'molecular biology', 'bacterial genetics', 'molecular microbiology', 'cellular and subcellular biology', 'molecular and biochemical pharmacology' on both scientific knowledge and society is of the greatest significance. Considering the enumerative nature of DDC and also its unability to construct numbers for new concepts as in other analytico-synthetic schemes, it is suggested that the Committee should keep sufficient provision in their newly recommended schedules to accommodate newer ideas and knowledge that will continue to emerge in the Life Sciences, either by keeping gaps in the notation or by any other means in accordance with their policy, so that the Committee in their future editions could construct new numbers for concepts that have acquired significance in between editions.

It may be further concluded that if this trend of revision and complete relocation of main schedules continues also in the future, there is every likelihood that the DDC scheme may lose much of its popularity which at present it is still enjoying. This is obvious, since no library can afford frequently to undertake an extra burden of the reclassification job of a significant portion of its holdings which have already been classed earlier according to an older edition of the scheme. Reclassification will be necessary as without which books on the same subject will be scattered on different shelves due to a change in the main schedule of a subject. This causes great inconvenience, embarrassment and hardship to the readers and as well as to the librarians, especially those of the open access libraries. However, the reactions of the readers and that of the librarians who follow the DDC scheme in their libraries can only be known as and when the forthcoming 19th edition of the DDC scheme will be issued with these proposed modifications and changes in the printed form.

Acknowledgment:

I convey my grateful thanks to Prof. G. Wagner, Director, Institut für Dokumentation, Information und Statistik, Heidelberg for kindly giving me a placement in his Institute and extending all facilities and help during my stay in his Institute. I also thank Mr. R. Henzler, Information Scientist of the same Institute for his cooperation and helpful discussions.

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(Ed. Note: Shortly before publication we received a letter from Mr. B. A. Custer, Editor of the Dewey Decimal Classification of Sept. 10, 1979, telling us: "although a 'phoenix' schedule for the life sciences was announced, it did not appear in DC 19, which was published last June. In fact, it may never appear.")

Hans Karlgren
Swedish Classification Society, Stockholm

Viewdata – Something to be Crazy About?

Karlgren, H.: **Viewdata – something to be crazy about?**
In: Intern. Classificat. 6 (1979) No. 3, p. 172–176

Information retrieval via an (almost) ordinary home television set as public utility opens up fascinating perspectives. But is it really such a long step forward? The technology is essentially conservative. What makes Viewdata so attractive? Does it, in fact, possess any distinctively innovative traits at all? Is the achievement instead the absence of complications, a T-Ford solution where an established technology is given large-scale low-cost application, now? The author concludes that for better or for worse, Viewdata can make an important impact on technical and social development and well deserves keen attention from information scientists as well as from economists and politicians. (Author)

1. A challenge

"Everyone seems to be crazy about Viewdata, so I came round to see whether I should be crazy too", said one of the world's leading information retrieval scholars when I asked her what she thought about Viewdata. Our conversation took place in an exhibition room where the British Viewdata system was demonstrated, on the occassion of the Conference of the International Federation for Documentation (FID) in Edinburgh last year.

The answer is typical of the present situation. Viewdata is something many are infatuated about. It is fantastic somehow. Journalists are prone to describe it as the latest technological achievement, and politicians have seen it as an immense power, although they disagree about that power's direction. At the same time, it is a very simple product, and a leading information retrieval scholar may well be unfamiliar about its design. It is admired as the first glimpse of technology of tomorrow; it is looked down upon as the trivial implementation of yesterday's technology, glorified to promote television industry sales.

The present writer has not been able to free himself from a certain ambivalence in his attitude towards Viewdata. It is technologically elementary and it is a fascinating development, a challenge to many institutions. How is this possible?

2. What is Viewdata?

The development most commonly known as Viewdata began in Great Britain. The British system rapidly got followers in other countries in Europe. Among these, Finland seems to have made the fastest progress so far. The writer has no recent information about similar non-European projects. Surprisingly, there seems to be no obvious counterpart in the U.S.A., where computerbased databases are otherwise proliferating.

The followers have accepted the British specifications, possibly with addition of new facilities. We therefore

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begin by describing the essential features of British Viewdata, launched under the trade mark Prestel.

The purpose was to provide a computer-based information service for everyman. This meant a demand for low cost and very simple manipulation. The design has the following characteristics.

A. It is an information system where a user from one out of many terminals can request data stored in a central computer. The terminals are connected via dialled telephone lines.

B. The information is presented to the user on a display of the same kind as in a commonhome television set. The user terminal consists of a modified television set, and in a near future a standard television set with some additional electronics. The cost of a Prestel receiver, which can also be used for ordinary TV reception, is now of the order of twice that of a colour TV set but is expected to fall rapidly, and in particular the marginal cost for the Viewdata facility when included during manufacturing will be small.

C. The information is stored as text and simplified images. The information is presented unaltered in the shape in which it was originally submitted to the system. The system, then, does not generate answers tailored to the user's question but only brings selected prestored information.

D. The information is already when submitted segmented into pages called "frames" before inclusion in the data base, and at any point of time the user is allowed to regard one frame, neither more nor less.

E. The retriever may, and this is all he can do, select the page to be displayed by giving appropriate commands. These commands are utterly simple:
"Show the next frame", "Show the preceding frame", "Show the main contents frame", "Show page number . . .". A terminological distinction is made between a "frame" – the segment displayed at one time on the screen – and a "page" which is a unit referred to by a page number. A page contains one or more frames and – the command most characteristic of Viewdata – "Show the (first) frame under heading number . . .", the heading number referred to being one of up to ten headings displayed on the screen at the moment of his decision. His selection may supply him with a page on the desired topic or, again, with a "menu" with up to ten options to choose between.

In addition to paging the user can give some messages to the system to be forwarded to the author of the page just displayed. This fringe feature is more important because of its implications than because of known applications. Mentometer and voting as well as ticket booking have been mentioned as examples.

F. These commands are delivered via a press-button gadget, with keys for the numerals and some punctuation symbols. Its size and design resembles that of a pocket calculator and, like some television set control boxes, it operates wirelessly. Thus, with this little console in his hand, the user can sit relaxed in an armchair and view the pages at a convenient distance, having all the pages in the system literally within arm's reach.

G. The text can be differentiated by means of colouring. Keywords, headings, etc. may be emphasized or contrasted by different colours.

The images, likewise in bright colours, are built up from rather big square elements. A page has room for 960 text characters or as many elementary image elements. This means that a Viewdata text page is equivalent to at most half a standard printed book page, and that pictures have necessarily low resolution and do not admit half-tones. The images are preferably maps, diagrams or designs, or else large-size letterings for headings or catchwords. No smooth curves or oblique lines can be produced, nor intensity variations.

However, an added dimension for pictures as well as for text arrangements is time variation: portions to focus on may be made to flicker or wink at the observer, struggling to seize his attention with a technique similar to that of dynamic neon texts at night.

H. The information is supplied by a large number of independent sources, so-called Information Providers (IP's). The host organization, the post office, acts as administrator and keeper of computer and software and collects the fees.

I. In excess of terminal rents and telephone costs, charges for Viewdata services are exclusively based on the amount of information read or supplied. Computer time does not enter the calculation of the charges.

The user pays a small fee (at present 1/2p per page requested) to the post office and a royalty to the IP. This royalty ranges from – 1/2p to typically 5 or 10 c per page.

The page royalty, which has been determined by the IP, is supposed to be known to the user when he requests a page.

The IP pays a moderate amount per page and year to the host (at present 4 pounds). An IP, then, may act according to a commercial strategy, running a risk that the demand for his material will not be great enough for royalties to pay for his fixed costs but also taking the chance of making a good income on attractive pages adequately priced. An IP may also choose to aim at wide diffusion with less than maximum or no immediate profit, setting his page price low, down to – 1/2p.

3. What is good about Viewdata?

What is there in all this that is original? Nothing? The combination? The publicitiy? Or the scale of operation?

Let us examine the different features one by one to see what is new in them. We use the same paragraph literals as in the preceding section.

A. Data bases for direct remote access via dialled telephone lines have been available since a quarter of a century and are everyday tools in several fields, but so far not for home or private use. It is still an open question whether Viewdata will succeed in reaching beyond the professional user, except for a small number of prestige users. A specialist, say, a lawyer subscribing to legal data bases, who uses his Viewdata terminal to retrieve a suitable London theatre program for an important visitor, is not a typical private user.

B. The cathode ray tubes in a home television receiver and in a data terminal being in principal the same kind, it has long been possible to output text from a computer on any television screen, although there has been little point in so doing except in some special applications where duplicate displays are required, since the screen part of the price of a standard terminal is not excessive.

The claim that Viewdata uses an ordinary TV is only partly true since one cannot yet buy the accessory elec-

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tronics at a cheap price. A Viewdata terminal today is of the same price class as a cheap computer terminal, which is often a negligible amount for a professional user, if the system has a significant effect on his work at all, but mostly unreasonable for a home.

The prices are expected to fall drastically as sale volumes go up. In particular, many new colour TV sets will include, at a small marginal cost, the necessary Viewdata electronics. The industry obviously hopes that Viewdata will cause a third sales wave, now that the initial wave of black/white sets and the second colour TV sales wave have passed and the market seems to be satured.

However, whatever happy surprises the price development has in store for us, these seem to be volume effects rather than the result of new technology. Many other types of terminals might also be massproduced at a low cost, could a sufficient number of buyers be made to concentrate on one kind.

C. and D. constitute restrictions which make the system easy to understand and which are required in order to obtain E.

These restraints require thought-through hierarchical structures with all what that implies of notorious difficulties. If adequate structures can be found, the system provides unmysterious and easily learnt retrieval operations.

Is this an ingenious or a trivial simplification? It is certainly not new: tree structures have been used for knowledge representation since several millenia, and page segmentation since at least one. Some recent development can be characterized as efforts to organize data otherwise. But has Viewdata struck the right level of sophistication?

For some kinds of data, the tree structure seems fair enough. For other data, the strict hierarchical arrangement imposes disturbing retraints, necessitating a kind of cleverness in data organization which we feel now to be rather artificial. At a point of time when information retrieval has otherwise, after a long struggle , begun to free itself from an unmotivated hierarchical thinking, which was possibly justified in manual or punched-card systems, at a time when in fact non-hierarchical indexing terms is recognized as the major or even only achievement of computerized retrieval so far, it is amazing that strict tree structures are re-introduced in a computerized environment. (This conflict, was a reason for the Swedish Society for Classification Research to take up Data Structures in Viewdata as a theme for a meeting this spring). The secretary of the Swedish Committee for effects in the widest sense for society of these new developments suggests possibly needed legislation.

Technological development is often characterized by retreats as well as by advances; see, e. g., what is said below on typography in computer outprints. Is the poverty of search procedures in Viewdata a justified retreat?

The simplicity of design has eliminated the common pitfalls of dialogue processing. The software becomes utterly simple and foolproof, since nothing worse could ever happen than that a user commands the wrong page, if we disregard now the above mentioned fringes of the system. (No provision so far has been made to safeguard against inadvertent looking-up of expensive pages or elaborate identification routines to stop thieves, but the Prestel system does include arrangements for closed user groups, using subsets of the database inaccessible to outsiders.)

The program system, therefore, is in itself not very complex. The considerable development costs in Great Britain have resulted in elaborate simplicity rather than – what is more typical for large programming undertakings – half-baked complexity. There is disagreement, though, about how simple the system is, seen as a piece of programming. The Prestel has been quoted as quoting prices of the order of 400 000 U.S. Dollars, whereas one follower (Philips Swedish Daughter Company) boasts to have paralleled the Prestel software with the same specifications in a few manmonths; another implementation (that of the Swedish Telecommunications Administration) has required considerable more manpower but is not yet debugged.

The specifications seem not to be protectable. The law protects complex systems if they are original as well as the program as such, but there is no legal protection for powerful simplification.

F. The little control unit is obviously made of components which happened to be available and is ergonomically undeveloped. Like most calculators, it is not particularly easy to use with one hand and without looking, which it should be, considering the slow flow of information it has to convey.

But is this simplicity of design gained at the expense of a stifling restriction on the intellectual organization of data? This was the question which the Classification Society tried to address. Should we warn against these built-in restrictions and encourage the development of a software for searching (and of control boxes with a full alphabet rather than only the numerical keyboard), replacing this menu lookup procedure? Or should one, instead, develop the art of creating adequate hierarchial classifications for various purposes? This is not an academic question; it is rather a crucial policy decision to be taken now!

It should be noted, that the menu principle, in spite of its simplicity, does not require a tree organization. Branches may meet again, forming many different patterns of linkage between the frames.

G. The manner of presentation is a radical improvement over data processing standards. When I first heard Viewdata described, I intuitively classed these features as populistic tricks to attract those who are lookers rather than readers, but after trying myself I am almost ashamed to admit the tremendous impact the external form has even on a well-motivated and trained reader.

It is not colour or dynamics per se which is so gratifying but the presence of some typographic differentiation at all. Colour variation is not a bad substitute for font variation.

It is well known that computerization has caused (or has been made to justify) typographic degradation, and data processing has in general a tradition of high-brow disdain for the visually attractive, but not until now did I realize how much we miss when we lose the typographic dimension.

Clearly these typographic refinements have come to data processing to stay there.

H. The coexistence of many organizationally and economically independent information providers permits an important decentralization, a promise which should deserve much more political attention and energy. Multisource databanks have existed before, but the independ-

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ence of information providers mutually and with regard to the host has not been carried out so systematically. This feature is intrinsically conditioned by.

I. The billing principles. These are probably the greatest innovation – though similar arrangements have been planned and practiced on a smaller scale and less systematically. The services rendered are not defined in computer terms. Thanks, perhaps, to the fact that Viewdata adresses a public thought to be ignorant about computers, the user's bills focus on what the user gets and not on the tools for getting it. This is a healthy attitude even for those who do understand tha data processing involved.

What Viewdata is creating then, for the first time, is a market for information. Computer services and information supply have been unbundled. Information is traded on its own merits, with feedback from user to provider much more immediate than could ever be achieved in, say, book publishing of the printed press.

Fixed page costs for a provider being much less per month than that of a small mimeograph edition, the economic arrangements drastically reduce the critical minimum readership of a publication. The minimum size of a text quantum for it to be launched separately and, most important of all, the minimum size of a publisher.

For a market to function, it must have a non-too-small volume. Viewdata must grow into a public service. Only then will the marginal costs for a user to consult a new provider or the cost to take on another provider be significantly lower than in other data base systems. The technical features mentioned should be seen first of all as means to the end of spreading Viewdata to a large number of ordinary people. Prestel are clearly very aware of this purpose and avoid splitting the resources by taking a conservative view on potential improvement and deter non-british users – by a fee of 100 pounds per user-hour – from complicating the issue.

4. Expected development

The only thing we know for sure is that development will be impressive quantitatively: the publicity already achieved and the consequent funding from public and private sources have focussed a good deal of thinking and enterprising on Viewdata. A large international conference on the subject has also been announced for 1980.

Some lines of development should be mentioned.

1. Hardware development. Most important are probably cost reductions, as mentioned above. The hand console will probably be made much more handy, and/or provide for full alphabetic messages from the user.

2. Viewdata will be integrated with other date processing in the host computer.

In some implementation, such as the Finnish TELSET, it is already now possible to activate special IP-provided programs when a particular page is presented. The commands then are not interpreted as Viewdata commands but have a special function, for retrieval or otherwise.

There are no technical obstacles for expanding the system to a full-fledged online processing system. But is this desirable? Simplicity of design being the major achievement so far, one might jeopardize the whole invention by making it too powerful. Will there be anything characteristic left? Will Viewdata be remembred only as a onetime event, which helped accelerate cost decrease for distributed data processing in the 1980's and added colour to computation? Respectable achievements as these may be, was that all?

British Prestel has been very averse towards such expansion, claiming that the system cannot handle them. Unless the Prestel software is extremely incompetently written, this cannot be literally true, though the verification of guest programs does present a problem to the host. In a wide circle of public providers, one cannot even reckon with unfaltering bona fides in making program modules innoxious to the host and every third party. But basically, this restriction is clearly a matter of policy. Prestel makes a point of simplicity and lucidity and does not want to enter the computer utility market. Just now, width in Great Britain is more important than anything, and sophisticated users, in Britain or elsewhere, are not interesting. I believe there is much common sense in that attidude, even though a more cooperative attitude is otherwise common in the computing world.

However, it seems unacceptable in the long run to put a ceiling on the computing capacity of the system. It is unsound to create new islands, unconnectable to associated computing and text processing on the output, and above all we do know that more elaborate search functions are often needed. To banish them from cooperating with the Viewdata basic system is rather a pity.

3. Viewdata will be integrated with information processing in the IP's computer. The same arguments apply as above though with less force: the risks are smaller and the need is less urgent, assuming that an IP can already now submit data as a computer file prepared in any other computer instead of keying the data in at an IP terminal; even this facility seems not to have been taken for granted at the outset.

4. Viewdata will integrate with user's local software. This is trivial as long as the protocol mimics the manual operations; but should it?

5. Competing Viewdata systems. A number of private, smaller-scale Viewdata implementations have appeared, in Britain and elsewhere. The Viewdata design may well be adequate for many closed-group applications, within an organization or special subscribers circle. However, that is then just an alternative design of online computing and message handling; the novel approach to create a public service – an information market with low marginal costs for an extra set of data to be published or accessed – requires large scale. It is only too natural for national telecommunication authorities and post offices round the world to jump to the conclusion that 'large scale' means 'governmental' and that 'public' means 'not private' in the economic sense.

6. Computer networks. With modern operating systems, the distinction between one large common computer and a set of interacting hosts of varying make, origin, ownership and internal organization becomes unimportant, nay unnoticeable to the user. The technology for networking is there (i.e. it is being marketed and will presently also function to the degree of foolproofness required for Viewdata applications). The crucial factor is the attitude of central administrations.

For a multitude of hosts to cooperate in an international network, there must also be a basic standard of conventions. Britain has won that battle for us: the Prestel specifications is a de facto standard thanks to the British early start.

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5. Desirable development

Viewdata's greatest feat so far, as I see it, is that it has made acceptable the idea of unbundling: computer hosting and information provision are clearly established by now as two separate functions, and the field has opened for a large number of smaller and larger competing publishers, competing on a market with no other restrictions than that of the inertia, ignorance and lack of interest of the buyers.

But there is a serious limit to competition in the original Prestel design, in that the host seriously reserves the right of programming entirely for himself. IP's who have their own algorithms for searching cannot offer these, unless they are implementable as tree structures on the data, and suppliers of search retrieval software cannot enter the market at all. Retrieval software , then, does not constitute merchandise on this market. At the same time, better retrieval mechanisms probably belong to the most important products that can be introduced in the 1980's – a statement made with conscious subjectivity.

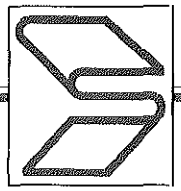
The most urgently needed additions to Viewdata therefore seems to be:

1. The facility for including more advanced programs for specially well-informed users, accessing certain subsets of the data, with retention of the simple procedure for communicating in simple cases. In accordance with lines of developments studied by, i. a., Jacob Palme, Stockholm, the system must be able to grow with the user's competence , so that the user can utilize – without abrupt changes of level – successively more advanced tools and this in such a manner that the more powerful options do in no way increase the complexity for someone who does not (then) need them.
2. Efficient networking, so that several computers, hosts as well as user's and IP's computers (distinctions which will then fade away) can communicate smoothly.

This will introduce a sound competition also between computers and suppliers of memory space: there will be more than one offer for equivalent storage. But, more important, this and this only will ensure real competition between retrieval systems. For a long time yet, there will presumably be severe practical restrictions on systems inserted under Viewdata in one IP's partition of a public computer. The full power of alternative procedures can be demonstrated only if these systems can be installed in dedicated computers, accessing data stored there or elsewhere in the network.

In short: we believe that Viewdata will initiate important technological and scientific progress not because it is in itself an instance of such progress but because it opens up new important fields for market mechanisms proven to be effective stimulators of innovations.

Whatever other trends the Viewdata development will follow, it is likely that the classificational approach, which is predominant now, will remain indispensible. The value of the Viewdata approach stands and falls with the appropriate classification adopted.



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