Part II
Applications

One the most exciting challenges is to reduce the complexity of real infrastructures to a simpler and insightful model. In this part of the book we present some applications to real infrastructures, like transport, the electric grid and even the human body.

Chapter 6 builds up an abstract model to predict epidemic-like fault propagation and cascades, thus allowing a statistical description of the real system.

In Chap. 7 the most classical problem of traffic routing and congestion is analysed taking into account the interaction between public and private transportation. At the theoretical level, this corresponds to the interaction between two or more 'quasi-planar' graphs (spatial networks).

Chapter 8 represents a very broad and general introduction to the electrical power system and concentrates on the blackout mitigation strategies based on 'islanding', i.e. the intentional partition of the electric grid into smaller full operating sub-networks.

Chapter 9 highlights how the complexity of the power system does not reduce to the interaction among its physical components. In fact, all real infrastructures require human intervention at different levels, like governance (decision making) or planning (policies), that nowadays have to take into account also the intermingling of economic and social networks influencing the whole system.

Finally, Chap. 10 is not directly related to critical infrastructures; however, it provides a novel paradigm for one of the most complex 'system of systems', i.e. the human body. The results of the chapter are strictly related to one of the most stringent problems in critical infrastructures, i.e. the analysis of the interdependencies among systems through historical data.