Looking Back and Looking Forward from "The Geography of the United States in the Year 2000"

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In the late 1960s, Brian Berry attempted to envision the rapidly changing American landscape, looking at its metropolitan development and space economy thirty years into the future. As a policy advisor to a number of U.S. government committees, he was especially interested in the developmental implications of satellite communications and computer networks. The tools at hand for his work included an archive of historical census data, mainframe computers, a selection of graphical visualization tools, and his adroit skill at representing complex spatial patterns and processes. In retrospect, we realize today that the census data of 1960 had limited geocoding of basic data units and were confined to the inadequacies of decennial accounting, constraining analyses to changes occurring in the period between 1950 and 1960. The mainframe computers of the late 1960s had less capability than today's hand-held personal assistants, and the graphical visualization tools required manual enhancement (drafting) of computer plots. Taking up the challenge of projecting anything so complex as the spatial socioeconomic structure of America with the tools at hand was a courageous undertaking. Yet the period of the late 1960s and early 1970s was one of exceptional interest in the future and in the methodology of forecasting. Major, well-known efforts of that era included:

- Bertrand De Jouvenel's *The Art of Conjecture* (1967)
- Marshall McLuhan's *Understanding Media* (1965)
- Herman Hahn and Anthony J. Wiener's *The Year 2000: A Framework for Speculation on the Next Thirty-Three Years* (1967)
- Jay W. Forrester's *Urban Dynamics* (1969)
- Robert Ayres's *Technological Forecasting and Long-Range Planning* (1969)
- Alvin Toffler's popular *Future Shock* (1970)
- The Club of Rome project, culminating in a general report by Donella Meadows, Dennis Meadows, Jørgen Randers, and William W. Behrens III—*The Limits to Growth* (1972)

Berry positioned his work not so much as a futurist, but as a scientist with a genuine interest in the future. More so than the authors of the works cited above, he drew explicitly on the efforts of economists, geographers, and regional scientists—John Borchert, John Friedman, Harvey Perloff, Allan Pred, and Wilbur Thompson, to mention just a few. At the same time, he was willing to combine scientific projection and analysis with intuitive insight, speculating on the changing forces of regional development in the United States. He foresaw a spatial inversion of the prevailing socioeconomic patterns of the 1960s, manifesting by the year 2000 as sharp polarizations between the central areas and peripheries of American cities. He forcefully illustrated his perspective on the important effect that electronic innovations and telemobility could have on this emergent geography. In all cases, his interpretations and presentations were explicitly spatial. His 1970 article was loaded with informative maps. He explored the use of spatial gradient analyses of urban influence over surrounding regions, migration fields, spatial patterns of innovation diffusion, and indexes of market accessibility expressed as population potentials, among other state-of-the-art 1960s-ish geographic approaches.

By narrowing the scope of prediction to the realm of spatial economic development, Berry sought to isolate many of the dominant general forces of change. However, focus on the economic and technological realms imposes a risk of failure to account for interactive effects of

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political and social processes, some of which are identified by other authors in this Forum, notably Barney Warf and Elvin Wyly. Even within the economic and technologic spheres, a thirty-year time horizon holds surprises that are difficult to control for. Table 1 is intended to highlight the difficulties of forecasting over a thirty-year time horizon. It lists events and circumstances that were not known or were poorly understood from the starting points of thirty-year periods. These periods begin in 1880, 1910, 1940, and 1970 (Berry's 1970–2000 predictive period). Going back over several periods helps to reinforce the enormous

Table 1 *Futures*

Year(s)	Event(s) and Processes
Could we predict the geography of 1910 from what we knew in 1880?	
1869	Transcontinental railway
1877	Bell's telephone; automated switching system (1879)
1882	New York's first electric central power generating station
1885	Benz's automobile and Daimler's gasoline engine
1878	Joseph Swan's electric lamp; Edison's incandescent bulb (1879)
1887	Interstate Commerce Commission created
1890	Steel frame structure for buildings (Chicago)
1895	Marconi's wireless telegraph
1898	The Spanish-American War
1903	Wright brothers and the heavier-than-air plane
1909–	The Model T Ford
Could we predict the geography of 1940 from what we knew in 1910?	
1914–18	World War I
1920	Use of radio in mass communication
1920	Transcontinental airmail service, New York City and San Francisco
1927	Lindbergh's flight from New York to Paris
1928	Glass curtain walls and steel-frame buildings
1929–	The stock market crash and the Great Depression
1933–41	The New Deal
Could we predict the geography of 1970 from what we knew in 1940?	
1939–45	Implications of World War II
1941	General TV broadcasting in U.S. (1936 in U.K.); widespread popular adoption after World War II
1944	High-speed digital calculators—MARK I, ENIAC (1946)
1946	U.S. Atomic Energy Commission established
1950s-	Suburban large-scale residential tract development
1950–53	The Korean War
1954–75	The Vietnam War
1956	Nuclear fuel for electrical power—Calder Hall, England
1956	Transatlantic jet airline service
1956–	Interstate highway system—the Federal Aid Highway Act
1957	The Space Age—Sputnik
1950s–1960s	Civil-rights initiatives
1960s	Racial strife in American cities
1962	Telstar communication satellite
1964	Japan's first high-speed passenger train
1965	Early Bird—first commercial communication satellite
Events/processes not likely to be known or not well understood in the late 1960s that would influence the economic geography of the United States in 2000	
1969–	The environmental movement
1973–	The energy crisis
1973–1990s	55 mile-per-hour speed limits–effects on urban development
1970s–	Growing awareness of global climatic change
1970s–	Persistent value of face-to-face communication in commerce
1970s–	International migration
1970s–1990s	Security issues of regional and global terrorism
1980s	Privatization and deregulation over transportation and communication
1980s–	Gentrification of inner-city regions
1991–	End of the Cold War
1990s–	The Internet as a global communications network
Late 1990s–	Widespread adoption of cellular communications

challenge that Berry faced in dealing with one of the most volatile thirty-year periods in the history of technology and economic change in the United States.

The events and technologies listed in Table 1 were selected because of their likely influence over national investment priorities (e.g., wars tend to redirect public funds in ways that alter the space economy), their impacts on the use of space and land resources (e.g., the transmission of electricity and the enabling technologies for skyscrapers), and their effects on spatial patterns of human behavior (e.g., telecommunications and the mass ownership of automobiles). Some of them transformed the significance of distance in daily human behavior and had implications for the very structure of the space economy (transport technologies for the movement of people and freight). The listings are decidedly oriented to technological events, but there is an observable shift to include social processes in the later periods—e.g., civil rights, gentrification, and immigration—events that precipitated significant social transformation in most American metropolitan regions.

The final section of the table includes events and processes that were not likely to be known or were not well understood in the late 1960s. In hindsight, we now know that they influenced the economic landscape of the United States by the year 2000 (e.g., the impacts of the energy crisis and reduced speed limits on production and distribution and on commuting patterns). Some of them were not and could not be envisioned by Berry in preparing his 1970 article (e.g., the end of the Cold War and the impact that it had on public investment priorities). At best, we can say that prior awareness of these events would surely have altered Berry's forecasts. In this Forum, Stanley Brunn and Edward Malecki elaborate in greater detail on several of the items listed for 1970–2000 and explore some of the implications of those that were not envisioned by Berry or that were contrary to his expectations (e.g., the persistence of face-to-face communications in commerce and the importance of gentrification on the social structure of cities).

To underscore the inherent uncertainties of making spatial predictions, consider taking the predictive effort forward another thirty years. Imagine replicating Berry's effort in 2000, speculating on and forecasting "The Geography of the United States in the Year 2030." What forces at play need consideration? We might include technologies related to e-commerce and the mobile economy (including wireless communications and global positioning systems), biogenetics and biotechnology, nanotechnology, and landscape security systems. Throwing in the human dimensions of war, migration, and ideology adds to the complexity of both prediction and interpretation—and we still have not considered those factors that lie beyond the consciousness of present-day technology and society. Clearly, a thirty-year horizon for forecasting even general socioeconomic change is clouded with massive uncertainty. Nonetheless, looking forward is an essential element of policy formulation and is congruent with human interests and needs. Normative considerations—for example, goals for environmental sustainability and social equity—seek to steer trends in desired directions but presuppose an understanding of the forces and actors that condition the trends.

The Enduring Value (and Cost) of Looking Ahead

The value of looking ahead is enhanced by our understanding of the past. The issues that we face as a society seem to transcend the decades—literacy, poverty, jobs and economic development, environmental quality, accessibility to basic human services in health care and education. Understanding these issues and being able to forecast the influence of our policy measures is worthy of serious investment.

In 2002, an extensive and expensive effort was initiated to refurbish the Hubble Space Telescope; by 2009, Hubble will be replaced with the U.S.$1.3 billion Next Generation Space Telescope (NGST). Operating in the infrared range, the NGST will peer back in time to early generations of stars and galaxies to spot individual stars in nearby galaxies (Lawler 2002). Beyond doubt, investments in looking back in time are of great significance, especially if they enable a better understanding of the future. The rationale that guides investments in space science has not yet been replicated with urgency to expanding scientific capabilities for profiling the social, economic, and demographic geographies of a changing world. Being able to capture the enormous flows of immigration-emigration, refugees, and commerce and to assess quickly the changing parameters of human well-being should be a high priority for meeting future human needs. Improvements in the tools to make this a reality are underway, but clearly there is a need for vast improvements in these methodologies, in terms of both their technical implementation and their public acceptance.

In the analysis, understanding, and forecasting of the human occupancy of Earth, statistical and visualization tools at hand today should yield significantly more refined approaches to envisioning the landscape of 2030 than was possible for 2000 in the late 1960s. These tools include enhanced, georeferenced data resources, high-capacity computation tools for exploratory data analysis (including exploratory spatial data analysis [ESDA]), geographic information systems, geovisualization tools, agent-based modeling techniques, and advances in spatial econometrics for greater understanding of spatial auto-correlated patterns and processes. The challenge is to wed these technical developments with advances in theories of complex, adaptive, and self-organizing systems (see Axtell and Cohen 1999). Catastrophe and chaos theories hold promise for understanding discontinuities in socioeconomic development, but they require a more formal integration with spatial analytic tools (see Kiel and Elliott 1998). Guy Robinson (1998) reviews these methodologies for application in human geography. Resources for their implementation are presented within the broader context of spatial social science by the Center for Spatially Integrated Social Science.

The tools mentioned above are clearly extensions of those that emerged from geography's quantitative revolution and from science generally, and they are consistent philosophically with the approaches adopted by Berry in his predictive effort. At issue is whether or not this perspective adequately captures the fundamental human values that underpin many social and economic processes. Prediction requires a recursive balancing act, projecting ongoing change while recognizing that human engagement in the processes of change may redirect such projections before they reach their expected (predicted) mark. Thus, while assessment and verification are hallmarks of science, the art of prediction must also recognize a world in which contingencies of relationships, values, and technologies are in constant flux. At the very least, this realization calls for the inclusion of social contingencies, human expectations, and normative aspirations within our predictive methodologies. ■

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