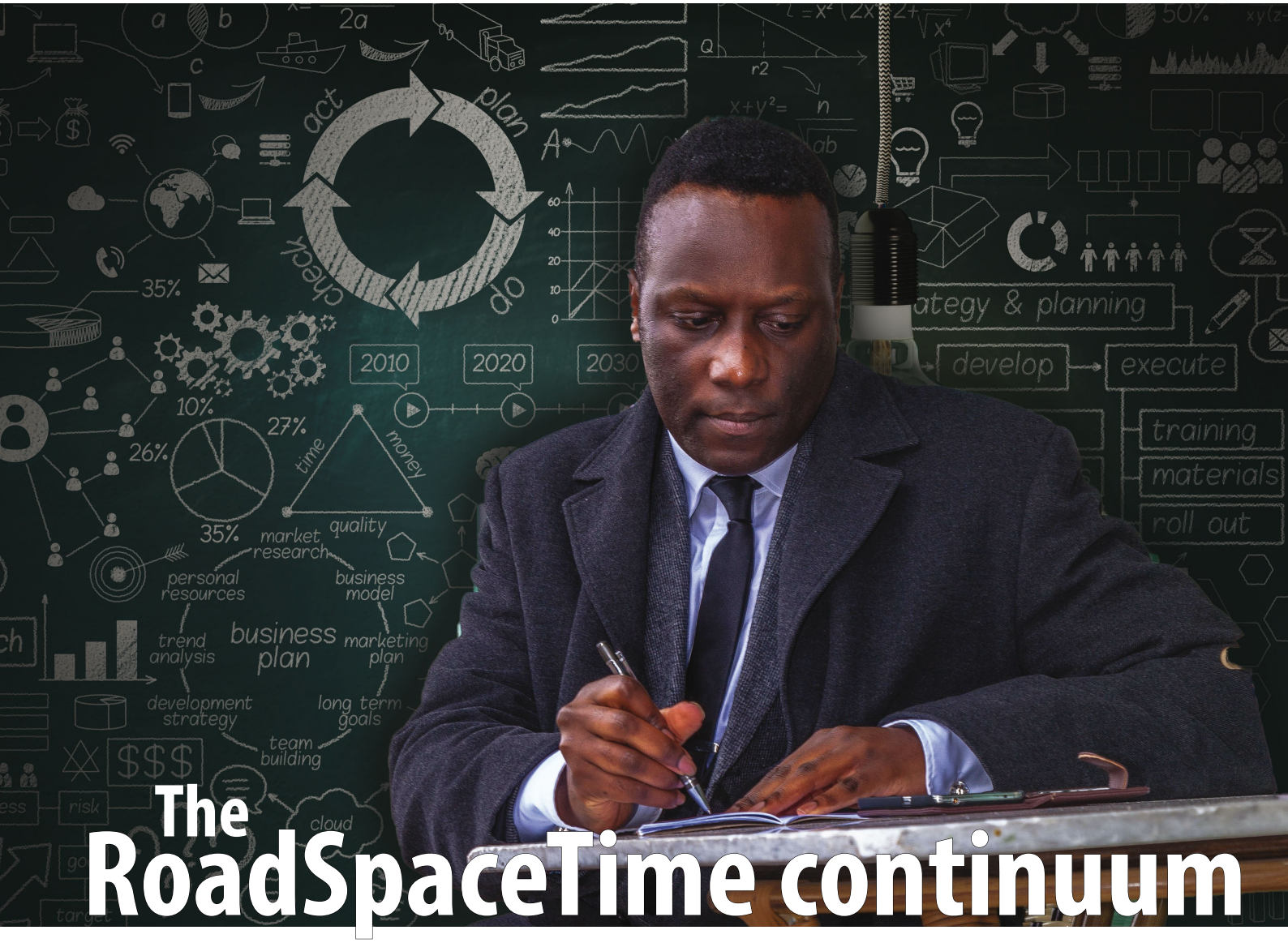


The RoadSpaceTime continuum

A Transit Exchange for the 21st Century – with a decade of hard work and perseverance finally destined to pay off for **Eric Masaba**, the creator of TEXXI explains how the concept works and how it has its origins in the pure mathematics of high finance

Fleet Routing typically takes place at a command and control level, but a new form of road and traffic management is now possible combining blockchain, geolocation, social networks with decentralised network concepts with predictive analytics that would eventually become an artificial intelligence (AI).

This system will replace the modes of road and motorway (highway) financing currently used, by providing an anonymised store of value for people so that anyone can invest in the road system independently of banks or their government and get a certain return every day.

Since everyone must travel and travel is a useful and easy to understand commodity, assuming a country is not destroyed, transport within that country will always have value.

THE 'WHY'

Increasing urbanisation is posing significant problems to many of the world's cities, especially the very largest megacities whose infrastructure cannot cope with the demand for transport by millions of users daily.

TEXXI, A HISTORY

How the Transit Exchange System, using a fusion of ideas from a plethora of sources, came into being and why it will be the transport model of future cities.

1992 - 1993: National Grid Technology and Science Laboratories, Overhead Lines Division, Plant Technology.

A project examining the effect of weather conditions on electricity transmission infrastructure and demand management.

1993 – 1995: Royal Air Force, Officer Cadet Flying Programme, University of London

1995: Sponsored summer project ("The Role of Computers in Transportation Technology")

Made possible with the kind assistance of Imperial College Department of Aeronautics, The Minsitry of Defence, NASA, the Department of Defence, the Royal Air Force, the Royal Academy of Engineering & the Royal Aeronautical Society.

1997: Project on RideSharing at Ecole Centrale De Lyon

Professeur Christian Vial, oversaw this project using groupware technologies and ideas (distributed, encrypted databases). We dubbed it Project Lugh, after the Celtic deity for whom Lyon is named.

1998 – 2003: Exposure to financial operations in banks and hedge funds

Front-office, back-office and middle office computer systems at investment banks and multinational firms

2003 – 2004: Constructing a Capital Structure Arbitrage system for Xaraf LLC

Credit Default Swap/Convertible Bond trading and Capital Structure Arbitrage trading strategies. It is here I came up with my credit contagion ideas that turned out to be so prescient.

2004 - Present: Texxi (Transit Exchange XXI)

Founding, Research, Presentations, Business Strategy

As human population increases, even more alarming is the overall increase urbanisation rate that will place 90 per cent all humans in cities by 2050. China alone will move 400m people into cities by 2030.

The need to find new road financing options while at the same time keeping the road open to all those who need to use it, regardless of their income level has collided with the dual imperatives of using fewer barrels of oil per passenger kilometre travelled and reducing fossil fuel emissions.

Petrol Duty (gasoline tax) by itself, cannot hope to cover the costs in upgrading roads, repairing potholes, resurfacing the routes and the bridge maintenance, especially on the busiest routes. A new model is needed that is socially equitable, can be implemented according to well-understood principles, such as the congestion charge in London.

THE 'HOW': TRANSPORTATION DEMAND MANAGEMENT SOLUTION

The one technology that can meet these

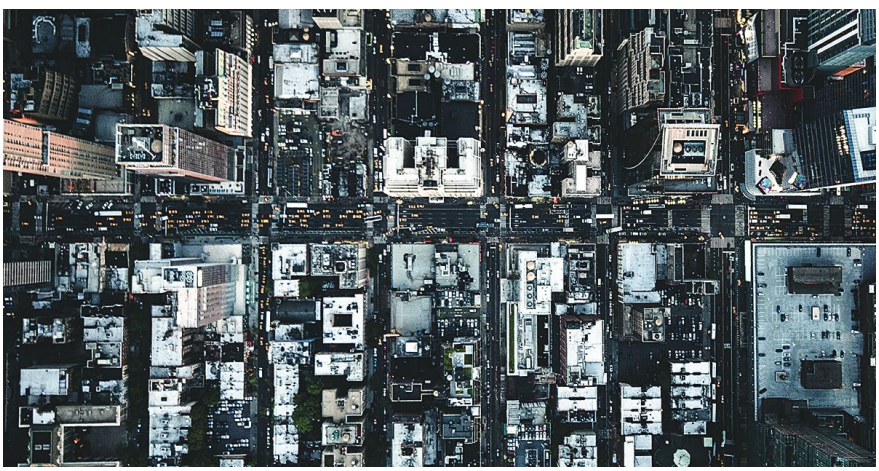
"More alarming is the overall increase urbanisation rate that will place 90 per cent all humans in cities by 2050. China alone will move 400m people into cities by 2030..."

INSTRUMENTS OF CHANGE

The exchange would get the required liquidity from investors who put into value at risk for a small return. This can happen since the Market Makers operating on the exchange will have a statistically certain outcome for grouping operations and they must pay a fee to the exchange to operate.

Much in the same way as any national government issues bonds, notes and bills to pay for operations, so would the road system via the transit exchange.

The added benefit of free-flowing traffic, cheaper transit and social equity would be a great return even apart from the financials.



"To begin with, roads must be treated as a scarce resource that is contended in both space and time..."

needs is energy efficiency through ridesharing. The wider and more difficult issue has been how to make it efficient, reasonable and palatable for people on a daily basis.

To begin with, roads must be treated as a scarce resource that is contended in both space and time. The general public already accepts the reality and need to pay for parking to rent a certain amount of roadspace for a certain amount of time: this idea simply builds on that perception.

TRANSIT EXCHANGE

A Transit Exchange is a means to rationalise contended access to any "transportspace" (roadspace, waterway or airspace system) based on the construct of a **Commodity Futures Exchange.** Most simply it enables real-time, dynamic ridesharing on a very large scale in any type of vehicle that carries passengers or freight.

The Transit Exchange operates below the level of the application layer (it is not an "app") sending trip packages to the end users on whichever app platforms (e.g. Uber, Lyft or Didi). It also creates isodapanes (demand maps) that can be consumed by any market maker operating on the exchange.

The Transit Exchange is akin to the overall water system (pipes, reservoirs, sewers, pumps). Taxi or RideHailing apps for users are akin to the taps in the house. They may be the only thing the user sees, but behind the tap there is an entire infrastructure which must manage demand and generate income for the whole system to be able to function.

It is intended to be an operating system for the transport cloud in any locality and provide funding to municipal operators. Like Air Traffic Control or an Automatic Dependent Surveillance Broadcast (ADS-B) system but for all vehicles at whatever altitude.

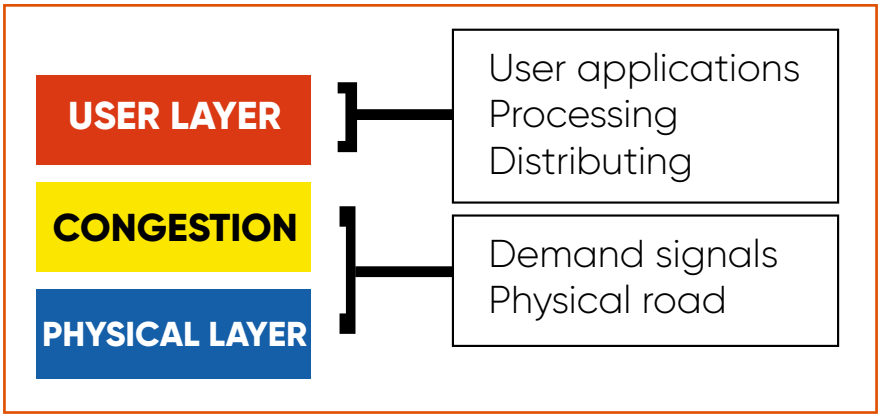
Using mathematical optimisation techniques (based on heuristics and genetic algorithms) the Processing Layer of the Transit Exchange examines and aggregates origin-destination requests for transport from dispersed users in both space and time (who may or may not know one another) and applies operational concepts and knowhow garnered from successful prior deployments, the Transit Exchange provides timely relevant trip package suggestions for ridesharing to those users and the vehicle operators in the locality.

The Transit Exchange also generates income for municipal road operators from the very market making functions on the **Commodity Futures Exchange for Transport** used to fill the empty seats in the fleet or vehicles operated in the "transportspace". Now congestion pricing, road pricing and vehicle pricing charges can all be applied to users and a negative congestion charge implemented to not adversely affect the poorest in society.

Predictive Analytics permit the transport users to choose when to travel and the transport service providers to place their assets in the most logical positions to best serve demand.

If an investor was to deploy an amount of money into the Transit Exchange, then through the market making protocols in solving NP-hard problems related to Large Scale Dynamic Real-Time Ridesharing a set of returns with varying yield-to-maturities can be replicated, providing an alternative to money-market funds and instantiated through the mechanism of a blockchain coin offering.

Demand Backed Blockchain: Rather than relying on the rather nebulous



promise of perpetual cryptographic security of a blockchain ledger, the provable work done has solved a pressing and current problem in the real world and done so in a manner that was transparent. Even then, homomorphisms could be applied to anonymise the transport data.

Highly Liquid investable security instruments (Transit Exchange Bill or TE-Bills) can thus be made available via the Transit Exchange. Its original purpose is to store value represented by demand for travel in a locality. Hence we will have a **Computational-Crypto-Currency** backed by an inspectiable commodity called "transport demand".

The Transit Exchange model seeks to provide the basis for trading 'roadspacetime' packets in a futures exchange construct. The Road Pricing model itself is built of three layers – PHYSICAL, CONGESTION and VEHICLE.

The **PHYSICAL LAYER** is the actual road itself. This is what vehicle licensing and road tax pays for with the flat licence fee per vehicle. While this number can be set at anything, in order for the system to be fair, each road, based on how it was constructed, could feasibly have a different charge. We see this already in many countries with toll roads. This is the base layer – the access price – or **ROAD PRICING.**

The **CONGESTION LAYER** is the variable pricing layer, which is most adaptive to real-time demand conditions. Most cities charge one rate for parking

during the busiest hours and another rate for overnight. Based on demand patterns and adapting to demand, any road could have variable congestion charging, which could also be negatively set by rewarding people who have scheduled to use the road, but stay off it at the busiest times. They could receive payment in tokens that can pay for other infrastructure uses like parking on the network.

The **VEHICLE LAYER** is where differential pricing related to fuel type, energy efficiency and recyclability comes in. Vehicles that are more polluting would pay more, but if the operator fills the vehicle with as many people as is permitted, this cost is thus rational. This also encourages larger capacity vehicles up to a given size for most trips and would thus promote ridesharing.

Access to the roadspace at a given time is purchased in exactly the same way as traders buy other commodity futures or forwards – via an exchange. This construct has worked semi-miracles for food production over 170 years – and it can work just as well for 21st century transportation and mobility.

Get Connected

Eric Masaba is the founder of TEXXI and can be contacted at
eric.masaba@texxi.global
www.texxi.com