WORKING NOTE D4

Alan Creak
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OPERATING SYSTEMS

This note was left as unfinished business in 1986, and forgotten. I have now (2002) reconstructed it from an old MacWrite file. Apart from this notice, the content is unchanged. It is likely to be of historical interest only, if at all, but it's nice to have the series complete.

A computer performs actions of many different sorts at different "levels" of its operation. It must be able to communicate with people who wish to use it; and it must be able to respond by controlling a wide variety of equipment in sometimes highly sophisticated ways. It must also look after its own internal affairs, and all this must ultimately be done in terms of quite simple and general logical operations built into the computer's hardware. The software which connects all these activities together into an organised whole is called the operating system.

If computer methods are to be accessible to all those who could benefit from their use, then we need operating system software which is very different from the crude offerings available today. This is particularly true of many disabled people, who, if they wish to use a computer, must somehow find out how to express their requirements precisely and quickly using a much more restricted range of physical movements than computer keyboards and other peripheral devices normally assume. Three lines of development in particular suggest themselves :

- A different approach to selecting which programme to run next. It is not necessarily sensible to expect that people who use computers will ipso facto know much about them, and this is perhaps especially true for groups who, like the disabled, use computers less from choice than from necessity. There is no obvious reason why they should be required to know anything at all about computers, for all they need is a reliable device which responds sensibly to requests made in a natural way. That doesn't have to be by typing a name, or by selecting a programme from a menu : it can just as easily be by pointing at a suitably evocative picture, or through some comprehensible dialogue. In fact, one might expect a range of systems of increasing sophistication, catering for all levels of potential client, from three-year olds to university graduates. (There is no implied prejudgment as to which needs the more sophisticated system !)

- Resilient systems, which will survive abrupt (accidental or deliberate) termination of running programmes, and which will never (short of power or machine failures) need restarting. Such a system would obviously be valuable to anyone who uses computers, but the value increases with one's degree of dependence on the machine for vital services. As well as the obvious advantages of having a system which cannot accidentally be put out of action by minor errors, such as pressing a key at the wrong time, it is often useful to be able to stop a running programme in full flight, so to speak : people using computers should always be able to escape from a programme when they've had enough of it without making the system collapse, or losing information which they may have stored in memory or in temporary files. Such robustness is hard to achieve in a system which depends on a single small processor, but becomes possible on a dual processor system, or perhaps on a more advanced processor capable of running with with virtual memory. A related possibility is that of running several processes simultaneously, with the ability to switch between them at will. One advantage of a system of this kind is that it makes terminal emulation comparatively straightforward without additional and expensive hardware.

- Intelligent systems, which draw inferences from the nature of a person's responses to events, leading to a model of the person, including such information as measures of familiarity with the system, and of expertise in particular areas. The model can then be used to guide the system's responses to the people, so that it can cooperate to as large a degree as possible. Work on such systems is proceeding for use by people in general [(1)], not specifically for the disabled : one might expect that such techniques would be specially useful for constructing systems which could adapt to an individual's specific disability.

REFERENCES

(1) R.F. Simmons : "Man-machine interfaces : can they guess what you want ?", *IEEE Expert* **1**, 86 (1986)