consequences of technologies which permit this are many and variable.

Unlike financial, personal, or structural factors, which are hypothesized as having causal roles in societal development, technologies are palpable and easy to document, even when a social **group** has disappeared and has left no written records. Views on the causal potency of individual technologies are mixed. As L. Marx and M. R. Smith argue in *Does Technology Drive History? The Dilemma of Technological Determinism* (1994), "hard determinists" assign technology a degree of agency and a developmental momentum through the ways in which it leads us to understand ourselves and it. "Soft determinists," by contrast, see technology as one of many factors in a complex array of social and historical forces, and as one which has no inevitable outcome associated with it.          DAVID GOOD

### technologies of the self
– see **Michel Foucault**.

### technology
Because of the ubiquitous and multifaceted role that it plays in the contemporary world, technology has come to have a number of different meanings for sociologists. Since the term was first coined in the early nineteenth century, it has served as both an abstract, general concept characterizing the entire realm of material artifacts and a word used to describe specific and delimited examples of artifactual life.

At a macro-level of overarching sociological theorizing, technology has long provided one of the defining features of what some term **modernity** and others refer to as **modernization**. For most theoretically minded students of society, it is the fundamental, or determining, influence of technology over social life that is often considered to be the main difference between modern and premodern societies.

From **Karl Marx** onward, sociologists have more or less taken for granted that modern, or contemporary, societies are strongly conditioned by processes of technological change, while premodern societies or nonmodern social formations are not. According to the preferred discursive framework, technology in this sense provides a convenient, shorthand label for an entire mode of production (for theorists of a Marxian bent), form of social **differentiation** (for theorists of a Durkheimian inclination), or system of **values** (for the Weberians). It provides, we might say, the characteristic disposition, or structure, that underlies or forms a material basis for contemporary social reality.

The nature of the role that technology plays in society is, however, a topic around which there remains little theoretical consensus. We might say that theorists have disagreed as to which narrative of technological change is to be considered the most socially significant. For many, modern technology is primarily viewed as a part of economic production, according to a story-line of capitalist exploitation and capital accumulation, which places in the foreground the social activities of business **firms** and so-called entrepreneurs. This position was formulated most influentially in the writings of **Joseph Alois Schumpeter** in the first half of the twentieth century, especially perhaps his work on *Capitalism, Socialism and Society* (1941).

For others, technological change is viewed as part of a rationalization or secularization process, whereby attention is focused on the activities of bureaucratic **organizations** and so-called experts. For **Herbert Marcuse** in such works as *One-Dimensional Man* (1964), and other critical social theorists, technology was characterized as the dominant form of **rationality** in society.

For still others, technological change is seen as an autonomous process in its own right, according to a technocratic story-line by which the key actors are engineers and other human embodiments of materiality. In recent years, this position has been made popular in social constructionism, for example by Wsiebe Bijker *et al.* in *The Social Construction of Technological Systems* (1987). For the majority of social theorists, however, technology is generally discussed in an abstract or conceptual way, as principles of production on the one hand, and procedures of organization on the other.

For more empirically minded sociologists, technology is a term that is usually subjected to qualification or specification. Indeed, the notion of an abstract, all-encompassing technological system or technological rationality is seen with suspicion, or at the least with a great amount of skepticism. In many varieties of empirical sociological research, it is rejected for what is often considered to be its underlying **technological determinism**. Instead, technology is seen as something that is shaped by people in particular social settings or contexts.

What is typically of interest are the ways in which material artifacts, that is, technologies in the plural, are produced by particular actors and social **groups**, or the ways in which they are used in various locales or arenas of social **interaction**. Rather than discuss general, abstract relations

between technology and society, the dominant tendency in recent decades has rather been to differentiate among technologies, and study particular cases, in relation either to the various societal sectors or branches of industry or to the variegated sites or spaces of use and application.

Most empirical sociologists of technology emphasize the importance of local contingencies, or contextual factors, in understanding what is characteristically referred to as the social shaping, or construction, of technology. Technologies, whether they be specific artifacts or more comprehensive systems or clusters of artifacts, are seen to be materializations of the interests of particular groups of people. Particularly influential has been the so-called **actor network theory**, which has been associated with Michel Callon and **Bruno Latour** in France and John Law in Britain, and the related social construction of technology, or SCOT, program, that has been promulgated by Wiebe Bijker and Trevor Pinch. According to these research approaches, technological development is investigated as specific processes of mediation and representation, in which even nonhuman objects can become agents or actors.

Another influential stream of empirical sociology has focused on user sites, or places in which specific technologies are put to use, often homes or offices. In these approaches, it is the domestication or appropriation of technology that is of interest, how artifacts are made to fit into patterns of **everyday life** or organizational routines and habits. Much of this sociology of technology has been carried out in "transdisciplinary" settings, in centers or institutes of **science and technology studies**, **cultural studies**, or **women's studies**.

As elsewhere in the **social sciences**, there is a noticeable gap between the large number of micro-level **case studies**, which have proliferated in recent years, and the more overarching theories at the macro-level that have been associated with the classical writers of the nineteenth and early twentieth centuries. In relation to technology, the micro–macro issue has been exacerbated by distinct national differences regarding the ways in which sociology of technology has been funded and institutionalized. Micro-level research has often been part of programs funded externally, either by companies or by national and local governments, as well as by international organizations.

There have been some attempts to help fill the gap by drawing on the kinds of institutional or organizational theories that have been popular in other fields of sociology. There has also developed a certain interest in the investigation of

**social movements** that have either fostered technological developments or opposed them, such as environmental and anti-nuclear movements. It is to be hoped that in the future the gap can continue to be bridged between the disparate case studies on the construction and use of specific technological artifacts and the broader understanding of the role that technology plays in the contemporary world.        ANDREW JAMISON

## terrorism

Despite renewed efforts by official organizations and academic scholarship to define terrorism in the aftermath of September 11, 2001, there does not yet exist a single, consensual, widely shared definition. As a term of political discourse, terrorism usually implies a value judgment equivalent to moral condemnation. Although terrorism can apply to state (state terrorism) as well as non-state actors – which can act either on their own or in connection to a **state** (state-sponsored terrorism) – in the current international climate this term habitually refers to the activities of non-state transnational actors. As a concept, terrorism is usually subject to important historical reinterpretations (for example by the winners, in the context of liberation struggles). As a concrete phenomenon, it also presents itself in a variety of forms, and it involves a wide range of social behaviors. At one extreme, terrorism merges into organized **crime**, or even psychopathic behavior by an individual (for example the Shoe-bomber in the United States) or a **group** of individuals (for example the Aum Shinrikyo movement in Japan). At the other extreme, it becomes indistinguishable from guerrilla warfare and other forms of low-intensity conflict. For analytical purposes, it is useful to distinguish at least three main approaches to defining terrorism. The first focuses on the intentions of the agents perpetrating it; the second defines it in relation to the **values** and **institutions** of the society that it targets; and the third views it as a technique of **war** or direct action.

The first approach, which looks at the intentions of the agents, points to the historical origins of the word terrorism. This term initially referred to the period of the Terror (1793–4) during the French Revolution, when terrorism was a state policy designed to terrorize the enemies of the French Republic, be they domestic or foreign, individuals or collectivities. Although short-lived, this conceptualization of terrorism as a necessary evil to achieve the greater good of the nation has had numerous followers. In particular, it was reactivated in the nineteenth century by