

Position Paper: Science of Design with a Focus on Open Source Software Development (OSSD)

UIUC - NSF Workshop on Continuous (Re)Design of
Open Source Software
University of Illinois, Urbana-Champaign
October 8-9, 2003

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- 1) Any investigation into the “Science of Design” must include Simon’s “Sciences of the Artificial”. In addition to the science of design, the book explores emergence and complexity, key ideas associated with self-organization.
- 2) The Open Source Software Phenomenon can be understood as a self-organizing process characterized by limited or no central control, bottom-up processes, and global structures emerging from local interaction of heterogeneous self-directed agents.
- 3) Software development, and OSSD in particular, is a social process. One way to model and understand social processes is with techniques from social network theory.
- 4) Topological properties of OSSD social networks such as diameter, shortest paths, clustering coefficients, hub nodes, or degree distributions can be used to gain understanding of the processes in play and how they differ from closed source software development.
- 5) OSSD includes many concurrent projects with many developers participating on, and migrating between, multiple projects resulting in the flow of knowledge and practices between projects.
- 6) Because of the large numbers of projects, evolutionary (Darwinian) mechanisms may be in place as OSS developers explore software space.
- 7) Complex systems such as OSSD may be understood by way of simulation. While empirical observations and equation-based models may define points and subsets in OSSD space, simulation can explore other regions and suggest areas for additional investigation.
- 8) OSSD is dynamic and cannot be completely understood with single empirical snapshots; longitudinal studies are needed, perhaps assisted with simulation.