**Project Description**

1. **Strategic innovation methods**
   - Outline methods to systematically innovate solutions for complex systems from end-to-end

2. **Smart, sustainable, integrated building design**
   - Achieve higher levels of building performance through impact-based performance metrics
   - Systematic, quantitative assessment of the true impact of an innovation

3. **Create value in the building ecosystem**
   - Create financial strategies enabling longitudinal value for stakeholders in the building design ecosystem

**Discussion**

- **Synergies** between the occupant, non-energy consuming and energy-consuming building systems provide opportunities for whole-building design innovation and enhanced building performance

- **Building performance criteria** can be changed for more accurate and insightful evaluation of its downstream performance allowing for optimization of the building value across different stakeholders under different scenarios of development

**Approach**

1. **Comprehensive Assessment of Building Impacts**
   - System Interaction Analysis
     - Study of whole-building dynamics and synergies, and their outcomes
     - Building design factors that impact the occupant
     - Occupant factors that impact building performance
   - Organize outcomes as jobs functional, social, emotional, financial

2. **Study of Performance Metrics**
   - Study of performance, characteristics of good performance metrics
   - Determine strong performance metrics that properly relate building systems to each other and the building performance goals
   - Organize outcomes as jobs functional, social, emotional, financial

3. **Design for Impact**
   - Develop methodology for an impact-based innovation model
   - Evaluate the true impact (social, economic, environmental and emotive) of building design solutions
   - Create a scoring method to assess how a building meets that metric
   - Assess the ideal mix of building subsystems to achieve building performance goals through building modeling for specific outcomes

4. **Invest in building innovation**
   - Identify building stakeholders, and their objectives
   - Use business model innovation to connect the occupant building value with upstream decision-makers
   - Determine a set of key performance indicators to track how the building is creating value for each stakeholder group and how well the building owners/occupants are capturing value in return

**Results**

- **Controlled heating and cooling system**
  - Temperature control
  - Energy efficiency
  - Comfort
  - Health

- **Controllable lighting system**
  - Lighting control
  - Energy efficiency
  - Comfort
  - Health

- **Building Parts**
  - Energy sources
  - Water usage
  - Lighting systems
  - Heating and cooling systems

- **System of System**
  - Sustainability
  - Efficiency
  - Safety

**Sponsor:** COE Innovation and Leadership Studies Program

**Contact:** dlumpkin@purdue.edu