

Digital Ecologies for a Green World

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Pervasive computing and communication environments link systems and people in unprecedented ways into a global socio-ICT “ecology” in which we and our ‘things’ co-exist in an atmosphere of information as a new kind of ‘techno-social’ system having the **physical** and **Cyber** – dimensions interwoven and juxtaposed with a **social** fabric (the users and their ability to form dynamic coalitions mediated via the Cyber dimension). By its hybrid techno-social nature a digital ecology constitutes a unique blend of socio-economic modeling and innovative ICT-enabled smart infrastructure design which considers user motivation in all its social relevance having people, in their many roles and personas, central in this respect, not only as “consumers” of applications, but also as producers, “players” and “inputs” that seamlessly drive the behavior of complex interdependent global-scale systems such as economies of scale and climate.

We aim at designing digital ecologies as a **framework** for steering large scale techno-social systems by catalyzing and reinforcing beneficial collective user behavior. Our main concern is how to trigger the self-organization of users to achieve a particular goal (e.g. ‘greening’ the economy) using the digital ecology as a *socially smart* Cyber – controller. The digital ecology will be persuasive in that it will stimulate collaboration and provide incentives to facilitate socially flavored interactions with positive effects that support the objectives of the particular application. To this extent a digital ecology mirrors the ‘invisible hand’ of the market by acting like a ‘social-network operating system’ which leverages on the community via an incentive-driven mechanism. To improve the predictability and management of their consumption digital ecologies foster self-organization of groups around a particular trade-off of the incentive mix.

To achieve such goals, it is essential for the digital ecology to obtain perceivable predictors of behavioral profiles of prosumers (aka the producers and consumers of services for a particular application) over different time horizons. For this we focus on designing market models and a distributed agent system that can incite people to engage in the particular (e.g. ‘green’) activity. Large empirical data sets collected in correspondence with various aspects of the particular management challenge will guide and support the modelling endeavor. Applications of digital ecologies to promote energy efficiency and reduce carbon and greenhouse gas emissions ranging from the deployment of smart power grids with renewable energy components to carbon-free network-enabled transportation and performance management in organizations will be revealed.