Smart Campuses and Smart People

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At the heart of the idea of the spatially enabled smart campus is the idea of integrating spatial technologies with human spatial thinking to make people and campuses “smarter.” But technologies do not always make people smarter. In considering how to best implement a smart campus it is important to reflect on both positive and negative influences of technologies on spatial thinking and cognition more generally, in order to implement smart campuses in a way that truly makes people smarter.

Some lessons can be learned from research on GPS-based mobile navigation systems. These systems can have both positive and negative spatial thinking processes. Recent research has shown that navigation using GPS systems is not always more efficient than navigation using traditional paper maps (Ishikawa et al., 2008). That is, when using GPS navigation devices, people are less likely to develop an internal cognitive map of their environment, relying on their smartphone to provide the relevant spatial information. While one might conceptualize a person and his or her navigation system as a distributed-cognition smart system, this might cause problems in emergency situations, in which GPS navigational systems may not always be available. One challenge, therefore, is to develop spatial technologies that augment rather than replace spatial intelligence.

A second cognitive concern in the development of smart campuses is the possibility of information overload, as we use spatial technologies to track human movement, communication patterns, and resource consumption. While this will provide extremely valuable information, the challenge will be to provide “just-in-time” information to stakeholders, and not distract people with information that is irrelevant to their current goals. Attention is limited, and the distracting effects of even mobile phones are now well established (e.g., Strayer and Johnson, 2011). Critically this distraction happens with both hands-free and handheld devices, indicating that the interference is attentional, and not just about tying up one’s hands with different devices. One can imagine similar distraction effects if too much information is available on a smart campus map. For example, when navigating to Room 3512 Phelps Hall from across campus for the first time, someone might appreciate a map of the internal corridors of Phelps Hall, showing the location of this room. But most of the time, when walking across campus, this information would be superfluous and distracting. Providing access to the most relevant information at the relevant time will require both good models of the information needs of stakeholders in a smart campus, and good user interfaces to the relevant information.

A third cognitive concern is that there are well established individual differences in spatial intelligence (e.g., Hegarty et al., 2006). People differ enormously in their ability to learn the layout...
of a new place, plan routes, or imagine spatial transformations. More critically, ability to use spatial interfaces is also related to spatial abilities, so that spatial technologies can often enhance the performance of those with good spatial ability while just adding to the challenges of those with poor spatial ability. The development of smart technologies also needs to take these individual differences into account.

References: