Consensus, network & control in self-organizing systems
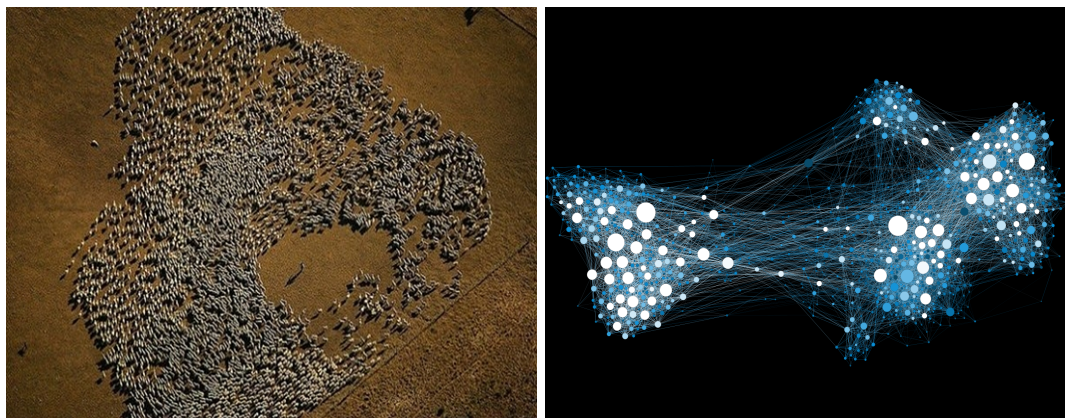

Figure 1: *"Psychohistory is the mathematical study of the reactions of human conglomerates in response to economic and social stimuli".* – Isaac Asimov, Foundation, 1951.

Self-organization in social interactions is a fascinating mechanism, which has inspired the development of new areas of applied mathematics and physics, in order to describe multi-agent dynamics towards formation of coherent global behaviors. The mathematical modelling of these phenomena roused a large variety of applications: in biology (cell aggregation and motility, coordinated animal motion,...); in socio-economics (opinion formation or wealth distribution,...); in engineering, (cooperative robots, traffic management,...).

The main question we will address will be *"Under which conditions self-organization can be obtained, and in which way we can promote/control it?"*. To answer we will focus on *consensus-type* dynamics where agents try to align their behavior according to interactions ruled by a *dynamical communication network*. Further, we will try to understand in which way these systems can be influenced by *control strategies*. Direct applications of our findings will be the modelling of **opinion dynamics on social network**.

The methods of study will be non-linear ODEs systems, Markov processes and optimal control. Theoretical and modeling concepts will be complemented by numerical methods and simulations.

> Course presentation and schedule confirmation
> October 2nd, 15:30-16:30 room M, Ca' Vignal 2.

Schedule (TBC)

1. 2/10. 15:30-16:30 room M. Presentation.

2. 3/10. 12:30-14:30 room G.

3. 6/10. 11:30-13:30 room M.

4. 9/10. 15:30-16:30 room M.

5. 10/10. 12:30-14:30 room G.

Contacts: `giacomo.albi@univr.it`.