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The current CL paradigm, which does not consider the mobility of goods as a public need, limits our capacity to understand and respond to the challenges and opportunities brought by this profound change. The impact of the increasing need for mobility of goods on the quality of life in our cities is a growing concern. It poses a threat to the health and productivity of residents calling for an urgent change in the way we think about CL.

Problems are not only big; they are also rapidly growing. By 2045, the world's urban population will increase by 1.5 times to 6 billion (World Bank, 2023). In four years, one-fourth of all purchases will be online, generating more than a quarter trillion deliveries a year (Pitney Bowes, 2022). According to the World Economic Forum, due to the increasing deliveries, by 2030, we will be spending 11 more minutes in traffic, and emissions will increase by more than 30 per cent (Deloison *et al.*, 2020). Only in the last three years delivery-related accidents have increased ten-fold. Still, the ruling paradigm considers CL a business problem and waits for the sector to solve it for us

with 'smart' thinking. However, most of this smart thinking goes into increasing sales (i.e. the delivery demand) by offering more products and services online with faster deliveries on a scale that cannot be matched with the envisioned incremental improvements in efficiency. Besides the misalignment of interests, the problem is simply too big for the sector to solve and too intertwined for governments (public agencies) to act alone.

Challenging this mindset, the ERC Starting Grant project, GoodMobility, which will be led by Dr Barış Yıldız of Koç University, proposes recognising the mobility of goods as a public need and addressing it with effective public-private sector collaboration with out-of-the-box thinking. Taking

a revolutionary approach, the project proposes restructuring CL as 'logistics as a service' (LaaS) with a public value focus and innovative infrastructure and market mechanisms. Laying the foundations of a new theory, GoodMobility will develop the fundamental concepts, models and tools to validate this vision and understand how to best realise it.

The first objective is to develop public value as a measurement system to assess and guide CL planning and management considering all stakeholder views. The project aims to achieve this with an iterative process, combining multi-criteria decision-making, sustainability analysis, simulation and optimisation. GoodMobility will define the public value measure as a measurement system to guide system design and management models. Instead of determining the index definitions in a single step, the project will follow an iterative approach in which the system performance will be assessed on social, economic and environmental dimensions with detailed simulations,

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# What is the future of city logistics?

Tectonic forces generated by exploding e-commerce and rising urbanisation are reshaping the city logistics (CL) landscape at an unprecedented pace. Goods are gaining more mobility with drastic implications for the cities.

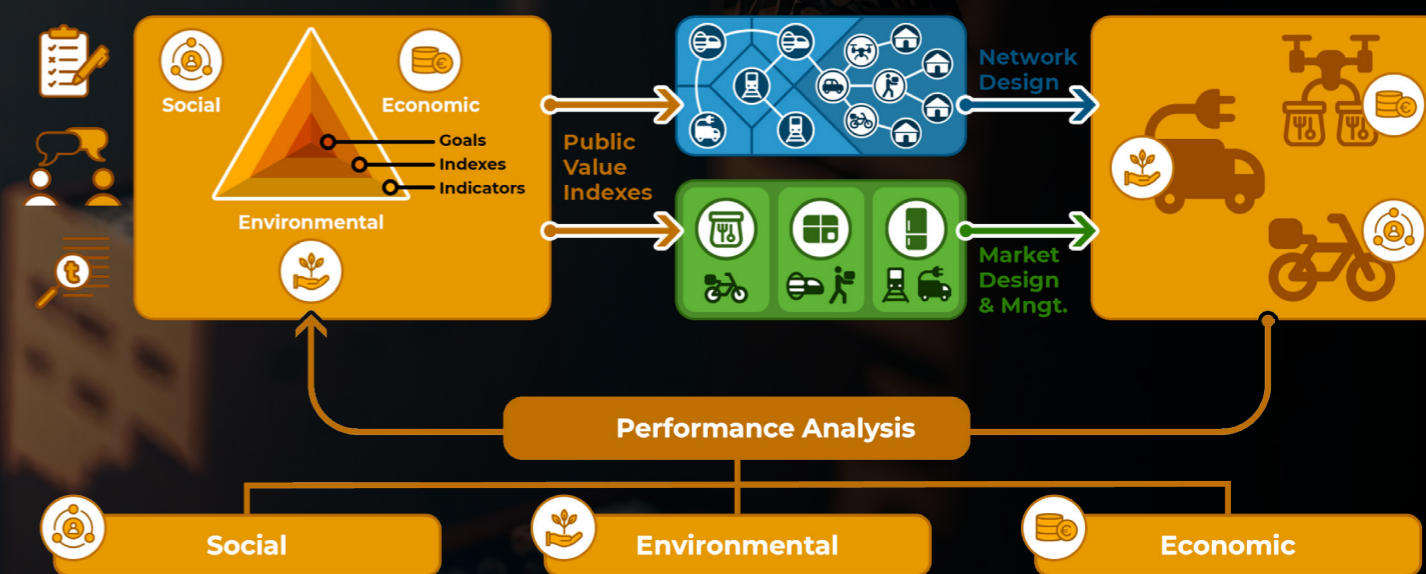


Figure 1: Diagram representing the GoodMobility project's iterative approach to realising a well-performing logistics as a service (LaaS) system.

... the project will work on creative system designs to combine new transportation and information technologies to set up the logistics infrastructures that would enable LaaS.

sensitivity analysis and expert evaluations to update the index definitions and the following models until converging on a well-performing system (Figure 1).

The second objective is to develop the principles, models and tools for LaaS infrastructure design. Novel network optimisation methods will be developed

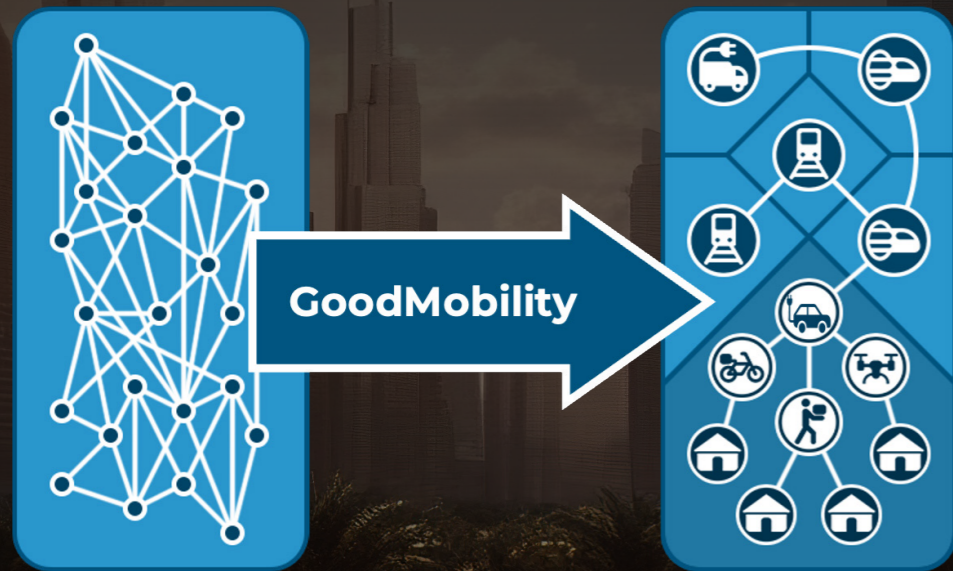


Figure 2: Visual representation of moving from multi-echelon network structures to effective multi-modal transfer mechanisms to support different transportation needs in the most efficient manner.



Figure 3: Visual representation of the GoodMobility project's intent to investigate establishing an independent market operator (IMO).

for designing the hardware of LaaS to provide orders of magnitude efficiency gains and influence the stakeholder activities to maximise public value. Powered by a solid understanding of public value, considering all the stakeholder perspectives and incorporating human behaviour factors, the project will work on creative system designs to combine new transportation and information technologies to set up the logistics infrastructures that would enable LaaS. To achieve this goal, the project will study multi-echelon network structures that would allow effective multi-modal transfer mechanisms to support different transportation needs in the most efficient manner (Figure 2). To solve the resulting complex design problems on a mega-city scale, the GoodMobility researchers will develop novel large-scale optimisation methods based on new problem formulations, learning-based decomposition techniques and quantum computing.

The third objective is to develop a theoretical framework and models for the operating procedures of LaaS, introducing the logistics markets to ensure efficiency and reliability and secure public value in matching logistics demand and supply. Logistics as a service cannot be realised without effective market mechanisms to replace today's vertically integrated logistics systems. To achieve this, GoodMobility will investigate establishing an independent market operator (IMO) who will run the market and decide on interventions to secure short and long-term public value (Figure 3).

With the advances in information and communication technologies, real-time 'sensing' and 'acting' have become powerful capabilities to regulate the transport demand and capacity to ensure the most efficient use of existing infrastructure. In this regard, GoodMobility will answer critical questions: Can and how will the allocation of public resources (e.g. roads and public space) be decided (in real-time) by IMO's (directly in lieu of governments or by making suggestions to governments to implement) for the sake of enhancing the public value? To answer these questions,



... GoodMobility will lay the foundations of a new city logistics planning and management theory, opening up new research perspectives and facilitating new methods applicable to a myriad of applications.

the project aims to develop a digital twin framework equipped with novel real-time optimisation algorithms to help public agencies take the best actions to manage urban mobility.

Proposing a new CL paradigm with far-reaching social, economic and environmental implications is a challenging task that GoodMobility aims to address. Building mathematical models of CL as a colossal socio-technical system is perilous. If successful, GoodMobility

will lay the foundations of a new CL planning and management theory, opening up new research perspectives and facilitating new methods applicable to a myriad of applications.

The results of this visionary project can have a significant impact on the future of our cities, helping them to achieve their development and sustainability goals together, increasing the quality of lives and productivity of billions of people living in urban areas.

References

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PROJECT NAME  
GoodMobility

PROJECT SUMMARY

The GoodMobility project seeks to revolutionise city logistics by recognising the mobility of goods as a public need. It proposes establishing logistics as a service (Laas) with a focus on public value. Through innovative infrastructure, market mechanisms and operating procedures, GoodMobility aims to address the challenges and opportunities presented by the increasing demand for the mobility of goods.

PROJECT OBJECTIVES

Taking a different perspective, GoodMobility proposes to replace the techno-business-centric 'smart' thinking with network-centric 'wise' logistics that takes the public value as the primary goal and envisions setting up a logistics web with the required infrastructure (hardware) and operating procedures (software) to establish logistics as a service (Laas).

PROJECT LEAD PROFILE

Dr Yildiz is a full-time faculty at Koç University Industrial Engineering. His research focuses on network design and management problems in various application areas ranging from infrastructure planning to city logistics to fleet management to service network design to location analysis. His leading research in transportation and logistics has appeared in the top journals and received several national and international awards and research grants.



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