

# Documenting the Use of Computers in Swedish Health Care up to 1980

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## Summary

**Objectives:** This paper describes a documentation project to create, collect and preserve previously unavailable sources on informatics in Sweden (including health care as one of 16 subgroups), and making them available on the Web. Time was critical as the personal documentation and artifacts of early pioneers could be irretrievably lost. The criteria for participation were that a person had developed a system in a clinical environment which was used by others prior to 1980.

**Methods:** Participants were interviewed and asked for early documentation such as notes, minutes from meetings, drawings, test results and early models—together with related artifacts. The approach included traditional oral history interviews, collection of autobiographies and new self-structuring and time saving methods, such as witness seminars and an Internet-based repository of their recollections (the Writers' Web).

**Results:** The combination of methods obtained new information on system errors, and challenges in reaching the goals due partly to inadequacies of the early technology, and partly to the insufficient understanding of the complexity of the many problems which needed to be solved before a useful electronic patient record could be realized. A very important result was the development of a method to collect information in an easier, faster and much less expensive way than using the traditional scientific method, and still reach results that are qualitative and quantitative for the purpose of documenting the early period of computer-based health care technology. The witness seminars and the Writers' Web yielded especially large amounts of hitherto-unknown information. With all material in one database available to everyone on the Web, it is accessed very frequently—especially by students, researchers, journalists and teachers.

**Conclusions:** Study of the materials explains and clarifies the reasons behind the delays and difficulties that have been encountered in developing electronic patient records, as described in an article [3] published in the IMIA Yearbook 2006.

## Keywords

Swedish medical informatics, historical documentation, clinical informatics systems, electronic patient records, methodology of information gathering, Writers' Web

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## 1. Introduction

Looking at the role of computers in society over the past sixty years, the change has been nothing short of dramatic. While the use of computing technology in the 1950s was narrowly focused on scientific computations and specific administrative routines, in today's society it can take an almost infinite variety of forms. Computers have developed into a commodity with a generic technology. In its various shapes, the technology has become an indispensable part of the world we live in.

The point of departure for this presentation—as well as for the project it is intended to contextualize, describe, and evaluate—is that the user and the use of computing technology need to be taken into account in order to understand the role of computers in society today. During recent years, the historiography of computing has also shifted in perspective from inventors and innovations toward the more complex relationship between the design and use of the machines. Research questions are changing as well, but finding sources that can help us answer the new questions posed is, however, not always very straightforward task. Historians interested in the history of computing share many of the difficulties that scholars of contemporary history in general face, such as archives that are not yet accessible, or the migration, or even deletion of digital sources, et cetera. In addition, they have to deal with sources that often are complex, technical in content, and

sometimes undecipherable. The widespread use of computing technology implies, more recently, that users throughout society, may, in many cases rely on them entirely, which makes it difficult and time consuming to even trace, let alone recover, written sources. A way to cope with these difficulties is to create and collect new sources from pioneering contributors to the field, with the help of methods and techniques from contemporary historical inquiry.

The master project “From Computing Machines to IT”, of which this project was a part, has been such an attempt. It aimed to create documentation on Swedish computing history, covering its methods, organization, theoretical approaches, and results [1].

The main objective of the project was to create, collect, and preserve sources on Swedish computing history from a user-centered perspective and make them available on the Web. The project was a collaboration between the Swedish Computer Society, the Division of History of Science and Technology at the Royal Institute of Technology (KTH), and the National Museum of Science and Technology. It started in 2005, became large-scale in January 2007 and was completed in December 2008. The approach involved several methods and tools, such as: traditional oral history interviews and collections of autobiographies, used alongside new self-structuring and time-saving methods, such as witness seminars and an Internet-based collection of memories (the Writers' Web).

## 2. Toward a User Perspective in the Historiography of Computing

Thomas J. Misa [2] argues that, although everybody knows that “computing has changed the world,” existing historiography faces, strangely enough, difficulties in addressing this question directly, and he suggests that scholars shift to focus “on the interaction of computing—including hardware, software, and institutional dimensions—with large-scale transformations in economies, cultures, and societies.” Since citizens and policymakers today know that computing has changed the world, Misa continues, historians should help them understand this history.

Misa distinguishes three thematic traditions in the field of the history of computing. The first focused initially on identifying the “first” digital computers and understanding the technical (hardware and software) details and was dominated by the practitioners and pioneers of digital computing. Scholars criticized this approach as an “insider history” and they argued for, and pursued, a contextual technical history. The second thematic tradition showed instead an interest in the historical roots of the “Information Age,” and, as Misa points out, in this view computers were machines that “first and foremost processed information and only secondarily provided the functions of calculation, control, or communication.” The third thematic tradition represents an institutional approach. Instead of emphasizing micro studies of individual computing machines or macro studies of the information society, scholars shifted focus to the governmental, professional, and institutional factors that shaped computing.

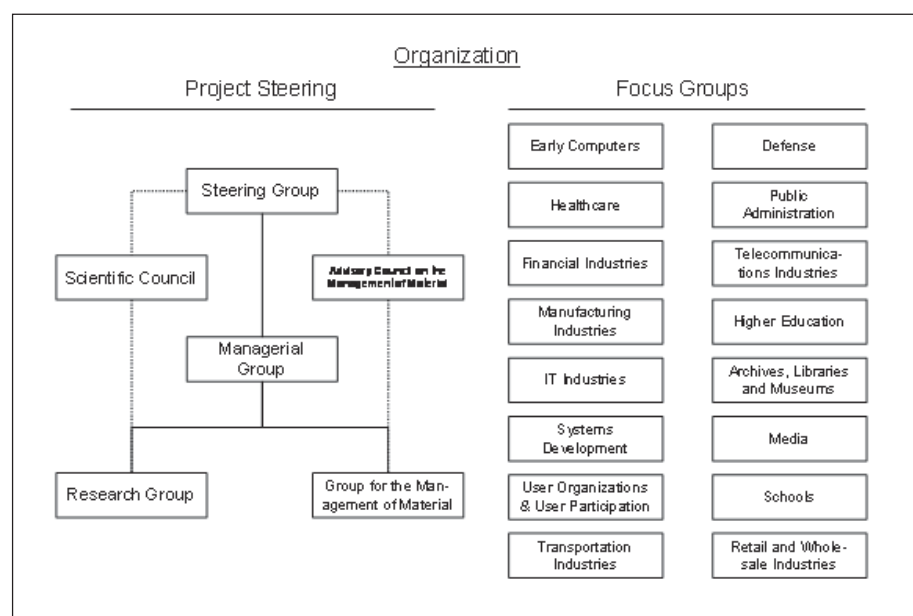
Since none of these traditions explicitly address the question of how computing has changed the world, Misa proposes a fourth tradition that takes up the challenge of “comprehending the twin-fold shaping of computing and society.” On the one hand, “we need to

show how developments in computing shaped major historical transformations, that is, how the evolution of computing was consequential for the transformations in work routines, business processes, government activities, cultural formations, and the myriad activities of daily life,” and, on the other hand, our narratives and analysis should “show how major historical transformations shaped the evolution of computing.” He, therefore, urges historians of computing to undertake studies that “situate computing within major historical transformations.” [2]

We believe that historians interested in undertaking studies along the directions that Misa proposes would benefit from addressing the role of the user. They have to understand how society, and especially how health care has developed to become one of the most intensive users of computers. They have to understand how computers entered everyday life and transformed work as well as leisure activities. Nevertheless, they also need to go the other way round and examine how users have shaped digital technology and thoroughly changed our cultural and social understanding of what computers are [1, 3].

## 3. Organizing the Documentation

The project was led by a project leader with the help of a steering group. The steering group included, in addition to the project leader and the chairpersons of the other five groups involved in the project, an appointed project coach with the role of advising the leaders of the other groups and coordinating the work. The managerial group had the operational responsibility. The research group had two tasks. The first was to coordinate, develop, and evaluate the methods used, to keep the project updated on the state of research in computing history, oral history, and to establish and maintain contacts with national and international research environments. For this, the research group participated in ongoing discussions on methods for contemporary history and presented the project’s results at national and international conferences. The second task was to identify, collect, and create sources as well as to produce edited sources. The research project leader was responsible for delegating the second task to *research secretaries*.



The research secretaries were part of the research group. Each of the research secretaries was, in turn, responsible for a *focus group*. The focus groups were each responsible for a *focus area*. The project identified sixteen focus areas. These were: early computers; health care; financial industries; manufacturing industries; information technology industries; systems development; user organizations and user participation; transportation industries; defense; public administration; telecommunications industries; higher education; archives, libraries and museums; media; schools; and retail and wholesale industries. In addition to a research secretary the focus group consisted of a number of practitioners with experience in the area under consideration. The role of the practitioners was to assist and advise the research secretary in his or her work. Together, they identified important historical events and processes as well as relevant and representative witnesses of these. In addition, they suggested and arranged witness seminars, conducted interviews, and invited people to write autobiographies. It was the responsibility of the research secretary to develop knowledge outlines, and to decide—in consultation with the practitioners—which topics should be covered, which type of collection should be carried out, and to what extent. The research secretary was also responsible for the process of collecting, creating, and editing sources as well as publishing it when appropriate. He or she was also responsible for presenting a final report on the work completed by the focus group.

The scientific council advised the research group in its methodological work. The research project leader and the research secretaries were assisted by a *project secretary*, who was part of the research group. The project secretary acted as the link between the research secretaries and the group for the management of material and was responsible for delivering the collected and created sources to the group for

the management of material. The project secretary also assisted the managerial group.

The group for the management of material was responsible for registering and preserving the sources, which the focus groups had collected and created, in the National Museum of Science and Technology. It also had the responsibility to oversee that documentation efforts were performed along the lines that long-term preservation practice requires. An archivist, a curator, a librarian, and a photographer were also part of the group.

### Deliverables

As mentioned, each research secretary was responsible for gathering and completing the documentation in each focus area. For *each focus area*, the project agreed on the following deliverables with the financing entities, for which the secretary had twenty-five paid-weeks available, with the suggested distribution indicated below:

- 1 knowledge outline, 3 weeks
- 3 witness seminars, 13 weeks (5+4+4)
- 10 interviews, 6 weeks (3 days per interview)
- 1 final report, 1 week

It should be emphasized that this set of deliverables could vary from focus area to focus area. In some cases, it might be more important to carry out more interviews and have fewer witness seminars. In other cases, the reverse might be true. The composition of deliverables for each focus area was specified by the research secretary and the focus group. The research group/focus group activities were planned to take two weeks.

The project, besides the above, had agreed to deliver about two hundred autobiographies. These were to be collected and written by the research group based on questionnaires according to a methodology developed by Nordiska museet (Sweden's largest

museum of cultural history) [4] as well as the specially designed Writers' Web.

### Debriefing

Research secretaries and the project secretary had to debrief the research project leader in the form of a monthly status report, while the research project leader, the project leader for the management of material, and the project coach, in turn, debriefed the project leader in the form of a monthly status report.

## 4. Conducting Oral History Interviews and Witness Seminars

### Methodological Considerations

A survey of oral history projects on computing suggested that documentation and research should, if possible, be conducted together [1]. Unfortunately, the specific conditions of the project—in particular its urgent nature and time-limited funding—did not allow us to relate our documentation efforts to ongoing research projects. We, therefore, introduced an element in the work process that served as a substitute to the research: the knowledge outline.

Compiling a knowledge outline consists of drawing a rough map of the landscape of the past. The purpose of the knowledge outline is to give a guide for the principal task of creating and collecting sources. Which parts of the past should be documented and why? If there, for instance, are abundant written sources on the events and processes in a certain part of the past, it becomes less important to create and collect complementary oral sources. If, on the other hand, the events and processes have left no traces, or few, in the existing archives, it becomes more important to create and collect new sources about precisely these events and processes. However, an unexplored

area in the landscape of the past is, at the same time, not a sufficient reason to start documenting. Such a project will easily become very large and could face insurmountable obstacles. There are many unexplored areas. The documentation efforts should, therefore, ideally be linked to those problems that have been addressed in the historiography on the given part of the past. The role of the knowledge outline is to identify these as well. Thus, the compilation of a knowledge outline consists of two stages: first, to obtain a picture of the existing historical research dealing with a certain part in the landscape of the past, for instance, a focus area; and, second, to identify existing sources on it by compiling bibliographies and listing relevant archives. If completed as described, the knowledge outline will become an important preparation to guide the documentation efforts that follow.

### How the Project Prepared, Conducted, and Edited the Oral History Interviews and the Witness Seminars

The knowledge outline acted, in a way, as a substitute for the research that documentation ideally should be linked with. It gave the research secretary a general overview of the focus area in question. Consultations with the senior practitioners in the focus group also proved helpful. With the help of the knowledge outline and the advice of the senior practitioners, the research secretaries could identify the potential interview subjects as well as potential themes and subjects for witness seminars. The research secretaries also discussed their choices with each other in the research group.

Once the interview subject had been identified, the oral history interview had to be prepared, conducted, and edited, and, in this process, we drew heavily on the experiences of CBI (Charles Babbage Institute) and the

IEEE History Center in New Brunswick, New Jersey. [5] The research secretaries prepared for the interview by gathering as much information as possible about the potential subject given the time they had at their disposal. If possible, they contacted him or her by telephone to set the time and date for the interview. Ideally, they spoke informally with the interviewee for about half an hour. The purpose of this introductory conversation was to gather information for preparing the interview, to see if the interviewee was reliable (i.e., did not suffer from amnesia and the like), and to gain the interviewee's trust. The research secretaries also asked if the subject could compile a CV as an aid for preparing the questions. The career-oriented oral history skeleton question list compiled by the Center for History of Physics at AIP (the American Institute of Physics) proved to be a useful tool for this task. [6]

The usual setting for the oral history interviews was two interviewers (usually a research secretary and a senior practitioner) and one interviewee. Before the session started, the interviewer described the project as well as the purpose and the outline of the interview. He or she also asked the interviewee to sign an agreement form to ensure that the Web publishing of voice clips or the edited interview transcript would not infringe copyright. After the session finished, the interviewer inquired if the interviewee had any archival records, artifacts, photographs, and the like that he or she wished to donate.

The sessions were typically between two to three hours long and recorded with sound in MP3 format with the help of digital voice recorders. A professional bureau transcribed the interviews verbatim, added necessary information (such as the names of the interviewer and the interviewee), and highlighted possible obscurities in the transcript (usually caused by mumbling voices, the poor quality of the recording or unfamiliar concepts and spell-

ings). The research secretaries or one of the practitioners then edited the transcript for readability and comprehension. At the same time, they aimed at keeping the transcript's oral character. During the editing process, the interviewees had the opportunity to clarify, correct, or comment on their contributions. Minor changes, such as corrections of names, dates, and technical concepts, were inserted in the transcript without comments. In individual cases, the research secretaries and/or the senior practitioner added sentences or subordinate clauses, as suggested by the interviewee, to make lines of thought or conversations more complete. Furthermore, they included extensive comments from the interviewee using addenda. They completed the transcript by adding five to ten keywords and an abstract in English. The final edited transcripts consist normally of fifteen to forty-five pages. After permission, we made them available on the Web as fully searchable PDF files.

Of great value to us, when planning and conducting witness seminars, were the experiences of the Centre for History of Medicine at the Wellcome Trust. [7] After choosing the theme and the appropriate witnesses, we looked for a suitable moderator. Since the witness seminars involved several participants and different organizations, they required careful planning. Invitations had to be sent out in advance. The auditorium had to be reserved, and the technical personnel scheduled. In the invitation, we described the purpose and the outline of the witness seminar. We discouraged the prospective witnesses from bringing pictures, PowerPoint presentations and the like to the seminar, since it might disrupt the session. We also advised them not to prepare manuscripts in advance, but we did ask them to send in their CVs ahead of time.

The usual setting for the witness seminars consisted of five to ten witnesses and a moderator. If possible, a professional historian with knowledge



of the field moderated the seminar, but since only a few Swedish historians are specialized in the history of computing, we usually followed the practice of the Wellcome Trust and let a senior practitioner carry out this task. As the project proceeded and the research secretaries gained more experience, they occasionally moderated the sessions. In several cases, an expert commentator, either a historian or a senior practitioner, assisted the moderator. It proved to be valuable, since the moderator, besides questioning the witnesses, had to keep all the practical details in mind. Our witness seminars took between four to five hours and were divided into two sessions, separated by a short coffee break. They normally started with a lunch with the participating parties. The museum staff or the research secretary photographed the participants and asked them to fill in the agreement form referred to above. Short introductions by the museum curator and the research secretary and/or some other representative of the project followed. The curator specifically asked if the participants had materials that they wished to donate. The moderator began the session by introducing the theme (or asked the expert commentator to introduce it), and after that followed an informal discussion based on a number of questions prepared by the research secretary and the moderator. We allowed the audience to comment on the testimony, and pose questions to the witnesses. The structure of the seminar varied considerably depending on the interplay between the moderator, the witnesses, and the audience.

We recorded the witness seminars in both sound and image form using digital video format (DVCAM). We used two cameras: one for getting a panoramic view of the whole session, and one for zooming in on specific participants. We then mixed the images into one film. We transcribed the sound files and edited the transcripts roughly in the same way as was done with the oral history interviews - but with two

important exceptions. First, the research secretary added explanatory footnotes to the edited transcripts. The footnotes contain biographical information about the people as well as descriptions of subjects mentioned during the seminar. The research secretary worked on the footnotes in close cooperation with the participants, and they, therefore, in many cases, acted as complementary sources. Second, we published the edited transcripts (about forty to fifty-five pages long) both in print and electronic versions, the latter in the form of fully searchable PDFs.

Since the conduct and questions of the interviewer or the moderator affect the outcome of the interview or the seminar, it is important to take a critical stance vis-à-vis the problems that occur when historians and historical subjects actively create sources together. In order to facilitate source criticism, we did two things: first, we preserved the different steps in the processing of oral sources (recording of sound and images, transcript, and edited transcript); and, second, the research secretaries described the context behind the process of creating and collecting sources in the final report.

## 5. The Focus Group on Health Care

In the focus group Health Care three "practitioners" and a research secretary participated. A practitioner was in our case a physician who had long experience in using computers in health care. We started out by trying to identify all persons who had been active in health care computing in Sweden, and had personal experience in developing and using computers. We found around fifty persons who had that experience before 1980. Of these only about twenty-five were still alive. We tried to interview all of them but this was impossible because of their advanced age and, in some cases, unwillingness to participate.

In total the focus group presented: Twelve interviews, with both sound recordings and edited transcripts, are available in Swedish at the National Museum of Science and Technology's Web page: <http://www.tekniskamuseet.se/it-intervjuer>.

Two witness seminars dealing with laboratory automation, signal analysis and computerized patient records. They were recorded with sound and image in digital format and are available in Swedish at: <http://www.diva-portal.org>.

Two types of autobiographies were made (a general call and a number of focused calls). The general call for autobiographies, which was carried out by the research group in collaboration with the National Museum of Science and Technology and Nordiska museet, resulted in a number of health care related replies of which thirteen was considered autobiographies. The remaining replies lacked autobiographical qualities.

The focused calls were carried out by the focus groups and we received the following six on health care:

- Bengt Dahlin, The history of a Patient record
- Ingmar Jungner, The story of the Autochemist
- Åke Holmgård, The Hudiksvall system for a clinical laboratory
- Leif Ohlsén, The history of the computer support for the Autochemist (ACH) and ACH-Prisma 1964—86
- Leif Ohlsén, The computer system for the Autochemist (ACH)
- Torsten Seeman, The development of the computer support in Gothenburg health care region

These are available in Swedish at the National Museum of Science and Technology's Web page: <http://www.tekniskamuseet.se/it-minnen>.

In addition to the call for autobiographies, the project developed a virtual platform, the Writers' Web. Three of the Writers' Web entries were related to health care:

- Paul Hall, We developed one computerized Patient Record
- Bengt Dahlin, The history of one computerized patient record
- Gunvor Svartz-Malmberg, How to search scientific health literature with the help of a computer.

The entries and the comments are available at: <http://ithistoria.se>.

## 6. Concluding Observations

The conclusions can be divided into observations on the organization and the methods. Of special interest is that the methods, the organization and the theoretical approach did mutually shape each other. We therefore believe that the project, besides contributing to the development of methods and the creation of sources, has resulted in an adapted project model for cooperation between end users, museums, trade and industry, and universities.

Another important consideration is that a user organization - the Swedish Computer Society, - was one of the parties involved in the project. This fact aroused the curiosity of the researchers who saw the possibility of exploring and developing a user perspective on the history of computing. It was also of importance that the Na-

tional Museum of Science and Technology, with its long history of cooperating with engineers and the engineering industry, was a party. The choice of a user perspective legalized and cemented, in turn, the organization of the project in focus groups and focus areas.

When it comes to oral history interviews and witness seminars, our conclusions are very much in accordance with those in the literature [4, 7, 8].

In summary, the health care part of the project resulted in one final report, one knowledge outline, twelve recorded and edited oral history interviews, two recorded and edited witness seminars, nineteen autobiographies and three Writers' Web entries (the results can be accessed at the above mentioned databases). The contacts with the contributors generated, in turn, several donations of archival records, artifacts, movies, and photographs. In addition, the participating researchers produced documentation that contextualizes the process of creating sources. Also developed within the project was an adapted project model for cooperation between users, museums, trade, and universities.

The material is intended for persons doing research in IT history and medical informatics but also for museums, journalists and schools. It is available for everybody at: <http://ithistoria.se>.

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