

# The group

- The group is composed of three ECLT fellows
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  - Institute for Advanced Study, University of Amsterdam
  - Former chair of the ECLT Science Board, now member
- ***Marco Villani***
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- ***Andrea Roli***
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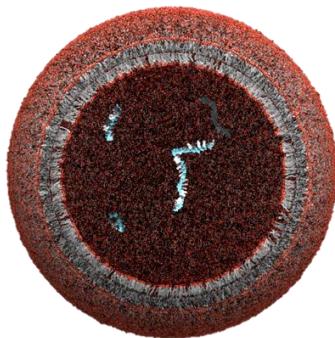
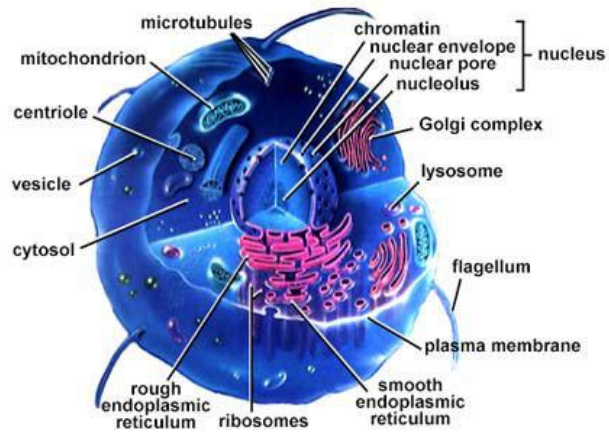
# Main activities

- “Complex systems biology”
- Models of genetic regulatory networks
- Models of protocells
- Identification of relevant dynamical structures in complex systems
- ... others ...

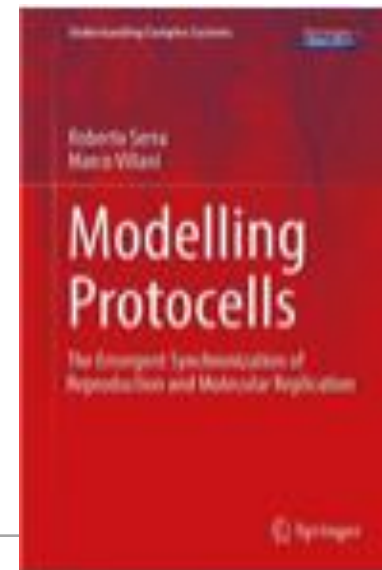
# Dynamics of genetic regulatory networks

- Comparison of simplified boolean models with experimental data – avalanches of perturbations of gene expression patterns
- Model improvements (memory)
- Theoretical issues (definition of critical regimes)
- Cell differentiation
- Evolved RBNs

# protocells



Synchronization  
Autocatalytic sets in  
growing and dividing  
protocells





# the relevance index

- Identifying subsets of integrated variables in complex systems
- The RI is based upon information theoretic measures, i.e.
  - The Integration  $I$  of the variables in the subset
  - The mutual information between the subset and the rest of the universe
  - A sieving algorithm selects the most interesting subsets
  - Applications to artificial models, gene network models, social interactions, pattern recognition...



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