THE STATE & COOPERATION?

Cartagena de Indias





EUROCORES Programme

Abstract

The collaborative research project (CRP) "Dynamic **Complexity of Cooperation-Based Self-Organizing Commercial Networks in the First Global Age, 1400-1800**" (Acronym: DynCoopNet) will confront one of the major research challenges of world history: understanding the dynamic, non-linear **world economic system** of the first global age, 1400-1800. In this system **cooperation** was much more strikingly important than in the world economy that would follow. The CRP will contribute to "The Evolution of Cooperation and Trading" (TECT) program through an examination of the evolution of cooperation within selforganizing commercial networks of merchants and other groups. Through a convergence of methods unusual in the historical social sciences, the CRP will reveal the mechanisms of cooperation that permitted merchants and others to establish and sustain the often long-distance trading networks of the period. DynCoopNet will pay particular attention to **the** global domains of Iberian monarchies. After defining the characteristics and roles of cooperation in the early centuries of the first global age, the CRP will identify and analyze the emergence of new forms of commercial relationships in order to understand the system's transformation to a second world economy. In this second world economy, cooperation was marginalized as a means to sustain networked connections between locations. Through the collaborative efforts of historians, geographic information systems (GIS) and cartographic design professionals, and mathematical **modelers in economics and geography**, DynCoopNet will produce new spatiotemporal data models that can be queried and new forms of visualizing the evolving trading relationships at different scales.

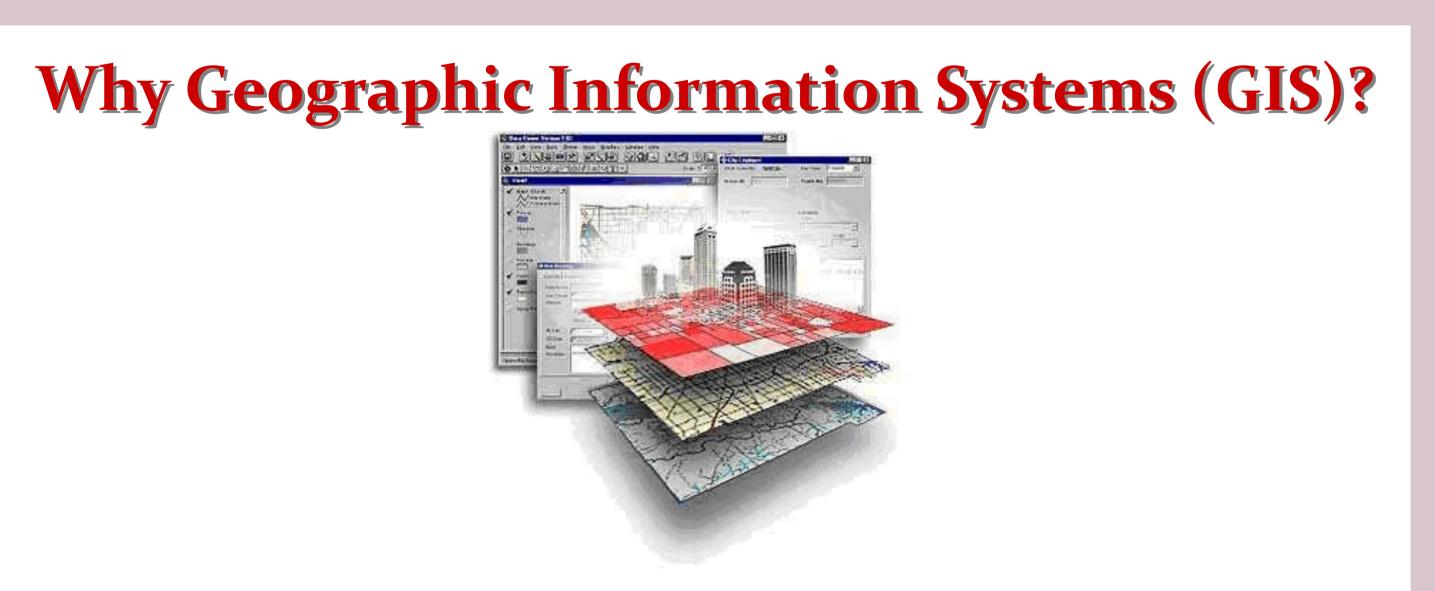


Image: http://www.kingston.ac.uk/esg/images/courses/gis_layers.jpg Each data type in its own layer: organize, aggregate, visualize

- Manage multiple stories and multiple perspectives
- **Combine** environmental/economic, social/political &
- cultural information about a place
- **Explore connections** between places
- Platform for data sharing and research collaboration

of History

Why Mathematical Exploration & Modeling?

Fans of the CBS program **Numb3rs** know that mathematics can model domain knowledge from research disciplines. Current GIS software is static, and History is about change over time. DynCoopNet combines the work of mathematical modelers in economics and geography with research in geographic information science (GIScience) to create a temporal GIS

Cooperation and Trading in the First Global Age, 1400-1800:

An Application of Geographic Information Systems (GIS)

J. B. "Jack" Owens and Derrick Sharp, Department of History, Idaho State University National Science Foundation, Award No. SES-0740345 (\$394,000; 2007-2010)

Dynamic Complexity of Cooperation-Based Self-Organizing Commercial Networks in the First Global Age, 1400-1800

[Acronym: DynCoopNet]

Why Visualize? Human Cognition & Art

• For the reduction of the cognitive weight when the alternatives are numerous and surpass the capabilities of human reason • For the **understanding** of the evolution of the networks and their geographic environment (pattern/form + process) • For the **comprehension and communication** of the spatialtemporal form of the world and its processes

• Fundamental for the implantation of this type of research within the discipline

adequate for the needs of historians.

Beckmann-

McPherson Central

Place Systems

 $V_{2} \rightarrow V_{1} \rightarrow V_{2} \rightarrow V_{2$

 W_2 W_2 V_3 V_4 V_4

 $\begin{array}{c} \overbrace{\mathbf{v}_{2}}^{\mathbf{v}_{2}} & \overbrace{\mathbf{v}_{1}}^{\mathbf{v}_{2}} & \overbrace{\mathbf{v}_{2}}^{\mathbf{v}_{2}} & \overbrace{\mathbf{v}_{2}}^{\mathbf{v}_{2}} \\ \hline \mathbf{T}_{1} \bullet & \mathbf{v}_{2} \bullet & \overbrace{\mathbf{v}_{2}}^{\mathbf{v}_{2}} & \overbrace{\mathbf{v}_{2}}^{\mathbf{v}_{2}} & \overbrace{\mathbf{v}_{2}}^{\mathbf{v}_{2}} & \overbrace{\mathbf{v}_{2}}^{\mathbf{v}_{2}} \\ \hline \end{array}$

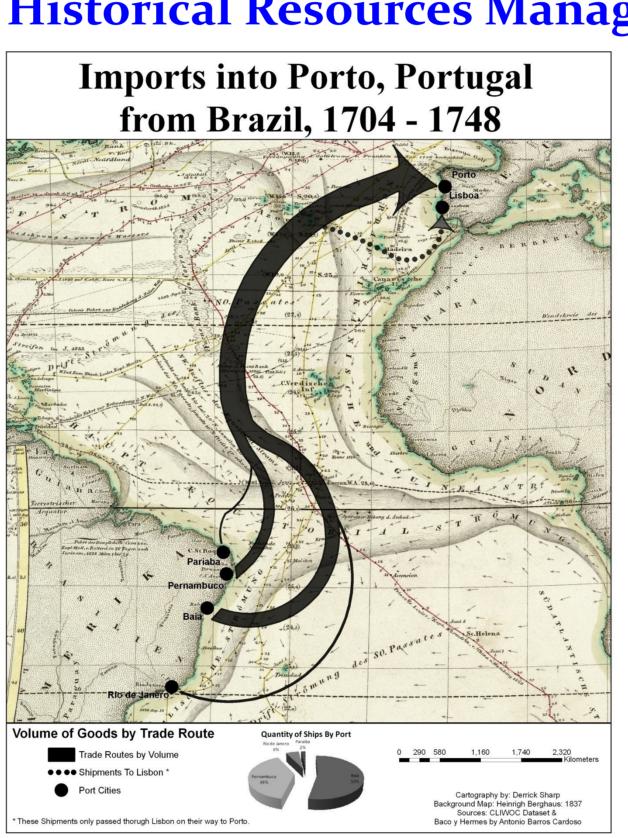
 $\begin{array}{c|c} W_{3} & V_{3} \\ \hline V_{3} \\ \hline V_{3} \\ \hline V_{4} \\ \hline V_{4} \\ \hline V_{4} \\ \hline V_{5} \hline \hline V_{5} \\ \hline V_{5} \hline \hline V_{5} \\ \hline V_{5} \hline \hline V_{5} \hline \hline V_{5} \hline \hline V_{5} \hline V_{5} \hline V_{5} \hline \hline V_{$

(c). $k_1 = 7; k_2 = 4.$

DynCoopNet will also utilize various types of mathematical modeling to explore the emergence of new forms and causeand-effect relationships (in order to facilitate the discovery and understanding of dynamics in a complex, non-linear system), to validate or corroborate hypotheses, and to identify unexpected tendencies or trends.

Idaho State University's GIS-based Master's in Geographically-Integrated History M.A. in Historical Resources Management





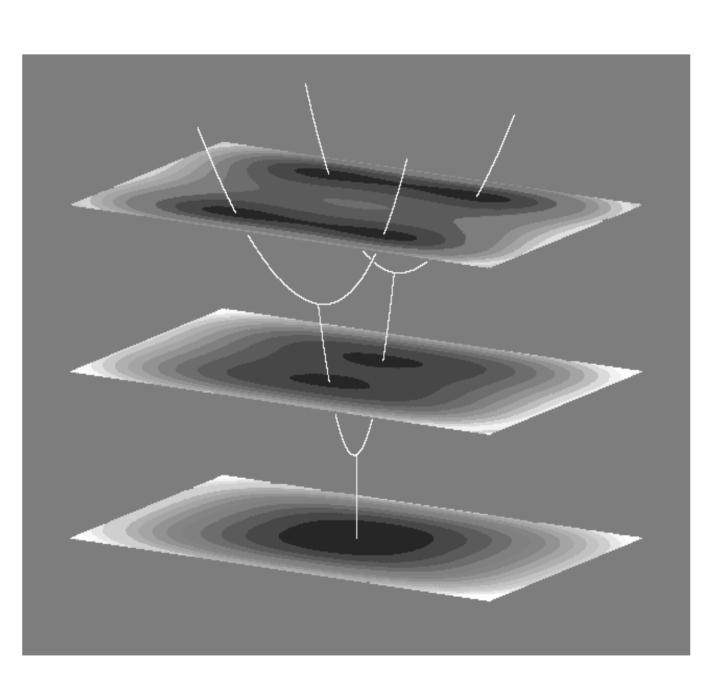
Data visualization by Derrick Sharp, DynCoopNet graduate research assistant, ISU **Future Developments** • Interdisciplinary Ph.D. in Human Ecology and Social

- Dynamics
- Idaho Institute for Regional Science

What kind of system is it? An Open, Complex, Dynamic, Nonlinear System

Implications:

- Lots of variables in a complex system
- However, there are a few variables (perhaps only one) that are stable, but near instability, and these variables maintain the stability of the system (Haken, 1983).
- These critical variables move to instability, and the system moves to instability, chaos, and bifurcation.
- New forms emerge.
- Different values & perspectives so that those of the new system have difficulty understanding the former one





What is the DynCoopNet collaborative research community?

Multi-national (16 countries; 5 continents) • Australia, Denmark, France, Germany, India, Israel, Italy, Japan, Mozambique, Netherlands, Portugal, Spain, Sweden, Switzerland, United Kingdom, United States

Multi-disciplinary (over 40 researchers)

• anthropology, cartography (history & visualization), economics, geography, history, geographic information science (GIScience), sociology, mathematics

- **European Science Foundation, EUROCORES (European Collaborative Research) Scheme**
 - **Program: "The Evolution of Cooperation and Trading"** [Acronym: TECT]

What are DynCoopNet's other assumptions? Andre Gunder Frank (1929-2005)

ReORIENT: Global Economy in the Asian Age (University of California Press, 1998) • **Connected world history**: The history of no place can be understood without understanding how it has been connected to other places (Frank, 1998; OAH, *LaPietra Report*, 2000). • A place is part of an ultimately **global system** that influences the history of all places all of the time (Frank, 1998). Cooperation & self-organizing commercial networks were

- a foundation of the first global economy
- Variations in cooperation in diverse locations & need for georeferenced information (Longitude & Latitude; Hill, 2006)

Why Cooperation?

- Foundational theory of evolutionary biology and economics on **competition** but **cooperation** everywhere in the biological world and human communities; how possible?
- ◆ Avoid the **"Tragedy of the Commons"** (Hardin, 1968)
- Local, regional, and international cooperation needed for resource allocation and environmental sustainability
- Cooperation across the boundaries of countries and firms becoming the **norm of the global economy**
- Because it was a different complex system, the first global age (1400-1800) will provide new insights into how cooperative relationships are established and maintained.

What are some hypotheses to be tested?

In the social science literature, it is often asserted that greater human cooperation in trading became possible with the increasing effectiveness of state or similar institutions. However, these cooperation-based networks of the first global age were characterized by a **diffusion of authority** and frequently by-passed the segmented political hierarchies characteristic of the period's governments. Moreover, these networks served as the source of the **creativity and innovation** necessary to respond in a flexible manner to the era's endemic disruptions to information, transportation, and capital flows.





IBERIAN MONARCHIES

Image provided by Javier Moya, Universidad Politécnica



What is the European Science Foundation program for multi-national, multi-disciplinary research? To promote multi-national, transformative research **EUROCORES** (European Collaborative Research) Scheme

Organizes research programs that are multinational and multi-disciplinary, such as the program "The Evolution of Cooperation and Trading" (TECT) The Evolution of Cooperation & Trading

Proposed by Evolutionary Biologists & Economists

(The foundational theories focus on **competition** but **cooperation** is widespread in human communities and within and among other species; how can such cooperation be accounted for within evolutionary and economic theory?)

Funded TECT projects (PL = Project Leader)

- Dynamic complexity of cooperation-based self-organizing networks in the first global age (DynCoopNet)
- 19 national projects PL: Dr. Ana Crespo Solana, Consejo Superior de Investigaciones Científicas (CSIC, Madrid); Prof. J. B. "Jack" Owens, Idaho State University, USA
- Cooperation in corvids (COCOR) 7 national projects
- PL: Prof. Ronald Noë, Université Louis Pasteur, Strasbourg, France
- The social and mental dynamics of cooperation (SOCCOP)
- 10 national projects
- PL: Prof. Herbert Gintis, Central European University (CEU), Budapest,
- Cooperation in mutualisms: contracts, markets, space, and dispersal (BIOCONTRACT) 6 national projects
- PL: Prof. Naomi Pierce, Harvard University, USA
- ◆ Sustaining eco-economic norms for a sustainable environment (SENSE) 3 national projects
- PL: Prof. Simon A. Levin, Princeton University, USA

Some References

Frank, A. G. (1998). *ReORIENT: Global economy in the Asian age*. Berkeley and Los Angeles: University of California Press.

Haken, H. (1983). Advanced Synergetics. Berlin & Heidelberg, Germany: Springer-Verlag.

Hardin, G. (1968). "The tragedy of the commons." *Science*, 162 (3859): 1243–8. Hill, L. L. (2006). Georeferencing: The geographic associations of information. Cambridge, MA: MIT Press.

Organization of American Historians (2000). *LaPietra report: A report to the* profession, http://www.oah.org/activities/lapietra/final.html, accessed on 30 April 2007.

Owens, J. B. (2007). "Toward a geographically-integrated, connected world history: Employing geographic information systems (GIS)." *History Compass*, 5 (October): online journal (Oxford, UK: Blackwell).

Puu, T. (2003). Attractors, bifurcations and chaos: Non-linear phenomena in economics. 2nd Ed. Berlin & Heidelberg, Germany: Springer-Verlag.

Staley, D. J. (2003). Computers, visualization, and history: How new technology will transform our understanding of the past. Armonk, NY: M. E. Sharpe. **Tuomela, R.** (2000). *Cooperation: A philosophical study*. Philosophical Studies Series. Boston, MA: Kluwer Academic Publishers.