HARDWARE AND SOFTWARE STANDARDS CONSIDERATIONS FOR THE SMALL COMPUTER USER

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ABSTRACT

As manufacturers of small computers proliferate, standards for both software and hardware have to be considered in order to assist the buyer of these to become an effective and satisfied user. The lack of standards becomes very prominent when one gathers the literature from various manufacturers. It is almost impossible to do effective comparison shopping. How can the buyer choose? This paper will develop some of the above themes and suggest how the first time buyer may be assisted.

CONSIDERATIONS SUR LES NORMES D'EQUIPEMENTS ET DE LOGICIELS POUR L'UTILISATEUR DE PETITS ORDINATEURS.

RESUME

Avec la prolifération des manufacturiers de petits ordinateurs, il devient de plus en plus nécessaire d'établir des normes pour les équipements et les logiciels afin de satisfaire le consommateur et de le rendre plus efficace. La pénurie de normes devient rapidement très évidente lorsque l'on parcourt la documentation publicitaire des divers manufacturiers. Il est pratiquement impossible de faire un magasinage comparatif valable. Comment le consommateur peut-il choisir? Le présent exposé abordera quelques-unes de ces questions et proposera quelques suggestions pour aider le consommateur novice.

HARDWARE AND SOFTWARE STANDARDS

THE DEVELOPMENT OF STANDARDS

In every industry, practices develop which become the established way things are done. These norms may be codified by various organizations representative of these industries, governments, consumers or all of the above. Most nations have well-established standards writing organizations, such as the Canadian Standards Association, British Standards Institution, Deutches Institut fÄr Normung, Association Francaise de Normalisation, or the American National Standards Institute. Over these various national bodies we have the International Organization for Standardization (ISO). Besides these general bodies, however, there are many contributory organizations which write standards. In the electronics industry, we particularly note the Electronics Industry Association (EIA), the Institute of Electronical and Electronic Engineers (IEEE), the European Computer Manufacturers Association (ECMA) and the Comite Consultatir International Telephonique et Telegraphique (CCITT) of the International Telecommunication Union (ITU).

All these bodies busy themselves with writing various standards for computers and data processing equipment. The process involves committees of (hopefully) competent people attempting to reach a concensus on the topic for which a standard is desired. Once a committee reaches a concensus, a proposed standard is circulated for comment and subsequent vote by a larger constituency. There may, of course, be considerable controversy concerning proposals. Sometimes several iterations of committee consideration, commentary and voting by constituents may be needed before a proposed standard is accepted.

The standardization process may have one of two objectives:

a) to codify existing practice as exercised by an industry

b) to suggest how things ought to be done, at least in the opinion of the committee writing the standard.

Unfortunately, a number of recent standardization efforts in the computer field fall in the later category. As such, users will not find them widely implemented, if at all. Standards which result from codifying existing practice are unfortunately quite rare.

There is, however, an informal standardization which results from market forces. Many manufacturers will make products which will work with other widely available

products. Similarly, programmers will write software to work in specific computing environments which are present in sufficient numbers to represent adequate potential sales revenue. These "industry standards" may or may not be of value to users.

THE REALITY OF SMALL COMPUTER STANDARDIZATION

The current marketplace for microcomputer equipment shows how little all the efforts of standards writing organizations have accomplished. This does not mean that there are no common practices among manufacturers and programmers. It does, however, mean that the published standards are of limited utility, and that the buyer or user must be extremely vigilant and persistent in determining exactly which practices have been followed.

A particularly disturbing aspect of the situation is the use of the word "standard" in many advertisements. In one Radio Shack flyer we read that a printer has a "Standard 8-bit parallel..." interface. A C.Itoh advertisement claims it uses an "Industry Standard 96 character Wheel" and "Industry Standard 8-bit parallel" interface. Unfortunately the term "Industry standard" and the word "standard" are not well-defined. In the worst case, it simply means that another manufacturer offers a product with similar features. Even when product descriptions contain references to published standards, there is no guarantee that the product conforms or implements the full standard, rather than a subset of it. Few applications demand the totality of any published standard, so this is not likely to cause consumer action against a manufacturer for misrepresentation. The user who must operate his equipment at its rated limits, however, can be seriously inconvenienced by such misleading advertising. In further criticism of product advertising, it must be pointed out that many advertisements are simply uninformative. Quoting print speeds in "words per minute" (Smith Corona TP1 announcement) rather than characters per second prevents comparison. And when features are described as "incredible" (Epson announcement) disbelief is the only recourse.

Lack of standardization and common practice are evidenced by the following examples:

a) Flexible disk storage: While some written standards exist in this area, the reality is that disks produced on one type of computer cannot usually be read on another. In the

worst case, different models from a single manufacturer are incompatible. Variations include:

1) size 8", 5.25", 3.5" (new)
2) sectoring by index hole or recorded pulse (hard or soft sectoring)
3) number of sectors
4) number of tracks
5) recording density
6) recording format
7) number of sides (1 or 2)

b) Computer bus structure: Most microcomputers use a set of wires (often printed on a circuit board) to communicate between various components of the system. One such bus, called S-100, is now IEEE Standard 696 with well established functions and signals on each of its wires. However, other manufacturers have developed their own schemes - Intellec bus, Unibus, Multibus and, most pretentious of all, "Standard bus", more recently denoted STD bus. This last example is used by only a very few manufacturers who represent only a fraction of installed systems.

c) Keyboards and screens: The layout of keys on keyboards, especially with the trend to special function keys, has led to a bewildering array of forms. This is particularly annoying when one must use several machines. The advertisements prattle happily of "Selectric-type" or "Professional-type" keyboards and as usual sprinkle on the word "Standard" liberally. Screens may have diverse formats from 16 lines of 52 characters (16 X 52) on the Osborne 1 to 25 X 80 on terminals such as a Sanyo. Most will generate or display the standard printable characters of the 7-bit character set (CSA Z243.4-1973) but may have unique extensions, including graphics capabilities.

d) Printers: These may vary in some of the following ways:

1) printing speed (in characters per second)
2) data acceptance speed (buffer speed) in baud
3) method of printing
4) character set(s)
5) logical interface - how the printer and computer communicate commands and responses
6) electronic interface - serial or parallel signals and pin assignments
7) paper width, thickness and properties, such as the requirement for special coating or sprocket holes.
8) paper feeding mechanisms

9) ribbons and their packaging or inking systems

On the positive side of the balance sheet, we note the following practices:

1. The generally common ability to interconnect computers and peripherals serially using interfaces claiming to implement the EIA RS232-C interconnection standard with a 25 pin DB25 plug.

2. The interconnection of instruments and peripherals on the IEEE-488 instrument bus with relatively minor adjustments to equipment. (Not all implementations of the standard are complete.)

3. The IEEE 696 (S100) bus, previously mentioned.

4. The CP/M operating system for Intel 8080 and 8085 processor and Zilog Z80 processor systems. This software is so widely available that it may be considered a de facto standard. Because of its widespread availability, Microsoft BASIC has become a major programming language. Similar comments can be made about Wordstar as word-processing software.

WHY COMPUTER STANDARDS ARE INEFFECTIVE

In the microcomputer systems field, codified standards have been found largely ineffective to date. The main reasons for this situation concern innovation and costs. Innovators are developing new ideas, new ways to do things. As such they are bound to violate codified standards or at least to extend capabilities beyond standards. Further, there are political concerns in standards bodies reflecting "establishment" views in at least a portion of their membership. As an example, the BASIC programming language has been the subject of a very convoluted standardization history and an uncomfortable compromise has only just been reached with the approval of ISO Minimal BASIC (DIS 6393). A full (some would say overblown) language proposal is only now coming up for public comment. However, the two major producers of BASIC language processors, Sinclair and Microsoft, have not so far participated in the discussion.

In order to achieve a fair degree of interchangeable hardware or software, users can generally only use subsets of codified standards. Even then, they may have to make small but often costly and timeconsuming modifications to hardware and software. In large measure this is caused by production

cost cutting. There is considerable pressure on manufacturers of microcomputer systems to produce the lowest cost, working product. Therefore, aspects of standards which are not required for the basic operation of the product may be discretely ignored. Translators of programming languages such as FORTRAN or COBOL, which are gradually moving toward published standards on mainframes, may not be able to implement all features of the language on small machines due to a simple lack of resources. The user is then restricted to a subset of the language.

CONCLUSIONS AND OPINIONS

With the current confusion in the marketplace, one may be tempted to abandon all hope that standardization will ever be achieved. However, the value of standards to users especially, but also to smaller manufacturers, is that they allow mobility of applications and interconnection of equipment. Therefore, an effort must continue to be made to develop workable, effective codes of practice. This is not to say that the use of such standards should be imposed on all manufacturers. However, users should press for advertising and product announcements which only use the word "standard" in conjunction with references to published standards. That is, manufacturers should be honest and precise in describing their products, a demand which we recognize will not often be met. Even so, it is in the interests of most information scientists to advocate and request that products conform to standards and be described accurately.