

**Cristoforo Sergio Bertuglia, Franco Vaio, *Il fenomeno urbano e la complessità*, Bollati Boringhieri, Turin, 2019, pp. 798.**

Let me begin with a jesting remark that is not really such a joke: a candidate for a political position as local administrator should have to

demonstrate great skill at the game of SimCity. About the game, Wikipedia<sup>1</sup> tells us that “The objective of SimCity is to build and design a city, without specific goals to achieve. The player can mark land as being zoned as commercial, industrial, or residential, add buildings, change the tax rate, build a power grid, build transportation systems and take many other actions, in order to enhance the city. (...) [T]he too-small-to-see residents, known as Sims, may choose to construct and upgrade houses, apartment blocks, light or heavy industrial buildings, commercial buildings, hospitals, churches, and other structures. (...) The player may face disasters including flooding, tornadoes, fires (often from air disasters or shipwrecks), earthquakes and attacks by monsters.”

Aside from the monsters, this is the complexity of real life! About the hypothetical candidates, and this really is no joke, my second requirement would be precisely the demonstrated ability to master the concept of complexity.

Bertuglia and Vaio’s book on “The urban phenomenon and complexity” is perfect both as preparation of these hypothetical candidates for the examination and, more seriously, as an in-depth scientific analysis of complexity in the city environment. Their analysis moves from the dream of thorough-going management of city-planning choices and the related economic events to the crude reality of a market-dominated world with glaring imperfections. The book considers the constituent historical, political, theoretical, and technical elements of urban spaces, never forgetting the economic side, always from the standpoint of complexity. In the authors’ own words (my translation):

Complexity is, by its very nature, hard to define. There is still no general definition of a measure that can be assimilated to our common perception of the complexity of a system, which is bound up with the unpredictability of its evolution over time

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<sup>1</sup> [https://en.wikipedia.org/wiki/SimCity\\_\(1989\\_video\\_game\)](https://en.wikipedia.org/wiki/SimCity_(1989_video_game)).

and the emerging, self-organizing properties that manifest themselves within that system.

Starting from the concept of complexity, the actual subject of the book is twofold: (i) urban planning and (ii) the economics of the real world's interaction with planning decisions. These are two areas that since the 1950s have been marked by high hopes of success, colossal disasters, and enormous transformations. As a consequence, we have the paradox noted by Jean Tirole (2016): the winner in the competition between economic systems, i.e., the market, is getting no praise, only criticism from all quarters.

The book consists of five chapters and a conclusion. Chapter 1 defines the city as a complex system in evolution. Chapter 2 discusses the transformations of urban systems. Chapter 3 inquires into the complexity of the city in sociological, philosophical, and anthropological terms. Chapter 4 deals with city politics, participation, and assisted self-organization. Chapter 5 brings out the real complexity of the economic designs of the city. In the Conclusion, the authors discuss the Italian experience of territorial and urban planning in recent decades.

In this review, we mostly follow the path of complexity and the economy within the book, looking with the authors for the possibility of building models to deal with complexity.

Section 1.1 reads in part (again, my translation):

The concept of complexity in systems has various roots in twentieth-century scientific thought.... In part, it develops from cybernetics, born in the late 1940s to identify and describe hierarchies of control in mechanical systems and living systems, to reproduce them using artificial intelligence.

... [T]he complexity observed in ... cities, characterized by both social and physical elements, which are formed by citizens who reside permanently or temporarily in a given urban area, by the commuters who work there, by the complex of urban physical structures, economic activities and financial flows that mark that

given urban area and many other elements, all in close interrelation, which are usually referred to, briefly, as “urban systems.”

To respond with positive actions to the vast problem of complexity described by the authors, we can imagine a matrix of strategic goals intersecting projects, resources (mainly managerial) relating to the economic actions and reactions of the real business world.

So what we need is highly realistic – not stylized – models. In Section 1.2 we read:

In the famous 1973 essay explicitly titled “Requiem for Large Scale Models”, Douglas Lee, professor of regional planning at Berkeley, underscored the failure of large-scale urban and regional modeling, based on models claiming to be all-inclusive and capable of forecasting. Lee thoroughly analyzed what he called ‘the seven deadly sins’ of that kind of model and described the disappointment following the experience of large-scale modeling. This experience was acquired in particular since the mid-1950s, when large computer systems capable of making the models work became available.

(...)

A new generation of models spread – models designed to be tools for analysis and research, to enable us to anticipate the outcome of political decisions, not merely to produce descriptions, claiming to be complete and detailed, of excessively extensive and detailed systems.

(...)

The studies conducted on this pattern of research constituted a novel method of modeling for those years, then became active and established for several decades, based on the increasingly common vision of societies and territorial social structures, including cities, as social organisms.

We find the same sort of evolution in the field of economics and

general planning. Let me go back about sixty years: in October 1961, just in time for the opening of the Twenty-Second Congress of the Communist Party, the Cybernetics Council of the Soviet Academy of Sciences published a volume entitled *Cybernetics in the Service of Communism* (Berg, 1961). This book outlined the enormous potential benefits of applying computers and cybernetic models in a wide range of fields, from biology and medicine to production control, transportation, and guiding the economy. In particular, the cybernetic construct interpreted the entire Soviet economy as “a complex cybernetic system, which incorporates an enormous number of various interconnected control loops.”

These ideas, proposed in the Soviet system, were a complete failure. It was not just a problem of hardware, which would have been resolvable in some way, but a profound dispute over power and organizational planning.

By contrast, today the entire economic construction of a cyber structure run by Artificial Intelligence has become possible, and the economic world is moving in a silent but accelerated way toward new structures of choice and planning, shaped by AI. This is being done on their own account by giant retailers, such as Walmart, Alibaba and Amazon. This last is a digression from the theme of the book, but a most interesting if not worrying one.

Getting back to the cities and Bertuglia and Vaio, we can imagine that using both agent-based simulation – to which there are innumerable links in the volume, as there are to complexity – and AI, very significant steps ahead are possible. Let me underscore that this is not the search for the unique, grand solution, such as the single point where computer models surpass the human capability of deciding, but the search for isles of reasonable solutions within a network of interaction. Very interesting considerations on this are to be found in Perez et al. (2017). From this perspective, the work of Bertuglia and Vaio is simply essential. In the fifth chapter, which highlights the complexity of economic conceptions of the city, we read:

In the economy of the globalized world as it has emerged since the 1980s, the processes that generated the competing world cities have become increasingly complex. Supported by the progress of information and communication technologies, the pace of socio-economic change has become ever more rapid, compared with the world cities described in the previous literature. Contemporary cities are interconnected in an extremely dense network of exchanges and communications, which has given financial and service activities, already prominent in the world cities (...) further importance in determining how today's global system of urban functions works.

In closing, I can only recommend that in order to give this important, encyclopedic work the broad readership it deserves, it should be translated into English.

### **Bibliography**

- BERG A.I. (ed.) (1961), *Cybernetics at the service of communism - USSR*, Cybernetics Council of the Soviet Academy of Sciences, Moscow/Leningrad. Translation published by: Office of Technical Services, U.S. Department of Commerce, Washington, D.C., 1962.
- PEREZ P., BANOS A., PETTIT C. (2017), "Agent-Based Modelling for Urban Planning Current Limitations and Future Trends", in M.-R. Namazi-Rad, L. Padgham, P. Perez, K. Nagel, A. Bazzan, (eds.), *Agent Based Modelling of Urban Systems*, pp. 60-69, Springer International Publishing, Cham. ISBN 978-3-319-51957-9.
- TIOLE J. (2016), *Économie du bien commun*, Presses Universitaires de France, Paris.

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