



## Course Syllabus

Course #: EST 582

Introduction to Systems Concepts

Spring 2020: February 24 – June 17

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<b>Credits:</b>	3
<b>Meeting Days:</b>	Saturday
<b>Meeting Time:</b>	7:00 - 9:50 p.m.
<b>Meeting Room:</b>	TBA
<b>Instructor:</b>	Patrick Rose, Ph.D.
<b>Office Address:</b>	B309
<b>Cell Phone:</b>	010-2971-2752
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**Last Revised: December 21, 2019**

## **I. Course Description**

Understanding phenomena as "systems" requires some changes in overall analytical approaches, and a new vocabulary. General systems theory concepts such as feedback, stability, tipping point, resilience, recursion, hierarchy, and complexity will be discussed, with regard to complex systems drawn from nature, business, technology, and education. The course will address the use of feedback, information and communication, structure, and cybernetics in the management of complex systems. The role and importance of "agents" in current systems thinking will be emphasized. Students will prepare a study of a complex system and its management incorporating these general concepts.

## **II. Objectives**

"System" is an essential device used by people to understand the world, to develop and analyze technologies, and to create meaning. The course enables students to recognize systems and systems features that are found in both very simple machines and complex technologies and organizations. On completing the class, students are able to:

- 1) Identify positive and negative feedback processes
- 2) Complete cybernetic analyses of technological and human systems
- 3) Employ system concepts such as stability and complexity, hierarchy, resilience, and emergence to understand the dynamics of human-formed and natural systems
- 4) Define issues that can be important in the use of models to explain complex phenomenon

## **III. General Class Format**

1. Announcements & Attendance – 5 minutes
2. Previous Class Review – 10 minutes
3. Lecture – 50 minutes
4. Break – 5 minutes
5. Class Exercise – 40 minutes
6. Project Work – 30 minutes
7. Close – 10 minutes

## IV. Course Text & Readings

### Required Text:

- Meadows, DH. **Thinking in Systems: A Primer**. D. Wright, ed. Chelsea Green Publishing, White River Junction, VT. 218 pp. In the bookstore (etc.), 2008.
- Kauffman, Draper. **Systems One: An Introduction to Systems Thinking**. [Source](#)
- Mitchell, Melanie. **Complexity: A Guided Tour**. Oxford University Press, 2009.

### Recommended Readings on Systems Thinking:

- Peter Senge, Kleiner, Roberts, Ross, and Smith, The Fifth Discipline Field book
- High Performance Systems, An Introduction to Systems Thinking
- Turtles, Termites, and Traffic Jams: Explorations in Massively Parallel Microworlds (Complex Adaptive Systems)

### Recommended Readings on Modeling Social Systems:

- The Difference: How the Power of Diversity Creates Better Groups, Firms, Schools, and Societies (New Edition), Scott E Page
- Complex Adaptive Systems: An Introduction to Computational Models of Social Life (Princeton Studies in Complexity), John Miller and Scott Page
- An Introduction to Models in the Social Sciences, Jean Lave and James March
- Joshua Epstein and Robert L. Axtell, Growing Artificial SocietiesS
- Donella H. Meadows, Jorgen Randers, Dennis L. Meadows, Limits to Growth: The 30-Year Update

### Other Resources:

- [Bellinger](#): good intro to systems thinking and causal modeling
- [Radzicki](#): an introductory book on system dynamics
- [Ford](#): a whole course on a system dynamics model of the environment
- [Roadmap](#): the complete course in systems dynamics from the people who invented it
- [Fiddaman](#): System Dynamics Model Library
- [MIT Systems Dynamics Laboratory](#)

- [Systems Dynamics Society](#)
- [System Dynamics / Systems Thinking Mega Link List by Günther Ossimitz](#)
- [Netlogo](#) and [Insight Maker](#) Modeling Software

## VI. Course Schedule

Topics are subject to change at Professor's discretion and according to students' interest and progress. The following is the tentative planned schedule:

Week	Class session
1	Class Introduction Lecture: Simple Systems
2	Read: Meadows Chapters 1-2, Kauffman Chapters 1-2 Lecture: Complicated Systems & Cybernetics
3	Read: Meadows Chapters 3-4, Kauffman Chapters 3-4 Lecture: Complex Systems & Chaos Theory
4	Reading: Meadows Chapters 5-6, Kauffman Chapters 5-6 Lecture: Stability & Transitions, Systems Dynamics Modelling Lecture: How to write an EST 582 paper and Examples
5	Reading: Meadows Chapter 7, Mitchell Part 1 Lecture: More System Dynamics and System Transitions, Sociotechnical Systems SUNY Korea as a Complex System - Class Exercise
6	System Project Outlines Due (10-minute presentations) Reading: Mitchell Part 2 Lecture: Models, Complex System Modeling, Algorithms Cell phone as a Complex System - Class Exercise
7	How it Works' Presentations (15 minute presentations)

8	<p>Reading: Mitchell Part 3</p> <p>Lecture: Soft-systems Approach, Organizational Complexity and Social Change</p> <p>Case: Fukushima Disaster</p>
9	<p>Reading: Mitchell Part 4</p> <p>Lecture: Models</p>
10	<p>Reading: Mitchell Part 5</p> <p>Lecture: Complex System Modeling</p>
11	<p>Summative Exam</p> <p>Lecture: Complex System Modeling</p> <p>Case: The Big Short &amp; the US Financial Meltdown Example</p>
12	<p>Project First Draft Due</p> <p>Advising and Group Work</p> <p>Lecture: Economic Systems and Algorithms</p>
13	<p>Conclusion / Review</p> <p>Case: Gulf Oil Spill and LI Coastal Ecosystems</p>
14	<p>Project Advising and Group Work</p>
15	<p>Presentations of Class Projects</p>

## V. Evaluation, Grading & Assignments

### Grade Calculation

Activity	Points Possible
Participation / Attendance	15
Reading Mind Map	5
How it Works Paper	10
Pop Quizzes	20
System Project Outline	10
System Project Presentation	10
System Project Paper	30

### Handing in Assignments

Electronic submission via Blackboard of assignments is required as MS-Office-type files. Use your name as the main part of the filename (e.g., JohnSmith1.xls). The first page of any written assignment should show the class title, your name and date.

### How it Works (Didn't Work) Paper (1)

You will write an analysis "How It Works" summary in which you will briefly analyze the success and failure of a complicated engineered system. Explain some of its inputs, process, and outputs. Explain the feedback and explain if it is a negative or positive feedback. Draw a hierarchical diagram that identifies subsystems. You will facilitate a class discussion about the system you investigate.

### Mind Map Article Presentation (1)

Summarize your selected reading (see included list) as a mind map (concept map) and facilitate a discussion about the reading. Organize the chapter in a way that makes sense to you by listing major terms or concepts you see as important, sorting through the list and grouping concepts that are related to one another, arrange the concepts on a page and draw lines between the concepts that you think are related. You can use an online tool or application for mind mapping like <https://www.mindmeister.com/>.

### Pop Quizzes (4)

There will be four pop quizzes throughout the course worth 5 points each. They will test your understanding of topics covered during the class to assess that you have learned the key concepts and terms. They will have multiple-choice, short answer, and analytical reasoning questions that will test your understanding of the materials. You should keep pace with the class

by reviewing and understand all information that was presented in class and assigned as reading outside of class. This includes the what, where, how, and why, and is not just definitions. Be prepared to apply information to situational questions.

### **Final Project (PhD Students): In-depth Socio-technical System Case Project Paper**

Select a system as your semester-long class project. Examine a system in-depth, demonstrating a clear understanding of key concepts from the class. Look for something you are curious about and you want to learn about on a deep level. Select a familiar system, although this is not a requirement (see list of suggested topics). In your paper, you will provide an overview of your system and its history. After the introduction, you will reference the literature to describe how the system works and how people interact with it, mapping out its major features, subsystems and its input, output and feedback loops. Include a system diagram. Next, you will discuss both the positive and negative impacts of the system. In your conclusions, you will provide recommendations for improving the system. You are encouraged to interview experts, users, system designers and the other people who regularly interact with the system. Please do not collaborate without prior permission or use work without attribution. You must conduct research for your systems paper, and must cite all references, including web sites.

#### **System Project Paper Outline**

The research process is best done in stages. Before starting your paper, you will submit and present an outline for instructor and peer review. A research paper typically has three parts: introduction, body and conclusion. Most research papers will start with a description of the research topic (system) that includes a first impression ('hook'), research question and a thesis statement. Next, the body of a paper will include the context or background (history), a summary of existing research on your topic (literature review) and your analysis, synthesis and interpretation of the information (findings). Finally, the conclusion of your paper will summarize the main points, explain the consequences and why it matters (relevance) and offer recommendations or suggestions. In your outline, write a paragraph or two for each section of your paper and include a draft system diagram.

### **Final Project (Master's Students): Socio-Technical System Case Project Website**

Similar to the system project paper above, but instead of writing a paper you create a website. Describe the socio-technical system (What is it?), the architecture (What are the technical components?) and the algorithm of the system (How does it work?), how people interact with the system (How is it used?), and how the system is evaluated (What data does it produce?). Conduct secondary research (What is the history of the technology, who invented it and why?). Include a system map.

Define the current situation in terms of problems, gaps, issues, concerns or ramifications about the system (Who is affected by it and how, and does it work as expected?) based on your data and insights of the system. What is the difference between the actual situation and desired situation (performance deficiency). Evaluate possible scenarios (options) for addressing the problem(s) and choices in an analytical fashion. Break down complex problems into smaller components that can be logically addressed. Evaluate each option based on benefits, costs,

timeliness, acceptability, ethical soundness and other factors. In a clear and straightforward way, describe the actions that could be taken resolve the discrepancy. What are the possible action alternatives, probabilities and risks? Make some “conclusions:” about your semester-long research. Briefly summarize the system as a whole, make recommendations on how to change and/or improve the system and justify your choices. What is the solution you are recommending that is tailored to the situation at hand? Describe how would implement your selected decisions and evaluate the results?

You are encouraged to interview experts, decision-makers, system designers and the other people who regularly interact with the system. Include a system map and algorithm chart. Include a bibliography of at least five relevant annotated sources discussing their significance for the project. Compare, synthesize and summarize the findings of your secondary research.

## **Citations**

Your sources must be cited utilizing APA or Harvard Business Referencing format only. Your research must conform to the university’s rules of ethics; this means: any material cut and pasted from the Internet, books, or articles must be identified as source material. You may use only short quotations of other people’s writing. You must paraphrase – that means, put in your own words – any longer passages from source material. Paraphrased ideas must also be cited, as they are not your original thoughts. Failure to meet these standards is grounds for a failing grade for the course.

## **VI. Additional Course Information**

**Class Participation:** An important aspect of this class is discussion, and therefore, class attendance is important. Each student should read the material in advance and be prepared to offer their insight into class topics. Participation is required – both in class as well as outside of class. Outside of class, students should complete the reading assigned materials and work on their final project sections. Failure to participate in class discussions and to prepare for leading class discussion as assigned will affect your grade.

**Late Work Policy:** No exams can be taken early or late, unless there is a university excused absence. Make up exams will only be given in light of a university excused absence. Inform me of your absence before or within 2 days after the examination date.

**Grading Scale:** Grading will follow a standard scale: 94%-100% is an A, 90-93% is an A-, 88%-89 is a B+, 84%-87% is a B, 80%-83 is a B-, 78%-79 is a C+, 74%-77% is a C, 70%-73 is a C-, and so on. Grades cannot be changed unless the instructor makes a computational error. Moreover, grades will not be revealed via e-mail or telephone. Students’ grades will be posted on Blackboard.

**Blackboard:** All non-textbook class materials and grades are available through Blackboard. Students should read the posted material in order to be prepared for class. New articles and material may be added over the course of the semester.



**Connected Mobile Devices:** Turn off mobile phones. If you leave class to take a call, do not come back in the classroom until class is finished. The instructor prefers that you take handwritten notes because this method enhances learning and retention, notebook computers will only be used during free study time. Students may not use connected mobile devices to engage in activities unrelated to the course.

**Class Start Time:** Show up for class at the starting time, not a few minutes late. If you are not in class at the starting time, you are considered absent. Exams will start promptly at five minutes after class starting time. You cannot start the exam after 15 minutes past the starting hour.

**Class Attendance:** Attendance will be taken daily throughout the semester. You are responsible for attending class and for all materials covered in class. If you miss more than 2 classes, you will lose a letter grade; and more than 3 unexcused absences (20% of the course) will result in an 'F' grade. If you are seeking an excused absence, you must notify me as soon as possible after the absence, but no later than the end of the second working day after the last date of absence. If the absence occurs the same day as a scheduled assignment or other graded procedure, the student must notify the instructor or department by the end of the next working day after the absence to ensure full rights. You are responsible for providing satisfactory evidence to the instructor within one week of your return to substantiate the reason for the absence (see Absentee Policy from University Conduct Code and Student Handbook).

## IX. University Policies

**Class Disruptions:** Disrupting class is a serious violation of university rules and regulations. Electronic communication devices such as cell phones are disruptive if they ring during class. Please turn them off before class.

**Plagiarism Statements and Academic Dishonesty:** Each student must pursue his or her academic goals honestly and be personally accountable for all submitted work. Representing another person's work as your own is always wrong. Faculty are required to report any suspected instances of academic dishonesty to the Academic Judiciary. Faculty in the Health Sciences Center (School of Health Technology & Management, Nursing, Social Welfare, Dental Medicine) and School of Medicine are required to follow their school-specific procedures. For more comprehensive information on academic integrity, including categories of academic dishonesty, please refer to the academic judiciary website at <http://www.stonybrook.edu/uaa/academicjudiciary/>

**The Americans with Disabilities Act:** If you have a physical, psychological, medical or learning disability that may impact your course work, please contact the One-Stop Service Center, Building A201, (82) 32-626-1117. They will determine with you what accommodations, if any, are necessary and appropriate. All information and documentation is confidential. Students who require assistance during emergency evacuation are encouraged to discuss their needs with their professors and Disability Support Services. For procedures and information go to the following website: <http://www.sunysb.edu/ehs/fire/disabilities.shtml>.

**Sexual Misconduct:** Title IX makes it clear that violence and harassment based on sex and gender (which includes sexual orientation and gender identity/expression) is a civil rights offense subject to the same kinds of accountability and the same kinds of support applied to offenses against other protected categories such as race, national origin, color, religion, age, status as a person with a disability, veteran's status or genetic information. If you or someone you know has been harassed or assaulted, you are encouraged to report it.

## Some Topics of Systems Papers

Biodiesel Production & Use  
A Systems Analysis of Education  
Modern Aerial Combat Systems  
The Barrier Island Chain  
Superorganism Organization in Insect Social Systems  
Second Language Acquisition  
Systems Thinking in a Coffee Maker  
Healthcare Compliance Inc. On-line Compliance Training Software  
Passenger Ferry  
High School FIRST Robotics Competition  
The Marine Corps  
Vehicle Stability Systems  
Follett Library Software  
Island Nursing and Rehab Center  
Computer Operating System  
Classroom Management  
Remediation of MTBE in Nesconset  
Smart Buildings  
New York State Brownfield Program  
Emergency Medical Services  
Microsoft Outlook  
Automobile Sales Process  
Hybrid Cars  
Sales Exhibition  
Traffic System in Taiwan  
Watermark-based Copyright Protection System  
Biofuels  
Wikis  
Web 2.0: the Interconnected System of Independent Interactive Media  
Classroom Discipline Plan  
Systems Thinking and Consulting  
Locating and Accessing Information  
The American Economy  
Restaurants  
The Internet  
Dabbawalas of Mumbai  
Criminal Justice System of Taiwan  
Modern Navigation Bridge  
Internet Calling  
Smart Classrooms  
Banks  
The Stock Market  
DDC Intranet Training System  
The United States Government  
Maasai Tribe: Culture, Family, and Age-set System  
BNL-CAD: ECI System  
Mobile Social Networks  
The NFL  
Red Light Safety Program  
US Patents  
The Premier League  
OCD: A System Gone Awry  
On the Effects of Clean Coal  
Software Development  
Analysis of Salesforce  
Education Governance System -- India  
Biomedical IT Systems  
Photography  
Commercial Aerospace: Airway Transportation Operations  
Public Transport System in New Delhi

High Speed Rail as an Integral Part of the Transport System	Online Ticketing
Net-Flix	Recruitment Function of a Company
Commercial Air Conditioning	Cold and Hot Water Dispensers
School Master Schedule	Mangrove Ecosystem
Advanced Metering Infrastructure	US Congress
Sunday Sauce System	Cooking Spaghetti and Meatballs
Systems Theory and Social Science: A Music Program with a Social Purpose	Mulberry/Cane Dyke Fish Pond Ecosystem
Vehicular Traffic	Playing the Violin in an Orchestra
System of Systems: Complex Systems in the US Military	Agricultural Greenhouses
The FBI	Toyota Star Safety System
An e-Commerce Website	How Amazon Works
Brookhaven National Laboratory's Quality Management Office	Ultimate Frisbee
Prescription Refill Process	Energy and Nutrition Level of a Pond Ecosystem
Steve Jobs	Ultrasonic Humidifier in Human Daily Life
Town of Islip Lifeguard Corps' Emergency Action Plan	Social Network Gaming and Psychological Addiction
Positive Behavioral Interventions and Support	Mini Waffle Maker
Competitive Running	Security System within a Home Automation System
Energy Storage System for Wind Energy in South Korea	Agile Web Development
Energy-from-Waste Direct Combustion	Yellowstone National Park
Remote Patient Monitoring	Autonomic Nervous System
Backlight and Ambient Light Sensors	Bitcoin
Learning an Instrument	Bicycle Drivetrain System
Commercial Banking in China	Engineering Design Process
Toy Locomotives	Geographic Information Systems
Cruise Control	Safety System of a Boiler in a Coal-fired Power Plant
Basketball Teams	Governmental R&D in South Korea
The Failure of Biosphere 2	Wuxing
Resilience in Forest Fire-based Ecosystems	Korea Natural Gas Industry
Motorcycles	Finding Roadside Bombs in Iraq
	Foreign Currency Risk Management
	Tire Pressure Monitoring System

Anti-lock Braking  
Classroom Behavior Management  
Taiwanese Student Association  
Manufacturing Facilities  
Insiders' Point of View of Public Schools  
Quality Management in CETC  
Organizations as Systems: Veda International Corp.  
The End of One Child Policy  
Age of Monkey Man  
Road Rage  
Arms Race System  
Population and Environment of Easter Island  
Cognitive System  
China's Population System and Government's Practice to Control It  
Inkjet Printers  
The Electric Power System  
Personal Decision Making  
System of Love  
Magnetic Pendulum  
Staff in Purchasing Department of Goodbaby Co.  
Global Climate Change  
Ponzi Schemes  
Uber System Analysis  
The Mahjong System  
Micros Point of Sale System  
Inventory Management  
Football Defense  
What is a Marriage and How is It Defined  
Acupuncture as a Complex System  
Baymax System  
Machine Learning as a System  
Taobao Online Shopping  
Driving as a System  
Mountaineering on Mount Everest  
Logistics System of Amazon  
Subsystems at Ski Resorts  
3-D Printing  
Acceleration-Deceleration in Automobiles  
Promoting E-learning in Korea  
Classroom as a System  
Web 2.0  
Dancing Musical Fountains  
3 Gorges Dam  
Brewing Beer  
Algorithmic Trading  
Beijing Subway System  
Google Driverless Cars  
Chorus as a System  
Earth's Climate System  
Victorian Tea Festival  
Columbia Electric System  
Weight Management  
Microsoft Excel Workshop  
Enterprise Resource Planning  
Forest Ecosystem  
Google Drive as a Complex System  
NYC Subway System  
Tencent Classroom Platform  
Traditional Chinese Medicine  
Oceans and Climate Change  
Systems Thinking at a University

## Selected Readings (Pick One)

1. Russell L. Ackoff (1999) *Ackoff's Best* NY: Wiley
2. Virginia Anderson and Lauren Johnson (1997) *Systems Thinking Basics: From Concepts to Causal Loops* (Pegasus)
3. Robert Axelrod and Michael D. Cohen ( ) *Harnessing Complexity*
4. Bela H. Banathy (1996) *Designing Social Systems in a Changing World* NY: Plenum
5. Bela H. Banathy (2000) *The Guided Evolution of Society* NY: Plenum/Kluwer Academic
6. Ludwig von Bertalanffy (1968) *General System theory: Foundations, Development, Applications*, George Braziller New York
7. Peter Checkland (1981) *Systems Thinking, Systems Practice*. (Wiley)
8. Peter Checkland Jim Scholes (1990) *Soft Systems Methodology in Action*. (Wiley) ISBN 0-471-92768-6
9. Peter Checkland Jim Sue Holwell (1998) *Information, Systems and Information Systems*. (Wiley) ISBN 0-471-95820-4
10. John Gall (1978) *Systemantics Pocket Books*
11. Jamshid Gharajedaghi *Systems (2005) Thinking, Second Edition: Managing Chaos and Complexity: A Platform for Designing Business Architecture* (Butterworth-Heinemann)
12. Charles L. Hutchins (1996) *Systemic Thinking: Solving Complex Problems* CO:PDS ISBN 1-888017-51-1
13. Michael C. Jackson ( ) *Systems Thinking; Creative Holism for Managers*
14. Bradford Keeney(1983) *Aesthetics of Change* Guilford Press
15. Daniel H. Kim *Introduction to Systems Thinking* (Pegasus Communications Inc.)
16. Daniel H. Kim (1995) "Systems Thinking Tools: A User's Reference Guide" Part of the *Toolbox Reprint Series*. (Pegasus Communications Inc.)
17. Draper Kauffman ( ) *System One and System Two*
18. M. Davidson, *Uncommon sense: The life and thought of Ludwig von Bertalanffy, Father of General Systems Theory* (J. P. Tarcher, Inc)
19. Gerald Nadler, Shozo Hibino (1999) *Creative Solution Finding: The Triumph of Breakthrough Thinking over Conventional Problem Solving* Prima Publishing
20. Gerald Nadler, William Chandon ((2004) *Smart Questions: Learn to Ask The Right Questions For Powerful Results* John Wiley & Sons, Inc.
21. Joseph O'Connor, Ian McDermott (1997) *The Art of Systems Thinking: Revolutionary Techniques to Transform Your Business and Your Life* HarperCollins.
22. Tom Ritchey (2002) *General Morphological Analysis: A General Method for Non-Quantified Modelling*

23. Mitchell Resnick ( ) Turtles, Termites and Traffic Jams
24. Peter M. Senge (1990) The Fifth Discipline - The Art & Practice of The Learning Organization (Currency Doubleday).
25. Senge, Kleiner, Roberts, Ross and Smith The Fifth Discipline Fieldbook
26. Sherwood, D., Seeing the Forest for the Trees: A Manager's Guide to Applying Systems Thinking, Nicholas Brealey Publishing, London, 2002
27. Lars Skyttner (2006) General Systems Theory: Problems, Perspective, Practice (World Scientific Publishing Company) ISBN 9-812-56467-5
28. Gerald M. Weinberg (1975) An Introduction to General Systems Thinking (1975 ed., Wiley-Interscience) (2001 ed. Dorset House).
29. Brian Wilson (Systems) (1984) Systems: Concepts, Methodologies and Applications. (Wiley) ISBN 0-471-92716-3
30. Brian Wilson (Systems) (2001) Soft Systems Methodology: Conceptual Model Building and its Contribution. (Wiley) ISBN 0-471-89489-3
31. Heidi Leoti Davidz, Enabling Systems Thinking To Accelerate The Development Of Senior Systems Engineers, Doctor Of Philosophy In Engineering Systemsat The Massachusetts Institute Of Technology, February 2006
32. Midgley, G., Systems Thinking, Volume IV, Critical Systems Thinking and Systemic Perspectives on Ethics, Power and Pluralism, Sage Publications, 2003
33. Hitchins, D.K., Advanced Systems Thinking, Engineering, Management, Artech House, Boston, 2003
34. Flood. R.L., Carson, E.R., Dealing with Complexity: An Introduction to the Theory and Application of Systems Science, Plenum Press, N.Y., 1990
35. Skyttner, L., General Systems Theory: Ideas & Applications, Chapter 11: The Future of Systems Theory, World Scientific, N.J., 2001
36. CAPRA, F. 1996. The Web of Life, Anchor Books, Ch1-3
37. Miller, 2007, The Genius of Swarms
38. Pete Wilton on Luke Pettit, 2013, Pigeon wingman rules (accessible at: [http://www.ox.ac.uk/media/science\\_blog/130927.html](http://www.ox.ac.uk/media/science_blog/130927.html))
39. Ortiz, 2013, Some thoughts on complexity
40. REYNOLDS, M. & HOLWELL, S. 2010. Introducing systems approaches
41. CHECKLAND, P. & POULTER, J. 2010. Soft Systems Methodology.
42. Rodgers, 2008, Leading Change Through Informal Coalitions
43. ORTIZ ARAGÓN, A. 2012. Shifting Identity from Within the Conversational Flow of Organisational Complexity.
44. Burns, 2012, Participatory Systemic Inquiry
45. STEPHENS, A. 2012. Feminist Systems Theory: Learning by Praxis.

46. MOWLES, C. et al. 2008. What contribution can insights from the complexity sciences make to the theory and practice of development management?
47. Rodgers, 2013, Taking Organizational Complexity seriously
48. Hummelbrunner & Jones, 2013, Planning in the face of complexity
49. Sgorbati & Weber, 2008, How deep are the laws of emergence
50. LAND, T., HAUCK, V. & BASER, H. 2009. Capacity development: between planned interventions and emergent processes. Implications for development cooperation.
51. JONES, 2011, Taking responsibility for complexity: How implementation can achieve results in the face of complex problems
52. Bar-Yam, 1997, Complexity Rising—From Human Beings to Human Civilization
53. EYBEN, R., KIDDER, T., ROWLANDS, J. & BRONSTEIN, A. 2008. Thinking about change for development practice: A case study for Oxfam GB.
54. WILLIAMS, B. & HUMMELBRUNNER, R. 2011. Systems Concepts in Action, Pgs 16-28
55. The Space Between Spoken and Unspoken: Dr. Siraya Chuenkamrai:  
<http://youtu.be/ujodWKVraRw>
56. Pt 1: ORTIZ, A. 2010. A Case for Surfacing Theories of Change for Purposeful Organizational Capacity Development.
57. Pt 2: ORTIZ, A. & Giles, JC. 2010. A 'Systemic Theories of Change Approach' for Purposeful Capacity Development.
58. TSOUKAS, H. 1998. Introduction: Chaos, Complexity and Organization Theory
59. ISON, R. 2008. Systems Thinking and Practice for Action Research.
60. MIDGLEY, G. 2003. Science as Systemic Intervention:
61. WILLIAMS, B. Bucking the system. The Broker, Issue: 11 December 2008
62. JACKSON, M. Systems Thinking: Creative Holism for Managers, 2003, Wiley, Ch 1-3
63. CHECKLAND, P. 2000. Soft Systems Methodology: A Thirty Year Retrospective, S11-S58.
64. ULRICH, W. & REYNOLDS, M. 2010. Critical Systems Heuristics.
65. GRIFFIN, D., SHAW, P. & STACEY, R. 1998. Speaking of Complexity in Management Theory and Practice.
66. VALENTINOV, V. 2012. Toward a Critical Systems Perspective on the Nonprofit Sector.
67. FLOOD, R. L. 1988. Unleashing the "open system" metaphor