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Simon Lavington

Early Computing in Britain

Ferranti Ltd. and Government Funding, 1948–1958

Springer

Simon Lavington
School of Computer Science
and Electronic Engineering
University of Essex
Colchester, UK

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Preface and Introduction

There is a tendency to view computer history either from a top-down or a bottom-up perspective. Enthroned at the top of the historical landscape are the policymakers: government mandarins and board-level industrialists who view each new generation of computers through their shifting requirements of economics, politics and national defence. Far below these policymakers, and secure at the foundational level, are the technology researchers and developers: the creators of theories and laboratory prototypes, whose motivation is the satisfaction of responding to challenges issued by their fellow academics. In between these two extremes is a largely unsung and heterogeneous collection of engineers, programmers and marketing staff who turn ideas into products, features into benefits and problems into solutions. Theirs is the song that you'll hear throughout this book.

The focus of the story is particularly on those who worked for one manufacturing company, Ferranti Ltd., and for the nine end-user organisations who purchased the first Ferranti computers in the period 1951–1957. It is a story grounded in technology but brought alive by personal experiences and practical compromise. Here you'll read of short-term social impacts and longer-term evolutionary adaptations, as new and untried equipment began to have an impact.

Why is this story of relevance to the emergence of modern computers? The 10-year period 1948–1958 was of great significance. The first Ferranti computer, which was prosaically called the Mark I, was the first production machine to have been delivered anywhere. A copy of this and improved versions called the Mark I* (*Mark One Star*) were the first substantial computers to have been delivered in Canada, Holland and Italy. And whilst American companies such as UNIVAC and IBM were selling tens of computers to their home market during the early 1950s, Ferranti seemingly had the rest of the world to itself.

Nevertheless, marketing was a struggle. In 1950, Ferranti employed Dr. B. V. (Vivian) Bowden, a Cambridge graduate with good connections in government and

industry, to promote these new computers. Bowden remembers[1] that "I had to determine if more than one machine of this type would ever be required, or if, as it was at that time widely believed, a single machine would be able to do all the computation which would ever be needed in this country. We have now [May 1953] sold half a dozen of these great machines and it has been my responsibility to discuss their possible application to a very wide range of subjects…. I have interviewed a large number of people whose interests are in the fields of science, engineering and commerce, from the chief designers of aircraft firms and the presidents of insurance companies to the organisation and methods branch of the Bank of England and the Treasury. I have discussed their problems with scores of accountants, actuaries, engineers and scientists of all kinds …"

The scientific and engineering sectors were the more receptive to begin with. But Bowden found "that they all faced the same problems. If the calculations were short, they were done on desk calculating machines operated by clerks. If the calculations were long and complicated, there were three overwhelming objections to the use of a computer. The machine usually broke down before it finished the calculation, its memory was too small to hold all the data it needed, and, worst of all, it took so long for the mathematicians to get the program right that it was usually quicker (and cheaper) to get the calculation done by clerks … We were more worried by the shortage of programmers than by anything else ….".

Users did eventually take the plunge but the uptake was slow. Travelling hopefully was the name of the game in the early days of the digital revolution. As remarked by Dr. G. W. (Gerry) Morgan of the Government Communications Headquarters (GCHQ) in 1951: "It is very clearly recognised that quite 90% of the value of a computer does not become apparent until it is in use".[2]

Stepping back from the efforts of Vivian Bowden in 1950, it is now clear that defence was the market driver in both the UK and the USA at the time. Britain felt especially hard-pressed with the passing of the McMahon Act 1946, which cut off American cooperation in the development of nuclear weapons. The Berlin Airlift and the radical changing of Soviet encryption methods marked 1948 as the year when the Cold War really became a threat. Then 1949 saw the Yangtze Incident and the emergence of the Peoples Republic of China. 1950 marked the start of the

[1] B. V. Bowden (1910–1989) obtained his Ph.D. from the Cavendish Lab., University of Cambridge. His wartime work on radar included a spell with a joint UK–US research team at the Naval Research Lab., Washington, followed by post-war work at MIT and the UK's Atomic Energy Authority. He joined Ferranti in 1950. These quotations come from two sources: (a) Four-page letter written by Bowden on 8 May 1953, when applying for the post of Principal of Manchester College of Science and Technology (later UMIST). Bowden's application was successful. He remained at UMIST until retiring in 1976. In 1963, he was created Lord Bowden of Chesterfield and held the appointment of Minister of State for Education and Science until 1965. He died in 1989. (b) Bowden, B. V. 1970. The language of computers. *American Scientist* 58 (1): 43–53. This paper was originally delivered at the Brighton College of Technology as the first Richard Goodman lecture, 2 May 1969.

[2] *GCHQ & Ferranti.* G. W. Morgan. GCHQ Minute X/565/1802, 7th November 1951. GCHQ ordered a Ferranti Mark I* computer towards the end of 1951 and took delivery of the machine in the autumn of 1953.

Korean War. With this backdrop, it was two government agencies, the Ministry of Supply and the National Research Development Corporation, that underwrote the development of all the early Ferranti computers.

A Reader's Guide

The first Ferranti computer did not spring fully-formed from the ground. It incorporated ideas that had first emerged from several research laboratories in the period 1946–1949 and on particular techniques developed at the University of Manchester. These came together in a 1948 prototype called the Small-Scale Experimental Machine, or simply *The Baby*. With government encouragement, this Baby was picked up and nurtured by Ferranti Ltd., a well-established Manchester electrical engineering firm. Chap. 1 provides the historical background to these events, with supporting technological details being conveniently confined to Chaps. 14, 15 and 16. It is no surprise that world-renowned luminaries such as John von Neumann and Alan Turing appear in these pages.

The transfer of technologies from academia to industry and the establishment of Ferranti's computer production resources are covered in Chaps. 2 and 4. A giant machine was being created that, to quote Ferranti's Computing Department Manager, contained "about 4,000 valves [thermionic tubes], 2,500 capacitors, 15,000 resistors, 100,000 soldered joints, six miles of wire and consumed 27 kW of power …. In point of fact, no one knew what the problems of maintenance would be, and the solution of these problems, together with that of improving the general efficiency, gave rise to a considerable amount of difficulty". In Chap. 4 we see that one set of solutions to the Mark I's software inefficiencies was incorporated into an upgraded version called the Mark I* (*Mark One star*).

They were exacting times for those whose lives were touched by the project. As one of the Ferranti programmers remembered, "It was a very good team—very exciting! And we were a good group, too, socially". The programs being written were largely applied to science and engineering applications, though the human side occasionally shone through: computer music, computer games and even the generation of love letters.

The Ferranti Mark I and Mark I* computers were proving difficult to sell to business and commerce. They were extremely expensive and their input/output facilities were at first ill-suited to accounting and management sectors dominated by punched-card equipment. Chapter 5 describes Ferranti's efforts to adapt and to introduce new products. Here and in Chap. 18 are presented the performance, cost and sales statistics of rival machines emanating from both UK and American computer manufacturers. 1955 was the critical year in which competitor computers began to appear.

The sales of early Ferranti computers were largely to government establishments, with defence applications predominating as the clouds of the Cold War loomed overhead. The UK's Ministry of Supply was the procurement entity responsible for

the installation of Ferranti computers at the Government Communications Headquarters (GCHQ) at Cheltenham, the Armaments R & D Establishment at Fort Halstead in Kent and at the Atomic Weapons Research Establishment at Aldermaston. The decisions, installations, applications, personalities and final shut-down of Ferranti Mark I* computers at these three locations are fully covered in Chaps. 10–12. The stories cover relevant requirements over the period 1945–1967.

Government funding secured the delivery of Ferranti Mark I computers at two Universities: Manchester and Toronto. The decisions, installations, applications, personalities and final shut-down of machines at these two sites are covered in Chaps. 2, 3 and 13. Another site with university and national Research Council connections was the Instituto Nazionale per le Applicazioni Calcolo (INAC) in Rome. The deployment and use of the Ferranti Mark I* at INAC is described in Chap. 9.

The Ferranti Mark I* ordered by the Amsterdam Laboratories of the Shell company in December 1952 is believed to have been the first computer in the world to be bought as a commercial venture rather than with direct or indirect government funding. The choice of this machine, its installation and its impact are covered in Chap. 8.

Both in the UK and in America, the aerospace industry was the first market sector to adopt the new type of digital computer with enthusiasm. Ferranti Mark I* machines were installed at the Chadderton factory of A. V. Roe (of Avro Lancaster and Avro Vulcan fame) and at the Ansty factory of Armstrong Siddeley Motors in, respectively, early 1956 and October 1957. The lives and times of these computers are covered in Chaps. 6 and 7. Since these two companies were largely working on government defence contracts, the Ferranti Mark I* installations can be said to have been partly financed by indirect government funds.

As for Ferranti, where did it all end? How did the company progress from being the first and largest British computer manufacturer in the early 1950s to losing its mainframe computer department in 1963 and finally becoming extinct in 1993? The saga, which covers successors to the Mark I series such as Pegasus, Mercury, Orion and Atlas, is revealed progressively in Chaps. 4, 5 and 13. Finally, the names and personal anecdotes of many of Ferranti's unsung employees from the Mark I days are rounded up in Chap. 17.

In summary, enjoy the photographs and enjoy the emerging hardware and software technologies and their applications but, above all, enjoy the personal reminiscences of those who made many small but useful contributions to the promotion of the modern computer in the decade from 1948.

Ipswich, UK Simon Lavington

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