Case Study Report for the Central Plains Heartland Freight Technology Plan

Source: Heartland Freight Technology Plan Presentation
July 29, 2021

U.S. Department of Transportation
Federal Highway Administration

Contract Number: DTFH6116D00052L, Task Order 0014, Modification 0005, Task 4.2
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1. Background and Overview of the Case Study

The Heartland Region is a national hub for agriculture, manufacturing, and freight distribution that includes the states of southwestern Illinois, Iowa, Kansas, Missouri, and Nebraska. Changes in the freight industry, including the advent of new and emerging freight transportation technologies and big data, have created a shift in how goods-movement companies and stakeholders interface with transportation infrastructure. While these technologies hold great promise to improve the safety, efficiency, and economic impact of goods movement, from, and through this region, they will need to be implemented in a strategic and coordinated manner.

To address this need, the Heartland Region conducted a technology assessment and developed a framework to:

- Understand and prioritize new technologies.
- Establish goals and strategies for harmonizing regulations.
- Better manage and share data.
- Organize actions toward implementation.

This project was completed in October 2020, and all work is documented on the Heartland Freight Technology Plan (HFTP) website.

2. Methods, Procedures and Processes

The Heartland Region’s technology assessment was managed through four task tracks.

**Stakeholder outreach and coordination.** A Stakeholder Engagement Plan was created to provide guidance throughout the project lifecycle. It was designed to facilitate discussion among all stakeholders in a timely manner, allowing for sufficient opportunity to voice needs, opinions, and concerns. The stakeholders engaged in this process included six metropolitan planning organizations (MPOs); five state Departments of Transportation (DOTs); the Heartland Civic Collaborative; and other academic, business, and industry leaders. This group was the project Consortium.

**Evaluation of economic nodes and drivers.** A description and evaluation of the freight flows, economies, supply chains, and market linkages in the Heartland Region was conducted to define the needs and opportunities to be pursued. Specifically, economic nodes and drivers were reviewed to (1) identify the top economic drivers of the region; (2) define the major urban and rural nodes in the region; and (3) define the connections between state and metropolitan economies.

**Technology assessment.** New and emerging freight technologies, big data, and a harmonized approach for managing them were examined for the Heartland Region. The assessment was conducted through interviews and a survey of stakeholders, a review of secondary sources, and a two-day virtual workshop with over 50 regional stakeholders in June 2020. The research focused on the maturity and Returns-on-Investment from various technologies, exploration of best practices for coordinated initiatives, and first-hand insight from agencies, deployers, and industry leaders.

**Data sharing and agreements guide.** Building on best practices from other agencies, a guidebook and templates were developed for freight stakeholders and agencies to harmonize their data collection and data management practices, and to prepare them for enhanced data management practices and
products in the future. These were developed to ease public and private data management and data sharing among the large group of stakeholders in the Heartland Region.

Data Sharing – Process View

![Diagram of data sharing process]

Figure 1. Steps in the data life cycle

3. Research Findings, Outcomes and Products

The Heartland Region’s technology assessment resulted in three key findings related to the activities conducted.

Linking the Heartland Regions’ economy to possible technology solutions. Defining the major economic and critical freight flows within the region revealed that links could be drawn between these two flows and possible technology solutions. For example, freight activities in metropolitan areas can be linked to urban delivery and e-commerce applications, such as robotics. Conversely, rural areas that are low-density and have long distances between activity centers may be appropriate for unmanned aerial vehicles (drones) for freight delivery. This demonstrates opportunity to “right-size” solutions based on local needs in this large megaregion.

Identification of technology solutions that provide stakeholder benefits. A combination of research, consultations, and workshops formed the basis for identifying a wide range of technology solutions that can help the Consortium achieve broad transportation system goals through implementation (see Figure 1). Based on the results, regional stakeholders judged that safety, big data, and data/information technologies were the most likely to be implemented, and that big data, energy, and safety technologies would be most beneficial.

Guided by the seven considerations proposed for assessing the viability of a technology application (i.e., Practical Scale; Scalability; Form; Champion; Funding; Jump-Start; and External Partners), two specific technologies were recommended to focus on as part of an implementation strategy: Advanced Driver Assistance Systems (ADAS) for safety benefits and truck electrification for energy/environmental benefits.
A framework and actions for regional data sharing and management. The HFTP developed a reasonable approach to assess and integrate new freight-related data and technologies within partner agency operations and a Blueprint for Action to establish (1) a data governance structure and vision, and (2) continue to actively monitor and discuss technology trends. These two components are essential so that Heartland Region stakeholders (the consortium) can move forward collectively when discussing policy, infrastructure needs, costs and benefits, and best practices around data sharing and agreements.

4. Challenges

Like many projects that chart new ground, the Heartland Region technology assessment was not without its challenges. However, each challenge presented a new learning experience for the consortium, and in one case, the revised approach resulted in more of an improved process than was initially conceived. Challenges included:

The COVID-19 Pandemic. This project was initiated just prior to the onset of the COVID-19 pandemic, posing a challenge to the high-level of stakeholder involvement desired during the process. Two project workshops were changed from in-person to online/virtual formats due to COVID-19 travel restrictions and health concerns. Each virtual workshop included breakout groups and interactive polling to maintain the interactive engagement objectives of the project. In the end, workshop participants all considered the switch to a virtual format remarkably successful.

The broad nature of freight data and users. The broad nature of freight data combined with varying stakeholder needs and perspectives made developing a data sharing agreement guide challenging. Care was taken during the process to promote a common understanding of different stakeholders’ perspectives, such as why private-public data sharing and agreements are uncommon and why public-public data sharing is often done informally or in an ad-hoc fashion. Understanding these nuances helped to set the focus of the project.

General staffing and leadership needs. Throughout the process stakeholders stated that they felt unprepared to handle the implementation of new technologies due to a lack of technical staff to leverage the opportunities available, develop the technologies, and test/pilot the new technologies prior to deployment at scale. A related weakness was a lack of expertise in utilizing existing data sources to communicate and frame a story to elected officials around a given need or opportunity. Additionally, changing leadership can make it difficult to see long-term data projects through to completion to support freight technology. The consortium has agreed to meet for an additional 18 months following the development of the HFTP to ensure there is a pathway (and a champion) for implementation.
5. **Immediate and long-term anticipated benefits**

The primary, immediate benefit of this work is the proactive private and public data sharing that occurred and the path that has been outlined for continued collaboration of Consortium members on freight, data, and policy topics.

Additionally, this project identified an approach to harmonizing planning and policy development for new freight technologies which may lead to earlier adoption and faster realization of potential benefits and economic impact of goods movements through megaregions, states, and metropolitan areas.

6. **Ease of Replicability**

The research and results of the HFTP are replicable in at least three ways and may provide guidance to other regions on technology identification, assessment, and implementation:

- **Stakeholder engagement.** This project started with identification of key stakeholders and development of a thoughtful plan on how they would be engaged. This engagement plan could be adapted and customized to any size region, including who and how to engage throughout the assessment process.

- **Technology viability assessment framework.** The process used in this research goes beyond a simple “technology maturity” framework and provides guidance on how technologies and their specific benefits could be evaluated in the context of a specific region’s goals and needs.

- **Data sharing best practices and guides.** While not replicable in the traditional sense, this project conducted research on various types of data sharing within the region and beyond, including public-public and public-private relationships. A detailed inventory of existing data sharing agreements and other data sharing resources is provided in the *Final Report* as a starting point for other agencies to quickly obtain a listing of best practices to explore.

7. **Lessons Learned**

The HFTP and the process used to conduct the research were considered a success. A few “dos and don'ts” for those that would like to conduct a similar effort include:

> Our project provided a really good model for how to approach freight technology needs to an area that’s emerging. I’m not aware of a lot of other places in the country that have done this, certainly (not) to the kind of multistate, multiregional scale that we’ve looked at it.

—Ron Achelpohl, MARC
Work with experts. One of the challenges of exploring an area described as “new” and “emerging”, is that local stakeholders are likely not experts. In the case of the HFTP there were a lot of stakeholders (over 300 public and private stakeholders). For this large a group, an expert was engaged that had national experience and links to best practices to share. The expert was also skilled in engaging large, diverse, groups of stakeholders which eased the coordination and was inclusive of the myriad perspectives at the table. Others who would like to replicate the HFTP activities should consider the scale of effort involved and if external support may be required.

Consider virtual outreach as Plan A, not Plan B. This project had extensive in-person outreach planned that was derailed during the COVID-19 Pandemic. While this could have had a detrimental impact on the process, switching to virtual outreach enabled the project to reach out to more stakeholders in a very cost-effective manner.

There were a lot of important lessons we learned. It was a large geographic area, and so building (outreach) tools into the process actually allowed us to...reach more stakeholders...in a more cost-effective way than...flying everybody in together to meet in a single location at key points in the process.

—Ron Achelpohl, MARC