

## Introduction to Technology Transfer Session by Frederik Nebeker

Welcome to a session on technology transfer. I am Rik Nebeker from the IEEE History Center at Rutgers University in New Jersey. There will be short presentations by each speaker, followed by a panel discussion in which you are all invited to make comments and ask questions of the speakers.

Before introducing the first speaker, I would like to make two points.

(1) Many people have commented on the similarity between biological evolution and the historical development of technologies. In both cases, entities are continually arising, surviving for a period, and then disappearing. In both cases, the new entities owe most of their attributes to certain preceding entities. In both cases, new attributes arise from time to time. In both cases there is sometimes geographic spread of entities. And in both cases, there is a process of selection—since the success with which entities survive and reproduce varies—and thereby a process of change over time, which is called evolution.

Consider some basic elements of an evolving system:

[biological evolution]

[history of technology]

transmission of attributes to offspring (reproduction)

technology transfer

[when a technological system is built, it is usually a copy or modification of a system already existing]

geographic spread of entities

technology transfer

[technological systems successful in one place are often reproduced elsewhere]

selection of the attributes that are transmitted

technology transfer

[technology transfer is a highly selective process, there being usually a great number of alternative systems]

creation of new attributes (mutation)

invention

[there are new technological ideas, just as there are new biological attributes]

(2) The second point I'd like to make concerns historiography, that is, the writing of history, and specifically how that has changed over time.

The first history of technology was the story of heroic inventors, notably Samuel Smiles' *Lives of the Engineers* (1861) and biographies of Samuel Morse, Alexander Graham Bell, and Thomas Edison.

In recent decades historians of technology have emphasized that much technological innovation is a social process (rather than being the intellectual creation of a lone inventor). There is much borrowing (as all inventors draw on the existing stock of technologies) and there is much work in moving to a practical tool (from idea, to laboratory prototype, to the reworking necessary to make something manufacturable and marketable, and to acceptance in the marketplace). There is technology transfer through patents, published articles and books, and business and personal contacts. Even within a company there is a great deal of technology transfer to bring a product to market.

So even when one's concern is innovation (that is, the appearance of new technologies, as opposed to the spread of existing technologies), the study of technology transfer is vital.