Appendix 1 Taxonomies Used in This Study

The following two appendixes present the taxonomies that are the basis for the analysis of TC's articles in chapters 2 through 5. This appendix introduces the following taxonomies by describing the procedure I used in constructing them, discussing the taxonomic theory that has been helpful to me, and finally giving a brief description of each taxonomy.

The procedure leading to the final taxonomies was basically a process of reading and rereading the 272 articles while attempting to identify the most helpful analytical models for interpreting all of the articles as a single body of shared historical discourse. Whenever a new model suggested itself I attempted to construct an initial taxonomy embodying the model while doing justice to the linguistic usage of the articles. The test of each model was always the same: was it possible to score the individual articles on a set of subcategories constituting the various dimensions of the model? Frequently, of course, the attempt to score an article would lead to an insight about TC's usage that demanded a change in the design of the taxonomy. Occasionally, too, a taxonomy that had been created and scored was abandoned because it did not reflect actual usage or because the information it presented was not judged to be helpful for interpreting TC's usage. Such a process is, by its very nature, always open to further revision. The final taxonomies are the result of six years of creation and construction. It is my hope that they will prove helpful to the reader, as they have to me, in understanding all of TC's articles as a single body of historical discourse.

The purpose of a taxonomy is to create a frame of reference in which a number of discrete discussions within a community of shared discourse can be organized into a meaningful whole. The taxonomies here fall into two basic categories, which I have titled "exclusive" and "inclusive." An exclusive taxonomy creates a set of subcategories so

designed that any article can score in one and only one logical space within it. The taxonomy is exclusive because scoring an article in one space excludes, in principle, scoring it in any other. The exclusive taxonomy is also designed to include every article in the set.[1]

An inclusive taxonomy creates a set of subcategories designed to reflect the asymmetrical process in which historians create a language of thematic interpretation. The subcategories reflect the contribution of various articles to the creation of a complex and multifaceted concept. No two articles will express the concept in the same fashion. Thus the design of the taxonomy must make logical spaces available for every subcategory that has been seen as a significant dimension of the concept by a number of authors. For example, if the thematic concept called "the process of emerging technology" is found to contain three distinct subcategories (invention, development, and innovation), we may find articles that refer to one, two, or all three of the sub-categories. Some articles may not score anywhere on the taxonomy because they do not treat the process of emerging technology at all. Such a taxonomy is called inclusive because it is designed to include all article references to such subcategories within it.[2]

The validity of any taxonomy is often said to depend on two criteria. First, the taxonomy must accurately embody the conceptual model being presented. Every intellectually distinct dimension of the model must be represented by a specific logical space within it.[3] Second, the scoring of the articles on the taxonomy must be replicable; that is, other scorers must be able to replicate the scores if they are provided with the operational definitions of each subcategory.[4] This criterion is meant to reduce the problem of subjectivity in the scoring process.

When a taxonomy is used to interpret historical discourse, however, the constraints of strict replicability create a problem. To construct a taxonomy that permits strictly replicable scoring we must break the general concept into quantifiable and univocal units that can be iden-tified and counted by any independent scorer. For the complex concepts that occur in historical thematic discourse, a perfectly replicable tax-onomy would entail the creation of an extraordinary number of discrete subcategories. Even if such a set of subcategories were economically feasible, however, the fact that they must be discrete and univocal would not allow them to reflect the overlapping and nonquantitative nature of the language with which historians interpret themes. Thus a strict adherence to the canon of replicability tends to result in a restriction of taxonomies to readily quantifiable data such as monetary figures or to data that is trivial because it oversimplifies historical

discourse. As a result, I have chosen to modify the criterion of replicability in the following manner.

In this study the validity of a taxonomy depends on its heuristic helpfulness to the members of the scholarly community, i.e., SHOT, who participate in the shared historical discourse. If the structure of a taxonomy and the interpretation of individual articles based on it prove helpful and enlightening for scholars in the field, if the taxonomy reveals methodological or thematic dimensions of the entire group of articles which foster a deeper awareness of presuppositions operative in the community, and if it results in a reading of the articles that rings true to scholars who have themselves read them, then the taxonomy is heuristically valid.[5]

The taxonomy in appendix 2, "Three Dimensions of Methodology," is the only exclusive taxonomy used. It has been designed to score every TC article in terms of three methodological dimensions containing sixteen permutations. The taxonomies presented in appendix 3 deal with the very complex thematic language of the articles. Their purpose is twofold: to help the reader visualize the entire theme in a single frame of reference, and to help locate those articles contributing to the language of each theme's subcategories.

Notes

1. For several discussions of what I am calling an "exclusive taxonomy," and for the theory of taxonomic analysis generally, see the following studies of cognitive anthropology. Wallace, "Culture and Cognition," pp. 116–118; Bruner, Goodnow, and Austin, "Categories and Cognition," pp. 183–184. See also Holsti, *Content Analysis*, p. 99.

2. For discussions of the asymmetrical character of inclusive taxonomies and their contrasts with exclusive taxonomies, see Wallace, "Culture and Cognition," pp. 118–120; Bruner et al., "Categories and Cognition," p. 185.

3. On the expression "logical space" see Wallace, "Culture and Cognition," p. 117. On the criterion that a valid taxonomy accurately embodies its conceptual model, see Holsti, *Content Analysis*, p. 95.

4. On the canon of replicability see Holsti, ibid.

5. Holsti is well aware of the subjectivity of even the most strictly replicable of taxonomies. "Many of the most rigorously quantitative studies use non-numerical procedures at various stages in the research. This is likely to be the case *in initial selection of categories*" (ibid., p. 11; my italics).

Appendix 2 Three Dimensions of Methodology

Although the operational definitions for each subcategory in the three dimensions of methodology are discussed in Chapter 1, it may help to present them in a format designed to show the entire taxonomy in overview. This appendix will begin with the operational definitions of all three dimensions. Tables 13 and 14 present the shifting proportions of each dimension over the years of TC's publication. Finally, a complete list of the articles clustered according to the sixteen logical spaces of the taxonomy is included.

Operational Definitions

1. Methodological style

Contextual style. The article discusses the functional design of the given artifact(s) and also discusses some aspect(s) of the ambience in which the artifact(s) exist(s).

Internalist style. The article focuses only on the functional design of the given artifact(s).

Externalist style. The article discusses some technological ambience without discussing the functional design of any artifact(s) that may pertain.

Nonhistorical essay. The article does not adopt a historical perspective.

Historiographical essay. The article discusses problems involved in historical research about technology.

2. The function of hypotheses in argumentation

A priori. The article bases its argumentation on one or more explicitly stated hypotheses that have been articulated prior to the research on which the article's findings are based.