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THE INFRASTRUCTURE OF AN EMERGING FIELD

Richard A. Jarrell[1]

Back in 1976, Don Phillipson mentioned to several of us historians of science and technology that we would have to develop the infrastructure of our field. Of course, he worked in Ottawa and understood science policy patois; we just scratched our heads and wondered 'What is an infrastructure and would we recognize one if we passed it in the hallway?' We learned quickly, however. Most infrastructures just grow over time. They can also be consciously organized, which is the case in our field. It is one of the ironies of our work that we can definitely speak of the infrastructure and its attributes, but we can not be so categorical about whether a 'field' even exists! The various articles in this symposium reflect the disjointed nature of the field. Although much of the history of Canadian science must be written with the history of technology in mind, the reverse is not necessarily so. The history of medicine may have contact with one, both or neither, depending upon the subject matter and historiography. What they do have in common is a history of being ignored by 'official' historians and this is what made infrastructure important for us.

When we speak of a 'field,' we normally restrict its meaning to an academic or scholarly context, excluding the amateur element. For the history of Canadian science, technology or medicine, this would be folly: the number of academics involved primarily in teaching and research would just about fill a telephone booth, and there is little likelihood of the situation changing in the foreseeable future. Thus, we must cast our net wider to include the work of amateurs and of historians in cognate areas. If we see fields as systems, it is clear that they have sub-systems and are, in turn, part of larger systems. In our case, the 'field' is at the junction of several other larger systems, those of Canadian history (and various of its sub-fields), the history of technology and the history of science. For instance, conceptual tools developed for the history of American science and technology have begun to appear in Canadian-oriented studies. It is true one can write on certain aspects of Canadian science with virtually no reference to the Canadian historical context, but to this generation of historians, with such a strong interest in social history, such work would be of little interest. This is even more acute for the historian of technology: the dedicated and knowledgeable 'buffs' have produced a large body of literature devoted to the technical aspects of railways and aircraft, for example, but more is required to turn this information into history. Increasingly, we find

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ourselves having to call upon other sub-fields such as economic, women's, labour or social history.

Does our field exist? I think we have to say 'no', if we think in traditional terms. Because of our myriad linkages with other sub-fields of Canadian history and the necessity for us to keep in constant touch with the wider developments in the history of science and technology, we cannot develop into a field--indeed, probably none of the newer areas of Canadian history ever can or should. Any area that did become a field would be so self-referential as to be of no further interest to anyone else. What do we have, then? We have a shared interest in understanding what Canadians accomplished in science and technology and what their efforts meant nationally and internationally. We do *not* have a shared ideology or methodology; some of us are academics teaching the subject or producing 'scholarly' work, some are museum researchers or curators bringing our knowledge to the public, some are librarians and archivists locating and organizing new sources, still others are the often-scorned amateurs whose specific knowledge goes far beyond that of most academics. Still, the term 'field' is so commonly used, it can do no harm to employ it, so long as we understand by it not a static, monolithic structure but an ever-changing, fluid area of mutual interest.

If we are not a 'field' in the traditional sense, nor are destined to develop one, then why would we require an infrastructure? Simply, to facilitate our work. We believe it is worth doing, worth sharing and worth expanding and improving. A mature infrastructure might be very complex; in our case, we can, after ten years, identify a few obvious requirements:

1. A means of meeting one another;
2. A means of training successors;
3. A means of communicating our results to one another.

Until 1976, historians of Canadian science and technology worked within the infrastructures of other fields. For personal contact, the amateurs had specialist groups, such as railway or aviation historical societies. Scientists, engineers and physicians with an interest in historical aspects of their own disciplines could meet one another at special events within their professional organizations, such as the Chemical Institute of Canada. A handful of academics and museum personnel could turn to specialist groups outside Canada, such as the History of Science Society, Society for the History of Technology or the Society for Industrial Archaeology. In Canada, the national society--the Canadian Historical Association--and regional groups such as the Ontario Historical Society made little effort to cultivate the subject area. From 1972, the meetings of the reorganized and enlarged Canadian Society for History and Philosophy of Science (CSHPS), became a venue for the academics. Typically, several sessions at the Learned Societies meetings were devoted to Canadian topics. Joint sessions with the Canadian Society for the History of Medicine allowed for cross-over interest.

In the summer of 1976, the Learned Societies met at the Université Laval. Several historians of science and technology and interested graduate students met over lunch to discuss mutual concerns. Two immediate projects presented themselves: one, to create a newsletter and two, to call a meeting of interested persons not normally connected with CSHPS. I volunteered to undertake the newsletter and the first, crude edition, the ancestor of this journal, appeared in November. Norman Ball, and later Arnold Roos, joined me as associate editors, ensuring links with the archival and museum communities. The mailing list of the *HSTC Bulletin* reflected the wide diversity of those interested in our field. Like most newsletters in their formative days, the *Bulletin* was a home-made operation, dependent upon readers' intellectual and financial contributions, along with the blind-eye financial contributions of my department heads and the cheerful assistance of my secretary Sylvia Williams.

The second tack was suggested by Don Phillipson. He circulated a letter amongst Ottawa colleagues proposing an informal meeting to discuss future directions. This meeting, in April 1977, attracted twenty-three individuals. As Phillipson reported,

> I convened the meeting to see whether there was any agreement with assessment of the general situation in Canadian studies of the history of science (including medicine and technology) and whether there might be any consensus about what should be done to stimulate more work on Canadian topics. There wasn't much of either. 2

A second meeting, to discuss scientific archives, was scheduled for September 1977. A larger group met at the National Research Council. That meeting did reach consensus, that a national conference to call attention to the needs of the field should be organized for the spring of 1978. The organizing committee included Norman Ball, then at the Public Archives, C.E.S. Franks, a political scientist from Queen's, A.W. Tickner, the NRC archivist, Jean-Claude Guédon of the Institut d'histoire et sociopolitique des sciences at the Université de Montréal and Bruce Sinclair from the Institute for History and Philosophy of Science and Technology at Toronto. The result of their work was the highly-successful First Conference on the Study of the History of Canadian Science and Technology (First Kingston Conference), held at Queen's University in November 1978. The proceedings provide us with a snapshot of the field and its needs.3

These first organizational steps resulted from meetings of historians within the Canadian Society for History and Philosophy of Science. That

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2 D.J.C. Phillipson, 'Ottawa Meeting on the History of Canadian Science and Technology,' *HSTC Bulletin* 1:3 (May 1977), 6.

3 R.A. Jarrell and N.R. Ball, eds., *Science, Technology and Canadian History/Les Sciences, la technologie et l'histoire canadienne* (Waterloo, 1980).

group seemed the most logical as a vehicle for the new field. Yet, as a means of facilitating further contact and publication, CSHPS was insufficient. Several of us suggested that the 'Canadianists' might form a semi-autonomous interest group within the organization, similar to the area groups in the Canadian Historical Association. This was rebuffed. We also began to hear reports of non-members who might have joined in our sessions but were repelled by the elitist structure of the society. Arnold Roos and I were elected to the executive at the Saskatoon meeting in 1979 as part of a thrust to secure a 'home' for the field; we managed to make pests of ourselves without any permanent change. A report on future directions, penned by Profs M.P. Winsor, John Farley and Michael Ruse, presented at the same meeting, suggested that an accommodation be reached with our group. The report was brushed aside.

By the autumn of 1980, Arnold and I agreed that the quantity and quality of material was sufficient to launch a modest journal for the field. The *Bulletin*'s name and newsletter function were absorbed by the journal. In October of that year, the first combined meeting of the History of Science Society, Society for the History of Technology, Philosophy of Science Association and the Society for the Social Studies of Science was held in Toronto. Bruce Sinclair and I were two of the local arrangers and convinced CSHPS to sponsor a session on the history of Canadian science. This was an excellent opportunity to come into contact with the newly-emerging group of historians of American science. In fact, shortly afterward, that group began to create their own infrastructure in much the same way as we had.4 The growing frustrations with CSHPS convinced Arnold and me that we would have to launch an independent organization. After one of the sessions of that conference, we sat down and framed a simple, non-elitist constitution and soon announced the formation of the Canadian Science and Technology Historical Association/Association pour l'histoire de la science et de la technologie au Canada. Norman Ball and Raymond Duchesne agreed to join the founders as the first executive. This was a rare instance of a journal forming a society rather than the other way around.

Therefore, by the beginning of 1981, the field had two (albeit very modest) parts of its infrastructure: an organization to bring together interested parties, and a journal to circulate research findings and news. The success of the first Kingston Conference invited repetition,

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4 Clark Elliott, of Harvard University Archives, has edited *The History of American Science: News and Views* since late in 1980. That newsletter has strong similarities to the old *HSTC Bulletin* including an annual directory, which we have published since 1977. The American group met informally within the History of Science Society from 1980 and, in 1986, formed the more permanent Forum for the History of American Science. Interestingly, although they represent a larger and more homogeneous group, they have not developed a journal or independent society as we have. This may be due to a willingness on the part of the HSS to accommodate their aspirations.

and the second conference--the first sponsored by CSTHA/AHSTC--devoted to research communications, took place in October 1981.5 The membership decided not to meet annually in conjunction with the Learned Societies, but biennially on their own. The Association wished to attract non-academics and to focus all its energies on its own work. Subsequently, two equally successful meetings were held in Kingston in 1983 and 1985, with the fifth meeting to be held in Ottawa this October. All earlier meetings have been liberally supported by the Social Sciences and Humanities Research Council and other organizations; they were well attended by both members and non-members and all have attracted excellent papers. The Association has maintained a very small executive, which simplifies decision-making--small societies do not have many decisions to make, anyway--and costs far less than large councils, one of our objections to CSHPS. This economy has resulted in a healthy budgetary surplus. The Association, despite its small size, also provides a separate annual directory; the launching of a newsletter independent of the journal, has been more problematic.

The first two major thrusts in building an infrastructure can be, and were, undertaken with limited financial resources, so long as a committed group of volunteers exists. The third area, the reproduction of the species, is not so easily managed. Indeed, that we have younger researchers in the field at all has, to a large extent, been more to the credit of persistent graduate students than to programmes and professors. Before the late 1960s, few history departments gave even a slight notice to the history of science and technology. Theses and dissertations are rare before 1970 and may be the products of economics and geography departments rather than history. Neither of the two doctoral programmes created to produce historians of science and technology, the Institut d'histoire et sociopolitique des sciences at Montréal and the Institute for History and Philosophy of Science and Technology at Toronto, made Canadian studies central, or even very important, to their programmes. Neither institute ever made a full-time appointment in the field. However, a few faculty members (typically two in each institute) were willing to supervise Canadian theses and dissertations; some, also, contributed to the literature. As a result of the students' choice, both institutions--the Montréal effort is now centred on the history department--have graduated a number of Canadian-oriented researchers.

The reproduction of researchers and teachers requires, however, the attainment of full-time jobs as a realistic goal. If we hoped that most PhDs in the field would receive academic appointments, we have been sorely disillusioned. The boom in higher education in Canada ended with a crash just as the first graduates were leaving graduate

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5 The conference proceedings were published: R.A. Jarrell and A.E. Roos, eds., *Critical Issues in the History of Canadian Science, Technology and Medicine/Problèmes cruciaux de l'histoire de la science, de la technologie et de la médecine au Canada* (Thornhill, 1983).

programmes. A few have received university positions (especially in Québec), whilst others have survived by part-time teaching, consulting and research. Several have obtained posts in museums, archives and government historical agencies. A handful have entered policy-related positions and a few have emigrated. The long-term picture is mixed; we might hope for some slight expansion in the public sector (e.g. museums), but no real change in universities until the present generation begins to retire, around the turn of the century. The entrepreneurial mood of universities and governments in Canada at the present time does not seem to auger well for any historical work. But perhaps historians must become entrepreneurial themselves, creating their own jobs. This is already happening with some success. Certainly, we cannot hold out the old hope of a faculty position. The chief drawback of this new mode is that the young scholars will have too little time for research and writing--which our field desperately needs--or will be constrained to specific research topics.

The history of science and technology came too late for the university boom in Canada, if indeed it would have ever caught the fancy of universities. Thus, we cannot expect more than a course here, a small programme there. We have managed to increase the stock of literature and to improve its quality in some areas. The long, slow push to bring our field to the attention of the general public has only begun. If our progress seems too slow at times, we should remind ourselves of how bleak the situation must have looked to the few pioneers writing in this area in the late 1950s and early 1960s.

Finally, I would like to take a quick look at the nature of the literature during the last decade. Because no one has yet to produce a full-scale secondary bibliography, we can only make general (and probably biased) observations. The bibliographical situation has improved during the last ten years; at the time of the first Kingston Conference, Prof Alan Richardson and then-graduate student Bertrum MacDonald began compiling a bibliography that combined primary and secondary sources for their own use in courses at the University of Western Ontario. A preliminary version was circulated to several colleagues. Its usefulness was applauded but its limitations suggested a broader approach was necessary. By 1979, Arnold Roos and I had produced a small bibliography[6] intended for use in what we hoped would be a number of new courses in universities and colleges. This bibliography was too limited, with fewer than 1000 entries, and too selective to be of much use to the seasoned researcher. During the second Kingston Conference, Arnold and I pressed Richardson and MacDonald to apply for a grant to produce a systematic bibliography of both primary and secondary materials. They were willing to undertake the project. Alan and I applied to SSHRCC for the initial grant, and Bertrum acted as the editor. As a PhD student in library science at

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6 R.A. Jarrell and A.E. Roos, *A Bibliography for Courses in the History of Canadian Science, Technology and Medicine* (Thornhill, 1st ed. 1979, 2nd ed. 1983).

Western, Bertrum was able to bring a high degree of professionalism to the project. The result, now ready,7 is one of the finest primary bibliographies in Canadian studies (see their article in this issue). The compilers realized at the beginning that the mass of material available and the methodological differences between compiling primary and secondary bibliographies made a combined work unthinkable. Therefore, the secondary bibliography remains as a future project, though Arnold Roos has made significant strides in that direction. In the meantime, more specialized bibliographies such as that of Philip Enros8, which began as a project at the Toronto Institute, and those in the history of medicine (see the article by Jacques Bernier in this number) will fill some of the gaps.

The shape of the literature during the last ten years has its peculiarities, given the small number writing, the nature of their positions and the wide scope open to them. A brief analysis of the contents of this journal will give some indication, though naturally skewed, of the areas of interest.

Table 1
Subject Matter in Scientia Canadensis, 1981-86

Subject	Articles	%
Institutions	10	21
Organization of sci/tech	6	13
Public health	6	13
Government and sci/tech/med	5	10
Engineering	5	10
Women's studies	4	8
Medical professionalization	3	6
Industry and innovation	3	6
Specific sci/tech subjects	3	6
Science policy	2	4
Biography	1	2
Total	48	

It is immediately obvious that social history of science, technology and medicine was the area of greatest attraction to scholars of the late 1970s and the 1980s. No doubt a reaction to the 'internalist' research of the 1950s and 1960s, and perhaps a more mature response to

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7 R.A. Richardson and B.H. MacDonald, *Science and Technology in Canadian History: A Retrospective Bibliography to 1914* (Thornhill, 1987).

8 Philip Enros, Comp., *A Biobibliography of Publishing Scientists in Ontario, 1914-1939* (Thornhill, 1986).

the intellectual and social upheaval of the 1960s, this movement is not a surprise. Even casual readers of the *Canadian Historical Review*, *Isis* or *Technology and Culture* have noticed the steady drift towards social history; note, also, the increased interest in labour history and women's issues in Canadian historical circles. Note how studies of specific sciences, technologies and biography, the old mainstays of our historiography, barely survive. It might be objected that *Scientia Canadensis* may be biased towards social history, although our editorial policy is open to all approaches. A check of our rejection files does not indicate any bias in one direction or another. One indicator is that of forty-one authors of these articles, only five were older than 50 at the time of publication, with most of them in their thirties.

By way of comparison, we should look at the 'compacted' history of technology literature up to the mid-1980s, as categorized in the Jarrell/Roos bibliography. Of course, this work is selective; it does not purport to list the most significant secondary sources, but does include most of the 'Recent Publications' noted in this journal since 1976. The significant differences show how the field has evolved.

Table 2
Secondary Literature--History of Technology

Subject	Items	%
Pioneer tech	21	4
Transportation	218	43
Industries	70	14
Staples	131	26
Architecture/building	34	7
Communications	14	3
Surveying	17	3
Total	505	

Transportation accounts for the most items by far, and of these, railway and canal histories predominate, with automobiles almost without entries, showing the older biases. Staples come next (including agriculture, mining, lumber, power, fisheries and furs). A great deal of the older literature tends to be antiquarian. An analysis of the history of science entries, though far fewer in number than those in history of technology, shows a similar pattern, with a strong showing for individual science topics and biographies.

There can be no doubt that the infrastructure that we have worked to build over the last decade has facilitated research and publication--though this would be difficult either to document or measure--but that the particular form of research so facilitated is qualitatively different from that of the literature base. What we have to recognize is that social history of science and technology is both interesting

and important, but that studies of individual industries, institutions and lives cannot be ignored. There remain, and will long remain, large gaps in our knowledge and much reworking of older scholarship to undertake. There are not many of us and, despite our future efforts to organize an amenable infrastructure for the history of Canadian science and technology, there never will be. But let us accept the challenge that such an embarrassment of riches offers.