

Enhancing Pedestrian Safety in Multimodal Transport through Pod-Based Transfers: An Ontological Approach

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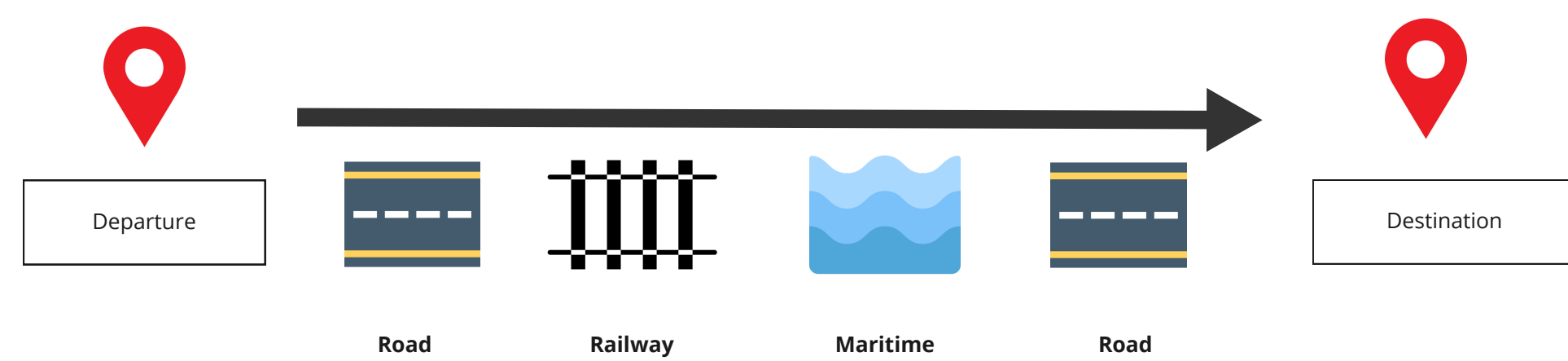
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Abstract

This poster suggests integrating an entity sensitive to pedestrian-related hazards into a travel ontology within the framework of Transport as a Service (TaaS). It addresses the dangers passengers face during the synchronization of flows between travel episodes, an aspect overlooked in current multi-modal mobility studies, which focus on different trip segments but neglect pedestrian safety during transfers. The proposal introduces a new "transfer" entity to the ontology to address this issue. Technologically, it involves using pods that separate transport units from carriers, enabling seamless door-to-door service without pedestrian transitions. However, this raises questions about the legal framework for pods and their compatibility with current and future passenger needs. A preliminary analysis identifies two potential use cases within the extended Paris region.

Context and Challenges

- Multi-modal transportation aims to improve overall transport services by integrating various modes of transport.



- This integration introduces critical safety issues, particularly in managing passenger flows within transport infrastructures.



Research objectives

This research proposes a **multi-modal ontology** to address **pedestrian safety** during **transfers**, introducing "pods" to minimize **risky pedestrian transitions**.

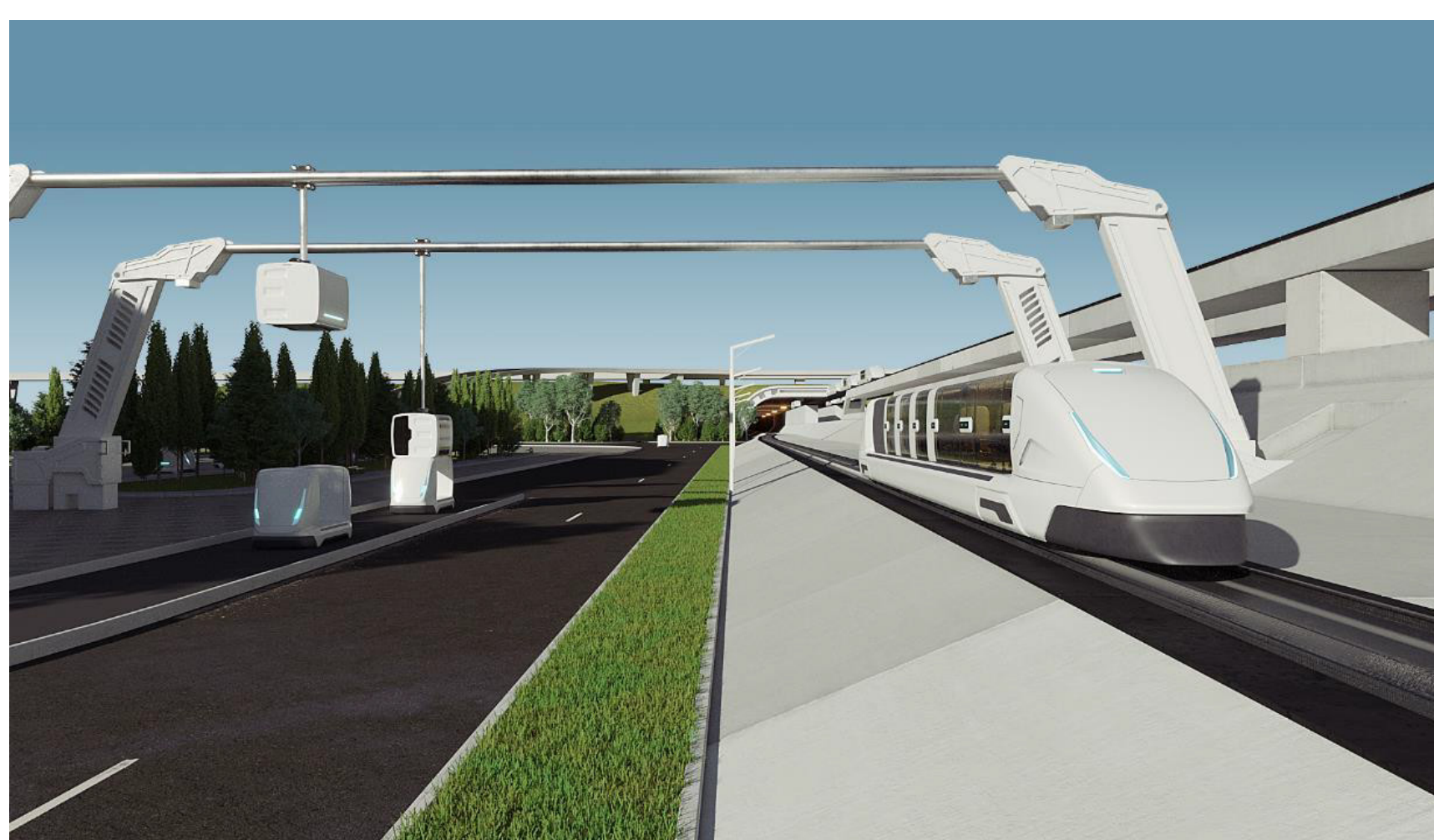
The Pods4Rail Project: Contextual Insights

Pods4Rail Project [3]:

- An EU-funded initiative aimed at developing a fully automated, sustainable, and integrated transport system for passengers and goods.
- Focuses on improving multi-modal transport by introducing **autonomous pods** to ensure seamless and safe transfers.

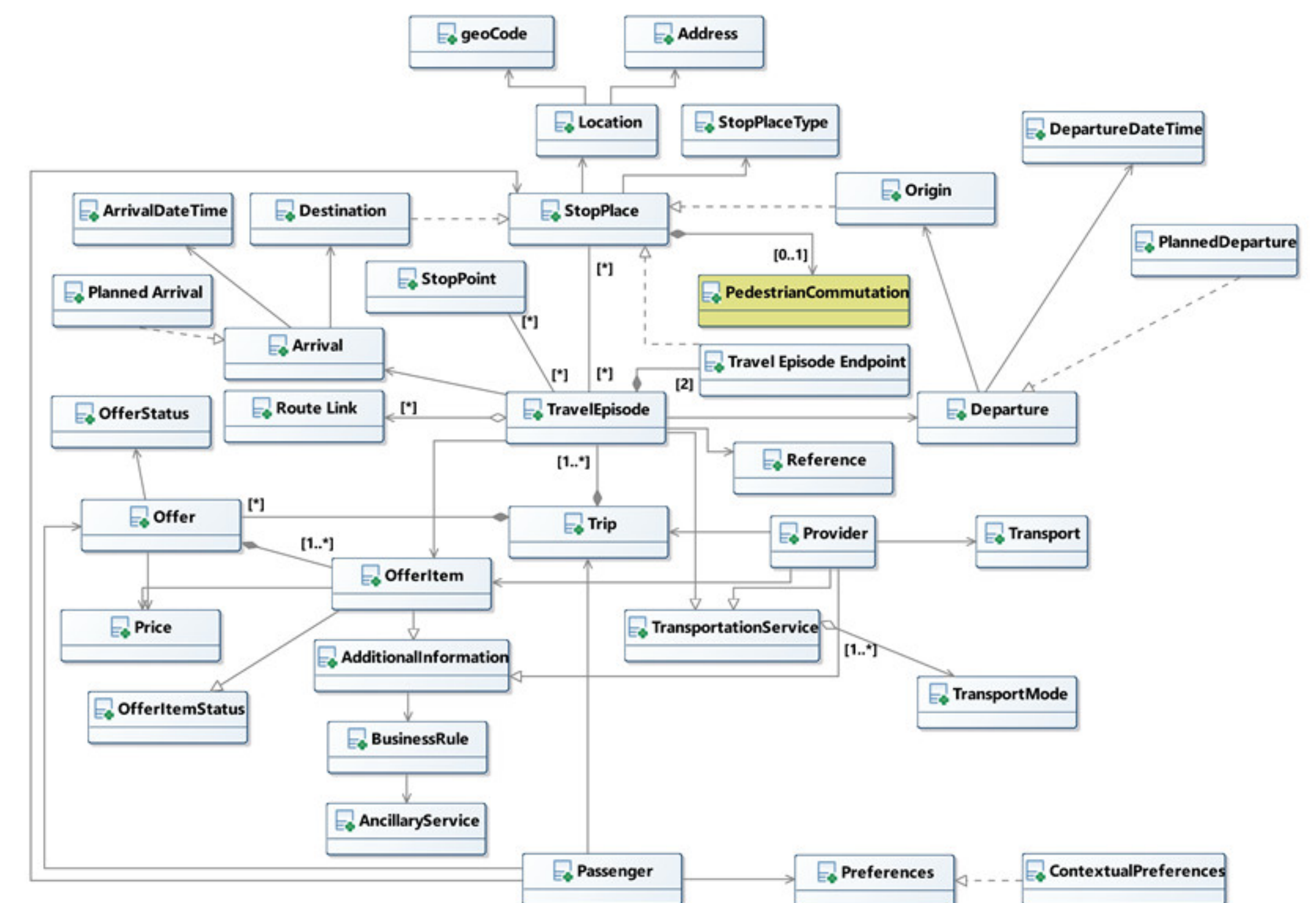
Key Objectives:

- Provide door-to-door services to reduce hazardous pedestrian transitions.
- Enhance safety, accessibility, and efficiency in transfer spaces.
- Align with EU goals for sustainable and smart mobility.



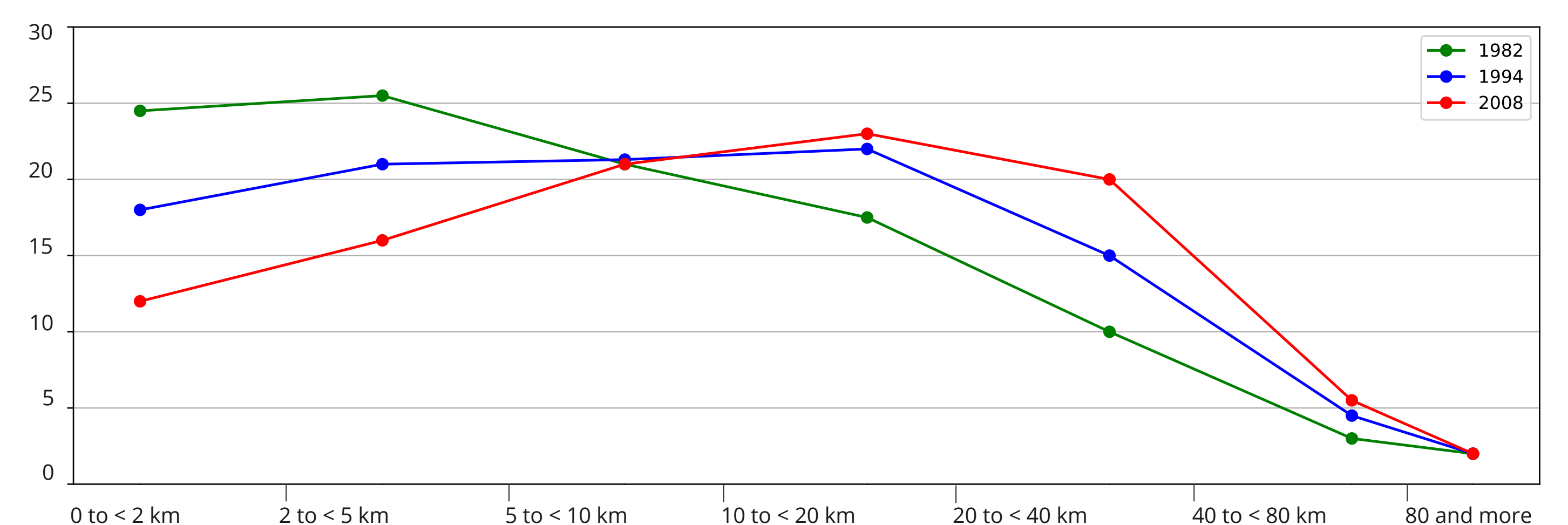
Enhancing the FREL Ontology by Introducing the Pedestrian Commutation Concept

- Ontological Framework:** Extension of the Shift2Rail-IP4 [2] reference ontology to include pedestrian transfers as a critical safety component.
- Pedestrian Commutation Concept:** A new entity within the ontology representing pedestrian travel between transport modes, with safety features for vulnerable users.
- Knowledge Engineering:** By modeling pedestrian movements as a "commutation" episode, this approach provides a structured method to evaluate and mitigate risks.



Discussion

- Value of Case Studies:** - Case studies provide a concrete focus for discussions, helping to evaluate real-world scenarios and constraints.
- Legislative Impacts:** - The discussion explores the role of legislative requirements on transport design and their implications for safety frameworks.
- Commuting Patterns in Peri-urban Areas:** - In 2007, 90% of employees in towns with less than 50,000 inhabitants worked outside their municipality, highlighting the need for integrated transport solutions.



In France, in 2007, 90% of employees living in the peri-urban areas of towns with less than 50,000 inhabitants and those living in rural areas work outside their municipality of residence. Based on this observation and based on a composite public transport offer, we propose to roughly identify a transport service compatible with these needs as explained in [1].

Corresponding needs of transport services

- Service Requirements:** Based on various types of journeys, such as:
 - Inter-city (60+ km):** Focus on high-speed connectivity, leveraging main rail lines.
 - Intra-urban (under 12 km):** Emphasis on capacity and efficient management within densely populated areas.
- Expected Outcomes:** Increased accessibility and safety in transfer spaces, aligning design and operations with specific travel needs.

Conclusions

- Enriched Ontology:** Introducing a comprehensive multi-modal ontology with a focus on pedestrian safety is essential for modern mobility systems.
- Pods Integration:** Pods offer a transformative solution for door-to-door transport, significantly reducing risks associated with pedestrian transfers.
- Future Recommendations:** Suggested regulatory adaptations and further research to ensure safe and efficient integration of pods into urban and inter-urban transport systems.

Acknowledgments.

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