



CENTER FOR
COMPLEX SYSTEMS
& ENTERPRISES



CCSE Overview

William B. Rouse

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Overview

- CCSE Point of View
- Research Issues
- Domains of Research
- Methods & Tools
- ***Immersion Lab***
- CCSE Strategic Plan
 - Competencies vs. Initiatives
 - Relationships vs. Initiatives



CCSE Point of View

- The large-scale public-private systems on which society depends are increasingly technology enabled for power, processing, communications and transportation.
- The behavior and performance of these systems depend on increasing levels of networked connectivity and feedback loops that make prediction and control far more complex than in the past.
- Understanding and improving these systems requires knowledge and expertise that cut across engineering and physical sciences; economics, finance, and management; and behavioral and social sciences.
- Great insight and value can be gained by supporting decision makers and key stakeholders to interactively explore real or computationally imagined complex systems.



Research Issues

- Computational Modeling of Complex Systems and Enterprises
 - Model-Driven Research
- Understanding Forces Driving Change and Processes Enabling Change in Complex Systems and Enterprises
 - Data-Driven Research
- Balancing Models & Data



Domains of Research

- Healthcare Industry
- Financial Systems
- Urban Systems
- Vehicle Industry
- National Security
 - Enterprise Systems



Healthcare Industry

- Prevention & Wellness
- Chronic Disease Management
- Delivery Models for Population Health
- Patient Flow Optimization via RFID
- Strategic Responses to Affordable Care Act
- Signaling Pathways in Cancer Biology



Financial Systems

- Investment Banking Market Disruptions by Financial Technology Startups
- Risk Perception, Preparedness & Mitigation of Small to Mid-Sized Enterprises
- Role-Based, Intelligent Decision Support for Insurance Underwriters



Urban Systems

- SmartCity Hoboken
- Virtual Antarctica
- Human Response to Natural Threats
- Coastal Resilience & Urban Excellence



Vehicle Industry

- Build to Order
- Manufacturing 2030
- Best/Worst Ten Cars
- Cars that Disappeared
- Technology Adoption in Vehicle Systems
 - Automobiles, Trucks, Ag Equipment
 - Comparison with Aviation, Shipping
- Vehicle Automation



Methods & Tools

- Multi-Level Modeling
 - Ten-Step Methodology
- Interactive Visualization
 - *Immersion Lab*
- Computational Modeling
 - Process Simulation & Optimization
 - Policy Flight Simulators
- Economic Decision Models & Analysis
 - Multi-Stakeholder, Multi-Attribute Models
 - Options-Based Analysis of Investments
- Statistical Modeling
 - Big Data, e.g., Corporate Performance
 - Text Analytics, e.g., Corporate Strategy



Immersion Lab



CCSE Strategic Plan

Mission

Understanding & Managing Complex Public-Private Enterprises

KPI's

1. No. of PhD and MS Graduates
2. No. of Industry and Government Partnerships
3. Impacts on Partner Enterprises
4. No. of Articles, Papers, Chapters, and Books
5. No. of Awards, e.g., Fellow, NAE, IOM
6. Sponsored Research Dollars
7. Gift and Endowment Dollars

Leverage Factors

Stevens & CCSE Reputations

Stevens Faculty & Staff

Stevens Students & Alumni

Greater New York City Location

SERC Network of Institutions

Partner Institutions (e.g., Georgetown)

Relationship Network (Ind., Gov't & Acad.)

NAE & IOM

Publications

Presentations

Strategies

Partner With Disciplinary Thought Leaders

Partner With Domain Enterprises & Thought Leaders

Incentivize Faculty, Staff & Student Involvement

Key Initiatives

1. Healthcare Delivery

- Strategies for Responding to the ACA -- Increase Efficiency, Expand Markets, Etc.
- Population Health -- Outcomes, Economics & Logistics
- Smart & Connected Health -- RFID, Portals & Smart Phone Apps

2. Urban Resilience

- Water & People -- Coastal Urban Resilience, Human Response
- Smart Cities -- Virtual Antarctica & SmartCity Hoboken

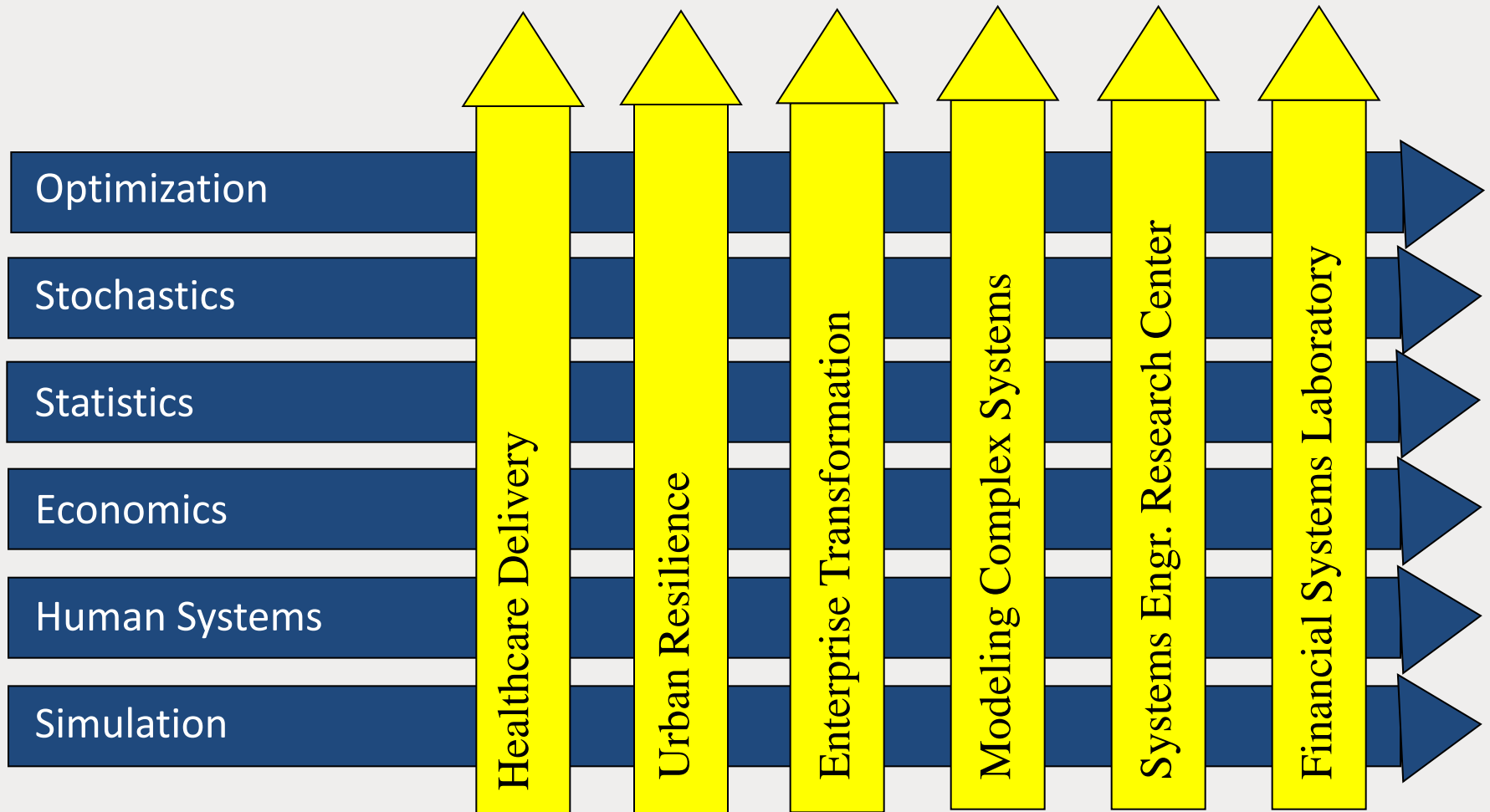
3. Enterprise Transformation

- Strategies for Delivering Healthcare with Pay for Outcomes Models
- Adoption Technologies for Automobiles, Trucks, Ships, Etc. \
- Strategic Entry & Withdrawal in Automobile Markets

4. Modeling Complex Systems

- Interactive Visualization of Complex Phenomena at Different Levels of Abstraction and Aggregation
- Approaches and Limits to Composing Representations Across Different Computational Paradigms

Competencies vs. Initiatives



Relationships vs. Initiatives

- Sponsors of Research
 - Government, e.g., AFOSR, AHRQ, NIH, DARPA, ONR, NSF
 - Industry, e.g., Accenture, Lockheed, Northern Light
 - Foundations, e.g., Robert Wood Johnson, Rockefeller, Sloan
- Partners in Conduct of Research
 - Universities, e.g., Georgetown, Georgia Tech, Indiana, UPenn
 - Healthcare Providers, e.g., Emory, Sloan-Kettering, CarePoint
 - Urban Governments, e.g., Hoboken, New York City
- Sources of PhD Students
 - Berkeley, Columbia, Georgia Tech, Illinois, Maryland, Michigan, MIT, NYU, RPI, Stanford, Stevens, Virginia, VT, Wisconsin, WPI



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