible with other formats. so that the student has to go through the manual cut and paste between

these packages. Furthermore, the fact that each application is independent from other applications do not allow for the output variables of a dynamic simulation tool , a statistical package or a spreadsheet to interact with each other while *it is the interaction of these variables that produce new types of information*

The existence of a modular , user friendly design and an integrated set of tools allows keeping the information separate but available for any type of combination, interaction and manipulation, the generated information is added to the old one and kept similarly for further computation using a wide set of tools. Thus Brandt points that :

*The computer provides the manager with a rapid and efficient mean for recording countless variables and describing their interaction. In a sense, this calls for a reversal of the simplifying conglomerating process for handling planning information and a recognition of the value of disaggregated data. The manager soon realizes that the computer is a marvelous instrument for aggregating and relating bits of information. Managers and planners who use computers are usually first concerned with developing information systems that keep bits of information separate so that the computer can combine them or manipulate them in a variety of ways.*

### **2.3.3. Flexibility in adjusting to learner , analyst needs**

Using customizable, " open architecture" software allow ing the analyst to add its own set of tools and allows multiple types of data and models to process data to coexist.

The existing software provides an important amount of features that are very seldom used .

### **2.3.4. Creating a user friendly environment**

An environment that contains mechanisms that are simple to operate, attracts the learner/analyst ( use of visual, audio impact) and does not require an initial learning period and allows an easier assimilation of information.

### **2.3.5. Providing a tool for case input**

As we have outlined earlier, optical character recognition technology is allowing the transformation of printed text into an editable electronic format. we have provided facilities to easily input the scanned text into a format that allows its structuring from several point of views.

### **2.3.6. An example of a futurist system with similar objectives**

Project XANADU was a futurist vision of an information system XANADU is Ted Nelson's hypertext system, XANADU is one of the most sophisticated examples of a hypertext system. It lets users link together different pieces of information. It can provide the computer equivalent of traditional literary links, such as footnotes or comments on the margin.

The fundamental unit of the Xanadu system is the document. From it, links and windows give free access to other parts of the material. Storage space is optimized by the use of heavy linking. The user is never forced to follow a preconceived path, but is free to follow his own way in search of his interests and information needs.

Xanadu, however, transcends the literary tradition. It lets the user trace the link and instantly access the material. These linked documents eventually form a rich document network easily retraced by other users.

The Xanadu Hypertext System can be used to serve any class of user needs (graphics, CAD, text management, numeric manipulations, etc.) through the creation of "Front ends." More than just powerful interfaces, Front ends are advanced applications packages, tailored to serve different markets, that know how to interface with various input or output devices, know whether the data is text or pictures or music, and decide how to format the data for display.

These Front ends, which will be created by third party software developers, communicate with the Xanadu Hypertext System (the Back end) using a standardized request and data transmission protocol (FeBe: Front end-Back end). No matter whether the Front end is

handling CAD drawings or legal documents, the Back end handles storage, retrieval, and linking and editing of data.

## **2.4. Presentation of concepts driving the design of the software**

We have presented the purpose and the main ideas and assumptions that oriented this software. We will present some of the tools and concepts that drive the mapping of these ideas from the conceptual to the physical level.

### **2.4.1. A multi-level , multi perspective / network representation of a document**

#### **2.4.1.1. The process of analysis as a non-linear process**

We consider that the that the process of analysis is essentially finding non-linear associations of disparate information. For instance Analogies are made by comparing different pieces of data that are coming from different parts of the case. Thus, extracting information from other cases, reports and articles and making analogies with companies or industries that exhibit a similar pattern of behavior provides multiple possibilities of associations and consequently a propensity to creates new information. The process of reorganizing and restructuring the qualitative and quantitative data generates new information and insights on the case. The effectiveness of the student would thus be increased by providing a media that is more conducive to this dynamic restructuring.

One of the first authors to stress the importance of non-linear associations in manipulating information is Bush. He pointed out that " Our ineptitude in getting at the record is largely caused by the artificiality of system of indexing. When data of any sort are placed in storage, they are filed alphabetically or numerically, and information is found (when it is) by tracing it down from subclass to subclass. It can be in only one place, unless duplicates are used, one has to have rules as to which path will locate it; and the rules are

cumbersome. having found one item, one has to emerge from the system and re-enter on new path. The human mind does not work that way. It operates by association. While one item in its grasp, it snaps instantly to the next that is suggested by the association of thoughts, in accordance with some intricate web of trails carried by the cells of the brain. It has other characteristics, of course; trails that are not frequently followed are prone to fade. items are not fully permanent, memory is transitory. Yet the speed of action, the intricacy of trails, the detail of the mental pictures, is awe-inspiring beyond all else in nature" (Vannebar Bush, Atlantic Monthly, 1945)

The primary organization of the book is a hierarchical order of sentences, paragraphs and chapters. This structure is a rigid structure, the relation between pieces of data is based on their physical proximity. While secondary organizations such as footnotes, a subject index or bibliographic references, transcend the physical order of information by making new connections, they are more cumbersome to use than the primary organization.

Consequently, the printed format imposes a particular rigid structure that corresponds to one point of view or perspective that the person who prepared the case had in mind and that usually follows a set of standardized principles. If the student or analyst would like to follow some line of thought that usually do not correspond to the case as structured, he would have difficulty in making the analysis.

The limitations of the printed text are very similar from a structural point of view to the limitations of a hierarchical database. as Date points: Any change in perception is very expensive and require an important restructuring.

#### **2.4.1.2. A network representation of a document**

Let us consider a document as a set of "data chunks" (a data chunk can be a paragraph, a chapter, a section. ). Each data chunk can be related to each other in several ways. The document has usually an outline that is a representation of the document where each "data

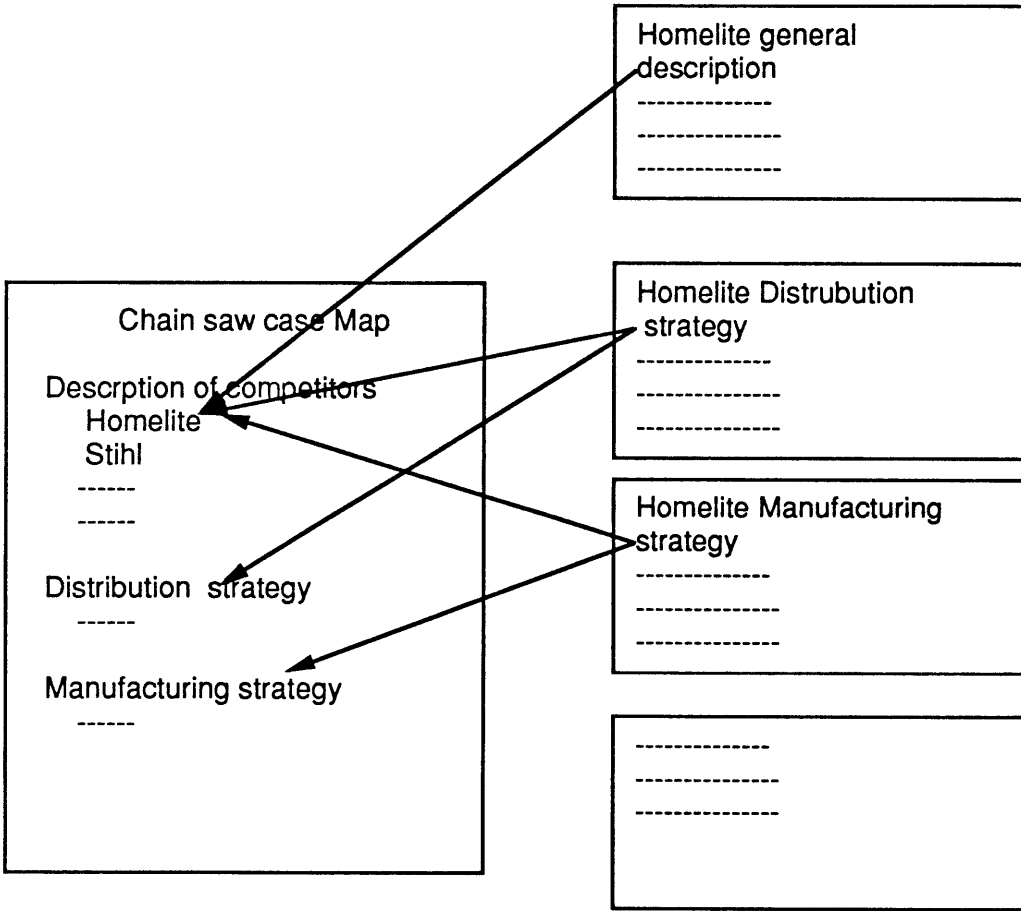
chunk" is represented by its title and that exhibits a particular type of relationship between different chunks. This relationship is a hierarchical relationship. Thus paragraphs that are "similar in contents" are grouped into a chapter. Chapters are regrouped into a section etc....

The outline is unable to represent certain relations between data chunks that are As shown in figure 5, a particular paragraph may be relevant from more than one point of view. Thus the distribution of the company Homelite is relevant when we describe a competitor and also when we describe the distribution strategy of this competitor. The problem is that there are several ways of relating chunks of data and that to represent all these relationships we would have to imagine a document as a network of chunk of data where multiple links in any direction between the chunks exist. Thus if we represent each chunk of data by a card, Figure 6 shows how the multiple relationships can be represented.

The existence of multiple relationships and a set of more complex linkages is even more relevant when we group different cases together. For instance, if we group cases that describe several industries, there are obvious relationships across industries. Thus, as represented in figure 7, it is very relevant to "navigate" through paragraphs related to distribution or manufacturing across cases, or to navigate case by case.

The outline as a tree structured representation is unable to represent these links. In fact, we need several outlines, each outline corresponding to one perspective or a particular set of links. One way to overcome that is to have multiple outlines corresponding to different perspective, the student or analyst would navigate through the document from each of these perspectives.

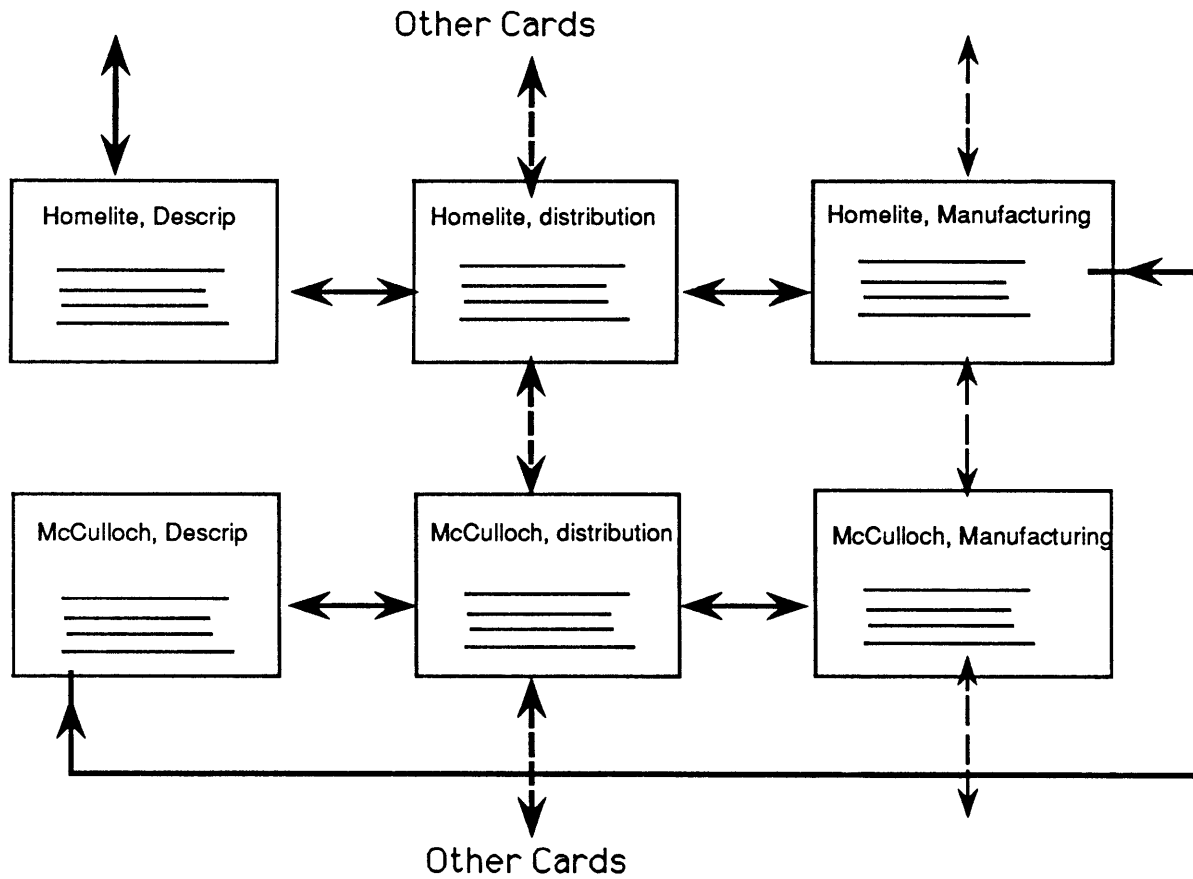
Thus we see that the computer is introducing a new degree of flexibility that the printed document could not easily permit. It allows the representation of the document as a map of chunks of data where a reader can navigate in different direction and follows different paths. these paths as explained earlier can be assimilated to particular line of thoughts that the reader follows. The printed representation of a document is of course unable to



**THE CHAIN SAW CASE**

**THE SAME INFORMATION IS RELEVANT  
FROM DIFFERENT PERSPECTIVES**

Figure 5



- Navigation from a Competition Perspective
- - - - - Navigation from a Distribution Perspective
- . - . - . Navigation from a manufacturing Perspective

**A Network Representation Of A Document Allows  
Navigation Among Data From Different  
Perspectives**

Figure 6

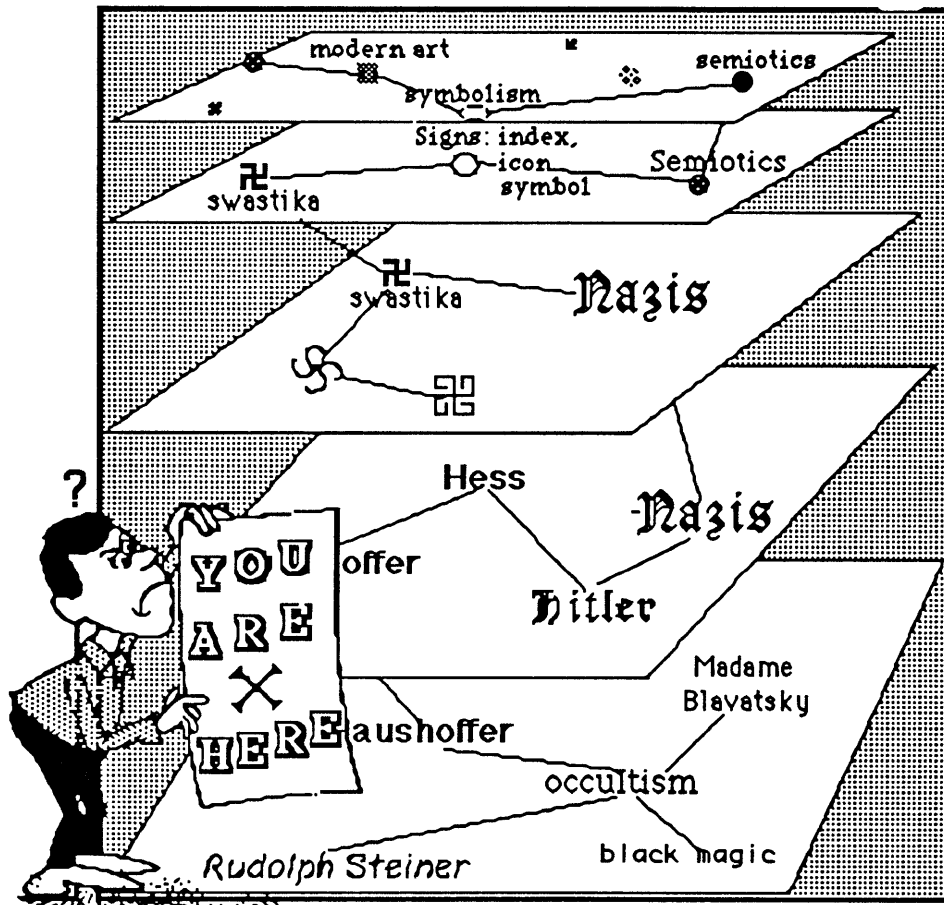




represent that relation easily because of the medium it uses to allow such a navigation. this type of navigation corresponds to the idea of "hypertext"

### 2.4.1.3. Loosing the cap during navigation

One of the shortcomings of this approach is that the user may get "lost" when navigating from one chunk or topic with another.(some people even argue that navigating in the information world is similar to navigating in the physical world and the same problems of orientation are found). An example of these problems of navigation is illustrated in the following cartoon:



To partially overcome this problems, we have provided two type of links , the first type of link, the author preselects, according to his interests, the subject that he would like to

emphasize, or ideas about the reader's interests, a certain path of navigation . The only option left to the reader is either following this predetermined path or not following it at all. we have also allowed more free type of navigation. For example, the user can go to a table or an exhibit, when reading a paragraph, he finds a reference to this table or paragraph, However, we did not allow navigation more than 2 levels deep.

#### **2.4.2. Use of visual effects, icons and menus**

A multimedia environment based on graphics,icons and sounds provide an attractive interface, This interface reduce the cost of learning , add interest value , cue devices and aim to ease the tension in the analysis process.

Icons , pictographic symbols which are used as part of the man-machine interface in order to represent processes and commands.

##### **The icon**

An icon is a graphical symbol which is used to represent objects in a computer system. These objects can either be data or processes (Gittins). Through icons , the designer aims to create a display environment in which the user can identify an object from its icon. Icons are usually classified into associative (manifests a characteristic of the object) or serves as a cognitive key to it. We are going to essentially use associative icons so that by looking at the icon, the user can identify the underlying object and its attributes.

the use of icons and menus has several advantages:

- Obviating the need for familiarity with the underlying objects, thus a detailed knowledge of data and processes is not necessary for use or operation of the system
- reducing error and input
- displaying space
- use of graphical metaphor reinforces the mapping process.

##### **The Menu**

A menu is a set of items that are displayed at the request of the user. the items correspond to data and processes (commands) that are selectable by the user. The use of menus reduces the need for memorizing commands and reduces input error. Menus can be hierarchically organized so that they correspond to an organization

We also use visual effect and animation to illustrate concepts or to simply add variety and interest value to the presentation of information. These effects are also used to demonstrate processes and interrelationships in a way that two-dimensional illustration can not. These effects can be easily changes and a graphic overview can easily be assembled component by component on the screen. Animation and visual effects thus provide a method for customizing paths through information to the needs of individual users. Sounds are used as cue devices, add interesting value and augment an animation sequence.

### **2.4.3. Software design by module integration**

In designing the software we used the following rules:

- a high level, English like language as a programming environment
- A language where an important set of examples and code samples exist in the public domain and are easily accessible
- A language providing a rich set of tools
- A programming environment that facilitated the modularity and independence of different parts of the application
- The systematic use of any public domain utility and application that would reduce programming
- The generation of reusable code
- An open architecture environment allowing the integration of resources written in other more conventional languages

As a result , the implementaion phase of the design considered mostly of organizing and integrating existing tools, utilities and code examples. Such an environment allowed me to focus on the logical part of the design and not to worry about programming issues such as memory management.

The development time was short. This evaluation is based on feedback from professor at the Sloan school of management

The code generation was not a painful experience as it has usually been the case

The use of a kind of object oriented environment allowed an easy modularity and flexibility of the code. The code can now be easily customized and used as a base for further development and refinement of its concepts.

#### **2.4.4. Customization**

Various methods for reading the case are used such as thumbing, glancing, skimming and browsing. Furthermore, writing in the margins, making corrections, summaries or mnemonic devices , conversion of text to tables and graph lists , placing bookmarks and "dog ears" should be provide as metaphors to help to sequence and reference materials in a personnalized pattern, ultimately matching the student style.

We have tried in the software to *institute place in a body of information through various visual-spatial cues in order to improve navigation and access.* We used an icon based approach and tried to mimic different ways of annotation For example to mimic writing notes in the margin of paragraph, you can call a notebook where you can write any comment or summary, these notes will be always associated with the paragraph and they can be gathered with reference to the paragraph associated. The user can also highlight a main point as he does with a highlighter.

#### **2.4.5. Approximation of an expert system**

We view this software as a base for expert intervention by the system to help, suggest and analyze the behavior of the student allowing thus an increased fast feedback and learning

We have implemented a basic capability for contextual analysis. The user provides a keyword for a topic such as strategy, or distribution and the system dynamically generates the paragraphs where the keyword appears, The student can then navigate through each of these paragraphs.

## **2.5. Presentation of the tools and the environment for software design**

### **2.5.1. Presentation of Hypercard/Hypertalk**

#### **2.5.1.1. Hypercard as a "database" program**

Hypercard as a product that is difficult to define. Hypercard is rather a union of various products : an application program, a programming language, a tool set , a resource library and an implementation of "hypermedia". We consider that this union of various concepts provides a new and appealing *environment* for design and creativity as well as a *medium* for a better communication of ideas.

Hypercard incorporates the elements of both an application program and a programming language.

At the simplest level, Hypercard is perceived as *a suite of diverse application programs* such as a rolodex, a booknoote, a slide show , a screen painting program and different tools for ideas organization.

Hypercard can also be perceived as a *"database program"*. Indeed, Hypercard provides basic capabilities for storing and organizing lists of structured information. Hypercard advances the trend towards flexibility in data types and structures. It allows storage of information with little prior regarding to size,type or sequence. You do not have to specify in advance the type of a stored item; in fact "everything is a string". This flexibility is not without problem, for example array manipulation is not easy. On the counterpart, storing,manipulating and retrieving information in a free text format is very efficient.

Hypercard can also store pictures alongside textual information. The storage of bitmaps is very efficient.

Hypercard provides *a programming environment* through its built in high level language : Hypertalk. This particular aspect will be discussed in more details later.

Hypercard can also be perceived as *an operating system shell* in particular, it can launch an application program and then resume control when the launched application finishes, it can open for viewing or processing , print a document provided that the application creating the file is accessible. external routines can be added for further file management operations.

Hypercard can also seen as *an implementation of "hypermedia"*. Hypercard let different type of information information be organized in a network like structure. The management of links between cards is efficient so this environment is very conducive to this type of software . However, we should not that presently, it lacks a capability of directly linking a particular word or data "chunk" to other data chunks a feature considered key to hypertext systems. This aspect can be worked around. At the time of writing the thesis, several upward compatible systems providing this capability have just begin to appear on the market. Hypercard can be linked to media for storing different type of information such as video disks approaching the idea of multimedia.

Hypercard is finally a user-friendly *interface* between an application program and the user. Indeed, because Hypercard is an open environment that can communicate with other applications through external routines, it can be seen as a layer that one implement over an application program that will use the multimedia properties of the environment to communicate with the user.

Hypercard has been used by small and "non techies" developers as a technology platform to which they add their own enhancements. The accessibility of the code of those applications and their ease of customization has provided an environment for putting down all kind of ideas. It has also been used by very large and well known applications as a way

of getting closer to the user. Some of the important use of Hypercard are : retrieving information, organizing information, controlling external devices, providing customized access to the Macintosh.

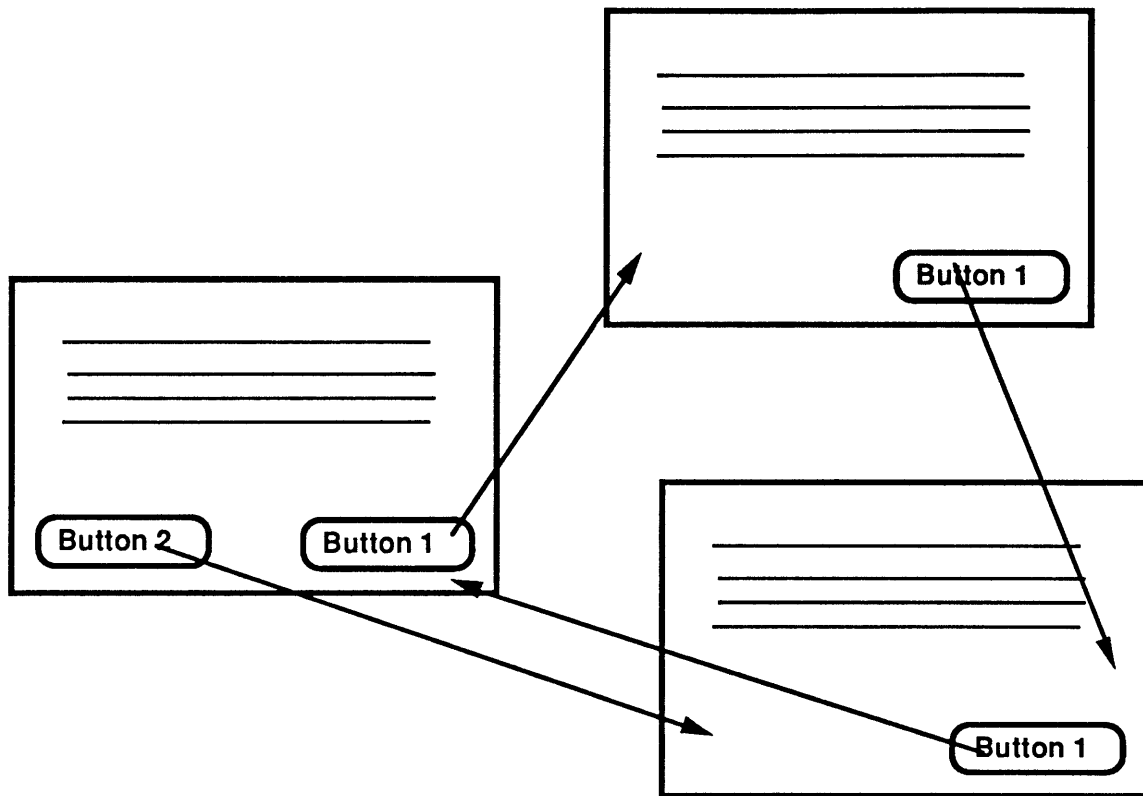
#### **2.5.1.2. Basic elements of Hypercard**

Hypercard employs and even extends the employment of visual metaphors on which the Macintosh is base.

Hypercard 's dominant metaphor is the notetaker's index card and stacks into which habitual card jotters tend to sort the cards. Hypercard stretches this theme to take in all the permutations such as cards in a Rolodex-type address file or a library card catalog.

The basic element in Hypercard is a *card* . A card is a support on which structure of varying complexity can be built that physically is a rectangle that fulfills the full screen area of the macintosh computer. A card can be linked to other cards via a *button* . A button is graphically defined as an area of the screen text or graphics that initiates an action when a user selects it with a device such as a mouse controlling an on-screen pointer. Thus if the primary idea of hypertext is to partition the information into discrete chunks. Each chunk being linked into a variety of ways to any other piece of information in the system. One chunk is analogous to the information contained on one card . The link is the button. The process of selection would activate the link to another card that contain a related chunk. This idea is illustrated in the figure below:





Cards linked via buttons

The *stack* is Hypercard's mechanism of grouping and identifying cards that have some relationship to each other.

Cards usually contain *fields*. The field is the principal storage container for information in the form of text, numbers and both together.

Hypercard has an "object-orientation" that is the button is an object that upon selection starts an action that is contained in its *script*. A script is an embodiment of hypercard programming language *hypertalk*. For instance the script of *button 1* as displayed in the figure above would be :

```
on mouseUp
go to next card
end mouseUp
```

that is when the system detects that the mouse has been clicked, it relays the MouseUp message to the current object displayed on the screen. In this case it is *button 1*, The script would cause the node "description" to be displayed on the screen

Thus a script combines two type of information: what events or events to watch for and what actions to take if a given event occurs. The combination of an event and the instruction telling how to handle an event is called a *handler* .

### **2.5.1.3. Hypertalk**

A main objective of Hypertalk is to be easily used by technical educators to create information applications:

It draws on English for its terminology and syntax

- It incorporate high level language structures that allow advanced application to be built
- It incorporates a wide variety of built in commands that are geared toward the creation of information applications. The key is providing enough power via the built in commands to allow the designer of an application to write a short script nonetheless powerful.

Hypertalk incorporates some "object oriented" features, Hypertalk carries the idea of visual programming. Thus, the objects being manipulated are often actual graphic images that are displayed on the screen while the underlying structure that implements these pictures are objects in the original sense of the word.

Hypertalk uses primarily three "object oriented" concepts :

- binding the data and the routines that work with the data
- supporting the idea of message passing between objects
- Supporting some form of inheritance,,: some objects are defined as part of a hierarchy of objects or of preexisting objects.

As we have seen in the example of the previous paragraph, this environment is more close to how people perceive the world. Thus Younggren points:"the idea of objects

communicating via messages is easy to grasp, even for people who are not programmers familiar with arcane concepts of data abstraction, the beauty of a scripting language using a visual object oriented paradigm is that it can be really understood and used by people other than professional programmers"

the data and the routines that bind the data are implemented using the graphical metaphor of a button , a field, a card , a background (metaphorically, the common elements of a particular set of cards) and a stack the script. these objects have properties such as the name, the id, the location, the script.

These objects exchange messages using A hierarchy. At the lowest level are the button and the field, we then find the card,the background, the stack , the Home stack and the Hypercard program and hte system at a higher level.

#### **2.5.1.4. Structure of the language**

Hypertalk script is a set of handlers. A handler is composed of at least three statements: an *on* statement followed by the name of the handler, an *end* statement and the commands to be performed when the handler receives the message. Handler can respond to messages as defined by the standard vocabulary of messages, they can also include messages sent by any other handler. In fact, even system messages and standard Hypercard messages can be intercepted and their behavior modified.

Hypertalk is a sequential language that has a control structure similar to other languages such as Pascal or "C" , Hypertalk interprets the commands and functions and does not compile them. A special type of commands are the *external* commands that are not defined using Hypertalk the programming language but are written in other languages such as 68000 assembler, Pascal or "C" and compiled as resources. These external commands (XCMD) or external functions called (XFCN) allow overcoming the speed limits due to

fact that Hypertalk is an interpreter and to allow other applications to communicate with Hypercard.

These commands, the icons , cursors and sounds are stored in a separate part of a Macintosh file called "resources". (refer to the bibliography for more information about resources)

```
on selection
-- procedure that simulates double clicking with the mouse
for selection
  if the selection is empty then
-- if nothing has already been selected
    set lockText of the target to false
-- unlock the field so that data can be selected
    repeat two times
      click at the clickLoc
-- simulate clicking
    end repeat
  end if
end selection
```

```
on mouseUp
-- procedure for advancing the "pointer to the next element -
-- of a list that contain ID of cards so that the card with -
- that id is displayed
  global order, list
  if order = number of items of list then
    go to card "case map"
-- if it si the last element of the list then go to the case
-- map
  else
    nextorder
-- call of the procedure for advancing the pointer
  end if
end mouseUp
```

```
on nextorder
  global order , list
  add 1 to order
  put item order of list into thenextcard
  do "go to " & thenextcard
end nextorder
```

```
on mouseEnter
-- procedure for locking or unlocking a text field so that
-- user can edit the text
```

```
    if the name of the target contains "field" and the
commandKey is down then set the lockText of the target to
not the lockText of the target
end mouseEnter
```

This approach allowed modularity and portability that is a user should be able to build a library of useful tools by writing directly this collection or using the public domain, shareware and under the right licenses, commercial stacks that he can use over and over again. The scripts can be ported to other applications and the code can usually be reused with minor modifications.

### **2.5.2. Issues in design and implementation**

The system that we presented is based on the decomposition into "chunks of data", determining boundaries and slicing text into sets and subsets require expert knowledge of the domain. Thus , the teacher or case designer has to carefully plan the case decomposition. Each chunk of text should be able to be associated with any idea and related to other chunks of text.

An important issue is the size of the chunk of text. As Carlson points, there is a trade-off between the chunk size and ease of navigation. A fine decomposition approach improves the potential to link the data to different paths, however, it increases the likelihood that the user get lost in the system.

An additional constraint to the slicing and decomposition of text is the screen design and user interface. In our case, because of limitations intrinsic to Hypercard, the size of the card is fixed and the text has to fit in the small screen, for tables the font size has to be very small to fit in the justified columns. While these limitations will soon disappear in the next versions of Hypercard. We should note that the grammar of hypertext intersects the issues of screen design and user interface.

### **2.5.3. Present status of the software**

The software is still at an experimental stage. While some feedback has been obtained from some students and professors, A thorough testing by MBA students will be undertaken during hte summer and the software will be introduced during the fall of 1990 in an introductory class in strategic management.

Presently, the ' Chain Saw Industry" HBS Case is going to be used as a prototype and example and will constitute the basis of further developments.

### **3. Chapter III The User's Guide**

#### **3.1. Explanation of basic procedures**

##### **Introduction to the case analyzer**

when you first enter the case, you are shown a card that contains several icons and buttons. Clicking on any of the icons or buttons performs a command. refer to the command section for understanding each of the commands

The first card allows you to choose to go to the basic help, to have information about the purpose of the software, to access the tips or the questions that the teacher or the case designer left or to access the CASE MAP. Accessing the case map will allow you to navigate through the case, annotate it and analyze it.

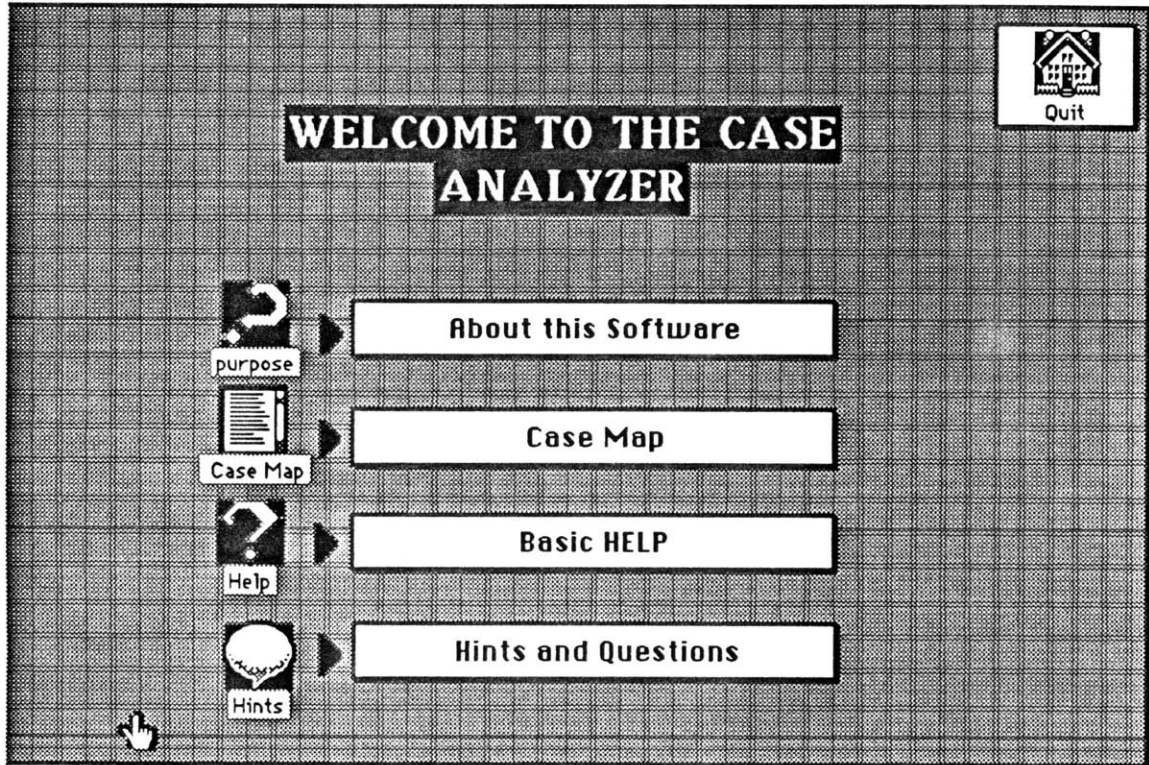
The first card is shown in figure 1

Figure 2 shows the case map, that is the outline of different perspectives of the case, the user navigates through the case by clicking on the relevant topic.

The case is divided into data chunks that we will call paragraph for convenience. Each card contains a paragraph of the case, a table or an exhibit. Figure 3 gives an example of such a card.

Quantitative data from different table can be represented graphically and manipulated through statistical analysis.

When the user creates graphs, he is taken to a specific card shown in figure 4 where the graph is displayed and can be edited.



Opening card  
Figure 1



**CASE MAP**

**CHAIN SAW INDUSTRY**

Competition



- Beaird-Poulan
- Desa Industries(Remington)
- Husqvarna
- Jonsereds
- Kioritz
- McCulloh
- Partner
- Pioneer
- Roper
- Solo
- Stihl
- homelite


Marketing perspective


- distribution


Markets


- Market analysis
- market share

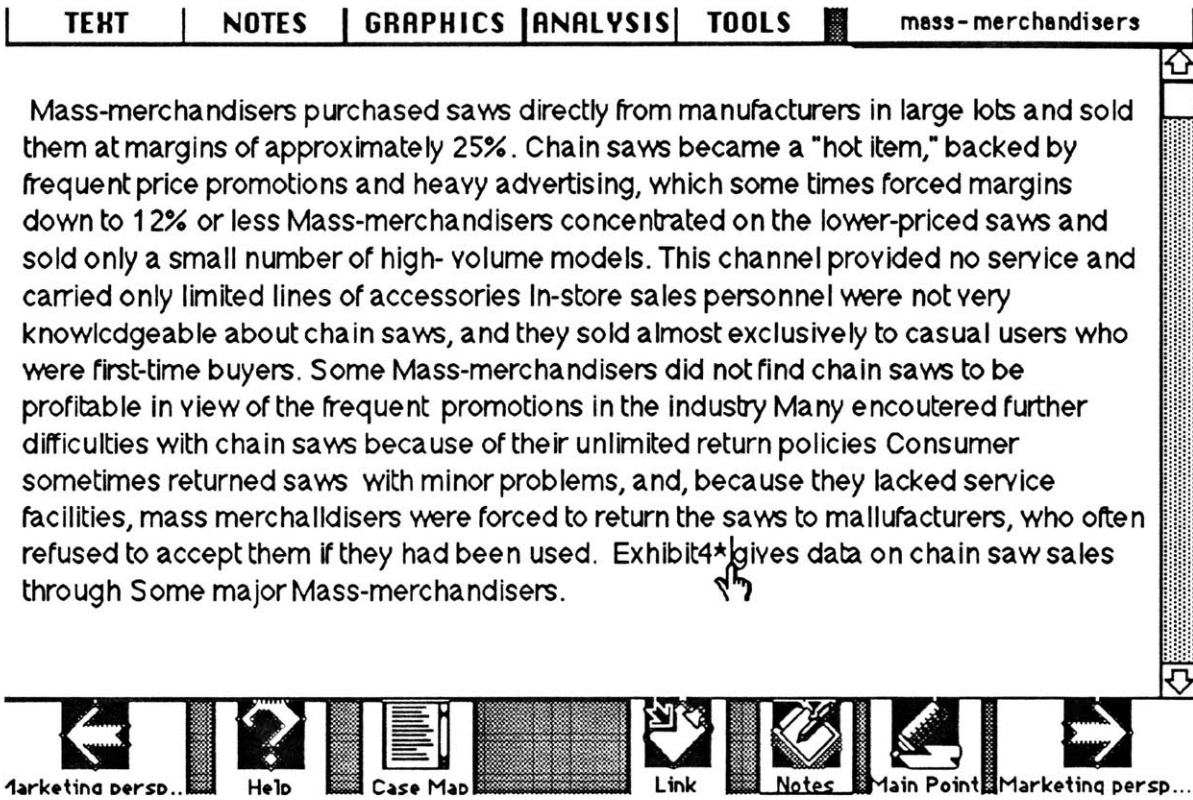
 Quit

 Expand outline

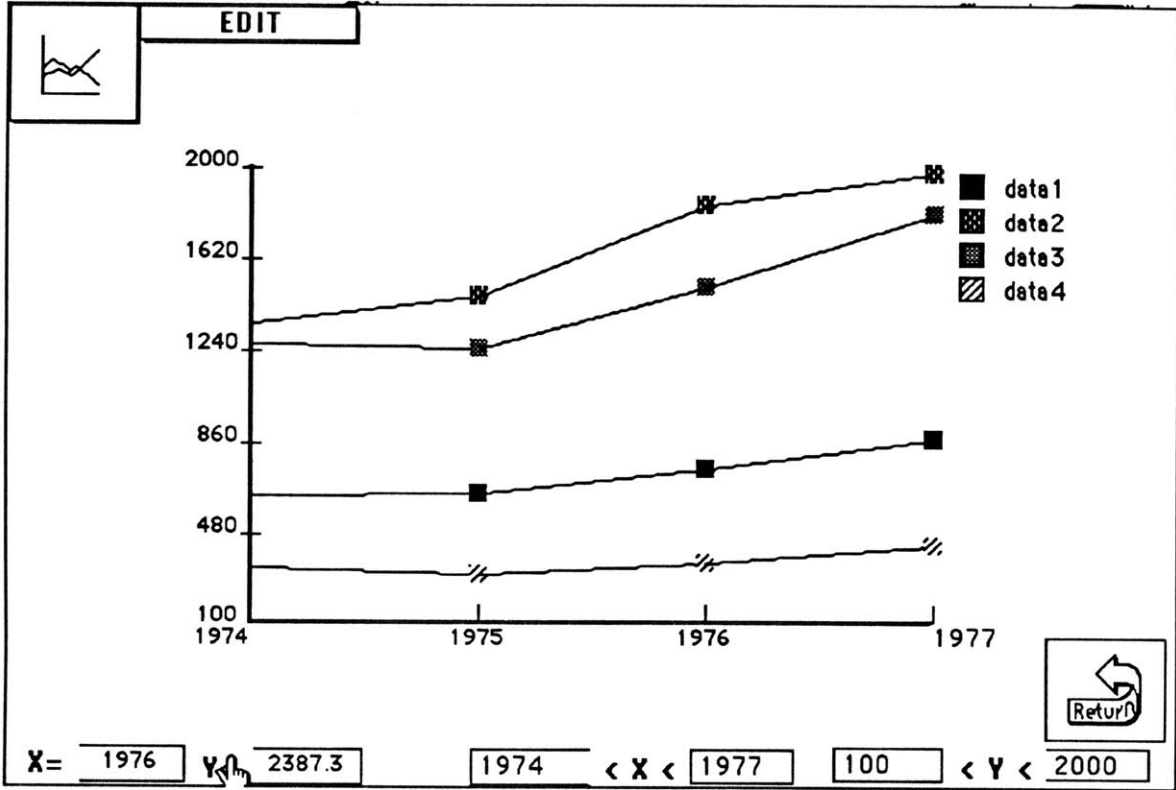
 First card

 RETURN

Case map card  
Figure 2



An example of a case card  
Figure 3



The graph card  
Figure 4

## **3.2. Using the case Analyzer**

### **3.2.1. Using the case map**

To access the text associated with a topic or subtopic. Click on the line of the case map that contains the topic. You will be taken to the first paragraph of the topic. You can then navigate back and forth between the paragraphs associated to the topic and all subtopics of this topic. This is done by clicking on the navigation buttons (the ones that contains an arrow icon)

If you would like to choose another topic, click on the button 'case map'. This will take you to the case map where you can choose another topic using the same procedure.

You can expand and contract the outline by clicking on the "expand" button, holding down the mouse will make a hierarchical menu appear. Then choose the level

Commands for adding, removing and renaming topics are available for entering the case (available only at the teacher level)

### **3.2.2. Using the menus**

When you are in a card that contains a paragraph, you will see several menus above the text of the paragraph such as NOTES, GRAPHICS, ANALYSIS. each menu correspond to a set of commands organized into a hierarchical menu. To access any of these commands, click on the corresponding menu AND hold down the mouse for half a second, you will the hierarchical menu. Hold the mouse down and move to the command you would like to execute it.

### **3.2.3. Navigation**

When you are in a card corresponding to a paragraph, clicking on the case map button, takes you to the case map where you can choose another topic. the buttons at the bottom

left and bottom right allow you to navigate back and forth among the paragraphs of a topic. If you are at the last paragraph of a topic the bottom right button icon changes to the case map icon. clicking on it will take you to the case map. If you are at the first paragraph of a topic the bottom left button icon changes to the case map icon. clicking on it will also take you to the case map.

In the paragraph, some words are followed by an asterisk (\*). they usually reference a table or an exhibit. Clicking on a word while in a browsing mode, (you are in a browsing mode if the cursor when you are over the text is a hand as it is the case now) takes you to the table or the exhibit. A return button appears, clicking on it will take back to the paragraph. To quit, go to the case map and click on the home button or type Q while holding the command key .

#### **3.2.4. Selecting the data**

The case analyzer allows to graphically represent, perform statistics and export data that can be extracted form any table or exhibit.data need not be from contiguous raw or columns of the same table or from the same table. You select a row at a time by clicking on the first element in this row or column. When you call a command for plotting or analyzing (choosing a GRAPHICS or ANALYSIS menu), you are asked to specify wether data are in row or column, you then are asked to click at the first element of the data, once you click, you are asked to name the data and then the process is repeated for the next set of data.

Once you have selected the data you need, you exit the data selection by clicking anywhere OUTSIDE the text area or on an empty line of text.

You can select data from other tables by holding down the shift key and clicking on the navigation buttons. As long as the shift key is down, you can also scroll through a text field. Once you are at the desired data, release the shift key and continue selecting.

#### **3.2.5. Taking notes and highliting main points**

During the analysis, the student highlights the main points and puts marks right near a paragraph in order to save time and short memory. We maintain this aspect by allowing the student to highlight the main points and providing a notebook that can be used anywhere during the navigation. However, we automatically gather the main points and the notes for further editing and export to a word processor thus reducing the time for case write-up. We also provide ways for incorporating the notes in the information to be searched and analyzed for later reuse by the student or other members of the group if the case is to be studied by a group of students.

Anytime you are in a paragraph card, you can take notes or review old notes. You simply click on the "notes" button and a notepad will appear. You can edit existing notes and add new notes.

Once you are done, click outside the notepad.

You can review, print or export your notes to a word processor by choosing the corresponding menu under notes.

You can also highlight the important points of the case by :

Getting in the EDIT mode, for this, choose mode -> edit under the edit menu. Once you have done that, the cursor should change to a Hairline cursor if you are on the text field, select the main point by dragging and click on the button "main point".

You can review, print or export the main points by choosing the corresponding command under the NOTE menu.

### **3.2.6. Graphics**

You can plot, chart or use a Pie representation of the numeric data.

For this, Select "PIE", "CHART" or "PLOT" under the graphics menu. you will then be asked to select the data as described in the data selection part of the help, when you finish the selection, you will be taken to a card where the data will be plotted.

You can scale your data by clicking on the graph icon located at the top left of the card WHILE holding down the option key. With the mouse down, drag from one corner to another corner of the rectangle where you want the graphic. Once you release the mouse, the graphic will fit the rectangle that you have chosen.

You can save the plot, print it or export it as a paint document.

If you have a plot, you can change the parameters (minimum,maximum) and obtain the coordinates of any point in the plot by clicking on it.

Click the return button to go back to the case once you are done.

### **3.2.7. Analysis**

You can perform various statistics on numerical data.

For this, Select the appropriate command under the ANALYSIS menu. you will then be asked to select the data as described in the data selection part of the help, when you finish the selection, the results of the analysis will appear and you can add them to your notes by clicking on the button "add to notes".

Click on the result to make them disappear.

You can also export the selected data to a spreadsheet , a statistics or a charting program by choosing the command export data under the menu ANALYSIS or choosing new data to export by calling this command and using the usual selection procedure.

Context analysis will allow to present the use of a keyword under different contexts. For this, select "context analysis" and type the keyword, this will take you to a card where the different paragraphs containing the word will be displayed.

Click on the main

### **3.2.8. conversion of text to tables and graphs**

The editing mode allows to manipulate the text of the case , the user can make corrections if he likes, he can also enter new data , for instance , he can type in quantitative data that he

thinks represent some qualitative data in the text and plot this data by selecting this data as he usually does with the quantitative data in the case. You can thus use in several ways the fact that text and quantitative data can be intermixed. the data need not be justified, however each number should be separated from another by a space.

### **3.3. Steps for entering A case**

#### **3.3.1. Planning the outline and the decomposition of the cases**

Providing a representation of the document that allows the student or analyst to navigate freely and from several perspectives is not costless. It requires *the designer or the teacher to deconstruct the paper text into a collection of fragments*. Furthermore, in order for the student to consider the case(s) from different perspectives and navigate sequentially from each perspective, the teacher has to consider what are the different topics and important perspectives he would like to emphasize so that he can define different paths of navigation. he first has to prepare an outline or map of the case from each of these perspectives that is titles corresponding to a path of navigation. In a first phase, the outline can simply be the outline as provided by the printed text paper. Figure 5 shows an example of a outline for the chain saw case.

#### **3.3.2. Planning the Decomposition of the case**

Another planning step is the planning of the decomposition of the text into chunks so that each chunk can be easily linked to different outlines. For example, in the Chain Saw case, A section describes the competitors. For each competitor, there is a general description, a description of the distribution and a description of the manufacturing of the competitor. If the teacher consider including a manufacturing and a distribution perspective, the description of the distribution and the description of the manufacturing of each competitor should be in a different card so that the navigation from each perspective is easier and more



focused. Otherwise, when navigating from a certain perspective, the user will access information that is not relevant from that perspective.

### **3.3.3. Converting the case from a paper to an electronic format**

If an electronic version of the cases is not available, the text and tables in the case can be entered manually, the formatting and space adjustment can be done afterwards, in the software.

However, the optical character recognition technology has reached a point where it becomes cheaper and easier to enter the cases using a scanner and an OCR software. Currently, provided that the copy is an original or a high quality copy, the accuracy of recognition is very high.

The Chain saw case has been entered using Omni-Page™. Each case took about three hours to enter. the tables were read with the correct formatting and justification.

The text has to be saved in an ASCII (TEXT) format.

### **3.3.4. Marking the boundaries for each chunk of text**

In order to specify the text that has to be entered in each card as defined in the text decomposition planning , the character "@" has to be entered at the end of each chunk of text. Thus , the text contained between two "@" characters will be entered in one card.

We recommend that all the text and tables be merged in one file and then place the "@" sign so that all the case will be imported in one step.

### **3.3.5. Entering the Cases**

entering the case is simply done from a text card ) a card that will contain the paragraph as shown in figure 6) by choosing the command IMPORTCASE under the menu TOOLS. You will be asked to prompted to select the text file where you saved the case or part of the case, after choosing that, the case will be entered automatically.

## Entering the outline

Double click on the "case analyzer shell" icon, you will be presented with card containing a field named "case map" see figure x, If no previous case has been entered before, then you will find one line in this field containing "the case" otherwise, you will see the outlines of previous cases entered.

creating an outline or changing it by using the button "edit map"

Clicking on the button "edit map" and holding the menu down , you be presented with three commands , add rename and delete.

We will assume in the following that no case has been entered before and we will give a small example on how to enter the outline:

- Click on "edit map" and choose "rename", you will be asked to click on the topic to rename. Click on the first line of the case map
- Enter the case name in the dialogue box for example "Chain saw"
- Click on "ok" or hit the return key

You will see the new name of th case in the case map

- Click on "edit map" and choose "add"
- Click on the case name
- Enter the name of the outline for example "competitive perspective"
- click Ok or hit the return key

in the case map you should see:

```
Chain saw
  competitive perspective
```

Repeat the procedure by choosing "add" and entering "competitors", you should obtain

```
Chain saw
  competitive perspective
    competitors
```

Thus in order to enter a topic, you need to click on the parent topic or topic for which it is a subtopic.

### **Entering the text and tables**

Entering the case is very simple, go to a case card (figure 3) and choose "import case" under the menu "tools", you will see the standard dialogue box for choosing a file, find the text file that contains the case and choose it. the case will be entered in multiple card based on the decomposition that was made in preparing the outline.

### **Linking the cases to the outline**

each card and associated chunk of data can be linked to several topics or titles in the outline. Once the case is entered, Each card will be associated to the relevant topics , subtopics and views. To do so , simply select the link button and click on the lines of the outlines corresponding to the topics or views to which it relates. For example, the paragraph describing the distribution of Homelite could be associated to both Homelite and distribution. When you click on the topic in the case map, you will navigate through each card that has been linked to that topic in the order of assignment.

### **Assigning names to cards**

It is advisable to give a name to each card so that the user can refer to it when the notes are gathered (the title of the card will be displayed before the notes of each paragraph when the user chooses to edit , print or export the notes. It also allow the creation of hyper-links to tables and exhibit. For example always give names to tables and exhibits that are referenced in the text

Due to limitations of Hypercard, in creating text links, the name of a table or exhibit should be 1 word (for example: "Table2" and not "Table 2"), these limitations will likely be removed in the next version

### **Creating hyper links to tables and exhibits**

In the case, there are several cross references to exhibits, a typical example is (exhibit 1 shows the sales etc...)

At the present time, you have to link manually by getting into the editing mode and putting an asterisk (\*) after the word to be referenced, you will have to change the exhibit name to one word for example "exhibit 1" should be changed to "exhibit1" . This limitation will be removed in the next version.

### **Restricting user modification of the case**

After the case is ready, the user can be restricted to modify the case by going to the card "user privileges" and choosing "user level"

## **3.4. Commands description**

In this section, we describe the purpose of each command and its use



**Notes** Creating and editing Notes

Click on this button whenever you want to comment the case or write your analysis or remarks about the case. It will bring a notebook where you can write your comments. click on "hide notes" when you are done. You can edit all your notes, print them or export them to a word processor by selecting "edit notes " which is under the menu "Notes"



**Main Point** Choosing a main point

Select the phrase or paragraph that you think is a main or important point of the case and then click on this button. The important point will be added to the other points that you have selected earlier.

You select the main point by clicking before the main point and moving the mouse while holding it down . For this you have to be in an editing mode. See the command "mode"

You can edit your main points by selecting "main point --> edit " which is under the menu "Notes". You can also print and export your main points.



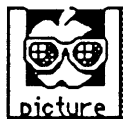
homeLite Going to next paragraph related to the chosen topic

this button allows to go to the next paragraph related to the topic or perspective you have chosen in the case map. If the icon of this button is a "case map" icon (see below) rather than an arrow icon , this paragraph is then the last paragraph of the topic or the perspective chosen. Clicking on on it will take you back to the case map.



Case Map Going back to the Case map

This button takes you to the table containing the topics (the case map). It allows you to choose a new topic or perspective by clicking on a line of the case map.



picture Show a related graphic

Some cards contain pictures or graphics which illustrate a concept that is associated to the paragraph. Clicking on this icon will display the picture. clicking on the picture will hide it.

The case designer can import the pictures using the command "import picture " under menu "tools"



Help Help

This button will take to a context sensitive or a general help. In the context sensitive card , clicking on any of the icons or commands will explain what it does.



**Hints** Hints and questions

clicking on this button takes you to a card for hints and questions that the case designer or the professor has entered to help the students in analyzing the case.



Go back

Clicking on this button will take you back to the topic or card you last chose.



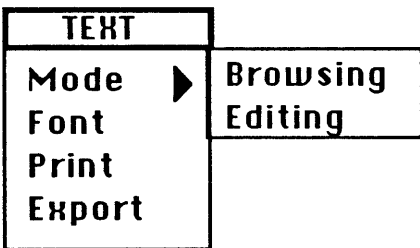
quit

Clicking on this button allows you leave the Case analyzer. If you click while holding down the option key, it takes you to the Home card.



Change the outline view

Clicking on this button displays a menu where you can choose the maximum sub-level that will be displayed in the case map



Text related commands

### *Mode*

There are two modes for manipulation of the text:

#### *Browsing mode*

When you click on a word followed by a star (\*), under this mode, you will go to the card related to this topic. For example clicking on TABLE1\* will take to that table.

You know that you are in a browsing mode if the cursor has the shape of a hand (see figure 3) when you are moving the cursor on the text

#### *Editing mode*

You can select and modify text under this mode.

You can only choose a main point when you are in an editing mode. If you are in a browsing mode, you change to this mode by selecting this command (mode-->editing)

#### *Font*

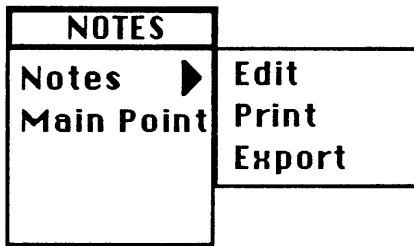
Choosing this command brings you a dialogue box allowing you to modify the font, font size, style, and height of the text. Changing any text attribute, will change this attribute for the other paragraphs unless a pre-defined font or any other text attributes has been preassigned to this particular card.

#### *Print*

This command allows you to print the text that is in this card (paragraph from the case, the main points if you are in the card "Main Point or note if you are in the card "Notes").

A dialogue box allowing you to choose the font, and font size will be displayed. Choose the font and font size and click Ok to start printing.

#### *Export*



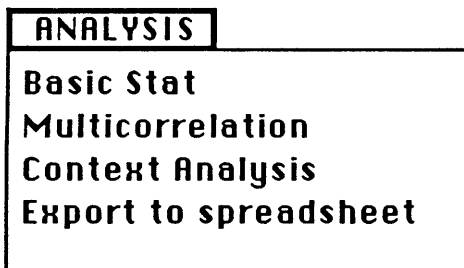
Notes related commands

### *Notes*

By choosing the command edit, Print or Export , all the notes that you have taken are gathered and you will be take to the card case notes where you can edit your main points or print or export them using the appropriate dialogue box as explained before.

### *Main points*

By choosing the command edit, Print or Export , all the main points that you have taken are gathered and you will be take to the case :Main points" where you can edit your main points or print or export them using the appropriate dialogue box as explained before.



Analysis related commands

### *Statistics*

This command will allow you to calculate the mean and variance of a set of data. You are asked to select the data as explained in the selection data section. Once you are done, you will see the results will appear on a field . Click on the button add to notes to add the data to your notes. Click on the field to hide the results.

### *Multicorrelation*

This commands allows you to calculate a multicorrelation matrix based on a set of data that has been selected using the usual method of selection of the data



### *Context analysis*

Choosing this command prompts you with a keyword to enter. It will retrieve all the paragraphs in the case containing the keyword in one field. You can click on any paragraph to go to this paragraph.

You can go back and forth between the different paragraph in the context card and the cards that contain these paragraphs by clicking on the paragraph: this will leads you to the corresponding card, hitting the escape key to go back

### *export for further analysis*

You can export the data you have already selected or a new data using the usual selection method to a spreadsheet or a statistical program. The selected data will be saved in a tab-delimited file format. You are prompted for the name of the file you wish to save. You can also choose the directory and diskette or hard drive.

<b>Graphics</b>
<b>Pie</b>
<b>Barchart</b>
<b>Plot</b>

Graphic related commands

### *Pie*

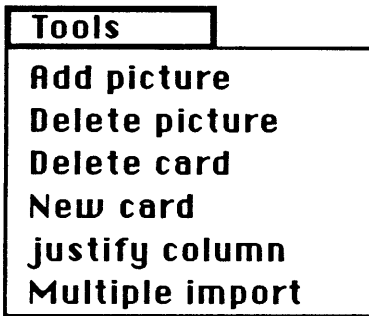
To draw a pie, the user has to select two set of data using the selection method explained, the first set is the attributes or the names associated with each slice of the pie, the second set is the data itself.

### *Barchart*

To draw a chart, the user first select the column then he successively selects each set of data and assign it a name, The user can select up to to ten set of data.

### *Plot*

To draw a chart, the user first select the column then he successively selects each set of data and assign it a name, The user can select up to to ten set of data.



Commands related to case input

*Adding and deleting picture*

You can add a picture on any of the cards that contain the text of the case. You will be prompted to select the picture to import. The picture should have been saved in a PICT format (you can save MacDraw™, Cricket Draw™ files in a PICT format). The picture will be added automatically as a resource and a button named picture will appear. By clicking on this button , the picture will pop-up

You can delete the picture by choosing "delete picture"

*Justification of exhibits*

Hypercard does not accept tabs in a file so the numerical data may not be justified. This command will add enough spaces so that when proportional font such as Courier or New York is used, the text will appear justified.

Before calling this command, you have to be in an editing mode and select the table or numerical data you would like to have justified.

*Importing the case into the cards*

You can import the case as indicted in the section on entering the case using this command.

### **3.5. Hints and Shortcuts**

#### **Locking and unlocking a field**

- In order to lock or unlock any text field (going from the editing to the browsing mode) move the mouse outside the field , hold down the command key and move the mouse inside the field, this will allow you to edit the field. To change to the previous mode (lock

the field ) , repeat the same steps. remember that when the field is unlocked, the messages do not reach the field (clicking the mouse on the field will not produce anything)

#### Setting the font of a card

Hypercard does not allow tabs in fields, so that in order to justify table, you need to have a proportional font such as Courier or New York. However, if you change the font, go to another card and change the font , the font will change for all cards and you will lose the justification. You can assign permanently a font to a card by choosing font from the text menu while holding down the option key. The present font for the text will be assigned and next

#### **4. Conclusion**

Significant developments in hardware and software coupled with an important decrease in their prices are permitting the existence of a new and more effective environment for learning and analysis. This environment should integrate diverse set of tools and use available technologies so that permits and even encourages reflection. An environment that would allow the information to be considered from different perspectives, where different alternatives can be simulated and tested and where different dimensions of a problem and their relationships can be simultaneously considered.

The existing medium for carrying information has limitations that electronic media can overcome. thus, the printed paper is particularly inadequate for case study because of its lack of flexibility in allowing a dynamic restructuring of information. Thus, we have argued that a linear or hierarchical representation of a document limits the ability to analyze the information contained in the document. The electronic media allows the representation of a document as a set of data chunks (paragraph, chapters, sections, tables or any atomic data) that are linked. The author or designer of a document structures the document by creating links between the data chunks and defining a number of path of navigation corresponding to different perspectives of the document. Furthermore, the software provides a way for the user to create links as parts of walking through the information domain, The user can create its own view of the document and dynamically record his ideas, storing these ideas and the produced mnemonic aids and interact with the user by providing feedback. As a result the possibilities of decomposing and analyzing a complex problem are improved. Furthermore, by integrating a set of tools for analyzing and modeling quantitative data, the capacity of modeling complexity and understanding processes is also improved.

Furthermore, the concept of the document as a network map can provide a new orientation in designing case study. The design and preparation of case study has been constrained by the media, The representation of the document as a network of pieces of data that can be

accessed from different views and perspectives may require a new approach to business case design since this representation relaxes the constraints of the printed media, providing a new approach to case

A main purpose of an integrated learning environment and a modular design is to keep pieces of information separate so that they can be combined in a variety of ways using computational tools and at the same time be able to aggregate the data. This approach coupled with the availability of instantly accessible set of tools for various type of analyses and simulations should permit a better understanding of decision making processes and a better grasp of complex concepts.

We have attempted to integrate some of these concepts and use some of the tools that advances information technology has generated to provide a software that would improve the productivity of the student in studying business cases and could be a starting point for a new approach in case study teaching and analysis. We have provided flexibility in modifying the application and building upon it so it can easily integrate feedbacks from the academia and can be expanded to provide new applications.

In the following we present some of the possible extensions to the software application.

### **Enhancement and possible extension of the software**

#### **Multi-user orientation**

The environment that we presented is very appropriate for collaborative work. It would be possible to have an entire class working together to create or modify the case. They would work together on ways of structuring and organizing a case, on possible perspectives and views that are relevant, the tool for quantitative data analysis would allow to redefine the relevant information and integrate it in the case. Multi-user capabilities will likely be available soon given the development in software for the Macintosh™.

#### **Providing tools for measuring and assessing the process of reading, learning and analyzing**

As we have outlined in the second chapter, Hypertalk is an event driven language so that the process of navigation can be easily tracked. For example, we can graphically represent a map of navigation containing the order of visit of each node (the chunk of data or paragraph), the time spent in each node and the number of times each node is visited. Thus pattern of navigation can be compared among students and these navigation maps may provide insights on and measures of the process of reading and analysis.

### **Providing an on line feedback for the analyst**

The use of expert system for tracking the pattern of navigation , frequency and pattern of use can provide an immediate feedback to the student by determining what are the data he should have considered, what is the area of the case he should have focused on.

The structure of the information would become part of the accessible information. The reader pattern of sequence of search actions becomes information that is describable, so that the system should be able to suggest what kind of information he has not looked at.

### **transforming the application into an executive information system**

We have focused on the case study because of the amount of analysis, non-structuredness of the quantitative and qualitative data. However, the same principal applies to everyday executive work. An executive is receiving an important amount of information that is relevant from different domains such as strategy , marketing , operations, he would like this information filtered and organized from different point of views, and providing an instantly available set of tools for manipulating quantitative data that are easy to use would also impact his decision making process. Furthermore, a case preparation and analysis is to mode the decision making process of a manager.

The software can be used for organization of articles, E-mail, reports etc.. from different perspectives and allow the combination of these information, the navigation through this information from different perspectives, the manipulation of quantitative data using a

customized set of tools, the direct integration of the new obtained information and the communication of the output to other applications.

Certainly, more work has to be done to provide a ready to use application for these managers. However, we consider that the tools we provide can be a starting point for such a system.

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