

Information-integrated Dynamic Building Eco-Systems: Design and Planning Tools

Dr. Terence Love

Abstract

Buildings are increasingly intelligent and 'active'. The ways buildings function is increasingly mediated by computerized information systems. Buildings increasingly provide substantial electronic communications, control and data-gathering infrastructure as well as being controlled and managed by such infrastructure either singly or in interconnected groups.

Buildings increasingly dynamic behaviors are provided by, for example movable wall elements, access control systems, active solar gain shading, integration with transport systems. Examples of such buildings and building clusters include airports, eco-designed building complexes, security infrastructure, and new types of building arrangements such as EMPAC at Rensselaer Polytechnic. The control of the functioning of these 'active' buildings is increasingly distributed over multiple constituencies.

On the user side, as a result of these changes, there is increasing opportunity to manage multiple buildings and elements of buildings in integrated ways that offer benefits to stakeholders and users. An early example of this has been the management of suburb-wide heating from underground sources.

These factors result in a new form of systemic complex comprising single or multiple dynamic or active buildings, information and communications technology and control infrastructure, changing multiple sub-systems elements, environmental factors, stakeholders, user groups and constituencies. No longer do the simple design models and heuristics used for traditional buildings apply. In addition, from a socio-economic planning perspective, this significant potential added value of the built environment and the management issues it presents significantly changes in the realm of planning policy.

Together these systemic changes present a significant emergent design and management problem for the fields of architecture, urban planning and public policymaking. They do so because the characteristics of this new design situation are distinguished by an increased level of complexity beyond that which a simple linear systems understanding of buildings and environments applies. The consequence is that frequent failures of design, decision making, planning and policymaking are likely to occur in these contexts.

This presentation will address three tasks.

- 1) It will outline some new systems tools that offer potential benefits for understanding and managing complex built environment digital eco-systems.

2) These tools indicate how the distribution and type of complexity in a built environment and communication systems can and will result in predictable and unplanned shifts of control and management.

3) The new approach will point towards identifying professional design approaches to avoid design failures in these complex built environments.