Winter 1-4-2008

The once and future information society

James B. Rule

Yasemin Besen-Cassino

Theor Soc (2008) 37:317–342
DOI 10.1007/s11186-007-9049-6

The once and future information society

James B. Rule · Yasemin Besen

Published online: 4 January 2008

Abstract In the late twentieth century, many social scientists and other social commentators came to characterize the world as evolving into an "information society." Central to these claims was the notion that new social uses of information, and particularly application of scientific knowledge, are transforming social life in fundamental ways. Among the supposed transformations are the rise of intellectuals in social importance, growing productivity and prosperity stemming from increasingly knowledge-based economic activity, and replacement of political conflict by authoritative, knowledge-based decision-making. We trace these ideas to their origins in the Enlightenment doctrines of Saint Simon and Comte, show that empirical support for them has never been strong, and consider the durability of their social appeal.

Intellectuals love to vie in the effort to name their own age – to define the essential and salient qualities that distinguish the times in which they live from every other. In the closing decades of the twentieth century, the upper hand in this struggle often seemed to go those insisting that we were entering an "Information Society." Beginning in the 1960s the idea took hold among many social scientists that information had assumed a new and decisive role in human affairs. For exponents of this idea, social processes based on innovative information uses, and particularly the transformation of information into authoritative knowledge, manifestly represented the distinguishing feature of the age. Characterizing the world's "advanced" societies as "information societies" became as axiomatic as bracketing other eras as "Neolithic societies" or "feudal societies."

J. B. Rule (✉)
Center for the Study of Law and Society, University of California,
2240 Piedmont Ave., Berkeley, CA 94720, USA
e-mail: jrule@notes.cc.sunysb.edu

Y. Besen
Sociology Department, Montclair State University, Montclair, NJ 07043, USA
e-mail: ybesen@gmail.com

All sorts of dazzling developments presented themselves to support that designation. These included the rise of cyberspace; the role of science and technology in creating new products and services; the use of social and economic indicators to guide government and private-sector policy; and the role of scientific thinking in setting countless other directions in human affairs. Wherever one turned, one encountered both dramatic new forms of information and ingenious new means for exploiting it. It seemed all but self-evident that no social trend could be more fundamental than these in marking the difference between the world that was emerging, and the one being left behind.

The idea of a world being transformed from top to bottom by new forms and uses of socially-relevant information continues to fuel a steady stream of commentary directed at general audiences.[1] But since the late 1990s, social scientists' fixation on these ideas has yielded ground to other images of our times – "risk society," for example, or "liquid modernity." Skeptics have questioned the centrality of information or knowledge, as juxtaposed against other social states or processes.[2] More recent commentators on the social role of information provide more qualified or nuanced accounts of that role.

But we believe that what we identify as the classic information society (henceforth IS) model warrants a closer and more detailed critical look than it has received. We suspect that the attractions of this view transcend historical periods – that they are likely to reassert themselves in the future, if only because of the complimentary self-image that they provide to intellectuals who embrace them.

In the pages to follow, we probe the intellectual career of these ideas, treating the notion of a rising information society as an empirically-relevant model. This classic IS idea, as we describe it, consists of a series of interrelated characterizations of relations between knowledge and information, on the one hand, and key social processes. These characterizations, though often vaguely stated in IS writings, are empirically relevant. That is, they stand to gain or lose credibility through confrontation with properly selected data. We aim to pursue these possibilities here. Specifically, we seek to assess the coherence and conceptual clarity of the underlying model; to inquire what evidence might, even in principle, bear on the model's persuasiveness; and to consider the (limited) strands of evidence available to that end.

In fact, the recent vogue of information society thinking consists of ideas that are far from new. They date back to the founding of modern social science – notably, to the Enlightenment thinking of Saint Simon and Comte. These and other Enlightenment figures, like many late-twentieth-century social scientists, saw themselves at the forefront of an entirely new social hierarchy – one based on authoritative information or knowledge.

In a famous passage, Saint Simon speculated about the hypothetical losses to France, should it be deprived of "thirty thousand individuals who are deemed most important to the State" – i.e., its feudal elite – versus the loss of the "three thousand

[1] E.g., Alvin Toffler, *The third wave*, New York 1980; Newt Gingrich, *To renew America*, New York 1995; Thomas L. Friedman, *The world is flat; A brief history of the twenty-first century*, New York, 2007.

[2] E.g., Frank Webster, *Theories of the information society*, London 1995; Jorge Schement and Terry Curtis, *Tendencies and tensions of the information age*, New Brunswick, NJ 1995.

best scientists, artists, and artisans in France."[3] In the first case, he wrote, the country would feel the loss only from "a sentimental point of view," whereas the loss of its productive members would leave the nation "a lifeless corpse."[4] Statements like these obviously prefigure Marx's notions that the "superstructures" of feudal society were doomed through their irrelevance to the activities and relationships generating the essential energy and prosperity of a new age.

Saint Simon's model of large-scale social change turned on the role of knowledge and information. What made the progressive elements of French society indispensable was their grasp of facts and principles basic to efficiency and prosperity. As the role of rational understanding increasingly came to be recognized as essential for all socially useful activity, he held, populations would be less and less willing to tolerate authority based on superstition, tradition, or other arbitrary claims. Thus like Marx, Saint Simon regarded the great revolution of 1789 as a manifestation of the poor fit between the structures of feudal authority and the realities of everyday practice. Unlike Marx, he saw change in prevailing forms of knowledge as the engine driving these changes.

The enlightened, productive classes in Saint Simon's model were thus defined by their access to, and reliance upon, authoritative knowledge. To be sure, different members of this group embodied this reliance in different measure – from pure scientists and other theorists to the practical artisans or husbandmen whose work was organized on rational principles. The crucial point was that the rationality of their thought-ways produced new economic bounty, and concomitantly new and distinctive social forms. Above all, the rise of rational thinking supported new principles of social hierarchy, as authority increasingly came to be based on authoritative knowledge. Thus politics evolved relentlessly into administration.

August Comte, Saint Simon's disaffected disciple, put forward a similar vision. For him, the rise of science was evolving into a new positivist religion that would eclipse the authority of both church and state. In the words of Frank Manuel, the authoritative chronicler of these Enlightenment ideas, Comte held that "[t]he state was but a subject ready to take on the coloration of the positive religion once the executive power was enlightened."[5]

Many of these ideas of course now have a fantastical ring – especially when identified as originating with the founders of positivism. But the idea of authoritative scientific knowledge supplanting the sordid role of naked interest in human affairs exerted great influence in late twentieth-century IS thinking, as did a number of other key elements of Saint Simon's and Comte's thinking.

By the 1960s, thinkers in various social science disciplines began to see the IS model as describing profound changes gathering speed in the world's advanced societies. Different thinkers focused greater or lesser attention on different elements of the model. Indeed, what we identify as the classic IS model is multi-faceted enough that one might logically accept one part of it while rejecting others. But the elements appear to have elective affinities for one another; thinkers attracted to one

[3] Keith Taylor, editor, *Henri Saint Simon; Selected writings*, London 1975, p. 194.

[4] Ibid., pp. 194–195.

[5] Frank Manuel, *The Prophets of Paris*, Cambridge MA, 1962, pp. 270–271.

seem likely to embrace others. We might summarize the over-all vision in the following terms:

1. History proceeds through *stages*, each stage shaped by a distinctive social force or principle. We have recently entered a new era distinguished by the changed roles played by information and knowledge in social and economic life. Latter-day information society writers do not commit themselves to precise dates for the onset of this new era, but many seem to see it dating roughly from the beginning of the last third of the twentieth century.
2. A basic feature of this new order is that larger proportions both of populations and of their activities involve purposeful use of authoritative information or knowledge. For this reason, information and knowledge *matter* more than before in setting directions of human conduct.
3. In this new social order, information and the ability to use it appropriately become the source of great value. Inputs of knowledge and information play a crucial role in fostering productivity and economic growth. Accordingly, decisive advantage accrues to those individuals and organizations that master their use.
4. Perhaps the most consequential feature of the new order is change in all kinds of authority and direction-setting in public affairs. In the information society, exercise of power increasingly requires justification through authoritative information. Arbitrary, uninformed decision-making based on special or partisan interests is less and less tenable. Accordingly, structures and processes involving authority, from those of the state to those in private-sector organizations, are undergoing profound change.

The vision of social change implied in these four points, we believe, inevitably has special appeal to intellectuals. It obviously ascribes to this group a special and flattering role in realization of key values, as interpreters of the requirements of reason in human affairs. This idea entered twentieth-century sociology, via Comte, in Durkheim's vision of sociologists as physicians of the body social. From there, it helped inspire American functionalist thinking on expert "solutions" to "social problems." The self-congratulatory image of social science conveyed here is so attractive that we doubt that it has made its last historical appearance.

We want to call special attention to the last of the four points; a distinctive theoretical element of Saint Simon's and Comte's thinking that continued to influence late twentieth-century scholars. The idea that deep social conflicts are somehow based on inadequate understanding is a characteristic Enlightenment notion. The broad alternative consists of views that posit irreconcilable conflicts of interest as an enduring possibility in social life, regardless of the state of reliable knowledge or scientific understanding. We need to assess what empirical light recent social developments may have to shed on these conflicting visions.

IS thinking in the late twentieth century

Again, though logically independent, the four themes noted above often go together. At least among late-twentieth-century IS thinkers, those who held that information

was taking on sweeping new roles in social life tended also to believe that the overall effect is unifying and beneficent. Let us review some key markers in the resurgence of IS thinking since the 1960s.

Triggering the revival was economist Fritz Machlup's *The Production and Distribution of Knowledge in the United States* (1962).[6] Machlup's inspiration was to consider knowledge as a distinct sector of the economy, and to classify and survey its extent. He systematically enumerated the dollar value of such activities as education, research and development, communications and the like, along with the machines and other capital that support these activities. One key finding was that knowledge-related activities were taking on increasing importance in the US economy. The "expenditures for knowledge-production were almost 29% of the GNP" in 1958, he concludes; remuneration to "knowledge workers" rose much more sharply, Machlup reports, in the two decades leading up to 1958 than did other remuneration.[7] These conclusions that growth in knowledge-related activities was greatly outstripping other forms of growth in the economy made a vast impression on subsequent debate.

Machlup offered no hypotheses on the social relationships characterizing what he saw as an increasingly information-based economy. But such ideas became common currency among liberal social scientists in the 1960s. Political scientist Robert Lane provided one salient contribution in an article entitled "The Decline of Politics and Ideology in a Knowledgeable Society." He defined the knowledgeable society as one whose members

> (a) inquire into the basis of their beliefs…; (b) are guided… by objective standards of veridical truth…; (c) devote considerable resources to this inquiry and thus have a large store of knowledge; (d) collect, organize and interpret their knowledge in a constant effort to extract further meaning from it for the purposes at hand; (e) employ this knowledge to illuminate (and perhaps modify) their values and goals as well as to advance them.[8]

Lane saw knowledgeable social relations on the rise, particularly in the public sphere. There politics, in the sense of naked clashes of interest, were giving way to rational public decision-making. Indices of such change were the rise of the civil service, professional bodies like the General Accounting Office, the Council of Economic Advisors, and growing reliance on special commissions and professional research organizations like RAND. Though Lane did acknowledge that "there will always be politics," the broad trend that he describes corresponds to what Saint Simon had in mind when he envisaged a social world evolving "from the government of men to the administration of things."[9]

Lane's sweeping ideas did no more than articulate a swelling current of educated opinion in the 1960s on relations between expert knowledge and governance. This was, after all, the period in which a number of noted intellectuals discerned the

[6] Fritz Machlup, *The production and distribution of knowledge in the United States*, Princeton 1962.

[7] Ibid., pp. 399, 396.

[8] Robert Lane, The decline of politics and ideology in a knowledgeable society. *American Sociological Review* (31) 5, p. 650.

[9] Taylor, *Henri Saint Simon*, p. 157.

extinction of ideology in favor of applications of expertise in the management of public affairs.[10] Those years saw a striking outpouring of optimism among social scientists about the potential role of their disciplines in solving social problems and directing the actions of power-holders.

One manifestation was the movement to create systems of "social indicators," statistics on the well-being of American society that would provide authoritative policy implications to decision-makers.[11] Another was the sweeping recommendations from Dr. Nicholas Golovin, of the President's Office of Science and Technology. In a truly Saint-Simonian inspiration, he proposed nothing less than a fourth branch of government, composed of experts from both physical and social sciences, to guide policy formation. The new agency would "a) collect all the data necessary to continually track the state of the nation, b) define potential problems suggested by the information, c) develop alternative plans to cope with the problems, and d) evaluate ongoing projects in terms of real time and advise the people accordingly."[12]

But quite apart from their public appeals for expanded professional influence, social scientists' scholarly writings identified a new, information-based era arising in the world's advanced societies. Some of the earliest and strongest statements came from Peter Drucker.[13] Like Saint Simon, he heralded the beginning of a new phase of social evolution, a phase marked by a new socio-economic role of information:

> "Knowledge" rather than "science" has become the foundation of the modern economy…. To be sure, science and scientists have suddenly moved into the center of the political, military, and economic stage. But so have practically all the other knowledge people. It is not just the chemists, the physicists, and the engineers who get fat on consulting assignments… Geographers, geologists, and mathematicians, economists and linguists, psychologists, anthropologists and marketing men are all busy consulting with governments, with industry, with the foreign aid program, and so on. Few areas of learning are not in demand….
>
> This demand, in turn, reflects the basic fact that knowledge has become productive. The systematic and purposeful acquisition of information and its systematic application… are emerging as the new foundation for work, productivity, and effort throughout the world.[14]

In a later statement, Drucker draws a conclusion that is sweeping, but by no means uncharacteristic of subsequent information society thinkers:

> That knowledge has become *the* resource, rather than *a* resource, is what makes our society 'post-capitalist.' This fact changes – fundamentally – the structure

[10] Daniel Bell and Irving Kristol, Editorial: What is the Public Interest?, *The Public Interest* (1) 1, 1965 pp. 3–4.

[11] US Department of Health, Education and Welfare, *Toward a social report*, Washington, D.C. 1969.

[12] John Lear, Public policy and the study of man, *Saturday Review*, 7 September 1968, p. 60.

[13] E.g., Peter Drucker, *The age of discontinuity*, New York 1968.

[14] Ibid., pp. 265–66.

> of society. It creates new social and economic dynamics. It creates new politics….
>
> The knowledge we now consider knowledge proves itself in action. What we now mean by knowledge is information effective in action, information focused on results. These results are seen *outside* the person – in society and economy, or in the advancement of knowledge itself.[15]

Here we have nearly all the key elements of the IS model.

These ideas received perhaps their most noted expression in Daniel Bell's *The Coming of Post-Industrial Society; a Venture in Social Forecasting*. Like Machlup, Drucker and many other observers, Bell held that crucial information processes were becoming both more widespread and more influential in the world's "advanced" societies. He wrote in the opening pages of that work,

> Post-Industrial society is organized around knowledge, for the purpose of social control and the directing of innovation and change; and this in turn gives rise to new social relationships and new structures….[16]

This new role of knowledge, Bell held, involved not just quantitative growth but a qualitatively new stage of social development – "a new principle of social–technical organization and ways of life, just as the industrial system… replaced an agrarian way of life."[17]

For Bell, as for Lane, new sources of authoritative information created new political directions – by making it possible to chart rational designs for collective action in ways that bypassed the ideological snares of politics. And as for Drucker (and Saint Simon), the emergence of a world that turned on information required increasing scientific and technological sophistication:

> … one can say that the methodological promise of the second half of the twentieth century is the management of organized complexity (the complexity of large organizations and systems, the complexity of theory with a large number of variables), the identification and implementation of theories of rational choice in games against nature and games against persons, and the development of new intellectual technology which, by the end of the century, may be as salient in human affairs as machine technology has been for the past century and a half.[18]

Note the top-down character of the action seen to arise from the new forms of knowledge; Bell's view is obviously no more populist than Saint Simon's.

Like all information society thinkers, Bell viewed information-related activities as a decisive new source of value in economic life. And access to information, and the ability to work with it, confer power and authority.

---

[15] Peter Drucker, *Post capitalist society*, New York 1993, pp. 45–46.

[16] Daniel Bell, *The coming of post-industrial society: A venture in social forecasting*, New York 1973, p. 20.

[17] Daniel Bell, The third technological revolution. *Dissent*, Spring 1989.

[18] Daniel Bell, *The coming of post-industrial society*, p. 28.

> Information becomes a central resource, and within organizations a source of power. Professionalism thus becomes a criterion of position….
>
> If the struggle between capitalist and worker, in the locus of the factory, was the hallmark of the industrial society, the clash between the professional and the populace… is the hallmark of conflict in the post-industrial society.[19]

Thus, like Saint Simon and many contemporary writers, Bell saw experts as a new and indispensable class. Their new role in directing human action on the basis of authoritative information would define the distinctive social dynamics of the new era.

By the 1980s, ideas like these had become so widely accepted as to be repeated with less and less qualification. The utopian elements grew even more marked, as commentators convinced themselves that the most seemingly intractable social dilemmas would be resolved through availability of authoritative information. In the words of Harlan Cleveland, political scientist, management expert, university president, and Ambassador:

> We can take it as read that information is the dominant resource in the United States, and coming to be so in other advanced or developing countries.[20]

And he continued,

> The inherent characteristic of physical resources (both natural and man-made) made possible the development of hierarchies of *power based on control* (of new weapons, of energy sources, of trade routes, or markets, and especially of knowledge), hierarchies of *influence based on secrecy*, hierarchies of *class based on ownership*, hierarchies of *privilege based on early access* to valuable resources, and hierarchies of *politics based on geography.*
>
> Each of these five bases for discrimination and unfairness is crumbling today – because the old means of control are of dwindling efficacy; secrets are harder and harder to keep; and ownership, early arrival, and geography are of dwindling significance in getting access to the knowledge and wisdom which are the really valuable legal tender of our time.[21]

Here we see the resilient optimism of information society thinking in its full-blown form. Increasingly available, authoritative information becomes, in this view, the all-purpose leveller of irrational social advantage. As for Saint Simon, authoritative, scientific understanding undermines the bases for arbitrary privilege and unproductive social conflict.

Following Bell, perhaps the most noted strictly sociological development of the information society idea comes from Manuel Castells (1996). His monumental, three-volume study of global social change, *The Information Age*, lives up to its title by casting information processes as central to distinctive, newly-emerging social

[19] Ibid., pp. 128–129.

[20] Harlan Cleveland, The twilight of hierarchy; speculations on the global information society. In Bruce R. Guile, editor, *Information technologies and social transformation*, Washington, DC 1985, p. 56.

[21] Ibid., p. 60.

structures. Like Bell, Cleveland, Drucker, Machlup and many others, Castells takes it for granted that control of information, and of the technologies that manipulate it, grants commanding status in all sorts of settings. In the Prologue, he writes

> In the new, informational mode of development the source of productivity lies in the technology of knowledge generation, information processing, and symbol communication. To be sure, knowledge and information are critical elements in all modes of development, since the process of production is always based on some level of knowledge and in the processing of information. However, what is specific to the informational mode of development is the action of knowledge upon knowledge itself as the main source of productivity… Information processing is focused on improving the technology of information processing as a source of productivity, in a virtuous circle of interaction between the knowledge sources of technology and the application of technology to improve knowledge generation and information processing.[22]

And for Castells, too, success in the emerging global order depends on strategic use of newly-available information resources:

> the successful organizations are those able to generate knowledge and process information efficiently; to adapt to the variable geometry of the global economy; to be flexible enough to change its means as rapidly as goals change... *The network enterprise makes material the culture of the informational/global economy: it transforms signals into commodities by processing knowledge.*[23] (1996, pp. 171–172, emphasis in original)

Again, a familiar theme: successful organizations, those most adapted to the world of the future, will be those that take full advantage of the possibilities of information for rational decision making.

One could extend this review of scholarly visions of the information society at great length.[24] These and other authors differ in the detail of their ideas on the role of information in late-twentieth-century social change. But all embrace key elements of the four-point model spelled out above, and view that model as increasingly approximated by empirical realities in advanced societies of the late-twentieth century.

It would be absurd to imagine that any model as rich as this one could admit of a binary, up-or-down "test." But it does abound with empirical implications, all of them at least in principle accessible to confrontation with potentially contrary evidence. Examination of such evidence, we hold, not only raises questions about the empirical strength of the doctrine, but also about some key theoretical elements going back to Saint Simon himself.

---

[22] Manuel Castells, *The rise of the network society; economy, society and culture*, Volume I of *The information age: economy, society and culture*, Malden, MA 1996, p. 17.

[23] Ibid., pp. 171–72, emphasis in original.

[24] E.g., Alain Touraine, *The post-industrial society*, New York 1971; Simon Nora and Alain Minc, *The computerization of society*, Cambridge, MA 1980; James Beniger, *The control revolution*, Cambridge, MA 1986; Shoshana Zuboff, *In the age of a smart machine; the future of work and power*, New York 1988.

The rise of "information activities"

One salient idea is the notion that the rising, information-oriented social order involves increasing economic activity based on knowledge or information. These ideas have been pursued in greatest detail by Marc Porat in a much-noted report commissioned by the US Commerce Department.[25]

Inspired directly by Fritz Machlup, Porat set out to quantify, in exhaustive detail, the changing role of information in the US economy, particularly regarding work and occupations. In addition to crediting Machlup, Porat acknowledges the influence of works by Bell and Drucker. Central to Porat's analysis is the distinction between informational and non-informational work. "An economy can be separated into two domains," he writes:

> The first is involved in the transformation of matter and energy from one form to another. The second is involved in transforming information fron [sic] one pattern into another.[26]

Porat acknowledges that all human activity involves some uses of information. But he willingly identifies various activities and occupations as *predominantly* informational or non-informational. Thus the information sector of a firm can be understood as

> all the workers, machinery, goods, and services that are employed in processing, manipulating or transmitting information. The telephone, the computer, the printing press, the calculator, the manager the secretary and the programmer – these are all essential members of the information activity.[27]

Similarly, Porat identifies *information capital* including "typewriters, calculators, copiers, terminals, computers, telephone and switchboards" and *information workers* "research scientist, engineer, designer, draftsman, manager, secretary, clerk, accountant, lawyer, advertising manager, communications officer, personnel director – all essentially paid to create knowledge, communicate ideas, process information – in one way or another transform symbols from one form to another."

Porat classifies all 422 occupations reported by the US Census in terms of whether "the worker's income originates *primarily* in the manipulation of symbols and information." The economy as a whole is further classified into a "primary information sector" consisting of "those firms which supply the bundle of information goods and services exchanged in a market context" (p. 3) and "secondary information sector" including "all the information services produced for internal consumption by government and non-information firms" (p. 3).[28] Summing the activities of these two sectors yields statistics intended to describe the total role of information in the economy. After exhaustive efforts of classification, Porat

[25] Marc Porat, *The information economy; definitions and measurement*, Washington, DC 1977.

[26] Ibid., p. 2.

[27] Ibid., p. 2.

[28] Ibid., p. 3.

concludes that "the informational activity" accounted for some 46% of the US GNP in 1967 – a figure much cited since then.[29]

A major concern of Porat's is historical change. He detects a broad shift from the nineteenth century, when the first statistics are available to him, to the time of his writing; Porat comments,

> In Stage I (1860–1906), the largest single group in the labor force was *agriculture*. By the turn of the century, *industrial* occupations began to grow rapidly and became predominant during stage II (1906–1954). In the current period, Stage III, *information* occupations comprise the largest group.[30]

Findings like these obviously resonate with key evolutionary ideas of IS thinking. For many readers, they have no doubt confirmed the perception that the United States and undoubtedly other advanced societies have indeed entered an "information age."

But there are questions of interpretation. Surely some of the employment decline in both agriculture and manufacturing results simply from social differentiation – i.e., rising division of labor – in these domains. Insofar as farmers and manufacturers come to rely on accountants, agronomists, engineers, or other specialists in symbolic activity, the proportion of "information work" registered among all occupations is bound to grow. But such growth would not in itself indicate that more "informational work" is being done – only that certain informational aspects of what had been bracketed as essentially non-informational work have now been re-organized as stand-alone activities. The cumulative effect of reclassifications like this would be to exaggerate the rise of informational activities throughout the economy.

At one point, Porat seems to bump up against this possibility, without altogether acknowledging its implications. This occurs in his discussion of what might appear as an unaccountable rise in information occupations in the period 1860–1885, followed by an equally abrupt decline from about 1885 to just before the turn of the twentieth century. What can explain this rise, at a period when we have little to suggest a special rise in information use in American life? Porat's interpretation is as follows:

> In part, the growth is a definitional artifact: as family farms and businesses dissolved in the face of industrialization and urbanization, jobs assumed a formality that was measured by the Census. The son and daughter vanished, and an employee took their place.[31]

Although Porat does not give evidence for this interpretation, his account is consistent with what one would expect as the result of differentiation. But it raises deeper questions about the significance of the broad shift toward informational activities and occupations shown in Porat's work. If the otherwise unexplained growth of "informational occupations" might result from changing classifications of activities that in fact did not change in their net informational content, to what extent

[29] Ibid., p. 8.

[30] Ibid., p. 122.

[31] Ibid., p. 134.

might the same be said for the rise of the information economy more generally? How many new information occupations represent qualitatively new activities, and how many are simply activities of long standing, reorganized as distinct specialties?

But Porat's figures do attest to the role of one unquestionably authentic social and economic trend – the shift from human to machine power. This much-noted transition had implications in all sorts of directions, ranging from rising consumption of fossil fuels to falling caloric intakes among the populations of industrial societies. Since agriculture and manufacturing are defined as non-informational, the numbers of people involved in them are bound to decline as machines take over the work of digging, lifting, assembling, and the like. The workers freed from such physical work on the farm and in the factory then become available for work involving manipulation of symbols, rather than things.

Other questions of interpretation arise in connection with the binary distinction between "informational" and "non-informational" activities. Does this distinction really get at the sorts of issues raised, say, by Saint Simon when he sought to identify the occupations most reliant on rational or scientific reasoning? Porat, we believe, aims at a much simpler judgment. He compares the work of a carpenter with that of a computer programmer, describing both as skilled occupations:

> However, the programmer's livelihood originates with the provision of an information service (a set of instructions to the computer), while the carpenter's livelihood originates with the construction of a building or a piece of furniture – non-informational goods.[32]

This distinction misses two important things. First, the role of information processes in work involving the manipulation of things (i.e., "non-informational goods"); and second, the *analytical content* of information processes involved in any sort of work. All IS authors (Porat included) ultimately acknowledge that information is an essential element of *all* social action. Regarding work roles, for example, it is impossible to imagine any form of work that does not require the worker in some way to assess the task at hand. But it seems absurd to ignore that *different forms of work embody different forms of information processing, including different degrees of analysis and abstraction*.

Compare the work of a data-entry specialist with that of a surgeon. The former's work – let us say, transferring sheets of hand-written sales orders into the computer record – is entirely informational. In contrast, by Porat's criterion, the surgeon engages in a non-informational activity, in that the ultimate result is change of a physical kind. Yet we ordinarily think of surgery as involving scientific thinking, or at least application of analytical abstractions to information on complex situations. Data-entry, on the other hand, is totally informational, but normally not especially analytic.

Then there are ambiguities in the application of the informational versus non-informational distinction. Someone who digs a hole in the ground presumably is engaged in non-informational work – despite the fact that he or she clearly must exercise at least some judgment about where to dig, and how. But how do we

[32] Ibid., p. 106.

classify the operator of a machine that digs the same sort of hole? The equipment operator makes the same sorts of judgments as the manual worker, but implements them through the control panel of the machine rather than muscle-power. So, for that matter, do airline pilots, operating engineers at nuclear power plants and the anesthetist who monitors the patient undergoing surgery. Should we regard all these forms of work as strictly and equally "informational"?

For Saint Simon, again, the crucial question was how and how much a particular activity contributed to efficiency in the pursuit of commonly-held social ends – prosperity, good government, or reduction of grave social conflict, for example. But it is hard to ascribe such results *ipso facto* to many occupations that Porat would bracket as "informational." True, that category includes a number of professions that Saint Simon would have recognized as part of his progressive class – engineers, urban planners, accountants, lawyers – all engaged in activities that arguably involve application of rational principles to human endeavors. But no less "informational," in Porat's terms, are such occupations as advertising copy writers, creators of soap operas, fortune tellers, and video-game designers. Porat is characteristically direct about this issue:

> I am completely indifferent as to the motivation for acquiring knowledge, or even to the quality of the knowledge relative to other kinds of knowledge. It does not have to be 'good' information to qualify as an information service, nor does it have to be 'true'. Unfortunately, lies, distortions, and inaccuracies are still information.[33]

As a practical matter, one can see why Porat chose to avoid judging quality in information activities. The conceptual ambiguity of making such judgments for every distinct occupation would surely make it impossible to arrive at the summary figures that he presents. But the binary informational versus non-informational distinction leads us in a very different direction from the one that inspired Saint Simon.

What can we learn from Porat's exposition concerning the essentials of information society thinking?

First, it seems clear that, as work roles requiring major physical exertion in farms and factories have grown fewer, a growing proportion of all occupations have become "informational" in Porat's sense. Fewer and fewer jobs involve application of human muscle power to planting, lifting, moving, digging, and the like – and more involve recording or transmitting information, guiding machines in light of information, co-ordinating action with others, and similar symbolic activities.

Similarly, like many other domains of social life, information processes have clearly grown both more differentiated and more formal over the last century or so. This means, for one thing, that information itself is more likely to be recorded outside the human mind – in written codes and rules, computer records, symbolic algorithms, and texts of many other sorts. And it means that activities involving information increasingly have become the province of specialized roles. The affinity between these newly-differentiated roles and formally-recorded information is obvious. But it would be a mistake to imagine that the activities involved – from

[33] Ibid., p. 23.

weather forecasting to psychotherapy – have no analogs in less formally distinct informational activities.

It is beyond dispute, in other words, that information use is taking new forms. But it is far from clear that these changes necessarily involve *net growth* in the informational content of social processes (however one might measure this diffuse concept), or that the role played by information has necessarily become, on balance, more consequential.

In search of the information society

These quandaries compel reflection on what evidence might conceivably serve to support the distinctive tenets of IS thinking. Clearly it will not do to assume that all activities that are *symbolic* – i.e., all uses of information – must necessarily conduce to what Saint Simon would consider enlightened social action, or what Lane would bracket as "knowledgeable" social relations. Informational activities distinctive of our times, after all, include everything from research aimed at elimination of international conflict to promulgation of computerized horoscopes; from efforts to chart and control destructive climate change to production of ever-more sophisticated video games. Of the enormous investments devoted to information, vast proportions obviously go to support activities that not only are not "knowledgeable," as Lane would have it, but that appear to foster anything but rational or analytical thinking. These latter roles of information – from advertising to pornography to pure entertainment – aim to confuse, benumb, or simply distract human thought processes. It is very difficult to imagine how anyone might measure the proportion of these latter processes among all "information activities."

The problem is both empirical and theoretical. Empirically, it is all but impossible to imagine how activities like those detailed by Porat could reliably be classified in terms of the extent to which they support any form of rational decision-making. The practical difficulties involved in any such operation would simply be overwhelming. Conceptually, the issues are even more troublesome. For any assessment of the social role of information requires reckoning with a most basic theoretical topic – the ultimate ends of human action.

By this, we mean questions of whether conflict and inefficiency in human affairs *in general* are better understood as unsuccessful collective strivings toward goals that are essentially shared – or whether contention over ultimate ends or interests ought simply to be considered a fundamental fact of the human condition. Even human activities involving highly efficient *instrumental* uses of information, after all, may clearly serve *ultimate* ends that hardly anyone could consider substantively rational – e.g., precise calculation of the most efficient ways of administering concentration camps or propaganda campaigns. Authors like Saint Simon and Lane embrace the assumption that increased availability of authoritative knowledge will drastically reduce the long-term bases for social conflict and otherwise serve the common good. But other assumptions, of equally long theoretical pedigree, lead to quite different empirical implications.

IS thinkers have not had enough to say on these issues. One reason, we suspect, is that empirical evidence that might form bases for judging the strength of the

IS position is either thin or ambiguous. Another is that Saint Simon's guiding assumption that more knowledge must somehow lead to reduction in waste and social conflict simply does not withstand critical reflection.

In the following pages, we aim to do a bit better than IS authors have, by identifying and examining the limited empirical evidence available. We seek to pursue what we consider the salient empirically-relevant arguments for their view, by examining the social role of information in five settings. These are: the role of information in fostering economic growth and productivity; the role of "theoretical knowledge" (à la Daniel Bell and others) in personal advancement; the personal and social benefits of formal education; the influence of information on hierarchy in formal organizations; and the role of knowledge in governance. These five contexts, we acknowledge, are highly disparate, both conceptually and in the sorts of empirical evidence that might be drawn from them. But they represent the points at which IS doctrine comes closest to making itself accessible to empirical refutation of any kind.

We hold that a hard look at the largely scanty and ambiguous empirical evidence on these matters does not provide clear support for the IS view. But let us be exact about our argument. We do not dispute that changing information processes hold important consequences for emerging patterns of social change, or that new forms and roles of information warrant serious sociological attention. Nor, we stress, do we mean to suggest than any empirical evidence *refutes* the essentials of IS thinking. IS thinking is for one thing far too diffuse for any such possibility. Our point is rather that the empirical implications of the doctrine are vague and elusive and that *the disparate and fragmentary evidence that is available provides no decisive support* for it. In particular, we see no clear evidence for the pre-eminence of changes in "information activities" among myriad other social trends and forces shaping the future. Where evidence seems to show rising importance of information, the very interpretation of such evidence is often confounded by the unsettled theoretical issues we have noted.

The role of information in fostering economic growth and productivity

Beginning with Saint Simon, IS thinkers have held it a basic feature of the new era that information and knowledge are taking on increasing economic value. One need only recall the statements quoted above from Cleveland or Drucker to the effect that information is coming to replace the role of capital.

As in other contexts, one can point to many contemporary trends that would seem to support the case. Everyone notices the value attached, for example, to patents, genetic information, data derived from satellite observations, personal data (for example, in guiding decision-making in credit and marketing), or successful business strategies. One thinks of the fortunes made from software design, energy exploration, or the exchange of insider information in world affairs, finance or commodities markets. In all such cases, information is clearly a source of value.

But are information processes really growing more important *in relation to the economy as a whole*? Is there any evidence of an "information revolution" in the second half of the twentieth century involving a heightened importance of information among other inputs to the production of wealth?

Any attempt to answer a question like this runs up against the vagueness of IS thinking as to what sorts of "information activities" might reasonably be considered crucial economic inputs. In our own investigations, we have analyzed figures on *patent issuance, educational expenditures, and research and development expenditures* in the United States since 1955.[34] All three of these factors represent ways in which informational resources might plausibly take on economic value. Accordingly, we looked for evidence that these factors contributed to American economic productivity and growth in the period between 1954 and 2001.

In fact, these analyses show that the three information factors do not predict productivity in this period. At least as indexed by these factors, informational inputs show no effect on productivity change in American during this period.

We also examined the role of these inputs in predicting economic growth. Here we found strong inputs from research and development expenditures and education; patent issuance had no predictive value. This result is broadly supportive of the IS idea that information activities foster prosperity. Why such a relationship should be absent in the case of productivity is mystifying in this context, since IS thinking has consistently envisaged that growth of information and knowledge make human labors more productive.

We looked particularly for evidence of a *transition* to an information society or economy at some point in the second half of the twentieth century. No IS author we know of has specified when, exactly, such a transition is supposed to have occurred. But implicit in many writings seems to be the notion that some such shift was under way by the end of the 1960s – perhaps corresponding to the time when computing came into widespread use in organizations.[35]

[34] Our data come from various credible sources such as the Bureau of Labor Statistics and the United States Census Bureau Abstracts. With the selected information-related variables such as educational expenditures, research and development expenditures and number of patents issued, we sought to explain growth in GDP, measured in constant dollars and productivity, measured as hourly output in all businesses in the United States. Our dataset provides over-time information on these variables since 1955. We have estimated two time-series models. In our first model, we explore the effects of information-related activities on economic growth. We have estimated the effects of informational activities such as research and development expenditures, educational expenditures, and number of patents issued on GDP. For reasons of multicolinearity, we have estimated an ARIMA time-series model, predicting not only effects of information related activities on economic growth contemporaneously, but also in 5 and 10 year lags. In our second model, we have estimated the effects of the same two information-related activities on productivity through a similar ARIMA time- series model with 5 and 10 year lags. Our findings show that, while information-related activities have no significant effect on productivity, they strongly predict economic growth. The effects of information-related activities on economic growth are not only statistically significant, but also substantially strong both at the present time, and in 5- and 10-year lags. We have also tested the strength of the information-related activities in predicting economic growth in the 1950s and today. Our findings show that in the first period, both educational and research and development expenditures play a role in economic growth, while in the second period, only research and development expenditures do. Overall, we demonstrate a positive effect of information-related activities on economic growth, while we do not find any significant effects on productivity.

[35] The closest any of these authors seems to come to identifying a date for the onset of the information society seems to be in the following passage by Peter Drucker: "The impact of information, however, should be even greater than that of electricity. Information has always been unbelievably expensive.... Now, for the first time, it's beginning to be available – and the over-all impact on society is bound to be very great." These remarks were first published in 1967.

We might have arbitrarily marked the cutoff point between the two periods at 1968, but statistical limitations led us to break our analyses into the periods 1955–1970 and 1971–2000. These analyses, however, show no dramatic differences in the strength of information variables in predicting economic growth during these periods. Both research and development and educational expenditure are statistically significant predictors during the first period, whereas only research and development is a predictor during the second. Change in patent issuance is not a predictor in either period.

To summarize: our analyses show positive effects of our informational inputs on economic growth between 1954 and 2001, but little effect of productivity change during this period. What the analysis does *not* show is evidence of the rise of a distinctively new role of information in economic growth beginning around 1970.

"Theoretical knowledge" as the basis for personal success

Another empirically-relevant theme widely sounded by IS thinkers is the rising importance of theoretical knowledge for personal productivity and success. In the growing, information-oriented world, it is said, disproportionate reward will inevitably go to those whose performances are based on formal, science-based knowledge.

Daniel Bell often strikes this note in his writings on post-industrial society.[36] For him, social advantage in an information-oriented world is bound to accrue to university-educated scientists and other specialists who apply the latest scientific insights to the management problems of complex, far-flung social and economic structures. Thus, he asserts, we should no longer expect major inventions from figures like A. G. Bell or T. A. Edison, talented innovators lacking in formal education.[37]

Note that the specification of *theoretical* knowledge serves to resolve some of the nagging questions left by analyses like Porat's. Bell cannot be accused of lumping unreflective, non-analytical uses of information with those that he sees as essential to the distinctive qualities of post-industrial society. The forms of knowledge that matter, he holds, are those propounded in scientific terms and disseminated through formal institutions of higher learning.

But this line of argument raises questions in its own right. Is "theoretical" knowledge really a distinct category? How does the analyst recognize it, in contrast to other forms of knowledge – let alone measure the frequency of its use? There would seem to be many ambiguous cases. Presumably the knowledge underlying genetic mapping to develop new treatments for disease would qualify as strictly "theoretical" in Bell's sense; here the derivation of practical action from "pure" scientific inquiry appears clear. But one can also point to developments like the creation of the Microsoft empire. Its founder, Bill Gates, cut short his formal education at Harvard to plunge directly into what proved to be a world-shaping,

[36] Daniel Bell, *The coming of post-industrial society*, pp. 20, 343–344.

[37] Daniel Bell, The third technological revolution, p. 169.

knowledge-intensive business.[38] This latter success story sounds much like an echo of the biographies of A. G. Bell or T. A. Edison, Daniel Bell notwithstanding.

Another case in point is George Soros, the fabulously successful investor who began as a student of philosophy under Karl Popper and seems always to have thought of himself as an intellectual. Those close to Soros gave mixed reports on the role of formal, scientific reasoning in his financial decision-making. His biographer quotes the words of his son:

> [George Soros] will sit down and give you theories to explain why he does this or that. But… the reason he changes his position on the market or whatever is because his back starts killing him….
>
> If you're around him a long time, you realize that to a large extent he is driven by temperament. But he is always trying to rationalize what are basically his emotions.[39]

The biographer cites similar accounts from various other close associates of Soros. The picture that emerges is one of brilliant analysis, certainly informed by resourceful use of information – but not exactly of "theoretical" reasoning.

Similar ambiguities arise in attempts to classify many important *genres* of information use. How do we understand the work of university-based jurists seeking to protect consumer interests by developing new legal concepts and strategies regarding product liability? What about makers of foreign policy seeking to exploit the reports of diplomats and intelligence operatives to fine-tune diplomacy? What about the experience-based understanding of a participant in a complex software design project, whose knowledge base consists of detailed acquaintance with the quirks and peculiarities of the various work groups and work styles constituting the over-all operation? These uses of information may be analytical and intense; they may have profound repercussions on human well-being. But are they "theoretical"?

Conceptual issues underlying these subtle and far-reaching questions are much illuminated in the outstanding study of nuclear weapons engineering by Donald McKenzie and Graham Spinardi, "The Uninvention of Nuclear Weapons."[40] The authors inquire whether, with the passing of a generation of specialists who had hands-on acquaintance with nuclear weapons manufacture, knowledge of how to construct such weapons might simply be lost. They argue that, despite the bases of nuclear weaponry in pure science, the actual making of weapons that work involves much "tacit" knowledge – practical *savoir faire* that cannot be, or at least in practice is not, transmitted through written formulae. Thus McKenzie and Sapinardi hold that nuclear weapons could plausibly become "uninvented," even as the underlying corpus of formal, scientific understanding remained intact and available.

Our point is not to draw a bright line between "theoretical," science-based knowledge and other consequential uses of information, but to question the wisdom of entertaining such a line. Analytical thinking comes in many different forms, and

[38] *Current Biography Yearbook*, New York 1991, p. 239.

[39] Michael T. Kaufman, *Soros; the life and times of a messianic billionaire*, New York 2002, p. 140.

[40] Donald McKenzie and Graham Spinardi, Tacit knowledge, weapons design, and the uninvention of nuclear weapons, *American Journal of Sociology*, (101)1.

matters in countless ways for human affairs. It is hard to specify any empirical evidence that could demonstrate that knowledge directly based on science, or even on academic learning, matters more as a prerequisite for crucial human performances than other forms of information use.

The rising importance of formal education

If social life is somehow becoming more "knowledgeable" over-all, one might expect to see support for this trend in growing investments in education. Porat, for example, charts the rates of growth in education, which he classifies as an "information activity." He reports a yearly growth rate of US expenditures in primary and secondary education of 12.0% for the period 1948–1958; for higher education in this same period, he reports a yearly rate of 7.5%.[41] These findings are of course consistent with his over-all portrayal of growth in knowledge activities throughout the economy.

We have already reported our findings that educational expenditure is *less* predictive of economic growth in the last three decades of the twentieth century than in the preceding period – and that it does not seem to predict change in productivity at any stage of the period since 1954. But IS thinkers might well point to other evidence appearing to demonstrate rising importance of formal education. Some would certainly point to rising wages of well-educated workers in the United States over recent decades, in relation to the stagnant or falling compensation to the poorly educated. For Robert Reich, for example, this gap demonstrates growing importance of "symbolic analysis" in an increasingly information-oriented economy.[42] Other commentators would draw similar conclusions from the fact that many American professions and occupations have established increasingly demanding entry standards, in terms of years of schooling and degrees taken. These trends presumably attest to the increasing need for formal education as a basis for economic effectiveness.

But the persuasiveness of such arguments depends on acceptance of functionalist theoretical assumptions akin to those discussed above. The arguments posit that growth in requirements for formal education in fact represents a response to "needs" of the economy or society as a whole. This is a much-contested idea. At issue is whether reliance on formal education is the *cause* of social advantage of educated people, or its *effect*. In his classic *The Credential Society*, Randall Collins argues the second point: that erection of formal credential requirements for all sorts of occupations and professions results from pressure by established status groups to restrict entry to privileged roles.[43] He cites a variety of studies showing that, within job categories, those with large amounts of formal training do not show better performance than those with little such training. Much of the skill necessary for most work roles is acquired on the job, Collins argues.[44]

[41] Marc Porat, *The information economy*, p. 64.

[42] Robert Reich, *The work of nations; preparing ourselves for 21st century capitalism*, New York 1991, p. 225.

[43] Randall Collins, *The credential society*, New York 1979.

[44] Ibid., pp. 48, 54.

Erving Goffman made much the same point decades ago, when he wrote

> the American Army during World War II innocently treated trades such as pharmacy and watch-repairing in a purely instrumental way and trained efficient practitioners in five or six weeks to the horror of established members of these callings[45]

Goffman noted that pharmacists feel that the requirement of a 4-year university degree to be certified as a pharmacist is "'good for the profession'"; but "… some admit that a few months' training is all that is really needed."[46]

Anyone attentive to requirement-setting within colleges and universities will note many formal qualifications for degrees that seem equally tenuous in relation to ultimate role performance – calculus for architects and chiropractors, for example, or foreign-language exams for PhDs. As a number of writers have argued, formal educational credentials may simply serve as a "screening device" or proxy for other qualities of interest to employers – congenial manners, steady work habits, or the status attributed to formal education.[47]

Much the same issue arises in interpretation of the growing role of information technologies in the workplace, a trend that some have understood as manifesting the generally greater productivity of "information intensive" activities. In a recent study of the correlates of workers' use of various tools on the job in America and Germany, DiNardo and Pischke demonstrate that computer use is strongly associated with higher wages. But the authors also show that similar wage advantages attach to "on-the-job use of calculators, telephone, pens or pencils, or for those who work sitting down."[48] One would hardly claim that the addition of pens or pencils raised the productivity of workers in these instances. For similar reasons, we must be careful about drawing conclusions about the" effects" of the apparent information content of work roles on productivity.

Here as elsewhere, IS thinking raises theoretical questions that its proponents do not directly confront. We can hardly afford to *reject* the possibility that knowledge and information uniquely conveyed through formal education are indispensable for personal success in today's "information society" – that the crucial performances presumably supplied by those with formal education could never take place without it. But we should acknowledge that evidence has not yet been provided to sustain such a conclusion.

Hierarchy in organizations

Saint Simon held that superior information and knowledge would erode all sorts of irrational social hierarchies. Several of the more recent authors cited above explicitly embrace this position. Actors endowed with authoritative information, the argument

[45] Erving Goffman, *The presentation of self in everyday life*, Garden City, NY, 1959, pp. 46–47.

[46] Ibid., p. 46.

[47] N.L. Hicks, Education and economic growth. In *The International Encyclopedia of Education*, second edition, Vol. 3, Oxford, UK 1994, p. 1660.

[48] John DiNardo and Jorn-Steffen Pischke, The returns to computer use revisited: Have pencils changed the wage structure too? *Quarterly Journal of Economics*, February 1997, p. 291.

goes, take their directions from informed understanding, rather than blind authority, superstition, or arbitrary custom. As society becomes more "knowledgeable," all forms of authority not based on reason tend to give way to information-based relations.

A number of late-twentieth-century IS thinkers have applied this reasoning to formal organizations, especially businesses. In their quest for efficient performance, they hold, public and private organizations are adopting more collegial structures, flattening once-sharp organizational profiles. In Drucker's words,

> Because the 'players' in an information-based organization are specialists, they cannot be told how to do their work. There are probably few orchestra conductors who could coax even one note out of a French horn, let alone show the horn player how to do it. But the conductor can focus the horn player's skill and knowledge on the musicians' joint performance. And this focus is what the leaders of an information-based business must be able to achieve (1988, p. 49).[49]

This vision of organizational change certainly bears empirical implications. One can imagine investigating organizations to see whether those whose members have more informational resources at their disposal are indeed less hierarchical. Drucker, for example, makes it clear that he expects *computerization* to decrease the levels of management separating chief executives from ordinary workers. The management structures of highly-computerized organizations, in other words, should grow less hierarchical, flatter. But he offers no systematic evidence on this point.

Neither have most other researchers, unfortunately, despite the fact that computerization has been pervasive in organizations over the last two decades. We have been able to identify just two published studies of computerization and hierarchy in organizations: one from Australia in the 1980s, the other from the United States in the 1980s and 1990s.[50] Despite the authors' efforts to do so, neither of these studies finds evidence that computerization is associated with "flattening" of management hierarchy.

At least one other empirical study would seem to point in the opposite direction. David Gordon's *Fat and Mean* argues that the dominant trend in American businesses in the 1980s and early 1990s was *increasing* hierarchy.[51] Gordon does not specifically address changes in access to computing or other sources of information, but his arguments refer to trends that occurred over the supposed course of the "information revolution." Gordon found that the proportion of staff in American businesses involved in supervision of other workers grew for decades, beginning about 1950. Perhaps more telling, American businesses by 1989 were more top-heavy in supervisory ranks than their counterparts in virtually every other

[49] Peter Drucker, The coming of the new organization. *Harvard Business Review*, January–February 1988, p. 49.

[50] Rashid Zeffane, Patterns of structural control in high and low computer user organizations, *Information and Management*, 23 September 1992; James Rule, Debra Gimlin and Sylvia Sievers, *Computing in organizations; myth and experience*, New Brunswick, NJ, 2002.

[51] David Gordon, *Fat and mean; the corporate squeeze of working Americans and the myth of managerial 'downsizing'*, New York 1996.

capitalist economy except Canada, and have remained so, even in the face of much-heralded corporate "downsizing."[52] Gordon portrays this salient difference as resulting from management efforts to squeeze more work from lower-paid staff – an interpretation not directly supported empirically. But whatever the explanation, the statistical picture that he presents does not seem compatible with a view of flattening authority structures over the course of the "information revolution."

Another widely-noted change in one category of organizations in the world's "information societies" also poses problems for IS thinking. This is the growth of vast, standardized retail enterprises purveying highly predictable products and services through thousands of local establishments – MacDonald's, the Gap, Starbucks, etc. These organizations essentially succeed by replicating a successful organizational formula on the largest possible scale.

Such replication clearly requires systematic organizational discipline over staff performance at each site. Information technologies are often essential to such enforced standardization of performance, as computers help monitor staff and enforce norms set down by upper levels of management. Note one extreme case reported in the study by Rule, Gimlin, and Sievers cited above; the authors quote a site interviewer's description of work at a fast-food franchise:

> The cashier pushes buttons on the register corresponding to the items and quantities ordered and NOT to the prices. The register has the prices in memory, calculates tax, provides the total and calculates the change…. [Staff] don't have to remember any prices…. On mechanical registers, they could enter the wrong price, here if they hit a button for the item, they have to charge the correct price.

A system like this makes it much more difficult for staff to take any action not envisaged by those who designed the system; the authors comment:

> the only way [for staff] to cheat… is to give away the food without entering it on the register at all... [I]f this were done to any extent… the computerized inventory control system would soon call attention to the missing ingredients.[53]

Other accounts from this study show how computerized information systems enable large retailers to remove discretion from shop-floor staff in re-ordering stock. Rather than allow local store staff or managers to decide what should be reordered, central decision-makers simply dispatch what they are convinced will sell best. Data generated by computerized cash registers, manipulated by software algorithms, make it possible to dispense with thinking at the shop-floor level.

An interesting feature of these large-scale ventures is that they seem to afford enhanced uses of information by those at the top – while wringing independent thought and discretion from the work of those at lower levels. One can imagine business school graduates poring over the flow of statistics on Big Macs, pants-and-tops combinations or *lattes grandes*, in efforts to fine-tune prices, supplies, and

[52] Ibid., pp. 43–47.

[53] Rule, Gimlin, and Sievers, *Computing in organizations*, p. 66.

staffing levels. These high-level specialists in management of "organized complexity" (to use Bell's term) are certainly engaged in "information occupations" – as are, for that matter, low level staff who feed data into the system that makes the grand assessments possible. But the underlying process at work in these settings might best be described as a dumbing-down of lower-level work in order to intensify management control over the organization. Whether the result is a more "knowledgeable" society, in Lane's terms, is doubtful.

Much this same conclusion emerges from Simon Head's recent study of the mobilization of information technologies to rationalize work in a variety of settings. Head focuses particularly on "call centers" created for the mass production of telephone interactions between highly regimented staffs and customers or large organizations. Extended analysis of phone traffic has led management to develop software that minutely guides the responses of workers to every query, wringing virtually all discretion and personality out of the work. Head comments,

> ... software companies… have created an elaborate superstructure of technology designed to "manage" these sales encounters from beginning to end, with the 'verbal interaction' between agent and client playing out according to prearranged formulas. The agent loses the power to manage the call and has instead to defer to instructions provided by the… software, which embodies the detailed preferences of management. A primitive version of this managed call will be familiar to anyone who has been disturbed by the intrusion of a telemarketer trying to sell real estate or Caribbean vacations. But the software systems on order… vastly strengthen the managed call as a weapon of knowledge management and control.[54]

Here, too, one can readily recognize the analytical sophistication of the system design, and indeed its theoretical bases in management studies and the sociology of work. But the net effect on the intellectual content of the interactions for the parties is surely negative.

Head casts a skeptical eye on the prophecies of rising worker autonomy and job enrichment in an "information-intensive" environment. Instead, he observes,

> At the upper echelons… new and advanced skills may be required of those who oversee the implementation of reengineering and ERP [enterprise resource planning] projects. But the sponsors of these systems habitually use them to simplify the work of middle- and lower-level workers, surrounding their tasks with elaborate regimes of business rules, and setting up all-seeing systems of digital monitoring to make sure that the rules are being obeyed…. With the reengineering of health care and the coming of ERP, skilled workers such as physicians and managers are themselves no longer beyond the reach of this all-seeing industrialism.[55]

[54] Simon Head, *The new ruthless economy; work and power in the digital age*, New York 2003, p. 85.

[55] Ibid., pp. 12–13.

Rationality in public affairs

Perhaps the most inspirational element of Saint Simon's original vision was the prospect that knowledgeable administration of human affairs would supplant politics. Exponents of IS views to this day widely hold that social processes occurring in information-rich environments will be less conflictive, that more and better information will make it easier for parties to agree on collective directions of social action.

But the notion that more knowledge *in general* will somehow lead to more cooperative action toward broadly-shared social ends raises the theoretical red flags noted above. The unstated – and highly controversial – assumption is that human conflict stems ultimately from inadequate information about how people might realize values or interests that all, ultimately, share. An alternative view would portray differences of interest within the polity as authentic and enduring. Insofar as real social systems are better described by this second model, more information will be apt to furnish more weapons for conflict, rather than more resources for resolving it.

Again, one hardly expects either of these highly abstract competing models to be upheld or rejected categorically in light of any empirical considerations. But it is surely worthwhile to weigh the apparent strengths and weaknesses of the two models in relation to recent social trends. Is there, in fact, any evidence that the over-all extent or intensity of grave social conflict has been reduced through proliferation of information or "knowledgability" (to use Lane's term)?

How could one get a grip on a question so far-reaching? One approach would be to take stock of major public issues or "social problems" – conflicts over basic directions of social action requiring some sort of collective response, locally, nationally, or globally. Examples are familiar to everyone: environmental degradation and climate change; destructive religious and ethnic conflicts; pressures for migration of populations from poorer to richer areas of the planet; the AIDS epidemic; high death rates from easily preventable illnesses.

Nearly every thoughtful observer, everywhere in the world, will join in deploring these things. In nearly all such cases, experts have all but saturated debate with supposedly relevant information. But it would be hard to argue that such clashes were becoming a less prominent feature of human affairs, or that they were, on balance, being resolved more easily through authoritative information. Even as consensus grows on the reality of global climate change, for example, clashing interests continue to block unified action – both globally and at lower levels of organization. Widespread understanding of the biological and social origins and transmission of AIDS does not seem to be generating consensus as to which countries and institutions should accept key responsibilities for acting against the epidemic. Leaders of terrorist movements and their antagonists do not seem divided so much on matters of fact as on ultimate value or interest. One could extend this list at length.

Has the proliferation of information on subjects like these at least reduced the range of reasonable disagreement on directions for action? In many cases, certainly. But one can also point to many grave conflicts in which information has become a weapon, with all sides putting forth their own "expert" views. All in all, it would be

rash to argue that spreading consensus is systematically reducing the intensity of, or danger posed by, conflicts like those cited above.

Conclusion

The enthusiastic embrace of classic IS models among late-twentieth-century social scientists has crested. But we believe that these interrelated ideas have not made their last appearance on the historical stage. We suspect that they will re-surface, slightly refurbished, at the service of future movements of intellectuals seeking a flagship ideology to herald the beneficent social role of their work.

For those whose work involves creating, manipulating, and transmitting ideas – particularly abstract and theoretical ideas – the appeal of this doctrine is bound to be considerable. It portrays analytical thinking – or at least, the *right kind* of analytical thinking – as the royal road to realization of key social values.

None of us, we suspect, is totally immune to the attractions of these ideas. Those who find the life of the mind a challenging and rewarding adventure *in itself* probably find it hard to doubt that these pursuits also bring some indispensable good *results*. One notes this same carry-over in countless other domains of human experience. Those who love to exercise, drink alcohol, or attend religious services usually find it hard to resist the conclusion that doing such things also provides instrumental benefits – making those who engage in them healthier, better natured, or more successful in one way or another. Those who deplore abortion as a moral evil in itself are also attracted to the proposition that it causes disease, mental stress, or disability later in life. Those who love art believe that the enjoyment of it makes art-lovers better persons.

Thus it is that those whose work involves social analysis are also inclined to believe that such understanding promotes all sorts of other good effects. Educated understanding of social life supposedly encourages economic growth and prosperity; it renders the individuals who incorporate it more productive and successful; it makes organizations more egalitarian and effective; and it reduces the role of destructive conflict in human affairs.

We have sought to show that strong empirical backing for such expectations is difficult to adduce – at least from data derived from the late twentieth century in the United States, one supposed forefront of the information society. It is particularly remarkable that so much of the available evidence is susceptible to multiple interpretations. A key example here is the fact that better educated workers typically make more money: does the explanation lie in their increased productivity, or in superior status-claims associated with formal education? Or, consider the fact that policy-making is increasingly buttressed by studies, reports and analyses. Does this demonstrate that social practice is being constrained by the demands of reason – or does it simply show that the trappings of reason have become weapons in enduring clashes of interest? We stress that neither our own evidence nor any other has been conclusive in these connections. But we find it noteworthy that what we see as the classic core of IS ideas has exerted the influence that it has, given the unevenness of empirical support for them.

We conclude that honesty requires skepticism on the Enlightenment notion that deeper, more "scientific" understanding generally conduces to the improvement of social conditions. But without this assurance, we intellectuals face some gnawing grounds for concern. If alleviation of ignorance and the perfection of understanding cannot be assumed reliably to ameliorate social troubles, what claims *do* we wish to make for our work?

James B. Rule is Distinguished Affiliated Scholar at the Center for the Study of Law and Society, University of California, Berkeley. He has researched and published widely on matters relating to sociological theory and the role of information in social life. His most recent books are *Theory and Progress in Social Science* (Cambridge University Press, 1997), *Computing in Organizations; Myth and Experience* (co-authored with Debra Gimlin and Sylvia Sievers, Transaction, 2002) and *Privacy in Peril* (Oxford University Press, 2007).

Yasemin Besen focuses on young people in the United States in her work, which combines qualitative and quantitative methods. Her research interests include teenage labor, gender, and inequality. Her work has been published in Contexts, Berkeley Journal of Sociology, Journal of Contemporary Ethnography, NWSAJ, and Equal Opportunities International. She received her Ph.D. in Sociology from the State University of New York at Stony Brook. She is currently Assistant Professor of Sociology at Montclair State University.