Dissertation abstract

Ambient Intelligence Ecologies – Toward Biomimetic IT investigates biomimetic trends in the design of distributed IT systems with a special focus on Ambient Intelligence. The core tenet of the dissertation is the 'Copernican turn' of IT deisgn: to obtain better IT we should not merely stay dependent on IT but make IT become dependent on users. The growing scope and complexity of distributed IT are likely to exceed our traditional means of control and calls for new architectural design. Biomimetic is a promising response to the challenge by applying models of complex adaptive systems to create autonomous and self-maintenant IT. To exemplify biomimetic IT design, the dissertation unfolds the conceptual design behind the DELCA Ghost project at the IT University of Copenhagen. DELCA Ghosts are semi-autonomous virtual assistants 'feeding on' use by 'associating' positive feedback from users and improved performances to increased 'viability'.

The greatest challenge for biomimetics is the common understanding of technology and design. 'Technology' has historically denoted static, linear and analytically neatly decomposable systems governed by Newtonian laws of clean push-pull interaction among isolated entities. Yet, new sciences of complexity and emerging technologies suggest abandoning this inadequate and infertile 'Cartesian engineering' for a 'Darwinian' design. The growth of technological complexity represented by IT, bio- and nanotechnology and various cultural markers suggest that millennia-old technological commons sense is giving way to dynamic and 'organismic' designs of technology. Future technology will probably come to rely on cyclic autonomous processes of adaptive reconfiguration and integrated control (software) and structure (hardware). Pursuing a 'Darwinian' technology depends on new design methodologies deploying ongoing interactive reiterative processes. Instead of the traditional top-down and linearly controlled creation of fait accompli *products* we will start seeing new kinds of dynamic artifacts – the so called *produces* - that are evolved rather than created.