System Dynamics (SD) is a continuous modelling method that is relatively easy to grasp and easy to use. SD dates from the very early days of computing, but still remains the modelling method of choice in a wide range of disciplines. SD is particularly suited to modelling complex, non-linear systems, especially highly distributed systems characterized by complex interrelations, many feedback paths, and substantial delays in material and information flows. While SD is still widely used in government and business as a policy exploration tool, SD models are intuitive enough that SD is also frequently used in STEM programs to help middle school students understand complex non-linear relationships. While historically, SD has not been widely used within Computer Science, recently several researchers have begun using SD to study the dynamics of the software development process. Three ISU CS graduate students are presently using SD models to conduct similar research. Efforts to couple Big Data to real-time simulation have also stimulated interest in SD among some Big Data researchers.

Since one could argue that SD models embody the oldest and most successful special purpose dataflow language, it is somewhat ironic that SD is not better known to computer scientists in general. This talk will introduce the core concepts and modelling techniques, demonstrate some simple simulations, and point to some areas where lessons learned in computer science since SD’s 1960’s conception might be applied beneficially to modern SD practice and implementation.

Robert Ward is a new ISU Computer Science doctoral student, recently retired from Arris Group, Inc., where he was Distinguished Advanced Research Engineer, working on advanced video advertising control systems. Prior to Arris Group’s acquisition of Motorola Mobility’s Home division, Mr. Ward was Director of Engineering for the Converged Solutions division of Home (also working on control plane systems for video processing and advanced advertising.) In that role, he was responsible for introducing agile methods to a distributed software development organization with teams in six countries on four continents. Mr. Ward was founder and CEO of a technical publishing company (R&D Publications, Inc.) best known for The C/C++ Users Journal. He has taught Computer Science at McPherson College in Kansas (where the students named him Professor of the Year), and lectured for the University of Kansas. He has a long-standing interest in scientific method as applied to debugging, and is author of the book Debugging C (Que, 1985). His consulting activities have included engineering curriculum development for Cadence Systems, Inc. and digital communications engineering for another Silicon Valley company. For a time, he served as a District Magistrate Judge in Kansas’s 4th Judicial District.