



Faculty of Science and Technology
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DEDIS

Dynamic distribution of an
ecosystem model



1. Overview



1. Overview
2. Acknowledgments
3. DEDIS
 1. General description
 2. Distribution
 3. Load-balancing
4. Results
5. Conclusion



2. Acknowledgements



- » M. Cyrille BERTELLE, headmaster of the DEA-ITA and one of my tutors all along this time.
- » M. Damien OLIVIER, tutor and mentor, who accounted to me for every problem or trouble I encountered
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- » M. Antoine DUTOT, PhD student and author of AntCO², with whom I cooperated during the entire project and who was always ready to touch on new problems
- » Everybody else who helped me during the last few months ...



3. DEDIS (1/2)



» Context

- » Aquatic ecosystems
- » Evolution
- » Sensibility

» Objectives

- » Simulating an aquatic ecosystem
- » Test evolution
- » Make significant predictions



3. DEDIS (2/2)



» Problems

- » Huge number of entities
- » Many communications
- » Emergence of group behaviour

» Tasks

- » Development of a large-scale entity-based distributed simulation
- » Implementation of entities such that their individual characteristics cause emergence of group behaviour
- » Using the AntCO² algorithm to detect heavily related clusters of entities



3.1. DEDIS > General description



- » DEDIS = acronym of "**D**istributed **E**nvironment for **D**ynamic **I**ndividual-based **S**imulations"

- » Set of Java classes that offer different services to entities
 - » Communication
 - » Neighbour location
 - » Migration



3.2. DEDIS > Distribution (1/2)



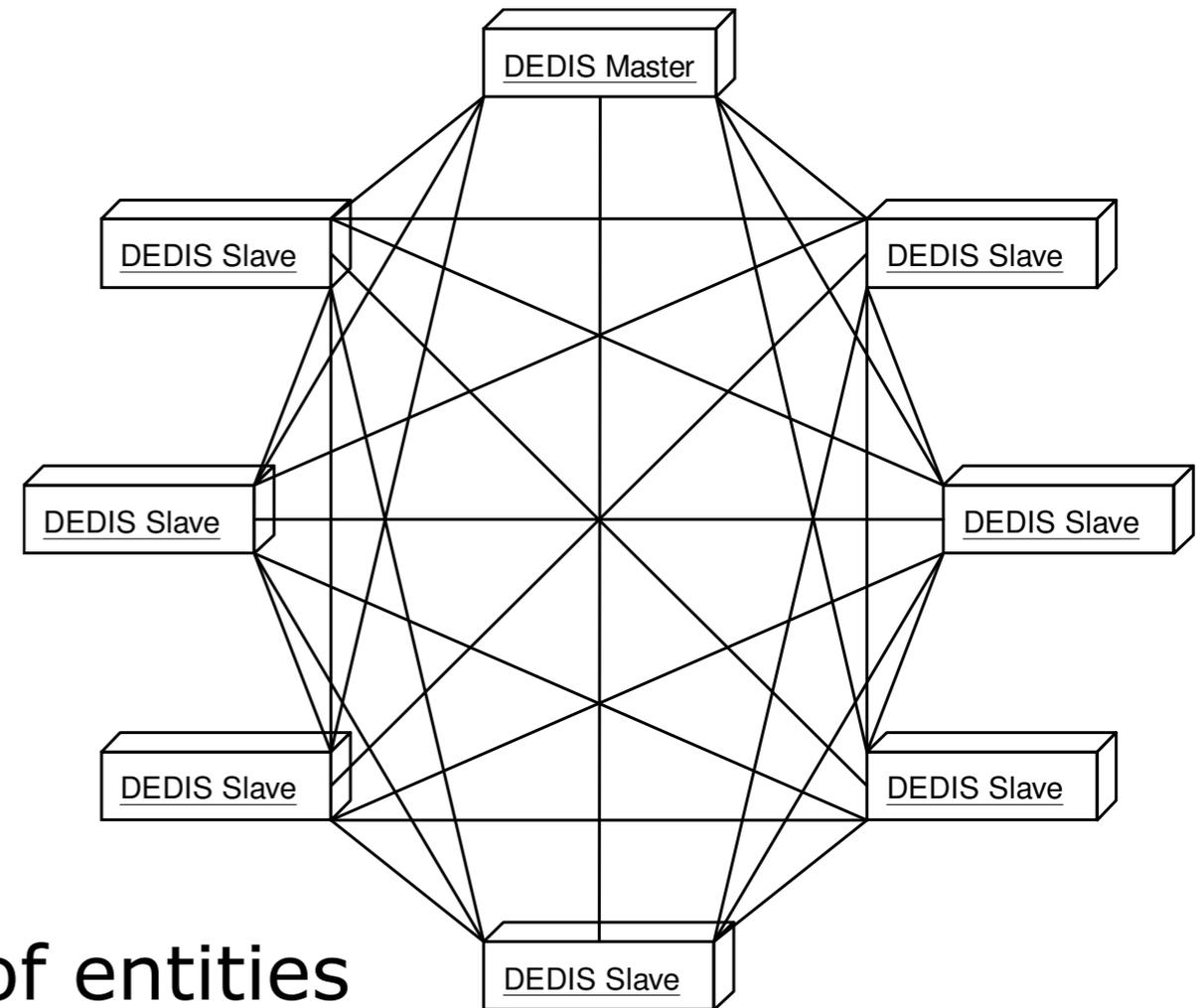
» Master-Slave architecture

» Master

- Simulation coordinator
- Entity directory

» Slave

- Contains a certain number of entities
- Connects to the master and all other slaves



↪ Communication between master and slaves form a complete graph.



3.2. DEDIS > Distribution (2/2)

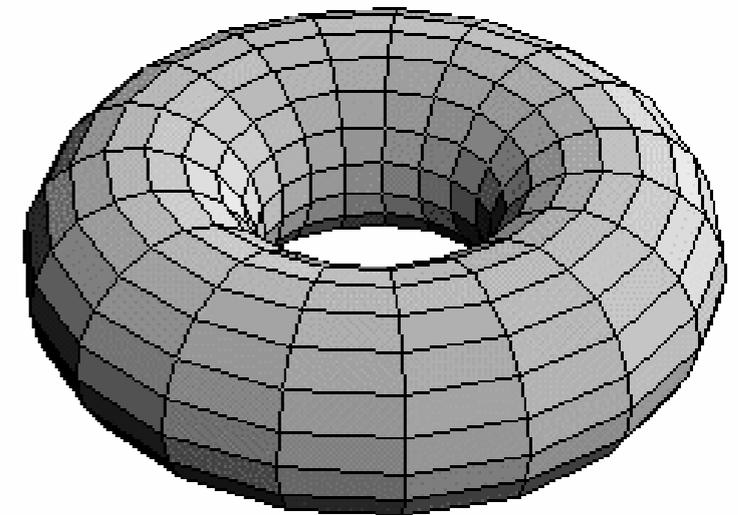


» Entities

- Live on the slaves
- Communicate with other entities
- Can migrate from one slave to another one

» Environment

- Forms a “torus”
- Contains the entities
- Is not shared
- Allows fast position lookup for entities



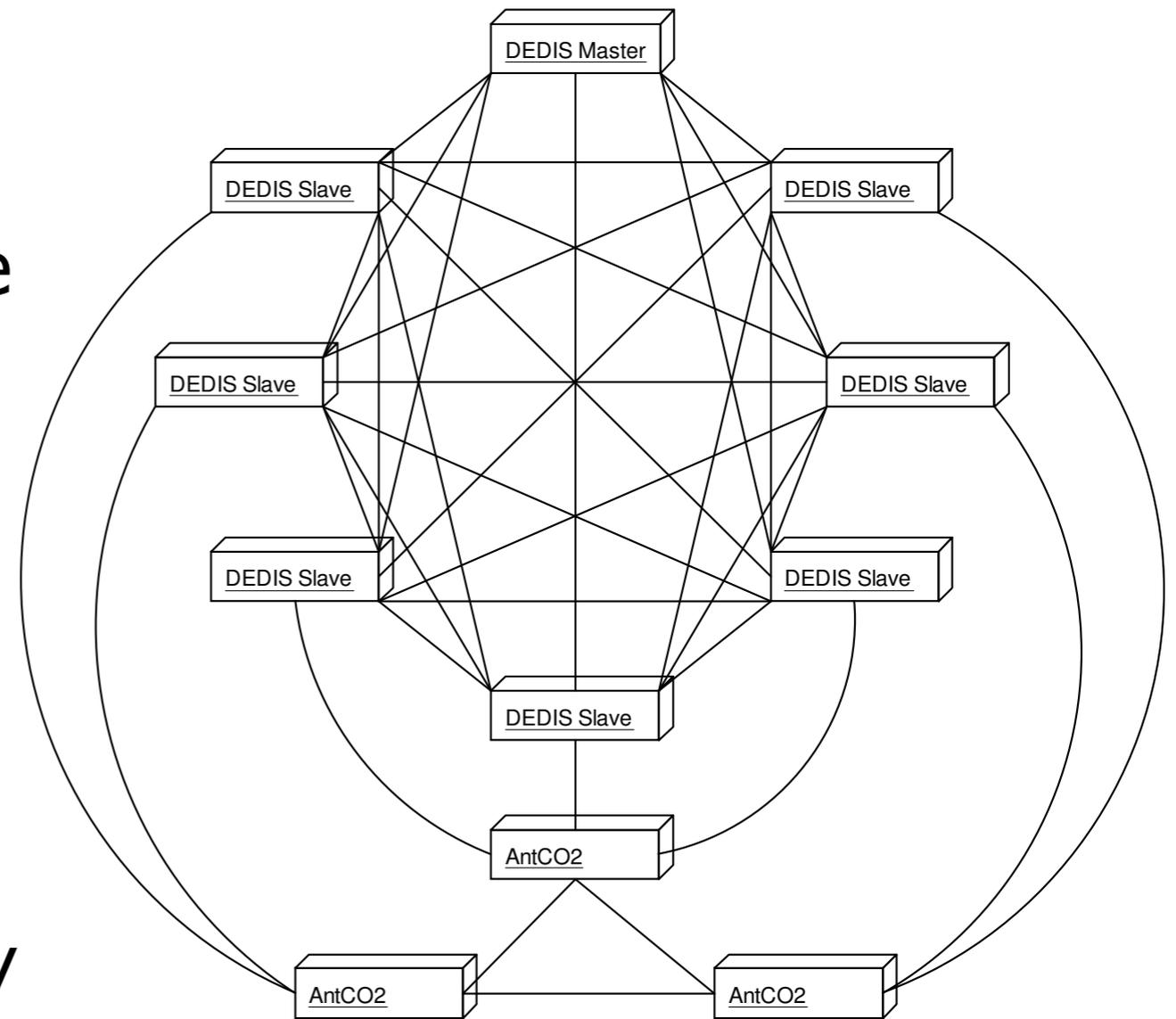


3.3. DEDIS > Load-balancing



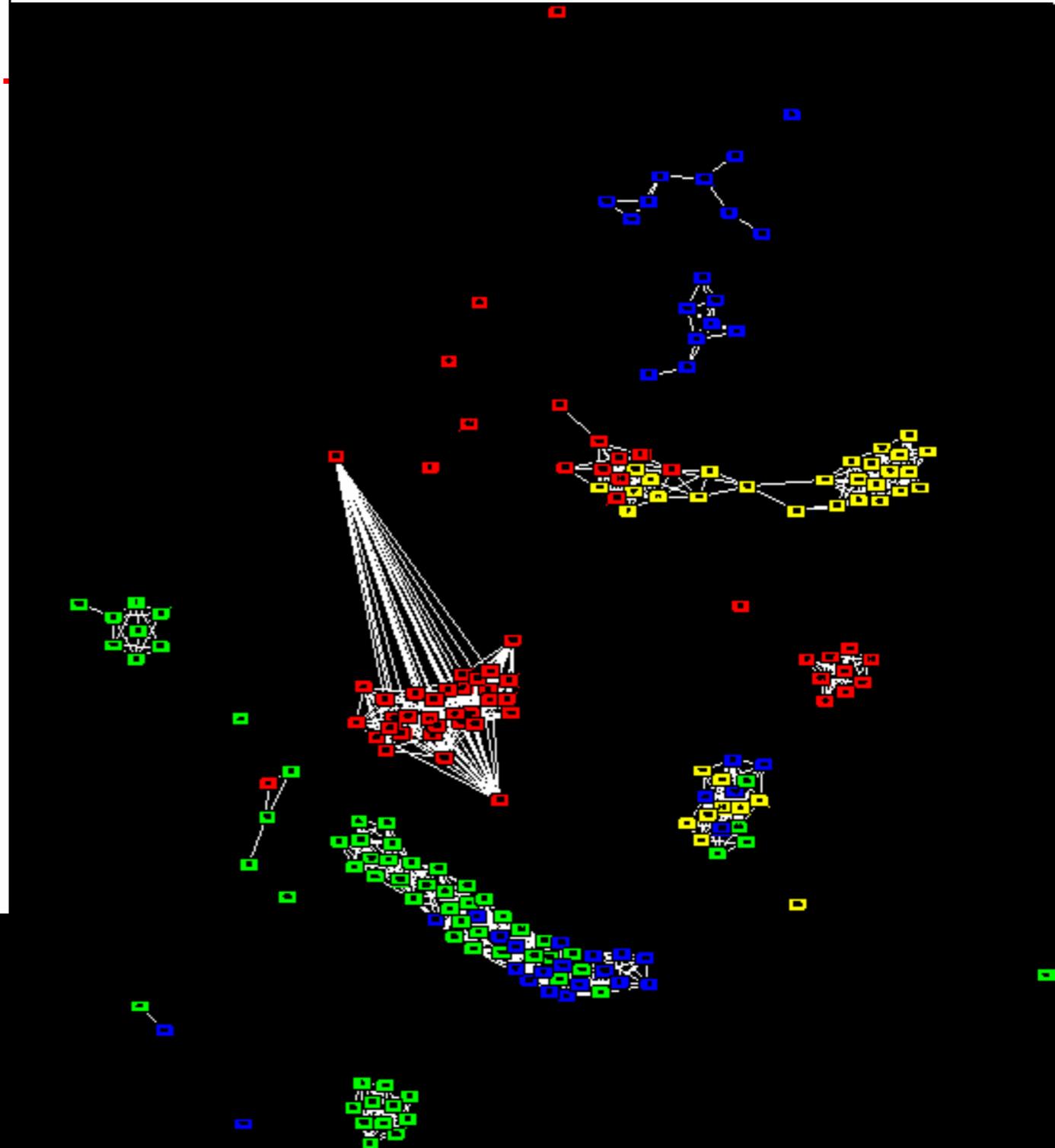
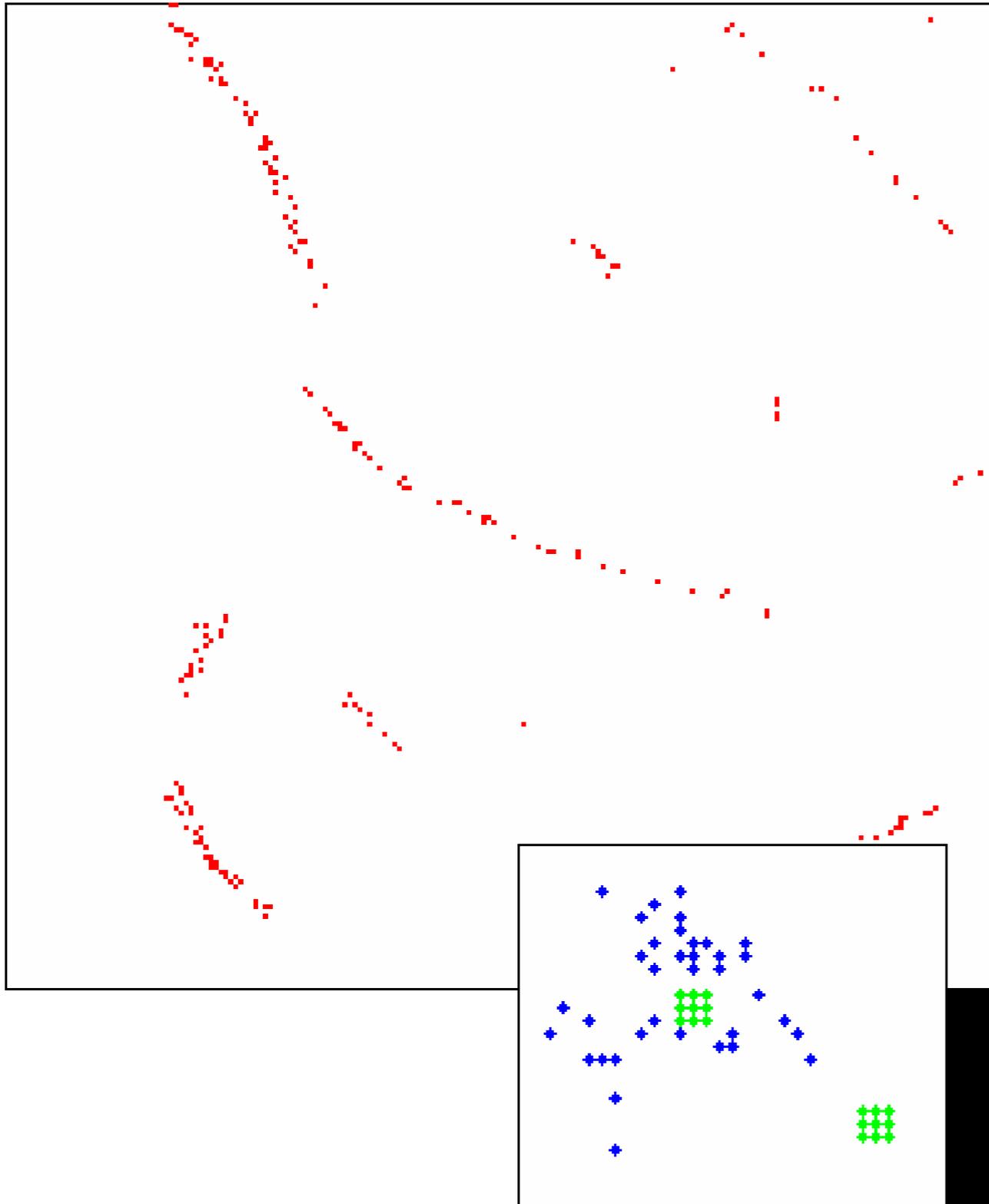
AntCO²

- Runs as service on the network
- Creates a dynamic communication graph based DEDIS' output
- May be queried by any entity in order to give a suggestion about where to migrate



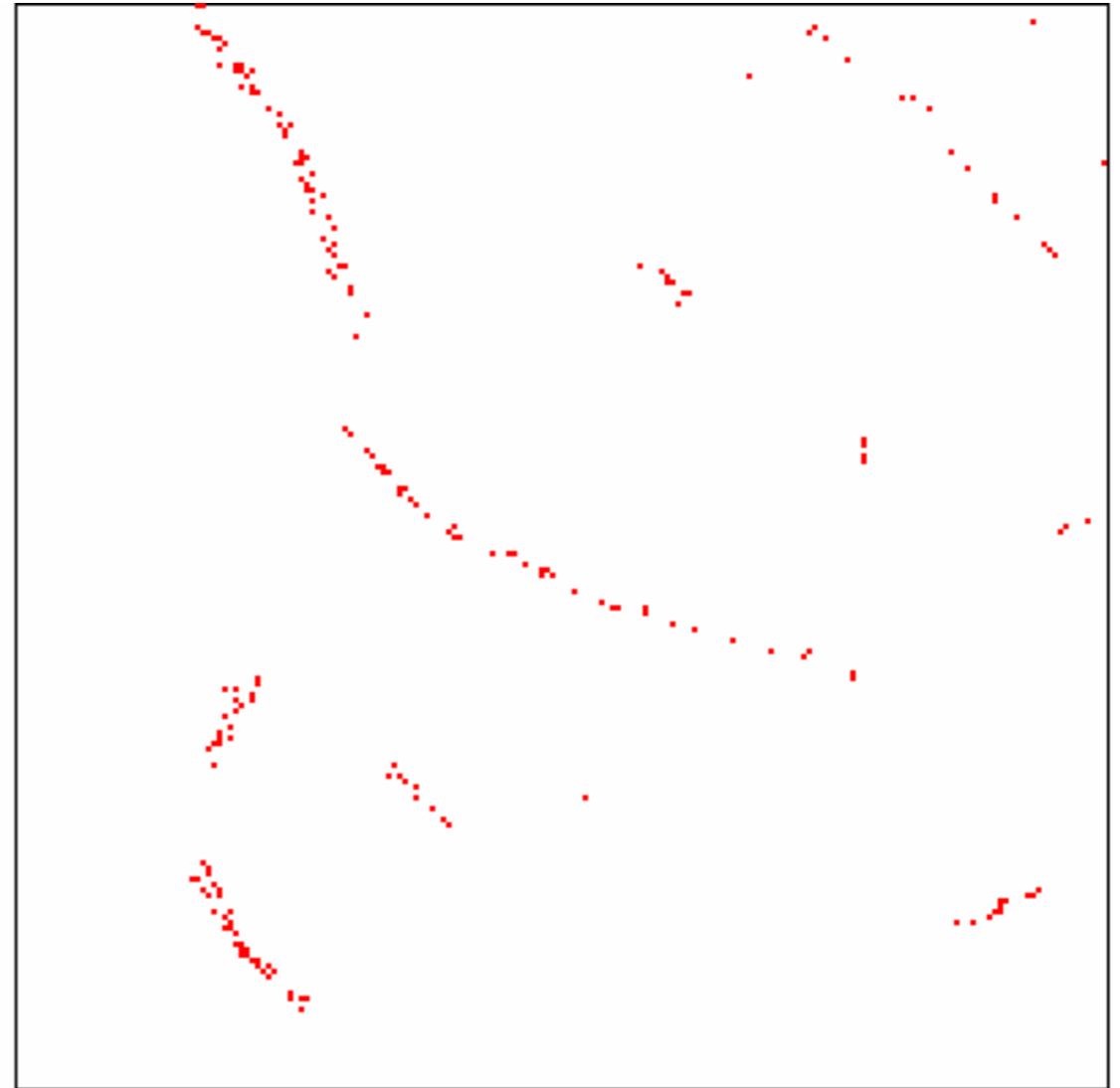
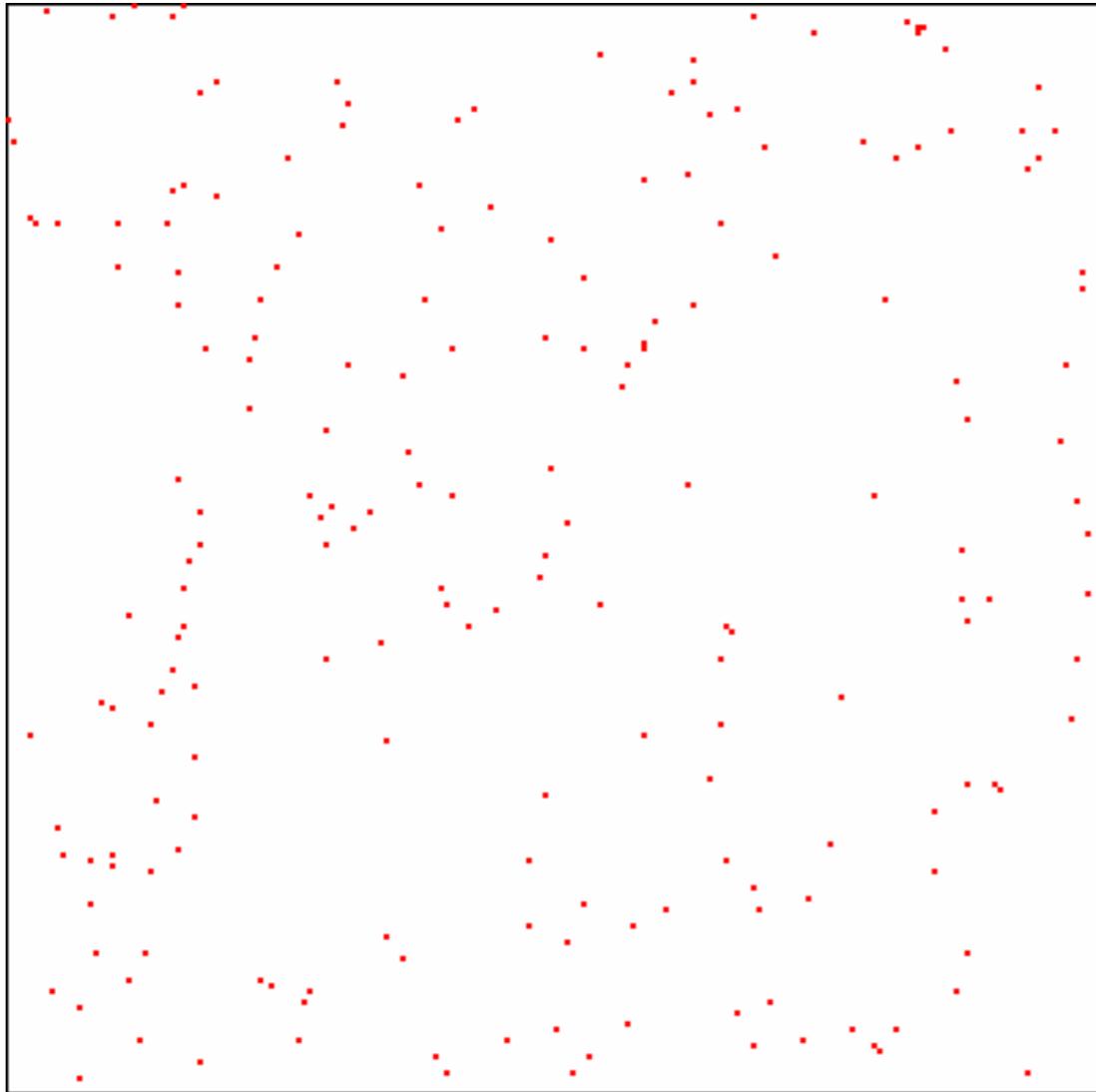


4. Results



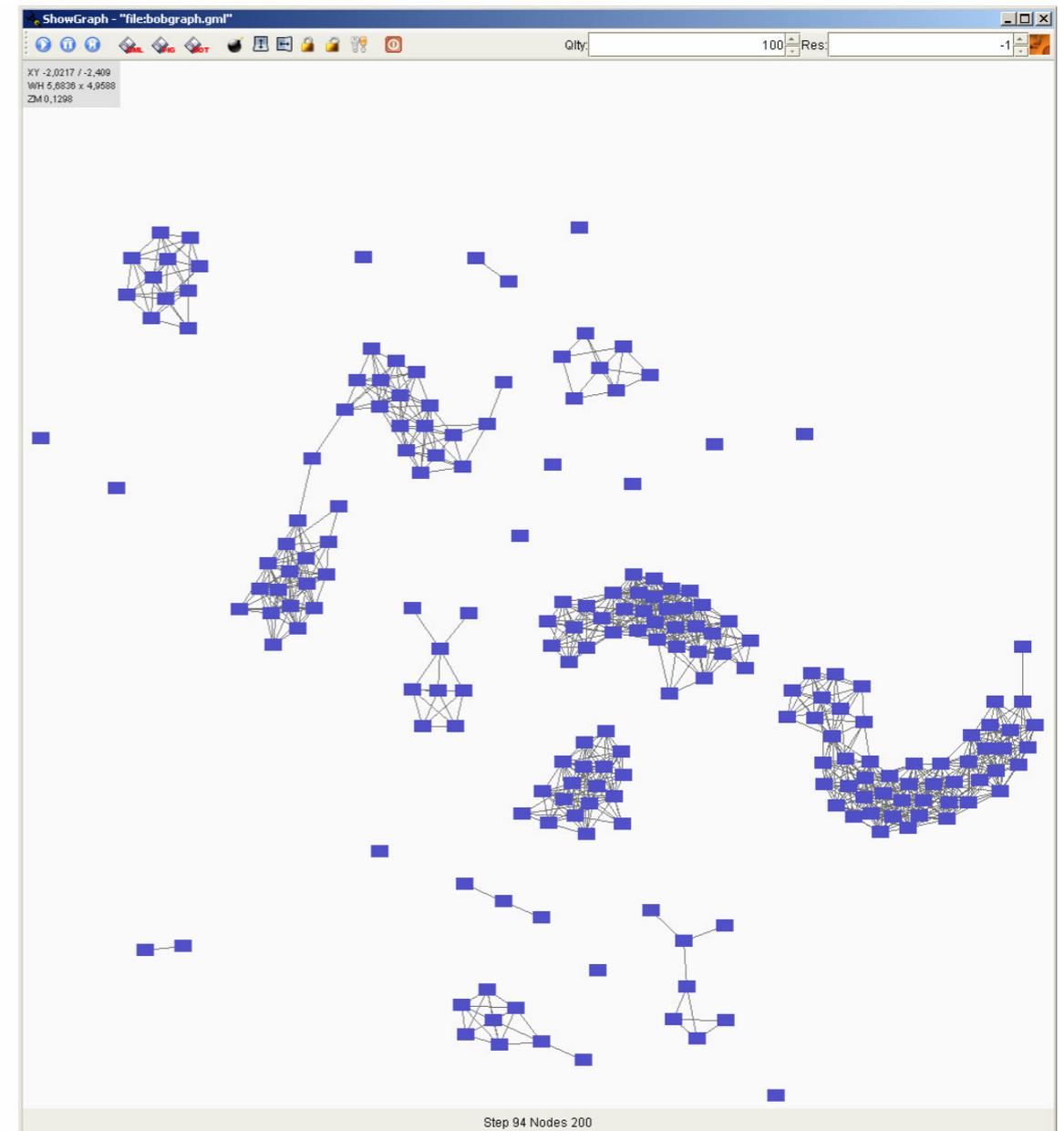
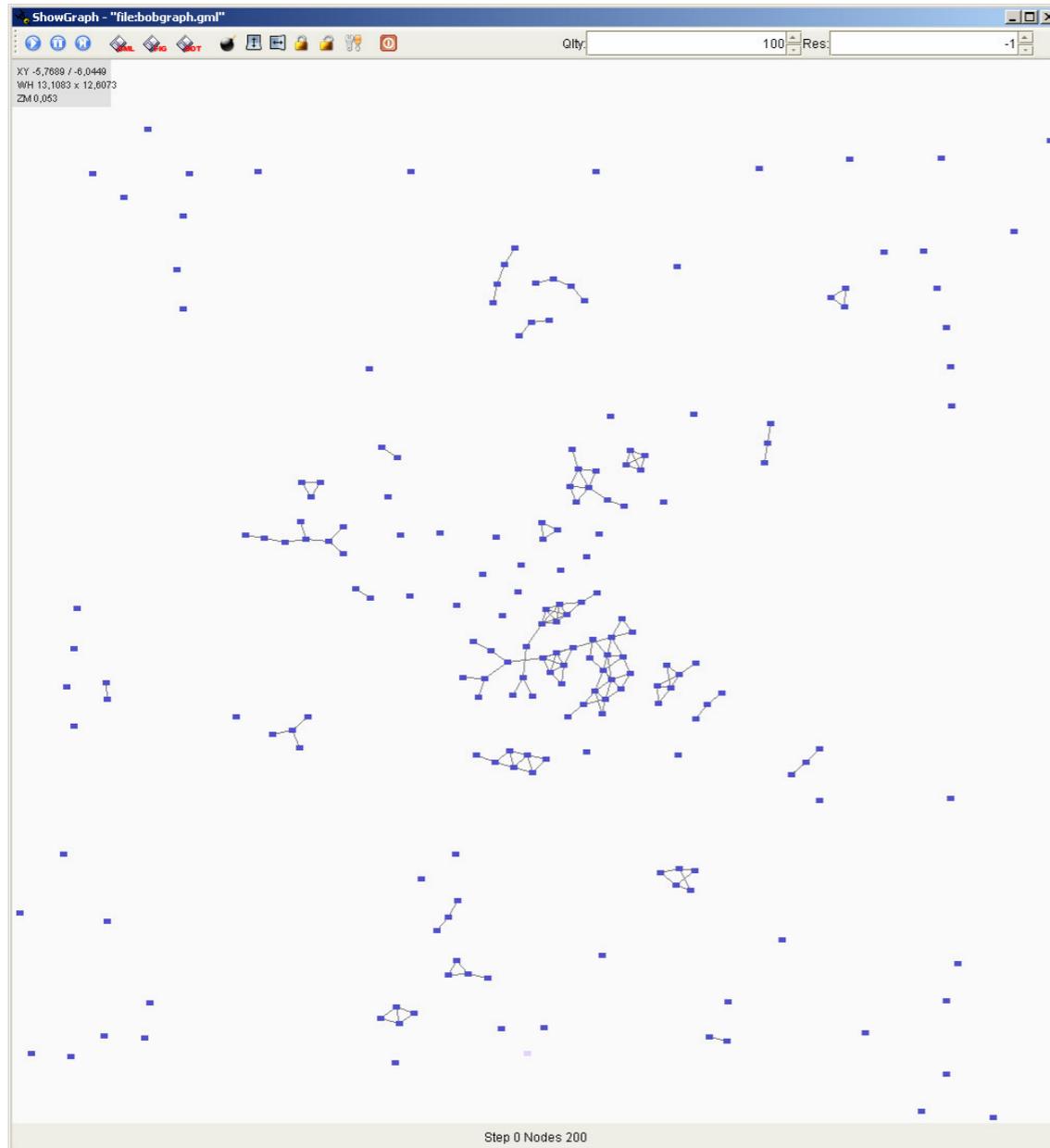


4. Results (1/4)



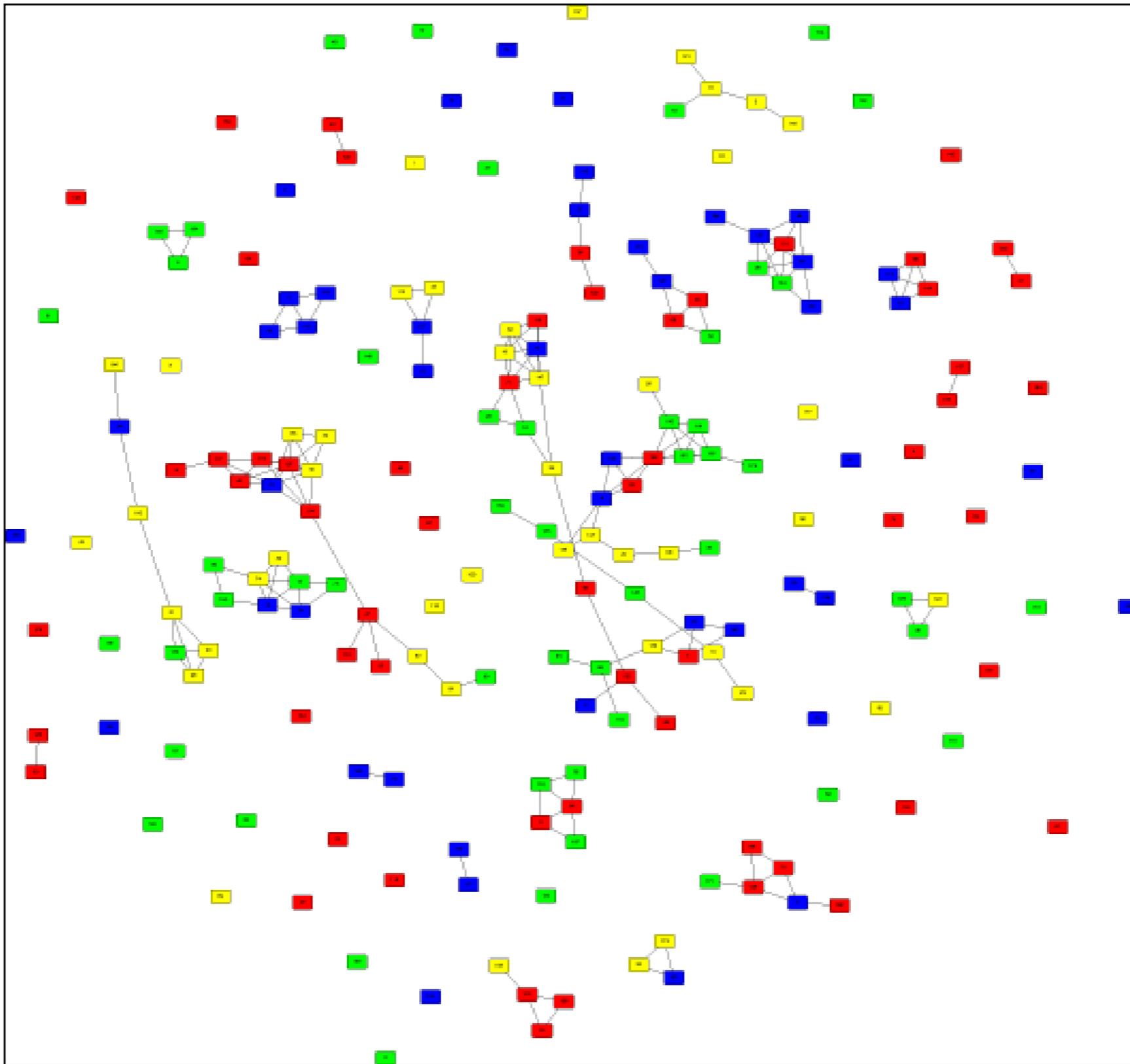


4. Results (2/4)



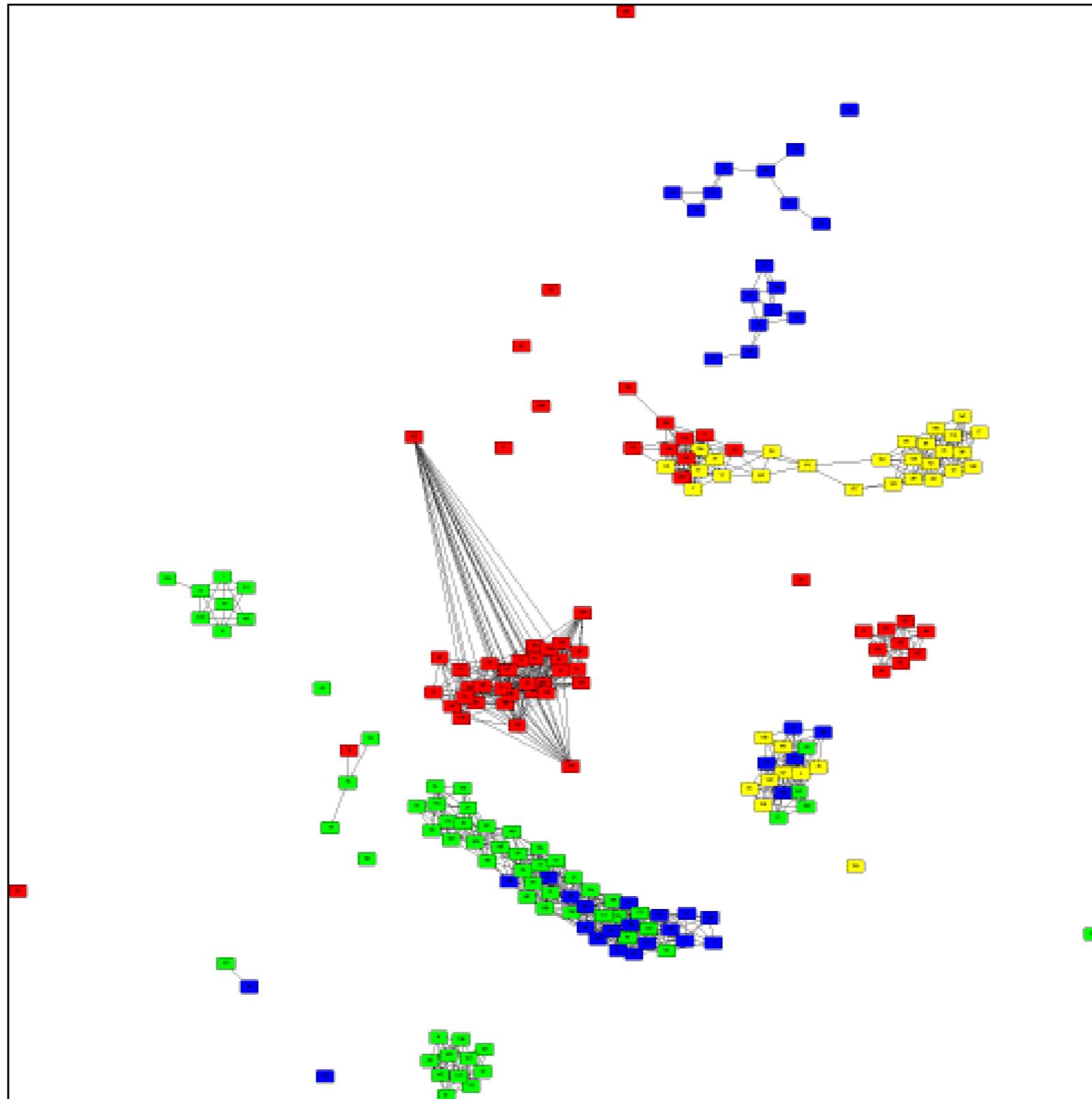


4. Results (3/4)





4. Results (4/4)





5. Conclusion



- » Although an aquatic ecosystem should have been modelled, the emergence of group behaviour turned out to be more important.
- » Very fascinating, especially the research for conceiving entities.
- » I learned a lot in the following domains:
 - Research
 - Teamwork for interfacing projects



6. References



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7. Questions

