COMPLEX SYSTEMS STUDIES

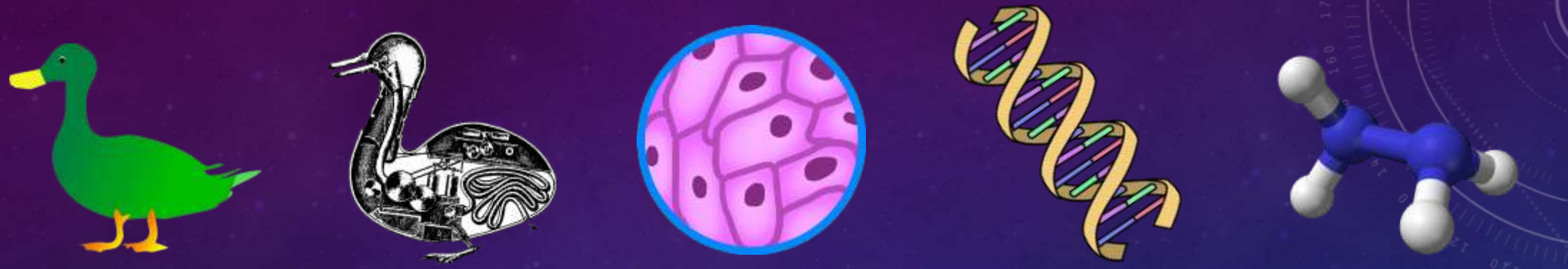
A New Approach to Understand Complex Systems

WHAT IS IT?

A complex system is a system that exhibits some (and possibly all) of the following characteristics:

- many components;
- dynamically interacting; → Thomas Gomez
- feedback loops; → Brian Dermody
- some degree of spontaneous order; → Qingyi Feng
- robustness of the order;
- self-organization, or in some circumstances; → Joris Broere
- emergent organization;
- hierarchical organization.

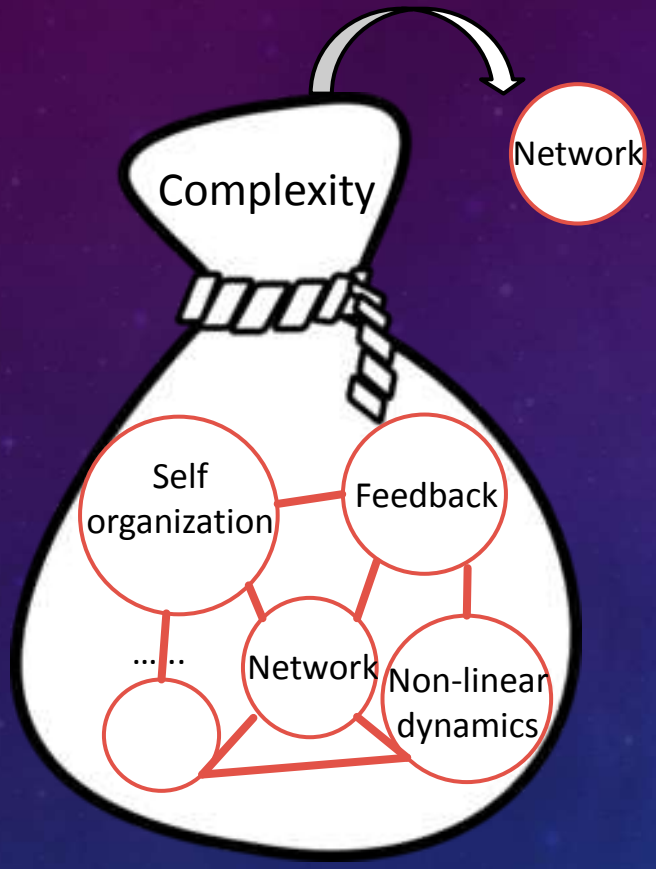
WHY WE NEED IT?

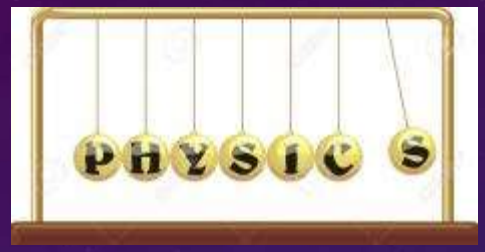


Reductionism

Duck = X_1 + X_2 + X_3 + …

HOW?

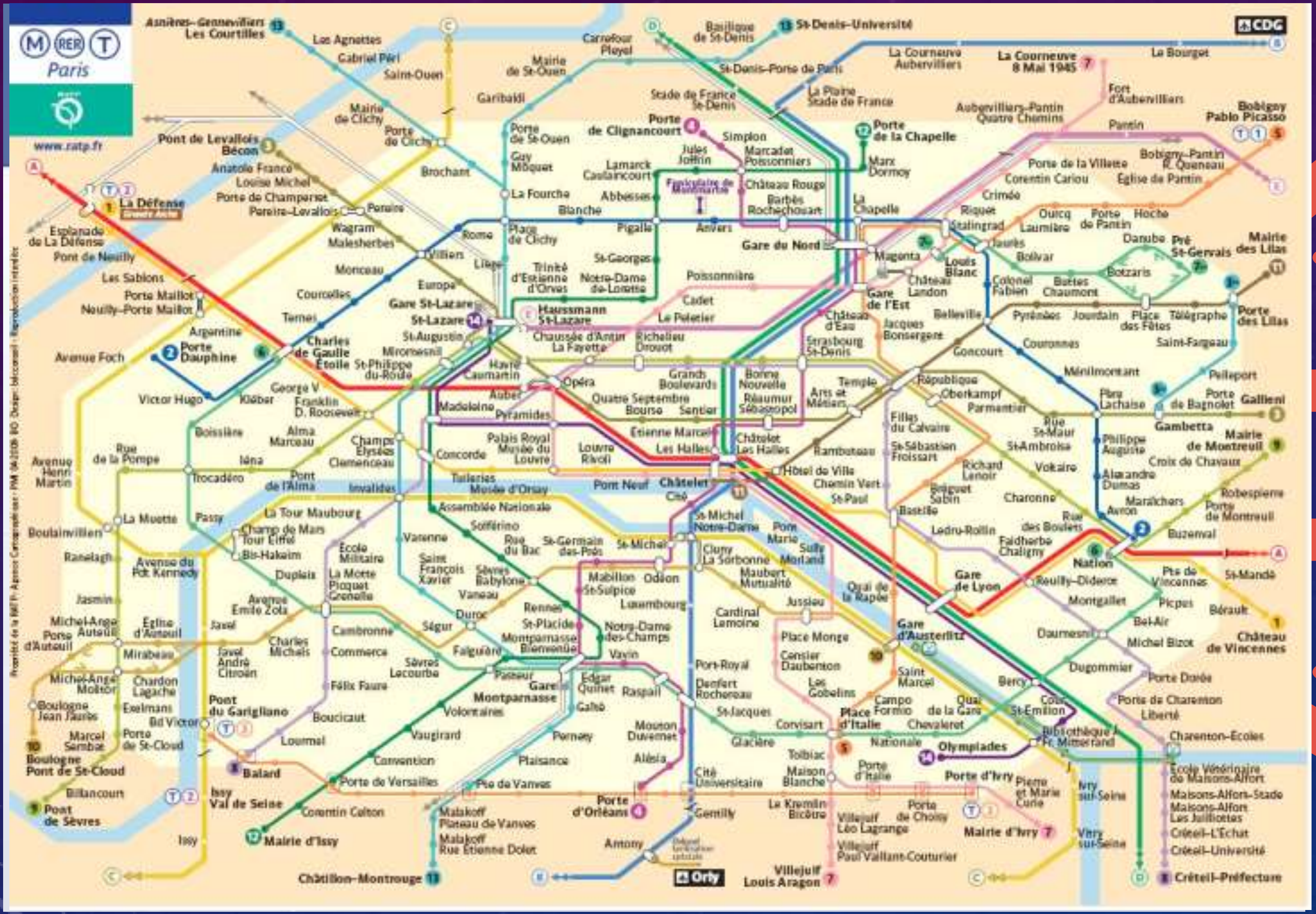

Network
Complexity
Self organization
Feedback
……
Network
Non-linear dynamics


PHYSICS


Chemistry

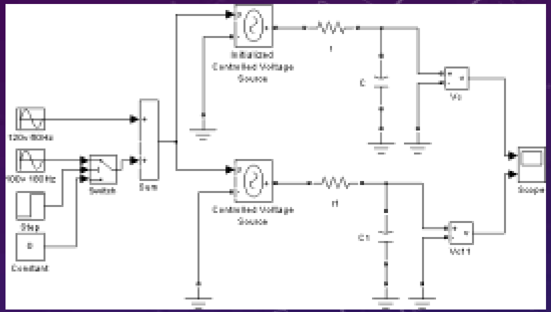

Biology
It's All About
Life

NETWORKS

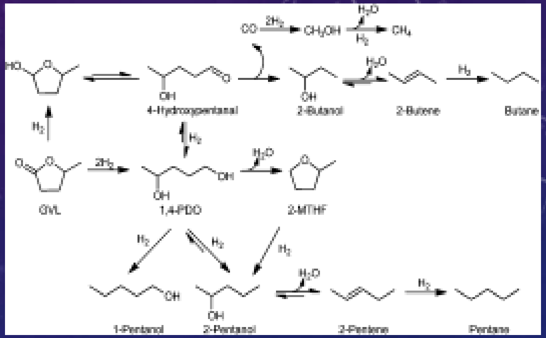


The Transportation network in Paris

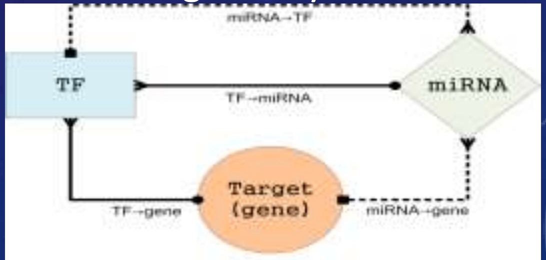
Electrical circuits



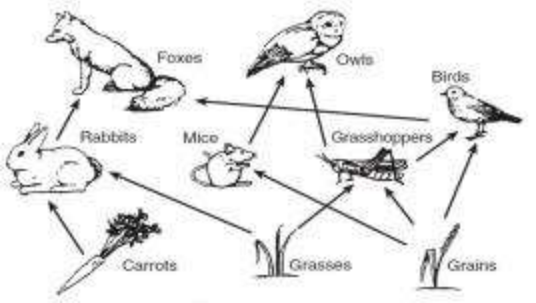
Reaction networks



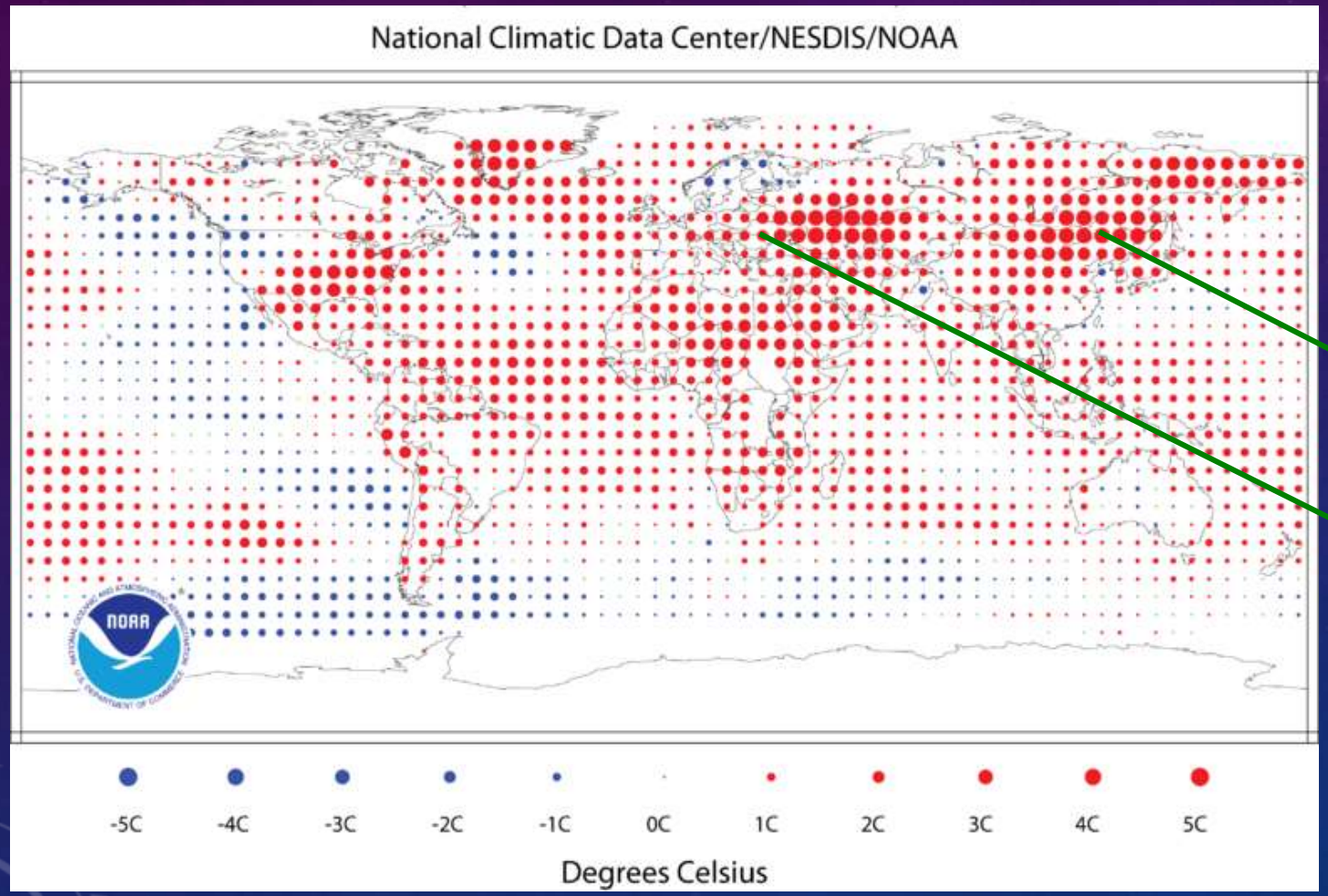
Gene regulatory networks

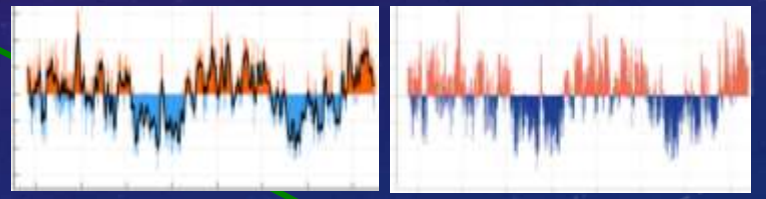


Food web

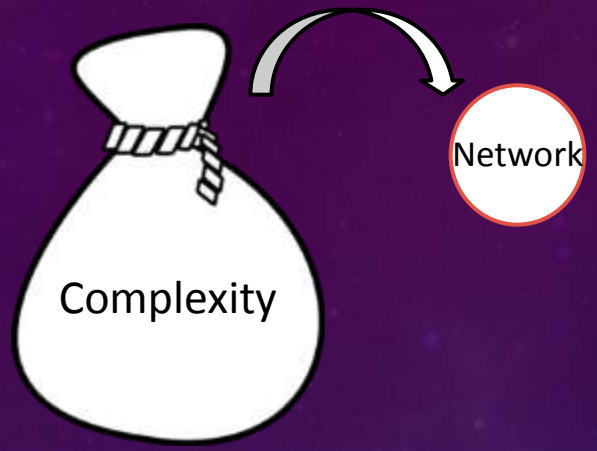


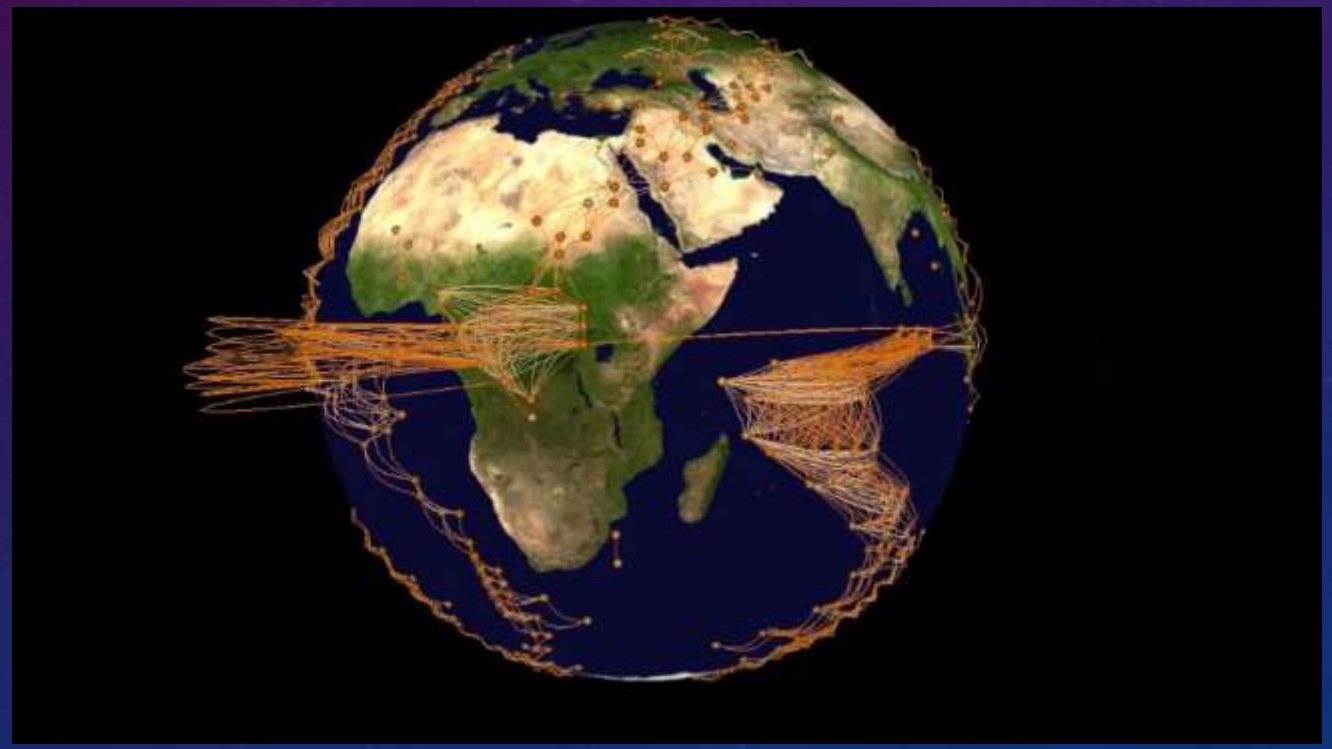
NETWORKS WITHOUT EXPLICIT NODES AND LINKS





$R >= \theta$





Provided by Complexity Laboratorium Utrecht (CLUe)

NETWORKS BASED ON RECURRENCE PLOT