Jon Eklund, Bernard Finn

Exhibition Critique: *Background for the* Information Age

The exhibit *Information Age* in the National Museum of American History had a gestation period of approximately five years—two of preliminary skirmishing, three of serious conceptual and development work. It was a team effort, involving five curators and a substantial supporting staff. The two of us were involved throughout the entire process. David Allison joined as lead curator at the beginning of the serious period. Uta Merzbach contributed to the initial phases, Steve Lubar to the final ones. The exhibit opened in May of 1990.

There are many advantages to a group effort. In this case one that stands out as particularly strong was the series of debates we had over the conceptual structure. The exhibit is, in our opinion, much richer as a consequence. There are also disadvantages. For us, most important was the fact that some of the debates were left unsettled, with the inevitable result that the final exhibit displays a number of loose ends that never got tied together.

We were determined, however, that the exhibit should speak through its artifacts, and we measure our success or failure largely in terms of how well we achieved that goal. We are therefore pleased to have the opportunity on these pages to present four instances (two each) where we think the objects served special purposes. Roger Bridgman then comments on their effectiveness.

Because the creation and sharing of information is central to society, it is reasonable to assume that a major change in information technology is likely to have a major social effect. In framing the exhibit we identified five general areas where technology is applied to an information signal: coding, processing, storing, communicating, decoding. We paid special attention to communications and processing, thus allowing us to use the contents of two of our strongest collections.

We organized the exhibit around the thesis that communications underwent a major 'revolution' when it became possible to convey information instantaneously (by electricity) in the 1840s (even though the practical impact of this technical ability would only gradually have an impact on society). Processing of information underwent a similar change a hundred years later with the invention of the electronic computer. For us the information age emerged in the 1970s when these two technologies, which shared an electronic base, effectively became one.

In addition to detailing the growth of these technologies, we tried to describe some of the major interactions with society: where social forces had had an impact on technology, and where technology had produced social consequences. For the latter we paid special attention to questions of who had access to the technology and who controlled it.

Such an analysis is hard enough to support in a historical monograph written for scholars, where evidence can be marshaled and exceptions noted. It is much more difficult in a popular exposition where words are at a premium, footnotes non-existent, and an attempt is made to have objects carry the bulk of the message. Nor did the team approach help very much. Nevertheless, it is our opinion that we succeeded more than we failed. We suggest that the four examples cited here are particularly good illustrations of what we had in mind.

Examples from Communications (Bernard Finn)

The telegraph instrument devised by Samuel F. B. Morse in 1835 and modified by him (with more windings on the magnet) in 1837 is mounted inside a case at the entrance to the exhibit. It is an American icon, especially impressive because of the crudeness of its construction and the openness of its design. As befits an icon, it is in an otherwise dimly lit area. But it is not alone. Next to it are its elements: for the receiver—an artist's canvas-stretcher similar to what Morse used as a supporting frame, an early electromagnet constructed by Joseph Henry, a contemporary wooden clock movement, a copper-wire paper-making screen from the early 19th century; for the transmitter—lead type and a printer's rule.

Beyond this assemblage are the more compact and professional-looking instruments constructed for Morse by Alfred Vail and used in the 1844 trial. And beyond those are five-needle and single-needle telegraphs of William Cooke and Charles Wheatstone (together with a Nobili galvanometer).

This group of objects, in a ten-meter-long case at the entrance to a major exhibition is supposed to convey four distinct messages. The Morse telegraph, by itself, is a symbol of the communications breakthrough made possible by electricity and the electromagnet. The device has an intriguing shape that should attract a visitor's attention, and the association with Morse's name (which is still recognized by most American school children) provides a strong focus for attention.

Second, together with the 'deconstructed' elements alongside, the Morse instrument tells about the circumstances of its invention. It was clearly made by someone with poor mechanical skills, with no money to hire assistance, using materials at hand. The value of luck is hinted at by the improved magnet, a critical element that was made known to Morse by a colleague only after the first instrument (in 1835) failed to transmit for more than a very short distance. And the type slugs and rule, which

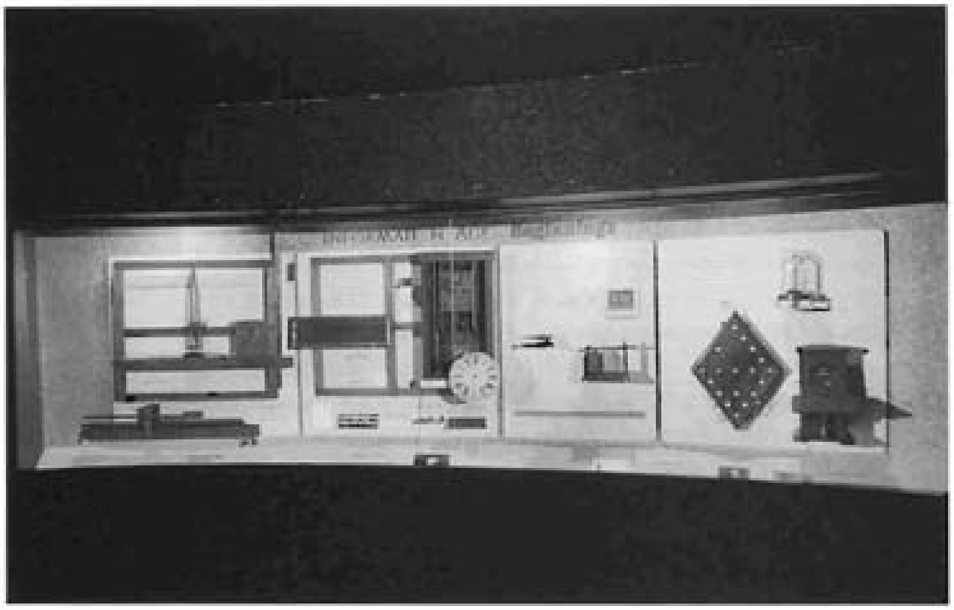
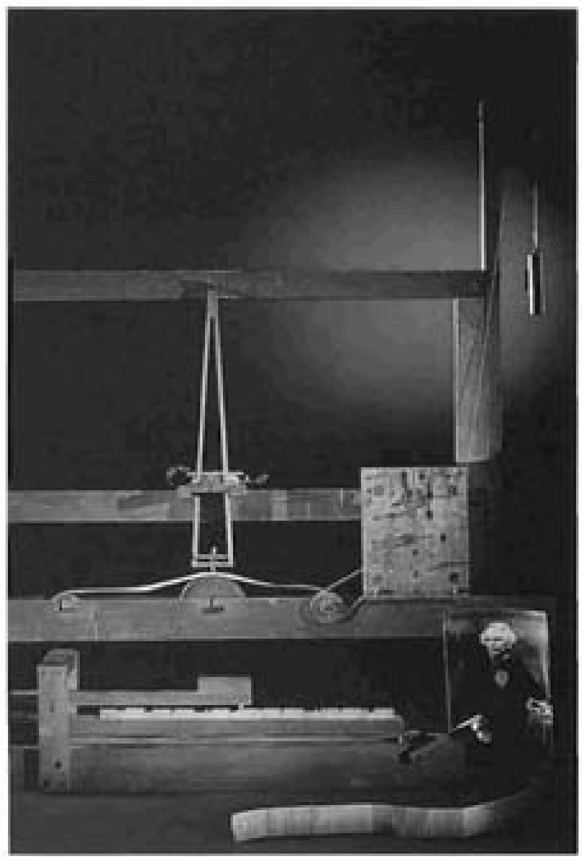


Figure 1. Morse transmitter in exhibit. Photo by Laurie Minor.

Figure 2. Close-up of Morse.



are similar to what Morse would have seen every day as he went to his apartment above his brothers' printing establishment, suggest the origins of his 'portrule' transmitter.

Third, the Vail equipment underscores the importance of having a craftsman construct the equipment. Not only does it look better, it is 'obviously' more efficient.

Fourth, the Cooke-Wheatstone apparatus shows clearly that Morse was not alone in inventing an electromagnetic telegraph. It also indicates that with a different background his English rivals came up with a different mode of operation (though still dependent on Henry's multiple windings) borrowed from Nobili's measuring instrument.

Together, in addition to providing insights into Morse's invention, this unit—at the entrance to the exhibit—introduces visitors to the concept of the social influences on invention. (A companion unit, immediately following this one, is focussed on the Atlantic cable and emphasizes the social consequences of invention.)

About a dozen meters further on in the exhibit a display of objects from Alexander Graham Bell and Elisha Gray provide another opportunity to examine social forces on invention. In the years 1873–76 Bell and Gray pursued remarkably similar paths as they developed versions of a 'harmonic telegraph' (a form of multiplex telegraph where signals are sent at different frequencies) and then modified them so that they could convey speech. Bell, with a background of teaching speech, with no commitment to a career as an electrical inventor and with an intense desire to create something unique, saw in this fragile apparatus the makings of a commercial enterprise. Gray, an established electrical inventor, saw it rather as a curious device for demonstration of transmission of music, and he quickly returned to what he saw as more promising work on the telegraph. The museum has a wealth of material from both of these inventors, and the artefacts selected for display here show how closely their work proceeded in parallel.

The objects, of course, do not speak by themselves. Here, as in the Morse exhibit, supporting text and graphics are used to provoke visitors to look at the objects and to answer questions that might be raised by the objects.

Examples from Computers (Jon Eklund)

In the first half of the exhibit the visitor sees how electricity was employed in a succession of ways to create new modes of 'immediate' communications—telegraph, telephone, wireless, radio. Each in its own way was 'revolutionary,' in the sense that it emerged as an unexpected technology, looking for useful applications. In contrast, the processing techniques are seen as evolving in response to perceived needs—new filing technologies, non-technical methods of organizing the workplace, the Hollerith (punch-card) sorting machine, railway signaling systems.

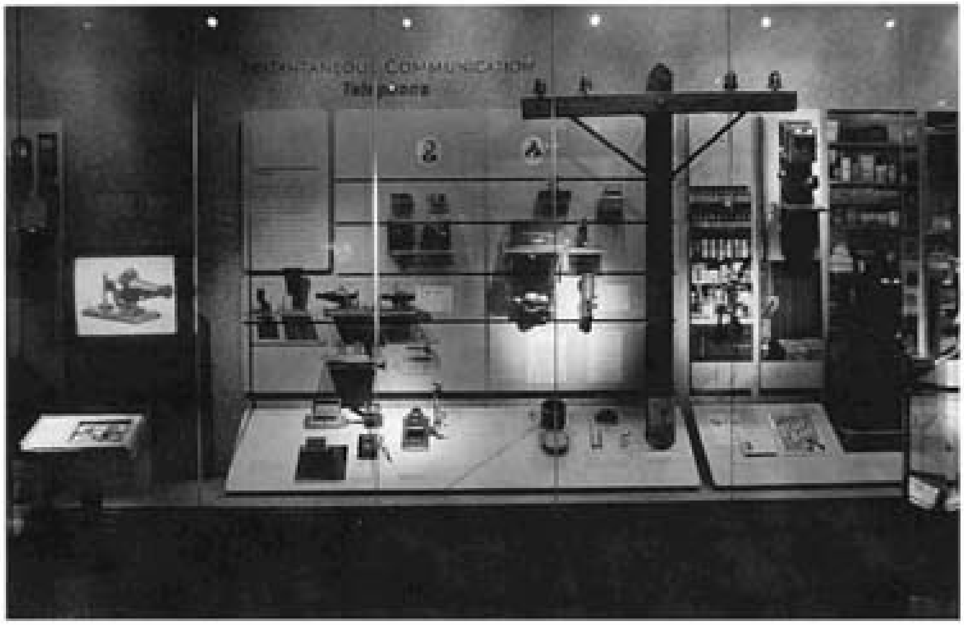
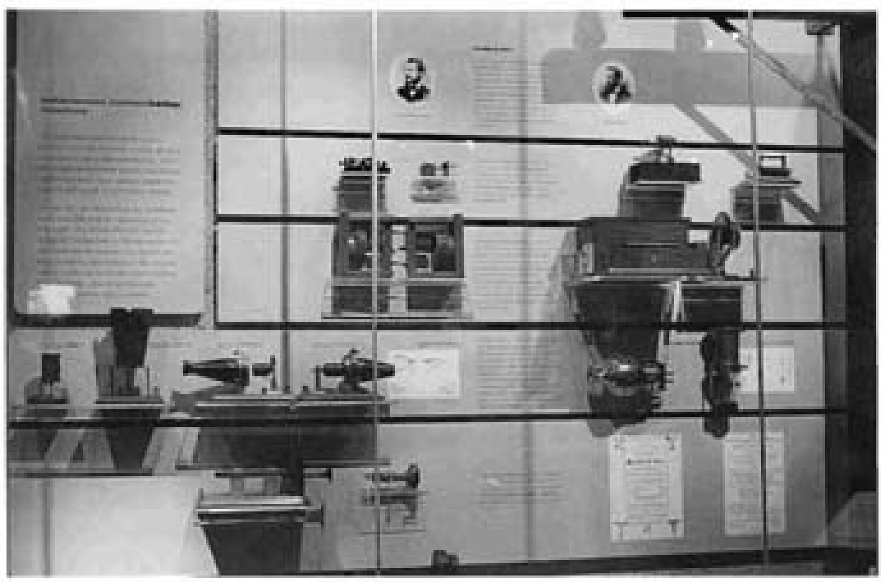


Figure 3. Bell-Gray comparison. Photo by Laurie Minor.

Figure 4. Close-up of Bell-Gray comparison.



The breakthrough, the 'revolution' if you like, occurred when immediacy came to processing in the form of the electronic computer, and it is with such—ENIAC—that we start the second half of the exhibit.

Figure 5. ENIAC. Photo by Laurie Minor.

In contrast to the Morse instrument, ENIAC is large—taller than any of our visitors, and even the fifteen (out of an original forty) cabinets displayed are enough to fill a good-sized room. The machine is thus able, physically, to anchor this transition point in the exhibit. But it has several additional characteristics that should be meaningful to most observers. It is, literally, a 'black box' (or, more precisely, a series of black boxes); but at the same time it is open enough to display some aspects of its complex interior—thus representing all of the discreet-component electronic black boxes to follow, many of which will not be accessible. Some of these interiors include well over 500 vacuum tubes, an indication to a substantial number of visitors of the amount of power required and of the machine's vulnerability to tube failure.

Even the exterior, though black, is not without interest. The multiple dials continue the complexity argument, and their arrangement in rows and columns suggest the computational nature of the processes taking place inside. The plug-in connecting wires are an indication that even though the processing activity is virtually instantaneous, the programming activity is not. These messages are reinforced by accompanying text, but also by a video monitor showing portions of an interview with co-inventor Presper Eckert demonstration some of the features of the machine; there are also contemporary scenes of it in operation.

Figure 6. Bank of America Check Entry and Recorder. Photo by Laurie Minor.

Our fourth and final example is a 'check entry and recorder' from the Bank of America. It is an institutional-gray box with the electronics hidden. An operator reads the dollar amount written on the check, enters it using the keyboard (visible) so that it can be printed in machine-readable code on the check. This number, together with coded information already printed on the check, can then be transmitted electronically to other computers in the bank's system. The machine therefore represents the final transition point in the exhibit, where processing and communications functions become inextricably entwined, thus announcing the arrival of the 'information age.' The notion of transition is reinforced by a dozen cubby holes attached to the machine—vestiges of its earlier use (prior to modification) as a sorting machine.

Thus it is that we saw these artefacts when we chose them for the exhibit. Their ultimate effectiveness is obviously influenced by the design and the accompanying text. We have our own views of the degree to which these features facilitated or hindered the achievement of our goal. But instead of expressing them we look now for Roger Bridgman's opinions.