THE END USER AS ANALYST

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ABSTRACT

The End User can successfully assume some of the tasks of analysis. There are major reasons why. For this to take place conducive computer system environments need to be created which lead the end user to learn the tools of analysis and develop their own analysis. Initial research is reported on methods for evaluating and comparing computer systems, and a system which automates the generation of data flow diagrams.

L'USAGER ULTIME: UN ANALYSTE.

RESUME

L'usager ultime de systèmes informatiques peut assumer avec succès certaines tâches d'analyse, et cela pour plusieurs raisons majeures. Pour ce faire, toutefois, il faut créer des environnements informatiques favorables qui inciteront l'usager à connaître les outils d'analyse et à développer leur propre analyse. L'auteur présente les premiers résultats d'une évaluation comparative de systèmes informatiques et décrit un système qui automatise la production d'organigrammes de données.

THE END USER AS ANALYST

In the computer industry we have our own version of the "generation gap"; it is the communication gap between the computer technologist who knows the tools of automation and the end user who understands the required applications, what the computer system should do. Bridging that gap is a major task.

There are different basic approaches one can take to building a communication bridge. Traditionally, the systems analyst, armed with his bag of analytic instruments, would diagnose and prescribe what system was required to solve the ailments of the operation or business. He would be required to learn as much as possible about the business in as short a period of time. The extent to which analysts, and subsequently designers and programmers, do NOT understand the end users' needs, the greater the probability that the final system will very rapidly do the wrong thing. We could liken the analyst only learning the end users' applications to building a bridge only starting from one shore or bank of a ravine.

Why not build the bridge from both sides? That is, to what extent can the end user learn the tools of analysis? To what extent can the end user perform his or her own analysis under the guidance of a systems analyst? Part of the computer specialist's task would be to create CONDUCIVE COMPUTER SYSTEM ENVIRONMENTS, one, for the end users to learn to use the tools of analysis, and, two, for the end users to develop their own analyses. In an earlier paper I referred to this type of analysis as Interactive Analysis (Marshall, 1981).

There are major reasons why the end users should be, to some significant extent, their own analysts:

1. Problem solving, communication, diplomatic, and managerial skills are as critical for successful analysis, as systems design and technical skills.

2. The end users understand what they need in detail, a detail difficult for analysts to absorb.

3. It might take less time for the end user to learn the tool of analysis than it does the analyst to learn about many industries.

4. Systems are becoming increasingly "People Literate", that is, easier to use and program. Systems analysts can use these same "people literate" capabilities of computers to make systems analysis itself user-friendly.

5. The computer industry is labor intensive in two areas: analysis and programming. This means analysis is expensive. However, the cost of computer systems is dropping. If a system cost $35,000. will the end user consider it reasonable to spend $10,000. on an adequate analysis? Unlikely. If the industry itself is delivering more for less, then analysis is required to do the same thing. It must become more efficient. Part of that increased efficiency could include the end user assuming some of the tasks of analysis.

6. End users should be introduced early to the realities of the computer industry, the capabilities and limitations of computers, and should be encouraged to think for themselves about what computers can do for them.

A GUIDANCE SYSTEM

What I am about to describe is largely a paper system with some of it in the process of conversion to computer now and more planned in the future. What I am describing is the creation of a guidance system, a navigation system, that provides the required coordinates and the instruments to use them, so that the end user can accurately locate the proper configuration of hardware, software, vendor, service, training and support required.

Six major steps, or stages, are involved in the acquisition of a computer system. The steps or choices the end user should make are determined by the answers to six key questions. They are:

1. Do you know what a computer is and what it can do for you?
2. Do you know your problems, needs or goals or how they might be analyzed?
3. Do you know how a computer might be used in your situation?
4. Do you know if what you need already exists?
5. Do you know how to evaluate and compare computer systems?
6. Do you know how to evaluate and compare manufacturers and vendors?

If the answer is "yes" to all of these, the end user has no problem. He knows what to buy, or not to buy. If the answer is "no" to any of these, then some materials need to be studied, problem solving, survey, and analysis techniques learned and applied, and so forth. There is insufficient time and space to discuss each of these steps in any detail.

What aspects of this process could be automated? Possibly more than we might imagine. I envision a day when the analyst will have a portable computer, a "Portable Analyst", that he leaves with the client. The client need only know how to plug the unit in and turn it on. It will then, guide the user through these six major steps, providing information and training when needed, and recording the analysis as the

user enters it.

THE CAPABILITIES AND USES OF THE "PORTABLE ANALYST"

What are the possible capabilities and uses of the Portable Analyst System?

1. Computer Aided Instruction materials are an obvious use, whereby the end user can select the materials that he needs to study commensurate with his given level of knowledge. Topics could include what a computer is, what it can do, how it works, the steps in analysis, how to use the tools of analysis, the principles of database management and how to model data, the principles of program development, in fact, ANY BODY OF KNOWLEDGE THAT IS CRITICAL FOR THE END USER TO KNOW AND IN WHICH HE MUST BE INVOLVED IN ORDER FOR A SUCCESSFUL ANALYSIS AND DESIGN TO TAKE PLACE.

2. The means by which the analysis can be rapidly recorded, changed and distributed. For example, information required for the Initial Survey would be recorded using a data entry procedure. Of more interest would be the automation of some of the Structured Analysis and Data Base Design tools such as Data Flow Diagrams, Data Dictionaries, and Data Modeling. The latter two processes have been automated on mainframe computers such as DATA MANAGER and DATA DESIGNER produced by the DMW Group of Ann Arbor, Michigan (Martin, 1981). The author and some of his students are working on procedures for automating the DFD generation process, and will be exploring the generation of data dictionaries and data modeling on microcomputers. Another use of the micro is to gather information on system analysis and design and data modeling from a multiple number of users, and merge those users views by transmission of different views to one central location.

3. Since many efficiency tools already exist on many computers, such as word processing and data or file management systems, they can be incorporated into the analysis process. For example, one of the many micro-based DBMS systems that are user-friendly can be used directly by the end user to define data items, records, files, report content and formats, and so forth. That information can be used for the design of larger systems while, at the same time, exposing the end user to computer capabilities in general. The microcomputer and software used during analysis need bear no resemblance to the final computer configuration. The word processor can contain descriptive materials, messages, and so forth as the analysis is edited and moves to final form. The master can be write protected so all can scan it, and updates can be added in a controlled manner.

4. In later stages, when specific computer system components and configurations need to be evaluated and compared, the Portable Analyst can be used to call in to a databank where the specifications of different possible system components can be rapidly down loaded. In a rapidly ex-

panding industry, careful evaluation of available products is critical. A procedure has been designed for making such comparisons using a scaling and indexing method. A sample is given in Figure 1 of one "graph" of several graphs developed. The values used are relevant to microcomputers.

Overview Comparison of Two Computer Systems

DESCRIPTIONS OF COMPUTER OR SOFTWARE PACKAGE 1(S1):

DESCRIPTION OF COMPUTER OR SOFTWARE PACKAGE 2(S2):

AREA(S) OF APPLICATION:

PARAMETER	VALUES						W.	S1	S2
NUMBER OF STATIONS	1 *	2-4 *	5-8 *	9-16 *	17-32 *	33 PLUS *	--	--	--
MEMORY:	< 64K *	64K *	128K *	256K *	512K *	1024K > *	--	--	--
TYPE STORAGE:	CASSETTE *		MINI-FLOPPY *	FLOPPY *		HARD DISK *	--	--	--
STORAGE: (In MB)	< .5 *	.6-.9 *	1-4 *	5-9 *	10-19 *	20> *	--	--	--
WEIGHT: (IN lbs)	30PLUS *	25-29 *	20-24 *	15-19 *	10-14 *	10< *	--	--	--
ACCESS TIME:	SLOW *	*	MODERATE *	*	*	FAST *	--	--	--
THROUGHPUT:	SLOW *	*	MODERATE *	*	*	FAST *	--	--	--
SCREEN SIZE:	5 *	7 *	9 *	12 *	15 *	SWIVEL *	--	--	--
KEYBOARD:	NON-STD. *	STD. *	NP *	CC *	10FK *	19FK> *	--	--	--

TOTAL INDICES: COMPUTER 1: ---- COMPUTER 2: ----

COST OF COMPUTER 1: $ ----------. COST OF COMPUTER 2: ----------

TOTAL INDEX S1: ---- TOTAL INDEX S2: ----

PERFORMANCE UNIT COST: --------- PERFORMANCE UNIT COST: ---------

Figure 2: Sample of Scales Used to Compare Computer Systems

The information required to fill in the scales can be entered manually. At some stage, a database will be introduced that users can call and request information on specific hardware, software, and so forth, and the graphs would be generated automatically. The end user would then enter greater weights to those scales of greater value to his or her applications and the Portable Analyst will produce indices and cost performance values. Although the scales are quite detailed, the user can scan for those scales that are critical and determine whether a given system meets critical needs. If it does not, then there is no reason to look at any other scales. Any scales of no interest can be ignored. The detail scales provide complete measurement and if ignored, a clear picture of what is being ignored. Everybody understands scales, like inches and meters, so the approach requires very little explanation. Further, each scale is described as to its meaning and impact in application (e.g. Memory, what it is, how it is measured, its effect on program operation, etc.) following each set of scales or graph.

5. One of the most important impacts of the Portable Analyst is a "side effect", namely, early exposure of the user to the many capabilities of computers and proper analysis approaches so that the users imagination and education are rapidly engaged.

PRESENT RESEARCH

Present research is being conducted in two areas:

1. The refinement & field evaluation of the scales used to evaluate and compare computer systems and components.

2. Investigation of whether Data Flow Diagrams as used in Structured Analysis, and Bubble Charts as used in Data Modeling for Data Base design can be more rapidly generated, updated and cross referenced using a micro-computer.

Graphs have been developed which allow for all the major "components" of a computer system to be evaluated and compared. This includes graphs for computers, peripherals, application software, development software, operating systems, and vendor support, service and training. Like any "consumer report", and that is basically what the graphs are, the scaling and indexing methods are indicative only. The procedures facilitate rapid evaluation, selection and communication.

In order to compare the automated with the manual generation, update and cross referencing of Data Flow Diagrams, a system has been produced which generates a DataBase of User Defined Symbols, or dBUDS (It is really a simple file of symbols that can be easily defined and changed by the end user, but that would have given rise to the acronym, "FUDS". According to Webster's Dictionary, Fud, means Fuddy-Duddy, not

an acceptable acronym for an analysis tool!).

dBUDS allows the user to generate, change the size and location of, and connect diagrams based on the symbols or shapes in the file. The system is designed for use on any ordinary terminal with no graphic capabilities under the CP/M operating system to provide for high transportability. However, the lack of graphics display might severely limit the systems use. Further, people may simply find the resulting diagrams produced on an ordinary printer too crudely "drawn". We expect to study this aspect of the system, see if our hypothesis is true, and improve this aspect of the system if it is. Further, more and more we will see systems with dot addressable screens and printers and superior graphics. The problem may solve itself.

We are also expanding the system to generate listings of processes, flows and stores in the DFDs. This can then act as the basis for the automatic checking of input and output flows, cross referencing of parent and child DFDs and act as the basis for a data dictionary.

We have not begun to use or evaluate the system for the generation of Bubble Charts.

In relation to the dBUDS program, CAI materials are being developed and field tested to teach end users how to generate DFDs for their own situations.

The research is in its very early stages. More progress has been made on the scales for evaluating and comparing systems than in the development of the tools for automating the analysis process. Very preliminary evaluation using ourselves, other students and colleagues as test subjects, indicates that the approaches have promise. First they interest people. In this case, that is most important. Second, they are easy to use. Third, it appears that they can be made to be less crude and more sophisticated, in time.

REFERENCES

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