

Editor's Introduction

The articles in this issue are an outgrowth of an ongoing colloquium series on the history of computing sponsored by the CWI and the GMFW (the national working group on the history and social function of mathematics). The colloquium series has focused not only on the history of computing technology per se, but also on the history of computation and computational methods in science, engineering, and business, and on the social, economic, and political contexts of these developments. The present selection of five articles, the authors of which include leading scholars in the field of history of computing, focus predominantly on computing hardware and software and span a time period from the mid-nineteenth century to the present. These articles not only give a sense of the scope of the colloquium series, but also provide an indication of the growing maturity of this area of historical research.

The author of the first article, Michael Lindgren, received a Ph.D. in Technology and Social Change from Linköping University in Sweden, and is presently Curator at the National Museum of Science and Technology in Stockholm. His article, "The Swedish Difference Engines", is based on his recent book, *Glory and Failure: The Difference Engines of Johann Müller, Charles Babbage and Georg and Edvard Scheutz* (MIT Press, 1990). The article details the history of three difference engines designed and built in Sweden by Georg and Edvard Scheutz (father and son) between 1834 and 1859. Lindgren explains design of the machines, particularly in relationship to the difference engine of Charles Babbage, from which they were inspired. The conclusion discusses why these mechanical computing engines never succeeded commercially.

The author of the second article, Jan van den Ende, is a member of the History of Technology Unit at Delft Technical University. He is currently completing a dissertation on computing in The Netherlands in the period 1900-1960, which looks at examples of scientific, technical, statistical, and business computing. The article which he presents here, "Tidal Calculations in The Netherlands, 1920-1960" focuses on computing problems in engineering. Specifically, it looks at the problems involved in making calculations to predict the effects of large hydraulic works on tidal patterns. Van den Ende discusses the various methods used to make these calculations prior to the introduction of digital computers. These methods included numerical techniques, and the use of analog electronic machines and scale models. The author compares and contrasts the three methods, examines the specific institutional and organizational contexts in which they were used, and looks at contemporary debates about their relative efficacy. He argues that the choice of methods was linked both to technical and to non-technical factors, the latter including disciplinary alignments, work organization, and the structure and process of decision-making for major hydraulic projects.

The author of the third article, I.B. Cohen, is Professor Emeritus of the History of Science at Harvard University, and Editor of the Series in History of Computing published by MIT Press. In this article, "Howard Aiken and the Beginnings of Computer Science", Cohen draws in part upon an extensive interview which he had with Howard Aiken in 1973, shortly before the latter's death. Cohen sketches Aiken's early career and the factors that led him to an interest in computers and computing. He also explains the design and operation of the Mark I, Aiken's first computer (completed in 1944). In the concluding section of the paper, Cohen provides a general assessment of Aiken's significance in the history of computing, taking into account not only his achievements as a computer designer, but also his roles as an educator and influential member of a newly emerging profession.

The author of the fourth article, Michael Mahoney, is Professor of History at Princeton University. His research focuses both on 17th century mathematics and on the recent history of computing. Currently he is completing two monographs, one on the formation of theoretical computer science and one on the history of software engineering and the software crisis. The present article, "The Roots of Software Engineering", includes some of the results of the latter study. In particular, Mahoney traces the growing need for more accurate and efficient production of software and shows how this need fostered a search for methods of "software engineering" analogous to methods of industrial mass production. He suggests, however, that these mass production models were taken up without adequate consideration of their applicability.

The author of the fifth article, Gerritt Blaauw, is Professor Emeritus in Computer Science at Twente Technical University in Enschede (The Netherlands). Blaauw completed a Ph.D. in Computer Science at Harvard, under Howard Aiken. Subsequently he worked in Amsterdam at the Mathematical Center (now the CWI), where he helped to design and build the first successful computer there. Later he worked for IBM, notably on the design of the Stretch computer and on the 360 series. His present article, "The Persistence of the Classical Computer Architecture" draws upon his lifelong experience as a computer designer. Blaauw defines the elements of the classical computer architecture which, he explains, "was established in the first generation and has endured until the present". The major aim of the article is to explain why this was the case. Blaauw reviews some of the many alternative architectures that were proposed and tried, but concludes that these never displaced the classical architecture because, in the end, they could not overcome the "costliness constraint", where costliness is measured in terms of space (i.e. numbers of memory and logic units) and time (i.e. processing time).

Taken together, the articles in this issue provide a good indication of some of the important new paths that are currently opening up within the history of computing.

The Guest Editors
Gerard Alberts and Eda Kranakis