# Imagining the Future and the Role of Human-Centered Design in Smart Service Systems

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John Carroll, Penn State

Brian Scassellati, Yale University

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# John Carroll

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**Paul P. Maglio, Editor-in-Chief**

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## Commentary

# Making Sense of Higher Education's Future: An Economics and Operations Perspective

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The increasing cost of higher education is a growing national concern, and the failure of universities to address it adequately has drawn a great deal of criticism from politicians, the media, and the public. There have been numerous efforts at reform, but few clear solutions. This paper applies lessons from decades of research into the economics and effective design and management of service organizations to propose models for changing the university.

## Ah, the Face of Change: Ch-Ch-Ch-Changes!

*Time may change me, but I can't trace time.* —"Changes" by David Bowie

The cost of higher education is being criticized from all quarters, in the popular media, and in academic literature and conferences, and it has become enough of a national concern that college and university presidents were convened by President Obama at the White House in January 2014 to discuss the matter. There was little disagreement over the need for change. We need to make the cost of attending a university[1] more affordable. Enrollment is declining, government help is headed in the same direction, and an increasing number of applicants need financial aid. Some at the White House conference and other commentators (Christensen and Eyring 2011, Anderson et al. 2012, Ernst & Young 2012, Etchemendy 2014) feel that moderate reforms over time would address the problem, whereas others (and I include myself in this group) feel that the modern university needs significant change. We need to rethink both our mission and our methods.

# Workshop to Develop a Research Agenda for Service Innovation

- *Human-Centered Service Systems (HCSSs)*, configurations of people, information, organizations, and technologies that operate together for mutual benefit.

- HCSS modeling is key, but system boundaries are fluid, and human roles are often hard to model.

- Performance of HCSSs depend on interactions and independent behaviors, which together have emergent properties.

http://ccss.ucmerced.edu/wp-content/uploads/2014/10/NSF-Report.final_.pdf

# Workshop to Develop a Research Agenda for Service Innovation

- Resilience in **cities**, infrastructure

- Complex system of population **health**

- **Manufacturing** and servitization

- **Information and communication technology** and smart services

- Potential service system revolution in **education**

# Workshop to Develop a Research Agenda for Service Innovation

- Research Agenda
  - Theory
  - Data
  - Modeling
  - Design
  - Measurement
  - Education

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**Theory**

**Theory**
**Are there new principles or laws to be discovered about the operation of human-centered service systems?**

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**Data**

**Key to understanding and improving service systems is gathering data about them**

**But exactly what data, and how can we manage it?**

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**Modeling**

**Simplifying assumptions may make behavioral and cognitive modeling possible**

**But modeling complexity explodes when nested networks for coordination, cultural factors, and individual preferences are taken into account.**

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**Design**

> **Need a multi-disciplinary approach to designing HCSSs that takes into account human, technical, and business considerations**

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  - **Measurement**
  - Education

**Measurement**
  **Key to measuring HCSS performance is measuring *value***

  **What are the methods and metrics for designing a human-centered service system that effectively integrates "smart" technologies and systems engineering?**

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  - Measurement
  - **Education**

**Education**
**How can the kind of multidisciplinary knowledge and skills required for HCSSs be effectively disseminated?**

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