

# Towards a Science of Systems: Exploring the Nature of Systems Processes & Pathologies

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**Abstract.** Imagine you could obtain a rich toolbox of systems processes that had been proven effective in virtually all cases of successful natural systems. Imagine this toolbox also specified multiple interactions between these processes that explained how systems work in unprecedented detail. Imagine this new level of knowledge also enabled your recognition of a wide range of ways that systems might not work (i.e., failure modes or pathologies). Wouldn't this knowledge be useful in your practice of systems engineering, teaching SE, modeling systems, designing systems, testing systems, and attaining a better understanding of complex systems of systems? Wouldn't these steps to a true "science" of systems help in the challenging tasks of systems integration, innovation, and improvement facing SE? This workshop will identify and describe about fifty systems "processes" and many dozens of precise statements describing how these processes influence each other – as determined by an examination of processes occurring in Nature. Knowledge of these will facilitate overcoming the common pathologies that afflict all systems—whether natural or man-made. A series of mini-presentations, posters, and exercises will explore how to: (a) Gather the numerous pathologies and processes into ontologically pertinent categories for better usability; (b) "Map" the comprehensive network of these many processes and interactions; (c) symbolize the theoretical components to better model or check models of systems; (d) teach SE thru the teaching about the "science" of systems. Come explore the new era of "Sysinformatics" and "Systems Mimicry!" Workshop attendance is limited to 30 persons. So, please sign up early to get a seat. Workshop registration can be done when you register for the symposium.

## Biography

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Dr. Len Troncale is Professor Emeritus of Cell and Molecular Biology, and past Chairman of the Biological Sciences Department at California State Polytechnic University. He is also Director of the Institute for Advanced Systems Studies, and Coordinator of its NSF-supported Systems-Integrated-Science General Education Program. He has served as VP and Managing Director of the International Society for General Systems Research (SGSR) for six years, and President of the International Society for the Systems Sciences (ISSS) for the three year cycle. He has served as Visiting Professor at the University of Vienna, Austria, CSU Monterey Bay, and CSU Sonoma and as Research Associate at IIASA (the International Institute for Applied Systems Analysis at Laxenburg, Austria). He was a member of the Board of Directors of IFSR (International Federation for Systems Research) and still serves on the Board of Trustees for ISSS. Currently he has been presenting numerous talks at INCOSE and at Systems Biology conferences and serves as Lead for two official projects of the Systems Science Working Group of INCOSE (the International Council on Systems Engineering). Dr. Troncale has published 87 articles, abstracts, editorials and reports, 18 conference posters, served as Editor on 11 projects, delivered 115 invited and computerized presentations and demonstrations in 23 countries and served as P.I. on 52 grants and contracts for \$5.3M from a variety of federal, state, and private organizations such as the NSF, DOE, ONR, HUD, the HHMI and the Keck Foundation, as well as the CSU System.