

The Smart Campus

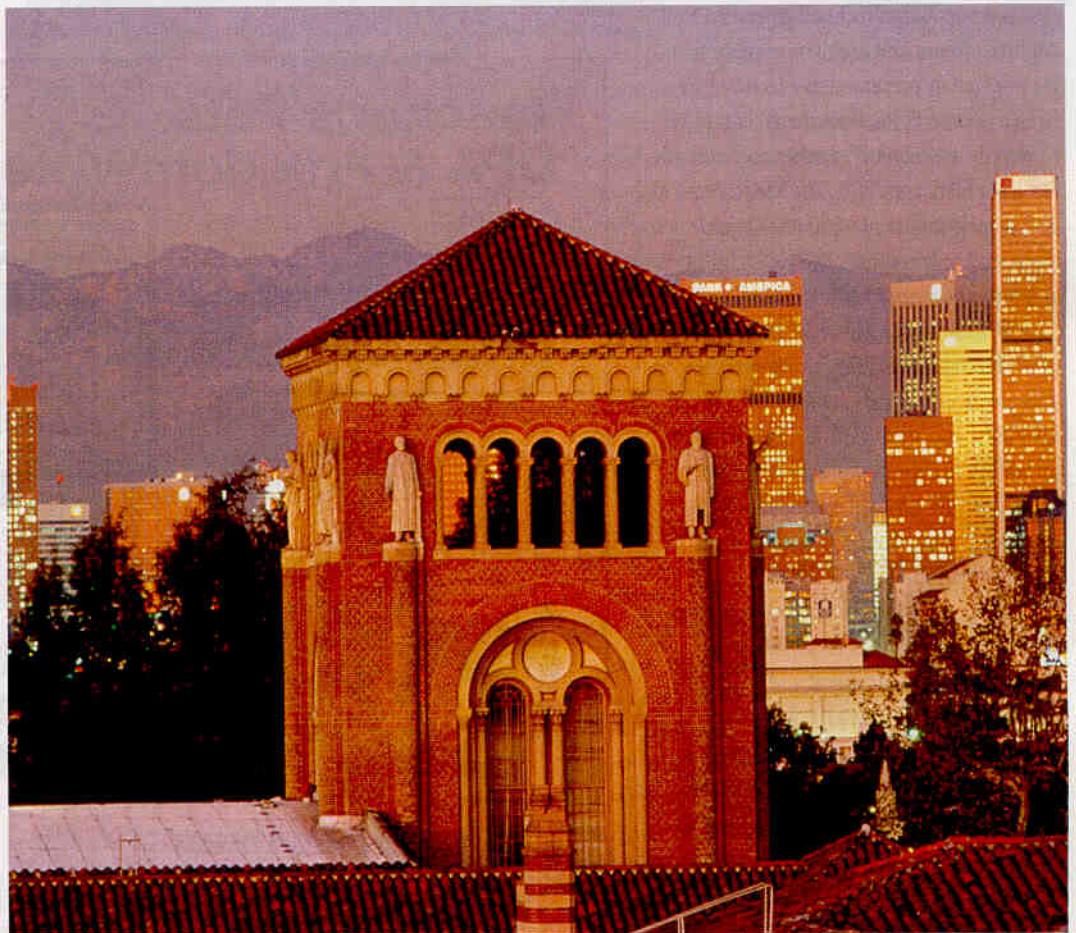
First came smart buildings. Now entire campuses are learning to be smart.

by Michael Fickes

When it gets too hot in the History Department at the University of Southern California (USC) in Los Angeles, a professor can call the facilities department and ask for more air conditioning.

While that's not unusual, the USC response is relatively uncommon. Using a desktop computer, the energy systems manager in the facilities department will power up a graphical diagram of the campus and call up the complex of buildings composing the

Photo courtesy USC News Archive.



At the University of Southern California (USC), the Enterprise Buildings Integrator (EBI) system tracks and controls the heating, ventilating and air conditioning systems in about 90 buildings spanning 4.8 million sq. ft. on two USC campuses.

History Department. By clicking on an icon of the affected building, the manager taps into a floor plan and the classroom or office where the air conditioning is out of kilter.

At each stage of this graphical journey, the computer queries networks of sensors that track temperature, airflow, energy use and related data. The research takes minutes, a fraction of the time required for a maintenance technician to drive to the building, walk to the room, evaluate the situation, and plan an investigation.

The system also enables the manager to fix problems from the facilities management office by adjusting the air conditioning systems in buildings across campus with a few mouse clicks. More important, the sensors measure data important to troubleshooting. Is the static pressure inside the air ducts feeding that room too low? Should more air regularly be routed there when outside temperatures rise to today's level?

Still under construction, the USC system tracks and controls the heating, ventilating, and air conditioning systems in about 90 buildings spanning 4.8 million sq. ft. of two USC campuses. That's about half of USC's full complement of buildings and space. "We haven't finished graphic displays for all of the buildings connected to the system, but we have covered the critical areas," says Richard Snouffer, director for energy services in the facilities management services department at USC. "As we evaluate requests, we add new graphics to the system. When we build a new building, we also create a new floor plan graphics."

Minneapolis-based Honeywell, Inc. supplied the USC system, which is called the Enterprise Buildings Integrator (EBI). It is one of the first steps in a USC effort to build what might eventually be called a smart campus.

Buildings That Report In

Temperature and airflow sensors dot all of the rooms and equipment managed by EBI. Wires connect the sensors to intelligent panels located in each building on the system. Fully integrated with Windows and the Internet, the panels send information back to a central computer in the facilities department via the campus network.

Today, Snouffer uses EBI to manage HVAC. But EBI has other management capabilities that haven't yet come on line. Smoke and fire warning systems can connect to the intelligent panels for central

monitoring through EBI. So can security devices from access control readers and motion detection sensors to video surveillance equipment. Integrated capabilities include turning HVAC systems on and off in particular offices when the person assigned to that office cards in through an access control system on a weekend. "We justified upgrading to EBI on the strength of its HVAC and interoperability features," Snouffer says. "In the future, we hope to use more capabilities."

EBI can also work with HVAC controls supplied by other vendors by way of a system called BACnet, a data communication protocol for building automation and control networks developed under the auspices of the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE). BACnet has come into play with several new USC buildings that use energy management control systems supplied by Johnson Controls and Siemens. Snouffer plans to use BACnet to translate data from those systems and pipe the translations into EBI. "We still have more work to do to make this integration work smoothly," he says.

Cost Control and Energy Management

Snouffer believes that the EBI system produces savings, particularly in terms of maintenance labor that would otherwise have to respond physically to calls. But he has not tracked the cost savings.

Currently, USC's most effective cost control efforts involve managing the purchase prices of electricity and natural gas. Snouffer tracks energy prices daily, works at projecting price patterns a year or so away and negotiates contracts based on his calculations. EBI offers an energy management module that can assist in these analyses for both electricity and natural gas. Snouffer hopes to bring this module on line soon.

Integrated building management systems are moving beyond smart buildings and beginning to create smart campuses. Snouffer, however, prefers to wait before applying the term smart campus to USC. "I think the chief characteristic of a smart campus will be communications," he says. "There is the ability to sit under a tree with a wireless laptop and check if the windows are open in this building or if the freezers in the laboratories of that building are at the right temperature. I think we'll eventually have these capabilities on our campus." **CPM**