

Digital platform can eliminate queues, without new roads

The solution to urban gridlock is not gigantic investments, but better use of existing resources. An interactive trip planner, coupled with the optimised use of infrastructure, will reduce congestion and encourage more sustainable travel options in most cities, benefitting the economy and the environment, write Anders Gullberg and Anna Kramers, researchers at the Centre for Sustainable Communications, KTH Royal Institute of Technology, Stockholm.

Most big cities' transport systems can be described in three words: inefficient, unreliable and unsustainable.

It is odd that something so critical to the functioning of cities is left to run amok, with recurrent and unpredictable failures, cancellations and delays. Meanwhile, traffic congestion, pollution and stress continue unabated in spite of huge investments in infrastructure throughout the world. What civic authorities are overlooking are the vast resources that already exist. And, if used wisely, they could make a big difference.

Contrary to the notion that one can “build away” problems with transport systems, we propose a different solution: one that costs less because many of the resources are already in place. Slight changes in the use of vehicles, roads and mass transit could boost the capacity of urban transport systems many times over, without any major investments being made.

Even small adjustments result in notable improvements: shortened queues, reduced congestion and more certain journey times.

For example, on major roadways, gridlock is usually caused by a simultaneous influx of just 10 percent over capacity. But if you distribute this influx more evenly, several thousand more vehicles can move rather than remaining stuck in traffic jams, according to a study the KTH Centre for Sustainable Communications did for the Swedish Transport Administration (Trafikverket).

On average, passenger vehicles remains idle 96 percent of the time; and while in traffic, they tend to have 3.8 vacant seats. In ordinary big city traffic, buses carry about seven times as many passengers as cars. With dedicated bus lanes, that number could be doubled.

Reversible lanes can accommodate spikes in traffic by creating plentiful spare capacity. Surface area on the road can be freed up when commuters leave their cars at home and take the train instead. A single motorist and their car occupy 60 times more surface area than a passenger on a train.

Today it is possible to predict where and when a traffic jam will occur half an hour in advance, which is important because little can be done at shorter notice. But can gridlock be avoided?

You can influence how and when people choose to travel by providing them with information. But information alone is not enough. Its effect is stronger when you support it with price points, as the congestion taxes in Stockholm and London demonstrate. With fees that vary according to time, location and demand, severe congestion maybe reduced or avoided. But only on the condition that enough road users can get individualised price information before embarking on a trip.

This may be enabled by what we call a Digital Transport platform, an open, integrated information and payment system for all forms of urban transport – passenger vehicles, buses, trains and haulage. Such a platform must be equipped with an interactive trip planner and functions for booking, advance payment and travel guarantees.

For the benefit of all travellers and transport companies, such a journey planner should include multi-modal options, freight forwarding services, parking, mass transit, ride sharing, car hire, taxis, bicycles and pedestrians.

By providing real-time, dynamic and coordinated pricing information on the use of the roads, parking and mass transit facilities, as well as incentives for ride sharing, we create an instrument that promotes the efficient use of infrastructure for the benefit of all. This includes those who produce and provide the transport infrastructure and services, and those who use them. Providing space-efficient, climate-friendly modes of transport must be a priority for environmental reasons. Commercial traffic also has to be prioritised, on the grounds that it tends to require road transport.

Such a smart transport system would provide first-class decision support, and enable infrastructure operators to offer much better services. For those who do not, or cannot, use the system, it would still be possible to travel as they do today. Even if they do not personally partake of the Digital Transport platform, these commuters will nonetheless reap the benefits of reduced congestion.

There are digital information and payment systems in use today that serve as models for Digital Transport plans. Offers can be individualised and delivered precisely when and where they provide the most value. Payment may be made based on usage.

Thanks to connectivity for individuals on the move, vehicles and even roads, customers may become co-producers with the ability to create information that may then be used to refine services. The transport sector has been only partially successful in this area, mainly in the explosive growth of services that help individual users and companies to find the best options for their travel or transportation needs. This is a positive development for the individual, but the contribution to the overall improvement of transport is limited. Only when the infrastructure is optimised can we see the greater benefit.

A major challenge is to get stakeholders to change their approach – starting with the consumer’s perspective – and engage in constructive cooperation. Strong arguments can be found in the fact that IT and pricing tools are excellent for coordinating resources that are interdependent and extremely sensitive to overload.

It is also important to help users to recognise the opportunities that a Digital Transport plan would bring, and through interest groups to increase public pressure for the significant improvement of transport conditions. Even those who see a future with a growing segment of autonomous vehicles have every reason to support the development of Digital Transport plans. The proposed platform has the potential to become a field for experimentation and an ecosystem for lively business innovation of geographically linked services. It will also attract excellence and contribute to industrial development.

For that to happen, politicians and authorities responsible for transport infrastructure and mass transit systems have to get involved and work together, not simply monitor developments. Cities that already have congestion taxes – such as Singapore, London, Oslo, Stockholm and Gothenburg – are in a position of advantage. In order to build on this, municipal authorities, transport agencies and transit operators must be tasked with managing the resources they have in an efficient, fair and responsible manner. IT provides new opportunities to do just that.

A Digital Transport plan, which affirms the third industrial revolution's gains in terms of the production and consumption of services, is now within reach. The big question is: which city will accept the challenge and take the lead in enabling a fundamental transformation of transport and improvement in urban quality of life?

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