

Introduction

Digital Formations: Constructing an Object of Study

ROBERT LATHAM AND SASKIA SASSEN

COMPUTER-CENTERED NETWORKS and technologies are reshaping social relations and constituting new social domains. These transformations assume multiple forms and involve diverse actors. In this volume we focus on a particular set of instances: communication and information structures largely constituted in electronic space. Examples are electronic markets, Internet-based large-scale conversations, knowledge spaces arising out of networks of nongovernmental organizations (NGOs), and early conflict warning systems, among others. Such structures result from various mixes of computer-centered technologies and the broad range of social contexts that provide the utility logics, substantive rationalities, and cultural meanings for much of what happens in these electronic spaces. In this regard, the electronic spaces that concern us in this volume are social. Digital formation is the construct we use to designate these specific types of information and communication structures. Digital formations are to be distinguished from digital technology tout court; not all digital networks are digital formations.

This volume seeks, then, to advance research that is at the intersection of what we might simplify as technology and society. We do not assume that technology and society are actually separate entities, and we accept many of the propositions in the critical social science literature that posit that technology is one particular instantiation of society—society frozen, that is, one moment in a trajectory that once might have been experienced as simply social (Latour 1991). Without losing this critical stance, we want, nonetheless, to capture the distinctiveness and variable weight of “technology” and to develop analytic categories that allow us to examine the complex imbrications between the outcome of society that we call technology and the social, economic, political, and cultural dynamics through which relations and domains are constituted. Much rides in social analyses of IT on the category of “newness,” and this volume is no exception. We believe we are looking at formations that have not existed before, and we mean this to imply two things: that the forms were not

present in a given social context before, and that the formations in question are novel social forms.

That these are novel forms implies that we are looking at entities that are likely in the early—if not initial—stages of formation. We are not claiming this status for IT itself. Beniger (1986) underscores that the reflexive development and organization of complex IT-based formations is discernible as early as the nineteenth century.¹ Rather, we attach this status to the emergence of a wide range of formations of varying scales that depend on digital technologies, cross a variety of borders (national or otherwise), and engender a diverse array of spatial, organizational, and interactive practices.

The set of cases explored in the chapters that follow is meant to give readers a sense of that range and to cover topics that have been considered important to the social analysis of IT, especially as it bears on transboundary phenomena, including transnational civil society, transboundary public spheres, global finance, transnational corporate networks, global technological diffusion, regional integration, and international economic development. There has been no attempt to be comprehensive, however.² What joins the chapters is not only the effort to capture constitutive and transformative processes, but also concerns with design and social purpose.

Locating a New Field of Inquiry

One of the distinct capabilities of these technologies when it comes to the communication and information structures that concern us in this volume is the rescaling of social relations and domains. What has tended to operate or be nested at local scales can now move to global scales, and global relations and domains can now, in turn, more easily become directly articulated with thick local settings. In both types of dynamics, the rescaling can bypass the administrative and institutional apparatus of the national level, still the most developed scalar condition. As a result of the growing presence and use of these technologies, an increasing range of social relations and domains have become *de facto* transboundary. It need not be this way, and indeed many of these digital formations are not, but the trend is definitely toward expanding the world of transboundary re-

¹ Another significant historical analysis that is U.S. focused is Chandler and Cortada (2000).

² One noticeable omission is the security sphere. But see the related SSRC-sponsored volume, *Bombs and Bandwidth* (Latham 2003), which focuses exclusively on this realm. Further, a new SSRC volume on global civil society and the Internet is in progress (edited by Jon Anderson, Jodi Dean, and Geert Lovink).

lations and domains. This trend is evident in this volume, where even digital formations that need not be transboundary, such as large-scale conversations or knowledge spaces, wind up being so directly or indirectly.

We are, then, seeing the transnationalizing of a growing range of local or national relations and domains, as well as the formation of new ones. Such transformations enable nonstate actors to enter international arenas once exclusive to states and the formal interstate system. This is well illustrated by specific features of the growing numbers and types of international nongovernmental organizations, global business alliances, and diasporic networks. These transformations have also furthered the formation of new types of spaces constituted partly through cross-border actors and transactions. All of this partly reconstitutes the world of cross-border relations and takes this world beyond formulations common in the specialized literature on international relations.

To some extent these transformations in the world of cross-border relations are overdetermined in that they entail multiple causalities and contingencies. This volume's focus on computer-based interactive technologies and networks does not presume to posit a single causality. What we refer to below for short as sociodigitization is deeply imbricated with other dynamics.³ In some cases sociodigitization is "derivative"—a mere instrumentality of these dynamics—but in others it is "transformative"—by reshaping social relations—and even "constitutive"—by producing new social domains of action. Yet even when derivative, sociodigitization is contributing to the rescaling of a variety of processes with the resulting implications for territorial boundaries, national regulatory frames, and cross-border relations. The outcome is a set of changes in the scope, exclusivity, and competence of state authority over its territory, and, more generally, the place of interstate relations in the expanding world of cross-border relations.

An organizing assumption in this volume and in the larger Social Science Research Council (SSRC) project on information technologies to which it contributes is that these new conditions have implications for theory and for politics.⁴ The social sciences are not well prepared to take on these developments. The discipline that has had cross-border relations at its core, international relations, remains mostly focused on the logic of relations between states and has not generally treated communication and information as essential to analysis. Exceptions to the state-centric focus in IR include work on transnational relations (Nye and Keohane 1971),

³ Sociodigitization, as defined below, is the process whereby activities and their histories in a social domain are drawn up into digital codes, databases, images, and text.

⁴ In particular, the SSRC program, IT and International Cooperation. See www.ssrc.org/programs/itic.

which assumes new relevance under current conditions.⁵ Also warranting greater attention is pioneering work incorporating information and communications (Deutsch 1953, 1957; Jervis 1976) and more recent research and analysis that focuses on information technologies.⁶ However, this work cannot quite fully encompass today's multiplication of nonstate actors and new conditions in transboundary cooperation and conflict.

An alternative line of scholarship is centered on the technical properties of the new technologies and their capacities for producing change.⁷ These technologies increasingly dominate explanations of contemporary change and development, with technology seen as the impetus for the most fundamental social trends and transformations.⁸ Such explanations also tend to understand these technologies exclusively in terms of technical properties and to construct the relation to the social world as one of applications and impacts.

Neither theorizations centered on the state nor those centered on technology as the key explanatory variable can adequately capture the transformations in the world of cross-border relations that concern us in this volume. Understanding the place of these new computer-centered networks and technologies from a social science perspective requires avoiding a purely technological interpretation and recognizing the embeddedness of these technologies and their variable outcomes for different economic, political, and social orders.

Confining interpretation to the properties of these technologies neutralizes or renders invisible the social conditions and practices, place-boundedness, and thick environments within and through which these technologies operate. Such readings also lead, ironically, to a continuing reliance on analytic categorizations that were developed under other spatial and temporal conditions, that is, conditions preceding the current digital era. Thus the tendency is to conceive of the digital as simply and exclusively digital, and the nondigital (whether represented in terms of the physical/material or the actual, all problematic though common concep-

⁵ Of note is the special issue of *Millennium: Journal of International Relations* on Territorialities, Identities, and Movement in International Relations (1999).

⁶ See, for example, Choucri (2000), Deibert (2000), Der Derian (2001), Laguerre (2000), and Wilson (2004).

⁷ Latham (2002) offers a fuller discussion of ways that newness has figured into analyses of IT and social change.

⁸ For critical examinations that reveal particular shortcomings of technology-driven explanations see, e.g. Wajcman (2002), Loader (1998), Nettime (1997), Hargittai (1998), and more generally Latour (1987), Munker and Roesler (1997), Mackenzie (1999), and Mackenzie and Wajcman (1999). For a critique by "technologists" of such technology-driven explanations, see Brown and Duguid (2000).

tions) as simply and exclusively nondigital. These either/or categorizations filter out alternative conceptualizations, thereby precluding a more complex reading of the intersection and interaction of digitization with social, other material, and place-bound conditions. Another consequence of this type of reading is to assume that a new technology will ipso facto replace all older technologies that are less efficient, or slower, at executing the tasks the new technology is best at. We know that historically this is not the case.

Nonetheless, it is important for our effort to recognize the specific capacities of digital technologies.⁹ They are central to the emergence of new information and communication structures and the transformation of existing ones.¹⁰ In their digitized form, these structures exhibit dynamics of their own that derive from technological capacities that enable specific patterns of interaction. These technology-driven patterns are, then, endogenous to these digitized structures rather than the product of an exogenous context such as the interstate system. Among such patterns are the simultaneity of information exchange, capacity for electronic storage and memory, in combination with the new possibilities for access and dissemination that characterize the Internet and other computer-centered information systems.¹¹

These technical capacities can change the relationship between information and a broad range of entities and conditions. For instance, new resources and capabilities are being created for NGOs and other private

⁹ There are important types of computer technology that we are not addressing in this volume, notably robotics, data processing, and virtual reality.

¹⁰ Studies of new or transforming structures have typically focused on various dimensions of social life, including individual identity, community, social development, work, politics, and economic organization. Illustrative are Webster (1995), May (2002), and of course Castells (1996), the latter being mainly focused on socioeconomic change. Note that much of this literature is anchored in the notion that modern societies are transforming into information societies driven by an information revolution. This sort of thinking caught on in the early 1970s, and a particularly notable statement is Bell (1973). Among the structures that are seen as developing through and around the use of these technologies are “virtual communities,” “virtual corporations,” and multi-user-domains (MUDS). On communities, see Smith and Kollock (1998); on virtual corporations, see the journal at www.virtual-organization.net; and on MUDs, among other virtual social forms, see Turkle (1995).

¹¹ For most producers and consumers of research on IT, knowledge begins and ends with the Internet. While the Internet is crucial to the development of digital formations, in and of itself it is not a formation but, as conveyed in the chapter by Latham, a global communication system that comprises myriad electronic networks. These networks, in turn, are the underlying platforms for digital formations. But a digital network need not be part of the open Internet tied to e-mail and the World Wide Web if it is a private network as considered by Ernst and Sassen.

associations via web pages and document storage (Garcia, this volume). This matters because groups, particularly when involved in contestational politics, can use these information resources to challenge certain kinds of interpretations of developments, events, or policies. Such challenges lead to new knowledge spaces (Bach and Stark). Groups, such as diasporas connected to zones of conflict, can construct their histories and make them accessible to insiders and outsiders. These possibilities, in turn, prompt a reexamination of assumptions about the role of “knowledge” circulating within and across groups in the shaping of intergroup cooperation or conflict (Alker). Technology here makes it easier to trace the history of interactions and events, which in turn has implications for reciprocity and repeated strategic interaction. When it comes to major economic actors such as transnational corporations, the typically private information systems offer whole new organizational and managerial capabilities, such as the global flagship networks examined by Ernst.

From a social science perspective, as compared to a purely engineering one, such digitized information and communication structures and dynamics—what we call digital formations—filter and are given meaning by social logics. By social logics we intend to refer to a broad range of conditions, actors, and projects, including specific utility logics of users as well as the substantive rationalities of institutional and ideational orders. The distinctiveness of digital formations can contribute to the rise of social relations and domains that would otherwise be absent. Examples of such distinctive structurations in our volume are open source software communities (Weber), the formation of digitally based large-scale conversations (Sack), new types of public spheres (Cederman and Kraus), certain types of early warning systems (Alker), and electronic markets for capital (Sassen).

The presence of social logics in the structuring of these formations means, from a social science perspective, that the technical capacities of these new technologies get deployed or used in ways that are uneven and contradictory within diverse digital formations. They unfold in particular contexts and evince both variability and specificity. Digital formations, as we define them here, do not exist as purely technological events. This, in turn, makes it difficult to generalize their transformative and constitutive outcomes. Variability and specificity are crucial dimensions emerging from the diverse foci of analysis in the volume. The choice of chapters seeks to address this as each focuses in great detail on a different subject. While variability and specificity make generalization difficult, detailed study can illuminate patterns and structures helpful in hypothesizing future trends and in developing agendas for research and analysis as IT continues to evolve.

The uneven and often contradictory character of these technologies and

their associated information and communication structures also lead us to posit that these technologies should not be viewed simply as factor endowments. This type of view is present in much of the literature, often implicitly, and represents these technologies as a function of the attributes of a region such as Asia or an actor such as an NGO—ranging from regions and actors fully endowed, or with full access, to those without access. Rather, we recognize that any given region or actor can be associated with uneven or inconsistent technological capacities. Cederman and Kraus make clear that even in wired Europe, attempts to construct a rich communicative space confront the limits of online public engagement.

Variability also emerges because the deployment and diffusion of these technologies is shaped by the diverse operational logics of social forms, including prominently states and markets. For instance, technologies relating to the Internet, satellite surveillance, and data banks can be strongly associated with cooperative policies and practices (e.g., transborder access to IT infrastructures, data, and human capital, greater transparency, the formation or strengthening of transboundary public spheres) or they can be linked to conflict (e.g., applications of IT in the military, the identity politics of ethnic groups involved in violent conflicts, the confrontational politics of activists, and the competition for sectoral economic dominance among large transnational corporations).

Variability is also a function of unintended consequences. Guthrie shows us how the state-controlled development of an IT industrial sector in China had the effect of setting in motion processes of change not foreseen by any of the players involved, most importantly a trend toward reducing some aspects of state authority as networked individuals could gain access to information about foreign models of economic development. Developing the industrial side of these technologies had the perhaps ironic effect of altering—if ever so minimally—the position of individuals toward the state.

The concepts that have been central to work on cooperation and conflict—such as alliances, regimes, and institutions—may not analytically capture what some of these types of communication systems are. The Internet illustrates this well. For instance, it has some of the features through which we specify institutions—in this case a transnational institution. It is so in the sense that there is a set of rules, compliance procedures, and norms that shape human action. But with its varied uses and forms of information, the Internet is also more than an institution: it is worthy of study as a global phenomenon in its own right, with interesting implications for cross-border relations (Latham).¹²

¹² The uniqueness of the Internet (compared to the telephone, telegraph, or television)

In brief, there is considerable diversity in the types of actors and logics that constitute communication and information structures. Their endogenous technical properties vary as do their endogenized social logics. Recapitulating the above, we identify at least three sets of implications for their study from a social science perspective. One is the difficulty of prediction in a domain of contradictory and uneven patterns and processes, a fact that may help undermine various types of regimes for control and governance. A second implication is that these systems have endogenous capabilities that may enable them to escape partly the conditioning of existing systems, such as the interstate system, and transform these or constitute whole new domains. A third implication is that communication and information structures need to be treated as distinct from information technology. That is, the first are human “habitats” or ecologies anchored in the social relations associated with public spheres, networks, organizations, and markets.¹³ They are therefore not subsumed by or reducible to the technology that helps make them possible.

Digital Formations: Constituting an Object of Study

Methodologically, the types of concerns present in this volume require us to go beyond the notion that understanding these technologies can be reduced to the question of impacts.¹⁴ That is, impacts are only one of several forms of intersection of society and technology—understood in the qualified sense discussed above. Other forms of intersection have to do with the constitution of whole new sociotechnical relations and domains—digital formations—that in turn need to be constructed as objects of study. This means examining the specific ways in which these technologies are embedded in often very specialized and distinct contexts. And it requires examining the mediating cultures that organize the relation between these technologies and users, where we might think of matters as diverse as gendering or the utility logics that organize use. Because they are specific, these mediating cultures can be highly diverse; for example, when the objective is control and surveillance, the practices and disposi-

rests on a combination of (1) ready-at-hand storage capacity for documents; (2) diffuse networks of communication and interactivity (including many-to-many rather than just one-to-one or one-to-many); (3) simultaneous access and interactivity produced by 1 and 2. The first factor may seem trivial at first, but it should be noted that the capacity to store data and documents of political import to wide bodies of actors was a virtual monopoly of the state (government archives, libraries, data bases such as tax rolls, etc).

¹³ For an exploration of the concept of “information ecologies” see Nardi and O’Day (1999).

¹⁴ We see this as consistent with the analytical frame in Castells (1996).

tions involved are likely to be different from those involved in using electronic markets or engaging in large-scale computer-based conversations.

The search for impacts means framing analysis in terms of independent and dependent variables, which is by far the most common approach in the social sciences. Our understanding that these technologies are part of transformative and even constitutive processes means we cannot confine the analytic development of this field of inquiry to that type of framing. We also need to develop analytic categories able to capture formations that incorporate what would be conceived of as mutually exclusive conditions or attributes in the independent-dependent variable framing. This is what we intend for the construct, digital formation.

The construct obviously builds on the concept of social form and the process of formation. The term “social form” is meant to convey that digital formations have ontological status as social “things” (with coherence and endurance), but not as fixed units whose attributes are pregiven to analysis.¹⁵ We are adopting a relational perspective that emphasizes that forms emerge in and through complex social processes and changing relations.¹⁶ By formation we mean to imply four things. These forms are, as mentioned above, in the early stages of development. Second, their emergence is not likely to be signaled by some sort of founding event, formal constitution, or charter, but by a mix of informal elements ranging from network blueprints (see Latham) to manifestos (Weber). Third, they will tend toward a developing and variable structure and nature because any social form is subject to changes in relevant contexts, agents, relations, and logics from one time to the next or one instantiation to the next (across different times and places). Finally, our understanding of digital formations is nascent and will change considerably as analyses of existing and newly emerging formations cumulate.

As that understanding begins to develop, we will need to think through strategies for delineating, however contingently, general categories of formations and their corresponding instantiations. How will we know we have the right categories in place? Are research networks, knowledge communities, and electronic markets, for instance, the right categories? How far up in generality or far down in specificity does one go? How will we identify the trajectories of change in categories? On what terms and with what basis of confidence should we generalize from individual cases and categories? These are important questions because their pursuit will open the way for comparisons across types and cases and for the identification of overarching logics and patterns relevant beyond digital formations.

¹⁵ Coherence and endurance as important qualities for marking the existence of a social form is mentioned by Abbott (1995).

¹⁶ See Tilly (1995), Emirbayer (1997), and Cederman (2002) for discussions of this perspective.

How would you recognize a digital formation if you encountered one? As we emphasized in the discussion above, you should be able to identify a coherent configuration of organization, space, and interaction. By organization we mean the ordering of practices (e.g., via rules and roles), content (data, images), and relations among actors (individual, collective, and even machine).¹⁷ By interaction we mean the flow of exchange and transmission among actors.¹⁸ And by space we mean the electronic staging of the substance (or content) and social relations at play in a digital formation.

These three dimensions of formation (organizing/interacting/spatializing) are of course overlapping and mutually constitutive: space is organized; organization is spatial and interactive; interaction requires organization; and interaction produces spaces. This imbrication among dimensions brings coherence and identity to a formation.

Of the three dimensions, space is likely to be the most troubling to readers. Organization and interaction are common conceptual tools in social analysis. Space is less familiar, and the electronic space associated with digital formations is even more so because it is not primarily geocorporeal in nature. In thinking about electronic space, we can build on the two main ways the broader category of social space is understood: as the lived environment of social artifacts (homes, factories, schools, etc.) and as the expansive range of realized and potential relations and actions that can unfold in and across such environments.¹⁹ Instead of geocorporeal social artifacts, electronic space is composed of picto-textual social artifacts embodied in electronic stagings of texts, images, and graphics through software and hardware.²⁰ A range of realized and potential relations and actions is opened up to produce electronic space. Manifestations of such relations are found in the linking, searching, and interacting described by Bach and Stark.²¹

¹⁷ Bach and Stark employ the argument associated with Bruno Latour (1987) that machines can be nodes in a network.

¹⁸ By interaction we do not mean to imply parity and symmetry in flows and exchange. We need not go as far as Lev Manovich (2001: 55–58) in rejecting use of the term because it can be taken to denote symmetry.

¹⁹ The most developed work on social space is Lefebvre (1974, see esp. pp. 33–59). Obviously, the issues at stake in the concept are far more complex than we can give justice to in this meager context. See here also the work of Poster (1997).

²⁰ This is a departure from the usual practice of describing electronic space as either virtual or cyber. We would save the term virtual to describe a type of picto-textual spatialization where geocorporeality is staged electronically. To explore this form of picto-textual space, see Barfield and Furness (1995). While “cyber” is a popular adjective, it does not help us here gain a sense of the character of space. It also refers back to control via feedback schema—as in cybernetics. This does not mean the term should not be applied to artifacts where control is paramount, such as in virtual reality. See Benedikt (1991) for some thoughtful essays united under this term.

²¹ Bach and Stark pick up on the contingent aspects of social space in their chapter.

The picto-textual dimension of electronic space emphasizes the materialization and visualization of the digital that depends on a mix of screens, logics of sequencing, and graphic presentations of text and images. The use of the term staging—borrowed from the theater and the military—is meant to convey the putting into order and motion of semantic configurations. Staging implies a coordination of views, visualizations, and narrations that unfold in time, put in place for public or private effect and readiness for further movement and action.²² Software, as Garcia and Sack stress, is obviously the key factor since there is not a great deal of variation in the hard infrastructure of such staging so far (such as screens of one form or another on your desk, at hand, or in your goggles).

Spatialization is shaped by organization and interaction. At the most obvious level, staging itself is an organization of presentation and narration. A less obvious instance is the organization of bodies of data and knowledge—and the relations between such bodies (see Ernst). There is also the organization of actions and practices within digital formations that have spatial implications (from downloading and file sharing to open source code distribution), as well as the organization of access that brings in or keeps out various actors and participants (see Sassen).

The latter bears on interaction and space understood as the realm of possible relations. Webs of exchange in tightly bounded, highly structured networks—as in Ernst’s GFNs or Sassen’s electronic markets—yield a spatiality that can take form as narrow channels of connectivity, where the options for sanctioned actions might be quite rich, but possibilities for disruptive interventions and actions are quite limited. On the other hand, the large-scale conversations analyzed by Sack or knowledge communities discussed by Bach and Stark produce a quite different space, which takes form more as a relatively open, loosely configured, discursive field susceptible to interventions that constitute serious breaks or ruptures, but which are more simple in nature compared to more highly structured and narrow spaces.²³

²² Cf. Laurel (1993) for the development of the theater-computer analogy. We do not, however, seek to go as far as making the connection to theater in toto, but only to the activity of staging. (Laurel is particularly focused on the dramatic aspects of “life on screen” such as MUDs.) As Sennett (1977: 34–42, 313) points out, the metaphor of “society as theater” is old. Some of the twentieth-century applications, Sennett argues—such as in the work of Erving Goffman (1959), where roles and social drama are emphasized—tend to take the social context and structure that produce the drama and roles for granted. As a result, the analysis, however insightful, tends to be conservative and narrow. Since this volume is focused on how and why digital formations come into place and with what political, social, and economic implications, we believe we avoid this pitfall.

²³ This is a classic trade-off between thick but highly bounded worlds and thin but open ones (Walzer 1994). Sack addresses the importance of breaks in meaning in shaping the course of conversations. See also Winnograd and Flores (1986), who in their analysis of artificial intelligence draw on Heidegger’s (1962: 105–6) development of breaks in “referen-

It is important to emphasize that digital formations as such are not reducible to electronic networks or to social networks more generally. On one level, digital formations subsume both kinds of networks.²⁴ Electronic networks—which are sets of nodes, software, and technologies of transmission—are the part of the material manifestation of digital formations. IT-based social networks, composed of patterns and structures of social interaction, in turn represent one, albeit important, aspect of digital formations. On another level, a network, as a complex ensemble of not just interaction but space and organization, can represent one type of digital formation, as can a digitally based public sphere, community, or market. The network as type of digital formation appears, for example, in Latham's chapter—which focuses on the emergence of the Internet as the global computer-based communication system—where it takes shape in the many research networks that arose around the project of developing digital networking technology.²⁵ These research networks entailed more than just sets of electronic nodes and connections (although they entailed that as well). Computer networks such as the Arpanet constituted electronic spaces, modes of organization among institutions and resources (both material and knowledge), and webs (or networks) of interaction among researchers.²⁶

In some cases an ensemble of space, organization, and interaction on the Internet constitutes not just a network but a community. Community, especially as thought about in electronic terms, is a complicated matter, but

tial contexts²⁷—where things can literally break down—that open the way for transformation. There is also interesting resonance with the features of thin and thick networks specified by Granovetter (1983).

²⁴ We refer here only to social networks that are relevant to digital formations, and not to all social networks *per se*.

²⁵ Sociologists who do network analysis could accuse us of using the term network in a loose, metaphorical way. However, the employment of the term here is useful to distinguish a type of formation emerging out of configurations of direct and indirect connection among elements; a space that is shaped by those configurations (that is, by the channels of transmission and interaction); and logics of organization that arise in the ordering of relations and resources among elements. Besides Latham, see the chapters by Alker, Ernst, and Garcia. The point is to be able to contrast a network type of formation with other types such as electronic communities or markets. Overlap between types can be understood in two ways. One way is as a Venn diagram, where some networks, for example, shade over into a community form. The other way is as intertwinement because, as just pointed out, any digital formation involves electronic and social networks. Neither sort of overlap justifies reduction of all formations to the network form. We are trapped by the sediment of a sociological language that only helps us make distinctions that are ultimately clumsy.

²⁶ The use of the term electronic space is based on Sassen (1998: chap. 9). Although some people associate electronic space with media such as television, it is used here as it relates to digital formations rather than mass media.

we take it to mean that configurations of space, organization, and interaction sustain a common identity around shared goals and reciprocal relations among participants, and that such identity, goals, and reciprocity are an important and substantive aspect of each of participant's life, professional or personal.²⁷ While it might be the case that the experts involved in developing the Arpanet in the end constituted a professional community (not just a research network), the concept of community can clearly be applied to the open source movement, and Weber in his chapter adopts it explicitly. As Weber points out, the Internet was essential to the rise of the open source communities he analyzes as the communication medium of access, exchange, and interaction. Open source communities as digital formations take shape in the organizational logics of collective software production (analyzed in detail by Weber), the webs of interaction across wide geographical expanses, the constellation of sites and electronic postings that constitute the electronic space within which participants operate as code and ideas are exchanged.

Also using the category of community are Bach and Stark, who apply it to a type of digital formation they label "knowledge communities." They explore how such "knowledge communities" emerge around the activities of NGOs. In contrast to the production of software, NGO knowledge communities, composed mostly of activists, are organized around the pursuit and exchange of knowledge about various areas of human development and security, from economic development to minority rights. Bach and Stark consider how new social networks, organizational forms, and spaces are constituted through the practices of knowledge production and exchange, especially as tied to the activities of linking, searching, and interaction that are familiar ways of moving through the Internet. They argue that such otherwise simple practices can be associated with the rise of unprecedented connections among actors (webs of interaction), forms of deliberative associations (organization), and knowledge spaces that they contend are part of a transformation of global political life.

Sack also considers how a digital formation can emerge around the exchange of ideas. "Very large-scale conversations" (VLSCs) are quite literally conversations that unfold around a given topic involving a relatively large number of participants. Typically these conversations, which can be transnational in scale, manifest in forums, mail lists, and newsgroups. Sack shows that these innocent-looking forms actually involve a complex intersection of interpersonal networks, thematic organization, and ideological relationships that together yield an architecture of discursive space.

²⁷ This definition is consistent with those of analysts such as Wellman and Gulia (1999), Smith and Kollock (1998), and Calhoun (1998).

He thinks through the different ways that a VLSC can institutionalize linguistic meaning and “common sense” (a form of knowledge) and of course be shaped by linguistic institutions that form the context of discourse within a VLSC.

The production of meaning, histories, stories, themes, and knowledge is also central to the digital formation examined by Alker. He analyzes the design of digital information networks for the linked conflict early warning efforts of experts in various institutional settings from NGOs to intergovernmental organizations. These networks are meant to serve as expert information systems, the capacity of which to store and distribute case histories would allow for the rewriting of interpretations of conflicts and the conditions of conflict—as ideas evolve, new data is introduced, or new connections are established. These information networks are meant to constitute unique spaces of knowledge, organizations of data, and networks of interaction among practitioners that can exploit the collaborative power of contested and alternative views of deadly conflicts to produce better early warning practices.

A far more familiar application of digital information systems is detailed by Ernst in an exploration of a digital formation he calls “global flagship networks (GFNs).” These networks link and coordinate a set of far-flung firms and suppliers—around a global flagship firm—collaborating in R & D, production, distribution, and marketing through the exchange of knowledge about these economic activities. Database sharing, conferencing, e-mail, and control mechanisms are among the activities found on these networks. Across the electronic space of GFNs, whole new ways of organizing economic cooperation are emerging, along with new logics of interaction among a diversity of actors. By looking at GFNs, Ernst is able to move beyond the usual claims about flexible production and virtual corporations that have occupied reflections on economic globalization to uncover tensions among network actors, the generation of new hierarchies, and the limits of network strategies.

Another feature of economic globalization is the rise of massive electronic financial markets for credit, currency, equity, and commodity futures. Sassen seeks to specify the difference that digital networks and the digitizing of financial instruments make to transboundary financial markets that have been part of modern capitalism since its beginnings. What is new about the type of digital formations usually referred to as electronic markets is not only their much noted speed of operation and scale of connectivity. Perhaps more striking is the extent to which in such markets complex financial instruments have been developed to guide decision-making, based on powerful computer processing and algorithms. This in turn has opened the way for an explosion in financial innovations, most

famously in the area of derivatives. Sassen contrasts the powerful and resource-rich world around global financial markets with the attempts—of chief concern in Bach and Stark—in the resource-poor world of activists, especially in the global South, to amplify their political effectiveness through global digital networks. Sassen's contrast underscores how similar tendencies toward interconnectivity and decentralized access can be associated with quite diverse types of formations because of differences regarding who and what is mobilized.

The disparity between centers and peripheries is what Garcia studies in her chapter. She explores the possibility that digital formations such as “virtual industrial districts” could be designed based on rural networks that would allow rural communities to agglomerate resources (knowledge and material) to overcome their historical disadvantages relative to cities. Electronic networking holds out considerable hope to rural areas that are sparsely populated and therefore do not enjoy the advantages of urban resource concentration, a sharp contrast with the flagship networks examined by Ernst. It will be necessary, Garcia argues, for these networks to be “decentrally” organized and inclusively interactive. Further, and crucially, these networks will have to be based on the imaginative construction of electronic spaces through innovative software development that, in effect, produces virtual cities.

The design of information technologies to integrate wide geographical regions is not limited to the economic realm. Cederman and Kraus concentrate on the effort of the European Union to construct a “communicative space” that would provide a democratic political realm, if not public sphere, for their Union. The hope is that within such a space information can be accessed and disseminated, conversational networks around policies initiated, and decisions influenced by such processes. The authors examine the assumptions underlying such an ambitious digital formation, drawing on an analysis of the rise of national polities. They force us to contemplate whether or not digital formations are relevant to such large-scale political projects, the vast stakes of which are defined up-front by designers. In contrast, the purposes of the very large-scale conversations examined by Sack seem to emerge organically.

Finally, Guthrie squarely confronts the relations between many of the digital formations mentioned above and the national polity—in his case China—not just as a model of formation, but as a field of transformation. Emerging networks of firms, knowledge communities among activists and educational institutions, and electronic social networks are among the formations touched on by Guthrie in his detailed analysis of effects on sovereignty, economic change, and the development of Chinese civil society.

Sociodigitization

There is nothing unique about digital formations being constituted by configurations of organization, interaction, and space. The same could be said about households, corporations, cities, states, nations, empires, or a dozen other social entities that populate modernity. What distinguishes digital formations besides their newness (as defined above) is their basis in digital technology. While a corporation, for example, can digitize its operations to a great extent, it is only when it becomes a “virtual corporation” that it can be said to owe its existence to the digital. In contrast, the global flagship networks portrayed by Ernst from the start are founded on digital technologies. We can imagine a GFN organized around nondigital information technologies, but it would no longer have the distinctive qualities that digitization entails, as we outlined above, and no longer represent a *digital* formation.

The fact that digital formations are grounded in information technologies raises the question of the relationship between the digital and nondigital. Central to this volume is the notion that it is not enough to focus on the digital. Crucial are the contexts and fields of social life, from finance to the environment of which digital formations are a part. Indeed, what is especially interesting about Ernst’s chapter is not necessarily the workings of GFNs per se, but their relationship to the corporations and economies with which they are imbricated. Viewed in this way, the process of digital formation depends on the dynamics at play in the links between the digital and nondigital.

We believe the best way to view that process is through a concept we call “sociodigitization.” This denotes the rendering of facets of social and political life in a digital form. These facets can vary from discourse about political events (Sack) and interpretations of conflicts (Alker) to regional economic practices (Garcia) and policy positions (Cederman and Kraus). “Digitization” as a concept has been around for some time as it is closely associated with the efforts of librarians, publishers, artists, and others to convert analog content to digital form.²⁸ The qualifier “socio” is added to distinguish from the process of content conversion, the broader process whereby activities and their histories in a social domain are drawn up into the digital codes, databases, images, and text that constitute the substance of a digital formation. As the various chapters below show, such drawing up can be a function of deliberate planning and reflexive ordering or of contingent and discrete interactions and activities. In this respect as well,

²⁸ There is a considerable literature on digitization linked to archiving and library science. See in particular Saxby (1990).

sociodigitization differs from digitization: what is rendered in digital form is not only information and artifacts but also logics of social organization, interaction, and space as discussed above. Ultimately, the character of digital formations depends on the social relationships, practices, institutions, and organizations that feed sociodigitization.

The drawing up of facets of social life into information systems is at least as old as writing itself and has been tied to processes of state formation as records, maps, and statistics produced potent forms of social knowledge.²⁹ Sociodigitization is on one level continuous with this long-standing development of social knowledge based on paper. But it strays from it because it allows actors other than states (and firms, since the early twentieth century) to generate, organize, and distribute substantial bodies of social knowledge. The most notable actors are the NGOs and social movements discussed in the chapters by Bach and Stark and Sassen. But the same can be said about the conflict experts in Alker's chapter; the researchers in Latham's; the software developers in Weber's; and the private citizens in Sack's.

What underlies the discontinuity of sociodigitization with past information media is the manipulative capacities engendered by digital technologies. Information and knowledge are subject to far greater levels of computation and organization. There are not only, as pointed out above, the complicated algorithms at play in the financial realm, but also the algorithms for producing semantic codes and structures explored by Sack. As increasingly sophisticated forms of manipulation and computation are put in the reach of nonstate actors through software, it is far from clear where disruptive practices and politics will go. Open-source development is so full of disruptive potential exactly because it can place control over augmentation into private and nonstate hands.

Another notable difference is the capacity to translocate information (of varying amounts) in digital form among various contexts.³⁰ This is a key to the mobility of knowledge described by Sassen. We see some of the implications of this mobility in the chapters by Ernst and by Bach and Stark. Ernst refers explicitly to the importance in GFNs of the modularization of knowledge, which allows for various units or nodes to work in a knowledgeable way on discrete portions of an economic process such as production.

It is impossible at this time to know what shape sociodigitization will

²⁹ Michel Foucault (1977) opened our eyes to this process. See also James Scott (1998) for a wide-ranging integrative perspective on relevant research and analysis in this area.

³⁰ The point is not to claim wholly new practices and capacities as these things were done prior to digitization. Innis (1951), for instance, differentiates the effects of writing on light media such as parchment from say stone based on the mobility the former affords. Differences regarding the digital are of degree, aggregating into differences of kind.

take in the future, and with what implications. The character of the information involved will likely be critical to developments and our understanding of them. On the one hand is the basic issue of the scope of information: what data will be drawn up into what formations. On the other is the question of the effects of that information, which depends to a large extent on how such information finds its way into evaluative statements that shape perceptions and actions.³¹ As new algorithms are developed, they will open up new forms of information manipulation, aggregation, and distribution around which also new digital formations might emerge.

Analytic Operations

Three types of analytic operations allow us to factor in the intersection of digital technologies and social logics. These analytic operations should hold whether these technologies are derivative, transformative, or constitutive. They should hold for a broad range of specific instances of the intersection between society and technology. And they should hold for a variety of analytical frameworks. This would include framings in terms of independent-dependent variables, but also strategies that aim at capturing imbrications and mutual interaction. Again, these analytic operations can themselves conceivably assume multiple forms. We have opted for three such operations, sufficiently complex as to accommodate a broad range of outcomes. We specify these as a first approximation for constituting digital formations as an object of study. Constructed as objects of study, digital formations can then also function as analytic categories. Each chapter in this volume represents an elaboration of a particular type of digital formation and illustrates a particular research strategy and theoretico-empirical specification.

At the most general level we want to emphasize the importance of analytic categories and frames that allow us to capture the complex *imbrications* between the capacities of digital technologies—specifically computer-centered interactive technologies—and the contexts within which they are deployed or used. A second set of analytic operations concerns the *mediating practices and cultures* that organize the relation between these technologies and users. Until quite recently there was no critical elaboration of these mediations. The dominant assumption was that questions of access, competence, and interface design captured the full set of mediating experiences. A third set of analytic operations is aimed at

³¹ This formulation integrates the discussion of information in the chapters by Latham and Sassen.

recognizing questions of *scaling*, an area where these particular technologies have evinced enormous transformative and constitutive capabilities. In the social sciences, scale has largely been conceived as a given or as context and has, in that regard, not been a critical category. The new technologies have brought scale to the fore precisely through their destabilizing of existing hierarchies of scale and notions of nested hierarchies. Thereby they have contributed to launch a whole new heuristic, which, interestingly, also resonates with developments in the natural sciences where questions of scaling have surfaced in novel ways. The next three subsections develop these issues very briefly.

Digital/Social Imbrications

As a first approximation we can identify three features of this process of imbrication. To illustrate we can use one of the key capabilities of these technologies, that of raising the mobility of capital and thereby changing the relationship between mobile firms and territorial nation-states. This is further accentuated by the sociodigitization of much economic activity. Digitization raises the mobility of what we have customarily thought of as barely mobile and renders mobile much of what we had considered immobile. Digitization can liquefy the nondigital. Once digitized, an entity can gain hypermobility—instantaneous circulation through digital networks with global span. Both mobility and digitization are usually seen as mere effects or at best functions of the new technologies. Such conceptions erase the fact that achieving this outcome requires multiple conditions, including such diverse ones as infrastructure and changes in the law.

The first feature is, then, that the production of capital mobility and the process of digitization requires capital fixity: state of the art built-environments, a professional workforce on the ground at least some of the time, legal systems, and conventional infrastructure—from highways to airports and railways. These are all partly place-bound conditions. Once we recognize that the hypermobility of the instrument had to be *produced*, we introduce nondigital variables in our analysis of the digital. Such an interpretation carries implications for theory and practice. For instance, it becomes quite evident that simply having access to these technologies is not enough: it will not necessarily alter the position of resource-poor countries or organizations in an international system with enormous inequality in resources.³²

³² Much of the work on global cities (Sassen 2001) has been an effort to conceptualize and document the fact that the global digital economy requires massive concentrations of physical and social resources in order to be what it is. Finance is an important intermediary

A second feature that needs to be recovered here is that the capital fixity needed for hypermobility and digitization is itself transformed in this process. The real estate sector illustrates some of these issues. Financial services firms have invented instruments that represent the value of real estate. This liquefies real estate, thereby facilitating investment and circulation of these instruments in markets other than the property market. While real estate remains very physical, this physicality has been transformed by its representation in highly liquid instruments that can circulate in global markets. It may look the same, it may involve the same bricks and mortar, it may be new or old, but it is a transformed entity.

These two properties signal that the hypermobility gained by an object through digitization is but one moment of a more complex condition. Representing such an object simply as hypermobile or as fixed is, then, a partial representation since it includes only some of the components of that object. The nature of the place-boundedness of this type of fixed capital differs from what it may have been one hundred years ago when it was far more likely to be a form of immobility. Today it is a place-boundedness that is, in turn, inflected or inscribed by the hypermobility of some of its components, products, and outcomes. Both capital fixity and mobility are located in a temporal frame where speed is ascendant and consequential. This type of capital fixity cannot be fully captured through a description confined to its material and locational features (Sassen 2001: chaps. 2 and 5).

A third feature in this process of imbrication can be captured through the notion of the social logics organizing the process. Many of the digital components of financial markets are inflected by the agendas that drive global finance, and these agendas are not technological *per se*. The same technical properties can produce outcomes that differ from those of electronic financial markets (see Sassen, this volume). Much of what we think of when it comes to electronic space would lack any meaning or referents if we were to exclude the nondigital world—cultures, material practices, systems of law, and imaginaries. It is necessary to distinguish between the technologies and the digital formations they help make possible.

In this regard, then, sociodigitization is multivalent. It brings with it an amplification of both mobile and fixed capacities. It inscribes the nondigital but is itself also inscribed by the nondigital. The specific content, implications, and consequences of each of these variants are empirical questions, and are objects for study in their own right. So are what is conditioning the outcome when digital technologies are at work and what is

in this regard: it represents a capability for liquefying various forms of nonliquid wealth and for raising the mobility (i.e., producing hypermobility) of that which is already liquid. But to do so, even finance needs significant concentrations of nondigital resources.

conditioned by the outcome. We have difficulty capturing this multivalence through our conventional categories, which tend to dualize and posit mutual exclusivity: an entity is either fixed or mobile. The example of real estate signals that the partial representation of real estate through liquid financial instruments produces a complex imbrication of the digital and nondigital moments of that which we continue to call real estate. And so does the partial endogeneity of physical infrastructure in electronic financial markets. Finally, capturing the imbrications of the digital with the nondigital allows us to capture this endogenizing of the social in the digital.

Mediating Practices and Cultures

One consequence of the above developed proposition about electronic space as embedded and not exclusively technological is that the articulations between electronic space and users—whether social, political, or economic actors—are constituted in terms of mediating cultures. Use is not simply a question of access and understanding how to use the hardware and the software. The mediating cultures through which use is constituted result partly from the values, projects, power systems, and institutional orders within which users are embedded.

There is a strong tendency in the literature to assume use to be an unmediated event, an unproblematized activity. There is in fact much more of a critical literature when it comes to questions of access than there is about cultures of use.³³ At best, recognition of a mediating culture has been confined to that of the “techie,” one that has become naturalized rather than recognized as one particular type of mediating culture. Beyond this thick computer-centered use culture, there is a tendency to flatten the practices of users to questions of competence and utility. From the perspective of the social sciences, use of the technology should be problematized rather than simply seen as shaped by technical requirements and the necessary knowledge, even as this might be the perspective of the computer scientist and engineer.

Use—to be distinguished from access—is constructed or constituted in terms of specific cultures and practices through and within which users articulate the experience and/or utility of digital technology. Thus our concern here is not purely with the technical features of digital networks and what these might mean for users, nor is it simply with the impact of digital technology on users. The concern is, rather, with this in-between zone that constructs the articulations of users and digital technology.

³³ There are of course important exceptions, notably the work by Dale Eickelman and Jon Anderson (1999) on how these technologies get used by, for instance, scholars of the Koran.

The practices through which use is constituted partly derive their meanings from the aims, values, cultures, power systems, and institutional orders of the users and their settings. These mediating cultures also can produce a subject and a subjectivity that become part of the mediation. For instance, in open source networks (see Weber), much meaning is derived from the fact that these practitioners contest a dominant economic-legal system centered in private property protections; participants become active subjects in a process that extends beyond their individual work and produces a culture. The kinds of rural-user-oriented networks examined by Garcia partly result from an awareness of long-term historical and institutional disadvantages of rural areas compared to urban areas and an orientation toward overcoming this disadvantage. There are multiple ways of examining the mediating cultures organizing use. Among others, these can conceivably range from small-scale ethnographies to macrolevel surveys, from descriptive to highly theorized accounts, from a focus on ideational forms to one on structural conditions.

The Destabilizing of Older Hierarchies of Scale

Key technical properties of digital networks are contributing to destabilize current formalized hierarchies of scale. These hierarchies, mostly dating from the period that saw the consolidation of nation-states and the interstate system, continue to operate and remain prevalent. They are typically organized in terms of institutional scope and relative territorial size: from the international, down to the national, the regional, the urban, to the local, with the national scale as the main articulator of the other scales. Today's rescaling dynamics cut across institutional scope and across the institutional encasements of territory produced by the formation of national states (Taylor 2000; Brenner 1998; Ruggie 1993; Sassen 2004). This does not mean that the old hierarchies disappear, but rather that rescalings emerge alongside the old ones and that these can trump the latter. This is partly because the practices and objectives of key political and economic actors are beginning to operate at, and thereby contribute to constituting, subnational and global scales where before they might have been confined to the national domain. Further, new types of scalar actors and objectives have emerged.

Existing theory is not enough to map the multiplication of practices and actors that are constituting these rescalings. Included are a variety of non-state actors and forms of cross-border cooperation and conflict—global business networks, the new cosmopolitanism, NGOs, diasporic networks, and transboundary public spheres. Several critical scholars have shown us how the disciplines concerned with transboundary or international processes tend to remain focused on the scale of the state at a time when we

see a proliferation of nonstate actors, crossborder processes, and associated changes in the scope, exclusivity, and competence of state authority over its territory.³⁴

With few exceptions, found most prominently in a growing scholarship in geography, the social sciences have lacked critical distance from the scale of the national. The consequence has been a tendency to scale as fixed, reifying it, and, more generally, to neutralize the question of scaling (or at best to reduce scaling to a hierarchy of size). Associated with this tendency is also the often uncritical assumption that these scales are mutually exclusive, most pertinently for the argument here, that the scale of the national is mutually exclusive with that of the global. A qualifying variant in the scholarship, though of a very limited sort, can be seen when scaling is conceived of as a nested hierarchy. The types of developments we focus on in this volume bring to the fore the historicity of scales and the limits of nested hierarchies.³⁵

Digital networks strengthen the multiscale character of many social processes, particularly processes that do not fit into nested hierarchies. An example of such a multiscale system is the combination of the far-flung network of affiliates of a multinational firm and the strategic system-integration and management functions that tend to be concentrated in a very limited number of cities (e.g., Taylor et al. 2002).³⁶ This is a multiscale system operating not only at a self-evident global scale, but also at a horizontal global scale (the network of affiliates). The latter is constituted as one step in a process of vertical integration, but it has its own scalar specificity, and it is useful to recognize its distinctiveness. It does not merely scale upward because of new communication capabilities that allow it to expand the scope of operations, going from local to global. Nor is it nested in a hierarchy of scales. Conceptualizing such systems entails distinguishing (1) the various scales that are constituted through global processes and practices,³⁷ and (2) the specific contents and institutional locations of this multiscale globalization.³⁸

Narrowing the discussion of scaling to the formation of transboundary domains, we can identify four types of scaling dynamics in the constitution of global digital formations. These four dynamics are not mutually

³⁴ Examples include Taylor (2000), Cerny (2000), Ferguson and Jones (2002), Hall and Bierstaker (2002), and Walker (1993).

³⁵ At the same time, it is important to recognize the risks of reification contained in exclusively scalar analytics in that it can lead to disregarding the thick and particularistic forces that are part of these dynamics (e.g., Amin 2002; Howitt 1993).

³⁶ See also the research network on globalization and world cities (GaWC) at <http://www.lboro.ac.uk/gawc>.

³⁷ See, for example, Taylor (2000), Swyngedouw (1997), and Amin and Thrift (1994).

³⁸ See, for example, Massey (1993), Hewitt (1993), Jonas (1994), and Brenner (1998).

exclusive, as becomes clear when we use the example of what is probably one of the most globalized and advanced instance of a digital formation, electronic financial markets. A first type of scaling dynamic is the formation of global domains that function at the self-evident global scale. Other instances might be some types of very large-scale conversations that are indeed global (Sack) and the knowledge spaces examined by Bach and Stark.

A second type of scaling can be identified in the fact that local practices and conditions become directly articulated with global dynamics, not having to move through the traditional hierarchy of jurisdictions. Electronic financial markets also can be used as an illustration here. The starting point is floor or screen-based trading in exchanges and firms that are part of a worldwide network of financial centers (e.g., Knorr-Cetina and Bruegger 2002). These localized transactions link up directly to a global electronic market. What begins as local gets rescaled at the global level. Similarly, we see this in the case of very large conversations (Sack), where the interaction of individual interventions leads to the formation of a space that can be global.

A third type of scaling dynamic results from the fact that interconnectivity and decentralized simultaneous access multiplies the cross-border connections among various localities. This produces a very particular type of global digital formation, one that is a kind of distributed outcome: it resides in the multiplication of lateral and horizontal transactions, or in the recurrence of a process in a network of local sites, without the aggregation that leads to an actual globally scaled digital formation as is the case with electronic markets. Instances are open source software communities (Weber), the early warning systems described by Alker, and the activist networks described by Sassen.

A fourth type of scaling dynamic results from the fact that global digital formations can actually be partly embedded in subnational sites and move between these differently scaled practices and organizational forms. For instance, the global electronic financial market is constituted both through electronic markets with global span and through locally embedded conditions, namely, financial centers and all they entail, from infrastructure to systems of trust (Zaloom 2005). So are the global communication flagships examined by Ernst.

The new digital technologies have not caused these developments, but they have in variable yet specific ways facilitated them and shaped them. The overall effect is to reposition the meaning of local and global (when internetworked) in that each of these will tend to be multiscalar. For example, much of what we might still experience as the “local” (an office building or a house or an institution right in our neighborhood or downtown) actually is a microenvironment with global span insofar as it is in-

ternetworked. Such a microenvironment is in many senses a localized entity, but it is also part of global digital networks that give it immediate far-flung span. To continue to think of this as simply local may not always be very useful. It is a multiscalar condition.

Design

Conjectures about the future are often part of analyses of contemporary developments around IT. The analytical operations discussed above and the chapters in this volume are no exception. However, we distinguish conjectures about the future overall shape of societies from conjectures about specific realms of human activity.³⁹ Conjectures of the latter sort can be understood through the lens of design. As Herbert Simon (1996: 114) so simply put it, design is about “devising artifacts to obtain goals.” Design forces contemplation of the future. In thinking about digital formations, the authors confront design because what they are studying is *formative*. It might indeed be the case that digital formations are more variable than many other formations—especially those anchored in geo-corporeal space such as cities—because they are (as pictotextual forms) highly susceptible to (re)configuration. Design is thus always proximate. This places each chapter at the edge between—to use well-worn but problematic terminology—normative and positive analysis, with the former focused on aims and values in social life; the latter, on insights into the workings and history of social fabrics.⁴⁰ Even if an author did not start self-consciously thinking about design, understanding what is at stake in formations requires thinking through the possibilities and trajectories of their development, and what those trajectories impinge on.

Design does not sit easily within social science; the latter tends to force a division between normative and positive analysis. When the term design is used in social science it typically denotes strategies for the effective construction of social artifacts such as institutions.⁴¹ While this is a meaningful use of the term, it problematizes the object of design rather than the category of design itself. One way the latter happens in the chapters that follow is through the analysis of the process of design. This is most visible in Weber’s study of open source software design. Sack, in turn, explores the possibility of direct involvement in design by offering tech-

³⁹ An example of such a social vision is Negroponte (1994).

⁴⁰ The chapters vary regarding the degree to which they confront design. Guthrie does so the least, Alker and Sack the most.

⁴¹ A recent example is a special issue of *International Organization* (2001).

nologies of social analysis that can become a part of the architecture of the very large-scale conversations he studies. Alker, in turn, thinks through what a design process bearing on the organization and application of knowledge can look like, emphasizing that the possibilities of *re*-designing narrative structures must be incorporated into a formation from the start.⁴² Bach and Stark also highlight the importance of redesign as they consider ongoing processes of translation and negotiation in activist knowledge communities. Redesign is often critical for electronic activism in the global South if bandwidth-intensive formats for information from the global North are to be used (see Sassen).

Goals and values in design are generally articulated in this volume through the conceptual optic of the social purpose of digital formations. This comes out the strongest in Garcia's chapter, where she explores the terms upon which digital networks can serve the purposes of rural economic development. She forces us to think not only about who might control design processes—and thus shape digital formation—but also how such control might be enacted through international regimes, regional cooperatives, or some other governance form.⁴³

Limits and Logics of Formation

Processes of design and sociodigitization do not unfold in a vacuum. They run up against an array of conditions and forces. For convenience sake, we can divide such forces and conditions into those that are endogenous to digital formations and the technologies they entail and those that are exogenous.⁴⁴ Endogenous conditions and forces are wide ranging. One set has to do with the character of technological change and sociotechnical systems. For example, not all moments in technological development are equally propitious for designs or susceptible to digitization. Garcia claims that today the rapid set of IT innovations associated with the 1990s' boom created an open moment for rethinking uses and applications of technology. The implication is that other moments might be less open and inopportune. Another related endogenous condition stems from

⁴² This is consistent with Herbert Simon's (1996: 165) strategy for avoiding teleology: any given design is only ultimately a platform for further design.

⁴³ We do not mean to imply that digital formation can be controlled or that what actually forms is the result of conscious planning. Controlling or governing processes of design is only one factor in determining the process of digital formation. Cederman and Kraus underscore the limits of design in the case of the EU's pursuit of a communication space.

⁴⁴ This division is for heuristic purposes, recognizing that, in practice, any force or condition likely has both exogenous and endogenous aspects. We are pointing to tendencies and salience.

aspects of a sociotechnical system that may render it unresponsive to design ambitions. Latham argues that the Internet system leaves little room for “legislating” social purpose at the overall system level because—as a dumb network—the Internet offers few means of control at the global level.

More internal to the social configuration of digital formations are tensions that can emerge across the three key dimensions of interaction, organization, and space. Such tensions can arise as a function of change in one dimension that undermines or challenges structures and practices in another dimension. A new pattern of interaction, for instance, can be inconsistent with existing organizational strategies honed in an earlier period. Tensions between dimensions are found throughout this volume. A particularly clear illustration is in Ernst’s chapter. He shows how new interfirm interactions can challenge previously organized relations among firms in a global flagship network.

Tensions can also emerge within the very logics of formation, as various configurations of interaction, organization, and space exhibit both distributed and concentrated tendencies. Ernst writes of “concentrated dispersion” within GFNs; Garcia, of strategies of rural concentration countering a history of deconcentration; Latham, of the concentration that can emerge out of distributed internetwork relations; and Weber, of the concentration of authority that attaches to leaders in open source communities. Sassen makes the double movement of concentration and distribution central to her chapter.⁴⁵ This double movement occurs on two levels. One is within the global financial realm; the other between the relatively concentrated world of global finance and the comparatively distributed world of transnational activism. The latter can, of course, also exhibit its own forms of concentration, as hinted at by Bach and Stark.

The double movement is important because processes of concentration force us to ask questions about who or what governs digital formations, and what is drawn up into them via sociodigitization and on what terms. It bears directly on issues of leadership, authority, and hierarchy that are crucial to thinking through these questions.

Endogenous conditions are important and interesting. But processes of design and sociodigitization are also shaped by exogenous forces. This is not only because digital formations are embedded in social contexts that determine their very social character, but also because sociodigitization is so dependent on the fields of human endeavor and activity that it draws upon. As we have defined it, a digital formation cannot subsume a given

⁴⁵ This parallels some of the dynamics posited by Sassen’s analytic construct of the global city (2001), which gains its specification precisely because a massively distributed global economy requires points of concentration.

area of activity. There should always be aspects of human life “outside” its boundaries, whether such life is ready to enter through digitization or remain in the frontier zone of a formation. Even in such an IT-focused arena as the open source movement, Weber shows how crucial are socioemotional factors such as prestige, trust, leadership, and norms that draw on a host of realms of human interaction from family to work.

Especially important in social contexts are the deep institutional and historical trajectories that digital formations bump up against. Cederman and Kraus point to the trajectories of democratic state formation in Europe that are not easily transcended by new electronic communicative space; Sassen, to the institutionalized practices and rules of global finance and the technical constraints faced in the global South; Ernst, to the transformations in economic life around liberalization; Garcia, to the deep-seated histories of rural zones in national, regional, and global economies; Alker, to the habits of knowledge around conflict; Weber, to the tension-filled intersection of open source practices with longstanding institutions of property and logics of production; and Latham, to the institutional power of state telecom agencies. Guthrie’s chapter makes the intersection of historico-institutional trajectories central to his analysis, as he argues for the importance of preexisting institutional change in shaping political and economic outcomes relating to IT in China.

Ultimately, we can understand that this line of argument is, in some regards, about the limits to IT and digital formations as forces of transformation (something argued quite explicitly in the chapters by Cederman and Kraus and by Guthrie). From our vantage point the identification of limits is a crucial step in understanding a phenomenon because it helps us see its boundaries and, with better accuracy, the way it is intertwined in social life.

We find that the concept of digital formation helps us think more productively about information technology as a social force. It tells us that IT itself is not a stable causal force but part of a process of social formation. Technologies are always in use or, as Latour (1987) says, “in action.” The Internet, for instance, stands for a moving, mobile ensemble of uses, social entities, logics, tensions, and practices. But that does not mean IT is not a force shaping political, social, and economic life. The point is to recognize that IT does so in and through social entities such as the digital formations considered in this book, which are themselves part of broader social fabrics. It is this embedment that allows technologies to have effects across contexts and domains. In turn, we get to see more clearly how the structures and logics found in those social fabrics shape IT.

Digital formations as a category also helps us think about how specific configurations of organization, interaction, and space can emerge across national boundaries bearing on quite different issues, from economics to

education. As research in this area moves forward, scholars should benefit from keeping in mind the tensions and limits that such emergence can encounter. And by making design more central to social science, scholars might open new ways to think about the social purpose of technologies. We believe that the chapters that follow are an important step toward such an analytical vision.

Conclusion

This volume is focused on digital information and communication structures that arise out of the intersection of technology and society. We use the construct “digital formation” to capture this outcome, one shaped both by endogenous technical properties and by endogenized social logics. There are multiple instantiations of this intersection, and these can be organized into several types of digital formations. Electronic Networks, communities, and markets are familiar types to social scientists, and they are central to the various chapters in the volume.

Constituting the object of examination as a digital formation requires us to go beyond the notion that to understand this intersection we can confine analysis to the *impacts* of these technologies *on* society. Impacts are only one of several forms of intersection. Others have to do with the constitution of new domains and with major transformations in old domains. Thus the locus of intersection can be variously conceived, ranging from conceptualizations in terms of independent and dependent variables to the specifying of new objects for study. Constructing digital formations as an object of study entails several tasks, some covered in this chapter and others in the rest of the volume. In this chapter we sought to construct an object of study—digital formations—and to specify its location in a conceptual field that allows us to capture both endogenous technical properties and endogenized social logics.

There are several analytic vocabularies that can be used or constructed to engage in this type of study. Identifying and constructing such vocabularies is part of the conceptual mapping of this field of inquiry and is part of the effort to generate research agendas on the subject. Each of the chapters contains a distinct vocabulary and is focused on a distinct puzzle or theme. We decided to go for a broad range of cases rather than one theme and multiple treatments, a decision that some might find problematic. Even if broad, the range of cases is clearly not exhaustive. It is impossible to cover the full range of pertinent themes. Ours is one possible selection. We look forward to the suggestions of our critics as to other options, not included here. We consider this volume one contribution to an emergent field of inquiry.

References

- Abbott, Andrew. 1995. Things of Boundaries. *Social Research* 62 (4) (Winter): 857–82.
- Amin, Ash. 2002. Spatialities of Globalisation. *Environment and Planning A* 34(3): 385–99.
- Amin, Ash, and Nigel Thrift. 1994. *Globalization, Institutions and Regional Development in Europe*. Oxford: Oxford University Press.
- Barfield, Woodrow, and Furness III, Thomas, eds. 1995. *Virtual Environments and Advanced Interface Design*. New York: Oxford University Press.
- Bell, Daniel. 1973. *The Coming of Post-Industrial Society*. New York: Basic Books.
- Benedikt, Michael, ed. 1991. *Cyberspace: First Steps*. Cambridge: MIT Press.
- Beniger, James R. 1986. *The Control Revolution: Technological and Economic Origins of the Information Society*. Cambridge: Harvard University Press.
- Brenner, Neil. 1998. Global Cities, Glocal States: Global City Formation and State Territorial Restructuring in Contemporary Europe. *Review of International Political Economy* 5:1–37.
- Brown, John Seely, and Paul Duguid. 2002. *The Social Life of Information*. Cambridge: Harvard University Press.
- Calhoun, Craig. 1998. Community without Propinquity Revisited: Communications Technology and the Transformation of the Urban Public Sphere. *Sociological Inquiry* 68(3): 373–97.
- Castells, Manuel. 1996. *The Information Age: Economy, Society and Culture*. Vol. 1: *The Rise of the Network Society*. Oxford: Blackwell.
- Cederman, Lars-Eric. 2002. Computational Models of Social Forms: Advancing Generative Macro Theory. Conference paper prepared for Social Agents: Ecology, Exchange, and Evolution, Chicago.
- Cerny, P. G. 2000. Structuring the Political Arena: Public Goods, States and Governance in a Globalizing World. In *Global Political Economy: Contemporary Theories*, edited by Ronen Palan, 21–35. London: Routledge.
- Chandler, Jr., Alfred D., and James W. Cortada, eds. 2000. *A Nation Transformed by Information*. New York: Oxford University Press.
- Choucri, Nazli. 2000. Introduction: Cyberpolitics in International Relations. *International Political Science Review* 21(3): 243–63.
- Deibert, Ronald. J. 2000. International Plug 'n Play? Citizen Activism, the Internet, and Global Public Policy. *International Studies Perspectives* 1(3): 255–72.
- Der Derian, James. 2001. *Virtuous War: Mapping the Military-Industrial-Media-Entertainment Network*. Boulder: Westview Press.
- Deutsch, Karl. 1953. *Nationalism and Social Communication*. Cambridge: MIT Press.
- Deutsch, Karl, et al. 1957 *Political Community and the North Atlantic Area*. Princeton: Princeton University Press.
- Eickelman, Dale F., and Jon W. Anderson, eds. *New Media in the Muslim World: The Emerging Public Sphere*. Bloomington: Indiana University Press.
- Emirbayer, Mustapha. 1997. Manifesto for a Relational Sociology. *American Journal of Sociology* 103(2) (September): 281–317.

- Ferguson, Yale H., and R. J. Barry Jones, eds. 2002. *Political Space: Frontiers of Change and Governance in a Globalizing World*. Albany: SUNY Press.
- Foucault, Michel. 1977. *Discipline and Punish: The Birth of the Prison*. New York: Vintage.
- Goffman, Erving. 1959. *The Presentation of Self in Everyday Life*. New York: Anchor.
- Granovetter, Mark. 1983. The Strength of Weak Ties: A Network Theory Revisited. *Sociological Theory* 1:201–33.
- Hall, Rodney Bruce, and Thomas J. Biersteker, eds. 2002. *The Emergence of Private Authority in Global Governance*. Cambridge: Cambridge University Press.
- Hargittai, E. 1998. Holes in the Net: Internet and International Stratification. Paper presented at INET '98 Conference: The Internet Summit, Geneva, Switzerland, July 21–24.
- Heidegger, Martin. 1962. *Being and Time*. New York: Harper & Row.
- Howitt, Richard. 1993. A World in a Grain of Sand: Towards a Reconceptualization of Geographical Scale. *Australian Geographer* 24:33–44.
- Innis, Harold. 1951. *The Bias of Communication*. Toronto: University of Toronto Press.
- International Organization*. 2001. 55(4).
- Jervis, Robert. 1976. *Misperception in International Politics*. Princeton: Princeton University Press.
- Johnston, R. J., Peter J. Taylor, and Michael Watts. 2002. *Geographies of Global Change: Remapping the World*. Oxford: Blackwell Publishers.
- Jonas, Andrew. 1994. The Scale Politics of Spatiality. *Environment and Planning D: Society and Space* 12(3): 257–64.
- Knorr-Cetina, Karin, and Urs Bruegger. 2002. Global Microstructures: The Virtual Societies of Financial Markets. *American Journal of Sociology* 107(4): 905–50.
- Laguerre, Michel. 2000. *The Global Ethnopolis: Chinatown, Japantown and Manilatown in American Society*. New York: Macmillan Press.
- Latham, Robert. 2002. Information Technology and Social Transformation. *International Studies Review* 4(1): 101–15.
- . 2003. *Bombs and Bandwidth: The Emerging Relationship between Information Technology and Security*. New York: The New Press.
- Latour, Bruno. 1987. *Science in Action*. Cambridge: Harvard University Press.
- . 1991. Technology Is Society Made Durable. In *A Sociology of Monsters*, edited by J. Law. London: Routledge.
- Laurel, Brenda. 1993. *Computers as Theater*. Reading, MA: Addison-Wesley.
- Lefebvre, Henri. 1974. *The Production of Space*. Translated by Donald Nicholson-Smith. Oxford: Blackwell.
- Loader, Barry, ed. 1998. *Cyberspace Divide: Equality, Agency and Policy in the Information Age*. London: Routledge.
- Mackenzie, Donald 1999. Technological Determinism. In *Society on the Line: Information Politics in the Digital Age*, edited by W. H. Dutton. Oxford: Oxford University Press.
- MacKenzie, Donald A., and Judy Wajcman eds. 1999. *The Social Shaping of Technology*. Buckingham, UK: Open University Press.

- Manovich, Lev. 2001. *The Language of New Media*. Cambridge: MIT Press.
- Massey, Doreen. 1993. Politics and Space/Time. In *Place and the Politics of Identity*, edited by M. Keith and S. Pile, 141–61. London: Routledge.
- May, Christopher. 2002. *The Information Society: A Skeptical View*. Cambridge: Polity.
- Millennium: Journal of International Studies* (1999). Special issue on Territorialities, Identities and Movement in International Relations. 28(3).
- Munker, Stefan, and Alexander Roesler, eds. 1997. *Mythos Internet*. Frankfurt: Suhrkamp.
- Nardi, Bonnie A., and Vicki L. O'Day. 1999. *Information Ecologies: Using Technology with Heart*. Cambridge: MIT Press.
- Negroponte, Nicholas. 1994. *Being Digital*. New York: Knopf.
- Nettime. 1997. *Net Critique*. Compiled by Geert Lovink and Pit Schultz. Berlin: Edition ID-Archive.
- Nye, Joseph, and Robert Keohane. 1971. Transnational Relations and World Politics: An Introduction. *International Organization* 25(3): 329–49.
- Poster, Mark. 1997. Cyberdemocracy: Internet and the Public Sphere. In *Internet Culture*, edited by D. Porter, 93–116. London: Routledge.
- Ruggie, John. 1993. *Multilateralism Matters: The Theory and Praxis of an Institutional Form*. New York: Columbia University Press.
- Sassen, Saskia. 2001. *The Global City: New York, London, Tokyo*. 2d edition. Princeton: Princeton University Press.
- . 1998. *Globalization and Its Discontents: Essays on the New Mobility of People and Money*. New York: The New Press.
- . 2005. *Denationalization: Territory, Authority, and Rights in a Global Digital Age*. Princeton: Princeton University Press.
- Saxby, Stephen. 1990. *The Age of Information: The Past Development and Future Significance of Computing and Communications*. London: Macmillan.
- Scott, James C. 1998. *Seeing Like a State: How Certain Schemes to Improve the Human Condition Have Failed*. New Haven: Yale University Press.
- Sennett, Richard. 1977. *The Fall of Public Man*. New York: Knopf.
- Simon, Herbert A. 1996. *The Sciences of the Artificial*. 3d ed. Cambridge: MIT Press.
- Smith, Marc, and Kollock, Peter, eds. 1998. *Communities in Cyberspace*. London: Routledge.
- Swyngedouw, Erik. 1997. Neither Global nor Local: “Glocalization” and the Politics of Scale. In *Globalization: Reasserting the Power of the Local*, edited by K. R. Cox, 137–66. New York: Guilford.
- Taylor, Peter. 2000. World Cities and Territorial States under Conditions of Contemporary Globalisation. *Political Geography* 19:5–32.
- Taylor, Peter J., D.R.F. Walker, and J. V. Beaverstock. 2002. Firms and Their Global Service Networks. In *Global Networks, Linked Cities*, edited by Saskia Sassen. New York: Routledge.
- Tilly, Charles. 1995. To Explain Political Processes. *American Journal of Sociology* 100(6) (May): 1594–1610.
- Turkle, Sherry. 1995. *Life on the Screen: Identity in the Age of the Internet*. New York: Touchstone.

- Wajcman, Judy. 2002. Addressing Technological Change: The Challenge to Social Theory. *Current Sociology* 50(3): 347–63.
- Walker, R.B.J. 1993. *Inside/Outside: International Relations as Political Theory*. Cambridge: Cambridge University Press.
- Walzer, Michael. 1994. *Thick and Thin: Moral Argument at Home and Abroad*. Notre Dame: University of Notre Dame Press.
- Webster, Frank. 1995. *Theories of the Information Society*. London: Routledge.
- Wellman, Barry, and Gulia, Milena. 1999. Net Surfers Don't Ride Alone. In *Networks in the Global Village*, edited by Barry Wellman, 331–66. Boulder: Westview Press.
- Wilson, Ernest J., III. 2004. *The Information Revolution and Developing Countries*. Cambridge: MIT Press.
- Winnograd, Terry, and Flores, Fernando. 1986. *Understanding Computers and Cognition: A New Foundation for Design*. Menlo Park, CA: Addison-Wesley.
- Zaloom, Caitlin. 2005. Trapped in the Pits: Open-outcry Technology and the Chicago Board of Trade. In *Frontiers of Capital: Ethnographic Reflection on the "New Economy,"* edited by Melissa Fisher and Greg Downey. Durham, NC: Duke University Press.

© Copyright, Princeton University Press. No part of this book may be distributed, posted, or reproduced in any form by digital or mechanical means without prior written permission of the publisher.

For general queries, contact webmaster@press.princeton.edu