A Classification of Methods and Contributions in the Historiography of Nordic Computing

Henry Oinas-Kukkonen, Harri Oinas-Kukkonen, Veronika Sušová

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Henry Oinas-Kukkonen[1], Harri Oinas-Kukkonen[2], and Veronika Sušová[3]

[1] Faculty of Humanities, History, Centre of Excellence in Research, P.O. Box 1000
FIN-90014 University of Oulu, Finland
Henry.Oinas-Kukkonen@oulu.fi
[2] Department of Information Processing Science, P.O. Box 3000
FIN-90014 University of Oulu, Finland
Harri.Oinas-Kukkonen@oulu.fi
[3] Veronika Sušová, Independent Researcher
(formerly of Charles University, Prague, the Czech Republic)
susova76@hotmail.com

Abstract. The relevance and need of proper scientific methods in the research of computer science history was debated in the closing session of HiNC2 (Turku, August 2007). This text extracts a classification of research approaches and methods from HiNC1 and HiNC2 papers and offers a classification of computer science history to help understand the various research contributions in the field. It recognizes two basic divisions and five dominant approaches in the current research on the History of Nordic computing. The need for a clearer definition of the research methods and approaches in the contributions is evident, and there seems to be a need to broaden the conceptual apparatus.

Keywords: Approaches, classification, historiography, history of Nordic computing, methodology

1 Introduction

The interest and effort devoted to studying the history of computing (HC) have grown remarkably in the past few years. There are many reasons for this, such as information systems and technologies becoming much more mature to manage by organizations and end-users, and many key people behind past IT innovations having perhaps retired but are still available for research purposes. However, the selection and use of proper scientific methods for carrying out computer science history research seem quite immature. This paper proposes a classification of research approaches and methods, using the first two History of Nordic Computing conferences (HiNC1 and HiNC2) as examples. The paper helps to clarify the various research contributions in the HC field, by describing the current methods and focus areas in them. It also supports future HC studies by combining theoretical and philosophical approaches with practical research methods and analysis.

1.1 Aim and Scope in HiNC1 and HiNC2

HiNC1, organized in Trondheim, Norway, in 2003 was rather hardware-oriented. The first sentence about the aims and scope of this conference in the call for contributions stated, "Nordic computing started with hardware such as BARK, BESK, and DASK." The historical time period proposed covered a period from the time of early computers until around 1985. Nevertheless, among other issues, attention was also given to information systems theories and methodologies, and the development of education and curricula in computer science by computing pioneers [1].

HiNC2, organized in Turku, Finland in 2007 paid more attention to the commercial products, conferences organized, and applications produced, with special focus on the software. The timeframe of interest clearly emphasized even more recent contemporary history. The call for contributions stated, "The conference concentrates on the period from the 1960s to the 1980s, but does not want to omit any part of history. Papers from the 1990s with relation to the past years are also most welcome." Attention also included politics, its role in advancing computing in the Nordic countries, and its relations and exchanges with the Former Soviet Union. In a similar manner, the Baltic countries, in particular the roles of Estonian computer pioneers and their experiences, achieved increased interest. Thus, the history of international relations became intertwined with the history of Nordic computing [2].

1.2 Historical Methods and Historical Sources

An ideal article is one that clearly defines historical questions and chronological scope, relying on the historical primary sources and indirect secondary ones that are explicitly presented and characterized in the introduction of the work. The combination of different sources, for example, oral history and archival or written texts, makes a research result more credible. In brief, an ideal article is coherent in defining its research questions and concepts, as well as in its selection of sources used for answering these questions.

The research questions and selected historical sources direct the researcher to seek additional research methods from other disciplines (e.g., network theory) to complement the "standard" methods of history such as source criticism, the cornerstone of utilizing historical sources. In brief, source criticism involves an interrelated set of steps: a focus on the origins of a source, its brief description, questions of source originality, and the authority of its author/s, or competence and trustworthiness of the observer. Finally, a very important step is the interpretation of the source, which occurs in direct relation to research questions. A goal of objectivity also applies to the scientific research, even though it may not be achieved by a strict epistemological definition. We submit for criticism and debate the history of the research into past events, which has emerged.

1.3 Historical Methods and Historical Sources in HiNC

We focus next on two mutually interrelated issues. Firstly, we discuss the question of using historical methods and historical sources through the analysis of the research contributions of the first two HiNC conferences, from the introduced perspective of historical science and its core methods. If a contribution extensively follows aspects introduced in section 1.2, we regard it as an advanced use of historical methods; however, if it does not do so, we regard it as a limited use of historical methods. Existing debates related to the historical sources, their use and epistemological problems in the recent historiography, fall outside the scope of this article's purpose and space allowed.

Secondly, we pay attention to the topical approaches of the papers and briefly to their conceptual apparatus to grasp the present scale of interest and scope in the HiNC field. Most of the papers deal with the period 1970–1995 and they are categorized according to the research contributions' current historiographical understanding of the history of Nordic computing until 2007. Our aim is to demonstrate the current state of art in this field and to illustrate some of the key problems in the HC field.

2 Two Lineages and Five Major Approaches of HiNC1 and HiNC2

2.1 Two Basic Divisions in Current Nordic HC Research

The HiNC1 conference generated forty-one historical papers for publication [3], whereas HiNC2 included thirty-two such articles [4]. These papers seem to fall into two main lines of research.

In Fig. 1, we show two basic divisions of research into the history of computing that also well reflect the current research into Nordic HC. We can characterize the first as research through historical methods and patterns involving text-based studies of written documents of any kind, as well as research based on material sources or artifacts, and oral history methods. The second division involves a broader recording of historically valuable texts/sources in the form of memoirs and autobiographies.

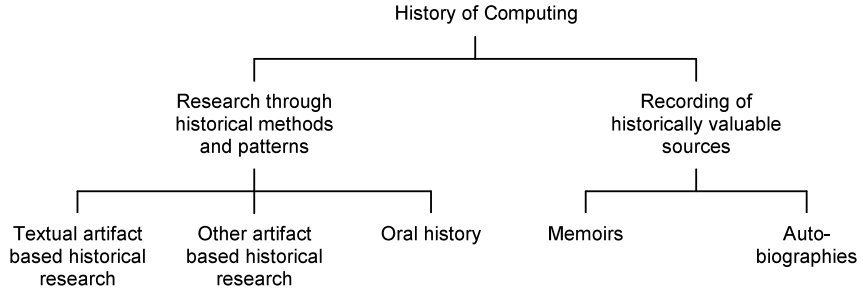

Fig. 1. Two basic divisions in the history of computing (HC) research.

2.2 Historical Methods and Historical Sources in HiNC1 and HiNC2

There have been seventy-three papers in the previous HiNC conferences, including many examples of good, professionally applied research practices in using historical methods and sources. Due to limited space, we can only exemplify two of them here. The articles written by Petri Paju [5] and Anders Carlsson [6] are examples of well-designed historical research. In accordance with his research question, Paju uses a variety of historical sources, including oral history, archival and published material, related to the topic, and offers a brief introduction on the sources utilized. Carlsson also explicitly uses historical sources. In particular, he emphasizes publically investigated material, but also takes into account some technical journals and archival sources that he applies to his research question.

There are also articles dealing with historical developments, in which the proper use of historical methods is limited. This limitation occurs when any historical sources used are not mentioned, whether primary or secondary, or references are omitted, thus causing confusion for their readers, since the origin or source of the authors' conclusions and findings are not traceable.

The following constitutes a list of typical mistakes found in the current HC research papers utilizing historical research methods:

- Confusion between history and memoirs (e.g., objectivity problem)
- Lack of references of any kind and/or omitting some of the key sources or references
- Reliance on only one type of source in the context of a broad research question
- Lack of criticism of the sources used
- Lack of proper links between sources and research questions

Not understanding what is history and what are memoirs seems to be quite problematic. From the orthodox historiographical viewpoint, we cannot regard memoirs and autobiographies as a genre of historical research (due to, e.g., the reliance on one's own publications or memory as a main or only source). Thus, in the purest sense of historical research, these memoirs or autobiographically-based articles should perhaps be categorized as the recording of historical sources rather than the historical research *per se*. Nevertheless, the HiNC1 and HiNC2 papers are not uniform in this aspect. There are a number of instances in which memoirs merge with the use of secondary historical sources, which makes classifying these papers especially difficult, at least from the perspective of historical science [7].

In spite of the difficulty in classifying these kinds of works, they provide a special case for historians, since HC as a research topic involves a period extending only some sixty years. This short time span makes it possible for individual actors who have participated in the given developments to bring their personal memories to the public's attention. Thus, it offers a unique opportunity to conduct historical research. Nevertheless, research into HC should clearly differentiate between a participant perspective and purely historical research into the published works. The latter normally deals with the past by using a historical source as its main method of approaching the topic from the *non-participant perspective*. This perspective is

generally believed to be more objective and, for this reason, it gains much wider acceptability among historians.

Table 1. Contributions in the HiNC1 and HiNC2 conferences [3, 4].

	HiNC1 [3]	*HiNC2 [4]*
Research through historical methods		
- Advanced use of historical methods	Carlsson, Oinas-Kukkonen et al., Paju, Suominen et al.	Oinas-Kukkonen et al. (b), Paju, Pohjolainen
- Limited use of historical methods	Benediktsson et al., Benediktsson, Berntsen, Elgsaas & Hegna, Espelid et al., Klüver, Kollerbaur, Krogdahl, Lawson, Reenskaug, Saarikoski, Skog, Yndestad	Elgsaas & Hegna, Jørgensen (b), Kimppa et al., Kjártaksson, Nordal, Oinas-Kukkonen et al. (a), Nykänen & Andersin, Reunanen & Silvast
Recording of historically valuable sources	Andersin, Asker, Bruhn, Dahlstrand, Fontell, Henrikson, Iivari, Kurki-Suonio, Lindencrona, Lindgreen, Magnússon, Nordhagen, Ofstad, Olle, Ruge , Sanders, Thorvaldsen & Wibe, Tuori, Vahl	Benediktsson, Bubenko (a), Bubenko (b), Dahlstrand, Engh, Enlund & Andersin, Hugoson, Järvi, Järvinen, Lawson, Thorbergsson, Tyugu, Väänänen & Mertanen
Historiographies, contributions to cultural studies, preservation of history, theory of history		Ferro & Swendin, Heinonen & Reunanen, Jørgensen (a), Lundin, Misa, Tittonen

2.3 Topical Approaches in HiNC1 and HiNC2

An analysis of the topical approaches and concepts utilized in the HiNC conferences helps to grasp the current situation in the field, identify main areas of interest, and perhaps recognize its blind spots. We can identify five main approaches in these papers as shown in Fig. 2.

History of information technology: This approach focuses on the chronologically conceived development of a particular computing-related technology or the computer (machine) itself such as computers and computer networks. Its main aim is to offer a descriptive rather than an interpretative analysis that often represents a highly expert view on the topic. Due to such a narrow scope, this approach often lacks socio-political contexts or a broader social dimension, and limits itself to the particular case study in its account [8, 9].

Socio-technical history of information systems: In this approach, which addresses IS/IT use, social aspects of computing, and computerization, the social impacts or socio-political contexts of IS/IT use and development remain as the focus of research

interest. Computer development is conceived as a social process in which different social actors and forces, like politicians, political parties, trade unions, states, cities, regions, and multinational firms, may be involved, and where its social or cultural consequences are addressed as well [10–12]. The scope in this approach tends to be more interpretative than descriptive and it analyzes different aspects of the relations between information technology and society from the historical perspective.

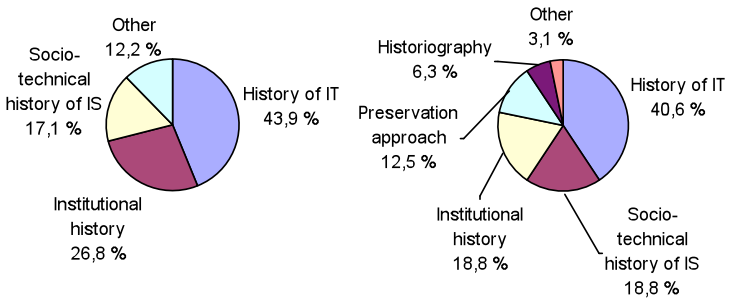

Fig. 2. Topical approaches in (a) HiNC1 and (b) HiNC2.

History of computing institutions: Institutional history is quite prominent in HiNC papers. Such an approach involves recounting the history of a particular firm [13], research or computer center [14], or university, including a history of the institutionalization of computing science and curricula development [15–17].

Historiographical approach to computing: This approach addresses rather theoretical questions of computing history studies and discusses, among others, the aspects of relevant historical sources, their critiques and use, possible research designs, and organizational issues. The articles by Thomas Misa (2009) on both the research theory and organizational experience of the Babbage Institute in the USA [18] and the one by Anker H. Jørgensen (2009), which questions the historical knowledge or awareness among IT specialists and students, provide examples of the historiographical approach [19]. This low number illustrates that the theoretical questions and historiographical discussions about HC were rather underrepresented so far among the analyzed conference papers.

Preservation approach to computing: While the fifth approach overlaps the historiographical approach to some extent, it nevertheless emphasizes the preservation of written sources and material artifacts related to the computing history and organizational questions of preservation institutions (museums) [20].

Other topical approaches: We could not categorize some papers with our classification framework. This group is composed of various papers that mainly have different research topics such as the role of women in computing history [21], or the relationship between science fiction and technological innovations [22].

3 Conceptual Apparatus in HiNC1 and HiNC2

HC is a new area of study; in this sense, it seems to be in search of an identity. Our focus on the HC conceptual apparatus illustrates to what extent HC is open to various interdisciplinary approaches and to what extent it seems to develop its own theoretical agenda in relation to the broader social scientific analysis.

In sum, various concepts such as computerization [23], technology transfer [24], internationalization [25], transfer of knowledge [25], computer fiction and techno-scientific democracy [21], digital heritage [26], techno-biography [19], and data policy [27], among others, have been addressed in the HC field. All these concepts obviously relate HC with the broader social scientific discussions and, as a result, help to make the field increasingly important for the further understanding of social change in contemporary societies.

Transition, continuity or discontinuity, or other historical concepts associated with the time and space of the historical events were not positioned as central research subjects in the first two HiNC conferences cf. [28, 29], which was probably due to the defined aim and scope of these events.

In general, a number of HiNC papers emphasize the confined contextual frameworks restricting their scope to questioning the particular IT or institutional developments without taking into account broader social, political, economical, and cultural contextual aspects. Furthermore, some inspirational grand concepts of other social sciences have been considerably underrepresented so far. Contemporary social thinking dedicates a great deal of work to the conceptualization of social and technological changes of the last century. As examples, we could just mention a few possible concepts of recent sociology, like Manuel Castell's network society and informational capitalism [30–32], cultural critic Steven Shaviro's controversial and provoking notion of soft fascism [33], or various studies oriented towards the virtual society [34]. Finally, the productive use of concepts can be noticed in the historical writing itself. For example, Paul E. Ceruzzi's notion of the digitalization of the world picture links HC to the more established field of the history of science and ideas [35] or Thomas P. Hughes' works about the history of technologies [36]. We can see the current underrepresentation of social research because of the predominance of a minimalist conception of HC, discussed next.

4 Conclusion

There seem to be two general conceptual methods in Nordic HC. The expert-oriented concept approaches HC as a confined research field in which chronological developments of computing play the role of inside-community *chronicle*. It is significantly relevant for the future understanding of early computing histories as well as for the identity of a community. A broader-scoped concept, which is more, oriented towards social, political, economic, and cultural contexts, as well as the interrelations, impacts, and influences of computing links HC to the agenda of recent social research and its conceptualizations.

The main problem related to the historical methodology and objectivity is a mismatch of history and human memory. One could take a more precise sectional division of future HiNC papers along with two lineages in Nordic HC. We should pay more attention to combine two practices into a welded cooperation between participating actors and non-participating historians, where personal memoirs would become the background of other historical sources.

The analysis in this paper indicates that despite the epistemological and methodological problems related to source criticism and the increasing inter-disciplinarity of historical science, this practice still represents a crucial historical method.

The main points mentioned above are embedded in historical/social research and computing. An intensified dialog about relevant methods, concepts, and theories is very productive.

In sum, all the published works in the history of Nordic computing have so far added important aspects to the body of knowledge in this relatively new field of HC. Nevertheless, future contributions of HC research should more clearly characterize how the research in each case was conducted by addressing the research methods and sources more explicitly. Our classification of the approaches may help in doing so.

Acknowledgments. We wish to thank Gustav Sjöblom and the reviewers of this paper for their constructive comments.

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