HEARTLAND FREIGHT TECHNOLOGY PLAN

FINAL REPORT

FINAL

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Prepared by

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EXECUTIVE SUMMARY

This plan examines freight connections between metropolitan areas and states, assesses potential impacts, and presents recommendations to harmonize the implementation of emerging freight technologies across the Central Plains/Heartland Region, which includes all or parts of Illinois, Iowa, Kansas, Missouri, and Nebraska. This mega-region is a national hub for agriculture, manufacturing, and freight distribution.

The project was broken into a framework with four primary areas to explore: 1) stakeholder outreach and coordination, 2) evaluation of economic nodes and drivers, 3) technology assessment, including regulation and harmonization across the region, and 4) a guide to advance data sharing and agreements. A summary of the approach, challenges, results, and recommendations has been outlined in this final report, with the detailed materials included in the list of appendices for each of these topics.

The ultimate output of this effort is a blueprint for action to advance the findings of the plan – within the blueprint are detailed next steps drawing on the specific recommendations outlined in each area of the project framework. Next steps within the blueprint are organized into one of three timeframes: near, mid and long-term.

The blueprint for action calls for the Consortium to remain in effect for at least the next 18 months, or until a suitable agency can be found to house the implementation of this plan. The Consortium will provide overarching guidance for this plan, setting direction for activities undertaken by the working groups. The blueprint also identifies specific actions to organize the Consortium, such as formally identifying a champion, further exploring funding and staffing requirements, establishing influence throughout the region, and building relationships with additional partners. Finally, the plan outlines preliminary steps for data and policy working groups to advance a number of priorities that the Consortium has agreed to advance in the near term.

The Heartland Freight Technology Plan lays the groundwork to advance policy recommendations throughout the Heartland mega-region with the intent to avoid or minimize the risks associated with a patchwork of regulations for new and emerging technologies. Understanding current regional state and metropolitan transportation goals and safety objectives, economic development, environmental sustainability, asset management and other needs are imperative to reducing patchwork regulations. Additionally, it provides recommendations that support technical and institutional best practices for data management and exchange between agencies and companies for safe, efficient operation of freight technology systems.

INTRODUCTION

PROJECT BACKGROUND

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 are creating a paradigm shift in how all participants in goods movement interface with transportation infrastructure, from the supplier to the consumer. To address the need that this shift presents, the Heartland Region created this project to develop a freight technology plan (Heartland Freight Technology Plan (HFTP) that will deliver:

- A prioritization framework for new technologies;
- Goals and strategies for harmonizing regulation;
- Recommendations for data management and sharing; and
- A blueprint for action and implementation.

The HFTP is part of FHWA's National Economic Partnerships (NEP) grant program and is being developed through a partnership of six Metropolitan Planning Organizations (MPOs); five state departments of transportation (DOTs); the Heartland Civic Collaborative; in coordination with other academic, business, and industry leaders.

To assist the Heartland Freight Technology Consortium (Consortium) in engaging key public and private stakeholders around a regional freight technology plan, the engagement strategy outlines roles, responsibilities, and communication methods to foster input, buy-in, and sustained collaboration throughout the plan development, implementation, and beyond.

SCOPE AND PURPOSE

This Final Report and corresponding presentation materials articulate the development and benefit of the tools developed in this project. Deliverables from each element of the project are discussed in this report and included as appendices.

This brief report offers a narrative summary of the methodology, process, challenges, and solutions in providing regional guidance, and incorporate technical analyses prepared earlier in the project.

STAKEHOLDER OUTREACH

A Stakeholder Engagement Plan was created at the outset of the project to document and guide engagement activities. The plan is a living document that provides guidance throughout the project lifecycle. It is designed to facilitate discussion among stakeholders while fostering collaboration and understanding that actively involves all impacted stakeholders in a timely manner, allowing for sufficient opportunity to voice needs, opinions, and concerns. It does not just simply distribute information, rather it incorporates feedback from stakeholders into project deliverables. This plan also defines roles and responsibilities, a timeline for stakeholder involvement, and stakeholder feedback loops for key deliverables.

APPROACH

The scope of the stakeholder outreach effort focused on addressing the three specific elements that are covered in the plan. This focus avoided too broad a scope of potential candidates and leveraged the collective energy of Consortium members and potential stakeholders directly on specific needs.

CHALLENGES

Two project workshops were changed from in-person to online/virtual formats due to COVID-19 travel restrictions and health concerns. Workshops were adapted to be held online or virtually as two-day Zoom meetings. Each workshop included three breakout groups each day and polling questions to maintain the Consortium's interactive engagement objectives. In the end, workshop participants all considered the switch to virtual remarkably successful. Another challenge was updating and maintaining the stakeholder database to support the Technology Workshop, the Data Sharing and Agreements Workshop, and the project survey.

RESULTS

The project team was successful in meeting the goals and objectives of the engagement strategy, which included identifying and engaging multi-jurisdictional partners to work alongside the Consortium to establish stronger regional freight and commerce collaboration; differentiating this effort from other planning efforts, such as statewide freight plans; establishing sustainable strategic partnerships that share regional insight and experiences for evaluating, cultivating, and adopting freight technologies; and crafting effective communication and messaging strategies to support regional collaboration and convey study findings with public and private sector stakeholders.

In addition to monthly project updates, the Consortium met a total of 12 times, including two in-person meetings. The project tracked another dozen additional related events on freight technology or mega-region topics that included the project team, Consortium members, and/or other stakeholders. Appendix J summarizes the project's outreach activities.

RECOMMENDATIONS

The project provides tools to establish a strong base for the Consortium to continue to build on and update in the future.

ECONOMIC NODES AND DRIVERS

The composition of the Heartland regional economy and its freight traffic provides a basis for identifying the industrial drivers for the region and the economic contribution represented by the commodities they produce and transport. The movement of freight traffic – by location, direction, mode, and commodity – is an expression of how economic activity translates into transportation to industrial and consumer markets. The patterns of movement and markets enable definition of economically influential counties and clusters of counties that function as the urban and rural nodes of the region. The Consortium recognizes that the relationship between urban and rural areas is symbiotic and dynamic, especially in the Heartland Region. Urban and rural communities are inherently complementary to each other and cannot exist without the other. Freight technology that improves industrial movement across nodes – making it faster, more reliable, safer, cleaner, more productive, lower risk, and lower cost – makes the Heartland, both urban and rural, more competitive in markets while maintaining the vitality of its communities.

APPROACH

This part of the HFTP provides a description of the freight flows, economies, supply chains, and market linkages within the study area that helps to define the needs and opportunities later in the project. Specifically, economic nodes and drivers looked at:

- Identification of the top economic drivers of the region;
- Definition of the major urban and rural nodes within the study area; and
- Definition of the connections between state and metropolitan economies.

Counties that are mostly urban generate almost two-thirds of the region's GDP. Just five percent is generated in counties that are completely rural, and the remainder of GDP is generated in counties that are mostly rural. Manufacturing makes the largest contribution to GDP from freight-dependent industries in both urban and rural counties,

led by food production, followed by transportation vehicles, machinery, and electronics. Rural areas have significant contributions from the agricultural industry, while urban areas have a higher contribution from wholesale trade. Important sectors are interconnected: food manufacturing as well as ethanol and biodiesel production use agricultural products, while chemical and machinery manufacturing provide inputs to agriculture.

Most freight in the Heartland travels by truck, and all commodities except coal depend on highway transport. Rail and waterborne freight are more prominent for freight flows into and out of the region. Cereal grains in particular — the largest commodity and a mainstay of the rural economy — rely on rail, water, and multiple modes to carry about one-third of the traffic. The lower transport costs associated with these modes is important to the competitiveness of Heartland Region.

CHALLENGES

When considering employment, contribution to GDP, and the value of freight, the nodes of the Heartland are its urban areas. Considered in terms of food production – the core regional industry of agricultural output and its manufacture into products for human and animal consumption – rural nodes emerge in the north and northwest. All told, nine economic nodes are responsible for over 60 percent of GDP and employment, and about half the volume of freight in dollar terms. Examination of nodal freight reveals that:

STB Waybill data was requested and analyzed. The results confirmed prior findings.

- Trade and traffic by physical volume (tonnage) is local: within the node and the state surrounding it
- Trade and traffic by dollar value are with national and global markets, and with the surrounding state as well
- Trade and traffic between nodes tend to be stronger when local markets are smaller, and weaker when local markets are large
- Trade and traffic between nodes and the Heartland states that do not surround them is relatively weak

The trade and traffic patterns reveal that the Heartland today functions more as a collection of nodes serving adjacent territory and the outside world, and less as an integrated region.

RESULTS

The data presented in this technical memorandum point to certain themes about potential shared outcomes.

- Much of the economic activity within the Heartland Region occurs within the region's nodal metropolitan areas, given that these are locations of population and employment concentration. Urban delivery technologies for conventional and e-commerce applications, such as robotics, thus are significant. While local traffic by definition does not reach across the region, its issues and opportunities can be addressed in a coordinated fashion. This could range from pilots in multiple locations - or in one location producing shared results – to policies developed in common that help technology providers to standardize.

- The territories adjacent to Heartland nodes rank as their largest or second largest trading partner by freight tonnage and value. Therefore, connections between the nodes and surrounding areas is a strategic consideration. One technology these connections are suited to is electric trucks, because the relatively short travel distances align with the operating range of contemporary batteries. Adoption of electric vehicles raises questions around power grid capacity for charging stations, and revenue replacement for gas taxes.

- Rural areas account for the majority of Heartland territory. In addition to the supplies they depend on from nodes and their need for long-distance links for agricultural products, they are low-density areas for freight with local connections via farm-to-market roads. Unmanned aerial vehicles (UAVs) or drones have uses in these districts, whether for road inspection or for e-commerce deliveries to farms. A contemporary task for road inspection is determining the presence and condition of lane striping, which safety systems in new model cars and trucks rely on, as will future driverless vehicles.

- The Heartland Region is well known for its agricultural production. These states have among the highest agricultural production in the nation. However, agriculture contributes a relatively small share of the region's GDP. Overall, manufacturing, wholesale, and retail trade represent a larger share of economic activity among freight-dependent industries.

- Data and data systems are an essential enabler of most new technology.

RECOMMENDATIONS

Heartland public agencies must plan for freight technology wherever it is being introduced, but efforts to influence and support it should reflect the dynamics of the regional freight market and the supply chains it serves.

- Technologies applicable to local operations – last mile, but also service between nodes and surrounding areas – address a primary component of the Heartland freight system and deserve attention.

- Technologies applicable to long-distance trade between the region and national and global markets will help keep Heartland industry competitive. Multimodal transport, intermodal connections, and over-the-road trucking are all significant aspects.

- Technologies that support connection between rural and urban areas can help the Heartland function more as an integrated market. Efforts that simply help rural areas benefit from technology advances are appropriate. Longer term, opportunities from the "internet of things" should be monitored, because farms are increasingly becoming digital operations and manufacturers steadily are more coordinated with their suppliers.

FREIGHT TECHNOLOGY ASSESSMENT AND HARMONIZATION

Assessment of freight technologies and development of a harmonized approach for managing them are the focal points of this section. Recommendations are based on research into the maturity and payoffs from various technologies, exploration of best practices for coordinated initiatives, and first-hand insight from agencies, deployers, and industry leaders. The assessment sought to:

1. Identify emerging freight technologies that are most likely for near to intermediate term implementation in the region.
2. Identify emerging freight technologies that are most beneficial for near to intermediate term implementation in the region.
3. Assess how public agencies currently coordinate technology integration practices and policies with industry advances in freight and supply chain technology.
4. Assess the strengths, weaknesses, opportunities and threats (SWOT) related to current agency policies and initiatives, and best practices moving forward.
5. Identify and analyze opportunities for harmonization of regional policies and practices related to freight technologies.

APPROACH

Research was conducted through interviews and a survey of stakeholders, review of secondary sources, and a two-day virtual workshop conducted with over 50 regional stakeholders in June 2020. Findings included evaluation of the maturity and benefits of relevant technology, and ways to keep the evaluation up to date.

Research and findings formed the basis for recommendations as to how Heartland agencies can organize to attain benefits and reduce deficiencies and led to two options for technology programs. The programs combine action in urban and rural areas, address strategic needs and support service in the Heartland's principal markets, incorporate constituent appeal, and pursue material benefits from consequential technology in the near and medium term.

CHALLENGES

The major challenge is the need for new revenue policies to fund infrastructure growth and technology deployment, sharpened in 2020 by pandemic-driven reductions in tax revenues. According to stakeholders, ineffective methods of revenue generation to support the transportation network is the Heartland's number one weakness. Legislative resistance to increased investments in technology is a complicating factor, as is the lack of a proactive policy towards such investments. These issues exist across the Heartland's public jurisdictions and affect the potential for coordinated regional action.

Another prominent challenge identified in the workshop is the need for a committed regional champion to push technology investments through to successful implementation. The organizational form the technology program adopts affects how such an official can operate. Additional challenges are:

- Diverse priorities across the region. Any lack of clarity in goal setting are obstacles to a cohesive technology plan.
- Infrastructure needs across rural and urban areas. These must be reconciled as part of a regional approach.
- Expertise with new technologies. This is necessary to leverage the opportunities available, and agency staffs may not have enough. There is similar need for expertise in using data sources to communicate and frame a story to elected officials around a given need or opportunity.
- Automation technology. This makes new ways of working and even new products possible. While it can make the difference in whether a facility or service is competitively viable, it also impacts the labor component. Some jobs might not exist without automation, the nature of other jobs may change, and still others could face elimination. Interaction with the Heartland agencies or departments responsible for workforce programs therefore should be a technology policy objective, both to ensure the readiness of workers for the skills technology requires, and to assist the transition of workers from diminishing forms of employment to new ones.

RESULTS

Technology types and their benefits are summarized in Figure 1. Heartland 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. The composition and maturity of the types is described in detail in the Technology Assessment and Harmonization memo and forms the basis of a Technology Watch List. A major recommendation is maintenance of the Watch List and continuing engagement and collaboration with stakeholders is a key method for doing so.

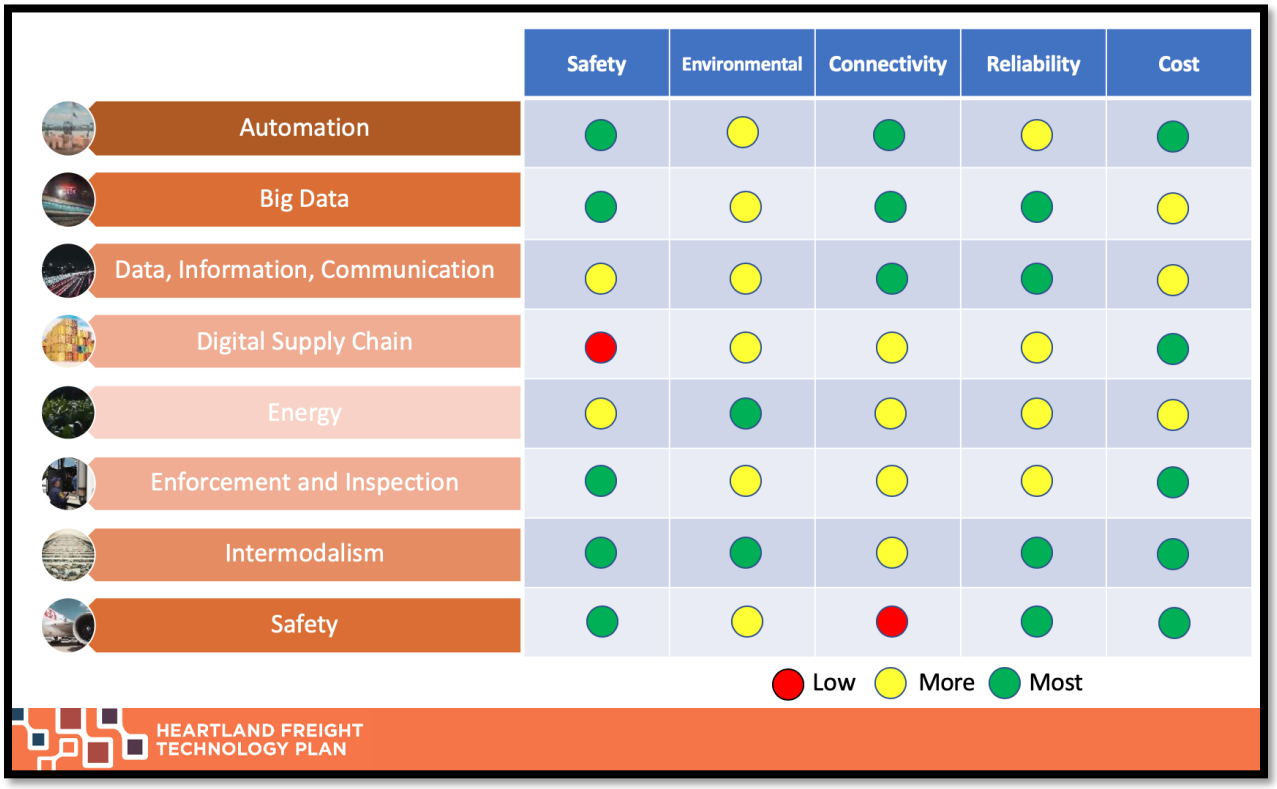

Figure 1: Technology Types and Benefits

Organization of a regional approach to technology is warranted, beneficial, and best done in cooperation with the private sector, guided by the following seven considerations:

- **Practical Scale:** the region should walk before it runs, reflecting its resources, its level of collaborative experience across sectors, and the need for focus in action.
- **Scalability:** technology will continue to evolve; organizational capabilities and procedures should be able to grow with it.
- **Form:** a core team should be established with responsibility for strategy and programs, supported by working groups drawn from member agencies responsible for implementation.

- **Champion:** a program champion can be drawn from Heartland Consortium members, elsewhere in their agencies, or from the private sector memberships of the region's Freight Advisory Committees (FACs).
- **Funding:** funding for fixed costs should come from sources that can be committed for multiple years. Variable costs could be applied for within existing agency programs and through competitive grants.
- **Jump-Start:** the value of an infusion of funds to jump-start the program is clear from precedents. Grants or economic stimulus funds could be a near-term source.
- **External Partners:** external partnerships should be advanced through engagement of Heartland FACs on a regionwide basis, use of intermediaries, and involvement of academic institutions.

Two technologies make promising candidates for initial focus: Advanced Driver Assistance Systems (ADAS) in the Safety category, and truck electrification under Energy.

- **ADAS**: These programs are in the early stage of adoption. Because they provide immediate benefits while being part of the suite of technologies that lead to automated vehicles, they are practical and forward-looking. They are a safety technology that reduces costs for motor carriers and addresses the concern for truck safety among Heartland voters in a way they can understand. Accelerating ADAS adoption by motor carriers is a program option, possibly as a small business initiative. Involvement of rural areas in regional technology development can become a strategic purpose of such a program.
- **Electrification:** Electric trucks are in the field stage of development and should move into adoption within five years, but they are worthy of attention now as long-standing barriers to widespread adoption erode. Economic barriers are declining, and costs are projected to be comparable to internal combustion engines by 2024. Technical barriers are being overcome with multiple firms bringing electric vehicle (EV) technologies to market. Electric utilities, targeting new market opportunities, are leading efforts to develop needed charging infrastructure. Proper planning and collaboration can remove policy barriers. EVs appeal to motor carriers because of driver preference and potentially lower cost. They are suited to local operations in Heartland nodes and surrounding territory, and for pick-up and delivery for long distance rail-truck, barge-truck, and air-truck operations. Planning for electrification ought to be initiated now because preparation and installation of infrastructure will take several years to start and require more time to expand.

RECOMMENDATIONS

The recommendations in this technical memo fall under three main categories: regional organization for success, and the support of both ADAS and electrification programs.

DATA AND AGREEMENTS GUIDE

The Data and Agreements Guide offers highlights and provides best practices and examples in data sharing and data management for a lay audience. It focuses on public sector needs and recommendations; others may also find this guide useful in understanding the challenges that public sector partners face related to data sharing. The guide will enable the region and freight stakeholders to move forward by setting the stage for enhanced data management practices and products that benefit both freight stakeholders and public agencies. The guide also summarizes a series of information-gathering sessions with relevant stakeholders that elicited input and stimulated brainstorming on the data policy.

Within this guide are recommendations for public and private data management and data sharing opportunities and arrangements to promote efficient interoperability of freight technology systems in the Heartland Region. Data-sharing and data management agreement templates, recommended metadata, protocols, and/or recommended data structures are also highlighted throughout.

This guide is not limited to freight data. Rather, it focuses on data needed to support cooperation on emerging freight technologies, which may or may not include traditional freight data sources.

APPROACH

The primary objective of this guide is to push the region and freight stakeholders forward in their data collection and data management practices to set the stage for enhanced data management practices and products that benefit freight stakeholders and agencies alike. The guide provides best practices, provides data sharing/management templates, and presents a system architecture to push the region and freight stakeholders forward.

This guide provides recommendations for public and private data management and data sharing opportunities and arrangements to promote efficient interoperability of freight technology systems within the region. It builds from the results and recommendations of previous work within the Heartland Freight Technology Project, as summarized within this section. Information was collected by the stakeholder outreach plan for the project, which included gathering critical input from the HFTP Consortium membership, stakeholder interviews, two workshops, and an online survey.

CHALLENGES

The broad nature of data combined with varying stakeholder needs and perspectives made this guide challenging to develop. The SWOT analysis conducted in the workshop format helped to support the direction for the guide. The analysis also helped to promote a common understanding of different stakeholder's 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 guide at a high level because both structural organization, including vision setting, and ongoing scans of data to support freight technology were needed.

RESULTS

A two-step framework defines the next steps for the Consortium to follow. The first step of the framework is to establish a data governance structure and vision, the second step is to assess and monitor data infrastructure maturity and technology trends. These two steps are further defined with tactical actions that will result in a common understanding and agreement among HFTP Consortium members and enable better communication with other stakeholders, especially when discussing policy, infrastructure needs, costs and benefits, and best practices around data sharing and agreements.

RECOMMENDATIONS

The guide discusses methodology and regional trends to provide context around how to develop and implement a data framework to support freight technologies with a large group of stakeholders found within the HFTP Consortium. The guide recommends that the Consortium take near-term action to establish a data governance structure and vision and continue to actively monitor and discuss technology trends collectively.

The Consortium or data custodian, if such a position has been assigned, should update the guide periodically.

BLUEPRINT FOR ACTION

The following outlines specifics steps that will need to be taken for the implementation of this plan drawing on the recommendations outlined within the technical memoranda. Each next step has been organized into one of three timeframes and should be completed within **near-term** (less than 3 months), **medium-term** (less than 18 months),

or **long-term** (more than 18 months) timeframes after plan adoption. These timeframes will help prioritize and focus Consortium efforts.

ONGOING CONSORTIUM EFFORTS

The Consortium will remain in effect for at least the next 18 months, or until a suitable agency can be found to house the implementation of this plan. The Consortium will be responsible for coordinating implementation and providing direction for activities undertaken by the working groups.

Next Steps:

i) Develop a pilot project drawing from the recommendations and apply for additional funding to jump-start implementation
Time Frame: Medium-term

ii) Maintain the technology watchlist. Update the watchlist annually and reassess for emergent technologies to inform the following year's workplans.
Time Frame: Medium-term

iii) Support the EV and ADAS Policy Committees and create working groups as new technologies emerge.
Time Frame: Long-term

CONSORTIUM ORGANIZATION

1. Funding and Staffing

With no obvious regionwide organization to attach to, and no immediate funds to support one, the Consortium should remain intact and serve as the initial organization. The Consortium should supply overhead for its activities from internal agency resources, until a more permanent structure can be identified and agreed upon. The organizational approach thus has a core team (the original Consortium) responsible for strategy and programs, supported by working groups drawn from member agencies responsible for implementation. This should be approached as an evolutionary process, adding capacity as can be justified over time.

Next Steps:

i) The Consortium should select a lead agency and staff person from within the Consortium membership to continue as project manager for the next 12-18 months of implementation of this plan. This person will be responsible for things such as running monthly Consortium calls, applying for grant funding and acting as staff liaison for Consortium members and working groups.
Time Frame: Near-term

ii) Determine the available staff resources from each Consortium member. Once staff has been identified, determine the level and duration of effort these resources can support for the implementation of this plan.
Time Frame: Near-term

iii) Explore a jumpstart or infusion of initial funds by defining key goals/next steps and applying for grant funding. In the absence of, or in addition to grant availability, explore the potential of a pooled fund.
Time Frame: Medium-term
Move towards Consortium supported funding once the initial infusion has demonstrated the need for the group and its ongoing work. Consortium supported funding should determine:

(1) Funding for fixed costs: Funding for fixed costs should come from reliable sources that can be committed for a number of years; State Planning and Research (SPR) funds come from the federal government and might be such a source.
Time Frame: Long-term

(2) Funding for variable costs: Variable costs could be applied for within existing agency programs (e.g., CMAQ for electric truck initiatives) or through competitive grants. Grants for economic recovery or from reauthorization of the FAST Act are two notable possibilities (but only possibilities) in 2020 and 2021.
Time Frame: Long-term

2. Name a Champion

The call for champions was a recurring theme in stakeholder engagement; the characteristics it seems to reflect are a blend of formal authority, informal temperament, and internal or external political support. Options for identifying a program champion include assessing Consortium members themselves or others within their agencies and seeking a private sector champion from among the region's Freight Advisory Committees (FACs) to pair with the Consortium chairperson.

Next Steps:

i) The Consortium will assess whether someone suitable has emerged within the membership or could be brought into the group from elsewhere in the Consortium agencies. Alternately the consortium may seek a private sector champion among FACs identified in the Heartland region.
Time Frame: Near-term

3. Develop Regional Influence

The MPOs and DOTs can choose to treat the Consortium as a primary reference for freight technology issues in their transportation and freight plans, and the lead agency selected by the Consortium can apply for federal funds on behalf of constituents for regional initiatives. The timing for such a step is advantageous, because updates to state freight plans are in progress or on the horizon across the Heartland. If Heartland agencies adopt the Consortium as a reference for freight technology issues in transportation and freight plans, the stature and influence of Consortium leadership will be greater, and the likelihood of a regionally consistent approach will increase.

Next Steps:

i) Identify all ongoing updates to MPO and DOT Freight Plans and assign a Consortium member to represent this Heartland Freight Technology Plan as part of the coordination for the update to ensure that the recommendations within this plan are integrated to the extent feasible.
Time Frame: Near-term

ii) Assigned Consortium members will work with their respective assigned agencies to coordinate the integration of the Heartland Freight Technology Plan into the freight plan updates. They will report back progress and updates on Consortium monthly calls.
Time Frame: Medium-term

iii) Continue to present and share progress on the Heartland Freight Technology Plan at events such as the MAFC – Annual Conference, FHWA – Monthly Talking Freight Webinars, AASHTO Freight Committee meetings, ITS Heartland events, and CSCMP Chapter meetings.
Time Frame: Medium-term

4. Establish Working Groups and Build External Partnerships

The Consortium will seek to engage additional partners to support the implementation of this plan. The need and importance of external partnerships emerged in workshops and elsewhere in this project. Partners can work informally as part of working groups or may be added as a member to the Consortium; where appropriate, partners may even lead the implementation of portions of this plan.

Potential partners may include, but are not limited to:

- Freight Advisory Committees (FACs)
- Intermediaries for the protections of data (i.e. ATRI and NACFE)
- Academic Institutions

(e.g. Logistics Programs)
- MAASTO
- ITS Heartland
- Clean Cities Coalition
- Supply Chain Managers at Logistics Companies
- Data Analytics Providers
- Chambers of Commerce (transportation sections)

Based on workshop feedback from several stakeholders and Consortium members, the Consortium should support peer exchanges, under which staff will visit partnering agencies for a day or otherwise share information. The objective of the peer exchanges would be the development of better mutual understanding of sector perspectives and institutional capabilities, as well as the thoughtful cultivation of long-term, valuable relationships among Consortium members and partners.

Next Steps:

i) Data Working Group: Establish a working group of technical staff from within the Consortium membership. This Data Working Group will advise both the ADAS and EV Working Groups as well as the general Consortium.
Time Frame: Near-term

ii) ADAS Policy Working Group: Establish a working group with stakeholders from finance, promotion, contracts, and technical partnerships. A strategic purpose of the program is involvement of rural areas and small businesses in regional technology development.
Time Frame: Medium-term

iii) EV Policy Working Group: Establish a working group with stakeholders from utilities, wind and solar producers, truck stops, and other developers interested in serving passenger as well as freight vehicles.
Time Frame: Medium-term

iv) Explore opportunities for peer exchanges between public and private agencies to develop mutual understanding and foster long-term cooperation.
Time Frame: Medium-term

WORKING GROUPS

Each working group should include a mix of core Consortium members, as well as private and external stakeholders. Once a group has been formed, co-chairs will be appointed by the Consortium to lead the working group. Each working group should develop a 12-month workplan that will be approved by the Consortium and coordinated with the Data Working Group. While the workplans will outline in fuller detail the activities, below are the high priority items that each working group should focus on in the near term.

1. Data Working Group

The primary function of the Data Working Group will be to use the Data Technical Memorandum and the Data Guide to begin implementing recommendations. Special focus should be given to account for protecting privacy and intellectual property, ensuring cybersecurity, and facilitating public and private sector benefits through their coordinated management and operation

Next Steps:

i) Develop data agreements to begin sharing core datasets used regionally.
Time Frame: Medium-term

ii) Explore the creation of a Regional Data Hub. Part of this regional data hub could include the ability to not just disseminate information, but gather it as well, following the recommendation for providing aggregated, anonymous safety data in exchange for ADAS data.
Time Frame: Medium-term

iii) Support the ongoing monitoring of federal performance measures as it relates to freight; develop new regional measures in coordination with the Consortium on an as-needed basis.
Time Frame: Long-term

iv) Support ADAS and EV Working Groups in collecting and analyzing data, examples include:
(1) ADAS hard breaking and near crash events to identify potential safety risks
(2) Adoption of electric trucks by the motor carrier industry
Time Frame: Medium-term

2. Policy Working Groups

The primary function of both Policy Working Groups is to identify and cultivate relationships within existing non-profit, national working groups, or federally supported university research programs that can develop policy recommendations to avoid or minimize the limitations of a patchwork of regulations for new and emerging freight technologies. Understanding current regional state and metropolitan freight transportation goals and safety objectives, economic development, environmental sustainability, asset management and other needs are imperative to reducing patchwork regulations.

Next Steps for ADAS Policy Working Group:

i) Evaluate existing legislation of the entire Heartland region for barriers to implementation of ADAS technologies seeking to harmonize as needed.
Time Frame: Medium-term

ii) Consider financial strategies to support the implementation of ADAS, particularly in small and/or rural businesses.
Time Frame: Long-term

Next Steps for EV Policy Working Group:

i) Explore multi-state, regional alternative pricing models for electric vehicles. According to stakeholders, ineffective methods of revenue generation to support the transportation network are the Heartland's number one weakness.
Time Frame: Medium-term

ii) Track and coordinate the development of significant EV corridors within the region. The Federal Highway Administration's (FHWA) Alternative Fuel Corridor program is establishing a national network of alternative fueling and charging infrastructure along national highway system corridors. Corridors are already identified in the Heartland Region, and private firms like Electrify America are building out charging infrastructure in these corridors.
Time Frame: Long-term

LIST OF APPENDICES

These appendices are available to download as a zip file from the project website.

PROJECT DELIVERABLES

SUPPORTING MATERIALS

APPENDIX A - STAKEHOLDER ENGAGEMENT PLAN

Available to download as a zip file from the project website.

APPENDIX B - ECONOMIC NODES AND DRIVERS TECHNICAL MEMO

Available to download as a zip file from the project website.

APPENDIX C - FREIGHT TECHNOLOGY ASSESSMENT AND HARMONIZATION TECHNICAL MEMO

Available to download as a zip file from the project website.

APPENDIX D - DATA AND AGREEMENTS GUIDE

Available to download as a zip file from the project website.

APPENDIX E - FINAL PROJECT POWERPOINT

Available to download as a zip file from the project website.

APPENDIX F - STAKEHOLDER DATABASE

Available to download as a zip file from the project website.

APPENDIX G - PROJECT WEBSITE

http://www.heartlandfreightplan.org/

https://www.marc.org/Transportation/Plans-Studies/Transportation-Plans-and-Studies/Heartland-Freight-Technology-Plan

Heartland Freight Technology Plan

HEARTLAND FREIGHT TECHNOLOGY PLAN

A national hub for agriculture, manufacturing and freight distribution, the Central Plains/Heartland Region includes the states of southwestern Illinois, Iowa, Kansas, Missouri and Nebraska.

Together, we are embarking on a freight technology plan for the region that will deliver:

- A prioritization framework for new technologies.
- Goals and strategies for harmonizing regulation.
- Recommendations for data management and sharing.
- A blueprint for action and implementation.

GET INVOLVED
PROJECT UPDATES
PARTNERS
TIMELINE
FACT SHEET

Understanding regional linkages requires vision, foresight and keen awareness of strengths associated with a shared regional vision. We will be looking for partnerships to assist in information sharing. Creation of the freight technology plan will follow this sequence.

Economic connections between Heartland metropolitan areas and states

The team will work to define the major economic and industrial connections critical to freight flow within the region. An approach to access these connections in other regions will be developed to support the overall economic benefit of efficient freight movement.

Harmonize regional regulatory objectives and strategies

The team will develop an approach to identify and assess emerging freight technologies as well as provide recommendations for harmonizing policies for transportation agencies in the region.

Regional data sharing and management

A guidebook and templates for regional data sharing and management will be created that highlight best practices for public/private data sharing. A methodology for evaluating, prioritizing and leveraging data technology will be created to promote efficiency within the region.

The plan is part of FHWA's National Economic Partnership (NEP) grant program and is being developed through a partnership of six MPOs, five state DOTs, the Heartland Civic Collaborative and other academic, business and industry leaders.

APPENDIX H - PROJECT HANDOUTS AND FLYERS

Available to download as a zip file from the project website.

APPENDIX I - PROJECT BRAND GUIDE

Available to download as a zip file from the project website.

APPENDIX J – OUTREACH AND COORDINATION ACTIVITIES

Summary of Outreach and Coordination Activities			
Outreach Activity	Date	Description	Format
Project Kick Off Meeting	September 5, 2019	Kick-off meeting for Consortium members and project team to review project schedule, key dates and discuss public engagement plan	In-person
AASHTO Annual Meeting	October 5-8, 2020	A one-page project flyer "*New Freight Technology Plan: Leveraging the Digital Revolution*" was developed and distributed at the annual meeting held in St. Louis, MO	In-person
Monthly Project Update	October 28, 2019	Consortium members and project team discussed outreach opportunities, stakeholder list development and engagement strategy	Virtual
Monthly Project Update	December 4, 2019	Consortium members reviewed project's brand guide and templates, stakeholder engagement plan and database development. Project team began a guided discussion through technology assessment framework	Virtual
MAPA / Greater Omaha Chamber ConnectGO Freight Focus Group	December 12, 2019	An overview of HFTP including project goals and schedule was shared with the group	In-person

Summary of Outreach and Coordination Activities			
Outreach Activity	Date	Description	Format
Ozarks Transportation Organization (OTO) Board of Directors Meeting	December 19, 2019	HFTP one-page flyer was distributed and referenced during this bi-monthly board meeting	In-person
Monthly Project Update	December 19, 2019	Consortium members participated in a follow-up guided discussion of the technology assessment framework	Virtual
National Cooperative Highway Research Program (NCHRP) ICM Workshop	February 6, 2020	The workshop focused on incorporating Freight and other stakeholders into ICM; an overview of HFTP including project goals and schedule was shared with the group	In-person
MOD Alliance & ITS Heartland Forum: Promoting Seamless Mobility	February 27, 2019	An overview of HFTP including project goals and schedule was shared with the attendees	In-person
Monthly Project Update	March 12, 2020	Consortium members and project team met in-person to review and provide feedback on stakeholder interviews, economic connections and	In-person

Summary of Outreach and Coordination Activities			
Outreach Activity	Date	Description	Format
		participated in workshop planning discussions	
Monthly Project Update	April 9, 2020	Consortium members and project team discussed active tasks including stakeholder engagement, economic connections and upcoming project workshops	Virtual
Emerging Technology Virtual Workshop	May 6-7, 2020	HFTP project team hosted this virtual workshop and networking series to bring together public and private stakeholders in the region to discuss new technologies and strategies for harmonizing regional regulations	Virtual workshop
Monthly Project Update	May 14, 2020	Consortium members and project team discussed active tasks including a debrief of the technology workshop.	Virtual
Missouri Chamber Supply Chain Webinar	June 3, 2020	Missouri Chamber of Industry and Commerce hosted a multi-part Supply Chain Webinar Series. Speakers included Erik Hansen, Vice President Sales & Marketing at Kansas City Southern; Adam Hill, President & Chief Operating Officer at Scarbrough Group of Companies; and Chris Gutierrez, President at Kansas City SmartPort, Inc.	Webinar

Summary of Outreach and Coordination Activities			
Outreach Activity	Date	Description	Format
Monthly Project Update	June 4, 2020	Consortium members and project team were given an FHWA NEP program update and discussed active tasks including finalizing details of the data workshop	Virtual
Data Sharing & Agreements Virtual Workshop	June 10-11, 2020	HFTP project team hosted this virtual workshop and networking series to bring together public and private stakeholders in the region to help define the broad spectrum of private/public sector data aggregation, sharing, use and other arrangements key to integrating emerging technologies and new datasets discussed during the Emerging Technology Workshop	Virtual workshop
Monthly Project Update	July 9, 2020	Consortium members and project team discussed active tasks including a debrief of the data workshop	Virtual
Heartland Civic Collaborative Mega Regions Conversation	July 17, 2020	Guest speaker Bruce Katz discussed the history, power and future of the Heartland mega region and how our four communities working collaboratively on issues can advance the Heartland Region, and how the Heartland can leverage its multiple competitive advantages to advance its common agenda	Virtual
MARC Highway Committee Meeting	July 22, 2020	An update on the project was presented to MARC's Highway Committee	Virtual

Summary of Outreach and Coordination Activities			
Outreach Activity	Date	Description	Format
Monthly Project Update	August 6, 2020	Consortium members and project team discussed active tasks and final deliverables	Virtual
Monthly Project Update	September 3, 2020	Consortium members and project team discussed active tasks and final deliverables	Virtual
Transportation Research Board Subcommittee on Megaregions Webinar	September 9, 2020	Transportation Research Board Subcommittee on Megaregions sponsored a webinar that highlighted ongoing research on mega regions and FHWA's NEP projects. MARC presented information about HFTP	Webinar
Project Coordination Call	September 17, 2020	Consortium members and project team discussed active tasks and final deliverables	Virtual
Mid-America Freight Coalition Annual Meeting	September 25, 2020	An update on the project was presented virtually to meeting attendees	Virtual
Project Coordination Call	October 1, 2020	Consortium members and project team discussed active tasks and final deliverables	Virtual
Project Close Out Meeting	October 15, 2020	Consortium members and project team reviewed project outcomes and discussed next steps	Virtual

APPENDIX K – STAKEHOLDER INTERVIEWS

Stakeholder Input Summary

The following organizations, ranging from technology start-up firms to academic powerhouses, shared thoughts and insights regarding emerging freight technologies:

Questions Posed

The following questions guided conversations with stakeholders:

1. What emerging freight technologies is your firm investigating?
2. Which technologies have the most promise?
3. Are you testing any emerging technologies? If so, how far has your testing progressed?
4. What are the expected benefits to your firm of these technologies?
5. How can public agencies best support your efforts to implement new technologies?
6. How do you evaluate these technologies? Can you think of any best practices that public agencies in the Consortium should consider?

7. Please share your thoughts on transportation policy development and implementation.
8. What other infrastructure needs beyond roads and bridges should be explored?
9. What do you think we might miss in our analysis during this project?
10. Can you share examples of data sharing that have been successful?

The project team summarized responses from the interviews into four categories: (1) Input on Emerging Technologies, (2) Input on Data, (3) Input on Policy, and (4) Stakeholder Guidance.

Input on Emerging Technologies

Transportation is weaning itself from oil, and the electric truck is coming. First, to light and medium duty fleets, then to the class 8 heavy duty local (< 75-mile) and regional (< 300-mile) markets. In the EV market, hydrogen-fueled electric trucks are three to five years behind battery powered tractors.

Electric power distribution infrastructure must be further developed, standardized, and implemented. Charging stations will become the new truckstops, and truckstops will become significant electric power consumers. Hydrogen is the energy delivery method most similar to diesel fuel (fast fill ups) and is a viable future electric truck option. Utilities are actively seeking to understand and serve the electric fleets of the future.

Natural gas, both CNG and LNG, are being used by carriers as diesel alternatives today but electric will win out over the longer term. Timeframe for this conversion is unclear, but government policy can influence timing dramatically if desired. Electric freight trains are in the distant future because the horsepower requirements are too large for current technology to meet.

Autonomous trucks are far in the future. Drones, or UAVs, are more likely to fill a niche in inspection roles or local delivery of certain goods. ADAS are real and widely accepted by carriers and drivers. Platooning has limited application and cost-effectiveness to-date. Telematics solutions, firmly in place across industry, provide the vehicle-to-vehicle/infrastructure connectivity and create rich data sets. Interactions between personal vehicles and commercial vehicles may lead to AV freight corridors. Public agencies can help by digitizing road network attribute data.

Digital Supply Chains are advancing and will have secondary effects on transportation infrastructure. For example, visibility to capacity and demand coupled with artificial intelligence is increasing logistics efficiency (load factors, total miles operated). End-to-end visibility of shipment/vehicle status is required/expected for both shippers and

carriers, and also has value for public sector use. Blockchain is mostly a buzzword. The Internet of Things is real.

For cost, reliability (of hauling capacity) and environmental reasons, intermodal shipping (water to rail, rail to truck, truck to UAV drone, etc.) is growing. More transload (transfer and interchange) points are being developed, moving freight distribution ever closer to the end consumer.

Railroad sees three main technologies coming. Drones, with a person piloting the drone for inspection and monitoring purposes, are being used today. Longer term, autonomous trains will be used; one such train is operating in Australia today. Autonomous inspection vehicles, which can inspect and record both the track and the surrounding substrates of ballast and ground for faults, is a third technology. Railroads are also looking at automating maintenance-of-way repairs to avoid labor costs and injuries from heavy, repeated lifting and placing.

Positive Train Control, mandated by federal regulations, is focused solely on preventing on-track collisions. It does provide geospatial location updates, but the system allows for gaps in reporting and is not a precursor to autonomous vehicle control of locomotives. Because the horsepower requirements for moving a loaded train are too great for current technology, electrification of the freight rail network is not on the near horizon. Railroads have no plans to place beacons (i.e., identification devices that would connect to an IoT) on every object comprising and using the rail network. A concern with widespread electrification that could result in electromagnetic interference, disrupting other technologies, was raised.

Agriculture sees some application for connected vehicles and automation, but it may not have the capital to invest in these technologies. The location precision required for automation is critical. Grain movement using this technology will be done by larger organizations. Intermodal shipping via water as seen as a viable option. An inland waterway vessel in lieu of barges is being tested that improves economies of scale for containerized shipments. Innovative approaches to improve and repair rural short-span bridges has potential to cut bridge repair costs significantly. Blockchain does not have any real application. From an agricultural view, the problems it solves are real, but other avenues exist to address them.

For consumer-packaged goods manufacturers, automation is a key emerging technology. Not limited to autonomous vehicles, automation like robots in the warehouse and artificial intelligence systems to monitor quality are gaining footholds. Blockchain is “just a buzzword.” Drones have limited applications. Hyperloop is not being considered. The digital supply chain technologies to optimize supply chain

networks are being used widely. Industry consolidation keeps supply chains in a constant state of flux. Technology to help drive operating efficiencies are sought as operations are merged and refined. Often, companies leapfrog from being a laggard to a leader where technologies deployed are concerned.

Perhaps the biggest change in transportation logistics is the shift to smaller, more frequent shipments direct to homes. Freight and people movement interactions will increase as a result of changing supply chain dynamics (e-commerce, direct-to-consumer, same day delivery). This is creating parking issues in metropolitan areas as delivery vehicles stop to deliver on nearly every street. Parking strategies and infrastructure are important considerations. Finally, policies for road sharing are also important as cities move to more sustainable and possibly automated transportation modes (mixing of pedestrian, bicycle, carts, cars, vans, trucks, etc.). Workforce issues are also present in the aging of the truck driver population.

Over 45 technologies in 8 broad categories were discussed in stakeholder interviews. Economics are driving the adoption of each of these new technologies. Safety and environmental improvements (fewer crashes, less fuel burn) reduce cost and are often key parts of the business case for investment, but rarely if ever the sole reason for pursuing the technology.

Input on Data

Above all, data are crucial. Bilateral data sharing is becoming more acceptable, and public agencies are positioned to benefit both as a supplier and consumer of the data. Streamlined interchanges of data are necessary to facilitate a "share once, use many" approach that works across regions and jurisdictions.

Data underpins most of the new technologies. Without data, they fizzle. Sharing of data across entities is vital. Private sector firms are collecting "Big Data" volumes of information daily and they are making this aggregated data available. Private fleets see the need for more of their data to be available to public agencies. Digitizing infrastructure attributes (lane details, work zone information, road conditions, etc.) is increasingly important.

Several key trends are disrupting the way the transportation industry operates. With driver assistance, active safety, and of course, autonomous driving systems, comes an unprecedented amount of data and transparency into the otherwise very human-centric day-to-day operations. There is and will be substantial impact of the new data-driven mode of operation on everything from liability (think better post-mortems and scenario reconstructions) to insurance (real-time assessment of risk and dynamic risk models for calculating premiums on the fly) to predictive maintenance/automated inspections.

Input on Policy

Federal harmonization of regulations and standards is important to smooth and efficient operations. The I-95 Corridor Coalition is a good example of a successful approach to a patchwork of laws that can become serious concern for development and deployment of new transportation services.

Agencies can help by placing a certain amount of funding to support non-hydrocarbon fleet operations. Grants to make the investments profitable for entities to encourage and accelerate the adoption of new technologies with broader benefits are helpful. Developing programs to highlight and differentiate emerging technologies are also beneficial. For example, a "Green Choice" program to have your freight moved via an electric fleet would help with the marketing and branding aspects of new technologies and their adoption.

Technology can simplify enforcement and monitoring activities, from HOS to toll collection to equipment inspections and weight limits. Carriers benefit by eliminating lost time at these inspection/collection points. Public employees must be equipped and able to operate in the digital world.

A real question is who will pay for the needed infrastructure upgrades: from more reflective and visible roadway markings and signage to improved sensing networks. Simply mandating solutions for industry without involving the impacted parties is ineffective. Placing beacons on all railroad rolling stock is not seen as practical, nor is the broadcasting of information on the exact location and contents of all rail freight. Security is a major concern. Involve railroads in the discussion and decision-making process.

Forward movement requires many voices and hands pointing in the same direction. There is no single case where something meaningful occurred where one entity mentioned it one time. Lack of awareness, lack of understanding, lack of motivation ("that's not the way we do business") – all are obstacles to adoption of new technologies that benefit all. Engineers can start a technical process, but they are not the right people to move it forward. It takes a broad and willing coalition to get policy movement.

Stakeholder Guidance

Stakeholder input allowed an initial ranking and categorization of various technologies that are or will likely be implemented and highlighted the need for both more data and more sharing of data between private firms and public agencies.

Stakeholders also raised a flag noting the need for non-traditional interagency collaboration. State DOTs and public utility commissions, for example, will both play key roles in enabling future freight movement.

APPENDIX L - DATA SHARING AND INFORMATIVE VIDEO FOR TABLEAU READER

Available to download as a zip file from the project website.