
A Roadmap Towards the Collaborative Transport Economy

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1 Introduction

The transport sector is experiencing a rapid shift towards more collaborative and integrated delivery models to connect people to places. The core concept of the collaborative economy is that the focus shifts from value being created by products and services to value created by networks. In the collaborative transport economy, new types of provider are emerging from technology, insurance, telecoms, retail and other sectors to enable more collaborative and integrated approaches built on the value of transport to people and places.

At the very least these changes represent a major challenge to traditional transport business models. This paper describes research undertaken by Scotland's transport think tank STSG to review how transport is changing and the ways it can respond to the challenges and opportunities of the collaborative economy.

1.1 A Changing Context

Integrated transport is a widely stated policy aim but the delivery usually does not match the aspirations. Business structures that define success for those working in transport continue to be largely organised around separate modes, sectors and infrastructure assets such as: roads, railways, buses, trains, ports, and airports. These structures are now facing a challenge from more integrated delivery models.

New types of provider are emerging to enable more collaborative and integrated approaches built on stronger customer relationships. The new providers are using the power of internet connections to join up the economy and society providing a more cross disciplinary delivery approach. With its relatively high scope for adding value from integration compared to other sectors, transport has become a priority delivery area for these new providers. There are already many new technology organisations rapidly growing their stake in transport.

This paper reviews how the economy is changing, what that means for transport, what is already changing and what further action is needed. It looks at how to build a more collaborative networked approach to transport delivery, changing the way that transport is regulated, financed and managed.

2 The Rise of the Networked Economy

2.1 The Information Technology Revolution

Transport was essential for all long-distance communication until the telegraph network started an information technology revolution that has continued progressively over the last 200 years. During the last 200 years each successive technology change has substituted electronic communications for some travel, but also developed complementary networked capabilities.

The collaborative economy has now grown with fresh challenges for value creation and management. In this new economy, the services that are most valued by users are often provided free or below operating costs, with the value for providers being captured elsewhere in the network. Survival in the face of these changes depends on more explicit collaboration between government, citizens and enterprises.

2.2 Problems of Scarcity and Abundance

Economic value in the economy has generally been created through scarcity. The laws of supply and demand have traditionally determined price levels, and markets have been regulated to allow them to function for the benefit of society. However, these approaches have increasingly been failing. Pervasive information, technology and automation has had a downward impact on the cost of production. The economic response has been to produce more, but there are practical limits to how much 'stuff' human beings can consume and how much production can be accommodated by the environment and society. Current business models are failing to capture the value of the things people value most. There have been growing adverse external effects from transport affecting health, wellbeing and quality of life. These compound market failures have not proved to be easy to fix through government spending, regulation or taxation.

The failure mechanism is perhaps most easily seen for walking, but similar principles apply to all transport. It is because walking is so valuable to everyone that it is unthinkable that it should not be free, and because it is free that it is not valued, and because it is not valued that it is starved of investment, and because it is starved of investment many social and economic problems result.

Governments across the world have been unable to manage the problem alone because the regulatory action needed requires a greater level of collaboration with voters and businesses than has been achievable. However, the pressures for new systems are growing. Like walking, internet connections provide access at a cost close to zero with few capacity constraints to create scarcity. Connections have become cheap and abundant (e.g. video conferencing), the need for labour is being eroded by automation, and smart use of capacity levers value from under-utilised resources.

Technology businesses have been able to work around the regulatory and taxation systems to build new collaborative business models. These businesses have used monopolies and patents to attract investment recognising the potential future value of being able to dominate parts of the transport economy. These new technology companies could quickly become too critical for society to fail, so a more collaborative approach to regulation is urgently needed.

2.3 Value from networks

Fortunately, just as information technology has eroded value in transport markets, it has also started to enable organisational and business models where collaboration is more important than price or value.

Network effects have long been recognised in transport. The impact of many small changes to a network is often greater than the sum of the individual parts. For example, installing a direction sign at a road junction has a local benefit, but it is of much greater value if signs are installed at all junctions so that users have a route to follow. The behavioural impact of signing a whole route influences the value of the system. The new information technology networks allow these concepts to be developed at a new scale, routing people with a new range of integrated products and packages linked to wider social and economic goals.

If value can be measured it can also be managed and information technology helps both with better information about value and with the management of the value. Value chain management and supply chain management are well established disciplines within logistics but less so within passenger transport. Collaborations are emerging between technology providers, (e.g. Uber and Tripadvisor), but less so with public authorities. Given the power of the new networks there are complex questions still to be answered about the changing roles and responsibilities needed to achieve the transition to a transport economy which unleashes the potential of information technology, for productivity, wellbeing and culture.

3 Understanding the Collaborative Economy

3.1 Is the collaborative economy new?

A new approach to creating value is starting to have a major impact on the economy. The core concept is that value is created collaboratively, shifting the focus from value being created by products and services to value being created by networks.

Companies such as Uber, AirBnB, Task Rabbit and others are growing rapidly, based on their ability to create value from underused human and physical resources. The services offered by these companies broadly follows long established business models renting labour, goods and services, with commission being taken for marketing and retailing.

New technology could also enable rights and responsibilities to be more effectively balanced within their collaborations. However, as these companies grow, the spirit of collaboration could easily be undermined. The collaborative economy began with locally based, grassroots-funded initiatives such as community car sharing and time banking. The new approaches are rapidly growing the business potential, but have found it increasingly difficult to sustain their initial social value .

The collaborative economy has been able to grow by exploiting gaps or weaknesses in transport and employment legislation. Until the regulatory framework catches up with the collaborative economy it is not clear how different it will ultimately turn out to be.

It may be that ultimately the collaborative economy will be more about a shared approach to developing and improving transport. Rather than attempting to use regulation to frame transport markets, a more collaborative approach could share investment risk, regulatory functions and performance management.

3.2 The Capabilities of Partnerships

For nearly 20 years, government has promoted policies for partnership to develop a more collaborative transport economy. The theory of these partnerships has been that transport operators, users and transport authorities can agree shared goals, allocate responsibility and resources for achieving them and share value in the improved performance. However, successful partnership delivery has depended on several critical factors not present in all parts of the country:

- A clear strategic focus on shared performance goals
- Active promotion by key individuals including political leaders
- A shared capacity to deliver the goals so all parties have a clear stake in delivery
- Strong incentives not to default on commitments

To address the challenges of what happens when partners cannot reach an agreement, over the last decade various statutory partnerships have been created. These seek to strengthen collaborative working by giving the partnerships some status independent of the roles defined by the separate partners through the partnership agreements.

The huge potential of partnerships has not been realised, although many successful joint projects have been achieved. Travellers continue to receive confused messages about accountability when problem occurs, social entitlement to transport is unfair, and there remains a widespread absence of leadership to deliver many potential transport improvements.

These problems are extensively documented in the experiences of community planning. Despite legislation requiring transport authorities and operators to collaborate there remains a lack of incentives and capacity. It remains common for transport authorities to express concerns about how private transport operators share their profits, and for transport operators to cite a lack of clarity from authorities about their share of accountability for transport performance.

After 20 years of weak partnership delivery, practical delivery arrangements should recognise the capabilities of local authorities, regional authorities, transport operators and national government to design and deliver systems which succeed in nurturing collaboration.

3.3 The Value of Sharing

Perhaps the greatest reason for the failure of partnerships is that the frameworks governing sharing have been poorly defined. Many of the longest standing and most controversial issues relate to how road space is shared. Instead of the political process being used to refine, check and modify a working model for sharing road space and other valued transport infrastructure, in the absence of effective governance of sharing, politics has become the frontline management level. Faced with more complexity than can be easily managed in the political arena, government has adopted defensive strategies rather than positive leadership leading to practice which divides rather than unites:

- Dividing the lobby industry into groups (motorists, cyclists, greenies, industry, etc) and playing them off against each other.
- Investing in railways and suggesting that a good rail network is an alternative to a good road network.
- Spending public funds so that intensive activity building things will deflect attention from the lack of a coherent strategy for making better use of existing assets such as sharing road space.

The lack of a managed approach to sharing is accepted by people only because the potential management arrangements for sharing transport systems do not instantly appear attractive to voters. Although the potential loss of autonomy associated with sharing has been a barrier, technology offers new capabilities for building trust.

Companies such as Ebay and Amazon have been able to grow rapidly by offering online marketplaces where providers can bring products to sell and purchasers can choose between them. Expanding these types of services to transport systems could allow people to choose the travel packages that best suit their preferences.

4 A Roadmap towards Collaboration

4.1 The Growing Challenges of Automation

Many new technologies are already capable of wider deployment but the social rules remain immature. Currently systems depend on the application of humanity which is not easily programmed into technology. To exploit the potential of technology, greater clarity is needed about the rules under which machines operate. People may understand vague concepts such as congestion and connectivity but technology needs a more rigorous treatment, where the travel time and access to opportunities is governed within clearly allocated rights and responsibilities.

Some new rules can be generated within the technology by observing human behaviour and replicating the key elements within artificial intelligence. However, for social and governance systems to ensure that their aims are reflected within the new systems they need to be much clearer about what they are seeking to achieve.

Hesitancy to introduce new regulation means that it is not currently clear whether transport services such as Uber and Lyft (in autonomous or driven vehicles) are transport companies, digital services or a hybrid of the two. The new services do not fit within existing definitions and legislation requires more refinement than a binary choice.

In the face of this complexity the European Commission's current stance on collaborative economy has been to apply much more general existing legislation including the Services Directive, the e-Commerce Directive, the Unfair Commercial Practices Directive as well as Treaty principles like Article 49 on the freedom of establishment. However, applying very specific legislation to some transport

operators, whilst leaving other new operators greater freedoms build in a bias toward those companies with the resources to context expensive legal action. Either some relaxation of existing transport regulation, to fall back on general principles, is needed or new clarity on the regulation of the collaborative economy is needed.

Similar tensions apply to taxation where current practices need urgent reform. This has been recognised by the UK Government's commission on modern employment.

4.2 Social and Business Rules for Technology

What ethical standards can we expect of machines? Autonomous cars without drivers could help to improve transport operation and receive priority, but they could fuel transport growth since automated vehicles will tolerate much longer delays due to congestion. The priority given to autonomous vehicles cannot be decided by the technology alone. Decisions about ownership of roads and railways cannot be separated from these new performance management considerations.

Also, air space needs to be better managed to ensure safety and noise from drone transport is managed. Some of these changes may require new regulation and ownership structures.

To avoid the raft of potential problems, governments have so far allowed only pilot operations of many new technologies whilst rules are developed governing:

- Safety and vehicle form
- Priority over capacity/allocation of space/redesign of the built environment/rules governing parking/pickup/drop-off
- Operation of vehicles without people
- Social benefits of driverless vehicles carrying people who would otherwise be immobile
- Costs and taxation
- Rights and responsibilities of designers/builders/owners/users.
- New uses for transport – mobile offices/new leisure activities/nomad lifestyles.

Insurance offers a promising economic system within which to manage the risks. Some risks could be carried by government where regulated control is used to manage systems for the public benefit. However, many other risks require new more sophisticated approaches to distributing risk across the population.

4.3 Managing change

To manage such major changes, smarter citizens and consumers need to engage with more progressive businesses under better regulation. Collaboration requires changes to promotion and provision to enable the new approaches to be publicly acceptable. Collaborative business models shift perceptions about mobility and pose questions to long held practices amongst existing transport providers.

Rebound effects to changes have resulted in protectionist approaches in several European cities, but the new collaborative approaches have so far always found a way round the legislative barriers. Companies such as Uber which have grown rapidly have been able to draw from their large customer base to demonstrate strong public support. However, despite many companies being marketed as providers of 'collaboration' and 'sharing', some commercial enterprises have sought to establish monopoly positions with little scope for collaboration.

Many of the new so called collaborative business models have been less about collaboration than tackling gaps in transport delivery where current service provision is weak, particularly technological development, smart payment, smaller vehicles and demand responsive travel. The new services are not designed within existing regulation, but instead exploit the gaps in the frameworks. Needs of vulnerable users such as disabled and elderly people or to sparsely-populated areas are sometimes omitted.

4.4 Aligning 19th Century Administrative Systems with 20th Century Infrastructure and 21st Century Technology

Government based on geographically representative constituencies has proved to be too weak to face contemporary challenges. New technology is revolutionising the economy and society yet government appears impotent. To be effective, government needs to be more realistic in the next 20 years than it has been in the past 20 about how to translate democratic goals into effective action.

Connected mobility systems are gaining huge investment to exploit the value of transporting people and influencing their travel choices. Transport delivery is becoming more about managing possibilities than reflecting demand for services. In order to design these new systems around people many have sought to combine transport's service delivery ethos with the potential for new technology. These new approaches are sometimes called 'mobility as a service' or 'planned and managed access' to emphasise the need to provide services that meet people's needs.

New delivery platforms will continue to challenge and innovate, but the current lack of a clear legislative framework is set to create growing problems. The capacity within existing transport operators and structures also needs to change to make the best of both old and new approaches. Regulators will need to consider carefully how to encourage approaches that enable new and existing transport providers to co-exist.

Perhaps the most damaging approach might be to place existing restrictions on existing operators in response to the new market pressures without considering the regulatory needs of the new provision. This applies to all decisions about regulation and ownership of existing bus and rail provision. The function and delivery of public transport is changing faster than some attitudes towards the role of buses and train, creating potentially politically unstable systems. Change management should recognise these pressures and plan for them.

Any approach to marry new and existing transport providers should recognise the range of potential reactions from the current market. Certain transport providers may fight for a share of the market under the new conditions, some may choose not to adapt or integrate, and others may leave the market. Collaborative service delivery is not purely additive to the transport network.

It is worrying that the most damaging options possible may in the short term appear to be politically attractive. For example, attempts at greater state ownership of traditional public transport services combined with unconstrained growth of technology businesses providing mobility services could be the fastest route possible to an unregulated free market.

New entrants such as Uber would be able to run bus services without falling under the new regulatory constraints so would be offered a competitive advantage relative to current providers. Private enterprises running commercial services would leave the public sector to cater for what it perceives are socially necessary services, resulting in unaffordable unmet social needs.

To succeed government may need a much stronger focus on the value of public 'services' as opposed to the 'sector'. Failure to respond to the challenges of public sector reform set out in the Christie Commission, community planning and other similar initiatives could result in a very one sided battle between private and public offers. A new focus on collaborative 'service' delivery would enable public policy goals to be factored into transport provision regardless of whether the service operation was public, private or social enterprise.'

4.5 The Changing Characteristics of Travel Demand

As the possibilities for travel expansion or reduction grow, so does the need for more collaborative approaches to manage supply and demand. There are growing pressures for both increases and reductions in travel demand.

People are travelling less because:

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- Changing demographics mean there are less people engaged in the highest trip generating activities.
 - The changing nature of work reduces the need to move people and things and including more home working.
 - The retail and leisure economies are changing with relatively more online activity.
 - Higher fuel prices increase travel costs and reduce demand with demand for energy continuing to grow faster than supply.
 - Less things are being moved with local production becoming more economic and online networks dominating communication.

People are also travelling more because:

- Increasing specialisation demands longer trips to more specialised activities.
- More comfortable vehicles mean that people accept longer journeys.
- A global economy has increased the need for people to connect across longer distances.
- Greater vehicle efficiency means that longer travel is more economic.
- New technology enables new types of travel to new places.
- Commuter catchments are being pushed further from employment centres as the balance of transport costs and house prices push people towards longer journeys.

Collaboration on demand management has been growing. Omni-channel retailing, has been enabling more dynamic interactions between customers and businesses. Smarter travel innovations include employers working with staff to make employee travel more efficient, providers engaging with customers to integrate travel decisions with the timing of other activities, new pricing strategies to manage demand in line with supply, and information systems to share user and management information for mutual benefit.

To enable the required level of targeted personalised communications, customer accounts with clear rules on data sharing are central to successful collaborations. One of the key questions facing transport is how to enable collaborative management of these travel accounts. However, a balance must be struck between the potential benefits of data sharing for society and the commercial benefits (passed on through lower travel costs) from commercial exploitation of customer information.

Travel accounts are widely used to manage differential pricing for long distance air and rail travel. Social networking, route finding and other online accounts are widely used to track travellers to provide them with relevant timely information. Many of these systems allow communications between information providers and users but the accounts are not used dynamically to manage transport supply and demand.

4.6 Exploiting Underused Capacity

The collaborative transport economy is where government regulation and taxation meet personal choice and the desire of people to behave socially. To understand how the collaborative economy might work, each of these three influences must be balanced.

The scope for better use of underused capacity is vast:

- Infrastructure is used well below capacity. Most roads and railways are under-used most of the time. There are large gaps between vehicles both in terms of the headway between vehicles and the lateral spacing between vehicles. Many roads are so wide that they are used for vehicle storage (parking).

- Vehicles are also vastly underused. Most seats in most cars are unoccupied most of the time. There is excessive delay at traffic lights to allow for human error. Scheduled buses and trains often have low occupancies.
- Labour is also being underused and this is causing distortions in the economy that have been recognised by government .

It would not be socially acceptable to regulate car travel to demand drivers share their cars, but the benefits of more sharing can be socially beneficial.

Ride sharing platform Uber recently was found by an employment tribunal to have exploited its collaborators. The tribunal found that Uber drivers were being treated more like employees but were not receiving benefits they would be entitled to as employees. Uber is appealing and in the meantime it will probably also change its terms to calibrate its practices to UK employment law. However, the judgement illustrates several key principles about how collaboration could work:

- What are workers? – An individual can be employed as a ‘worker’ or ‘self-employed’. Self-employed people have few rights and workers have many. There are grey areas about how each category is defined and as work practices have changed these grey areas are of increasing importance. People with little personal wealth are vulnerable to exploitation so employment law and the benefits system are closely linked.
- What level of influence comprises excessive exploitation? - For many years volunteer drivers have made a critical contribution to the transport system. Sometimes community transport organisations need to encourage their volunteers to make trips that would not be their first choice. Pressure meters are needed to help manage the collaboration.
- Does the law protect vulnerable people – Case law is a flexible way to ensure that the law can adapt and evolve to a changing world. However this can also mean that the law evolves to fit the preferences of those that can afford the best lawyers.
- Are gaps in existing regulation sufficient to allow innovation? – To create more collaborative approaches, new ways of interacting may be needed that may not fall neatly within existing laws.

The rapid growth of the collaborative economy is exposing many ways that transport could become more efficient and effective. However, if a driver of a bus or taxi cannot earn a living wage for doing a real job then the society needs to be very sure that investment in the future of technology companies means that these drivers will not be needed in the future. There is currently little consistency between the regulatory and fiscal frameworks of government and the perceptions of financial investors about future employment markets. Whilst financial capital and public attitudes are so far apart, the benefits of collaboration are constantly under threat.

To tackle these problems, new approaches to the regulation of financial services are needed to allow the valuations of transport providers to move closer to fundamental elements such as services, products and labour. This does not necessarily mean more regulation but it does mean better regulation. Until that happens financial markets will undervalue profitable activities (e.g. carrying bus passengers) and over-value debt e.g. the future value of tech companies. This will continue to result in market distortions, and perhaps more importantly a d-stabilisation of socio-political structures.

Distrust and protectionism could undermine all workable future social and economic systems.

5 What Needs to Happen?

This paper seeks to provide a foundation for progress on the collaborative economy. To realise the vision of better connected transport, a new framework is needed with sharper accountabilities for partnership working. Legislation, funding and administration should be used to support joint working.

5.1 Prosperity

- New terms of engagement are needed to enable transport and technology companies to work collaboratively with transport authorities to deliver rewards for everyone. The costs of transport can be an overhead on a prosperous economy, but many transport business models still treat transport investment as if it is separate from the wider economy. These problems are being exacerbated by declining budgets for transport authorities, causing inefficient constraints within the economy.
- Transport authorities should clarify transport performance requirements to provide frameworks for partnership delivery. Innovation towards better performance can come from any provider, so the new performance management frameworks could increasingly replace current adversarial approaches to regulation and procurement that stifle progress. The partnerships for place-making being developed through city deals and in some of Scotland's towns, are a promising first step to involve more partners, but are currently weakened by the continuing lack of priority for partnership approaches within mainstream spending programmes.
- Identify how the employment and benefits system relates to transport delivery, taking into account the UK government review of modern employment.

5.2 Fairness and consumer protection

- Reform taxation to enable more equitable transport investment. Taxation should be based on the benefits of transport for people and places and could be much more progressive. An element of land value taxation could be applied to places and the burden of taxing travellers should be borne more heavily by those who travel most. A root and branch review of transport taxation should cover fuel tax, new vehicle purchase tax, VAT, and air passenger duty seeking to match the burden of taxation better to the accessibility/connectivity benefits and the equitable distribution of taxation.
- New protection is needed for vulnerable travellers and suppliers to ensure collaboration delivers benefits for all people and business. New types of transport service and greater automation of vehicles, drones and other emerging transport technologies are being accompanied by increasing legal costs to resolve rights and responsibilities. Case law helps legal systems to evolve, but vulnerable travellers have less ability to defend themselves in shaping the new laws and need extra protection.
- Recognise that emerging transport technologies may exacerbate rather than resolve existing geographical disparities in access. There may well be new boundaries between areas where people have access to an array of new and existing services and areas which are poorly served, if at all - as is the current case with broadband access. New collaborative transport services may distract from public transport services in urban areas, resulting in the removal of existing rural services leaving some areas with less access than they may currently enjoy. What is the role for the state when new modes avoid the association with public transport but may essentially be relied upon to provide/replace it?
- Clarify policies on sharing, describing how they can be applied in practice. Identify how the value of social well-being is measured and managed, and identify how risk is allocated, including the scope for collaboration between commercial and social insurance systems.

5.3 Participation

- New more collaborative business models are needed to supplement or replace the current transport delivery structures. Better transport should be for everyone to help deliver. Rather than people and organisations being restricted in their opportunities to partner and invest in better transport, new platforms for organising shared transport are needed where integrated services can be managed and retailed.
- Set up clear audit mechanisms to check that transport delivery can demonstrate transparency in the way it manages efficiency, effectiveness and social value.

Success depends on achieving new collaborations between the transport marketplace, government, and other non-market activities (produced and consumed outside of monetary exchange). Perhaps the first step will be to build a consensus for change by developing a narrative around which all partners can unite based on the key principles identified in this report.

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