

S J Newton

Graphics and Image in Office Systems

S J Newton

PUBLISHED BY NCC PUBLICATIONS

British Library Cataloguing in Publication Data

Newton, Steve

Graphics and image in office systems.

1. Business – data processing 2. Microcomputers

I. Title

658'.05404 HF5548.2

ISBN 0-85012-425-5

© THE NATIONAL COMPUTING CENTRE LIMITED, 1985

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, without the prior permission of The National Computing Centre.

First published in 1985 by:

NCC Publications, The National Computing Centre Limited,
Oxford Road, Manchester M1 7ED, England.

Typeset in 11pt Times Roman by UPS Blackburn Limited, 76-80 Northgate, Blackburn, Lancashire, and printed by Hobbs the Printers of Southampton.

ISBN 0-85012-425-5

Acknowledgements

This book results from a distillation of the experiences and opinions of many people, including persons employed by suppliers of products and services, and users in the private and public sector.

In particular the author wishes to thank the following for their time and support:

Allied Business Systems Limited, Brighton (F Zapple)
Apple Computer Limited, Hemel Hempstead (P Morse)
Aregon International Limited, London (R Williamson)
BL Public Limited Company, London (J Cragg)
BP International Limited, London (W Tallis)
Brighton Health Authority (V Kempner, S Apps)
Comshare Limited, London (P Ellens)
Convergent Technologies, Amersham (M Lippman)
Cullinet Software Limited, Stanmore (W Bridge, A Gillett)
Data General Limited, Manchester (D Shuttleworth)
Grafox Limited, Oxford (I McCella)
H M Treasury, London (G Giles)
IBM (UK) Limited, Sale (N Marsden, J Gill)
ICI Organics, Blackley (C Elson)
Imperial Group Limited, London (G Wells)
Issco (UK) Limited, London (J Millard)
Keen Computers Limited, London (W Aenlee)
Philips Business Systems Limited, Colchester (J Williams)
Rowntree Mackintosh Limited, York (M Fenwick, L Marshall, M Roberts)
SAS Software Limited, Weybridge (L Ruane)
Shell UK Oil, London (A Dunsmuir)

Tektronix (UK) Limited, Harpenden (H Rippiner)
Terminal Display Systems, Blackburn (T Hemmington)
University of Manchester (T Hewitt)
Wang (UK) Limited, Isleworth (C Raffo)
Xerox Corporation Limited, Uxbridge (K Dowe)

Thanks are also due to:

- the following people who passed comment on the first draft:
 - G Crowe, Manchester City Council
 - S G Price, NCC
 - G Williams, Cullinet Software
- the following organisations who provided the graphical examples contained within this book:
 - Cullinet Software
 - Grafox
 - Issco
- NCC colleagues: J M Bird, R J Firth and J A T Pritchard.

The Centre acknowledges with thanks the support provided by the Electronics and Avionics Requirements Board (EARB) for the project from which this publication derives.

Contents

	Page
Acknowledgements	
1 Introduction	9
General	9
Graphics	10
Image	15
2 Business Graphics Hardware and Software	19
Hardware	19
Software	39
3 Choosing and Using Charts	43
Types of Charts	43
Design Principles of Charting	58
4 Business Graphics Systems – Types and Examples	63
System Types	63
System Examples	71
Other Graphics Applications	86
5 Business Graphics Case Studies	89
Case Study A – Brighton Health Authority	89
Case Study B – Rowntree Mackintosh Plc	93
Case Study C – British Petroleum	96
Case Study D – BL Plc	98

6	Justifying Business Graphics	101
	Justification	101
	Problem Areas	106
7	Graphics Standards	109
	The Need for Standards	109
	History of Graphics Standardisation	110
	Acceptance of GKS	112
	Standards in a Conceptual Graphics System	113
	Standards Development and Acceptance	115
8	Image Systems – Types and Examples	119
	Introduction	119
	Image Processing	120
	Facsimile and Mixed-Mode Transmission	126
	Computer-Assisted Retrieval (CAR) of Microfilm	132
	Optical Disk	138
9	Developments in Graphics and Image	145
	Graphics	145
	Image	146
Appendix		
A	Glossary	149
B	Bibliography	155
Index		159

1 Introduction

GENERAL

Within the modern office, information is perceived as a resource which plays a critical part in the decision-making and problem-solving activities carried out. The nature of this information varies from organisation to organisation, but in general it is made up of five distinct elements:

- data;
- text;
- voice;
- graphics;
- image.

The use of data in its various forms – eg budgets, accounts, forecasts, sales figures, etc – is well established within most office workloads. Data was the first of the information categories to be automated – data processing having been around since the 1950s.

The handling of textual information within the office was automated in the 1970s by the introduction of word processing systems. Such systems allowed text to be created, updated, edited, filed and retrieved by electronic means. For many organisations, word processing represented the first step in the introduction of new technology to the office environment.

Voice is slowly beginning to have an impact in office automation systems. The use of voice message systems, voice annotation, voice

recognition, voice synthesis, speaker verification, etc is assuming increasing importance within the USA office automation market. The UK will almost certainly follow this trend over the next few years. (The use of voice in office systems is the subject of a future NCC project.)

It is the final two elements of office information – graphics and image – that will be specifically addressed by this book.

GRAPHICS

In newspapers and magazines you will often come across graphs depicting such information as the number of foreign tourists, the share of the UK car market, the fall in value of the pound against the dollar, etc. Similarly, turn on the television and you may well see graphs used to depict political trends at election times or the number of viewers for Channel 4. NCC itself makes use of graphs for a range of activities, including showing the various trends to emerge from the *Salaries and Fringe Benefits in Computing* report (see Figure 1.1). Graphs are playing an increasingly important role in everyday life, and nowhere is this more apparent than in the area of office automation where business graphics is currently experiencing high levels of growth.

So what exactly is business graphics, and why is there such interest being shown in the technology? Basically graphics can be used in business in three ways:

- data presentation;
- dynamic usage;
- graphic solutions.

Data Presentation

A frequently cited reason for the use of graphics is that “a picture is worth 1000 words”. Tektronix, a leading computer graphics supplier, introduced a slight variation on this theme in a recent advertisement which proclaimed that “a picture is worth 10 minutes of discussion”. Both statements in fact relate to one of the major uses of business graphics – that of presenting complex data in chart or graph form in order to ease comprehension and provide rapid understanding.

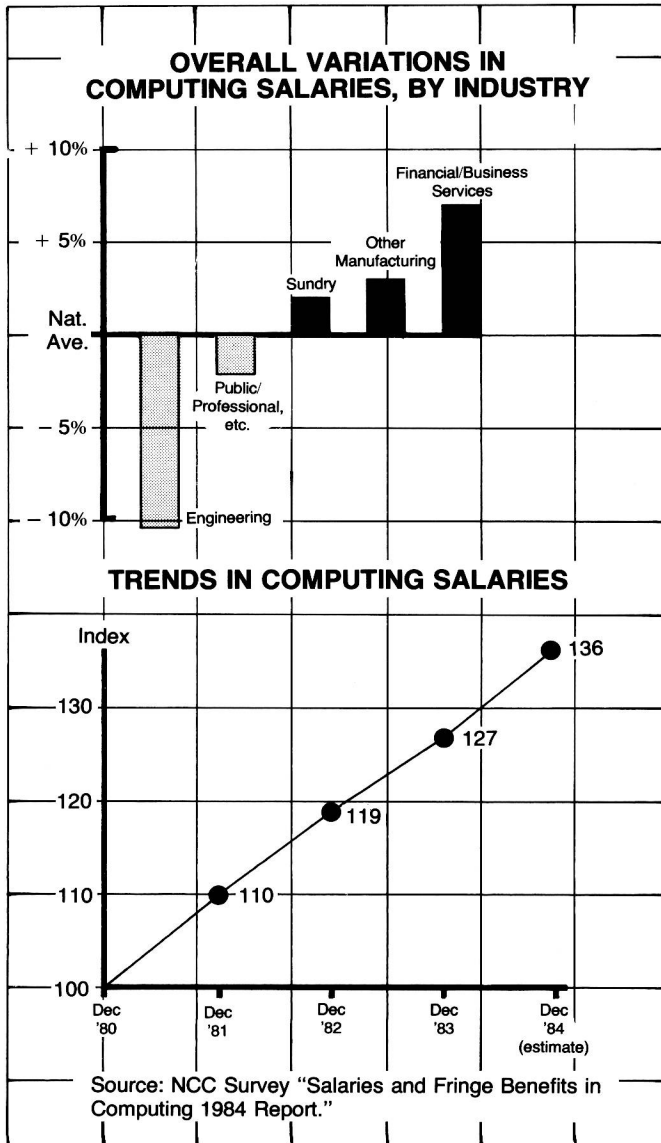


Figure 1.1 Graphs Used in the NCC *Salaries and Fringe Benefits in Computing Report*

Business graphics can summarise pages of facts in a simple chart and thus make information easier to understand and retain. It can be used to aid comprehension by explaining complex information, emphasising key points, showing comparisons, showing relationships and explaining new concepts.

If you have any doubts about business graphics' ability to achieve these points, examine Figure 1.2. The chart and the table contain the same information. You will probably need a few minutes to study the table in order to get some understanding of what the figures show. By looking at the chart you get an instant picture of the UK car market since 1974 showing the rise of Ford coupled with the decline of BL. In other words, the chart gives you the information faster.

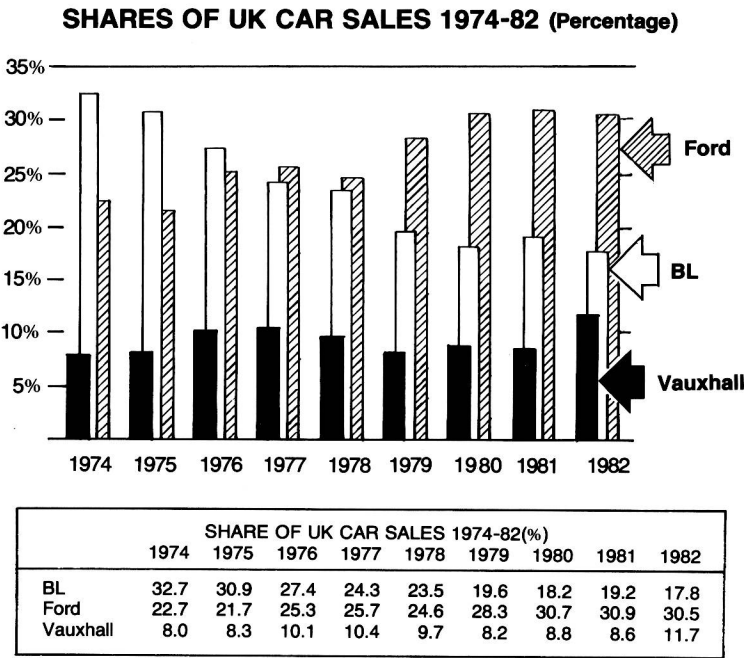


Figure 1.2 Percentage Share of the UK Car Sales 1974-82

Data can be presented in a number of ways – bar charts, line charts, pie charts, Gantt charts and word charts are just some of the methods used. The form of output used for presentation can also vary. In almost all cases the charts and graphs are created for presentation to other people, in either formal or informal circumstances. Thus the output may be in the form of 35mm slides or overhead transparencies. Equally, it may be in paper form for inclusion in a report, or in electronic form to enable it to be viewed at a graphics terminal.

Dynamic Usage

There is an increasing range of products which enable graphics to be used dynamically, ie where charts and graphs are examined according to changing data input. In other words graphs can be used to provide ‘what if’ facilities. A certain series of data can be taken, together with certain sets of conditions, and the results plotted: the sets of conditions are then changed and a new set of results is produced. This type of facility differs from the data presentation area in that the user is interacting with the graphics system to assist his decision making.

Graphics Solutions

There is a whole series of business problems that can benefit from the use of graphics solutions. Break-even charts, learning curves and PERT charts are all typical management graphical tools. Once again this area would see the user interacting with the graphics system to assist with the decision-making processes.

These are the ways in which graphics can be used effectively in business. Why is it then that business graphics is currently booming and is confidently expected to continue to do so? For example, Frost and Sullivan in 1981 predicted that European graphics sales to the business and education market would grow 1000% through the 1980s, rising from \$45 million in 1980 to over \$500 million in 1990: the latest figures suggest that sales are well on course to achieve this. Another study, called *PC Business Graphics: Impact and Opportunities*, from Strategic Incorporated of San Jose, California, claimed that business graphics is the fastest growing segment of the computer graphics market, with an annual growth

rate of 200%. Everywhere the picture is one of continuing high growth. There are two basic reasons for this:

- system developments;
- information requirements.

System Developments

There have been a number of significant developments in both the cost and the quality of the hardware and software components of business graphics systems. Generally the cost of the hardware has dropped considerably. This trend is clearly demonstrated in the low-end pen plotter market. Capabilities that used to be on plotters costing £5,000 are now on plotters costing below £1,500. Hewlett-Packard have had a considerable impact in this area with the release of HP 7470A at a price of around £1,000.

The cost of other components of graphics systems – memory, logic circuits and interfaces – is also decreasing. Cathode ray tube (CRT) terminals, which used to cost over £50,000 per unit, are now available with full colour for around £2,000. With these new prices, business graphics products can be afforded by more users at every level.

Not only is business graphics more affordable, it is also better in quality. Today's terminals offer colour capabilities with selective erase and bright display. New products offer better ways to use image memory with windowing, alphanumeric scrolling and better interactive device control. The introduction of high-resolution printers and plotters has led to high-quality finished output of the charts onto paper, slides or acetates.

Developments in software have also been impressive, with quality products now available from both independent suppliers and hardware manufacturers. Until recent times few personal business graphics software packages existed. Now that 16-bit microprocessors are being integrated into desktop systems the software market is growing. The availability of graphics software on the entire spectrum of computer equipment from micros to mainframes has made the technology accessible to a whole range of new users.

The development of easy-to-use interfaces for the non-programmer has also played an important part in the growth of

business graphics. Such facilities enable the non-technical user to interrogate data bases, down-load data and construct charts without the need to refer to the programming specialist within the computer department. This 'self-sufficiency' has in effect taken business graphics out of the hands of the programmers and placed it firmly in the control of the end user.

Information Requirements

A manager's primary resource is time. He has only so much time in a day to absorb information that is relevant to his immediate decision-making responsibilities. If information is not readily accessible, then the manager's return on his invested time will not be satisfactory.

The more data a manager receives, the harder it is for him to find a relevant piece of information in a reasonable amount of time. As the volume of data becomes increasingly unmanageable, many managers become "data rich, information poor".

As was stated at the beginning of the chapter, there has been a gradual realisation that the information held within offices is a resource which, if used correctly, can greatly improve the decision-making and problem-solving capabilities of the staff involved. Whilst computer technology has given the user the capability to capture, store and manipulate this information, what it has not given him is the ability to quickly collect and assimilate the information necessary to make decisions at any given time.

The solution lies not in providing the manager with more data, but in providing him with tools to solve his information-handling difficulties. Such tools should enable him to access the relevant information quickly and easily and then, more importantly, to understand the implications of this information in order to make decisions in a swift and effective manner.

Because of its particular characteristics, business graphics has become an integral part of the decision support systems which are now being developed to address the problems outlined above.

IMAGE

If the documents handled in an office are analysed then it becomes

apparent that, whilst the information category 'text' predominates, there are many document types which contain major portions of image information. Examples of image include:

- in correspondence: the letterhead with company logo, the small print and the signature;
- in forms: the form layout with line graphics, the signature and handwritten annotations;
- in reports: the cover print, drawings and colour images;
- in magazines: journal articles and press cuttings containing graphics and grey tone and colour images;
- other examples include handwritten memos, historical information and diagrams and sketches.

The above list, by no means exhaustive, shows that documents containing at least some elements of image account for a high proportion of the total information flow within the conventional office.

Whilst we have examined the various forms image may take, it is also appropriate to consider why such information is difficult to integrate within an electronic office system. Basically there are two types of information as far as a computer is concerned. The first is the coded type of information which is machine readable and therefore can be recognised and held in electronic form. Within this category comes data, text and computer-generated graphics. The second type of information is non-coded and hence non-machine readable. It is in this category that image is found.

To date, office systems have overcome the problems of image in a variety of ways. For example, microfilm can be used to store a copy of the image document. However, whilst microfilm is a space saving and economic method of storing information, it can cause difficulties with the relatively slow retrieval times. More importantly it is a non-electronic medium, and therefore the user cannot access the filmed document from his desktop workstation as he can coded documents which are held electronically.

Another method which has been employed by office systems to store image documents has been to create an electronic index for a hard-copy file. Thus the image documents are stored in hard-copy