Bi-Monthly Progress Report:
Project Number and Title: 4-2 Future-Proof Transportation Infrastructure Through Proactive, Intelligent, and Public-involved Planning and Management
Research Area: Thrust 4 Connectivity for enhanced asset and performance management
PI: *Jin Zhu, Ph.D. Assistant Professor, University of Connecticut*
Reporting Period: *June 1, 2019- July 31, 2019*
Date: *July 31, 2019*

Overview:

Between June 1 and July 31, 2019, the research team carried out the planned activities in the previous bi-monthly progress report. The research team started developing a framework for future-proofing transportation infrastructure knowledge base using the taxonomy developed before. A knowledge base is a centralized database for collecting, organizing, retrieving, and sharing information and knowledge. A knowledge base could provide a structured way for planners and decision makers to learn and incorporate future-proofing philosophy into their daily operations and decision-making processes. The development of the knowledge base is a critical step towards the decision-making support tool we eventually want to achieve in this project.

The knowledge base we propose includes five dimensions: *why, what, how, who*, and *where* (Figure 1). *"Why"* illustrates the reasons to use this knowledge base, *"What"* demonstrates what are included in the knowledge base, *"How"* demonstrates the ways that the knowledge base can be used, *"Who"* provides a list of people that might acquire or use information in the knowledge base, and *"Where"* alludes to the different data sources that contribute to the knowledge base. We started building the knowledge base from the "What" dimension using different important concepts identified from the taxonomy we developed before. Then based on the relationships between the "what" and other dimensions (e.g., who knows what knowledge, where to find what knowledge, how to use what knowledge), we will expand the knowledge based. During the process, a future-proofing transportation infrastructure planning ontology will be naturally developed as well, based on both concepts and relationships in different dimensions.
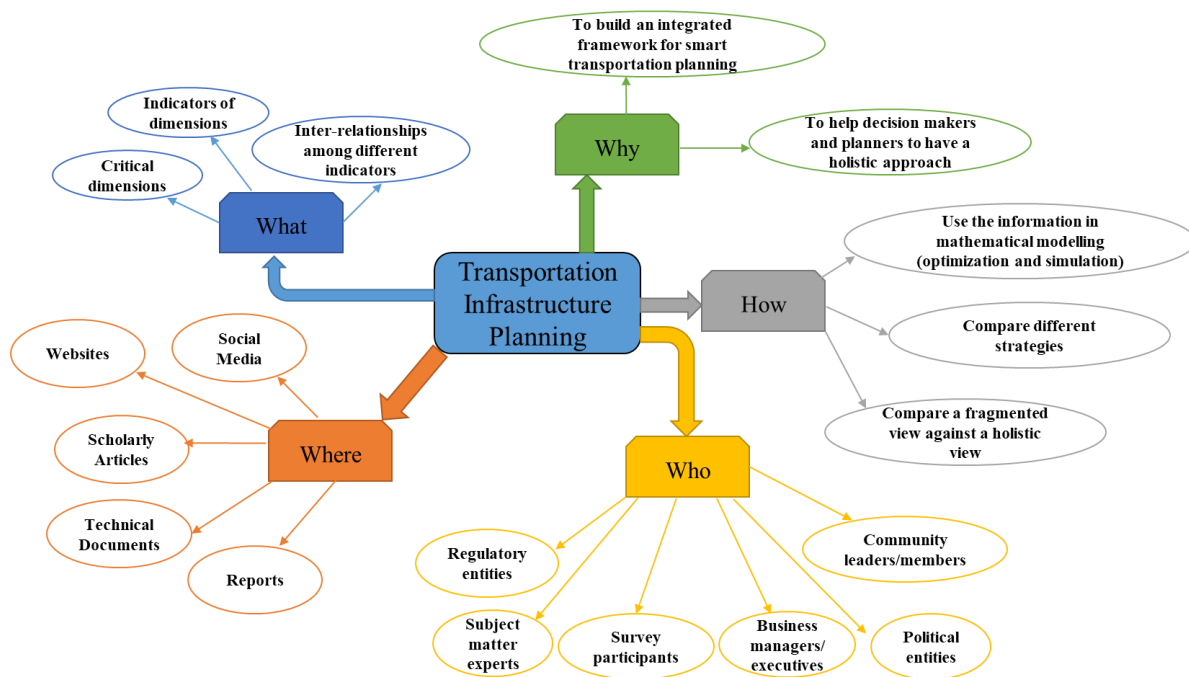

Figure 1: A framework for future-proofing transportation infrastructure planning knowledge base

We used the state of Connecticut as the context for our knowledge base development. We have collected information regarding different dimensions in the knowledge base and are in the process of organizing information and developing relationships.

During this reporting period, PI and PhD student working on this project attended the TIDC annual conference at University of Maine between June 6-7, 2019. PI Dr. Zhu presented the research progress and phased outcomes from this project. PhD student Sudipta Chowdhury presented a poster titled "An Integrated Framework for Data-driven Infrastructure Planning: Capital Projects in the Digital Age" at the conference.

Planned Activities:

In the coming two months, we plan to:

(1) Further collect information using the proposed knowledge base framework as a guideline and organize information collected;

(2) Validate the developed taxonomy and knowledge base with subject-matter experts.