Synergistic Transport System - how to create synergy within our transportation system.

In our rapidly evolving world, where technology continuously shapes our lives, it's evident that the fields of robotics, electric vehicles, communications, and machine learning are ushering in transformative changes. These changes not only impact our daily lives but also necessitate a revaluation of our traffic management systems. The need for this revaluation is clear: our traditional traffic management methods must adapt to these evolving technologies, changing priorities, and the promise they hold. Here's a comprehensive exploration of this transition:

Customer Expectations and Priorities: As technology advances, it subtly hints at a future where human involvement in transportation will be superseded by automation. To smoothly navigate this transition, we must enhance our traffic management techniques. These improvements should not only accommodate the technological revolution but also ensure that traffic networks are agile enough to meet shifting priorities.

These priorities include:

- Enhancing Urban Liveability and Promoting Active Transportation: The focus is shifting towards making cities more liveable and encouraging active modes of transport like walking and cycling.
- Reliability and Predictability: Services must become more reliable and predictable, reducing uncertainty in travel times.
- Safety Goals: The Vision Zero initiative emphasizes safety, striving for an ergonomic approach to reduce accidents.
- Customer-Centric Approach: Mobility as a Service (MaaS) and end-to-end journeys are gaining favour, promoting customer-centric travel experiences.
- Sustainability: The urgent need to reduce greenhouse gas emissions pushes us to transition from fossil fuels to renewable energy sources.

These changing dynamics are driving a growing demand for the automation of transportation networks. Recent studies suggest that advanced communication technologies, such as 5G, will lead to reduced vehicle separation, offering benefits like trajectory control, automatic collision avoidance, and platooning. Furthermore, discussions are underway regarding the integration of all transportation modes, managed in real-time. However, as legacy and autonomous vehicles coexist during the intermediate phase, known as mixed autonomy, it's imperative to develop frameworks that capture the technological potential and facilitate these trends.

To support this transition, we need to rethink our traffic management framework. This framework should not only build on existing norms but also explore alternative traffic management approaches that optimize human capabilities while enabling the eventual transition to a fully automated traffic system. The goal is to efficiently allocate spatial resources, ensuring a continuous flow of vehicles while maintaining security.

Additionally, there's a rising demand to combine land-based options that leverage mass transit, with the flexibility of roads, such as trackless trams which requires a shift away from privately owned vehicles.
Tackling Traffic Congestion: Traffic congestion has been a long-standing challenge. It leads to unpredictable travel times, impacting customer satisfaction, increasing pollution (specifically greenhouse gas emissions), and affecting productivity. It even influences how cities are designed. Congestion often forces drivers to break road rules to save time, while the increasing use of mobile phones raises concerns about rising accident rates. Traffic professionals have implemented measures to mitigate these risks, with Safe System approaches being applied to transport planning, management, and operations. However, limitations persist due to the complex web of factors involved and inconsistencies in human behaviour.

The promise of advanced transportation robotics gradually replacing human intervention offers optimism. There's a vision of significantly reducing road incidents, moving towards the Vision Zero goal. However, the unpredictability of technology adoption timelines, the lifespan of vehicles, and the rate of technological adoption make this a lengthy process. Therefore, we must reduce reliance on private vehicles and steer human behaviour towards customer-centric models like MaaS and public transportation. This proactive shift will make public initiatives ready to embrace technology as it becomes available.
Yet, public transportation initiatives often struggle due to congestion issues and the challenge of improving services to compete with private vehicles.

Overcoming this hurdle necessitates improving traffic congestion and implementing methods for prioritization. Research reveals that traffic congestion arises from the uncoordinated movement of various user groups through space, leading to conflict points. To alleviate congestion, strategic coordination of available space is essential. This involves exploring innovative traffic intersections and techniques that displace these conflict points.

A strategic review of coordination within the available space is critical to achieving mobility and congestion improvements. Notably, little has been done regarding horizontal geometry and the techniques related to the displacement of conflict points, often referred to as Innovative traffic intersections. Rectifying this deficiency is pivotal.

The future traffic management network should create a seamless experience, eliminating multiple stops during travel. Consider the concept of X2V technologies, which focus on communication from the infrastructure to the vehicle, enhancing traffic flow and customer satisfaction, such as arriving at green lights without unnecessary stops. The goal is to maximize throughput, ensure safety, maintain the utility of roadside facilities, prioritize certain modes of transport to influence customer behaviour, and address parking and vehicle charging challenges. The latter will become especially critical as vehicles need charging and parking facilities during off-peak hours.

Creating this system is a delicate endeavour. It requires comprehensive planning, a deep understanding of the pace of technology adoption, and the capacity to introduce gradual government interventions that align with human behaviour, psychology, marketing, and economics.

Partnership for Progress: Recognizing the magnitude of this endeavour, UNSW, Synergistic Traffic Consultancy Pty Ltd, and iMove Australia have joined forces. Their mission is to develop a series of traffic intersection designs capable of reducing wait times while addressing the multifaceted challenges discussed above. By proactively improving intersection coordination and steering customers toward consumer-centric models, they aim to create a more synergistic transportation system.

In conclusion, the fusion of cutting-edge technology and evolving customer expectations necessitates a fundamental shift in our approach to traffic management. It's not just about getting from one point to another; it's about crafting a transportation system that aligns with the future, provides reliable, safe, and sustainable travel experiences, and fosters customer satisfaction. This transformation is not just a necessity; it's an opportunity to build a transportation network that truly serves the people it transports.

Image one

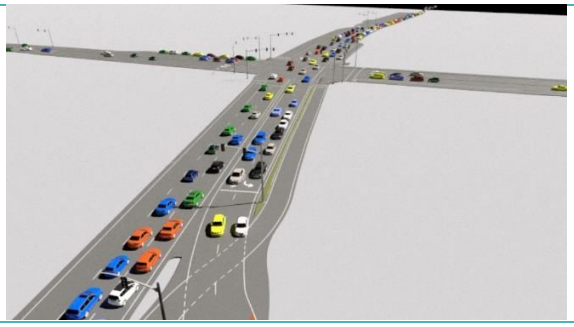

Image two

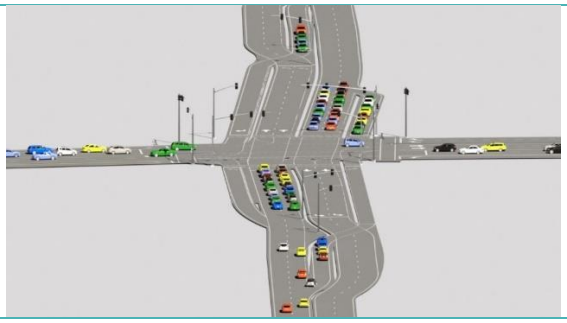

Image three

Image four

Image five