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Welcome

ISSS 2008

Gary S. Metcalf, Ph.D.

Dear Colleagues and Friends,

Welcome to Madison, WI, and to the 52nd annual conference of the International Society for the Systems Sciences.

Regardless of how firm the plans, or how clear the initial vision, a conference is an evolving process. This one even began without a location, since I had no physical university campus or facility from which to host it. Thanks to Tim Allen, our incoming president, we were able to secure space in this beautiful venue on the campus of the University of Wisconsin, in Madison. That was only the beginning of the process, though, because it was through the connection with Tim that I learned much more about his work, and that of his many colleagues and the larger network of researchers focused on the immense complexities of ecological systems and sustainability. Rather than changing the focus of the conference, it only brought more focus and clarity to it.

The theme initially chosen for the conference was Systems That Make a Difference, drawing from Gregory Bateson's notion of information as "a difference that makes a difference." The intent, though, was never to make this a conference about Gregory Bateson, or about his work explicitly. It was to borrow from his thoughts as yet another way to challenge our collective work and our direction as a society. In my incoming presidential address last year, I tried to capture the same intent in terms of the (apparent) dichotomy between rigor and relevance. It is critical that our work be sound, and that we not tolerate groundless fantasies as representing us. If our work results in no direct value to the larger society, though, we can hardly blame the general public for not understanding.

We know the implicit value of our work. For over 50 years we have been led and joined by dedicated, intriguing, and often brilliant thinkers. Sometimes others have understood the importance of systems sciences; often they have not. Many of those who have glimpsed its importance have done so at a distance, and opaquely. Universities rarely knew where to situate programs. Funding agencies typically preferred simpler, narrower approaches that promised unequivocal answers or predictions, regardless of their limitations.

Some have declared the systems sciences to be vestiges of the past; something which had its time, but whose value is gone. On the contrary, it may be another 50 years, or more, before these ideas are truly understood enough to move into the mainstream.

In the meantime, the list of challenges that we are facing is growing rapidly. This has been another devastating year of natural disasters for people in many places around the world. More importantly, both policy-makers and the general public seem to be starting to understand the interconnectedness of energy, economics, food supplies, the environment, etc. Unfortunately, that only causes many to throw up their hands in helplessness. It may be a time, though, when we can begin to think in new ways.

We have, as society, made a difference simply by carrying forward the ideas of our founders. I can't imagine that they would be content to stay where we are, though. We have much more that we can do.

I welcome each of you to this conference, with all of the ideas and energy that you care to bring to it. I think that you will find room for all that you are willing to share and contribute.

Gary S. Metcalf

2008 President, International Society for the Systems Sciences

Co-Sponsors & Affiliated Organizations

The following organizations have provided various levels of support for the ISSS 2008 conference. All have agreed to publicize the conference through their institutional networks. In addition, those so designated have provided either financial or in-kind support through participation in conference planning and facilitation.

Conference Partners



Please see page 125 for further information from these sponsors.

Conference Program and Schedule

SUNDAY, JULY 13, 2008

Pre-conference Workshops

09:00 - 11:00	<i>Key Tools for Doing Systems Science</i> , Len Troncale Inn Wisconsin
09:00 - 17:00	<i>Fundamentals of Relational Science: Building a Curriculum</i> , John Kineman and Judith Rosen Old Madison East
13:00 - 17:00	<i>Introducing a System of Systems Processes (SOSP)</i> , Len Troncale Inn Wisconsin

Registration

13:00 - 18:00 Registration
Annex Room, Memorial Union Lobby

Reception

18:00 - 20:00 Reception
Main Lounge, Memorial Union

MONDAY, JULY 14, 2008

08:00 - 18:00 Registration
Annex Room, Memorial Union Lobby

08:00 - 09:00 ISSS Roundtable
Capitol View Room, 4th Floor

Plenary Sessions: All plenaries held in Tripp Commons, 2nd Floor (number in parentheses refers to abstract number)

09:00 - 09:30 Conference Opening, Gary Metcalf: *The Science and the Perspective of Systems* (1069)

09:30 - 10:15 Bobby Milstein, Centers for Disease Control: *Crafting a Health System that Protects Us All: Syndemics, Simulation Scenarios, and Social Change* (1061)

10:15 - 10:45 Coffee Break
Tripp Commons, 2nd Floor

10:45 - 11:30 David Schwartz, U. of WI, Genomics: *Plunge of the New Biology into Complexity* (1033)

11:30 - 12:15 Manfred Drack, Bertalanffy Center for the Study of Systems Sciences: von Bertalanffy Lecture. *Ludwig von Bertalanffy's Early System Approach* (1031)

12:30 - 13:30 Lunch
Great Hall, 4th Floor

13:30 - 15:00 Paper Sessions

Stream 1: Inn Wisconsin East	Stream 2: Inn Wisconsin West	Stream 3: Old Madison East	Stream 4: Old Madison West	Stream 5: Reception Room
SIG: Evolutionary Development	SIG: Applied Systems and Development	SIG: Hierarchy Theory	SIG: Agent-based Social Simulation; Systems Modeling and Simulation	
Chair: Alexander and Kathia Laszlo	Chair: Dennis Finlayson	Chair: Jennifer Wilby	Chair: Takehiro Inohara	
Introduction and discussion of Evolutionary Development	1008 (no paper) Human Rights Revisited: Reciprocity, Stakeholders, Lifecycles and Systemic Issues? <i>Finlayson, Dennis Edward</i>	885 (894) A Business Model Architecture: Observation Problems and Solutions in Modelling Businesses and their Networks <i>Shaw, Duncan Robert</i>	964 (1007) Preservation of Misperceptions: Stability Analysis of Hypergames <i>Sasaki, Yasuo; Kijima, Kyoichi</i>	
1055 (no paper) Leaders of Change: Social Entrepreneurship and the Creation of Ecologies of Solutions <i>Castro Laszlo, Kathia</i>	1049 (no paper) Design for an Assessment of Gaining Access to the International Interoperability Systems in the Bid for Secession <i>Solomons, Leonie Marilynne</i>	931 (no paper) Coevolving Open Source Business Models and Private Source Business Models <i>Ing, David</i>	921 (no paper) Methodology toward a Model of Earthquake Prediction <i>Patino-Ortiz, Julian; Badillo-Pina, Isaias Jose; Patino-Ortiz, Miguel</i>	
994 (no paper) Co-Creating Living Systems that Thrive on Diversity <i>Southern, Nancy</i>	928 (no paper) Slum Communities as Complex Adaptive Systems: Using Complexity Science to Inform an Adaptive Ecosystem Approach to Environment and Health in Informal Settlements in Chennai, India <i>Bunch, Martin Joseph; Franklin, Beth; Morley, David; Romona, Gananathan</i>	916 (1006) The Hard Facts of Soft Social Systems: A General Systems Explanatory Model for Schools and Workplaces <i>Gabriele, Susan Farr</i>	969 (974) Architecture Case Study in Transformity Factorization <i>Collins, Dennis Glenn</i>	

15:00 - 15:30

Coffee Break

Tripp Commons, 2nd Floor

15:30 - 17:30 Paper Sessions

Stream 1: Inn Wisconsin East	Stream 2: Inn Wisconsin West	Stream 3: Old Madison East	Stream 4: Old Madison West	Stream 5: Reception Room
SIG: Evolutionary Development	SIG: Health Systems	SIG: Hierarchy Theory	SIGs: Living Systems Analysis; What is Life and Living?	Special SABI panel: Conversation on globalization and localization
Chair: Alexander and Kathia Laszlo	Chair: Thomas Wong	Chair: Jennifer Wilby	Chair: Jim Simms	Chair: David Ing
915 (no paper) Toward a Description of the Consciousness Field <i>Ordunez-Zavala, Enrique; Badillo-Pina, Isaias Jose; Peon-Escalante, Ignacio</i>	866 (973) A Difficult Balance: Decisions in Health Care <i>Metcalf, Marilyn A</i>	1057 (1065) Complexity, Global Climate Change and Soil Carbon Cycling: Factors Controlling the Temperature Response of Microbial Decomposition <i>Wixon, Devin</i>	904 (905) A Service Science Perspective <i>Swanson, G.A</i>	Proposed trigger question: What can we expect in social systems and economies as the world simultaneously seems to be becoming global (with free trade, information and communication technologies) and becoming local (as supplies of energy, soil and water have become stressed)?
934 (no paper) How Do We Know? How Do We Acquire Wisdom? A Systemic Classification of Knowledge <i>Aceves, Francisco Javier; Alvarado, Jesus; Tejeida-Padilla, Ricardo</i>	1042 (1048) Measuring the Inequity of a Health System: A Systems Perspective - Systematic Analytical Mapping Approach <i>Ngana, Jean-Paul</i>	1040 (no paper) Scenarios Addressing United Parcel Service's Energy Acquisition: A Methodology for Performing a Comparative Analysis of Alternative Fuels <i>Pease, Megan</i>	1050 (no paper) A Status Report on the Development of Living Systems Science <i>Simms, James Robert</i>	
	955 (no paper) Real Life or Death Application of System Theory: The 2000 Years Daily Decision Making Experience of Traditional Chinese Medicine Practitioners <i>Leung Wong, Thomas Sui; Yan Huang, E C</i>	1074 (no paper) A Systems Perspective On Ecological Restoration: Should The Current Historic Climax-Community Restoration Model Be Replaced By A Future Oriented Dynamic Ecosystem Based Model <i>Thornforde, Stephen L</i>	1039 (1046) Fundamentals of Relational Complexity <i>Kineman, John</i>	
		Sandpit <i>Tim Allen</i>	910 (990) Are Ecosystems Alive? <i>Vesterby, Vincent</i>	

17:30 - 18:00

Presentation by the International Federation for Systems Research (IFSR), Tripp Commons, 2nd Floor

18:00 - 19:30

ISSS Board Meeting, Profile Room

19:30 - 21:00

Past Presidents Fireside Chat with Student SIG, Reception Room, 4th floor

TUESDAY, JULY 15, 2008

08:00 - 18:00	Registration, Annex Room Memorial Union Lobby
08:00 - 09:00	ISSS Roundtable Capitol View Room, 4th Floor
09:00 - 09:15	Conference Updates, Gary Metcalf
09:15 - 10:00	Steve Carpenter, U. of WI, Zoology: <i>Scenario Thinking to Solve Complex Environmental Problems</i> (1064)
10:00 - 10:45	Jon Foley, U. of WI, Sustainability and Global Environment: <i>Living on a Shrinking Planet: Challenges and Opportunities for a Sustainable Future</i> (1070)
10:45 - 11:00	Coffee Break Tripp Commons, 2nd Floor
11:00 - 11:45	David Waltner-Toews, University of Guelph, Population Medicine: <i>The Ecosystem Approach: Complexity, Uncertainty and Managing for Sustainability</i> (1072)
11:45 - 12:15	Poster Session Tripp Commons, 2nd Floor
12:15 - 13:00	Council Meeting Reception Room, 4th Floor
12:30 - 13:30	Lunch Great Hall, 4th Floor

13:30 - 15:00 Paper Sessions

Stream 1: Inn Wisconsin East	Stream 2: Inn Wisconsin West	Stream 3: Old Madison East	Stream 4: Old Madison West	Stream 5: Reception Room
SIG: Evolutionary Development	SIG: Designing Educational Systems	SIG: Research towards General Theories of Systems	SIG: Systems Modeling and Simulation	
Chair: Alexander and Kathia Laszlo	Chair: Sue Gabriele	Chair: Lynn Rasmussen	Chair: Takehiro Inohara	
925 (1025) Toward a Unified Field Theory of Human Behaviour (Global Cultural Evolution) <i>Abundis, Marcus</i>	924 (981) E-Teaching: Eroding the Stronghold of Teachers <i>Chroust, Gerhard</i>	982 (989) Adapting Banathy's Systems View of Education to a Systems View of Human Systems <i>Rasmussen, Lynn</i>	900 (947) A Systems-Theoretical Representation of Technologies and their Connections <i>Inohara, Takehiro</i>	
875 (1021) Being Values and Beneficent Obsessions: Applying Theories from Maslow and Assagioli to Evolutionary Guidance Media <i>Klisanin, Dana</i>	952 (954) Using Systems Thinking and Social Network Theory to Improve Children's Mathematical Problem Solving Skills <i>Pinzon-Salcedo, Luis; Barros, Ricardo; Zarama, Roberto; de Meza, Margarita; Carulla, Cristina; Bejarano, Astrid</i>	996 (997) Operating Principle of the Uni-Versity <i>Mandel, Thomas</i>	929 (1013) Analysis On Trust Game by Reciprocal Agents <i>Okayasu, Hidetoshi</i>	
884 (958) Evolutionary Ethics: Vision and Values for a World of Insurmountable Opportunities <i>Laszlo, Alexander</i>		980 (no paper) The System of Systems Processes Brian Hilton	909 (971) A Viable System Model Approach to Enterprise Resources Planning Systems <i>Badillo, Isaias Jose; Tejeida-Padilla, Ricardo; Morales-Matamoros, Oswaldo</i>	

15:00 - 15:30 Coffee Break and ISSS Membership Meeting
Tripp Commons, 2nd Floor

15:30 - 17:30 Paper Sessions

Stream 1: Inn Wisconsin East	Stream 2: Inn Wisconsin West	Stream 3: Old Madison East	Stream 4: Old Madison West	Stream 5: Reception Room
SIG: Evolutionary Development	SIG: Environmental Systems	SIG: Foundations of Information Systems and Information Systems Design	Session: Sustainable Systems	Special SABI panel
Chairs: Alexander and Kathia Laszlo 919 (no paper) Social Implications of a Partial Privatization of the Mexican Petroleum Industry <i>Avalos-Villarreal, Elvira</i>	Chair: Ockie Bosch 959 (961) Holistic Method for Developing Risk Maps in Rural Zones <i>Aceves, Francisco J.; Audefroy, Joel F.; Peon, Ignacio E.</i>	Chair: Jed Jones 977 (1023) A Systems Approach to Streamlining the Creation of Web-Based Content <i>Jones, Jed C.</i>	Chair: Tim Allen 927 (no paper) Resource Use, Economic Transformation, and Transportation: A Case Study in Southern Wisconsin <i>Allen, Peter; Allen, T.F.H</i>	Chair: David Ing Conversation on the information revolution / services revolution in business Proposed trigger question: How much have learned about the "new economy" associated with the "information revolution" or "services revolution", and what don't we yet know?
906 (970) A Systems Sciences Approach to the Design of a Municipal Integration Model for Sustainable Tourist Development. Case: The Orient Zone of Mexico State <i>Tejeida-Padilla, Ricardo; Badillo-Pina, Isaías; Vargas-Castro, Juan Carlos</i>	914 (no paper) Climate and the San Luis Valley: Changes in Growing Season and Temperature <i>Mix, Ken</i>	1029 (1030) A Basic Principle for the Architecture of Computer-Based Information Processing <i>Kampfner, Roberto R</i>	877 (no paper) Integration Science: Reconciling the Boundaries of Humans and Nature <i>Lucio Lopes, Vicente</i>	
991 (999) Systemics and the Mutually Binding Economy Networks: A Knowledge-Based Approach for Sustainable Communities <i>Teissier-Fuentes, Honorato C.; Mendoza-Santillan, J. Gabriel</i>	873 (no paper) Assessing Adaptive Capacity in an Urbanizing Watershed <i>Vogl, Adrian L; Roberts, Susan; Fotinos, Timothy A; Klier, John</i>	913 (949) Digital Democracy and Citizenship as the Democratic Political Systems for the Information Age <i>Cho, Ilsoo</i>	951 (960) Negotiating Social Complexity <i>Bausch, Ken</i>	
	1018 (1054) Backstage of the Global Climate Change: A System that Everybody Seems to Think Relates to Someone Else <i>Frias, Ricardo Andres; Gessaga, Tariana Maia; Rabassa, Jorge Oscar</i>	887 (1000) Application of a Model of Planning for the Continuous Improvement of the Development of the Telecommunications <i>Vega, Cirilo Leon</i>	872 (no paper) Entropy Debt: A Link to Sustainability? <i>von Schilling, Caroline; Straussfogel, Debra</i>	

Evening Dinner Get-together: hosted by Tim Allen, at Tim's home, 18:30 till late.

WEDNESDAY, JULY 16, 2008

08:00 - 15:00 Registration
 Annex Room, Memorial Union Lobby

07:45 - 09:00 ISSS Roundtable
 Capitol View Room, 4th Floor

09:00 - 10:30 Paper Sessions

Stream 1: Inn Wisconsin East	Stream 2: Inn Wisconsin West	Stream 3: Old Madison East	Stream 4: Old Madison West	Stream 5: Reception Room
SIG: Organisational Transformation and Social Change	SIG: Applied Systems and Development	Session: Dialogue	SIG: Spirituality and Systems	
Chair: Tamar Zohar Harel	Chair: Dennis Finlayson	Chair: Jed Jones	Chair: Thomas Wong	
876 (895) Social Responsibility: An Innovation of Ethic Toward Requisite Holism as a Basis for Humans to Make a Difference in Affluence <i>Mulej, Matjaz; Potocan, Vojko; Zenko, Zdenka; Knez-Riedl, Jozica; Hrst, Anita; Prosenak, Damjan</i>	1011 (940) Korean Politics and Complex Systems Theory <i>Sim, Youn-Soo</i>	926 (983) Dialogue and Ecological Engineering in Social Systems Design <i>Metcalf, Gary</i>	1037 (1047) How to Look across the Room <i>Ong, John Nathan</i>	
930 (979) Searching for Ourselves: A Methodological Exploration of a Soft System Dynamics Method as a Social Learning Tool for Watershed Implementation Planning <i>Brown, Stephan Edward</i>	946 (1002) What's the North Korean Nuclear Weapons' Future? <i>Kwon, Hyuk Kihl</i>	932 (1022) Business Models and Evolving Economic Paradigms: A Systems Science Approach <i>Ing, David</i>	992 (no paper) The System and Control Theory in the Vipassana Meditation of the Noble Eightfold Path as Taught by Buddha: Understanding Meditation with the Taichi Yin-Yang System in Modern Terminologies <i>Leung Wong, Thomas Sui; Yan Huang, E C</i>	
957 (no paper) How Would Asian Government Emerge through the Electronic Moneys of Private Institutions? <i>Takahashi, Kazuyuki Ikko</i>		Discussion	889 (938) The Traditional Morality of Totalitarianism: Juche Ideology Through Hyo <i>Park, Chul Ho</i>	

10:30 - 11:00

Coffee Break and Poster Session
Tripp Commons, 2nd Floor

11:00 - 12:30 Paper Sessions

Stream 1: Inn Wisconsin East	Stream 2: Inn Wisconsin West	Stream 3: Old Madison East	Stream 4: Old Madison West	Stream 5: Reception Room
SIG: Organisational Transformation and Social Change	New Economic Systems	SIG: Systems Applications to Business and Industry	SIG: Duality	
Chair: Ignacio Peon Escalante	Chair: Sally Goerner	Chair: David Ing	Chair: Luis Sancho	
937 (no paper) Self-Organization and Self-Organization within Social Organizations. How Knowing The Difference Makes a Difference in Appreciating Common Denominators: The Case of Self Regulation <i>Zohar Harel, Tamar</i>	1009 (no paper) The New Science of Sustainability: Implications for Economic Theory and Practice <i>Goerner, Sally</i>	1014 (no paper) Meaningful Measurement in the Contemporary Enterprise <i>Kosits, Marianne</i>	859 Gender Duality: informative women, energetic men Luis Sancho	
1004 (1005) Evolving to Sustainability <i>Li, Jon</i>	Discussion: Dorothy Lageroos, Sally Goerner and Jennifer Wilby	869 (893) Systems Thinking for Team and Organisational Learning: Case of Performance Measure Conflicts in a Multinational Supply Chain <i>Maani, Kambiz E.; Fan, Annie</i>	860 Temporal information: the arrow of Einstein, the arrow of Evolution Luis Sancho	
1016 (1024) Are Organizational Size and Efficiency Engaged? <i>Frias, Ricardo Andres; Barrera, Ricardo</i>		899 (967) Audit Support Plug-In System by the Use of Ontology Model <i>Minegishi, Junya; Gehrmann, Andreas; Nagai, Yoshimitsu; Ishizu, Syohei</i>		

12:30 - 13:30

Lunch
Great Hall, 4th Floor

FIELD TRIPS WEDNESDAY AFTERNOON

Details about all tours are available at the registration desk, and also online in the Madison Conference website

12:30

Field Trip 1: Taliesin. Escorted tour of Frank Lloyd Wright's home and studio at Taliesin. Travel is about one hour each way by air-conditioned coach. The coach must leave at 12:30 PROMPT from outside the front door of the Memorial Union. Box lunches are available instead of the conference buffet lunch, and additional water should be taken on the trip. The tour takes two hours. The price includes the cost of the coach and tour, and is \$75 per person. Limited to 20 people.

13:30

Field Trip 2: Ecology field trip with Tim Allen: Out into the Wilds of Wisconsin. Lunch at the conference buffet and then board a school bus in front of Memorial Union at 13:30 for a field trip with the Botany Laboratory at University of Wisconsin. **Additional water should be taken on the trip.** The cost towards the bus is \$15 per person. Limited to 30 people.

14:00

Field Trip 3: Tour of the Laboratory for Molecular and Computational Genomics, on the campus at Madison, hosted by David C. Schwartz, the Director and Principle Investigator, after lunch meet in Main Lounge at 13:30 p.m. There is no cost for this tour, but it is limited to 15 people.

THURSDAY, JULY 17, 2008

08:00 - 18:00	Registration Annex Room, Memorial Union Lobby
08:00 - 09:00	ISSS Roundtable Capitol View Room, 4th Floor
09:00 - 09:15	Conference Updates, Gary Metcalf
09:15 - 10:00	David Hawk, New Jersey Institute of Technology, Management and Architecture <i>The Business Educators Dilemma: Teaching Analytics to those who Strive to Manage Systems (1058)</i>
10:00 - 10:45	Bill Rouse, Georgia Institute of Technology, Industrial and Systems Engineering and College of Computing <i>Modeling & Managing Complex Systems: A Case Study of Healthcare Delivery (1060)</i>
10:45 - 11:00	Coffee Break Tripp Commons, 2nd Floor
11:00 - 11:45	Doug McDavid, IBM Almaden Research Center, Executive Research Consultant <i>Sociable Technologies for Enterprising Sociality (1059)</i>
11:45 - 12:30	ISSS Membership Meeting Tripp Commons, 2nd Floor
12:30 - 13:30	Lunch Great Hall, 4th Floor

13:30 - 15:00 Paper Sessions

Stream 1: Inn Wisconsin East	Stream 2: Inn Wisconsin West	Stream 3: Old Madison East	Stream 4: Old Madison West	Stream 5: Reception Room
SIG: Organisational Transformation and Social Change	SIG: Metamodeling and Systems Epistemology	SIG Systems Applications to Business and Industry	SIG: Critical Systems Theory	
Chair: Tamar Zohar Harel	Chair: Janet McIntyre	Chair: David Ing	Chair: Pamela Buckle	
1026 (1027) Informing the Consumer is Strengthening the Economy <i>Gabriele, Anthony</i>	936 (1001) Systems of Things That Flow <i>Al-Fedaghi, Sabah Saleh</i>	863 (no paper) Idealized Design: An "Open Innovation" Process for Successful Business Model Creation <i>Pourdehnad, John</i>	886 (939) "You Are Adapting More to Me Than I Am Adapting to You" (But What Does More Mean?): Cybernetic and Foucaultian Explorations of the Domain of Power <i>Guddemi, Phillip V</i>	
907 (993) Bureau-Pathologies in Public Organizations: Synthesizing a Botanic Garden Case for a General Policy System Theory <i>Slawski, Carl</i>	868 (1028) Making a Difference through E-Government from Below: An Evaluation and Future Directions <i>McIntyre, Janet Judy</i>	903 (922) Failure of Foresight: Learning from System Failures through Dynamic Model <i>Nakamura, Takafumi; Kijima, Kyoichi</i>	864 (1015) A Boundary Critique of Gender in the Project Management Body of Knowledge <i>Buckle Henning, Pamela; Thomas, Janice</i>	
945 (984) Systemic Metamethodology for Methods Design <i>Peon-Escalante, Ignacio Enrique; Aceves, Francisco Javier; Badillo, Isaias Jose</i>	874 (968) The "Cosmo-Planetary and Terrestrial Meta-Dynamics Systemicity" <i>Blanc, Jean-Jacques</i>	858 (1003) Incorporating Systems Thinking in Organizational Change Projects Using Action Research By Practitioners Conducting Academic Research <i>Sankaran, Shankar</i>	1035 (no paper) Structure/Process as Ontology for Critical Systems Thinking & Practice <i>Bowers, Todd David</i>	

15:00 - 15:30 Coffee Break
Tripp Commons, 2nd Floor

15:30 - 17:30 Paper Sessions

Stream 1: Inn Wisconsin East	Stream 2: Inn Wisconsin West	Stream 3: Old Madison East	Stream 4: Old Madison West	Stream 5: Reception Room
SIG: Aging Systems; Human Systems Inquiry; Women and Children	Information Systems Design and Information Technology	SIG Systems Applications to Business and Industry	SIG: Research towards General Theories of Systems	
Chair: Daniel Hershey	Chair: Ockie Bosch	Chair: David Ing	Chair: Lynn Rasmussen	
901 (no paper) Entropy Theory of Aging Systems: Humans; Corporations; and the Universe <i>Hershey, Daniel</i>	878 (995) Technology Acceptance in Libraries: A Systemic Approach <i>Quijano-Solis, Alvaro</i>	972 (975) Symbiosis as a Metaphor for Sustainability Practice in Human Affairs <i>Leonard, Allenna</i>	865 (871) A Novel Approach to the Concept of System Information <i>Yahyavi, Mehdi</i>	
898 (no paper) Exploring Organisational Paradigms: Systemic Inquiry Revisited <i>Klein, Louis</i>	911 (963) Ontology-Driven Decision Support Systems for Management System Audit <i>Syohei, Ishizu; Gehrman, Andreas; Minegishi, Junya; Nagai, Yoshimitsu</i>	948 (966) Growth Strategy and Hierarchy Theory: Emergence of Super-Players in the Healthcare Computed Tomography Oligopoly <i>Galbrun, Jerome; Kijima, Kyoichi</i>	1067 (no paper) Finding Linkage Propositions between Systems Processes <i>Troncale, Len</i>	
1056 (no paper) Tacit Dimension of Soft Systems Approaches in Administrative Behavior <i>Yoshida, Taketoshi</i>	917 (1012) After-Sales Service Parts Supply Chain System in OEM Telecommunication Firms <i>Morales-Matamoros, Oswaldo; Flores-Cadena, Mauricio; Tejeida-Padilla, Ricardo; Ixchel</i>	920 (1019) A Soft Systems Methodology Approach to Design a Restaurant Management Model for a Great Tourism Hotel <i>Briones-Juarez, Abraham; Tejeida-Padilla, Ricardo; Morales-Matamoros, Oswaldo</i>	1068 (no paper) Defining Systems Diseases Using Systems Pathology <i>Troncale, Len</i>	
867 (988) Cannibalizing Childhood's Future as Rising to Falling Rope <i>Robbins, Jeffrey H</i>	1044 (no paper) New Models for Sustainable Fashion Industry System: A Case Study about Fashion Net Factories <i>Sbordone, Maria Antonietta</i>			

17:30 - 19:00 Break

19:00 - 22:00 Banquet
Memorial Union, Main Lounge, Memorial Union

FRIDAY, JULY 18, 2008

08:00 - 13:00	Registration Annex Room, Memorial Union Lobby
08:00 - 09:00	ISSS Roundtable Capitol View Room, 4th Floor
09:00 - 09:10	Conference Updates, Gary Metcalf
09:10 - 09:25	Vickers Award, Student Presentation
09:25 - 09:45	Jennifer Wilby, University of Hull, UK <i>Harnessing Complexity in Managing International Public Health Policy in The 21st Century</i> (1036)
09:45 - 10:30	Tim Allen, University of Wisconsin, Botany Department, Incoming President ISSS <i>Confronting Economic Profit with Hierarchy Theory: The Concept of Gain in Ecology</i> (1062)
10:30 - 10:45	Coffee Break
10:45 - 11:30	Tripp Commons, 2nd Floor Jim Gustafson, M.D., Professor of Psychiatry, University of Wisconsin-Madison <i>Vertical and Horizontal Scaling Strategies to Avoid Destruction in the Modern Contest: Riding Out the Perturbations of its Largest Scale, of the Seizing of High Gain/Cheap Energy and the Expensive Refining of Low Gain Energy, As Argued by Tim Allen and Colleagues</i> (1071)
11:30 - 12:15	Speakers from UW Madison, Botany Department: <i>Tim Allen's Sandpit</i> Megan Pease (1040), Peter Allen (927), Devin Wixon (1057), Steve Thomforde (1074)
12:15 - 13:00	Australian Presentation for ISSS2009
13:00	Conference Close
14:30 - 18:00	Connections Meeting Langdon Room

SATURDAY, JULY 19, 2008

09:00 – 15:00	Connections Meeting, Langdon Room
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Plenary Speakers

MONDAY

Gary S. Metcalf, Ph.D.

The Science and the Perspective of Systems (1069)



Gary Metcalf is the President for the ISSS for 2007-2008. He also currently serves as a Vice President for the International Federation for Systems Research. His Ph.D. was done under the mentorship of Bela H. Banathy, through Saybrook Graduate School in San Francisco, CA.

Professionally, Gary Metcalf is the president of InterConnections, LLC, an organizational consulting firm based in Ashland, KY, USA. He is also a part-time faculty member in the Organizational Systems concentration at Saybrook Graduate School, with the Federal Executive

Institute (Office of Personnel Management, US Federal Government), and with the Bhavan Marshall MBA Program in Bangalore, India.

Bobby Milstein, PhD, MPH

Crafting a Health System that Protects us All: Syndemics, Simulation Scenarios, and Social Change (1061)



Bobby Milstein, PhD, MPH, works at the Centers for Disease Control and Prevention where he leads the Syndemics Prevention Network and also coordinates planning and evaluation activities for emerging investigations and policy initiatives in chronic disease, environmental health, emergency preparedness, and health system improvement. He specializes in understanding transformations of public health work that arise in situations where there are multiple interacting epidemics, or syndemics. This work involves a close analysis of the concepts, methods, and moral considerations that guide health protection ventures, along with a synthesis of techniques from other areas of applied science such as dynamic modeling, democratic organizing, and social navigation. With an academic background that

combines cultural anthropology, behavioral science, and systems science, he has guided the development of CDC's framework for program evaluation and often consults on the role of dynamic, democratic processes in improving health and health equity.

David Schwartz, PhD

Plunge of the New Biology into Complexity (1033)



Professor Schwartz, a Bronx native, has been working in the field of genomic analysis since 1975, when he was an undergraduate at Hampshire College in Amherst Massachusetts. During his senior year, he worked in a Harvard University laboratory using viscoelastic measurements to determine the sizes of a series of eukaryotic genomes. There, he conceived a radical approach for the electrophoretic separation of very large DNA molecules, which at the time was poorly received. After starting graduate school at University of California-San

Diego, under the mentorship of Professor Bruno Zimm, he was able to further develop this concept. A transfer to Columbia University, under the mentorship of Professor Charles Cantor, enabled the creation of Pulsed Field Gel Electrophoresis, and a series of publications, which help to establish the basis for the recently completed Human Genome Initiative. Upon graduation from Columbia University (Dept. of Chemistry), Professor Schwartz became the first Staff Associate at The Carnegie Institution of Washington, Dept. of Embryology, who did not have prior post-doctoral experience. There he pioneered single molecule techniques to study DNA polymer dynamics during electrophoresis. In 1989, he was appointed as an Assistant Professor of Chemistry and Biochemistry at New York University, New York, and was later given an adjunct appointment in the Computer Science Department (Courant Institute for the Mathematical Sciences). At New York University, he developed the Optical Mapping System, which is the first practical single molecule approach for whole genome analysis. In 1999, Professor Schwartz, moved his laboratory to the University of Wisconsin-Madison, where he was made a Full Professor in the departments of Genetics, Chemistry, and the UW Biotechnology Center. At UW, Professor Schwartz's laboratory is developing new single molecule platforms for whole genome analysis, through the concerted understanding and exploitation of novel polymer effects within confined geometries. These new findings are embraced within an integrated high-throughput environment to address important biological questions regarding basic genomic structural, and functional issues in normal and cancer genomes, as well as addressing the need for the high-resolution analysis of populations to foster effective association studies.

Manfred Drack, PhD

Ludwig von Bertalanffy's Early System Approach (1031)



Manfred Drack is Austrian. He was trained as a mechanical engineer and studied biology. After performing research at the Center for Biomimetics at the University of Reading, he received a PhD from the University of Vienna with a thesis on biomimetics and eco-design. He worked in several projects at the Center for Appropriate Technology of the Vienna University of Technology. Rupert Riedl brought him back to the University of Vienna, where he is now working on system theory at the Department of Theoretical Biology.

TUESDAY

Steve Carpenter, PhD

Scenario Thinking to Solve Complex Environmental Problems (1064)



Steve Carpenter studies change in ecosystems and social-ecological systems, using long-term databases, large-scale experiments, and models. He is a founding member of the Resilience Alliance (<http://www.resalliance.org>) and Fellow of the Beijer Institute of Ecological Economics (<http://www.beijer.kva.se/>). Carpenter was co-chair of the Scenarios Working Group of the Millennium Ecosystem Assessment (<http://www.MAweb.org>), an interdisciplinary team of 95 experts from 24 countries which developed scenarios of global environmental change for the 21st century. He is a member of the U.S. National Academy of Sciences, a Foreign Member of the Royal Swedish Academy of Sciences, and has received research honors from

the American Society of Limnology and Oceanography, Ecological Society of America, and other scientific organizations. Presently Carpenter is working on whole-ecosystem experiments to investigate leading indicators of rapid change, as well as a project on resilience and large-scale environmental surprise. He is the Leader of the North Temperate Lakes Long-Term Ecological Research program (<http://lter.limnology.wisc.edu>) at the Center for Limnology, University of Wisconsin-Madison, where he serves as Stephen Alfred Forbes Professor of Zoology. Information on his projects and a full publication list are available at <http://limnology.wisc.edu/personnel/carpenter/>.

Jon Foley, PhD

Living on a Shrinking Planet: Challenges and Opportunities for a Sustainable Future (1070)



Prof. Jonathan Foley is the founder and Director of the Center for Sustainability and the Global Environment (SAGE) at the University of Wisconsin, where he is also the Gaylord Nelson Distinguished Professor of Environmental Studies and Atmospheric & Oceanic Sciences. Foley's work examines complex global environmental systems and their interactions with human societies. His research team uses state-of-the-art computer models and satellite measurements to analyze changes in ecosystems, land use, climate and freshwater resources across local, regional and global scales. Their work has contributed to the understanding of large-scale ecosystem processes, global patterns of land use, the planet's water and carbon cycles, and interactions between ecosystems and the atmosphere.

Foley joined the University of Wisconsin faculty in 1993 as the first Bryson Distinguished Professor of Climate, People and Environment. He has won numerous awards and honors, including the National Science Foundation's Faculty Early Career Development Award, the Samuel C. Johnson Distinguished Faculty Fellowship, the J.S. McDonnell Foundation's 21st Century Science Award, and the Sustainability Science Award from the Ecological Society of America. In 1997, President Bill Clinton awarded him the Presidential Early Career Award for Scientists and Engineers. He has also been named a Vilas Associate and Romnes Fellow of the University of Wisconsin, and an Aldo Leopold Leadership Fellow of the Ecological Society of America. He is currently the Chief Editor of the interdisciplinary scientific journal, *Earth Interactions*.

David Waltner-Toews

The Ecosystem Approach: Complexity, Uncertainty & Managing for Sustainability (1072)



A Professor in the Department of Population Medicine, David Waltner-Toews is a veterinary epidemiologist, essayist, poet, and fiction writer. He teaches and does research on the epidemiology of food and waterborne diseases, zoonoses and ecosystem health. He has been co-director of the Ecosystems, Climate Change and Health Omnibus (ECCHO) Project (www.eccho.ca) and is the founding president and CEO of Veterinarians without Borders/ Vétérinaires sans Frontières ^ Canada (www.vwb-vsf.ca), as well as

the founding president of the Network for Ecosystem Sustainability and Health (www.nesh.ca). He has collaborated on interdisciplinary research and teaching in Africa,

Asia and Latin America. Besides being an author on about 100 peer-reviewed scholarly papers, he has published half a dozen books of poetry, an award-winning collection of short stories, a murder mystery (Fear of Landing), three books of popular science (including "The Chickens Fight Back", in 2007 and "Food, Sex and Salmonella", in 2008). His texts include "Ecosystem Sustainability and Health: a practical approach" (Cambridge University Press, 2004), and, most recently, a major work co-edited and co-written with Nina-Marie Lister and the late James Kay entitled "The Ecosystem Approach: Complexity, Uncertainty, and Managing for Sustainability" (Columbia University Press, 2008).

THURSDAY

David Hawk, PhD

The Business Educators Dilemma: Teaching Analytics to those who Strive to Manage Systems (1058)



David Hawk: Professor of Architecture and Management, New Jersey Institute of Technology and Visiting Professor, Tsinghua University. Researches and advises several Asian, Northern European and US firms. Implicit to his work is a systems perspective that emerges in concepts of liquid enterprises, fluid management and non-rational, non-national models of internationalization. Results of his work include implications of three long standing ethical dilemmas for systems sciences, and others: Second Law Economics (Georgescu-Roegen),

the Faustian Tragedy (Goethe), and the Planner's Dilemma (Ozbekhan). He was the co-founder of the Energy Star Homes Program, based on his Systems PhD. He has spent many years working and researching in Northern Europe and Asia. He has a farm and a Foundation for Homeless Corporations in Iowa where he spends an increasing amount of his time seeking signs of hope.

David has a PhD in Systems Sciences from Ackoff's Wharton Program, an unfortunate Masters in Planning and Architecture, and a dismal Bachelors in Architectural Engineering. He teaches building economics, business ontology, and business architecture, all via a general systems orientation. His research is occasionally used by firms. Just now he is senior advisor to China's largest company and working with a US developer to help create a city of light for a hundred thousand residents of an unfortunate place. Light is used via multiple metaphors; all of them optimistic and systemic.

William B. Rouse, PhD

Modeling & Managing Complex Systems: A Case Study of Healthcare Delivery (1060)



Bill Rouse is the Executive Director of the Tennenbaum Institute at the Georgia Institute of Technology. He is also a professor in the College of Computing and School of Industrial and Systems Engineering. Rouse has written hundreds of articles and book chapters, and has authored many books, including most recently *People and Organizations: Explorations of Human-Centered Design* (Wiley, 2007), *Essential Challenges of Strategic Management* (Wiley, 2001) and the award-winning *Don't Jump to Solutions* (Jossey-Bass, 1998). He is editor of *Enterprise Transformation: Understanding and Enabling Fundamental Change* (Wiley, 2006), co-editor of *Organizational Simulation: From Modeling & Simulation to Games & Entertainment* (Wiley, 2005), co-editor of the best-selling *Handbook of Systems Engineering and Management* (Wiley, 1999), and editor of the eight-volume series *Human/Technology Interaction in Complex Systems* (Elsevier). Among many advisory roles, he has served as Chair of the Committee on Human Factors of the National Research Council, a member of the U.S. Air Force Scientific Advisory Board, and a member of the DoD Senior Advisory Group on Modeling and Simulation. Rouse is a member of the National Academy of Engineering, as well as a fellow of four professional societies -- Institute of Electrical and Electronics Engineers (IEEE), the International Council on Systems Engineering (INCOSE), the Institute for Operations Research and Management Science, and the Human Factors and Ergonomics Society.

Doug McDavid

Sociable Technologies for Enterprising Sociality (1059)



Doug McDavid is an Executive Consultant with IBM's Global Business Services and Almaden Research Lab. He specializes in bridging the gap between business people and technologists, and is exploring methods of rehearsing services techniques in 3D virtual environments. He does business modeling and requirements definition for clients in insurance, utilities, telecommunications, manufacturing, travel, aerospace, defense, and education. He has 6 patents, and publications in *IBM Systems Journal*, the *Handbook of Object Technology* and others. He is a member of the prestigious IBM Academy of Technology, and serves on the Board of Directors of the New Media Consortium. He has been a member of ISSS since 1999, and has worked with the INCOSE Intelligent Enterprise Working Group, the IEEE Standard Upper Ontology Working Group, and the Business Architecture Working Group of The Open Group.

FRIDAY CLOSING

Timothy F. H. Allen, PhD

Confronting Economic Profit with Hierarchy Theory: The Concept of Gain in Ecology (1062)



Professor Allen's formal training was as a plant community ecologist studying algae with multivariate methods of gradient and cluster analyses. These are scaling techniques that launched him into issues of scale in principle, and from there on to complexity itself. His focus is on complexity per se, and so the particular things he and his students study are eclectic. Professor Allen's research liaisons provide a scale-based theoretical framework for groups at the Northern Lakes Long Term Ecological Research site and Oak Ridge National Laboratory. The U. S. Forest Service in Fort Collins, Colorado, and the Science Advisory Board for the US/ Canadian International Joint Commission provide an outlet for him to practical problems.

Jennifer M. Wilby, PhD

Harnessing Complexity in Managing International Public Health Policy in The 21st Century (1036)



Jennifer Wilby is Director of the Centre for Systems Studies and a lecturer and researcher in management systems and sciences in The Business School, University of Hull, United Kingdom. Jennifer's research interests include: developing systems resilience and flexibility in the management of complex systems, hierarchies and general system theory, and the development of critical systematic evaluations of research methods. Jennifer is also a part-time (2007-2009) EPSRC post-doctoral fellow researching on the EmergeNet Emerging Sustainability Project. Prior to working at Hull, Jennifer spent five years at the University of York in the Centre for Reviews and Dissemination undertaking systematic reviews of health care interventions on behalf of the Department of Health (NICE). Jennifer is Vice President for Administration for the International Society for the

Systems Sciences (ISSS), Honorary Treasurer and executive board member of ARCISS (The Association of Research Centres in the Social Sciences), and a member of the board of the UKSS (United Kingdom Systems Society).

Plenary Abstracts

1031

LUDWIG VON BERTALANFFY'S EARLY SYSTEM APPROACH

Manfred Drack

Department of Theoretical Biology, University of Vienna, Althanstraße 14, 1090 Vienna, Austria and Bertalanffy Center for the Study of Systems Science (BCSSS), Vienna, Austria manfred.drack@univie.ac.at

Most of what Bertalanffy published in the field of “organismic” biology was written in German and is thus not widely known. In order to understand the development and meaning of his “general system theory” – which might more accurately be called “general systemology” – those early works are essential. In this talk I will therefore focus on key aspects of his “system theory” of life, both on the level of scientific concepts and philosophical considerations. This will also include a note on works that influenced Bertalanffy and motivated him to later establish a new transdisciplinary field. He was influenced by several philosophers as well as by results from experimental research. As a trained philosopher, Bertalanffy was clearly aware that the notion of systems has a long history going back at least to ancient Greek thinkers. As for the influences from science, the focus here will be on Paul A. Weiss and his experiments performed at the Biologische Versuchsanstalt in Vienna. Those two roots will be used to clarify Bertalanffy's unique contributions towards a system approach in biology and beyond, in which the aim was to free the term system from vague or even obscure metaphysical connotations and arrive at a framework that is useful for science.

Keywords: Ludwig von Bertalanffy, organismic biology, system theory of life

1033

PLUNGE OF THE NEW BIOLOGY INTO COMPLEXITY

David C. Schwartz, Ph.D.

Professor of Chemistry, Professor of Genetics, University of Wisconsin-Madison

Biological complexity is nearly boundless, and new ways for observing, measuring, and tabulating biological phenomena are currently revealing layers of increasing complexity that are outstripping our abilities as bioscientists to fully exploit them for understanding life processes. Driving this revolution are advances from information technology that are used for the management and interpretation of capacious biological datasets, as well as for propelling computer simulations into new territories. Interestingly, the very same technologies that have commoditized computer hardware are now being harnessed for developing new ways to detect and quantify previously obscure biological phenomena that wind their way into huge data sets. The size and magnitude of these datasets are starting to challenge those accumulated by high-energy physicists in their quest to understand the composition of matter. Although we are greatly increasing the rate at which biologically relevant information is piling into databases, our ability to mine and apply these findings for answering key biological question is not fully impedance matched by available experimental approaches. Current experimental approaches are limited and unable to fully draw upon the resources offered by information technology. Biology is a largely empirical science, and virtually all hypotheses derived from data mining or simulations require experimental validation for emergence of meaningful

“stories” that will be embraced by any community of bioscientists. This validation process presents a major bottleneck because it is toilsome and ad hoc in nature. Given these challenges and resources, new types of biological discovery systems will need to be developed for bundling hypothesis generation and empirical activities into one unified scientific approach that empowers bioscientists to radically increase their rate of discovery and the formulation of complete scientific stories.

1036

HARNESSING COMPLEXITY IN MANAGING INTERNATIONAL PUBLIC HEALTH POLICY IN 21ST CENTURY

Jennifer Wilby

University of Hull, UK

Complexity as a framework for managing complex systems provides an enriched description for both policy development and its implementation, whether in international health (the subject of this talk) or in any other public policy arena. The integration of complexity research with reviews of current emerging infectious disease (EID) policies shows that there are contributing risk factors in EID that are not addressed in current health policy making, and that this is a direct result of failing to recognise the complexity of the interrelationships in such systems. Joshua Lederburg of the CDC said: “...pitted against microbial genes, we have mainly our wits.” (CDC, 1997) However, we have additional strategies available, such as the developments of complexity sciences, which can and should be employed as a supplement to simply using our wits. Complexity can be a framework to inform and guide the design of public policy making in the 21st century so that more informed (although never perfect) policy can be developed.

Keywords: complexity, epidemiology, hierarchy theory, international health policies

1058

THE BUSINESS EDUCATORS DILEMMA: TEACHING ANALYTICS TO THOSE WHO STRIVE TO MANAGE SYSTEMS

David Hawk

NJIT

During the sixties it became apparent that human activities were not complementary to the natural systems on which humans depended. Evidence, that something was amiss between the way of nature and the pathway of humans, was emerging with growing frequency. Early systems theorists had noted the dilemma decades before, but were seen as woefully out of touch with the “human project,” or simply funny people. Signs, while slight, were there that systems people were in fact seeing something quite important, but the vocabulary might not have been sufficiently developed, or the experiences that illustrated what they were saying was insufficiently rude. They had argued for rethinking what it meant to relate to nature, and resisting the perception of nature as a science project. The majority of science, and the society that implicitly supported its endeavors, lent it energy to the science project theme. Governments got on board with expansion of NSF and instituting science forcing activities like the National Environmental Policy Act. The Act noted that our analytic methods had somehow resulting in ill-conceived economic activities harming the environment, thus humans should now turn their efforts towards the reverse, while using the same analytic methods. The idea that humans could protect nature, from themselves, somehow seemed perverse. It was.

A research endeavor was begun at this time that will be outlined. Its conclusions were reported in "Environmental Protection: Analytic Solutions in Search of Synthetic Problems" (Hawk, 1977). The journey begun therein finally came to center on the role of economic ideas and business operations in defining and organizing relations between humans and nature. The focus shifted to business education and corporate advisement, to see if change was possible, if any. The central issue was what changes could be made where to improve the situation we are all a part of. Various subjects will be introduced to illustrate the difficulties: 1) That the idea of strategic management is essentially unethical (it's the mainstay of business education), 2) Why corporate finance is mostly silly (it's the most popular subject in MBA programs), and Why the planner's dilemma can't be solved (why serious planning will never be possible). All these issues can be rectified by systems thinking, yet are not.

The conclusions deal with the why.

1059 (1073)

SOCIABLE TECHNOLOGIES FOR ENTERPRISING SOCIALITY

Doug McDavid

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We are witnessing a proliferation of information and communication technologies (ICT) to support the socializing function in human communities. At the same time there has never been a greater need, and a greater opportunity, for socially-based and socially-oriented enterprise. Enterprises and technologies are rapidly co-evolving, driven by the ecosystem of globally integrated enterprises and enabled by such technologies as Web 2.0 and virtual worlds.

It is particularly timely at this moment in history to focus on the viewpoint that businesses and other enterprises are fundamentally human social systems. There has been recent emphasis on the importance of services and service economies as we move into an anticipated period of deepening integration of ICT into the fabric of global society. Human capabilities and inter-relationships actually constitute the primary source of value in a world of increasingly urgent problems and opportunities, yet the creation of value by human social systems is often ignored or downplayed.

Several theories of human social systems are used to articulate the dimensions of enterprising sociality. A specialized ICT architecture is presented to help understand the dimensions of sociable affordances. These views of both enterprise and technology are then brought together to explore the structural coupling that needs to occur between the organizational and technological domains. Evidence from literature and experience reveals the unexpected power of socializing technologies to enhance and catalyze new ways of pursuing life and work as we move deeper into the 21st Century.

Keywords: ICT, Web 2.0, virtual worlds, human social systems, enterprise, social technology, business architecture

1060

MODELING & MANAGING COMPLEX SYSTEMS: A CASE STUDY OF HEALTHCARE DELIVERY

William B. Rouse

Tennenbaum Institute, Georgia Institute of Technology

The challenges of managing complex systems are discussed. The ways in which mathematical and computational models can inform management are considered. The nature of these challenges and use of models are illustrated in the context of healthcare delivery. One illustration focuses on controlling healthcare costs. Another example concerns a newly emergent health threat and how it can best be addressed.

1061

CRAFTING A HEALTH SYSTEM THAT PROTECTS US ALL: SYNDEMICS, SIMULATION SCENARIOS, AND SOCIAL CHANGE

Bobby Milstein

Coordinator of the Syndemics Prevention Network at the Centers for Disease Control and Prevention

This presentation is about leading a dialogue about the dynamic and democratic dimensions of the U.S. health system. The speaker's remarks will focus on the system's notorious tendency to resist change as well as its remarkable openness to evolve in new directions through the hard work of health professionals and other citizens alike. He will share insights from CDC's recently released report, *Hygeia's Constellation: Navigating Health Futures in a Dynamic and Democratic World*, and also examine how a serious engagement in system science and game-based learning could reveal plausible pathways for elevating our collective health status, at lower cost, and with greater fairness.

1062

CONFRONTING ECONOMIC PROFIT WITH HIERARCHY THEORY: THE CONCEPT OF GAIN IN ECOLOGY

T. F. H. Allen¹, Joseph A. Tainter², Amy M. Malek¹, John Flynn¹, Michael M. Flynn¹.

1. Botany Dept, University of Wisconsin, Madison; 2. Department of Environment and Society, Utah State University, Logan.

Contemporary problems are often complicated by values intruding into the arena of physical systems. Economic notions of profit have values embedded in them in a way that generally does not occur in ecology and the other natural sciences. We generalize profit as gain in settings beyond strict economics in a way that encourages placing values properly in biological and historical social systems. Complications of elaborate control quickly enter the scene at this point and in this paper we invoke hierarchy theory to keep levels of analysis straight. Hierarchy theory often invokes dualities and a mix of process and structure that are fluid under changes in level of analysis. Notions of gain and profit are recursive as the system uses resources and must change strategies to deal with scarcity, which forces increases in efficiency in yet a new round of change. The transition from abundant resources used carelessly to scarce resources used efficiently changes controls in systems. Such changes over time amount to hierarchical restructuring, which in turn requires of the observer meticulous application of new levels of analysis as the system is redefined. The system bounded at a new hierarchical level

encounters dualities embedded in the hierarchical concept of the holon, which offers a precision of definition of the new system as it exists as an autonomous whole while still being part of some larger system. We introduce these shifts and dualities using examples from nuclear energy, colonial insects and changes in complex societies such as Rome and the EU. In the end both ideas of profit and hierarchy theory are clarified in a two-way exchange.

Keywords: Ants, duality, EROEI, hierarchy, high gain, holon, level of analysis, low gain, resources, societal collapse, termites.

1064

SCENARIO THINKING TO SOLVE COMPLEX ENVIRONMENTAL PROBLEMS

Steve Carpenter

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Scenario thinking solves complex environmental problems, and enables us to avoid fragmentary solutions that only create new problems. Scenario thinking does this by combining diverse models, retaining important details from each of many different perspectives, each one essential but each one incomplete. The process of scenario thinking builds understanding of common interests in solving a problem. It also facilitates shadow networks of people, which enable the implementation of solutions. The scenarios themselves help leaders frame new and compelling visions for the future. Nonetheless, there are significant barriers to more widespread use of scenario thinking. Too often, institutions block forward-looking processes. Too few experts are trained in the interdisciplinary skills needed for scenario thinking. In many cases, crucial information needed to address environmental problems has not been collected, is mis-managed, or is suppressed. These problems could be overcome by an ongoing assessment process for planetary life support. Such a process would benefit everyone by evoking common understanding of complex environmental problems, and creating new options for solution of these problems.

1069

THE SCIENCE AND THE PERSPECTIVE OF SYSTEMS

Gary S. Metcalf, Ph.D.

Keynote address to the 52nd annual conference of the International Society for the Systems Sciences

The founders of our systems societies were respected, and often brilliant, scientists in their own rights. As such they were well grounded in the approaches and methods of science, such as using mathematical models to describe the phenomena that they studied. They also seemed to agree that as they moved into realms like biology, cognition and social systems, the simple reduction to the principles of physics was not adequate. The tension has remained, though, between adhering to fundamental principles of science, and gaining the accuracy that it provided, without oversimplifying the more complex phenomena that they tried to describe.

The question at present is whether the tools of science as we know them are adequate to the task of living, self-organizing systems. Maybe it is just a matter of waiting for bigger and better mathematical models, in which case technology may provide the answers. It is also possible, though, that the paradigm of self-organizing systems is

correct, but that our abilities to understand such systems will require new tools or approaches at higher levels of complexity.

1070

LIVING ON A SHRINKING PLANET: CHALLENGES AND OPPORTUNITIES FOR A SUSTAINABLE FUTURE

Professor Jonathan Foley

Director Center for Sustainability and the Global Environment (SAGE), University of Wisconsin

Growing population... Increasing resource consumption... Changing patterns of climate... Diminishing land and freshwater resources... Degrading air and water quality... Emerging diseases... Increasing threats to human health and security...

These are not just theoretical concerns. Already, many of the world's people face immediate, life-or-death threats from water scarcity, food shortages and environmental pollution. Continuing changes in the global environment may mean that even more people will face threats to their health, well-being and security.

Solving these problems will require new, interdisciplinary research to help us understand the changing relationships between human actions and Earth's complex environmental systems. It also requires integrating the latest science into real-world decision-making and public policy, with the ultimate goal of managing our planet's natural resources — the air, water, land and biological diversity upon which all life depends — sustainably into the future.

This presentation will consider the multiple challenges to global sustainability, and examine the lessons from systems dynamics in addressing these grand challenges.

1071

VERTICAL AND HORIZONTAL SCALING STRATEGIES TO AVOID DESTRUCTION IN THE MODERN CONTEST: RIDING OUT THE PERTURBATIONS OF ITS LARGEST SCALE, OF THE SEIZING OF HIGH GAIN/CHEAP ENERGY AND THE EXPENSIVE REFINING OF LOW GAIN ENERGY, AS ARGUED BY TIM ALLEN & COLLEAGUES

Jim Gustafson, M.D.

Professor of Psychiatry, University of Wisconsin-Madison

Segue from paper by Tim Allen and colleagues, *Confronting economic profit with hierarchy theory*. What I am going to add to their horizontal (timewise) portrait of hierarchies undergoing a phase shift from cheap to expensive energy is a portrait of how human beings (we, us) ride through its deadly perturbations on smaller scales of space (vertically) and time (horizontally).

This is a condensation of my 500-page new book, *The Core Illness of Disorientation*, to be published later this summer, to a thirty-minute talk. This is possible to carry out, because of the fractal structure of the subject: i.e., it is (almost) the same on all scales, and (almost) the same from all angles. I will look at it from the following angles: A. The neurobiology of orientation-to-perturbations. B. The disorientation-to-exchange in us. C. The dream mapping of disorientation-to-exchange in us. D. The mapping of disorientation-to-exchange in the English sentence.

The neurobiology of disorientation: I am going to code this huge subject into a single diagram of a paper by Mathews and Strogatz (1990) on the phase space of limit-cycle oscillators, in which the coupling strength and frequency range is varied: the key point is

the tendency to synchrony when the coupling strength rises, and when the frequency range is diminished. In human beings, this is achieved by something called the constant attitude: locking into an idealization in childhood.

The disorientation-to-exchange in us: I am going to code this huge subject into a diagram of a paper by Alexander and Globus (1996) on how the nervous system alternates between top-down coherence and bottom-up incoherence in every breath. If you attend only to the top-down rhythm, you essentially turn yourself into a cog of synchrony, a thing. If you can attend to bottom-up incoherence, you can retain your juice so to speak, and independence.

The dream mapping of disorientation in us: I am going to code this huge subject by reference to an essay by Henri Poincare (1985, original work published 1908), in which he demonstrated the capacity of the dream instrument to map the non-linear geometry of its phase space, illustrating this with several dreams of my own which arose when Tim Allen asked me to give this lecture.

The mapping of disorientation to exchange in the English sentence: I am going to code this vast subject of our disorientation-in-language-to-exchange that comes down to us from Homer, and Dante, and Shakespeare, and Tolstoy, via a paragraph from Vincent Scully (p. 37-38, 1991), on the takeover of the Temple of the Great Goddess by the Mycenaean lords like Agamemnon himself at Mycenae. The impingement of resource seizure of high gain energy is only about five thousand years old, and the impingement of expensive refining of low gain energy preceded it and followed it through many cycles since. It turns out that the English sentence is beautifully constructed to read it, if you know how to balance it.

References:

- Alexander, D.M. and Globus, G.G. (1996). Edge-of-chaos dynamics in recursively organized neural systems. In *Fractals of brain, Fractals of mind*, E. MacCormac and M.I. Stamenov, Eds., pp. 31-73, Amsterdam: John Benjamins Publishing Company.
- Matthews, P.C. and Strogatz, S.H. (1990). Phase diagram for the collective behavior of limit-cycle oscillators. *Physical Review Letters* 65 (14), 1701-1704.
- Poincare, H. (1985). Mathematical creation. In *The creative process* (B. Ghiselin, Ed.), pp. 22-31, Berkeley, CA: University of California Press.
- Scully, V. (1979). *The earth, the temple and the gods. Greek Sacred Architecture*. New Haven, CT: Yale University Press.

Further readings can be found at [http:// psychiatry.wisc.edu/Gustafson](http://psychiatry.wisc.edu/Gustafson).

The Core Illness of Disorientation will be available in hard cover and paperback and as a free e-book on the website this fall.

1072

THE ECOSYSTEM APPROACH: COMPLEXITY, UNCERTAINTY AND MANAGING FOR SUSTAINABILITY

David Waltner-Toews

University of Guelph dwaltner@ovc.uoguelph.ca

The late James Kay collaborated, argued, and worked with a wide range of theorists and practitioners to wrestle with the deep questions of how to link complexity theory to sustainable living. The world is complex, he would ask. How? And so what? Drawing on work done by Kay and his associates from Africa to the Amazon, Kitchener to Kathmandu, Waltner-Toews will present some of the often surprising and sometimes graphically startling answers.

Workshops and Roundtables

Workshop 1

KEY TOOLS FOR DOING SYSTEMS SCIENCE

TOOLS FOR INTEGRATION & SYNTHESIS RULES FOR ABSTRACTION & DEABSTRACTION

Led by: Professor Len Troncale

Sunday, July 13th, 9 a.m. to 11 a.m.

Integration and Synthesis are among the most recognized and honored of intellectual achievements. Everything from radically successful entrepreneurs in business, industry, and engineering to Nobel prizes in the natural and economic sciences depends on new integration and synthesis. But while we honor and reward such accomplishments, we do not have an acceptable and consensus toolbox of techniques for integration and synthesis. In fact, synthesis and integration are not serious topics in our curricula at any level. If it is so crucial, why are integration and synthesis not taught anywhere?

The goal of this 2-hour Workshop will be to diagnose this problem and present a series of practical tools and techniques to do synthesis and integration in any field. During the Workshop, we will cover the much neglected, but powerful tool of General Morphology introduced by Fritz Zwicky at Caltech. This tool is relevant to systems theory and demonstrated practicality in a range of engineering applications.

Some of the topics that will be discussed will include:

- What is integration or synthesis? How can we recognize it?
- Listing of specific techniques for integration and synthesis
- Obstacles to, or human limitations for, integration and synthesis
- Specific Rules of Abstraction and examples
- Specific Rules for De-abstraction and case studies
- Great boundary crossers of the past: instructive examples of synthesis from history?

Presenter: Dr. Len Troncale was Managing Director of the ISSS for nearly ten years, and then ISSS President. He has been on the Boards of the IFSR, and WISINET and on the Editorial Boards of several systems journals. He was Director of the Institute for Advanced Systems Studies for 30 years and author of systems science curricula. Professor Emeritus of Biology.

Method: Fifteen minutes of intense ppt presentation on each of the above topics will be followed by fifteen minutes of open discussion by the group on that topic continuing until the time is exhausted. PPTs will be distributed to participants. A major Workshop goal is to stimulate international collaboration to continue work on integration of GTS's between annual conferences and enable cooperation in disseminating SSP across the many new systems conference venues.

Fee: \$15, payable at the event

Venue: Look for signs in ISSS Registration area. Receipts will be available for use as educational or business tax deduction. RSVP to lrtroncale@csupomona.edu of intent to attend so appropriate numbers of handouts can be printed.

Workshop 2

FUNDAMENTALS OF RELATIONAL SCIENCE: BUILDING A CURRICULUM

Led by: John Kineman and Judith Rosen

Sunday, July 13, 9 a.m. to 5 p.m.

This workshop will focus on foundational concepts in the emerging field of relational science. As a group, we will review the basic assumptions of this science, which were derived primarily from the work of Dr. Robert Rosen, mathematical biologist and former ISSS president. The workshop will go beyond Rosen's development, following his many hints and leads, to establish a clear and teachable set of ideas at the foundation of a new science. This new science is the science and analysis of relational entailments and how they construct the natural world. While most of Rosen's work was focused on applications in biology, and addressing the question "What is Life", what he discovered in terms of the nature of complexity turns out to be revolutionary in that it applies to all of science, underlying even physics. It provides a different mode of analysis than traditional quantitative and state-based concepts. Accordingly it is not itself predictive of states but of system types. These, in turn, can identify constraints on quantitative analysis and prediction. In this way, the relational view does not contradict mechanistic science, but instead it provides a broader conceptual and analytical framework in which new phenomena can be investigated. In this one-day experimental workshop, we will introduce the basic assumptions of this world view, showing where they come from, and we will explore various implications. As a group we will discuss specific definitions of terms and evaluate specific epistemological criteria. The main goal of the workshop is to begin a collaborative, community approach to pursuing and developing this theory, as was done in the very successful development of mechanistic theory. By focusing on education and simplifying concepts appropriately for that, we believe we can make rapid initial progress. All ISSS participants are welcome to participate. The only prerequisite is the willingness to begin with a basic working assumption that nature can be described entirely in terms of natural modeling relations. We will work from that premise to its logical implications.

The importance of this work, aside from providing science with new tools to study poorly understood complex phenomena, is also to provide a counter perspective to current mechanistic models that are inadvertently transferred to society and perceptions of our future. The original memo suggesting this workshop expressed concern that an alternative voice must attain sufficient strength to challenge current views that have been popularized, that human agency can design not only our own future, but the future of all life on Earth, controlling evolution according to human interests. It is clear that as long as we continue to believe that nature is fundamentally mechanical our models for enacting such control over our natural world will be seriously flawed. Furthermore, these same models guide and condition our management and governance approaches, ensuring that we will not have sufficient understanding for ethical decision-making. Many people have said that we must find a new paradigm in science, because science does drive Western society, and that this new science must be broad enough to afford clear integration of living and non-living phenomena. We believe that relational theory and a relational science that we can now articulate, can at least begin this process.

Workshop Coordinators: Dr. John J. Kineman, Ph.D. and Mrs. Judith Rosen

Email contact: john.kineman 'at ' colorado.edu

Phone contact: 303-443-7544

Workshop 3

INTRODUCING A SYSTEM OF SYSTEMS PROCESSES (SSP)

GENERAL THEORY, RESEARCH POTENTIAL, TOOLS FOR USE

Led by: Professor Len Troncale

Sunday, July 13, 1 p.m. to 5 p.m.

How many schools of thought or candidate general theories of system can you name? These are the knowledge base for the ISSS; they should be the source of many insights and guidelines for applications to solve complex systems problems. We (of the ISSS) should be more informed than anyone about all the alternatives that are available, and what are the strengths and weaknesses of each theory or approach.

The System of Systems Processes general theory is an attempted synthesis of many other candidate general theories and techniques. This 4-hour workshop will present a concise summary of the following features of this comprehensive school of thought:

- Tenets and Special Contributions of the SSP vis a vis General Theories of Systems & Praxis
- Criteria for selecting Systems Processes (and eliminating non-)
- The relation between Structure and Process, and Isomorphies
- Listing of 100+ Systems Processes
- What should be known about each Systems Process with examples
- Comparison of systems processes covered in different "candidate" theories (includes take-home matrix)
- Critical Importance of Knowing Specific Mutual Influences Between Systems Processes
- Types, Classes, and Examples of Linkage Propositions
- Matrix of Hundreds of Case Studies of Systems Processes in Seven Natural Sciences: Proof of Isomorphy
- Discinymys & Discriminations across Systems Processes; How they lead to confusion
- Computerized Tools to Enable Group Collaboration and Use of the SSP

Presenter: Dr. Len Troncale was Managing Director of the ISSS for nearly ten years, and then ISSS President. He has been on the Boards of the IFSR, and WISINET and on the Editorial Boards of several systems journals. He was Director of the Institute for Advanced Systems Studies for 30 years and author of systems science curricula. Professor Emeritus of Biology.

Method: Fifteen minutes of intense Powerpoint presentation on each of the above topics will be followed by fifteen minutes of open discussion by the group on that topic continuing until the time is exhausted. A major workshop goal is to stimulate international collaboration to continue work on integration of GTS's between annual conferences and enable cooperation in disseminating SSP across the many new systems conference venues.

Fee: \$60 payable at the door. Look for signs in ISSS Registration area.

RSVP: Please notify lrtroncale@csupomona.edu of intent to attend so appropriate numbers of handouts can be printed.

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INCORPORATING SYSTEMS THINKING IN ORGANIZATIONAL CHANGE PROJECTS USING ACTION RESEARCH BY PRACTITIONERS CONDUCTING ACADEMIC RESEARCH

Shankar Sankaran

Associate Professor in the School of the Built Environment in the Faculty of Design Architecture and Building at the University of Technology Sydney

This paper will first explore the use systems thinking in action research projects. It will then describe three 'real' action research projects, where systems thinking processes were used by managers who conducted action research, to introduce change in their own organizations. It will elaborate how applying systems thinking principles supported the application of action research. All three managers have successfully completed their doctorates in programs conducted by an Australian University. The paper will then discuss the merits and problems in applying systems thinking in action research projects and conclude with how systems thinking approaches could be effectively applied by management researchers planning to conduct academic research. The principal author of this paper was involved in the supervision of the doctoral research of the projects discussed in this paper. The three managers are being contacted for participating in writing this paper.

Keywords: Systems Thinking, Action Research, Organizational Change, Management Research

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GENDER DUALITY. INFORMATIVE WOMEN, ENERGETIC MEN

Luis Sancho

Humanity has debated for centuries the meaning of gender. Two main theories have defined gender in the past. Dualist doctrines considered that yin, the informative, female principle and yang, the energetic, spatial, male one, explained gender - not only among life beings but in any species of the 'sexual' Universe. Since we exist in a Universe of 2 substances, energy and information, gender could be just an expression of that essential duality. For example, in a Universe in which we gather both, energy and information, all organisms have energetic bodies and informative heads and both are needed to survive. In physics, all entities have an informative particle that moves over an energetic field (duality particle/wave), and both are needed for the physical entity to survive.

Gender will be just one case more of the essential duality of the Universe:

If we mix a species slightly more perceptive and informative (the female) and a second species slightly more energetic (the male), both together will have better chances to absorb energy and information and survive.

This theory of 'gender', which we might call the theory of 'complementarity' and 'specialization', was substituted in the XX C. by an ill-understood Theory of Gender Evolution, which considered that sexual differentiation improves the chances of survival of any species, and hence 'survival' is the cause of gender. Indeed, as we have seen the survival of complementary genders is the reason of their existence. Yet gender is not a reproductive quality defined by sexual interaction, it is a structural feature of the

Universe. Since in fact, non-sexual reproduction is a better strategy of survival. Since non-sexual species also have random mutations as sexual species do, but have the higher advantage of achieving always a successful reproduction, since they do not need to find a mate to reproduce. The true survival advantage of gender is in their informative/energetic specialization, not in their sexual differentiation.

Further on, a Theory of 'sexual gender' doesn't address the morphological and personality differences between both genders.

On the other hand, the complementarity theory of gender that we propose here, adapted to the laws of modern science and duality, explain those differences of character and it is increasingly backed by empirical data: women indeed have proved themselves better handling informative words; women show the cyclical patterns of temporal information in their bodies and behavior; women have better temporal memory; women perceive more in all languages of human perception except those related to spatial or visual parameters (mathematics).

On the other hand, men handle better spatial energy. They are better in spatial geometry. They have stronger bodies, with lineal, energetic forms... They are, as energy is, fond of destruction and lineal weapons of war. There is however in the ternary Universe, always a species that combine both qualities, energy and information, in the gender case it is the 3rd, gay/lesbian species, arguably the most complex of the 3...

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TEMPORAL INFORMATION: THE ARROW OF EINSTEIN, THE ARROW OF EVOLUTION

Luis Sancho

Since Physics is based in mathematics, which derives from geometry, a language of space, it tends to study reality with a single arrow of spatial energy or 'entropy' that dilates and expands that Universe. However the Universe has 2 arrows, 2 substances, spatial energy and temporal information. Thus, to complete Physical theories we need to include this second arrow of temporal in-form-ation that creates form.

Only when we properly merge both arrows, and define the fundamental laws and relationships between them, we are able to understand many questions still unresolved in science.

The most important of those laws is a general tendency in all systems to increase the information of the system as time passes by, till a point in which the arrow is reversed in the process of 'death'. So we can establish a dual arrow in all temporal processes, the arrow of life:

Spatial energy (youth) -> Temporal information (old age)

Followed by the arrow of death, which inverts the process:

Information (old age) -> Death (erased into energy).

The dual arrow of energy and information has been defined in Physics by Einstein, who affirmed that 'time bends space', giving it form (General Relativity). Yet Einstein also established the inverse arrow of 'destruction of mass, or gravitational information' into energy, the arrow of death of matter: $E=Mc^2$.

In biology the arrow of information and life was defined by Darwin, who proved that information accumulates with the passing of time.

Yet, Darwin established also that 'energy is scarce'. So all species fight for survival, using each other as relative energy through the predator-prey process of death.

Individual life is also guided by that arrow which takes people from a first age of energy or youth into a 3rd age of warping wrinkles and growing information that ends in death, when our information is erased back into cellular energy.

In history the arrow of information has been proved by the increasing technological evolution of human societies. Yet again, Vico and Spengler, showed that when a civilization reaches its informative zenith it decays and dies, becoming erased in war processes, the arrow of death in history.

Thus, in the Universe, there are 2 arrows of futures, the arrow of spatial energy and temporal information. And only by understanding both arrows together, its relationships, symmetries and laws of complementarity we will be able to fully grasp the nature of that Universe.

863

IDEALIZED DESIGN: AN "OPEN INNOVATION" PROCESS FOR SUCCESSFUL BUSINESS MODEL CREATION

John Pourdehnad

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In industry after industry, companies with superior performance are displaying innovation in the totality of the way they are doing business. This explains why a recent IBM survey of over 765 CEOs shows: Business Model Innovation is on the top of their list. In the absence of a single genius entrepreneur/leader, one of the challenges confronting the businesses today is to develop a process of "open innovation," that taps into the creativity of the stakeholders and in particular the employees of the organization (s) to create a successful business model. Traditional models of innovation, which relied solely on "creative types," usually within R&D functions or strategic planning function, are being replaced with "open innovation". One of the most potent open innovation processes, is idealized design. Originally conceived as an internal process to facilitate corporate planning, idealized "design thinking" is now being used for opportunity recognition. In this paper, the operating principles of idealized design as an open innovation process together with the Enterprise 2.0, a system wide enabling technology that facilitates participation, is discussed.

864 (1015)

A BOUNDARY CRITIQUE OF GENDER IN THE PROJECT MANAGEMENT BODY OF KNOWLEDGE®

Pamela Buckle Henning & Janice Thomas

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The Project Management Body of Knowledge (PMBOK®) is a document describing appropriate reasoning styles and behaviour for project managers. As a codified "body of knowledge," it acts as a knowledge system for the profession. This codification is tacitly gendered, privileging masculine cognition and action. We examine this tacit value system that has de-legitimized certain feminine contributions to the profession, leaving them outside its boundaries of recommended practice. This boundary critique advocates on behalf of our emancipatory interests in improving the effectiveness of individual project managers, and the success of the profession itself.

865 (871)

A NOVEL APPROACH TO THE CONCEPT OF SYSTEM INFORMATION

Mehdi Yahyavi, Mohammad Vaziri Y.

This paper represents a novel approach to the system information correlating General System Theory, Cybernetic and the Theory of Information. The main objective is to investigate whether “information” is a subjective concept or an objective entity in the physical reality. In this quest, system has been identified as an abstract model for observation and the perception of the world by the human mind. Based on this definition, every phenomenon that can be observed or imagined is perceived as a system. Where there is a system, there should be an observer and hence there exist information in between.

Combination of system elements as a whole is explained by System Dynamics. Based on this assertion, the system is in a continuous change and transmutation; a conceptual process that is independent of time and space. In this perspective, time and space are conceived not as the background but the outcomes of the inherent dynamics of the system. It is shown how the time could be considered as sequence of events and the space as relation between system elements.

System structure is modeled based on Binary graph as the fundamental topology for combinatory pattern of the system. A new System Algebra is defined, based on which the System Information Matrix (SIM) is introduced to demonstrate information imbedded in a system. This model is also used to evaluate the amount of system information based on Entropy as defined in thermodynamics and in the information theory. Complexity is another parameter of the system that is represented here based on multi-functionality of system elements. This new definition provides basis to quantify this feature of the system.

Cybernetic systems categorized as life, machines and composite systems with high degree of complexity such as human societies, are all shown to be distinguishable by exchange of information. In these systems, information flows through different components the same way as it would from any system to the observer. It is concluded that information realized by the observer is a relative objective entity in a system. However, in cybernetic systems having controllers as internal observers, the information is physical and objective regardless of any external observer.

Keywords: System Theory, System Information, Entropy, Complexity, Cybernetics.

866 (973)

A DIFFICULT BALANCE: DECISIONS IN HEALTH CARE

Marilyn Metcalf

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As humans, we have a number of basic needs: air, water, food, shelter. While these needs have not changed, our ways of meeting them have evolved with our societal arrangements. These changes in the ways our needs are met require infrastructure. Secondary to the emerging infrastructure that has come with increasing urbanization have been additional capabilities. Many people have come to see the provision of these capabilities as needs or rights. Among them is health care. While this author is in complete agreement with the ideal of making access to health care universal, the concept of what that means bears closer examination.

The World Health Organization (WHO) defines health as “a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity.” Such a broad definition may encompass any number of what will be referred to here as emerging needs, including the health care referenced above, as well as education, security and certain personal, political or religious freedoms, among many others. This state of physical, mental, and social well-being is also not likely to be defined in the same way for each individual, group, or culture. The balance in this system becomes difficult because there are multiple perspectives on what would constitute an ideal health care system, and perspectives may naturally change with circumstances.

The needs range across a very broad spectrum. We are entering a time of incredible divergence in our medical capabilities. On one hand we are moving toward an era of personalized medicine, in which we hope to provide medications for a specific genetic make-up. On the other hand, we are battling new or more resilient outbreaks of old foes such as cholera, dengue fever, and malaria. For participants in the health care system, including health care providers, public health practitioners, non-governmental organizations, and pharmaceutical companies, these questions and needs must be addressed on a global scale. As suggested by the WHO, we are a single planet whose populations have become interconnected enough to require the participation of all players in preventing disease and promoting health. The movement toward public-private partnerships, with implementation through grassroots organizations is likely to bring us the farthest in hearing the voices of the many, and understanding how to define, prioritize, and meet those needs. It is also important to consider the broader context within which that health care system works on a global scale. This paper will suggest ways in which systems thinking can “make a difference,” to echo the conference theme, by helping the various efforts in public health and individual health see the impact of multiple efforts together, so that they can be more complementary, or at the very least not work at cross-purposes.

867 (988)

CANNIBALIZING CHILDHOOD’S FUTURE AS RISING TO FALLING ROPE

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With the relaxing of restraints on advertising to American children during the Reagan Administration, marketers have pulled out all the stops in targeting the young. This paper examines the commercial exploitation of childhood and consequences as a case-in-point of the 2nd Law of Thermodynamics at work. Drawing on physical chemist Peter W. Atkins’ 2nd Law metaphor as heavier weight falling linked to lighter weight rising, we contend that revenue streams driven by sophisticated marketing to children is, in large measure, at the expense of childhood, families, and the nation’s future. By systematically bracketing off all but the bottom line, we’ve become “a society that is eating its own children in the name of profit.” But, if indeed, the rising corporate order satisfies the 2nd Law by using the lives of children and families as convenient sinks for dissipative effluents, what is the *modus operandi*? What is the rope linking the rising and falling weights in Atkins’ metaphor? The proposed answer lies in evolving techniques capitalizing on an instinct that’s so natural, it knee-jerk bypasses most, if not all, critical judgment. Formally it’s called “the Principle of Least Effort,” the urge to preserve what was once precious food energy by seeking out and indulging in shortcuts. The techniques are especially effective with children.

Keywords: 2nd Law of Thermodynamics; shortcuts; corporate marketing; linked weights over pulley metaphor; “The Principle of Least Effort”

868

MAKING A DIFFERENCE THROUGH E-GOVERNANCE FROM BELOW: AN EVALUATION AND FUTURE DIRECTIONS

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This paper discusses a process evaluation of a project funded by an Australian Research Council Linkage Project with the South Australian Department of Health, Flinders University, University of South Australia and Neporendi Forum Inc, an Aboriginal NGO. The co-researchers comprising academics across a range of disciplines, service users and providers address wellbeing in terms of their lived experiences of what works, why and how. The outcome is the development of prototype software that is co-owned by the partners and has been tested out by the participants. The process has taken knowledge management beyond storage and retrieval of information to include the perceptions and meanings of the stakeholders. It has potential to enable costing the pathways in social justice terms, in order to make a case for participation both as ‘a means and an end’ to support wellbeing within particular contexts. The software can be updated as it is used and it has the wider potential to be applied in a range of governance contexts. The use of meaningful metaphors designed by the participants could a) tailor the software to different user and provider groups by b) enabling the participants to collect data on their areas of concern.

User-centric design is based on telling narratives and exploring perceived ontologies or meanings. The next step is to analyze the discourses for patterns (Christakis and Bausch 2006 and Van Gigh 1991, 2003 on meta modelling). Making sense of perceptions is through identification of patterns and making meaning/sense of the patterns based on weighting the choices. The number of times particular themes were raised or particular service choices made equals a weighting.

We used a pluralist approach and avoided a ‘one size fits all’ approach by using a) participatory action research and questioning, b) soft systems mapping, c) critique informed by Critical Systems Thinking and a Design of Inquiry System and d) social cybernetics applied to ‘if then’ scenarios.

The approach demonstrates the ability of people to design the content of the software and thus to engage in participatory design, e-governance and e-democracy which could be used to extend democracy to the marginalized and socially excluded. In the Australian context these include Aboriginal Australians, refugees and young people without the vote who will have to live with the decisions in the future. The current research is only with Aboriginal stakeholders aged 18 and above and it needs to be extended in the next phase to include younger Australians.

I will use most of the presentation time to give a practical demonstration of the software and to discuss its potential application.

Keywords: e -governance, design, user-centric

869 (893)

**SYSTEMS THINKING FOR TEAM AND ORGANISATIONAL LEARNING
CASE OF PERFORMANCE MEASURE CONFLICTS IN A MULTINATIONAL SUPPLY
CHAIN**

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Performance measurement and management have received great deal of attention in the literature in recent years. However to date, there is scant attention to dynamics and trade-offs amongst performance indicators in theory and in practice (Santos, Belton et al. 2002). Thus, performance management systems (PMS) have remained static, fragmented, and backward looking (Bourne et al. 2000) leading to adverse outcomes, often unknown to managers and organisations. A systems view of performance, on the other hand, calls for a holistic approach to performance measurement integrating multiple dimensions, functions and time horizons across the enterprise. A systemic performance measurement would take into account the interdependencies of functions and their dynamic influence on the performance of the organisation as a whole. This paper addresses this challenge using the four level thinking (Senge, 1991) and causal loop models to highlight the inter-relationships between the KPIs and their trade-offs within and across different functions. The study reports on an action research within a multinational company where through real case scenarios we demonstrate how KPIs influence, contribute or impede one another in a manufacturing/supply chain setting. The paper reveals how the use of systems thinking concepts and causal loop models by novice users facilitated an open environment for cross-functional communication and collaborations, leading to team and organisational learning and enhanced performance.

Keywords: performance measurement, team learning, mental models, systems thinking, cross-functional management

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ENTROPY DEBT: A LINK TO SUSTAINABILITY?

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The thermodynamic laws governing open systems necessitate a cost to system complexity. The cost represents an energetic debt in the system's surroundings called 'entropy debt'. This research starts from the premise that communities are complex systems. They garner energy from their surroundings to build internal complexity such as social order, infrastructure, and networks. Regarding natural resources, the entropy debt of community complexity is the impact communities have on their natural environment – defined in this research as 'community entropy debt'. Environmental impact is problematic when it compromises the ecological integrity of the natural resources upon which communities rely. Given the necessary relationship between energy throughputs, in the form of natural resources such as food, fiber, and fuel, and community complexity, maintaining ecological integrity is paramount to community sustainability. Yet, despite community dependence on the natural environment, air, water, and terrestrial pollution and loss of sensitive ecosystems continue.

This research asks how can an open systems conceptual framework highlight the energetic-entropic relationship between community complexity and the natural environment? How can such a conceptual framework effectively be operationalized and applied to community systems? Finally, what can an analysis of the conceptual

framework parameters reveal about systemic drivers of anthropogenic environmental degradation?

To answer these questions, this research, first, proposes a general conceptual framework based on the thermodynamics governing open systems, specifically, the theory of dissipative structures with a focus on the concept of entropy debt. It then proposes a methodology to effectively operationalize the parameters of the conceptual framework. The parameters are: energy throughput, community system complexity, and community entropy debt. The proposed methodology involves establishing surrogate measures for each parameter, applying them to selected communities, and comparing the surrogate measures of each parameter and for each community. Five British Columbia communities are viewed through the lens of a conceptual framework highlighting their energetic-entropic relationship with the natural environment. This paper discusses the challenges and opportunities of operationalizing and analyzing the proposed conceptual framework.

Keywords: entropy debt, community systems, open systems, theory of dissipative structures, energy throughput, complexity, sustainability, environmental degradation, conceptual framework

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ASSESSING ADAPTIVE CAPACITY IN AN URBANIZING WATERSHED

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Human land use has often been seen as distinct and separate from ecological processes acting on a landscape. This is especially true of landscapes where cities have developed, with very little attention paid to interactions between social and ecological processes that shape how land is allocated during the process of urbanization. In urbanizing areas fragmentation of natural habitats, simplification and homogenization of species composition, disruption of hydrological systems, and alteration of energy flow and nutrient cycling reduce cross-scale resilience, leaving systems increasingly vulnerable to shifts in structure and function. Adaptive capacity refers to the ability of social actors in a system to manage resilience, and so is crucial to the long-term sustainability of social-ecological systems.

Historical interactions of humans and natural systems in the Bull Creek watershed, located in the Hill Country of northwest Austin, Texas, have resulted in a moderately developed urban fringe area that has structure and function considered desirable to humans, as indicated by its popularity for residence and recreation. The watershed contains suitable habitat for a variety of rare and endangered species including the golden-cheeked warbler (*Dendroica chrysoparia*), Tooth Cave spider (*Neoleptoneta myopica*), Bee Creek Cave harvestman (*Texella redelli*), and Jollyville Plateau salamander (*Eurycea* sp.), as well as a very diverse flora. Currently a large portion of the watershed is undeveloped and/or part of a system of wildlife preserves, jointly managed by the City of Austin, county, and federal entities for the protection of endangered species. A dynamic tension exists between expansion of urban development and the legal and community forces that are pushing for maintenance and expansion of the preserve system, riparian buffers, and maintenance of overall environmental integrity.

In order to identify the key drivers and processes that affect resilience, and to assess current levels of adaptive capacity in the Bull Creek watershed, we conducted an integrated historical assessment of changes in the watershed over the past 100 years.

The assessment was performed by examination of streamflow and water quality data, existing studies of vegetation and faunal patterns through time, census data, a survey of residents at two different time periods, interviews with both long-term residents and key stakeholders, and by GIS analysis of aerial photography and land use planning data from 1966-2003. Results of the assessment indicated that the Bull Creek watershed exhibits several key elements that contribute to adaptive capacity, while some elements are present to a lesser degree or not at all. These findings have implications for the long-term adaptability and resilience of the watershed. While fully urbanized watersheds can provide useful data on the long-term impacts of economic development on a river system's processes, watersheds such as Bull Creek that are located on the fringes of urban development can yield valuable insights into the dynamics of how social and natural systems shape each other in a process of co-evolution.

874 (968)

THE "COSMO-PLANETARY AND TERRESTRIAL META-DYNAMICS SYSTEMICITY"

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Ever since 1996, J.-J. Blanc, as the author, made an extensive research on "Systems science", which induced to his developing a new systemic¹ paradigm in terms of a transdisciplinary approach to "Living systems". Named "The Bioethism", it is meant to support the acquisition of a large understanding of living systems' origin, of their natural structures, behaviors, bonds and evolution while permanently interacting with environmental events for survival. These actions within their body milieu, their ecosystemic and sociosystemic environments are necessarily linked with their specific individual and social status and the the diversity of species production from evolutionary trends and are closely tied with cosmo-planetary dynamical forces. The reasoning process adopted participate in developing the structure of two theories as said in the title.

Beyond the sense given to the noun (and adjective) "systemic" as generally referring to qualifying most "systems" in about 28 different meanings, the notion of "systemicity" is, in this new theory, far more suggestive of global and adequate dynamics, which, as "meta-drivers", participate in Life to exist and sustain. To illustrate the dynamical sense of "systemicity", it is only to refer to the dynamic sense of "velocity"². However, these two notions are not to be understood as synonymous but yielding to the same connotation in terms of moving forces.

The survey of the different disciplines concerned with living systems' survival, an analytical methodology and analysis of the above processes, conduced to the emergence of a new theory the author called "The Life's systemicity". Because it is relying on the entire body of forces and dynamics that made and makes life to exist and sustain, it is by essence adapting to the permanency of changes. At a level above Life's

¹ - **Systemic:** dynamic and retroactive forces pertaining to or affecting an entire body or organism.

² - **Velocity:** "the rate of change of position along a line and/or throughout a 3D network, with respect to time or the derivative of emerged positions with respect to time. It is also a rate of occurrence or action : the differential speed of historical changes.

survival dynamics, it is clear considering the "meta-systemicity" of the Universe as a set of forces and moves that participates in the physical and chemical cosmic³ dynamics within a world of retroactivity imparting most cosmos motions.

At the Asilomar ISSS 48th conference (2004), the author, introducing the notion of "systemicity" and the theory, first described "survival". Survival is a circular and regulating set of dynamic moves permanently fed along with a psychophysiological body of streaming biochemical matters and information within the emergence of feedback results that are "retroactive positive differentials" when referred to as survival dynamics. Moves that are fed from survival interactions and retroactions result as emerging from endogenous and/or exogenous effects of milieu changes. The body of these retroactive phenomena is fundamental to living system's survival, then suggesting another and complementary approach in the form of a new paradigm as central to Life's dynamics. At a first level, survival is systemic, made of circular phenomena as the emerging products of interactions within ecosystems and body structures milieu. They yield to the notion of the "environmental-psycho-somatopsychism", a neologism and its abbreviation: "e-psop", which the author postulates as being fundamental to Life's sustainability because of its circularity effect within a living body physiology.

Consequently, an overview upon the entire body of universal interdependent bio-physicochemical mechanisms, processes and streams, interwoven within "3D networks" shows that systemic survival abilities and performances are epigenetically provided from both the convergence of cosmic forces (magnetic, gravitational...) and planetary conditions (geologic, geochemical, geophysical, geo-climatic...) that retroactively sustain the Earth and by extension a world of individual creatures and societal systems to exist and survive within a world of inevitable interdependencies and chaotic effects over them.

The circular information streams, stimuli and survival activities efficiency require adaptation to the dynamics of these "physicochemical games" and other environmental changes. The energy that is required is provided for by environments and transformed into metabolic results that "fuel" the vitality of life's biological processes. Then, epigenetic and emergent results induced from the cosmic physicochemical world, together with evolution changes, promote biochemical and physiological processes results, that structure, assimilate and form body components, psychic structures and differential metabolic outputs for creatures to survive. The "entirety" of these universal, cosmic forces, planetary mechanisms and processes, as individually and globally dynamical, explains the notion demonstrating that "Systemicity" is a meta-dynamic that was and is at the origin of Life to exist and sustain.

The description of the "Theory of Systemicity" requires several communications, so it was decided to divide its development into first a general overview, then to brush up, one after the other, parts of the scientific principles that support the whole complexity of "Systemicity" meta-dynamics. We will nevertheless partly develop the historical and timely aspect of "Systemicity" as part of the meta-systemic dynamics that sustain our Planet as "Gaia" and Life as the convergence of combined and interactive physicochemical emergent results generally referred to their synergetic effects or in other terms, dynamical⁴ coordination.

Acknowledgment: The purpose of the author is to bring up to achievement a "new general theory" about the dynamical context of Life's origin and Living systems existence and survival that is named "The general meta-systemicity". Reasons are assumed as

³ - **Cosmic:** the essence of the general relativity is in the space-time that has dynamic properties,

⁴ - **Dynamical:** "of/or relating to physical force or energy",

very much innovative in terms of its being transdisciplinary and is meant to foster a new mode of describing the cosmo-planetary pressure over the living systems survival dynamics, their specific interdependence within their actual universal completeness and the dynamics that are specific to the planet Earth.

It was postulated that developing these two new theories would require its transdisciplinary structure to have many chapters that are complementing previous papers and future issues. Their description as "General systemicity" and "Life's Systemicity" will be taking into account physicochemical and biological phenomena and planetary configuration changes along with particular dynamics and specific meta-dynamics. Its transdisciplinary approach is also to require, step by step, the development of a very large work in volume and time.

Both the "Theory of general meta-systemicity" and the "Theory of Life's systemicity" have specificities that show the implication of number of dynamics, processes and mechanisms; and have interdependent and complex imbrications and interrelated effects, one to the other and where the synergistic illustrates the interconnectivity of them. This paper will then describe only some aspects of the two theories in terms of physics, chemistry and biology principles.

Keywords: Systemicity, Bioethism, dynamics, meta-drivers, synergy, cosmic physics, emergence.

875 (1021)

BEING VALUES AND BENEFICENT OBSESSIONS: APPLYING THEORIES FROM MASLOW AND ASSAGIOLI TO EVOLUTIONARY GUIDANCE MEDIA

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Memes are units of cultural transmission, the symbols that shape our worldview. In seeking to create a sustainable worldview we require words, images, and systems capable of serving as evolutionary guides for societies at varying levels of development. The evolutionary guidance systems (EGS) framework designed by Bela H. Banathy is one such societal meme. Its application to media gave birth to evolutionary guidance media (EGM), a framework for creating media designed to promote planetary consciousness. In continuing the design of EGM, this paper explores the application of Maslow's theory of "metapathologies" as a means of isolating and/or diagnosing societal ills, and examines the appropriate use of "being values" as antidote. To expedite the healing process Assagioli's "technique of evocative words" and the "beneficent obsession" are presented.

876 (895)

SOCIAL RESPONSIBILITY – AN INNOVATION OF ETHIC TOWARD REQUISITE HOLISM AS A BASIS FOR HUMANS TO MAKE A DIFFERENCE IN AFFLUENCE

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Economic laws from Adam Smith's times no longer work for the most advanced parts of the contemporary world. A difference must be introduced. Global ethic is suggested. So is happiness as criterion of success. Social responsibility matters for humankind to continue its evolution beyond the phase 4 foreseen by Porter - affluence. In affluence needs, perhaps even wants, are scarce rather than resources. This kills the ambition to create in order to have. Happiness can result from the ambition to create and be beneficial beyond having. Thus, maybe, a new concept is showing up, in which innovativeness is no longer a technological or short-term profit-oriented one only, but using / developing human creativity, co-operation capacity, and professionalism as a source of happiness reaching beyond the material content to help life make sense. Official action to promote social responsibility is suggested beyond publishing documents.

Keywords: creativity, Dialectical Systems Thinking, economics, happiness, holism, innovation, social responsibility

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INTEGRATION SCIENCE: RECONCILING THE BOUNDARIES OF HUMANS AND NATURE

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This presentation introduces the principles of integration science, an emerging metadiscipline concerned with a more integrally-informed understanding of the interconnections of human and natural systems.

Despite the widely accepted view that human and natural systems exist in interdependent complex interactions, Western science since the Enlightenment has conceptualized human and natural phenomena as being of a different order. The maintenance of this dualistic separation of human (cultural) and non-human (natural) dimensions obscures the complexity of the relationship between humans and their natural environment.

The search for solutions to environmental problems regularly involves the application of traditional methods within disciplinary boundaries, which attempt to isolate and identify problems and propose solutions independent of personal (subjective) and cultural (inter-subjective) perspectives. Such narrow, disciplinary perceptions are proving inadequate for addressing the complex, interconnected problems of the current age.

Rejecting the dualistic view of Western science, the emerging field of integration science provides a different view of the world and how we come to know it by: (1) interpreting the world not as a fixed "datum" from which all subjects and subjective qualities can be

removed, but rather as a collective field of experience lived from many different angles; and (2) seeing human beings as participatory “experiencers” embedded in the world, as opposed to detached observers.

Integration science builds upon four fundamental principles: (1) wholeness – viewing the world as an undivided whole consisting of a multiplicity of self-ordering patterns in relationships to each other; (2) integrity – recognizing our interdependence of the greater web of life and our moral responsibility to care for life in all its diversity; (3) complexity – exploring emergent properties and non-linear relationships in social-ecological systems; and (4) participation – recognizing that the context for reflection and action requires collaboration among actors to reinforce and sustain desired social-ecological states.

Drawing on integral (holistic) thinking, complexity theory and participatory methods, integration science advances a multi-perspective approach to characterizing and managing complex environmental problems while at the same time: (1) embracing complexity and expanding ways of taking uncertainty into account; (2) facilitating learning through participatory inquiry; and (3) promoting dialectic decision making and management strategies that better respond to uncertainties and feedbacks.

878 (995)

TECHNOLOGY ACCEPTANCE IN LIBRARIES: A SYSTEMIC APPROACH

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Information technologies (IT) have been very important for university libraries. IT perception, acceptance, adaptation and possible appropriation and routinization by the user are key factors for IT to revolutionize the way in which information is acquired, organized and disseminated. It is clear that the fact of solely having IT's has not guaranteed the efficient use of them within work environments, nor is a warranty of inventive capacity in order to develop new information products.

From the library administration's standpoint, it is necessary to have methodological tools that allow predicting which technologies and adaptation processes are the most adequate for the organization in order to plan the impact that IT will have on intermediate (librarians) and final users.

This work presents a case study where planning difficulties for the acceptance of new technology came about in a decline on the productivity and in a deterioration of the organizational environment in an academic library. After diagnosing the problem, possible solutions were drawn and an intervention was structured, which predominately included a matrix reorganization that favored the work group.

After the intervention, internal and external evaluations were carried out trying to appreciate the global functioning of the system, finding an improvement in the aspects that were affected.

The theoretical setting of the problem analysis was the system approach, along with the technology acceptance model, which in turn is inscribed in the subject of innovations diffusion. The reference setting was analyzed with a 4-cycle model which allowed to establish the IT stages in the last 14 years narrated in the case. Each one of the cycles has attributes that set the differences among them, referred to the prevailing organizational culture paradigm and the planning type with which it was intended to face IT change.

Therefore, the objective of the research presented was to design, implement and evaluate an intervention model, based on the systems approach for planning the change

in an academic libraries, with the objective of maintaining and increasing their productivity as well as strengthening the organizational environment.

In order to reach such a goal, it was also necessary to consider the following particular objectives:

- To identify the internal and external components that take part in the technological acceptance processes in an academic library and that allow adaptation to the environment,
- To determine the factors related to the technological change that have a bearing on the productivity of an academic library and the deterioration of its organizational environment.

The work assumed, as a guide to reach its objectives, the following hypothesis:

The use of systemic methodologies in the planning of technological change in academic libraries favors technological acceptance and therefore, increases productivity and strengthens organizational environment.

The identification of the forementioned cycles allowed to search the data for the main characteristics of each one of them, the learning obtained in those years and the main conclusions that give support to the planning of the organizational change done, particularly in relation to favoring group work and to the delegation of the decision making process.

In order to improve the validity and reliability of the research results, pair reviews were carried out inside the library, as well as sessions where the results were discussed.

884 (958)

EVOLUTIONARY ETHICS: VISION AND VALUES FOR A WORLD OF INSURMOUNTABLE OPPORTUNITIES

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One of the great leaders of Mexico, President Benito Juárez, once said, “El respeto al derecho ajeno es la paz” — respect for other’s rights is peace. Such an understanding of peace carries with it a distinctive intentional connotation, an appreciation of which is necessary for an orderly transition from a materialistic, ego- and nation-state centered world to a global civilization where all can live and thrive in dynamic interdependent coexistence. In fact, an ethic based on concern and respect for all people in the human family, as well as for its life-supporting environment, is a precondition of respect for world peace.

Societies all around the world are currently experiencing a period of rapid and extensive transformation, certain facets of which involve integration toward greater globalization while others involve dissolution toward increased factionalism. In this age of interconnectedness and interrelatedness, the environmental and demographic challenges facing humanity are of equal measure to the opportunities for meeting them. New ways of living in harmony with each other and the planet are emerging – ways that offer a path for all people in the global community to live in dignity and freedom, without destroying each other's chances of livelihood, culture, society and environment. Clearly, action steps are urgently needed to meet the contemporary challenge of change, but the type of action and the ideals that inform it will make the difference between a world of crisis and chaos and one of balance and alignment with nature. An "evolutionary ethic" is the moral and psychological foundation for an orderly transition to a global civilization, just as the structures and provisions of world peace are the relational and sociological

foundation for this epochal step. This paper defines the nature of an evolutionary planetary ethic, considers its origins and the chances of its timely spread in contemporary society.

Keywords: Evolution, ethics, development, sustainability, learning society

885 (894)

A BUSINESS MODEL ARCHITECTURE: OBSERVATION PROBLEMS AND SOLUTIONS IN MODELLING BUSINESSES AND THEIR NETWORKS

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This study uses the Hierarchy Theory concepts of criteria, grain and extent, together with the concept of mutual value exchange, to construct an architectural model of the relationship between any two members of a network. These dyadic architectures can be assembled into a business model architecture that can be used to analyse the 'health' of the network, to support management or automation and to predict sustainability. This business model architecture theoretically develops the business model literature and the linked area of business process modelling and it produces a practical insight into the developing area of orchestrating networked businesses. An analysis of a network of organisations that produce Information, Advice and Guidance services for job seekers is used to illustrate the use of the model. The analysis produces theoretical implications about the relationship between modeller, model and subject as well as practical management implications for the manager as modeller and contrasting inter-organisational perspectives.

Keywords: business model architecture, Hierarchy Theory, specification and scalar emergence, perception, orchestrated business networks, careers guidance services.

886 (939)

"YOU ARE ADAPTING MORE TO ME THAN I AM ADAPTING TO YOU" (BUT WHAT DOES MORE MEAN?): CYBERNETIC AND FOUCAULTIAN EXPLORATIONS OF THE DOMAIN OF POWER

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It is possible to derive a cybernetic approach to what the concept of power might mean, an approach which illuminates and critiques both that concept and the relations it is used to describe. Selected quotes from a short article Michel Foucault wrote late in his life, entitled "The Subject and Power," are juxtaposed with a demonstration that aspects of his emerging relational view of power, as he was formulating it in this article, prefigure some elements of what might be developed into a cybernetic approach to what might be meant by power. I show that such a relational cybernetic approach can be developed from basic cybernetic and systems principles including system capacity, (structural) coupling, the relationship of an organism to a niche or environment, and the hierarchical organization of adaptive systems. A resulting concept of power, or rather, of the domain in which we talk about power, can help reanimate our theoretical discussion of what we mean by such a concept and what such a concept inevitably obscures.

887 (1000)

APPLICATION OF A MODEL OF PLANNING FOR THE CONTINUOUS IMPROVEMENT OF THE DEVELOPMENT OF THE TELECOMMUNICATIONS

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The communications systems are used to send information from a place to another one through different means like the space, the optical fiber and metallic wiring. The most common systems among others, are the television, radio, infrared, satellite, the telephone ones, voice on IP that consist of sending the voice on an IP. The objective is continuously to improve the form to make get at the addressee the information generated by the source, of fast, safe way truthful and low cost.

This model consists of five stages: first is the Projection of Reference in which one detects problematic of the system using the techniques of Kawakita Jiro (TKJ), analytical hierarchal structuring and the principle of Pareto; in the normative planning the mission of the system considers that includes its goals and objectives; the strategic planning raises how to give solution to the detected problems; the organizational planning proposes the resources with which the problematic one will be solved; the fifth stage is the evaluation that allows to know what is feasible to do.

889 (939)

THE TRADITIONAL MORALITY OF TOTALITARIANISM: JUCHE IDEOLOGY THROUGH HYO

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The hyo (filial piety) system of Juche Ideology of the North Korea that leans excessively upon gives rise to the criticism that the North Korean political system is too extremely totalitarianism. To keep the North Korean system through Juche Ideology, the regime needs to make use of friendship of hyo in Juche Ideology too. Once the North Korean people's demands are satisfied properly through friendship of hyo, Kim's regime can invigorate the North Korean people to overcome their difficulties. If Jung Il Kim harmoniously makes use of the hyo of obedience and the hyo of friendship in Juche Ideology, he will succeed in keeping his power alive and developing the North Korea regime together.

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EXPLORING ORGANISATIONAL PARADIGMS - SYSTEMIC INQUIRY REVISITED

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Derived from Luhmanns systems theory and critical narration theory, Systemic Inquiry (SI) is a methodology for exploring and developing the practice and the design of social systems. SI brings social systems back in contact with themselves by reinforcing the practice of self observation and self description. SI was developed as a combination of Appreciative Inquiry and Systemic Evaluation. From systems theory point of view, based on SI, any kind of social system, i.e. interaction, organisation and society, can be reached, irritated and affected in their design and their practice.

Systemic Inquiry is a guide to self-awareness via self-observation and self-description by interview sets and systemic analysis. The methodology allows combining the diagnosis of the system with the design of the system. This follows a cascade from the level of narratives via systemic semantics down to the very basics of guiding differentiations. Referring to the ideas of Spencer-Brown's "Laws of form", the guiding differences of the system's self-observation and description become visible and can be worked on. They describe the system's field of possibilities which in a next step are mirrored to the system itself. This is the point where the system – on the basis of authentic self-recognition – is enabled to decide about its self-creation within the limits of its present field of possibilities or even beyond it.

In all this Systemic Inquiry is first of all a self reflected tool of qualitative research in social systems with knows about its implications for the very system in focus. If you observe you cannot not intervene.

The methodology of SI and early scientific reflections were brought forward in the Heinz von Foerster Volume of cybernetics, at the Heinz von Foerster conference in Vienna in 2003, the ISA RC 51 "Sociocybernetics" conference in Maribor (Slovenia) and at the 50th ISSS conference in Sonoma (Cal.) in 2006.

Further scientific reflection of SI, lead to interesting findings along the so called organisational paradigms. Starting with the Luhmannian assumption of operational closure of social systems, SI revealed the importance of exploring the idiosyncratic sets of models, methods and instruments, reference stories and background values which constitute the very practice of a specific social system. For organisations SI allowed to explore organisations in terms of their organisational paradigms defining actual and possible practice. Especially in change management matters this brought forward a superior access to what can be called next practice being the actual, self-referential, authentic path for any organisational development in contrast to any other-referential best practice. Exploring organisations means to explore organisational paradigms.

899 (967)

IMPROVING THE USABILITY OF ONTOLOGY BASED AUDIT SUPPORT SYSTEM

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Auditing against Generic Management System requirements, like requirements of ISO 9001, is an established means for evaluating organizational capabilities. In ISO 9001, auditors check individual management systems based on generic management system standards. Auditors faced with semantic problems because they must interpret the meaning of individual complex management system from the stand point of generic management system standards. To solve this semantic problem, audit support system has been developed using ontology editor. However the audit support system is not widespread, because the ontology editor is so complex. In ontology editor Protégé, too many functions for the ontology operations are provided. The main objective of this paper is to develop a new audit support plug-in system, which supports auditors who don't know about ontology concepts will be able to solve the semantic problems. In this paper, first we analyze complexity of conventional audit support system. Next, we construct plug-in system that is customized in audit by the use of protégé plug-in function. In addition, we demonstrate the use of audit support system following the typical audit activities.

900 (947)

A SYSTEMS-THEORETICAL REPRESENTATION OF TECHNOLOGIES AND THEIR CONNECTIONS

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This paper proposes a systems-theoretical representation of technologies. A technology is represented as an efficient input-output (I/O) system in the sense of mathematical systems theory, where the I/O system transforms the inputs provided for it through the input channels of it into the outputs, which are outputted from it through the output channels of it. This paper also provides a definition of connections of I/O systems as a way to construct a bigger I/O system from smaller I/O systems. Of course it is not always true that a connection of I/O systems is a technology. It can be verified, however, that a connection of technologies is always a technology. In this paper a mathematical verification of this fact is provided.

901

ENTROPY THEORY OF AGING SYSTEMS: HUMANS; CORPORATIONS; AND THE UNIVERSE

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Entropy is a measure of order and disorder, in humans, in so-called inanimate organizations such as corporations, and even the universe. If left alone, these aging systems go spontaneously from low entropy and order, to high entropy and disorder. From life to death, where death is maximum disorder or maximum entropy.

We present here the commonality of entropic principles, which govern the birth, maturing, and senescence history of aging systems. We show the entropic process at work. We show the entropy calculations which trace the lifecycle of everything: humans ; corporations; and the universe.

Keywords: entropy; aging; lifecycles; systems; corporations; universe; death

903 (922)

FAILURE OF FORESIGHT: LEARNING FROM SYSTEM FAILURES THROUGH DYNAMIC MODEL

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A dynamic model for holistically examining system failures is proposed, for the purpose of preventing further occurrence of these failures. An understanding system failure correctly is crucial to preventing further occurrence of system failures. Quick fixes can even damage organizational performance to a level worse than the original state. There is well known side effect of “normalized deviance” which leads NASA’s Challenger and Columbia space shuttle disasters. And there is so called “incubation period” which leads to catastrophic system failures in the end. However this indicates there is a good chance to avoid catastrophic system failures if we can sense the incubation period correctly and respond the normalized deviance effect properly. If we don’t understand system failure correctly, we can’t solve it effectively. Therefore we first define three failure classes to treat dynamic aspects of system failures. They are Class 1 (Failure of deviance), Class 2 (Failure of interface) and Class 3 (Failure of foresight) respectively. Then we propose a dynamic model to understand system failure dynamically through turning hindsight to foresight to prevent further occurrence. An application example in IT engineering demonstrates that the proposed model proactively promotes double loop learning from previous system failures.

Keywords: system failure, engineering safety, dynamic model, double loop learning

904 (905)

A SERVICE SCIENCE PERSPECTIVE

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A shift from production orientation to a service perspective has been occurring in business disciplines over more than a century. During the last decade, that shift has provoked the emergence of significant and fundamental changes in the traditional means of adding economic value. Those changes are pressuring academia to provide commensurate professional education. This paper examines important aspects of these advances and their implications for curriculum development.

Keywords: service science, curriculum, Living Systems Theory, innovation, traditional value stream, service value stream.

906 (970)

A SYSTEMS SCIENCES APPROACH TO THE DESIGN OF A MUNICIPAL INTEGRATION MODEL FOR SUSTAINABLE TOURIST DEVELOPMENT. CASE: THE ORIENT ZONE OF MEXICO STATE

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The new tourist modality generates a tendency toward the values and the importance of the natural environment. It is also consistent with the nature, social and community values, and allows a positive relationship between residents and tourists. This new tourism tendency is regulated through a new development model that is being proposed at a world level: the Sustainable Development Model.

The paper exposes the design process of a Municipal Integration Model for Sustainable Tourist Development, where the possibilities of intervening elements' interrelations are studied to achieve a union among municipalities in order to promote and revitalize the tourist cycle of the region with the use of Systems Paradigm.

The Orient Zone in the State of Mexico is proposed as the study target, due to its resources. However, it is intended that the pattern could be applied in diverse regions of the country that fulfil the necessary elements for its implementation.

Keywords: Systems Paradigm, tourism, sustainable development, municipal integration.

907 (993)

BUREAU-PATHOLOGIES IN PUBLIC ORGANIZATIONS: SYNTHESIZING A BOTANIC GARDEN CASE FOR A GENERAL POLICY SYSTEM THEORY

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When modernization of pathways for handicapped accessibility and an outdoor meeting patio is resisted by a campaign of public agitation under the guise of historical preservationism, architectural taste, traffic and fire safety, etc., is it any wonder that eyebrows are raised about the true motivating forces behind such agitation? Based upon the author's use of a wide variety of social psychological and sociological theories to understand how to manage "BUREAU-cratisis" (ISSS 2002) and the convergent rise of a curious case of legalistic manipulation of county bureaucracy against the clear mission and goals of a private educational and scientific research organization, namely a botanic garden in a beautiful outdoor canyon, illustrations of tentative theoretically based causes and possible solutions to the largely social and cultural, as well as environmental intermix of problems will be given. Theories to be applied will include Conflict, Cognitive Dissonance (Festinger), Labeling (particularly as techniques of neutralization, "denial of responsibility," "denial of injury" toward one's opponents, and "appeal to a higher loyalty," as developed by Sykes and Matza: 1957), Role Bargaining (W.J. Goode), functionalism (in terms of the functions of ignorance as stated by Moore and Tumin: 1949), Identity Bargaining (Erikson), modes of Synergy (Coulter: 1976), and perhaps most pointedly, Game Theory. The issue around what is called the "Meadow Terrace" project came to a head in the middle of 2007 in Santa Barbara, California, when a county Planning Department approved the project, but after it was at least one-third finished (at the expense of \$72,000.00), some canyon neighbors with their resident lawyer mounted a campaign that caused a new Planning agent to rescind the permission to firm up the pathways and gently sloping patio/display area with level, natural stone, and to build

three supporting outdoor terrace walls of 18 inches high for easier accessibility and a more level gathering place in the meadow, surrounded as it is by tall trees, and in the general vicinity of seven previously specifically designated historical landmarks located around or between the original botanical library and a dam across a canyon creek-bed. In the process of previous historically sensitive compliance, did the Botanic Garden (BG) give up its rights to modify any aspect of the tracts of land containing those seven landmarks (without a full-scale environmental impact report), including cutting down nearby dying or dead oak trees, or firming up the pathways across the meadow for easier access by wheelchairs or persons needing medical walkers? Did the BG relinquish its rights to use any of the remaining space within those partly historical tracts to continue to accomplish its educational and scientific mission (i.e., botanical research)? Ignorance by neighbors, and by the county bureaucrats about the actual nature of the planned terraces (and about other modifications of libraries and staff offices and teaching facilities in another area of the historically designated tracts), and the complainants' lawyer stating the neighbors' virtual claim to jurisdiction over the entire historically pertinent area, including over the low level terrace leveling project, caused a furor characterized by public debate in meetings of the HLAC (the county's preservationist overseers, who are not expertly trained in botany or education, if even archaeological or historical methodologies, namely, the Historic Landmarks Advisory Commission) and the county Board of Supervisors, few of whom showed a clear understanding of the botanical (scientific) mission of the Garden or of the legal limits of designation of the seven sites on the grounds, in contrast to the overblown aesthetic and historic preservation ideology.

Keywords: Policy System Theory, "BUREAU-cratitis", botanical science, preservationism.

909 (971)

A VIABLE SYSTEM MODEL APPROACH TO ENTERPRISE RESOURCES PLANNING SYSTEMS

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The Viable System Model (VSM) is recursive and helps explaining the general production management model of the ERP system. The recursion level explains the development starting from warehouse management to Material Requirement Planning (MRP), to Manufactory Requirement Planning (MRPII), to Enterprise Resources Planning (ERP), and to Supply Chain Management (SCM).

In each recursion level, the emergent concepts helps explaining the discovery of the two categories of demand: independent demand and dependent demand, the feedback concept helps explaining the closed cycles in ERP, the local, future and total environment concept helps explaining the interactions between the market and the Production System and the Law of requisite variety helps to manage complexity.

Keywords: Viable Systems Model (VSM), Enterprise Resources Planning (ERP), Recursion Level.

910 (990)

ARE ECOSYSTEMS ALIVE?

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A system is a group of interacting components in which the nature of the interactions maintains the situation as an interactive group for some relevant amount of time. Organisms are living systems in which a complex of subsystems, biological cellular-maintenance metabolism, contained and protected by an outer membrane, continuously maintains the character and dynamic nature of the system. An ecosystem is a system composed of living organisms and their abiotic environment.

While it is observationally evident that the abiotic component of an ecosystem contains the biotic component, the question has been raised whether an ecosystem is also a living system, like monocellular and multicellular organisms. A rigorous answer requires an approach based on consideration of the intrinsic qualities of (1) living systems and (2) systems with living systems as components. Because this is a question about the nature of these systems, this is a problem for general systems science.

Monocellular organisms, such as amoebas and paramecia, are living systems—they are alive. Using a single individual monocellular organism as a baseline example of a living system, the discussion follows a development of increasing complexity of relation and hierarchy from two such individuals in a simple group, through a few stages of system development to the level of an ecosystem. Along the way are noted the factors that prompt that development, and whether those factors or the emergent relations or hierarchic levels confer life on the successive situations. It is a series of stages of increasing complexity of systems with living systems as components. If ecosystems are alive as ecosystems, at the hierarchic level of ecosystem, then where do the factors that make them so come into play, somewhere in the development of systems leading up to the level of ecosystem, or only at the moment of emergence for an ecosystem?

With the results of this investigative process in hand, the discussion turns to questions concerning the origin of the idea that ecosystems are alive, that they are living systems. There are specific patterns of organization of material structure and process (system principles, isomorphies, etc.) that occur in diverse situations—such as at multiple levels of the hierarchic organization of material reality—where those patterns play specific roles in the intrinsic nature of those situations, roles that are consequences of the intrinsic nature of each pattern of organization. General systems studies these patterns of organization, discovering (1) which patterns play these general roles, (2) where they occur, (3) how they influence the nature of the situations in which they occur, and (4) how and why they differ from one situation to another. Once these general patterns of organization are recognized and understood, they can be used as intellectual tools to enhance the understanding of various situations. This is systems thinking, and it is necessary in order to achieve an understanding of whether an ecosystem is alive or not, and why.

911 (963)

AUDIT SUPPORT PLUG-IN SYSTEM BY THE USE OF ONTOLOGY MODEL

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Auditing against Generic Management System requirements, like requirements of ISO 9001, is an established means for evaluating organizational capabilities. In ISO 9001, auditors check individual management systems based on generic management system standards. Auditors faced with semantic problems because they must interpret the meaning of individual complex management system from the stand point of generic management system standards. To solve this semantic problem, audit support system has been developed using ontology editor. However the audit support system is not widespread, because the ontology editor is so complex. In ontology editor Protégé, too many functions for the ontology operations are provided. The main objective of this paper is to develop a new audit support plug-in system, which supports auditors who don't know about ontology concepts will be able to solve the semantic problems. In this paper, first we analyze complexity of conventional audit support system. Next, we construct plug-in system that is customized in audit by the use of protégé plug-in function.

913 (949)

DIGITAL DEMOCRACY AND THE CITIZENSHIP AS THE DEMOCRATIC POLITICAL SYSTEMS FOR THE INFORMATION AGE

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Representative democracies throughout the world are undergoing major transformations with strong challenges from well-armed citizenry with ICTs. Voter turnout rates have been steady decline since 1960s in the world, while other forms of political participation of citizens, e.g., popular initiatives and recalls, powerful NGOs, and so on, have been increasing. Into what form will our democratic political systems evolve in the information age. There might be many possibilities to redesign the democratic political systems. 'Digital democracy' could be one of the strong alternatives for the new political systems. It is composed of two processes: democratic decision making processes and effective administrating processes. It not only resolves some problems of representative democracy revealed in the industrial society, e.g., the failure of representation, but also takes advantage of some traits, e.g. the emphasis on interaction, process and change, complexity, etc., that direct democracy and deliberative democracy are believed to have. Technological feasibility, unfortunately, does not necessarily entail political possibility. If we intend to realize the potentialities of digital democracy, we have to solve some problems anticipated in the information age such as political fragmentation and atomization, overloaded information, tyranny of the majority, etc. In order to overcome these problems and, thus, to make full use of the potential of digital democracy, we have to become citizens with self-guiding capacity. In other words, liberalistic perspectives, which stress civic autonomy, seem more appropriate than communitarian perspectives, which stress civic virtues, for democratic citizenship in the information age.

914

CLIMATE AND THE SAN LUIS VALLEY; CHANGES IN GROWING SEASON AND TEMPERATURE

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The San Luis Valley (SLV) is a large alpine desert located at the headwaters of the Rio Grande Basin in south-central Colorado. The Rio Grande sources to the west of the valley in the San Juan Mountains and drains the valley to the south flowing into New Mexico. The Valley is approximately 122 miles (196 km) long and about 74 miles (119 km) wide extending from the Continental Divide on the northwest to the New Mexico state line on the south.

The SLV relies heavily upon agriculture for its livelihood with approximately 30% of the economy derived from agriculture. Virtually all of the agriculture in the valley is irrigation dependent as the valley is arid, receiving less than 20 cm. of precipitation annually.

This study examines changes in climate of the SLV utilizing 9 weather stations within the valley. Two located in San Juan Mountains, seven are located on the valley floor. Data for each station have independent periods of record, ranging from 1893 to 2007. Data from mountain stations, Hermit 7ESE (1920-2008) and Wolf Creek Pass 1E (1957-2001), were analyzed to determine changes in maximum, minimum, mean annual temperature, precipitation and number of days with a temperature $>0^{\circ}\text{C}$.

Data from valley floor stations, Alamosa (1907, 1932-2008), Center 4SSW (1942-2008), Del Norte 2E (1919-2008), Manassa (1893-2007), Monte Vista 2W (1893-2008), Saguache (1894-2007) and Great Sand Dunes NM (1950-2007), were analyzed to determine the following changes during the growing season in annual and monthly maximum, minimum, mean and number of growing degree days. Additionally, the length of the growing season was analyzed to determine changes in the occurrence of last spring freeze, the first fall freeze and the freeze free period.

The San Luis Valley is of great importance to Colorado's agricultural economy and contains vast water resources which are of interest to agricultural, urban and down stream water users. Changes in the above climatic parameters may have a significant impact on water availability, water use, crop production and ultimately the economic viability of the San Luis Valley

915

TOWARD A DESCRIPTION OF THE CONSCIOUSNESS FIELD

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After describing some basic concepts of this theme, such as consciousness, brain, mind and physical field, it is conjectured with some arguments: a) the existence of a consciousness field, which could be a characteristic of each human being, and b) the possibility of integrating all of the individual fields into a more complex and influential consciousness field.

According to the researchers cited on the paper, all the structure of matter, energy and information in our body, from the very beginning of the life, enfolds the universe in some way. The basic conjecture is that the matter, energy and information from the universe activates the brain and nervous systems which in turn produce and overall experience in

which memory, logic, sentiments, awareness, perception, cognition, and perhaps more processes, are combined in to a whole system of consciousness.

In this work some ideas related with the cognitive consciousness and the necessary field associated with this attribute of the human being are exposed. Finally, the potentiality of this unique field is suggested to help solving some individual and social problems to cooperate to the human evolution.

Keywords: field, cognitive consciousness, human evolution, enfolds.

916 (1006)

THE HARD FACTS OF SOFT SOCIAL SYSTEMS: A GENERAL SYSTEMS EXPLANATORY MODEL FOR SCHOOLS AND WORKPLACES

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In this paper, a new model for social systems is introduced, one that aims to inform all decision makers in schools and workplaces. The need for such a model is great, given the failure of modern well-intentioned reform efforts and wide variety of decision-makers. The new model is gleaned out of Boulding's nine-level typology of system complexity, and named TPO for the three key domains that are clarified: technical, personal and organizational, for specialists; and things, people, and outcomes, for non-specialist decision-makers. These three key parts of a social system have very different properties. First, things (technical) are of three kinds--level 1: frameworks (e.g., buildings, books and equipment); level 2: clockworks (e.g., school routines, schedules and calendars); and level 3: thermostat-like systems (e.g., school goals which people--students and educators--self-regulate to attain.) Things are predictable and designable. Second, people (personal) in a social system are not designable. While things like thermostats self-regulate to externally prescribed criteria, living systems self-regulate to internally prescribed criteria (level 4: open; e.g., a living cell). Living systems (levels 4-7) act to meet their own basic needs first, then, in people, higher needs—generally predictable by Maslow's hierarchy of human needs: survival, safety, belonging, achievement, self-actualization and transcendence. People's behavior decreases in predictability due to inherent individual differences (level 5: blueprint; e.g., plant); differing immediate perceptions from among competing stimuli (level 6: image-aware; e.g., animal), and their own long term reflections, prior knowledge, choices, and abilities (level 7: symbol processing; e.g., human). The third part of a social system is labeled outcomes (organizational). Outcomes depend on people's behavior. If people easily meet their basic needs, they will act to meet the organization's needs. This principle is not a question of ethics, but a question of physics. It is natural, biological, and scientific law that people will behave to meet their individual and personal needs (level 7: human) before their social system or organization's needs (levels 8 and 9). Level 8 systems (social) are optional. Level 7 functioning is mandatory. A person can transfer schools (level 8), but cannot transfer bodies (level 7). The TPO model of a social system clarifies that effective designers put all their attention to things, the designable components of a social system: frameworks; clockworks; and thermostat-like systems (e.g., school and classroom goals and ratios and flows of resources). Effective designers fashion these designable components as attractors, to allow system members to meet individual/personal goals as first priority, and organization goals as second priority. Goals of the TPO approach are termed here systemic renewal, or systemic change efforts designed to increase opportunities for each social system member to meet his/her own self-

perceived goals at his/her own pace. The ISSS Morning RoundTable corresponds to the goals of systemic renewal and the TPO model.

Keywords: General systems theory; social system theory; systemic school renewal

917 (1012)

**AFTER-SALES SERVICE PARTS SUPPLY CHAIN SYSTEM IN OEM
TELECOMMUNICATION FIRMS**

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After-sales service is an important source of revenue and predictions for OEM (Original Equipment Manufacturer) Telecommunication firms. A good performance of the after-sale service provides a competitive advantage for the OEM firm against their competitors.

However, the design and management of the after-sales service is a challenge for many reasons, e.g. obviously the OEM can't produce services in advance of demand, the only thing they can do is just make predictions about products failures. In the other hand, the supply process is also a source of variability, then the match of demand and supply process is another problem.

In order to tackle and mitigate this kind of problems this paper shows how to build the systems of the after-sales service supply chain, going from strategic to operational issues. From business plan, master production plan for spare parts and labor, safety inventories in consignment to customers, etc. Also we emphasize the information technology and coordination that need to exist within the different echelons into the supply chain, so this can be viewed as a whole system.

Keywords: Service Parts, Supply Chain, Production Systems.

919

**SOCIAL IMPLICATIONS OF A PARTIAL PRIVATIZATION OF THE MEXICAN
PETROLEUM INDUSTRY**

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Privatization is a process, which has had a great diffusion in the last decades. Many companies that were administrated originally by one state have been transferred to private owners. Now there is a certain experience from the obtained results and it is possible to integrate them in a systemic evaluation of the social and economic effects generated by the application of this process.

The obtained impact from the application of the privatization on the developing countries compared with the emerging countries has been different given that the developed countries have more robust economies and the emerging ones have many social and economic problems, which avoid to surpass the negative effects of the involved administrative changes.

This paper analyzes the problem from an integral point of view, laying aside the partial analysis of the most studies which have a tendency to emphasize only economic aspects over social ones. It is considered also the historical and ideological point of view.

In this case, the process of privatization is focused on the petroleum industry. The study is based on the Mexican Presidential initiative presented to the Parliament in April of 2008, which does not modify the article 28 of the Mexican Political Constitution, but propose modification of secondary laws and rules.

In this analysis, the privatization process was studied by means of the use of a systemic approach, using a Soft System Methodology (SSM), which allows us to consider the systems involved and their relationships, as well as the causes and consequences of its application.

The main objective was analyze the social implications of the energy sector reform in Mexico by means of several solutions which involved a partial privatization in the petroleum industry. The evaluation of these different solutions helped to identify a better equilibrium among the political, economic and social effects.

The content of this study is: a system approach, a diagnosis, a presentation of a solutions set, an analysis of them to obtain a determination of their social and economic implications.

920 (1019)

A SOFT SYSTEMS METHODOLOGY APPROACH TO DESIGN A RESTAURANT MANAGEMENT MODEL FOR A GREAT TOURISM HOTEL

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This paper is about the design of a systemic model used in restaurants' management inside the hotels of Great Tourism category in Mexico City, applied to the Restaurant the Gifts of the Hotel Sheraton Historical Center.

With the purpose of establishing a Holistic vision of the work's development, the use of the Systems' Paradigm and the Soft Systems Methodology by Peter Checkland was determinate, since the case of study is a social system that is not only able to choose means to reach certain goals, but also capable to select and to change them.

The designed model was conceptually defined with the restructuring of the information flows, the reorganization of the restaurant's organizational structure and the view of the elements that affect the system in its intern and external environments.

Keywords: Soft System Methodology, management, restaurant, hotel, tourism.

921

METHODOLOGY TOWARD A MODEL OF EARTHQUAKE PREDICTION

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Earthquakes are some of the most frequent and powerful phenomena observed on the surface of the planet Earth, almost one hundred daily all over the continents.

The seismic phenomena is a complex manifestation of the implicit order of Nature, thought it will be impossible to know and control the last causal link of the phenomena, at least we conjecture that it is possible to predict approximately the first causal link, originated in the explicit order of tectonic displacements.

In this paper, it is proposed a preliminary methodology to build a model of earthquakes prediction, with intensity larger than 5 in the Richter Scale.

The methodology to produce the model follows the steps and concepts to develop scientific models recommended by Stafford Beer and the theoretical multidisciplinary fundamentals that come from the tectonic theory and fractal mathematics.

Keywords: earthquake, tectonic theory, fractals, modeling, implicit order, explicit order.

924 (981)

E-TEACHING - ERODING THE STRONGHOLD OF TEACHERS

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Internet and the World Wide Web have probably caused the most dramatic paradigm changes in learning and teaching, even more than the printed book. The basic objective of teaching is to transform tacit ('internal') knowledge of an creator into tacit knowledge of another person, in academia usually by a third person - a teacher. Therefore communication is of key importance in teaching, both synchronous communication between the teacher and the student, and - nowadays equally important - accessing and using stored information (libraries and repositories). Especially in the case of stored information their availability, access, and retrieval are heavily dependent on the available communication technology.

In this paper we consider the evolution of communication technology from speech, to hand- written and typeset books, to photocopying and fax, to e-mail, to books produced from camera-read manuscripts, to the world wide web with powerful search engines, to ubiquitous computing, and finally to social computing. We discuss how this evolution impacts the knowledge acquisition and dissemination by teachers especially in relation to the means of students for independent access and acquisition of knowledge.

Concentrating on academic institution we identify three key factors of the educational process. We notice that for each of them the current trends tend to weaken the position of the teacher versus their students.

- the lead-time of a teacher, comparing informal insider know-how, and access and acquisition time of a teacher to new knowledge with the means of a student,
- the verification potential of knowledge, considering the ability of a student to authenticate
- the material presented by a teacher.
- quality assurance evaluating the correctness, reliability, and trustworthiness of the knowledge source, again comparing the possibilities of the teachers versus those of the students.

We analyze above factors with respect to the changed teaching approaches due to the evolution of communication technologies.

We close with a discussion of consequences for academic educational institution and suggest some approaches to improvements.

Keywords: E-teaching, academic education, evolution of communication technology, World Wide Web, lead-time of a teacher, verification, authentication, quality assurance

925 (1025)

TOWARD A UNIFIED FIELD THEORY FOR HUMAN BEHAVIOUR (GLOBAL CULTURAL EVOLUTION)

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A model of human consciousness based on Earth's geologic history of mass-extinction & recovery (evolutionary dynamics). Five Earthly dynamics trigger within humanity's adaptive psychology an "adverse relationship" with environment – a Paradox that sparks human consciousness with intellectual and spiritual questions of unity vs. diversity (Earth/Mother vs. humanity). Humanity adaptively mirrors Earth's five evolutionary dynamics with five gender-based archetypes (bio-cultural dynamic) that unfold in a mythologizing of natural adversity as foundation for all human knowledge.

The intellectual lineage used to develop this model includes:

- Evolutionary biology and Earth systems science to establish an overarching context for this study – an answer to Chalmers' "hard question,"
- Paleoanthropology defines the circumstance of humanity's emergence from Gaia,
- Psychology then monitors humanity's shift from animal-self to modern creative-self, using work of Hegel > Freud > Jung > Joseph Campbell > Arnold & Amy Mindell to define a new structural psychology,
- Fractal geometry then offers a holographic/mathematical design for modeling consciousness,
- Memetics, finally, presents a tool for measuring humanity's conscious traits, with a variation of the Hall-Tonna values inventory.

This work is presented as a "general hypothesizing model" for human consciousness, in attempting a science of consciousness.

926 (983)

DIALOGUE AND ECOLOGICAL ENGINEERING IN SOCIAL SYSTEMS DESIGN

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A number of systems theorists and practitioners have described ways in which human systems of thought and interaction might be consciously designed. Banathy (1996) specifically proposed approaches to the design of human social systems through conversation and dialogue. More recently, Allen, et al, (2003) have proposed distinctions between environmental engineering and ecological engineering, which offer valuable insights into some of the difficulties inherent in the design of human systems. This paper will explore ways in which dialogue in the development of social systems might be related to ecological engineering in biological eco-systems, and how the design of organizational and other social systems might be better understood.

927

TRANSPORTATION, ECONOMIC TRANSFORMATION, AND RESOURCE USE: A HISTORICAL CASE STUDY IN SOUTHERN WISCONSIN

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The development of the railroad in Southern Wisconsin in the mid 19th century took advantage of a U.S. economy based on a low gain diffuse agricultural resource base capturing the sun's rays. This diffuse resource needed to be harvested and concentrated, and thus towns blossomed as points of concentration. The railroad system emerged connecting these agricultural towns, transporting these resources to markets. The turn of the century brought a high gain industrialized economy based on higher quality resources, namely, fossil fuels. This economic transition from low to high gain was accompanied by an infrastructural transition, from rail to road. A town once supported by a railroad may or may not be supported by a nearby highway. Currently the U.S. economy is again in a state of transformation, but this time, back to a diffuse resource base - information (the Internet) and sunshine (biofuels). This research narrates the position of one town in Southern Wisconsin in relation to its broader transportation, economic, and resource use context. Evansville flourished during the 19th and early 20th century as a stop on the rail connecting Chicago and the Twin Cities, however, it saw a decline with the establishment of the highway system. It is currently in a state of rebound, as it has been chosen as the location for the largest biodiesel plant in Wisconsin, because it is still on the railroad. While both roads and railroads show a fractal pattern of networks within networks, the way the respective systems developed is opposite; roads cascade upwards in scale while railroads cascade downwards. This research explores how this subtle difference in development as a consequence of the broader economic shift from low to high gain may have had cascading impacts on regional demographic, land use, and energy use trends.

The theoretical basis of this research is centered on concepts of high and low gain energetics in social-ecological systems. GIS and network theory are utilized to analyze the development of transportation infrastructure in this context. The resulting interdisciplinary narrative blends insights from ecology, economics, geography, and history through a systems framework to explore multi-scale interactions and responses to large-scale transformation in social-ecological systems.

928

SLUM COMMUNITIES AS COMPLEX ADAPTIVE SYSTEMS: USING COMPLEXITY SCIENCE TO INFORM AN ADAPTIVE ECOSYSTEM APPROACH TO ENVIRONMENT AND HEALTH IN INFORMAL SETTLEMENTS IN CHENNAI, INDIA

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There is a long history of attempts to deal with problems of urban poverty and informal settlements (known as "slums" in Asian and United Nations parlance). Slums are characterized by extremely poor living conditions: they are located on marginal and often dangerous sites; they lack urban amenities; housing is dense and substandard; residents almost always lack tenure and are subject to eviction; and they are the location

of poor, vulnerable and marginalized populations. Despite decades of work to address this issue, slums persist and continue to grow, currently housing 1 of every 6 people in the world. A conservative estimate reported by the UN Millennium Development Project predicts that by 2030 1.7 billion of the world's 3.9 billion city dwellers will live in slums.

Attempts to address problems of slums demonstrate that slum settlements are resilient and resistant to change. This suggests that slums are complex in the sense that relationships among slum dwellers and their social, economic, organizational and biophysical environments reinforce the current organization of slums, and dampen the impacts of internal and external forces of change. Understanding of this complex systems aspect of environmental management and human organizational change can provide theoretical grounding and the potential to adapt participatory methodological frameworks to manage such situations.

Since 2004 a team of Canadian and Indian researchers and project staff have worked with NGO and community partners in two slums in Chennai, India (Pallavan Nagar and Anju Kudisai) to explore the efficacy of applying an adaptive ecosystem approach to environment and health in those communities. Starting with expressions of the ecosystem approach as described by applied systems thinkers such as James Kay (the Adaptive Ecosystem Approach and self-organizing holarchic open (SOHO) systems) and David Waltner-Toews (Applied Methodology for Ecosystem Sustainability and Health) and the EcoHealth Approach promoted by the International Development Research Centre (IDRC) in Canada, we have reformed an ecosystem approach to environment and health using Participatory Action Research (PAR). This approach is non-linear, and takes direct account of the organizing capacity of the domain of actors, resulting in emergent and adaptive outcomes consistent with complex, dynamic biophysical and human contexts. A primary objective of this reformed methodology is to emphasize sustainability of process through ongoing participatory adaptive management of environment and health in the partner communities.

This paper focuses on two aspects of the action research project in Chennai, (1) self-organization in the context of informal settlements, and (2) the use of Outcome Mapping to monitor and assess behavioural change in messy and turbulent situations of complexity. We conceive of self-organization around issues of environment and health as a primary driver in this project. This has informed community and researcher engagement to both define the situation and to take action. Understanding the situation from the perspective of complexity and self-organization has provided insight as to why these communities are so perversely resilient, and has led us to identify key relationships and processes that should be either undermined or promoted to encourage the system to evolve to a more desirable configuration.

Outcome Mapping (OM) is a methodology for monitoring and assessing community development that was created by researchers at IDRC. OM explicitly recognises that development occurs in situations of complexity, that multiple actors and influences impact development projects, and that it is human processes and changes in behaviour in key actors that lead to long term and sustainable impacts. Thus, OM concentrates on processes and behaviours of actors in such situations. As such it provides an alternative to accounting approaches such as Log-Frame Analysis and Results Based Management –an alternative that matches more closely the relationships that emerge as important when understanding low income informal settlements as complex adaptive systems.

929 (1013)

ANALYSIS ON TRUST GAME BY RECIPROCAL AGENTS

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In this paper, the author proposes a game-theoretical model of trust among reciprocal agents. Our model, a trust game, is a non-cooperative game in extensive form. By considering about this game, we can define clearly the concept of trust behavior in general games in extensive form. But just using ordinary equilibrium concept (e.g. subgame perfect equilibrium), we cannot explain the trust behavior in some situations. This result contradicts with some observations in real world. So, we have to adopt another solution concept, sequential reciprocity equilibrium (SRE), which is suggested by Dufwenberg. Adopting this SRE concept, we analyze repeated Trust Game (RTG). As a result of analysis, I find the condition of reciprocity to trust others, and reciprocal agents can get higher payoff than non-reciprocal agents when the length of game is enough long.

930 (979)

SEARCHING FOR OURSELVES: A METHODOLOGICAL EXPLORATION OF A SOFT SYSTEM DYNAMICS METHOD AS A SOCIAL LEARNING TOOL FOR WATERSHED IMPLEMENTATION PLANNING

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Theories of environmental planning acknowledge that social-interactional dynamics contribute significantly to the complexity of environmental problems. Especially, the collaborative capacity to coordinate activities among diverse interests is crucial for successful plan implementation. However, environmental planning typically takes successful implementation as a given rather than as a problematic outcome. Consequently, we understand very little about how to measure the institutional capacities of communities to carry out plans. On a more practical level, if successful implementation depends on the coordination of multiple stakeholders, then we need an effective tool for learning how to join different institutional purposes. And if, as this proposal contends, common purpose is embedded in (rather than separate from) collective action, the implementation-planning tool will conform to a participatory action research methodology. Drawing on Rodriguez-Ullua and Paucar-Caceres' (2005) Soft System Dynamics Methodology, and informed by the cognitive model of institutions, I am proposing a Soft System Dynamics Method (SSDM) that combines the richness of Soft Systems Methodology storytelling and the rigor of System Dynamics (SD) modeling into a social learning tool for action planning. A central premise of SSDM is that socio-cultural values underlie patterns of social interaction. In watershed planning and management, the "environment" represents social goods but also contexts of social interaction where often tacit norms about roles and responsibilities are enacted and negotiated. In this sense, watershed communities are sociotechnical systems, or "communities of practice." My dissertation research is a methodological exploration of SSDM as a social learning tool for watershed implementation planning. Three contemporary cases of watershed implementation planning processes will be selected to receive the SSDM intervention. The primary objective of the study is to explore whether and how SSDM promotes group learning about the institutional context and associated leverage points of watershed plan

implementation. The study will also demonstrate SSDM both as a tool for developing middle-range theories of collaborative capacity and as an implementation planning tool for problem structuring and institutional design. This paper outlines the proposed SSDM and study design, arguing that a design view of systems can and should contribute to a participatory action research methodology for measuring and realizing group learning. Ultimately, it is hoped that SSDM represents a step closer to realizing C.W. Churchman's vision of the "Singerian Inquiring System" where social learning is characterized by the synergistic integration of theory and practice, facts and values.

931

COEVOLVING OPEN SOURCE BUSINESS MODELS AND PRIVATE SOURCE BUSINESS MODELS

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Much of business has been founded on the idea of trade secrets: formulas, processes or designs kept private, in the pursuit of competitive advantage. At the beginning of the 21st century, open source software – human-readable instructions redistributable freely to other parties – has led to a revolution in the production not only of computer programs, but also creative works (e.g. music, images, written opinions) and collaborative content (e.g. encyclopedias, scientific research).

Some for-profit enterprises (e.g. IBM) have embraced the open source philosophy for parts of the business, while continuing to operate in a private source model for other parts. Study has produced cases where private source assets have been granted to open source foundations, and where open source assets have been incorporated into commercial products. Understanding the ways in which a for-profit organization can effectively operate in a business model blending open source and private source is still at an early stage.

Research into this domain is being conducted in an inductive case study approach. Models from systems science are being investigated in the hope of gaining deeper insight into new business models.

Keywords: open source, private source, business models

932 (1022)

BUSINESS MODELS AND EVOLVING ECONOMIC PARADIGMS: A SYSTEMS SCIENCE APPROACH

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For professionals at the beginning of the 21st century, much of the conventional wisdom on business management and engineering is founded in the 20th century industrial / manufacturing paradigm. In developed economies, however, the service sector now dominates the manufacturing sector, just as manufacturing prevailed over the

agricultural sector after the industrial revolution. Simultaneously, as end products have transitioned from material outputs to information in digital form, traditional business models are under siege. The economic sociology in this new world challenges the integrity of models, methods and interventions successful in an earlier paradigm.

Since 2005, IBM has encouraged universities to develop a new field of Services Science, Management and Engineering (SSME). Researchers are responding with development of a new science of service systems, but mature foundations will require years of collaboration. In the absence of a well-established science from which educational curricula can be deduced, teachers can develop educational programs for joint learning, guided inductively by relevance and pragmatism.

A new course on business models – ways in which business organizations operate and evolve – is proposed. Complementing traditional management and/or engineering curricula, this course challenges students to reconsider contexts, surface assumptions and explore alternative approaches to business. With a domain that includes both human and technological parts, systems science serves as a skeleton on which content can be structured.

Keywords: service science, systems science, business models, economic paradigms

934

HOW DO WE KNOW? HOW DO WE ACQUIRE WISDOM? A SYSTEMIC CLASSIFICATION OF KNOWLEDGE

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The process of acquisition and application of knowledge is complex, however it can be explained or understood in the following way:

a) The brain perceives or receives thousands or millions of isolated data the whole time, through its five senses, sight, hearing, smell, tact and taste. b) The mind processes and selects some of those data, the most relevant, and gives them coherence, it transforms them in to information. c) At the same time that information is classified and inserted inside a conceptual net that when being processed and widespread, becomes a theoretical frame work that provides them with even more consistency, and then it turns into knowledge; theoretical knowledge, practical knowledge.

But the process doesn't end here, already with a series of data, information and knowledge, it lacks to define what use to give to it, and it is then when the wisdom arrives. To know what to do, when to do it, how to do it, for who's benefit.

In this paperwork, we meditate from a systemic perspective, about the process of knowledge acquisition. A person that knows how to give utility or ethical use to all this information is wise. A person that simply knows a lot of information is an erudite.

Keywords: knowledge, information, data, wisdom, Paradigm of Systems.

936 (1001)

SYSTEMS OF THINGS THAT FLOW

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Diagrammatical descriptions are used extensively in understanding systems. Typically, systems are expressed in terms of heterogeneous symbols that represent basic characteristics of the system, including elements, connections, flows, communication, etc. This paper introduces a new model to describe flow-based systems. It models "things that flow," such as information, materials, actions, and money. They are distinguished by flowing in five states: received, processed, created, released, and communicated. The new model is applied to typical systems to contrast them with classical descriptions.

Keywords: flow model, system modeling, conceptual modeling

937

SELF, ORGANIZATION AND SELF-ORGANIZATION WITHIN SOCIAL ORGANIZATIONS. HOW KNOWING THE DIFFERENCE MAKES A DIFFERENCE IN APPRECIATING COMMON DENOMINATORS: THE CASE OF SELF REGULATION

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The self, be it an individual or an organization exist in a web of relationships. Social organizations, regardless of their nature, be it family structures, non-profit or for profit organizations also exist in a relational web consisting of macro and micro levels of organization (larger social organizations, families and individuals that constitute the larger social organizations). These webs of relationships are dynamic. The tension between forces of change and stability continuously shape the transformative process of growth of selves and their relationships that constitute the web. The dilemma posed in this paper is: How to advance systemic awareness in everyday living through interdisciplinary dialogue and on multiple levels of selfhood? (Large social organizations, family and individual levels)

As findings from brain research permeate apparently discrete disciplines the appreciation for an interdisciplinary approach is expanding. Schore (2003) advocates a multi-disciplinary study of human development from diverse disciplinary perspectives, simultaneously, ranging from developmental biology, neurochemistry, developmental psychology and psychoanalysis. The view that he advocates is that the "beginnings of living systems always set the stage for every aspect of an organism's internal and external functioning throughout the lifespan." He further elaborates on the fact that "a developmental theory, a conception of genesis of living systems, a model of self organization is found at the base of each and every domain of theoretical and clinical science."p.3 Furthermore, the distinction made by Piaget (1958) between structures and functions is made by Schore (2003) in relation to affect regulation and is established in management and brain sciences. (Senge, 2006, Siegel, 2007) This distinction is

essential for understanding the developmental process of the self in the service of adaptation and growth on multiple levels of self in the relational web, in belonging and functioning. This emerging awareness highlights how knowledge of different content areas can facilitate the identification of shared conceptualizations within the framework of System Theories (von Bertalanffy, 1955, Miller 1972) and the potential for operationalization. Such efforts can reinforce further awareness of the self in multiple layers of the system, interdisciplinary and inter-organizational communication and growth as standard relational practice.

The first purpose of this paper is to demonstrate how self regulation as a concept, structure and function is discussed in different disciplines such as Beer's management model, brain and behavioral sciences combined with General and Living Systems Theories can make a difference in advancing common conceptualizations and facilitate interdisciplinary discussion on self, organization, and self-organization.

Recent advances in Brain Research and Behavioral Neuroscience focus much attention on Self Regulation as a concept, brain structures and functions. Affect regulation is discussed by Schore (2002, 2003) as a set of control processes. Stafford Beer's Viable System Model (1972) described in his book "Brain of the Firm"(1972) and later in Yolles (1999) work also addresses the control function that managers need to be concerned with in order to tame "the mess" (Beer, 1972) which is the complex reality in which organizations exist. Beer addressed in his model how the organization as a whole and its different parts perform in relation to their goals. This is true to the discussion of the self on multiple levels of organizational conceptualization. Hence external realities to the brain and internal brain based realities which influence and are influenced by each other require self regulating mechanisms and processes to achieve their goals. The second purpose of this paper is to demonstrate how the multi-disciplinary perspectives on the concept of self regulation (Beer's management model, Brain and Behavioral Neuroscience research) in integration with General and Living System Theories based conceptualizations can advance understanding of the individual self, the organization, the self as an organization, the organization as a self and the process of self-organization that is essential to growth and adaptation in the service of sustainability. The third purpose of this paper is to present a primary effort to develop a General and Living Systems Theories based assessment instrument to evaluate self on multiple levels of organizations: individual self, family, organization, community, culture, society.

Keywords: Self, Organization, Self-Organization, Self Regulation

References:

- Beer, S., (1972) Brain of the Firm, Penguin Press, London.
- Churchman, W. () The Design of Inquiring Systems: Basic Concepts of Systems and Organizations, Basic Books, New York.
- Miller, J. (1978) Living Systems, McGraw-Hill, New York.
- Piajet, J. (1958) The Growth Logical Thinking from Childhood to Adolescence. New York: Basic Books.
- Schore, AN., (2003) Affect Regulation and the Repair of the Self. W.W. Norton & Company. NY. London
- Senge, PM., (2006) The Fifth Discipline. The Art & Practice of the Learning Organization. Currency Doubleday, NY. London
- Yolles, M. (1999) Management Systems: A Viable Systems Approach. Financial Times/Prentice Hall
- Von Bertalanffy, L. (1955) "General Systems Theory" Main Currents In Modern Thought, Vol. 71, No. 75.

945 (984)

SYSTEMIC METAMETHODOLOGY FOR METHODS DESIGN

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There is a large collection of systemic and non systemic methods, and even a metamethodology for the adequate selection of a systemic method for each problematic situation, but at the same time there is a void of systemic tools for the design of methods. We have two main objectives in this article; the first one is to document some of our initial advances in the design of a tool for the innovation of methods, a metamethodology for systemic design of methodologies that link systemic and non systemic methods, and its parts. The second objective is to open a constructive dialogue on this issue with other systemic researchers that are working on this theme, we are interested in their advances, and we also want to exchange information and critical points of view with an open mind to different approaches. The design of the metamethodology is under the transdisciplinary point of view of the systems science.

Keywords: Method, methodology, methamethodology, cybernetics, transdisciplinarity

946 (1002)

WHAT'S THE NORTH-KOREAN NUCLEAR WEAPONS' FUTURE? COMPLEX-SYSTEMS APPROACH

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Two years before, North-Korean Government sentenced they have been had Nuclear Weapons. In correctly, October 9th, 2006, North Korean Government announced they had tested the Nuclear Weapons at the northern part of their territory. Also, they insisted their testing was successful with in triumph. They sentenced their country will be stronger than any other countries. It's means that they will have the hegemony of the Korean Peninsula.

By the way, South Korea, U.S. and Japan also China didn't want to accept the North Korean Nuclear Weapons. They worry about the break up with North-Eastern countries' weapon balance. Also, for South Korean people didn't want the existence of Nuclear Weapons in Korean Peninsula. They thought the Nuclear Weapons will not be a good environmental condition to unify the divided two Korea.

Anyway, the effort to remove the North Korean Nuclear Weapons is most important subject for Asia-Pacific countries. Therefore, they set up Six Party Talks to solve the North Korean Nuclear Weapons. Also, they made the promise to solve the North Korean Nuclear Weapons. On Feb.13, 2007 North Korea and Six Party Talks members agreed to shut down and disable its nuclear programs and weapons in return for incentives provided by other members of Six Party Talks-United States, Russia, China, Japan and South Korea. But, up the present North Korean Government didn't make a satisfactory response. I wonder if how the North Korean Nuclear Weapons be destined to future. I'd like to research 'What's the North Korean Nuclear Weapons' Future?' by Complex Systems Approach.

Keywords: complex systems, satisfactory response, nuclear weapons, weapon balance.

948 (966)

GROWTH STRATEGY AND HIERARCHY THEORY: EMERGENCE OF SUPER-PLAYERS IN THE HEALTHCARE COMPUTED TOMOGRAPHY OLIGOPOLY

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This paper examines how firms discover effective strategic positions in a business technology-driven oligopoly context (limited players, no possible entrant and rapid technological change). In such settings, neither rational deduction nor local search is likely to lead a firm to a successful growth: firms escalate by launching new products faster, developing new services or acquiring new capabilities. Demonstrating the complexity of the business oligopoly, however, allows us to define the emergence of a new type of players, “super-player”, able to write a new set of rules and to substantially influence the industry for a given period of time. With respect to the Hierarchy Theory, we find the attributes of context changing, filtering information and simplifying multilevel business systems for this “super-player”. More surprisingly, we find a succession of “super-players” that we identify as a consequence of co-evolution for a given oligopoly-type industry, in the Healthcare Computed Tomography: the “super-player” evolves in a way that the entire industry ultimately adapts itself and co-evolves in the same way.

Keywords: complex systems, growth, strategy, hierarchy theory

951 (960)

NAVIGATING SOCIAL COMPLEXITY

Ken Bausch

Complexity is a term applied to systems that confound our efforts to spell out their inner relationships. Chaos theory has found laws that describe how self-organization works.

Complex social systems have special characteristics. Such social systems have been described by Ackoff as “messes” that present “wicked problems” (Rittel) because any effort to influence the system results in unanticipated consequences. Any attempt to make sense of such global problems has been termed by Ozbekhan (1970b) a “problematique.”

As with all complex systems, complex social systems resist efforts to spell out their inner workings. In fact, they confound reductionist efforts even more because social realities are constructed by people into often conflicting realities. It might be seen that chaos thinking is the only consistent way to deal with them.

We humans recoil against that idea. We insist on tinkering with our social systems to make them better. We are often successful especially in simpler social situations but even in some more complex ones. This success usually happens because people use their common sense and not because they follow some university inspired blueprint. There are some problems, however, that resist our rational tinkering. When we correct one aspect of these problems we mess up its other aspects. Getting a solid problematique of the situation eludes us.

It would seem that the sciences of Chaos/Complexity and Structured Dialogic Design both have important things to say about social complexity, but from different points of view. Chaos/Complexity relies as far as possible on observer-independent data and

describes how complex systems change. In this way they supply clues that enable us to influence systems at their tipping points.

SDDP relies upon observer-dependent data in order to prescribe the most desirable and efficient ways to change existing situations.

952 (954)

USING SYSTEMS THINKING AND SOCIAL NETWORK THEORY TO IMPROVE CHILDREN'S MATHEMATICAL PROBLEM SOLVING SKILLS

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The education of young people with mastery of appropriate mathematical skills is crucial to the future prosperity of every country. The gap between rich and poor countries will get wider if young people in underdeveloped countries continue to get a poor mathematical education. This paper presents the initial stages of a systemic effort to improve the mathematical education of young people in a developing nation. Kids, teachers, parents and researchers from quite different socio-economic backgrounds form part of a collaborative learning effort that integrates them using information technology in order to work together to improve their mathematical problem solving skills. Systems methodologies, social network theory, mathematical tests, and qualitative analysis are used to explore how to improve the students' beliefs and attitudes towards mathematical problem solving, their collaborative work, and their mathematical skills. In this project we are making a difference in the life of young people by taking advantage of their different socio-economic backgrounds, the different contexts in which they live, and their different languages.

REAL LIFE OR DEATH APPLICATION OF SYSTEM THEORY – THE 2000 YEARS DAILY DECISION MAKING EXPERIENCE OF TRADITIONAL CHINESE MEDICINE PRACTITIONERS E C

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Modern system theories has been established for 52 years but the Taichi Yin-Yang system theory has been established for more than 2500 years and has been employed by Traditional Chinese Medicine to deal with real life or death situations for 2000 years. Traditional Chinese Medicine practitioners, E C, are certainly "decision makers facing far-reaching, real-world complexities on a daily basis". They have been making life or death decisions based on system theory to deal with real-world complexities including new diseases and combinations of diseases on a daily basis.

E C have 2000 years of experiences on applying system theory. The question of when it can be applied and when cannot, what difficulties would appear in real life applications and how to solve them, has been addressed by E C on a daily basis. The successful battle against SARS once again proves that component partial view may be able to explain the problem, however, holistic system view provides feasible solutions that work! It is hoped that the 2000 years of experiences in system theory application could help modern system theorists to link up with real life decision makers, and together make a difference in modern system theory applications.

There is an old Chinese saying: if one cannot become a good prime minister, then one should become a good E C. Therefore both fields should have the same principals, same theory and same regulation rules. They can hence be applied to the fields of both biological science and social science such as economics and management.

The Taichi Yin-Yang system theory was established from experiences gained in practical situations. However, the current task is the other way around: how can we formalize the Traditional Chinese Medicine system theory in terms of modern system theories such as complex systems, system dynamics, non-linear system or adaptive system, so that the ancient theory can be applied to other fields of modern applications.

For 2000 years E C have been performing every task according to the Taichi Yin-Yang system theory, including information gathering and analysis, state determination of patients' body system and that of the environment, and strategies implementation. Everyday the combination of new and old diseases produces different behaviour of human system both physically and mentally. E C have to use Differentiation diagnosis-cure process to determine the current state of the body and implements the proper strategies for a cure. Taichi Yin-Yang system view can be employed at any levels microscopically or macroscopically. Therefore, every symptom is analysed both locally and globally according to the Cold-Hot and Deficiency-Excess spectrum. Should a contradiction arise between different parts or between a part and the system as a whole, E C will employ special strategies to determine the best possible state of the human body system. All the traditional strategies are classified according to the spectrum with system view. However E C have to decide how to classify new tools and strategies arise from partial view.

Moreover, E C have to face the real battle between western medicine partial view and TCM system view of the human body. Before a practical solution is found for the integration of the two views, which one should we trust? How to explain to others who mostly believed in partial view? Could this only be done only through metaphor, analogy,

and draw from experience? General public believe in quick fix and do not really want to understand system science. Most people claimed that they have a scientific mind and believe in science, but all they actually believe is just technological products that could provide living conveniences or the abilities to fulfil their craving and eliminate their aversion.

In this paper we will present our research on the experiences of Traditional Chinese Medicine practitioners in terms of modern system theories, and how to apply these experiences to modern situations. Also, the directions of research on how to formalize the Taichi Yin-Yang system theory base on modern system theories will be presented.

Keywords: real-world complexities; decision making experience; health systems; Traditional Chinese Medicine practitioners E C

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HOW WOULD ASIAN GOVERNMENT EMERGE THROUGH THE ELECTRONIC MONEYS OF PRIVATE INSTITUTIONS?

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Nowadays we have, for example, the flown mileages of All Nippon Airways and the prepaid electronic moneys, Suica of Japan Railway Company and Edy of Sonny. They make network between them. We can convert the mileage points of ANA to those of Edy according to mileage conversion rate. They are nothing but moneys, because they serve as a standard of value for measuring different goods and services and also a medium of reservation and exchange.

In the near future, we can use Suica in the subways of Seoul and buy chocolate with Edy in Shanghai. We can fly with mileages of ANA from Taipei to Hong Kong. Between two countries, we can exchange national currencies according to the exchange rate and then convert between national currencies and private moneys. But when we exchange more than three national currencies, a private company would easily make a weighted index of currencies for those national currencies. It should be a currency basket. It is not a real fiat currency, but a virtual private currency. How we make correlation networks among currencies depends on the calculation of the private company. On the basis of the company's credit, it would circulate. Then, we have several basket currencies.

When a multinational cooperation buys some natural resource in Thailand and make goods of it in China and sells them in Japan, it should use this type of basket currency according to its own standard. The company can pay salary with this basket money to the employees, who are coming and going between those countries.

These types of currencies would urge the self-organization of local moneys, which are non-profit exchange networks for goods and services traded without the need for printed currency.

Thus we have many types of currencies, private, local, national and transnational.

The Ministry of Economy, Trade and Industry in Japan has proposed Asian Monetary Unit as a weighted average of East Asian currencies. But idea of this is totally different from ours. In Asia, Japan is the only country that employs the flexible exchange rates system and many countries need the basket currencies, with which their exchange rates should be pegged. But, according to recent researches, many countries have not made rational choices, not got their act together. We cannot hope to make our integrated money like Euro.

We are afraid that it should be difficult to make transnational networks between nations' diplomacy. But the network of private and local currencies would go beyond national currencies, and help make multinational currencies, which would stabilize the region's financial markets.

Our concern is how the systems would emerge. When we would like to make Asian Government, it should be a Network Government based on this network of multiple levels of currencies, transnational, national, local and private.

959 (961)

HOLISTIC METHOD FOR DEVELOPING RISK MAPS IN RURAL ZONES

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Urban and rural zones risk maps are useful for showing the most dangerous places in the case that an extra-ordinary phenomenon such as a hurricane, an earthquake, a volcano eruption, or a tsunami, happens. The same risk map will be useful to show the safest places, where help centers can be installed, in the case that the community is affected by such extra-ordinary phenomenon.

There are several methods for developing the risk maps in urban zones, which include maps made with modern technologies such as satellite images, written records of relevant happenings in the region, urban services infrastructures maps, which allows us to develop a very exact and trustful risk map. But very few of this information exist for rural areas, (especially in countries of the third world, like in Mexico) so it is required to use other alternative methods for developing rural risk maps. A holistic method is proposed in this paper for developing rural zones risk maps, which, when there are not enough written records or maps, then uses local resources, such as local persons who are previously prepared for interviewing the people that knows very well the area. At the same time uses the most modern technology, such as the GPS (Global Positioning System) for locating, with a great precision, the more dangerous and safest sites in a certain region.

The advantages and limitations of this holistic method are analyzed in this paper, and some recommendations are given to get the best of possible worlds: maximum clarity and precision, at the minimum economical cost.

Keywords: Risk Maps; Rural Zones; Holistic Method; Chiapas-Mexico.

964 (1007)

PRESERVATION OF MISPERCEPTIONS – STABILITY ANALYSIS OF HYPERGAMES

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The present paper tries to model how some kinds of misperceptions of agents are preserved in a decision-making situation where multiple agents are involved. We use hypergame model, which is a theoretical framework to deal with agents who may misperceive situations. After each play of hypergame, agents may update their

perceptions based on the result, that is, the structure of the hypergame may change. However, in some case, they may not, and the hypergame is 'stable', that is, their misperceptions are preserved. To discuss stability of hypergames, we newly define a solution concept what we call stable hyper Nash equilibrium. Using these ideas, we analyze the stability. To demonstrate change in perceptions of agents, we consider agent-based intrinsic motivation. Although we provide general foundation for discussion, we analyze a game called battle of sexes as an example case.

Hypergame theory is a theoretical framework to deal with agents who may misperceive a decision making situation proposed by Bennett et al (1979). In a hypergame situation, agents are assumed to perceive the situation subjectively, and the subjectivity may cause their misperceptions.

In the present research in the framework of hypergame theory, we will conduct stability analysis of dynamically changing games. After agents play a hypergame, they may encounter outcomes that they have never expected because of their misperceptions. In those cases, intrinsic motivations to improve their own perceptions would arise from the surprises. These agent-based motivations may lead to learning of situations or communications among the agents and to changes of their perceptions, that is, agent-based motivation may bring about structural change of the hypergame. This process would never occur in classical game situations.

However, even if there exist misperceptions, some types of hypergames may remain unchanged and be stable in the sense that misperceptions of agents are preserved. Our main concern is with preservation of misperceptions, which has not been discussed rigorously so far.

Our main purpose of the present paper is to formalize such stability of structure of hypergames and to give reasonable explanations to the stability from a viewpoint of agent-based intrinsic motivations for improving perceptions.

969 (974)

ARCHITECTURE CASE STUDY IN TRANSFORMITY FACTORIZATION

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This paper studies the Giannantoni factorization of H.T. Odum's transformity into dissipative and generative components. A dissipative component of architecture was developed in the author's paper " 'Tropical' Emergy and (Dis-) Order" at the 4th Biennial Emergy Research Conference, and is related to the number of surfaces used up in architectural construction, for example making walls out of bricks. A generative component was developed in the author's paper "An Algorithm to Measure Symmetry and Positional Emergy of n Points," presented at the 2007 annual meeting of the American Mathematical Society, New Orleans, LA and included in the ISSS 2007 Bulletin; the generative component is related to the number of equal distances created between different parts of a structure. There is some evidence of ordinality; for example higher-dimensional structures can have orders of magnitude more symmetry. Emergy maximization is analyzed as a constrained calculus problem, which for maximization requires middle values of both dissipation and generation. For example a placement of bricks around a yard in a highly symmetric fashion may have high symmetry but if they are not connected, will not lead to a desirable architectural structure. Similarly

connecting the bricks into haphazard walls may have high dissipation but without some symmetry of construction into regular structures such as rooms, will be considered a waste of materials. Some other questions such as evolution of biological and animal structure are discussed.

972 (975)

SYMBIOSIS AS A METAPHOR FOR SUSTAINABILITY PRACTICE IN HUMAN AFFAIRS

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This concept paper is an exploration of various symbiotic relationships and their potential relevance for the organization and conduct of human affairs. Many types of symbiosis exist: between plants, between plant and animal life and between different animals. They contribute to protection and defense, cleaning, reproduction, nutrition, transportation and illumination. Some symbiots are so tightly coupled that they are not able to exist, or exist in the same form, separately. Others can exist separately but they are less viable alone than together. Still others benefit from but do not depend upon the relationship. All seem to provide complementary features and strengths that either enhance the success and well being of both or impose a bearable burden on the non-advantaged partner.

We are seeking, and none too soon, new ways to make a difference in the achievement of sustainable relationships in human society and organizations and between human activity and the natural environment. A broader and deeper appreciation of symbiosis in the general public and among researchers in different disciplines may make a contribution to both innovation and a more effective application of existing knowledge and tools.

Keywords: symbiosis, yoyo model

977 (1023)

A SYSTEMS APPROACH TO STREAMLINING THE CREATION OF WEB-BASED CONTENT

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In a wired world, the information one already knows is becoming less important than how adept one is at conducting effective searches for the information one desires. In the case of publicly-available, indexed information resources such as those made possible by the World Wide Web, content that cannot be found may as well not even exist in terms of its usefulness for human consumption.

The need for content to be findable on the Internet presents an important challenge for creators of content intended for consumption on the Web. Specifically, the content one creates must not only be valuable (i.e., useful and relevant within the context of a particular need) to human consumers, but it also must be properly indexed by search engine agents so that it can be made accessible to those consumers in the first place. Given the complexity of this dual requirement, content developers today lack a framework for guiding them in creating content that consistently satisfies both of these requirements.

In order to assist the creators of online content to do so in a way that is both findable and valuable to human consumers, the current paper proposes a systems approach to modeling the complex relationship between Web-based content, the immediate content needs of its intended human consumers, and the technology agents that index that content for human consumption. The intended outcome will be a Content Consumer Profile, which future content creators can leverage to help them efficiently create content effectively and efficiently.

Keywords: information search, Web-based content, systems approaches, content consumption, search engines

980 (998)

THE SYSTEMS OF SYSTEM PROCESSES

Brian J. Hilton

This paper arises out of work within Professor Len Troncale's online Systems Study Group. It draws on an hypothesis attributable to Janet McIntyre and developed as a general theory of systems evolution. It is totally consistent with Beer's VSM Model by providing a model of general evolution that incorporates VSM.

Keywords: General Evolution, VSM, Living and non-living systems, Troncale's SofSP

982 (989)

ADAPTING BANATHY'S SYSTEMS VIEW OF EDUCATION TO A SYSTEMS VIEW OF HUMAN SYSTEMS

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While Troncale's System of System Processes (SSP) lists over eighty processes found in complex systems throughout nature, most systems workers are familiar with and apply a fraction of that number. Although knowledge of all eighty processes is not necessary for a systems view, familiarity with most of the processes and their interactions should be a prerequisite for claiming expertise. In *A Systems View of Education*, Banathy described concepts and processes of human activity systems generally, and educational systems more specifically. He then asked readers to apply the concepts and processes to their particular systems. He took readers through three models of a system: the system-environment model, the function/structure model, and the process model. A comparison of *A Systems View of Education* with the SSP led to six suggestions for adapting and updating the rubric to general and specific natural and human systems: (1) Rename the "process model" to the "development model" or "change model." (2) Add and/or emphasize development, hierarchy, networks, and chaos/attractors. (3) Reframe abstract, philosophical concepts like beauty, good, plenty, and truth into systems functions and processes. (4) Add the primary drives and physiological functions of human systems. (5) Articulate consciousness, cognition, and emotion as functions and series of processes. To more fully develop this rubric, a comparison to more recent systems texts is in order. Findings from fields as diverse as neuroscience, social and evolutionary psychology, and business management can provide further insight and examples. Finally, determining what is important for developing a beginning systems view and what should be included in later courses may be best discovered by offering the course and then determining with participants what is helpful and what needs revision.

Keywords: systems processes, isomorphies, systems education, human systems, consciousness, systems development, system of systems processes

991 (999)

SYSTEMICS AND THE MUTUALLY BINDING ECONOMY NETWORKS: A KNOWLEDGE BASED APPROACH FOR SUSTAINABLE COMMUNITIES

Honorato C. Teissier Fuentes and J. Gabriel Mendoza Santillán

The monetary concentration due to global financial-economic system finally conducts to increase the monetary inequity and unsustainable communities (Gini Index, OCDE).

Mutually Binding Economy Networks pretends to close the distance between producer and consumer, generally poor communities and rich people all over the world, by supplying social mechanisms usually for products distribution; solidarity, equity commerce, responsible consumption, loyal economy, etc. In the most of cases these communities works in an empirical level of the collective intelligence. The exchange results obtained by primitive communities were competitive with Nature, even with others communities in such primitive world. In front of today global economy, the communities constructed by old empirical models are going to be dead in a few years if they do not include the knowledge in their networking ways.

This article describes how in small communities, a knowledge based network improved by systemic methodologies and models, could allows best results in a short term for the community dynamics, favoring the emergence of a long term perspective in a sustainable development. In addition, some results in real cases in these communities and networks, in the northeast of Mexico are shown.

Keywords; Systemics; Mutually Binding Economy Networks; New Economies Communities; Knowledge Based Sustainable Communities.

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THE SYSTEM AND CONTROL THEORY IN THE VIPASSANA MEDITATION OF THE NOBLE EIGHTFOLD PATH AS TAUGHT BY BUDDHA: UNDERSTANDING MEDITATION WITH THE TAICHI YIN-YANG SYSTEM IN MODERN TERMINOLOGIES

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The theory in the Vipassana Noble Eightfold meditation technique of Buddha is believed to be the Theory of Everything. However, Chinese believed that the Taichi Yin-Yang theory is the Theory of the Universe. Albert Einstein and Richard Feynman believed in the unity of all the equations and theories of physics to explain the nature. Could they be the different truth of the universe? Or they are all the truth of the universe but only illustrated in different terminologies? It is believed that the latter one is the case. The links between these theories are illustrated in this paper using modern system and control theories.

The evolution of science gave birth to our modern materialistic world. Does this materialism contradict with our spirituality? It is believed that both of them follow the Theory of Everything. All the contradictions arise only because of human beings, who tried to control and manipulate the universe to suit their frame of reference involving cravings, aversions and ignorance. The practice of Vipassana meditation allows us to realize the union of materialism and spirituality, because Vipassana helps us to acquire

the ultimate wisdom, to be the master of our own mind, and to be able to make decisions base not on emotions but on compassion.

Buddha explained the theory of our universe but said that the ultimate truth cannot be explained in the words and concepts that we use to communicate. Our common senses are based on pattern differentiation. Our communications are based on languages. And the fundamental of all languages are mathematical logic, set theory, and Taichi Yin-Yang system theory, which all are again based on differentiation. Buddha said that the ultimate truth is without differentiation, which is beyond our common senses and our communication abilities. However, Buddha taught a method for everyone of us to experience the ultimate truth ourselves. The beauty of this method is that it is simple, practical and realistic, involving no sectarianism, no imagination and no super-natural power. The method is similar to a virus cleaning program that will eliminates all the impurities within our mind, allowing us to experience the ultimate truth. Even though the ultimate truth cannot be explained in words, the Vipassana method itself is within our basic concepts and hence can be explained in terms of system and control theories.

The Taichi, boundary, of this system is the "purification of my mind". According to the Taichi Yin-Yang theory, the Yin-Yang combo will be formed in different parts of the system namely the internal part, and the superficial part which acts as the interface between the internal and the external of the system. Research reveals that the internal Yin component of Vipassana method is equanimity, the balance of the mind, and the Yang component is our awareness. The superficial Yin component is wisdom and the Yang component is compassion. Our goal of regulation is to keep both parts of this system working within the balanced range of the Cold-Hot and Deficiency-Excess spectrum.

The preparation stage of Vipassana meditation is Anapana meditation, the concentration of the mind through the observation of the breath. Research shows that the technique requires the observer to fix the frame of reference on the entrance of the nose. Then observe the flow of air during breathing in and breathing out. However, only the polarity of the first derivative of the flow of air at this moment is observed. That is, whether the breath is coming in or going out at this moment. The value of the derivative, the second and higher derivatives, the memory of the past moments, or the prediction of the coming moments should all be ignored.

This paper will demonstrate our research of the Vipassana meditation technique as taught by S.N. Goenka globally nowadays, in terms of the Taichi Yin-Yang system theory which is now structured in terms of modern system and control theories with our research.

Keywords: Control Theory, Differentiation & Integration, System Theory, Spirituality and systems, The Taichi Yin-Yang system, Vipassana Noble Eightfold Path of Buddha, Dhamma, The Theory of Everything, Vipassana Meditation As Taught By S.N. Goenka

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CO-CREATING LIVING SYSTEMS THAT THRIVE ON DIVERSITY

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This paper explores a human systems view of transformative learning to support an understanding of who we are in relationship with others, our organizations, our

communities, and our world. Our hope is that as we come to know ourselves as relational beings that are shaped by the other, we can embrace diversity in a way that fosters curiosity and overcomes our fear of difference. As we reduce the fear of difference, we can dismantle the structures that reinforce oppression and create new structures that are inclusive and collaborative.

Our work draws upon the living systems work of Maturana & Varela, on Frieres work on systems of oppression and inclusion, and on the work Mezirow, Daloz, and Kegan in the field of adult transformative learning. Our perspective is grounded in hermeneutics as an ontological and relational way of being in the world, and has been informed by the work of Heidegger, Gadamer and Habermas.

The paper first explores a shift in consciousness from individual to relational self, and then discusses how we can co-create a new world where diversity and difference become sources of creativity that strengthen our commitment to inclusive systems. An appreciation for diversity begins with a desire to encounter and engage with the other, whether that be people like us, different from us, or concepts and ideas with which we disagree. As we recognize and learn to value people from different walks of life, our ability to embrace diversity becomes integral to our lives and ways of being in the world. Diversity enriches and transforms our lives, yet often we become afraid when we encounter others with radically different ideas or perspectives. The resulting fear creates and sustains the conditions for oppression in families, schools, organizations, and society.

Inner oppression arises from fear, and our fears of difference create systems of oppression. Oppressive societal and organizational systems attempt to control rather than to free human expression. Freire (1970) recognized that oppression was the result of systems of control, especially those within our educational system. Rather than teaching children how to learn, to think critically, or to make good judgments, educational systems often force meaningless information into children and do not foster learning environments where diversity thrives.

To create systems that thrive on diversity, qualities of openness, truthfulness, and vulnerability enable us to speak truthfully to one another. Our commitment to bring these qualities into encounters with the other helps us understand one another and create mutual relationships of care and inclusion, leading to joy in our lives. As we seek to encounter the other, to engage with others who are different from ourselves, we become aware of the impact of privilege both personally and as a force that permeates our society and affects our ability to participate in relationships of care.

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OPERATING PRINCIPLE OF THE UNI-VERSITY

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Ludwig von Bertalanffy, in the very last sentence of the last chapter of his book *General System Theory* wrote: "Note 7. Notice the theological motive in Leibniz's invention of the binary system. It represented Creation since any number can be produced by a combination of "something" (1) and "nothing" (0). But has this antithesis metaphysical reality, or is it but an expression of linguistic habits of the mode of action of our nervous system?" (von Bertalanffy 1969)

It is posited in this paper that such a principle does in fact have a metaphysical reality. It exists not only in the conceptual schemes of humankind as a fundamental principle of

that conceptual process, “an expression of linguistic habits...” but also in nature as the primary principle of structural co-operation a.k.a. synergy or the integrative system.

In this paper I will discuss the complementary (a.k.a. system) as an artifact of our conceptualization process as well as provide examples of the metaphysical reality by which nature works together at all levels of existence. This principle is not to be confused with a “Theory of Everything” which is, in principle, impossible because, in short, any thing cannot be everything. However, there can be and is a principle of how everything works as exemplified in the concept of a minimal system. (Schwarz 1995) In short, there is no "General System Theory" but there is a "General System Principle". That principle stated implicitly is “working together.”

Keywords: Theory of Everything, Principle of Everything. Operating Principle, Universal Principle, Principle of conceptualization, General System Theory.

1004 (1005)

EVOLVING TO SUSTAINABILITY

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Humanity needs a conscious transformation, called a paradigm shift, to a system based on sustainable principles. Previous shifts of the magnitude of the Agricultural and Industrial Revolutions allow us some insight into the process. The U.S. dollar has become weak due to debt. In the U.S. and Europe, financial crises in the private sector are raising havoc in the public sector. Growing environmental problems are forcing institutions to be more responsive to limits. China seems to be racing as fast as it can to make the same mistakes as the U.S. and Western Europe. This time there does not appear to be a bottom to the economic downturn; the stages are: slowdown, recession, meltdown, depression, collapse, free fall, transition, transformation. Human nature necessitates freedom within enabling constraints. Women should be respected as equal to men. Ideas for sustainable agricultural practices and viable urban communities lead to an ecotopian economic model of plenitude, prosperity, and social stability within a healthy, nurturing environment planetwide.

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HUMAN RIGHTS REVISITED: RECIPROCITY, STAKEHOLDERS, LIFECYCLES AND SYSTEMIC ISSUES?

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Compared to environmental sustainability and economic development the third element of human improvement, Human Rights seem to be making little progress. This may suggest that the ideas, thinking, language involved needs to be reconsidered. We need to ask whether the current approach is frustrating progress and whether the adoption of a new vocabulary might move things forward? The suggestion here is that the concept of rights could be broadened to one of ‘reciprocity’ between those involved. Furthermore, it is important that the performance of other stakeholders from families, local communities, authority figures from churches and faith groups, national government officials and international agency personnel including those from NGO’s should be considered as well as the persons immediately involved.

Another element of the approach suggested is to consider rights over the life cycle of those directly affected as well as the life cycle of different areas of human interaction and in different cultures over time. Are there lessons to be learnt from earlier experience of Western Europe, for example, in the areas of slavery, gender differences and the treatment of minors that could inform the appropriate approach to adopt in other parts of the world in the 21st century? Are there also lessons for how these latter countries themselves now approach other areas such as disability, refugees, older people, those with mental health issues or who prefer alternative lifestyles? Finally, are there implicit systemic issues as to how all questions of discrimination and exclusion are addressed?

Previously I discussed the 'death of metaphysics'. One element of that argument suggests that values, ethics and moral are not universal rather, while they are neither generally relative, they are contextual and need to be seen to be requisite to the space, time and human situation under consideration. That would then imply that systems design methodologies encompass within them the opportunity for one or more of the stakeholders to deliberately specify and nurture values consistent with the perceived purpose of an organisation whether it be a company, an NGO or a government department. Although this is generally recognised as being the case in practice, little seems to have been said about the basis for this presumption, still less the implications for systems practice, or at least not outside the narrow 'critical systems thinking' field.

If these ideas are extended to the field of human rights a number of issues can be confronted that may allow that different levels of tolerance may be appropriate in different contexts i.e. at different points in space and time, within different cultures and, in particular, within minorities and indigenous cultures as well as more generally at different periods in the life cycles of relationships such as between children and parents, teachers and students, patients and carers and so on. Much of what I have said obviously pertains in everyday life in all our societies, but what are the explicit implications for a general methodology that aims to systemically analyse 'progress' in the field of human rights or understand the role of minorities and indigenous groups, for example, in global sustainability? In particular, how do move any human situation forward from a position that is no longer deemed requisite (i.e. is apparently failing to sustain itself with its present set of values, ethics and morals) to a 'better' one?

One possibility might be to use a method such as the one labelled as 'Organisation Character Assessment' by Finlayson at the ISSS 1999 Asilomar conference. Characteristics are agreed by the participants of an organisation, say 6. Each is then related to another organisation that is judged by those concerned to perform better on that characteristic. It may be a company that is more effective, a church that is more friendly, a super market that has better access and so on. The aim then is to move your organisation forward on each separate dimension by in some sense emulating the better practice that the relevant other organisation apparently demonstrates. The power of such an approach derives from it not implying any general sense that one organisation, or one way of doing things is better than any other in any overall sense, but rather only that we can all learn from good practice elsewhere. Again this obviously happens in everyday life in all our societies, but implicitly! Do systems analysts need to make the process explicit?

The above discussion raises the issue of how a reconsidered approach might be presented as well as what are the implications for campaigning groups such as Amnesty and Human Rights Watch, for example? As far as the presentation is concerned the use of 'rich pictures' as recommended by advocates of Soft Systems Methodology or SSM first proposed by Checkland some 30 years ago but now applied widely by operations researchers and others. My own ideas might include the use of 'historical atlases' as well

as ‘networks-maps’ as suggested in Enabling Effective Engagement, for example. When it comes to campaigning the use of these presentational tools might facilitate activists to focus on other stakeholders beyond those directly involved such as local leaders and politicians, International Organisations, NGO’s, multinational companies and the ‘civic society’ in general at local, regional, national and international levels. Recent advances in Information Technology now mean that this would be relatively easy to achieve in almost all situations.

1009

THE NEW SCIENCE OF SUSTAINABILITY: IMPLICATIONS FOR ECONOMIC THEORY AND PRACTICE

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Recent work by Ulanowicz, Goerner and Lietaer (2008) offers a new way to quantify flow-system sustainability as a particular balance of resilience and total throughput efficiency. Since this measure applies equally to ecosystems and economic networks, the conceptual framework behind it provides a foundation for a radical rethinking of current economic theory and practice and a cohesive basis for a new “eco-logical” theory of economics. The concept of resilience, for example, explains the importance of maintaining a healthy grassroots economy, while the concept of centripetality explains the observed destructive effects of excess size and efficiency upon which much of current neo-liberal theory is based. At the same time, the need for balance offers a precise third-way path between traditional right- and left-wing approaches. Both sides of the equation — small and large; diverse and efficient; intricately connected and streamlined — are necessary in proper measure; it is only extremes that are unsustainable. This talk explains the new measure and explores the implications for current theory and practice.

1011 (940)

KOREAN POLITICS AND COMPLEX SYSTEMS THEORY

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The political system of Korea is closely linked with the lower-level systems of Korean politics since it has the dynamic system that changes consistently through the interactions of external factors and a slight change in the early conditions of one system can bring about a tremendous change in the entire system. Therefore, it is important to understand Korean politics in this sense. The modern system of Korean politics rather operates on an axis of chaos and disorder than order. A political phenomenon is one that is totally linked with each other rather than having a temporary or isolated nature and its chaotic and dramatic nature is further enhanced in the environment of Korean politics as it gets to the recent times. This phenomenon may be regarded as an expression of systematic characteristics that are derived in the macroscopic procedure that Korean society is seeking stabilization as a complex system.

Therefore in order for us to understand Korean politics, we need to recognize the complex properties linked to the problem of Korean society itself and dynamics of

surrounding situation. Korean politics is getting more complex as it gets to recent days. The meaning of complexity can be interpreted in two ways. One is that the ground of Korean politics is getting complex and the other would be that the behavior patterns of political figures that play on the ground have been further complicated as compared to the past.

Keywords: Korean politics, complex systems theory, catastrophe theory, non-linearity, complexity

1014

MEANINGFUL MEASUREMENT IN THE CONTEMPORARY ENTERPRISE

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When establishing measures intended to inform desirable action in complex adaptive organizations, leaders must choose carefully what they measure. Measurements tell the organization what is important and where to focus. Unintended consequences often result when measures are not aligned with the desired strategic trajectory of an enterprise.

In the recent past, attempts to express vision and values, and institute 'balanced scorecards' types of measures or 'executive dashboards' are initial attempts to think systemically in the contemporary enterprise. There is, at some level, a recognized need to express outcomes in a way that are not limited to the quantitative measures of a mechanistic organizational system.

Measurements draw boundaries and distinctions that are meaningful. Examining Ken Wilbur's work on boundaries, Erving Goffman's work on Frame Analysis, Dean Spitzer's work on measurement, and theories on the need for quantitative and qualitative measures may offer insight to how complex adaptive organizations can establish meaningful measures.

Keywords: measure, measurement, frame analysis, boundaries, qualitative, quantitative

1016 (1024)

ARE ORGANISATIONAL SIZE AND EFFICIENCY ENGAGED?

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Firm size is relevant in discussions on competition policy, integration, market structure and size. And undeveloped countries differ from developed countries in being relatively more dependent on technology imports and foreign competition, hence results from large countries may not hold.

In the other hand, small firms, say the others, advantages are more related to entrepreneurial dynamism, internal flexibility, responsiveness to changing circumstances and specialized expertise, which contribute to higher innovation efficiency in skill-intensive sectors enjoying rapid technological development. And Audretsch (1995,

p.178) saw small enterprises be the engine of innovative activity in certain industries, despite an obvious lack of formal R&D activities.

Geoffrey West (2007) showed evidence from the US, those small firms to be less likely to patent than large firms. In contrast, in related areas, such as biotechnology, pharmaceuticals, etc., so called serial innovators, with an accumulated portfolio of technologically important and scientifically linked patents, were more likely to be small than large firms (CHI Research, 2003).

Organization and efficiency, together, remind us, frequently, a factory surrounded by a high brick wall and manned by a force of people working in eight hours shifts. And, of course, in this wisdom we are afraid that in an effort to increase the efficiency, the freedom of working out the innovation in its own way, and at its own convenience will be curtailed.

Red tape is not confined exclusively to the business of the government, but may be found entangling the work and impeding progress in any large organization. It is safe to say that the greatest difficulties which the average innovator has to overcome are not involved in his task itself, but are those thrown in his way by man-made organizations. Usually these obstacles are constructed in the name of efficiency and by those who are employed to assist, not to obstruct.

The danger in any organization of innovation & change lies in the tendency to submerge the individuality of the worker. In such organization it is not dealing with machines, or with pieces workers. In innovation & change the unit of the organization is a developed human mind. The product which this organization turns out is the result of the thought of the workers, and just so far as the organization inhibits or distracts these minds from their true course is inefficient. On the other hand, the organization promotes efficiency so far as it tends to permit and to stimulate originality and freedom of thought in any worker, and at the same time to coordinate and concentrate the activities of the several workers on the problem on hand.

Many processes which work well in small scale develop defects when tried on a large scale, and vice versa. Many methods of real value have never gotten beyond his scale, because there was no one with sufficient interest, or technical knowledge to adapt the process to the new scale. Thus there is a great economic loss which can be overcome by proper organization.

We believe there is not sufficient support to the thesis about the advantage of larger than small firms. And we remembered the words of Illya Prigogine (1997): "The little groups can give changes to society as a hole. Minorities had show remarkable power in the past. Thinking the change only succeed by majorities is wrong. It's wrong to think that conscious is determined by economic and social structures, and they are here now and ever. What will be tomorrow could be totally different from today".

Keywords: size, efficiency, innovation, small firms, large firms

1018 (1054)

BACKSTAGE OF THE GLOBAL CLIMATE CHANGE: A SYSTEM THAT EVERYBODY SEEMS TO THINK THAT IT RELATES TO SOMEONE ELSE

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The city of Ushuaia, located at the southern end of the world, is already one of the many regions affected by the severe consequences caused by the Global Climate Change (GCC).

The physical evidence of GCC it is manifested by the gradual disappearance of the glaciers that surround Ushuaia city, and so long by others factors such as the increase of the average temperature in the area and the substantial decrease in winter rainfall, among others; this factors appears not to alert society about the significant consequences that derived from the situation in the short and long term.

Our research group is trying to analyze the socio-economic consequences generated by the disappearance of glaciers around the city of Ushuaia, because they are our main source of drinking water, by using the systems approach.

Thus, we conceptualize the problem by identifying its elements, the description of the relationships between themselves and the distinction of the subsystems most relevant, we were able to establish the conceptual boundaries that distinguish our system from its environment, and the multiple relationships that operate between them.

In the other hand, through these studies we have found a series of emergent properties, which is the a result of the analytical perspective we took; those emergent properties are as important as those ones that were revealed at the beginning of the investigation, including the contamination problem of the glacier water tributaries and the reducing flow of its.

We will present the results so far found in three stages: 1) a background related to the effects of GCC on the glaciers of Patagonia, Argentina, and especially those that surround the city of Ushuaia, highlighting the projections about its density and volume; 2) another stage, we will show the system performance under analysis and its relationships with the environment, subsystems and we will describe the horizon of potabilization idea, that will allow us to lay the foundations for further mathematics development; thus, aiming to predict a deadline when the water resource will over as the current state of variables and relationships. At the end of these exhibitions, we'll arrive at the conclusions of this phase of the investigation.

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Keywords: GCC, Global Climate Change, Glaciers disappearance in Ushuaia, Water, Socio-economics consequences, Horizon of potabilization.

1026 (1027)

INFORMING THE CONSUMER IS STRENGTHENING THE ECONOMY

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Adam Smith's assumption that consumers are rational and knowledgeable in their buying decisions is examined in this paper, along with the views of other prominent economists. It is concluded that this assumption is incorrect, though consumers are clearly somewhat rational and knowledgeable. The detrimental effects of the lack of consumer product knowledge are thus recognized in a few scenarios as examples.

Although, this would be a very valid conclusion for this paper, the paper follows this topic of Smith's faulty assumption for the purpose of making improvements of our economic system. The conclusion that organizing to enlighten consumers can correct for Smith's faulty assumption is proposed as a solution to many of the inequalities of our present free market system. Some details on the effective way to organize for consumers are mentioned.

Keywords: Consumerism, economics, information economy, corruption.

1029 (1030)

A BASIC PRINCIPLE FOR THE ARCHITECTURE OF COMPUTER-BASED INFORMATION PROCESSING

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In this paper we discuss the effect of computer-based information processing on the adaptability of the systems. Because of the close relationship that exists between subsystem independence and adaptability, the effect that the structure of computer-based information processing has on the degree of independence between the subsystems of the system that makes use of computer-based information processing (referred to here also as the host system) is central to our discussion. We are focusing here on complex systems that are controlled and operated by humans with the help of computer-based information systems and that face an uncertain environment. This type of systems includes organizations, complex projects, and complex processes and devices controlled by humans with the help of computers. The view of information processing as an aspect of the dynamics of systems (Kampfner, 1998) is also central to our discussion. An important advantage of this view is that it allows us to study the relationship of information processing with other aspects of the dynamics in which it occurs. This in turn gives us the potential to understand the role that information processing plays in practically any particular kind of natural and artificial systems.

Three closely related, but distinct types of interdependence between the subsystems of a system can be distinguished. The first one is the interdependence between the computer-based information system, itself a subsystem of the system it supports (referred to here as the main system) and the other subsystems of the main system. The second type of interdependence is the one that exists among the other subsystems of the main system. The third type of interdependence is between the components of the computer-based information system. These three types of interdependence between the subsystems of a system are clearly closely interrelated. Each of these types of interdependence has characteristics that distinguish it from the other types. The first type of interdependence is characterized by the combination and the interaction of human and computer-based information processing.

1035

PROCESS/STRUCTURE AS ONTOLOGY FOR CRITICAL SYSTEMS THINKING & PRACTICE

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It can be argued that there are two thin spots in the philosophical-theoretical topology of Critical Systems Thinking and Practice (a multi-paradigmatic approach to Systems study, design and intervention) [MC Jackson, et al.; 1984–2008]. The first concerns the assignment of the appropriate paradigm for purpose; the second when we hop from the subjective to the objective and back; e.g., for intervention and what we might call 'reality checks.' Regardless of those who say that here, Systems (writ large) does not have an ontological/epistemological leg to stand on, we carry on pragmatically and leave it to the philosophers to reconcile the 'what' with 'why.' I examine this deficit in Systems Theory then outline, explain and propose an ontological base for CST&P taken from the current Social Philosophies of Structure and Process and a General System theory—A System of Systems Processes [Troncale, 1978–2008]. In this ontology, the universe is a 'structure/process' or 'process/ structure', which contains other process/structures recursively (and may be contained). They are abstract, epistemologically and methodologically adaptable. In this world, the objective epistemologies are taken as being objective; i.e., that 'things' have an existence independent of human perception. Subjective epistemologies are considered subjectively; i.e., that which one says 'is' is dependent on the process/ structure of their own thinking/brain. This ontology thus represents reconciliation and coexistence of what heretofore have been considered dualities: objectivity– subjectivity, positivist–interpretivist, and fact–concept. It moves the emphasis of concern from the existential (our 'things') to the ever-changing present; a world of actions–embodied and embedded. We are reminded that Systems tries to influence the future but can only do so by intervening in the present.

1037 (1047)

HOW TO LOOK ACROSS THE ROOM

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The combined "inness" and "outness" of our sense experience, such as seeing and looking and hearing and listening, has been systematically investigated from the physical input, psychic output and combined perspectives. For completeness, both the Seer and Attention in the proposed analogies for perception. Phenomena rationalized by the combined analogies included interruption of the physical chain of events, coherence of and location of images, separate seeing of the eyes, and stability of the viewed world. Also the dual physical and psychic nature of our senses was verified by examples of distant looking and listening. We structured our knowledge of the senses by an Absolute Theory of Attention from the Vedic tradition. Connections of sense experience with the Divine were made with spiritual traditions worldwide. Including the subjective aspects of Attention and Seer in the combined analogy does not interfere with normal ways of gaining knowledge.

1039 (1046)

FUNDAMENTALS OF RELATIONAL COMPLEXITY THEORY

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“Relational Complexity” is emerging as a new science that can explain the origin of both the living and non-living world. Its basic tenants are quite simple, but controversial due to prior limits on scientific thinking, particularly the mechanistic world view. In this new view, both living systems and mechanisms emerge as special cases of the general, relational complexity. The basic relationship is between existent and potential aspects of nature, which is an information relation crossing the subject-object boundary. The theory is compatible with both Western and Eastern thought and offers a means to integrate these quintessentially opposite world views. It can also provide a solid theoretical foundation for structure-function epistemology in ecology that is not predicated on, or thus limited by, mechanistic assumptions.

1040

**SCENARIOS ADDRESSING UNITED PARCEL SERVICE’S ENERGY ACQUISITION:
A METHODOLOGY FOR PERFORMING A COMPARATIVE ANALYSIS OF
ALTERNATIVE FUELS**

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Companies dependent on fossil fuels, such as United Parcel Service (UPS), are searching for methods for deciding how to adapt to the problem of a changing context of resource acquisition and the absence of a single, technological solution. Changes in resource acquisition, whether in biological or social systems, can be understood using concepts of complexity. Defining UPS as a complex system is beneficial for constructing an understanding of UPS and to ask questions about how they can plan for uncertainty in resource acquisition. How can UPS design flexibility in their system, thus allowing adaptation to a changing context and achieve sustainability? I used the decision making process to displace petroleum diesel fuel use in UPS package cars (the brown trucks) as an example of how UPS can change their relationship to the environment, increasing the flexibility of their response to change.

Specifically, my research is concerned with the intersection of two gradients. A physical gradient of high energy density oil resource that was inexpensive and plentiful. The second is a social gradient of people demanding the movement of things. The concept of gradients allows me to look at the emergence of structures, firms in the transportation sector such as (UPS), and follow their history with an eye on developing scenarios for a sustainable future. Identifying the social and physical gradients is important for understanding energy flow through a system and forming the analogy of UPS to a biological system. New resources, with steep, driving gradients, may emerge. UPS needs to be in an informed position to take advantage of the new gradients while minimizing unintended consequences.

The biological analogy allowed several tools to be used for performing the comparative analysis of alternative fuels. Use of systems theory to understand the phenomenon and system helped develop the analogy of UPS to a biological system. This then made tools available for addressing uncertainty which enabled a broader view of strategic decisions and how UPS can construct contingent strategies for emergent future scenarios. The future of energy use is uncertain, and the combination of different tools provided a

comprehensive methodology for the decision making process. The specific tools used are Peter Checklands Soft Systems Methodology, Mario Giampetro's Multi-Scale Integrated Analysis and a Stakeholder Matrix. Together, the approach of layering different types of information through a series of matrixes supports the conclusion for UPS to build flexibility into the system by using a package car technology that can accept a variety of fuel types.

1042 (1048)

MEASURING THE INEQUITY OF A HEALTH SYSTEM: A SYSTEMS' PERSPECTIVE: SYSTEMATIC ANALYTICAL MAPPING APPROACH

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The World Health Organization in its 2000's World Health report identified and defined stewardship as the most critical key function that must be undertaken towards a sustainable and well-performing health system. As the ultimate responsibility for the overall performance of health system lies with government, it is therefore its responsibility to take on the role of stewardship for the health system. The government should then involve all stakeholders in the implementation of this role; the ministries in charge of health should therefore take on the role of stewardship for the health care system. The stewardship role comprises the responsibility of:

- defining the vision and direction of health policy,
- developing legislation, regulations, standards, policies and directives to support the vision and the defined directions for health policy; and
- monitoring and reporting on the performance of the health system and the health of the population.

The implementation of the stewardship role will require that the equity principle that is dealt with at the operational level of decision making, be brought at the strategic level of decision making and be taken into account while defining the vision and the direction of health policy. This paper aims at providing an instrument that could be used to factor in and monitor the equity of a health system for a population group at the strategic level, through the measurement of the inequity of health system for this population group. A Strategic Equity Index, an input measure, is defined using the rate of equity of the health system, for a given population group. Applying Systems Thinking methodology, key components of a health system are identified. The Systematic Analytical Mapping approach is proposed as a methodology to be used for the identification of the challenges facing by a population group for access and accessibility to health services. The identified challenges constitute the inequity of the health system for the given population group. A formula for the calculation of the Strategic Equity Index is proposed.

Keywords: health system and health care system, inequity and equity, Systems Thinking, Systematic Analytical Mapping, Strategic Equity Index, strategic decision and operational decision, input measure.

1044

“NEW MODELS FOR SUSTAINABLE FASHION INDUSTRY SYSTEM: A CASE STUDY ABOUT FASHION NET FACTORIES”

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The paper aims to describe a design methodology in design strategy and design services sectors, it highlights the importance of designing new models of production and distribution in the fashion driven sector. In complex industrial systems you have passed from a “product oriented” concept to a “customer oriented” one. This strategy focuses on customization of the production and distribution mechanisms that increase globally competitiveness. In the “network society” defined as a social network that spreads through the network logic and which is powered by information technology, it emerges a new form of communication based on horizontal networks of communication. In this scenario thanks to the strong interaction between businesses, consumers and distribution networks, it achieves a “network businesses”, where to develop a methodology capable of formulating design tools and the action guidelines is pivotal. Fashion Net Factories (FNF) is made of a set of equivalent shares, like businesses, distribution and consumers, all linked by the purpose of defining a format for the use of the entire fashion system. The FNF is like a virtual agora where the transparency of the processes, from production to distribution and sale, promotes a process of customization of the system of services oriented to the fashion system. The Communication and Information Technologies (ICT) that provides a productive sector, support a relationship of knowledge in which the manufacturer increases and creates knowledge about the customer and vice versa. The FNF is a system that develops and expands a set of services aimed to knowledge activities, loyalty and consumption in multidirectional terms, strengthen the different players and give them space in the fashion system to supports the emergence of virtual communities.

1049

TITLE OF PAPER: DESIGN FOR AN ASSESSMENT OF GAINING ACCESS TO THE INTERNATIONAL INTEROPERABILITY SYSTEMS IN THE BID FOR SECESSION

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In sovereign based conflicts where secession is threatened, war plays a significant role in levelling the playing field in the bid for, and in, Peace Talk negotiations. Whilst each opposing protagonist would prefer to enter Peace Talk negotiations with the upper hand, the greater likelihood is stalemate conditions or subdued victory provides the atmosphere for meaningful Peace Talks. However, the prelude to such conditions is that usually there is an intensification of atrocities. Indeed the greater the perception of the threat of secession, the greater the intensity of war.

The question is – is there another way to level the playing field in the bid for Peace Talk negotiations without the carnage and price of war and terrorism?

Recognising the Secessionist's State's need for operational viability, particularly in the form of needing to participate in what is termed the ‘international interoperability

systems' (IIS), this paper proposes there is an alternative to the intensification of war/terrorism. This is particularly so when the purpose is to level the playing field in the bid for Peace Talks.

This paper considers the attractiveness of that alternative. It examines the Secessionist State's need for international interoperability. For example the need for an international telephone dialling code, international postal designation, recognition of its passport and banking system. In turn, it considers the way this need engages the Parent State to prevent the achievement of such operational viability.

This brings to light the operational relevance of recognition of new States by the international community and the path of positioning and negotiations that the opposing protagonists can engage in.

This paper proposes a design for assessing that international positioning by each opposing secessionist. It also proposes that such assessment can be used, like the results of the status of war, in the bid for levelling the playing field for internal self-determination Peace Talks where territorial integrity is preserved and equality on substantive matters is achieved.

1050

A STATUS REPORT ON THE DEVELOPMENT OF LIVING SYSTEMS SCIENCE

James R. Simms

Work has been ongoing since the early 1700s to develop what is now known as a living systems science. The development was initiated when 18th century philosophers attempted to erect a science of society that rested on laws of nature similar to those of Newton's Principles of universal gravitation. Although work has been on going for a long period of time, to date there is not an established living systems science. However, there have been significant developments toward such a science. The fundamental phenomena of the science have been identified along with their measures, and some fundamental principles have been identified. This paper describes these developments, the current development efforts, and their status.

1055

LEADERS OF CHANGE: SOCIAL ENTREPRENEURSHIP AND THE CREATION OF ECOLOGIES OF SOLUTIONS

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Syntony Quest

The line of inquiry on evolutionary learning communities (ELCs) to promote evolutionary development (ED) seeks to identify the conditions by which people can self-organize to learn, design and implement actions that will improve their quality of life and their socio-ecological milieu. In the Fall of 2007, the Forum of Universal Cultures took place in the city of Monterrey, Mexico. This UNESCO sponsored world event provided a perfect opportunity to implement an evolutionary learning community with local citizens to bridge the knowledge of the Forum with the sustainable development needs of the local community. One hundred citizens responded to the call to join the "Leaders of Change" initiative. The ELC was conceived as a group of emerging social entrepreneurs who came together to learn, identify possibilities, and support each other in the development of projects to translate their vision into action. This article reports on the design, process

and outcomes of the 8 month project as well as the next steps and implications for future research.

Keywords: evolutionary learning community, social entrepreneurship, systems design, knowledge based development.

1056

TACIT DIMENSION OF SOFT SYSTEMS APPROACHES IN ADMINISTRATIVE BEHAVIOR

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The purpose of my presentation is to show one of the important aspects of systems methodologies; that is, we can utilize a systems methodology as a tool to internalize skillful persons' management styles, the persons who embody, for example, ability of double loop learning. In order to discuss this viewpoint, we employ Checkland's soft systems methodology as an example.

For the purpose, I extend at first our understanding about the soft systems methodology from 'I.Nonaka's organizational knowledge-creating process' point of view. In Nonaka's theory he defined his own two types of knowledge: explicit and tacit knowledge. I discuss some differences among these new knowledge types, epistemological knowledge and Polanyi's tacit knowing. Second, I consider complementary applications of systems methodologies in administrative behaviors, especially in decision-making processes. Finally, I conclude my above assertion by applying the concept of tacit knowing. At the same time, I insist that this internalization will ensure high quality of organizational decision and organizationally created knowledge.

1057 (1065)

COMPLEXITY, GLOBAL CLIMATE CHANGE AND SOIL CARBON CYCLING: FACTORS CONTROLLING THE TEMPERATURE RESPONSE OF MICROBIAL DECOMPOSITION

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A proliferation of data being gathered to predict a critically important, urgent and social-policy related question leads only to confusion, debate and paralysis. This classic feature of complex systems is currently being evidenced in answering the question of a positive feedback response of soil respiration with increased temperatures due to global climate change. Temperature shifts might lead to increased soil carbon release, adding more carbon dioxide to the atmosphere, thus both depleting carbon stores and increasing global temperatures in a positive feedback loop. Understanding environmental dependencies of microbial decomposition processes is essential to the modeling of future climate change. Factor interactions, feedbacks, and biological constraints are not well represented in current models, as I demonstrate using a laboratory experiment isolating biotic controls. As with many current environmental challenges, a central problem is the web of interacting factors acting at varying scales. Soil microbial communities are decidedly complex, and the factors controlling their temperature response have defied consensus on even the most basic relationships.

My first conclusion from a review of the literature is that varied perspectives on the system's dynamics and its web of controlling factors have led to seemingly conflicting

results. Research from diverse disciplines, and effective communication between them, is critical. The microbial community functions as a holon, and has been compressed as a “black box” in most temperature response research. New technologies, however, are effectively providing insight into micro-scale dynamics. Experimental design, model development, and their integration can benefit from a holistic, systems approach to the diverse perspectives and associated factors of interest.

A second observation from the literature is that factor models and their associated terminology are not equivalent and cannot be simply integrated. At different levels of analysis, different constraints apply. My second conclusion is that multiple and diverse models with focal views restricted to key spatiotemporal scales will be needed to achieve an overarching understanding. Such models must compress information and select driving factors of interest, but they must also account for the integrated effects of factors that are not explicitly included. Given these conclusions, I apply the tools of soft systems methodology (SSM) towards achieving a conceptualization of the complex web of interacting factors across scales. I finally present a product of this systems theory application, a relational database that formalizes a hierarchy between factors in a simplified model. I categorize these factors as criteria, indicators and metrics and situate them in the biotic, abiotic or experimental domains. Interactions and feedbacks are explicitly incorporated. I finally conclude that although this model is limited to pairwise interactions, it provides a useful tool to assess potential interactions and factors of interest.

1066

**THE SSP USES THE NATURAL SCIENCES AS A RICH SOURCE
OF USEFUL DETAIL ON SYSTEMS PROCESSES (ISOMORPHIES)**

Len Troncale

In the early stages of formulation of the SSP (the System of System's Processes), even the founders of GST were surprised at the number and diversity of systems processes it recognized and modeled. Many of the first and second generation of systems theorists worked with only a comparatively small number of isomorphies between systems. Many workers in system's applications do not even study system's processes on non-human levels where they are arguably more fruitfully studied. There is a critical need today for much more information on each isomorphic system's process to better understand how they make complex systems possible. More detailed understanding should lead to better applications and to a better understanding of numerous systems pathologies. This poster will show how SSP practitioners use the published, reductionist, empirical research of several natural sciences (astronomy, physics, chemistry, geology, biology, math, computer science) to harvest extensive detail on systems processes and investigate what each process contributes to systems “health.” The poster will graphically show how surveys across these science disciplines help “measure” the extent of isomorphy of each systems process to provide evidence of oligo-, poly- and pan-isomorphic states. Presence of the same systems processes across newly emergent levels in the natural, unbroken sequence of origins will also be illustrated. The poster will present a graphic matrix of the number of professional papers that cover each of the system's processes for each of the disciplines currently in the SSP database. It will present a graphic matrix of the numbers of natural science phenomena that exhibit the same system's process. We construct an outline from this database that specifically recognizes and names each of the natural phenomena that are represented by each systems process. This becomes a detailed knowledge base for a science of systems. The poster will illustrate graphically

how this body of evidence could serve as proof of the extent of isomorphy for each systems process in the natural world. A similar set of proofs could be constructed that covers extent of isomorphy in human, social, and artificial (engineered) systems.

1067

FINDING LINKAGE PROPOSITIONS BETWEEN SYSTEMS PROCESSES

Len Troncale

It would be hard to find two more fundamental concepts in GTS efforts than “isomorphy” and “interacting parts.” The first denotes presence in all systems or universality of structure or process, and the second is found in every basic definition of system. Ironically, despite their importance, there is little attention paid in the extensive systems literature to encoding specific interactions between systems processes or isomorphies on the generic level, or in testing them across a range of phenomena. This presentation will use the terminology of the SSP (System of System’s Processes) to show how workers can use published, empirical literature of the natural sciences to “fish” for new Linkage Propositions (LP’s). LP’s are defined as proposed generic, universal types of interactions between two or more systems processes (SP’s). Allegedly, this is the exact feature that makes a system what it is. Very specific examples of “finding” new LP’s will be presented that include, but are not limited to the following:

- Social & Biological Networks: Use of hierarchical structure to predict missing links in networks [LP between network & hierarchy SP’s] (Computer Science)
- Nanoparticle/Copolymer Mixtures: [LP between synergy SP, self-organization SP, and hierarchy SP] (Chemistry)
- Evolution of Gene Expression: [LP between feedback SP, diversity SP, and development SP] (Molecular Biology)
- Coherence in Chemical Systems: [LP between symmetry SP and oscillation-cycle SP] (Chemistry)
- Nerve/Blood Vessel Wiring: [LP between feedback SP, network SP, and fractal SP] (Anatomy-Biology)
- Spin Transfer in Quantum Dots: [LP between hierarchy SP and network SP] (Physics)
- Climate Impact on Ecology: [LP between feedback SP and cycles SP] (Biology and Geology)

SSP has many more examples to share from its database (see Poster Session, this conference). As the library of codified LP’s expands, systems theory will move more decisively to a science with evidence supporting its knowledge base and will become more useful to practitioners of systems applications and systems pathology.

1068

DEFINING SYSTEMS DISEASES USING SYSTEMS PATHOLOGY

Len Troncale

The basic information from general theories of systems enables the emergence of a new formal discipline called “systems pathology” modeled after medicine. This presentation will use case studies from the natural science literature to show that recognition of very specific “diseases” in system function in human and social systems would have significant implications for designing better systems or “curing” previous designs. Identifying symptoms and consequences will be presented for such classes of systems

diseases as heteropathologies, cyclopathologies, cyberpathologies, and “nexopathologies.” The relevance to systems pathology of new concepts appearing in both the natural and systems sciences such as “quorum causation,” “pleiotrophy,” “polygenic,” “degeneracy,” and “epistasis” will be discussed. The possible utility of the new systems pathology to better understanding such complex human diseases as cancer, autoimmune, and neurobiological diseases will be suggested. Identification of fundamental human causes of systems malfunction are made possible by the study of a wide range of named systems pathologies. The presentation will end with discussion of the very timely and significant questions, “Should natural systems have rights under the law,” and “Should there be HMO’s for ailing systems?” Many of the most challenging problems facing humanity today from global warming to bird flu are complex “system of systems” problems that need new practitioners trained in systems pathology. If we do not build the new theory, how can we train new workers to solve the problems?

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A SYSTEMS PERSPECTIVE ON ECOLOGICAL RESTORATION: SHOULD THE CURRENT HISTORIC CLIMAX-COMMUNITY RESTORATION MODEL BE REPLACED BY A FUTURE ORIENTED DYNAMIC ECOSYSTEM BASED MODEL

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Restoration ecology has become an essential conservation component as it provides powerful insight into community dynamics, a material system to test ecological theory, and opportunity for humans to participate in stewardship. The current restoration paradigm aims to recreate historic climax-community reference models. Therefore, restoration practitioners design correspondingly static communities that sit on the K-cusp of the Holling fore-loop without consideration for r-memory back loop species. This presentation suggests the current ecological restoration emphasis placed on historic community configuration is flawed. Systems perspective and resilience thinking suggests the current restoration paradigm be replaced by a future oriented, dynamic, ecosystem function and service model. Instead of pretending to know what the past community compositionally resembled, restoration needs to focus on restoring and maintaining future ecosystem function and service. The shift from community configuration to an ecosystem function and service configuration becomes paramount as climate change and peak oil modifies the, “business as usual” paradigm. The current restoration historic climax community-outcome based models may prove non-resilient to future environmental gradients and therefore fail to provide adequate ecosystem service. Likewise, peak oil suggests a shift towards low gain resource capture that could encapsulate the restoration process for provisional ecosystem services including food and textile production. Systems and resilience thinking offers an intellectual framework to design operant restorations that highlight ecological function and service. Principles associated with systems and resilience thinking in reference to ecological restoration are introduced and include: cross-scale diversity, functional diversity, redundancy, and successional rules of assemblage, all of which allow for alternative desirable stable states. Experiments to test ecological resilience are discussed and field applications identified.

Keywords: Resilience, High Gain & Low Gain, Alternative Stable Equilibria, Ecosystem Service, Functional Diversity, Redundancy, Assemblage Rules, Ecological Restoration.

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ISSS2009
53rd Meeting of The International Society for the
Systems Sciences
University of Queensland, Gatton Campus
July 12-17, 2009
<http://isss.org/world/en/brisbane-2009>

Making Livable, Sustainable Systems Unremarkable

There are several ideas in this theme for the Australian meeting of the ISSS. First is the notion of making systems thinking unremarkable. As devotees of systems thinking we are constantly puzzled as to why it is kept gently but firmly out of science and mainstream problem solving. There are modeling approaches, chaos and power law complexity, but that does not often capture the reflexive point of view that comes with systems thinking. But now the time might be right, as a post-modern and post-normal view becomes itself unremarkable. Modernist realism gives way to more sophisticated epistemologies of a systems ilk.

Second is the issue of sustainability in times of transition in energy sources, water scarcity and land use. Again it is not the material reality of the situation that is crucial, since we do not have access to reality. Rather it is a matter of sustainability of what, for whom, for how long, and at what cost? Sustainability is a matter of values, so get those values sorted out, and then we can talk sustainable.

But then finally is livability as a constraint on what sustainability will be. That means that if sustainability is does not offer a livable environment for the people who have a say, then it will not happen. Conversely, it is easy to sell livability, even when it is blatantly not sustainable.

“Some commentators regard liveability as a more local or short-term manifestation of sustainability while others see it as a necessary but insufficient pre-requisite of sustainability” (Brook Lyndhurst, 2004). In practice however, this has not prevented unsustainable actions in the name of liveability. Transport, for example is one such area in which the “pursuit of personal ‘liveability’ can conflict with the liveability of whole neighbourhoods and the community, and more widely with that of sustainable development”. There are many other examples of how liveability, especially in urban and peri-urban areas (where more than 80% of Australians live), is affected by the ability of people to have access to and benefit from a physical and cultural environment, key facilities and services, and a secure and supportive community. Can liveability be achieved in cooperation with achieving sustainability?

The four questions for sustainability in fact address the livability issue.

- “For whom” speaks of people prepared to sacrifice for some longer run?
- “For how long” addresses the aftermath of livability decisions?
- “At what cost” is the cost of less than easy livability?

- “Of what” is the identification of what comes when a particular livability scenario is over?

In the upshot this meeting will address systems education with regard to practice and theory. It will include case histories that will often be local to Australia, but will also include global scenarios as well. It will put people in their environment as a system in a way that need not be so self-conscious, rather invoking common sense. After the meeting we may be better equipped to enter mainstream problem solving and be welcome there.

There will also be a pre-conference Training Workshop in Systems Thinking and Practice, with special reference to developing countries (sponsored by UNESCO).

Our Host will be The School of Natural and Rural Systems Management at the University of Queensland, Gatton campus, near Brisbane.

UQ Gatton is located in South East Queensland, Australia, under an hours drive west of Queensland's capital city of Brisbane.

Nestled in the heart of the Lockyer Valley, the Campus is five minutes drive from the township of Gatton and is also close to a number of major centres including Toowoomba which is a 25 minute drive to the west and Ipswich, a 40 minute drive to the east.

We look forward to seeing you in Queensland!

Professor Timothy F H Allen, President 2008-09

Professor Ockie Bosch, VP Membership and Conferences



Announcing the 27th International Conference of the System Dynamics Society Albuquerque, New Mexico, USA July 26 - 30, 2009

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Join us in "The Land of Enchantment" for a unique combination of architecture, scenery, culture and history. Located at the foot of the Sandia Mountains in the Rio Grande Valley, Albuquerque is a bustling melting pot that retains the spirit of the Southwest. It is an attractive and affordable leisure destination with numerous museums, cultural and artistic centers, a zoo, a botanical garden, and an aquarium. The city is crisscrossed with bike paths, sprinkled with golf courses, and surrounded by Native American Pueblos and landmarks of ancient civilization.



The conference venue will be the Hotel Albuquerque, a short distance from the airport, nestled in Old Town, at the heart of the city's historic center. The hotel offers spacious, state-of-

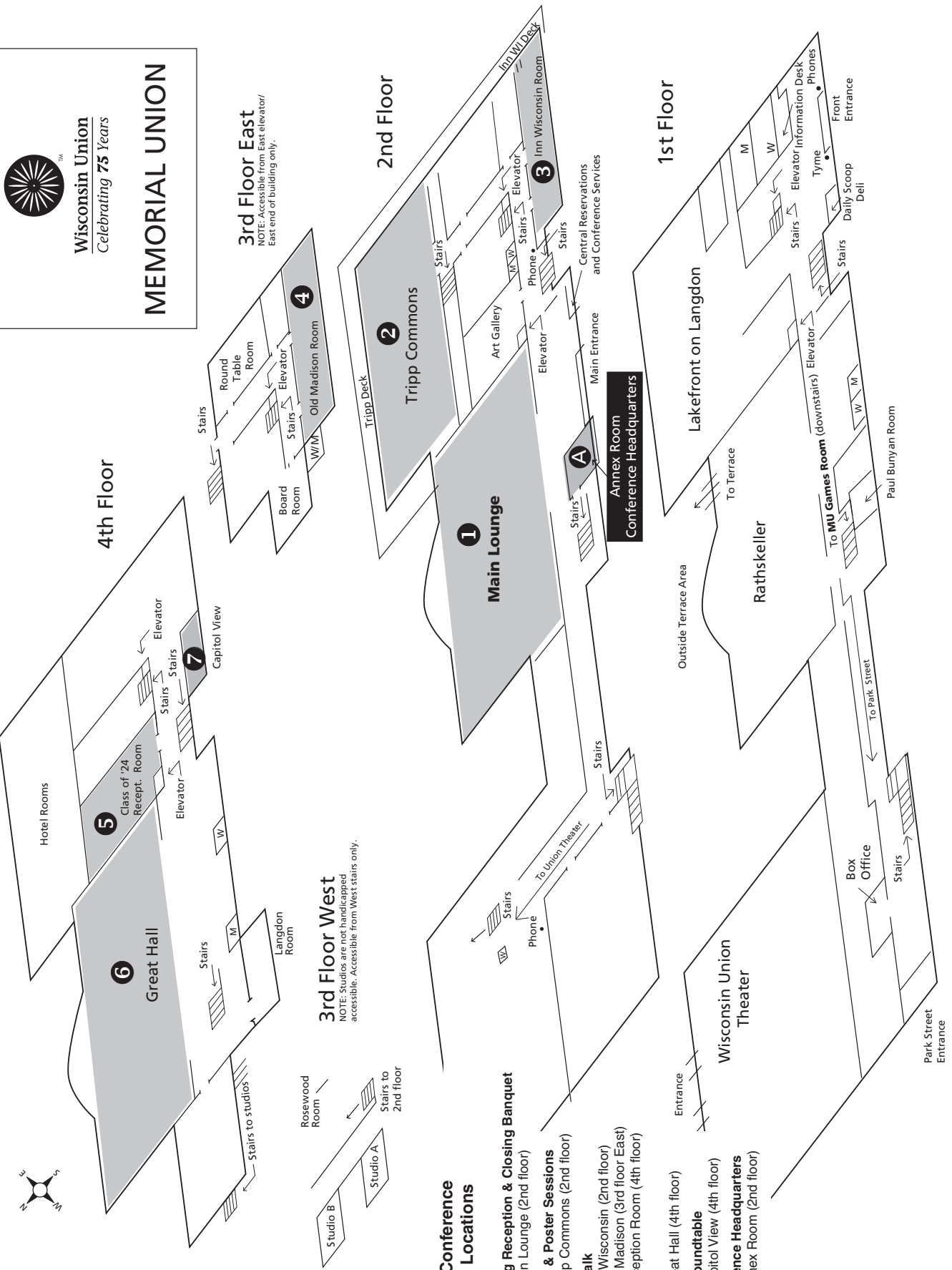


the-art conference facilities, in a beautifully decorated and cozy environment. This is an ideal setting for all conference activities, including program sessions, networking and socializing.

For detailed information about the Hotel Albuquerque at Old Town, please visit: <http://hhandr.com/albuquerque.php>

Watch for further announcements and details as they develop.

Visit our website: <http://www.systemdynamics.org>



/SSS Conference Room Locations

Opening Reception & Closing Banquet

- 1 Main Lounge (2nd floor)

Plenary & Poster Sessions

- 2 Tripp Commons (2nd floor)

Paper Talk

- 3 Inn Wisconsin (2nd floor)
- 4 Old Madison (3rd floor East)
- 5 Reception Room (4th floor)

Lunch

- 6 Great Hall (4th floor)

ISSS Roundtable

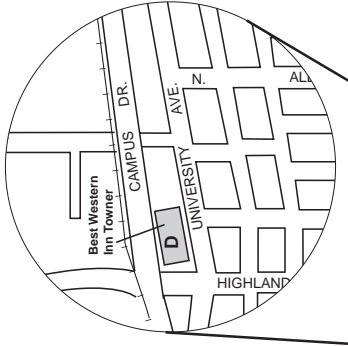
- 7 Capitol View (4th floor)

Conference Headquarters

- A Annex Room (2nd floor)

Directions to Best Western Inn Towner

- Take University Ave. west.
- Take the 1500 - 2600 University Ave. Exit.
(Do not take Campus Drive).
- Hotel is 8 blocks down on the right.



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1. Memorial Union	D1	A. Dahlgren Campus Inn	E2
2. Helen C. White	D1	B. Concourse Hotel	G1
3. SERF Building	D3	C. University Inn	E2
		D. Best Western Inn Towner	See Map Inset
		E. University Towers	E2

