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Would A Rigorous Knowledge Base in Systems Pathology Add Significantly to the Systems Engineering Portfolio?

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Abstract

This paper introduces a new, systems-architecture-level of systems pathology that might contribute to Systems Engineering (SE) and its core knowledge base, systems science. The new SysPath is contrasted with three existing strains of systems pathology, namely conventional pathology studied at the systems-level, cell-molecular biology, and systems biology. Several "classes" of systems-level diseases are named and presented as generic pathologies true across a very wide range of natural, human and social systems. Specific examples of each "class" of systems architecture disease (SAD) are listed. Sources and methods for identifying and discovering new SADs are suggested. The paper includes a preliminary analysis of what contributions the new SysPath might make to a much broader application of systems engineering, to systems pathology approaches, to understanding complex systems, and to understanding complex diseases. The paper closes by listing "caveats" or limitations to the new SysPath and key questions that must be addressed for it to be successfully added to the SE or systems science portfolios. An invitation is included to five practical action programs now underway.

1.0 Image of a New Systems Pathology: Working Hypotheses

The systems pathology introduced here is a spin-off derivative of a larger project that attempts to integrate the best findings of the new natural systems sciences (systems biology, systems chemistry, earth systems science, network theory and chaos theory) with the historical products of five generations of systems approaches (from general systems theory to systems management, circa the 1890's to the present). This unified product is called the System of System Processes Theory (SPT) and is the current version of a research plan that was first introduced 33 years ago (Troncale 1978, 1986). Both the project to synthesize past systems theories and the