



Celebrating 50 years
of systems science

1972 – 2022

For more information:
www.iiasa.ac.at

Magyar Tudományos Akadémia

2022. október 28.

Boza Gergely
tudományos munkatárs

**Modellek
a baktériumoktól
a társadalmakig**

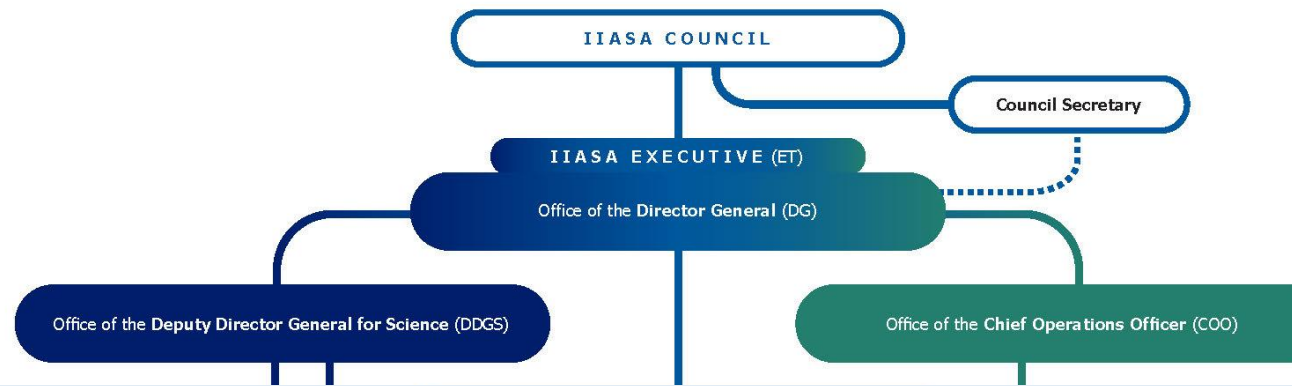
15 év a IIASA-ban



- Evolúciótudomány Intézet, Ökológiai Kutatóközpont, Budapest
- IIASA (Cooperation and Transformative Governance Research Group, Advancing Systems Analysis Program), Laxenburg
- Társadalomtudományi Kutatóközpont, Budapest
- ELTE, Budapest



A Nemzetközi Alkalmazott Rendszerelemzési Intézet



IIASA az évek során – A kezdetek (1973)

PLANNING THE RESEARCH PROGRAM

Research planning conferences held during the progress. Their role was not to generate specific ideas. More than three hundred distinguished experts help the Institute leaders to identify and discuss

Biological and Medical Systems
 Ecology and Environmental Systems
 Energy Systems
 Industrial Systems
 Water Resources
 Urban and Regional Systems

October	Dantzig, G. B.	USA	Methodology	9 months
	Kourochkin, N.	USSR	Energy	1 year
	Feldman, J.	USA	Computer Science	1 month
	<u>Rabar, F.</u>	<u>Hungary</u>	Methodology	3 months
	Hammond, R.	USA	Energy	2 weeks
	Kulikowski, R.	Poland	Methodology	2 weeks
	Patzak, R.	Austria	Energy	1 year
November	+ Bruckmann, G.	Austria	Methodology	15 months
	Charpentier, J.-P.	France	Energy	1 year
	<u>Kiss, I.</u>	<u>Hungary</u>	Organizations	2 months
	Moiseev, R.	USSR	Methodology	2 weeks
	Winkler, C.	Chile	Methodology	1 year
	Tokhadze, V.	USSR	Water	1 year

Analysis
 Organizations

ushkov
 tkowitz

IIASA az évek során – 1980

ENERGY SYSTEMS • CORE	• DISSEMINATION • STRATEGIES • OPTIONS						
FOOD AND AGRICULTURE • CORE	• STRATEGIES: NATIONAL POLICY MODELS FOR FOOD AND AGRICULTURE • LIMITS AND CONSEQUENCES OF FOOD PRODUCTION TECHNOLOGIES						
RESOURCES AND ENVIRONMENT	• CORE	HUMAN SETTLEMENTS AND SERVICES	• CORE	MANAGEMENT AND TECHNOLOGY	• CORE	SYSTEM AND DECISION SCIENCES	• CORE
<ul style="list-style-type: none"> • REGIONAL WATER MANAGEMENT • ENVIRONMENTAL QUALITY CONTROL AND MANAGEMENT • ENVIRONMENTAL PROBLEMS OF AGRICULTURE • GLOBAL CLIMATE • RESOURCE ASSESSMENT AND ACCOUNTING (WELMM) 		<ul style="list-style-type: none"> • NORMATIVE LOCATION MODELING • MODELING HEALTH CARE SYSTEMS • MANPOWER ANALYSIS • URBAN CHANGE • POPULATION, RESOURCES, AND GROWTH 		<ul style="list-style-type: none"> • PROBLEMS OF TECHNOLOGICAL CHANGE (INNOVATION) • ORGANIZATIONAL MANAGEMENT • MANAGEMENT OF INTERORGANIZATIONAL PROBLEMS 		<ul style="list-style-type: none"> • DECISION AND PLANNING THEORY • ECONOMIC MODELING • OPTIMIZATION 	
GENERAL RESEARCH	<ul style="list-style-type: none"> • SURVEY PROJECT • INFORMATICS • REGIONAL DEVELOPMENT • GLOBAL MODELING REVIEW 						

IIASA az évek során – 2007

ENVIRONMENT & NATURAL RESOURCES



Dr. Markus Amann
Austria
Atmospheric Pollution &
Economic Development (APD)



Dr. Ulf Dieckmann
Germany
Evolution & Ecology (EEP)



Prof. Sten Nilsson
Sweden
Forestry (FOR)
Deputy Director (IIASA)



Dipl. Ing. Günther Fischer
Austria
Land Use Change & Agriculture (LUC)

POPULATION & SOCIETY



Dr. Brian O'Neill
USA
Population & Climate Change (PCC)



Dr. Joanne Linnerooth-Bayer
USA
Risk & Vulnerability (RAV)



Prof. Wolfgang Lutz
Austria
World Population (POP)



Processes of
International
Negotiation (PIN)
Network Steering
Committee

Left to right: Prof. Rudolf Avenhaus (Germany),
Prof. Guy Olivier Faure (France), Prof. I. William Zartman (USA),
Paul W. Meerts (Netherlands), Ambassador Franz Cede (Austria),
Prof. Victor Kremenyuk (Russia), Prof. Gunnar Sjöstedt (Sweden)

ENERGY & TECHNOLOGY



Dr. Arkady Kryazhimsky
Russia
Dynamic Systems (DYN)



Prof. Nebojsa Nakicenovic
Austria
Energy (ENE)
Transitions to New Technologies (TNT)

SPECIAL PROJECTS



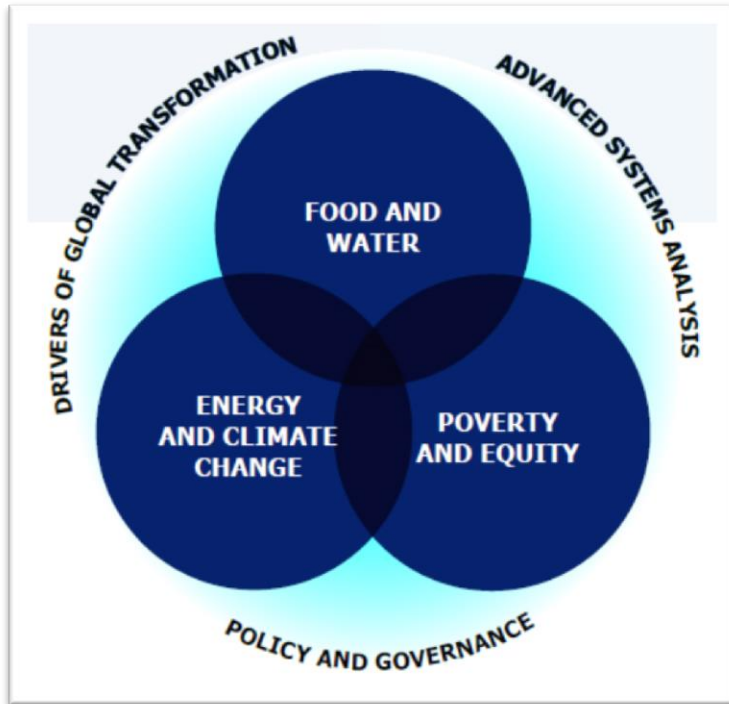
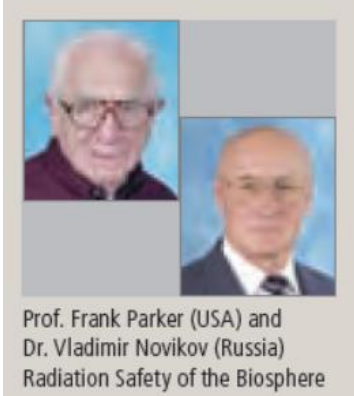
Dr. Lands MacKellar
USA
Health & Global Change (HGC)



Dr. Marek Makowski
Poland
Integrated Modeling
Environment (IME)

In 2007, 192 research scholars, research assistants, and postdoctoral research fellows from 30 different countries worked at IIASA. Together, these scientists contributed 104 person-years to IIASA's research—an expansion from 91 person-years in 2006.

IIASA az évek során – egyéb programok és témák



Cross-cutting projects

Cross-cutting research at IIASA draws on expertise from across the institute's research programs. These primarily methodology-focused projects represent unique and unaddressed research challenges that require integrated and interdisciplinary expertise and focus.

Equitable governance of common goods

Selected highlight:



Alleviating the tragedy of the commons

Dynamic vegetation models: The next generation

Selected highlight:



Laying the foundation for a new generation of models

Socioeconomic heterogeneity in model applications

Selected highlight:



Consumers, development, and the future of wellbeing

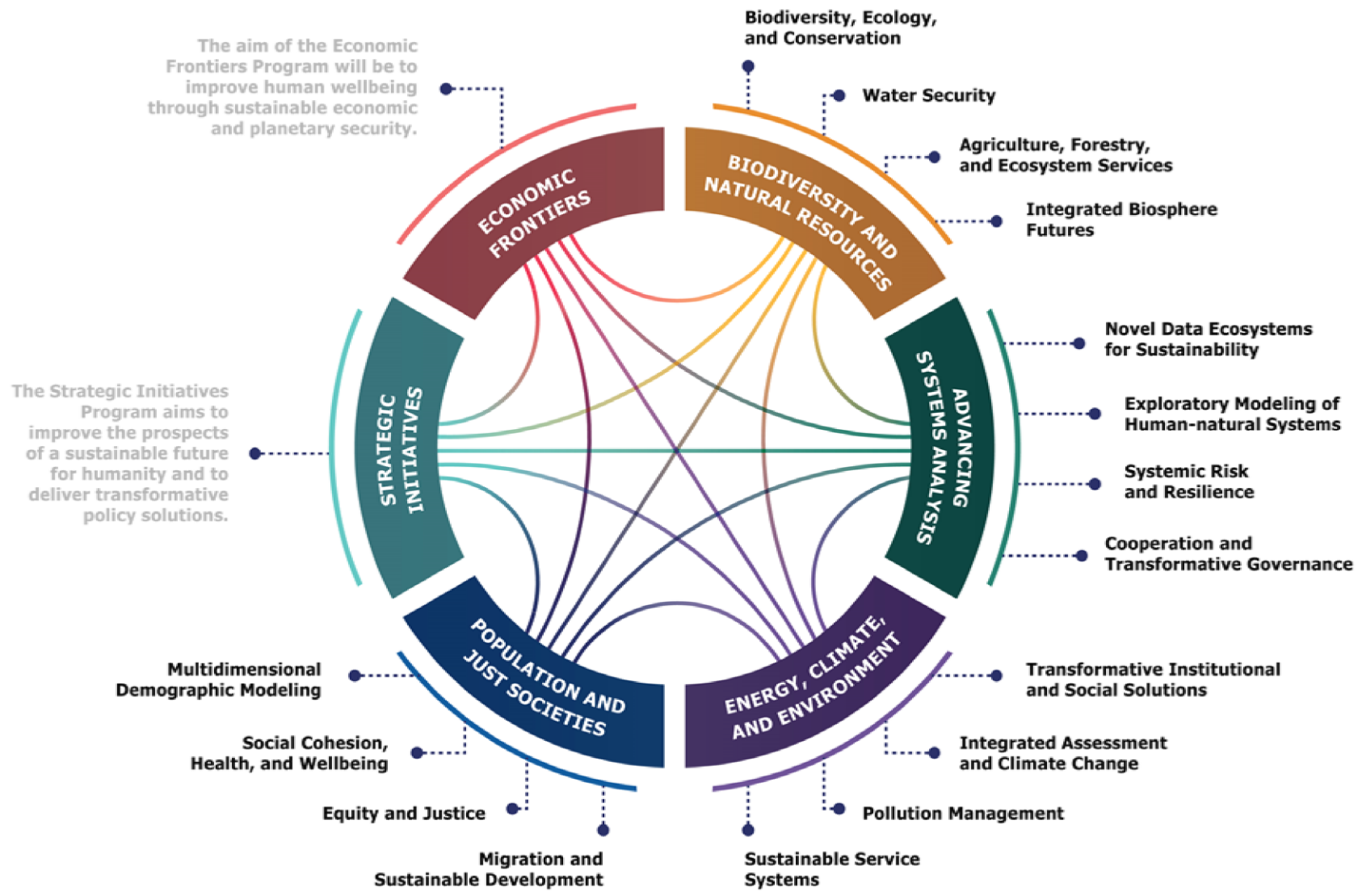
Systemic risk and network dynamics

Selected highlight:



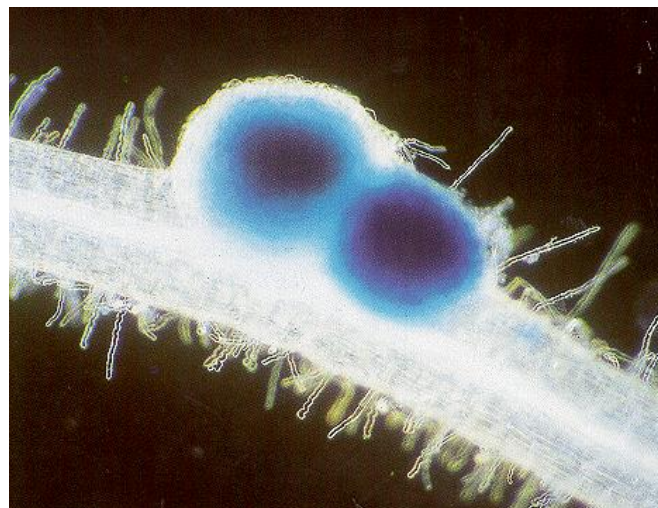
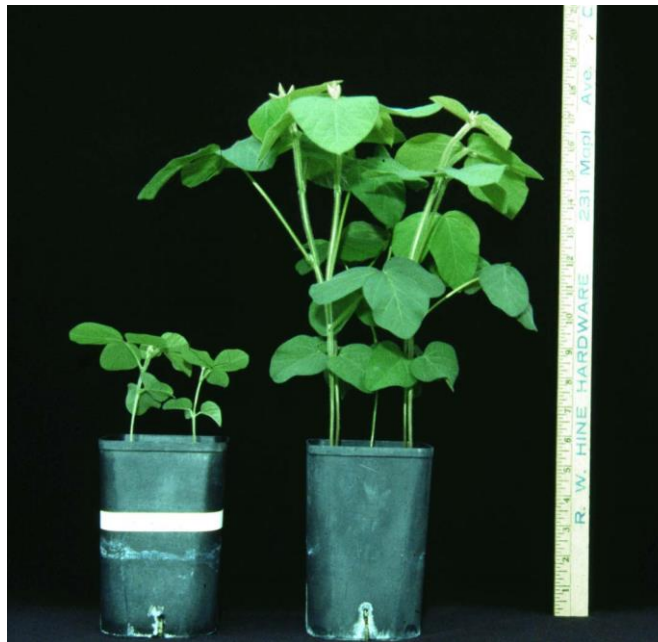
Improving the resilience of systems

IIASA az évek során – napjaink

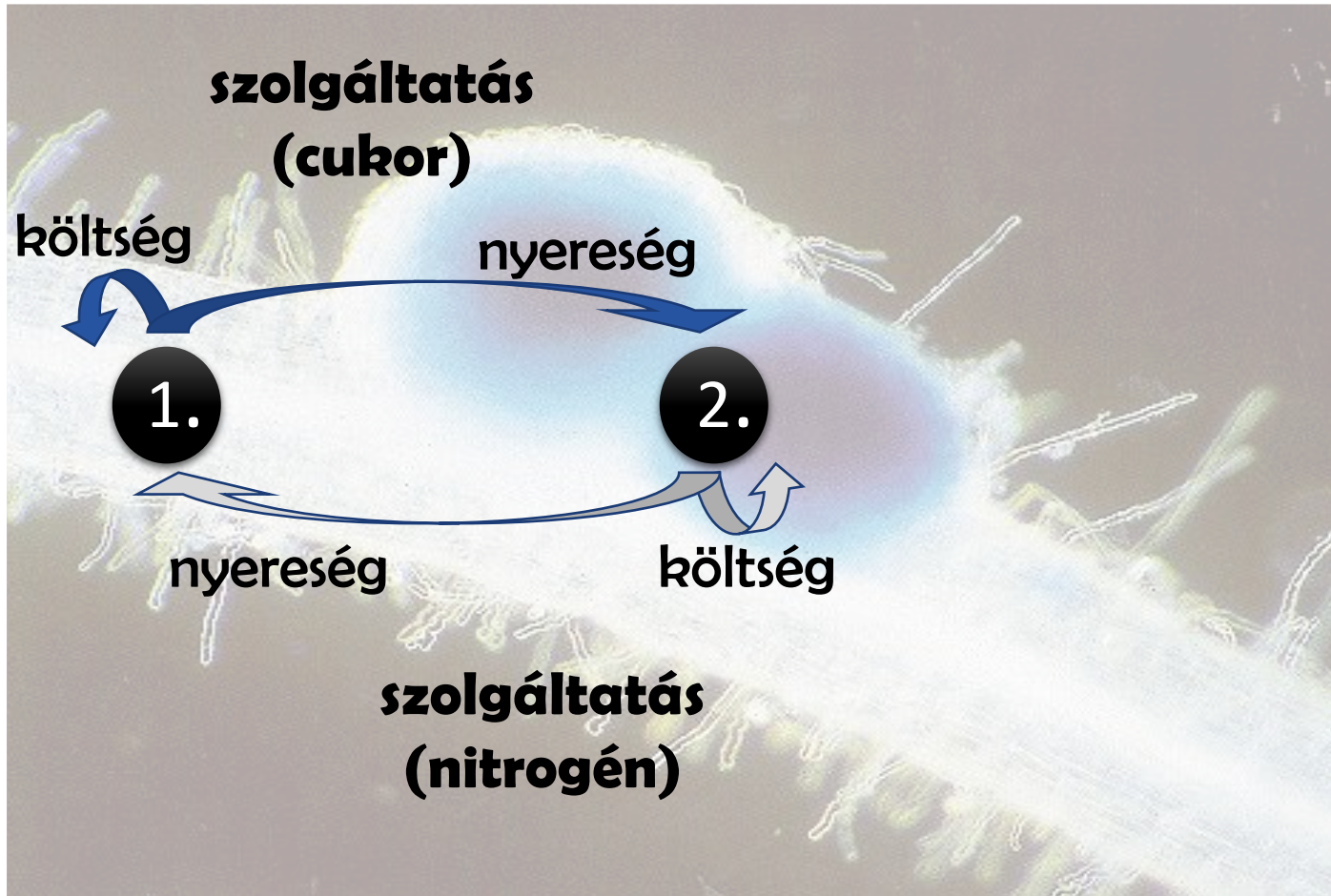


Mutualizmus

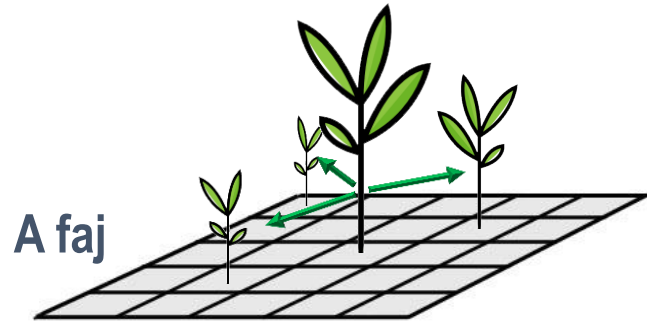
növények és baktériumok kölcsönös együttműködése



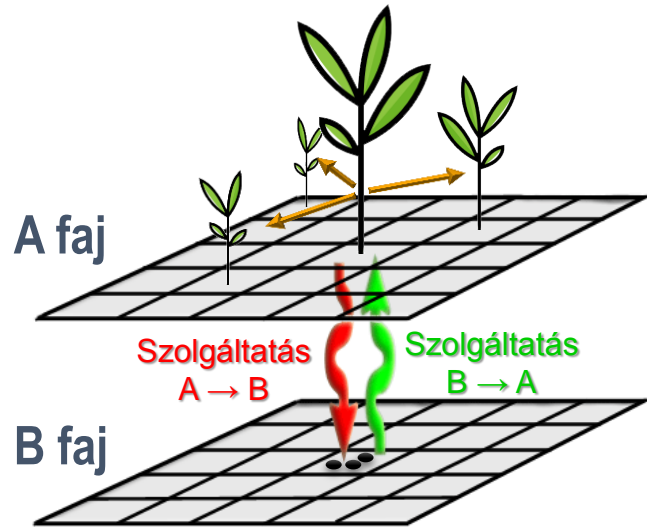
Együttműködés (kooperáció) fajok között



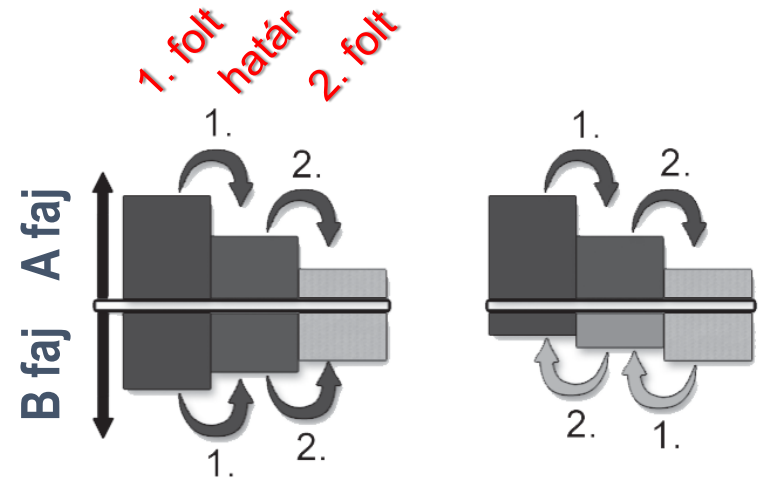
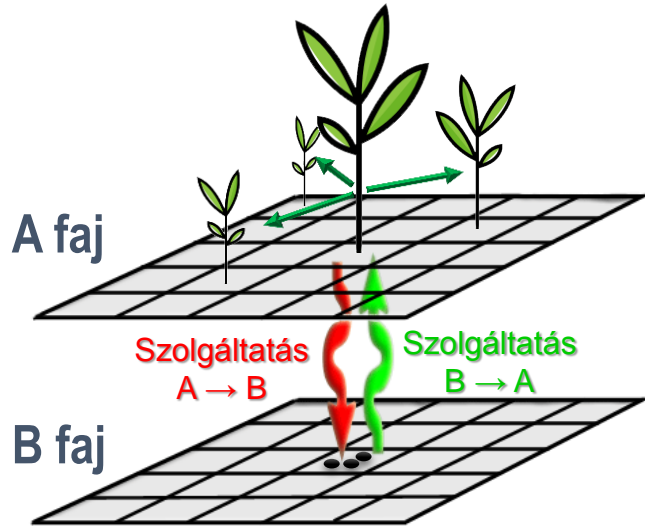
Térbeli egyedalapú modell



Térbeli, egyedalapú modell

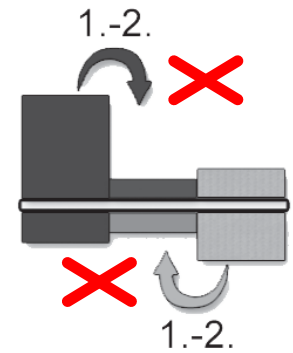
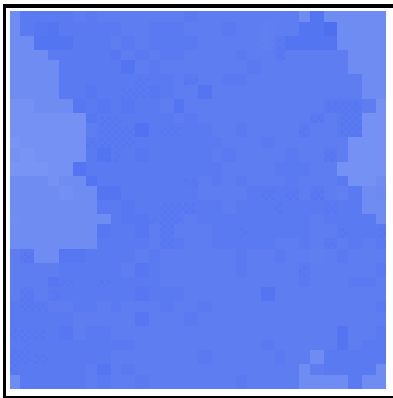


Dinamikus térbeli (koevolúciós) mozaikok



A faj

B faj



Reciprocitás emberek között

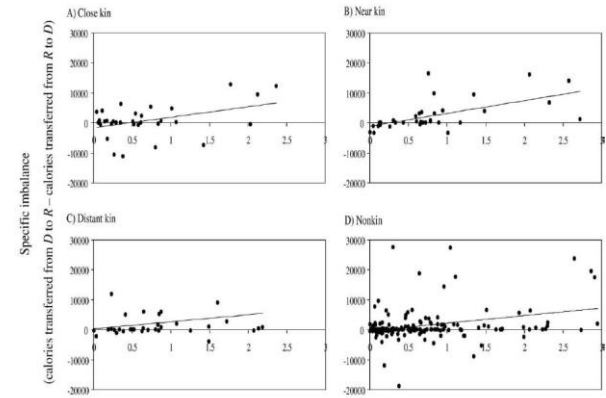
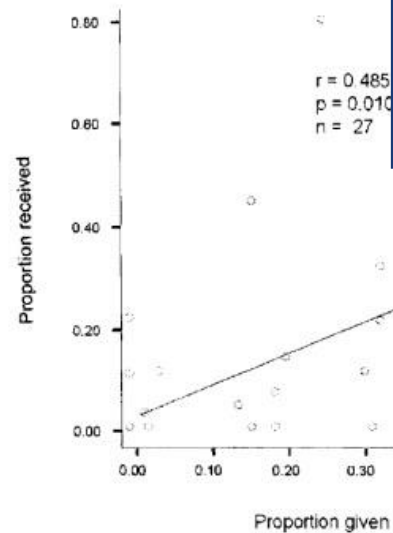


Fig. 1. Linear regression of the relationship between the difference in net caloric production between dyads of households and specific imbalance in their food transfers (arrayed so that positive specific imbalance values are attained when an imbalance favors the household with the lower net caloric value). Plots for (a) close kin ($r > .05$), (b) near kin (.018 $< r < .047$), (c) distant kin (0 $< r < .018$), and (d) unrelated dyads ($r = 0$).



Meal Sharing among the Ye'kwana

Figure 2. Proportional giving and receiving.



Evolution and Human Behavior 29 (2008) 305–318

Reciprocal altruism, rather than kin selection, maintains nepotistic food transfers on an Ache reservation[☆]

Wesley Allen-Arave^{a,*}, Michael Gurven^b, Kim Hill^c

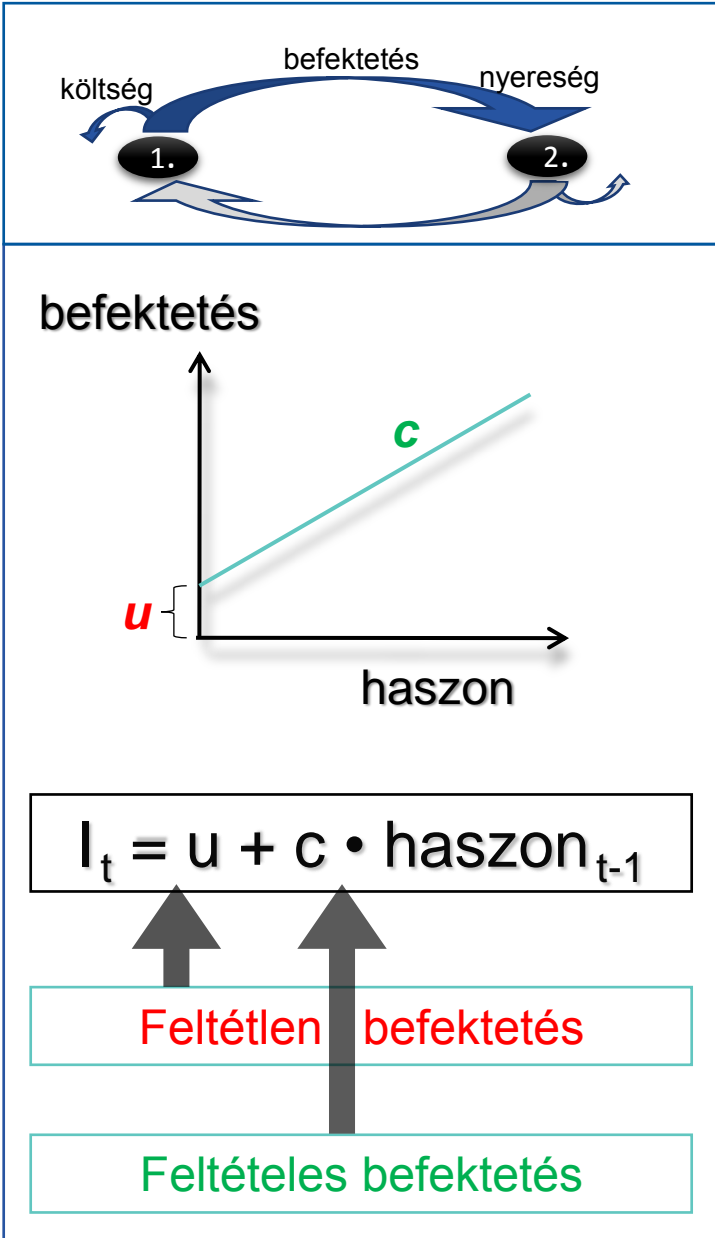
^aDepartment of Anthropology, University of New Mexico, Albuquerque, NM 87131, USA

^bDepartment of Anthropology, University of California Santa Barbara, Santa Barbara, CA 93106, USA

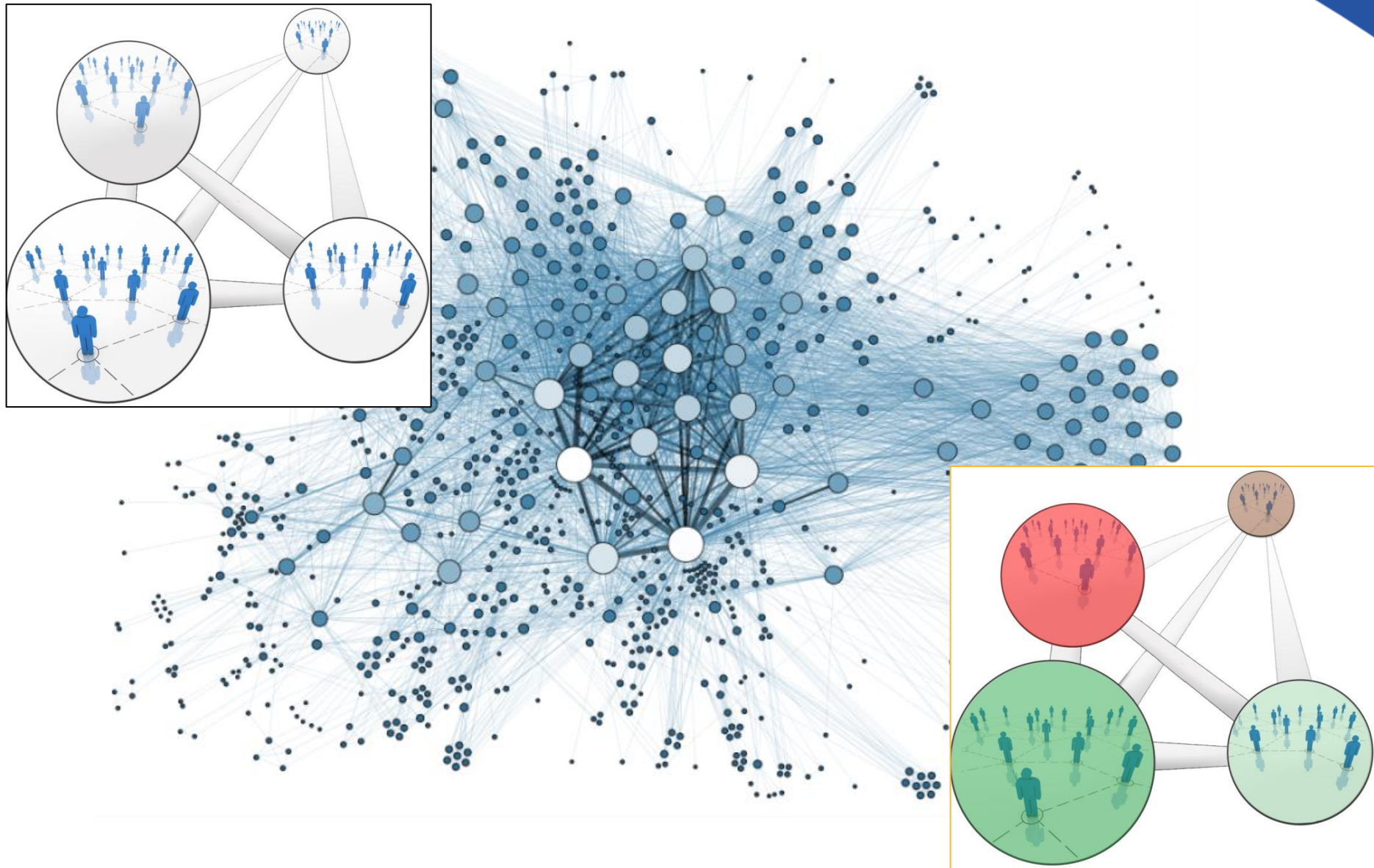
^cSchool of Human Evolution and Social Change, Arizona State University, Tempe, AZ 85287, USA

Initial receipt 9 December 2006, final revision received 24 March 2008

Reciprocitás emberek között



Moduláris hálózat és heterogenitás



Közösségek dinamikája és a világnézeti diverzitás



Hierarchikus

Egalitáriánus

Individualista

A hierarchikus, az **individualista**, és az **egalitáriánus** nézetek csatája

Domináns
világnézet

H

kezdőpont

végpont

E

Ciklikus
dominancia

H

I

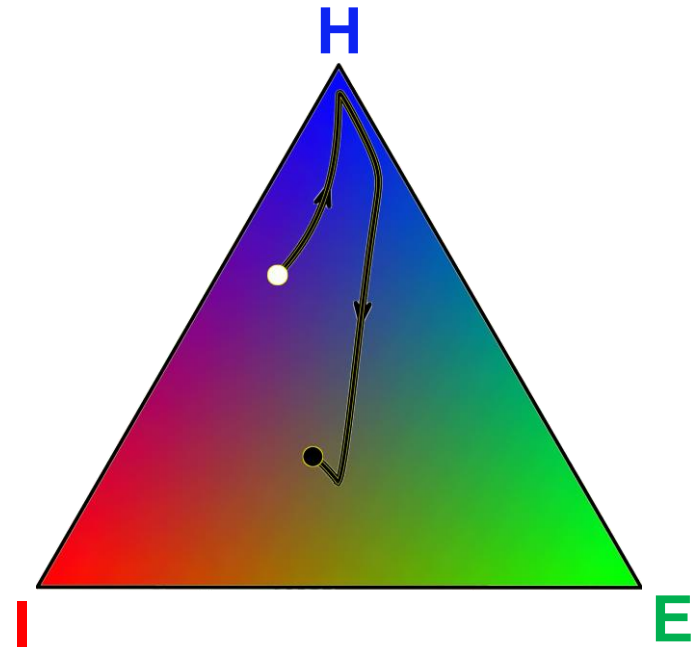
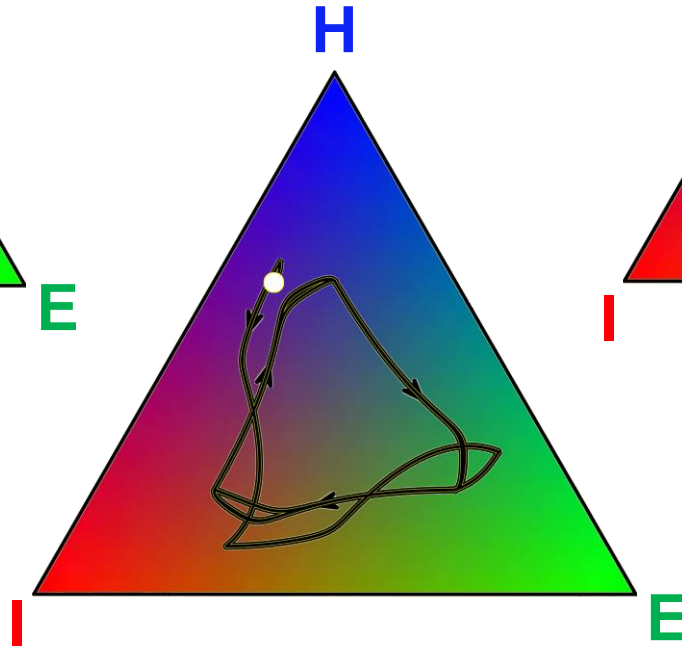
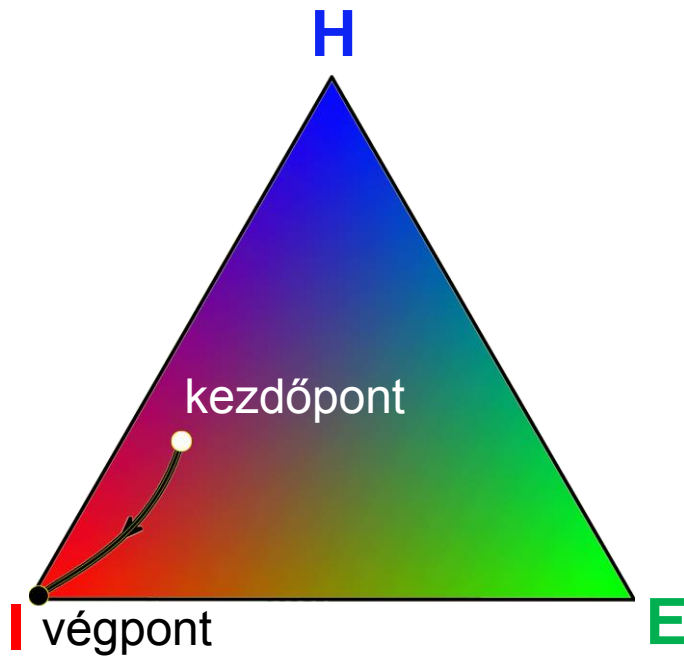
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Stabil
együttélés

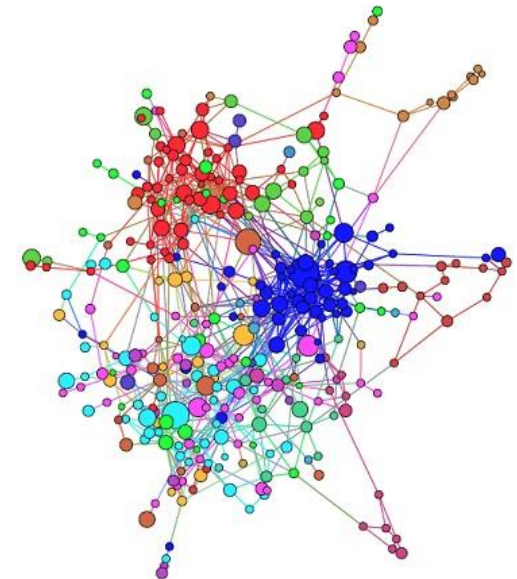
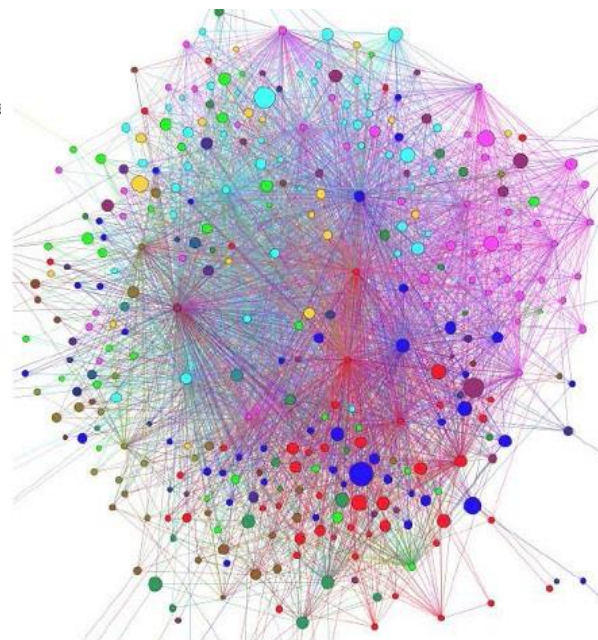
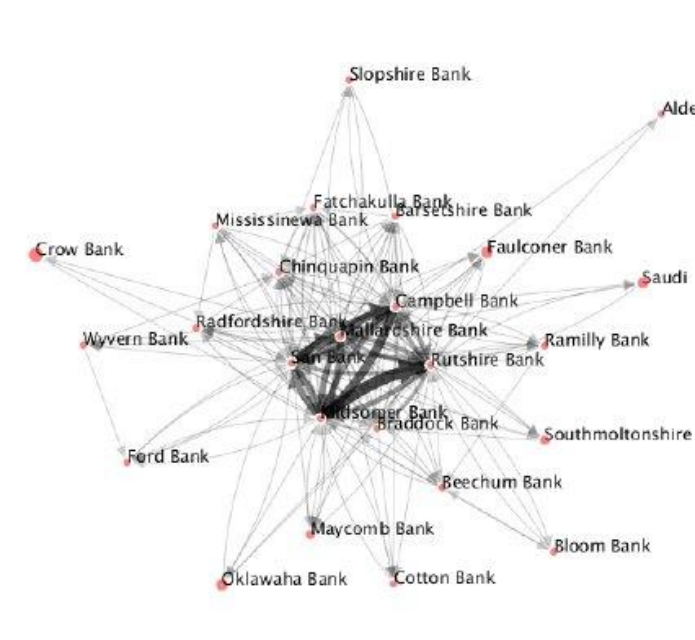
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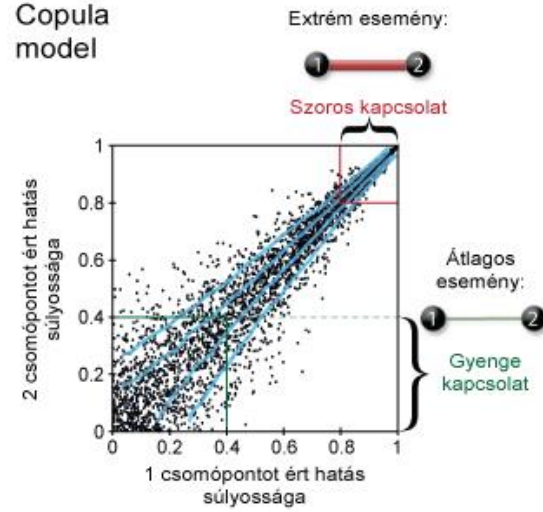
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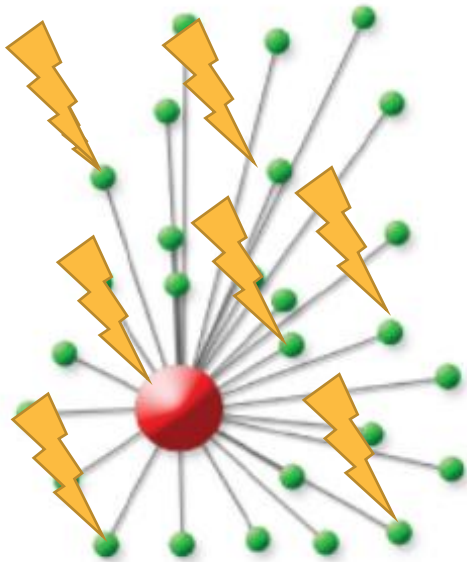
Komplex rendszerek, mint hálózatok: pénzügyi, banki tranzakciók



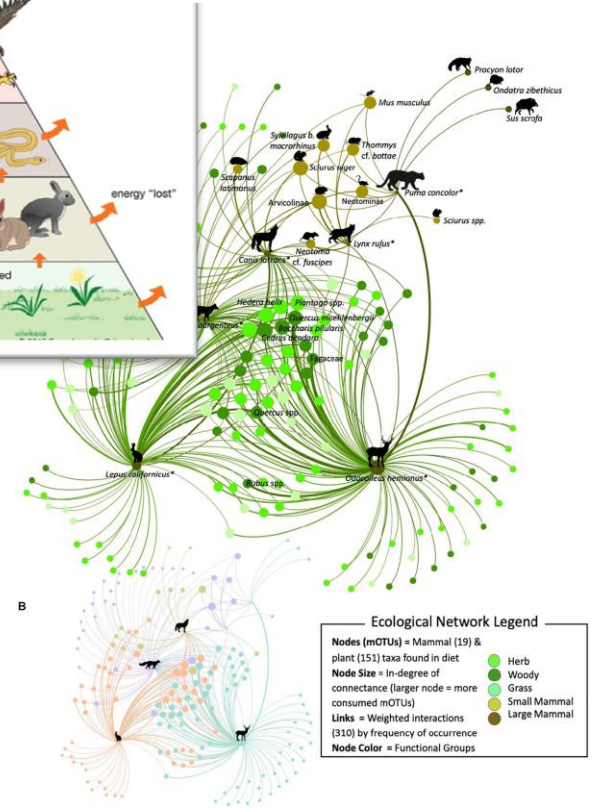
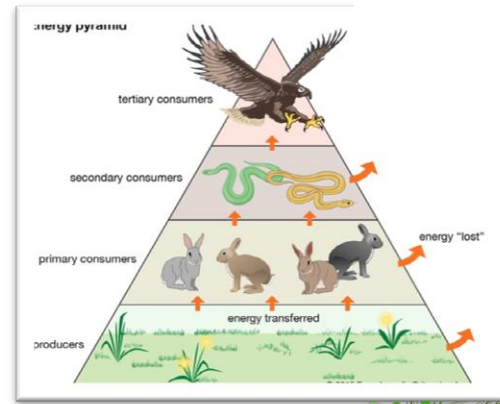
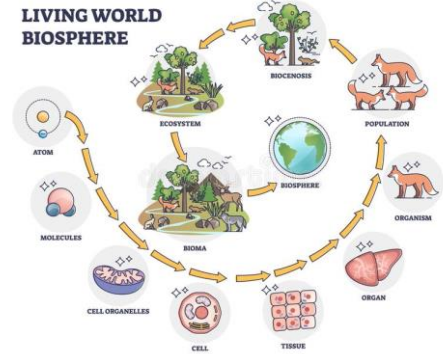
Sérülékenységi és a hálózat felépítése



Centralizált

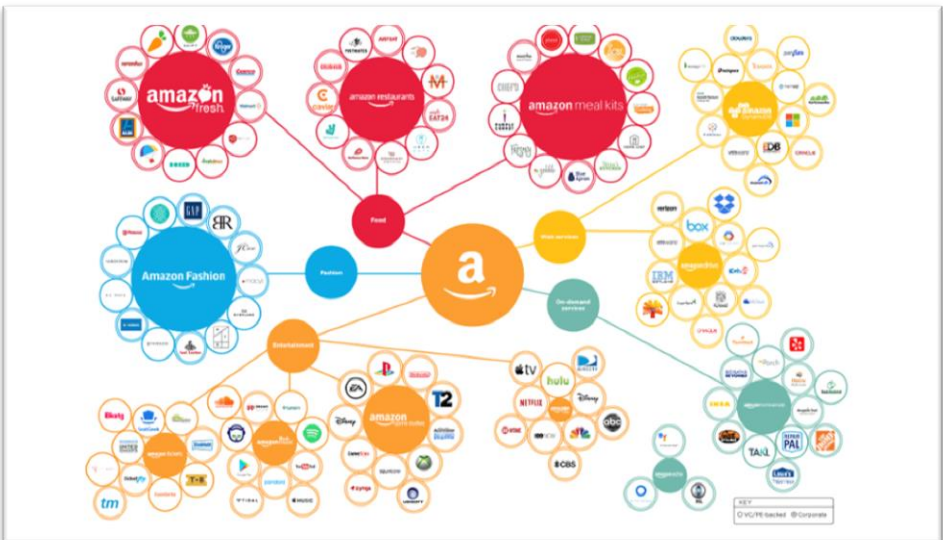


Digitális és tudásalapú „ökoszisztémák”

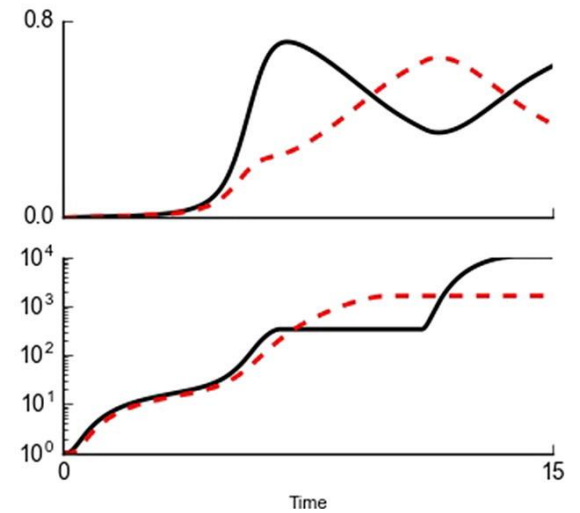
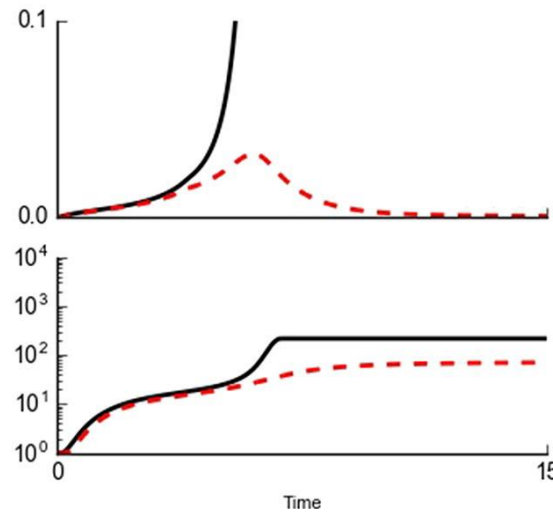
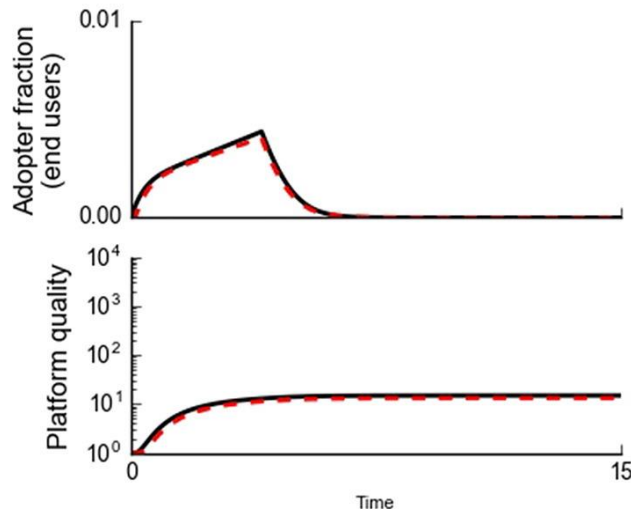
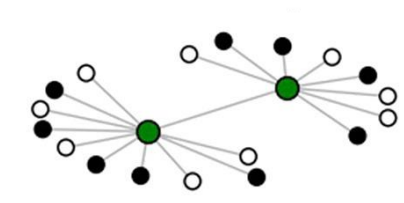
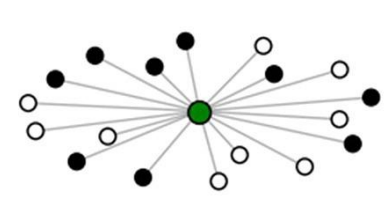
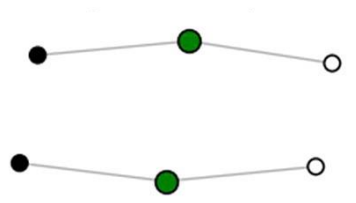


Ecological Network Legend

- Nodes (mOTUs) = Mammal (19) & plant (151) taxa found in diet
- Node Size = In-degree of connectance (larger node = more consumed mOTUs)
- Links = Weighted interactions (310) by frequency of occurrence
- Node Color = Functional Groups



Komplex adaptív rendszerek: A „kulcsfaj”



A befogadó csoportok, programok:

- Evolution and Ecology Program (EEP)
- Risk and Resilience Program (RISK)
- Systemic Risk and Network Dynamics (SRND)
- Equitable Governance of Common Goods (EGCG)
- Advanced Systems Analysis Program (ASA)

- **Advancing Systems Analysis Program (ASA)**
- **Cooperation and Transformative Governance Research Group (CAT)**

Összegzésül, a IIASA erőssége, többek között, a(z):

- interdiszciplináris/ multidiszciplináris kutatás,
- diverz modellrendszerek alkalmazása, kombinálása,
- különféle a komplex rendszerek különféle szerveződési szintjeinek kutatása,
- rendszerszintű szemlélet fejlesztése, összefüggések feltárása
- tudomány és döntéshozatal közti szakadék áthidalása,
- kulturális sokféleség üdvözlése,
- tudomány egyesítő erejének ápolása.

Köszönöm a figyelmet!

Együttműködő partnerek:

Dieckmann, Ulf

Hathiari, Sarah

Hochrainer-Stigler, Stefan

Kun, Ádám

Linnerooth-Bayer, Joanne

Pflug, Georg

Thompson, Michael

Rovenskaya, Elena

Scharler, Ursula

Scheuring, István



ÖKOLÓGIAI
KUTATÓKÖZPONT



EVOLÚCIÓ-
TUDOMÁNYI
INTÉZET

