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Conceptualising the transport Interchange

By Marcus Enoch

A transport interchange is the physical point at which a traveller switches from one leg of a journey to another. This think piece characterises the concept, and then speculates on what the future of the interchange might be. Overall it identifies that interchange comprises three core elements: access mode, interchange facility, and egress mode, and notes that new forms are becoming increasingly common. Four future developments are envisaged: more minimalist interchanges; increasingly developed macro interchanges; struggling mid-range interchanges; and a reduced role for interchanges overall as driverless vehicles become more commonplace. It recommends that policy makers pro-actively designate facilities as being minimalist or as destinations in their own right, and that they direct resources accordingly.

INTRODUCTION
Solving transport problems is about matching demand with supply as closely as possible across the network as a whole and throughout the day, week and year. In practice this is difficult, and so externalities arise, either from demand exceeding supply (leading to congestion and overcrowding and associated effects); or from supply exceeding demand, with the implications of the inefficient use of resources (Enoch, 2012).

One solution often favoured by politicians, is to better integrate transport services such that travellers physically switch from one form of transport to another. This switch takes place at an interchange.

This think piece characterises the current concept; identifies the issues with the process; and then speculates on how current trends might influence the future of the transport interchange. Finally, possible implications for policy are highlighted.

CHARACTERISING THE TRANSPORT INTERCHANGE
Fundamentally, the transport interchange comprises three separate elements: access, interchange and egress. Of these, the access and egress elements comprise of mobile modes, whilst the interchange occurs at a fixed location which may be availed of facilities for travellers such as seats, shelters, toilets and shops.

Conceptually, the process as experienced by an individual traveller is represented in Figure 1. Here, the lowest capacity access and egress vehicle modes are represented on the left, while the highest capacity modes are represented on the right. Similarly, the interchange types range from those with minimal facilities on the left, to those with substantial facilities on the right.

Thus, the ‘traditional’ model of bus-based park-and-ride in the UK (Meek, 2009), would involve the passenger arriving by private car (access mode); then interchanging at a site with seats, an enclosed shelter, toilet facilities, tourist information, and an assistant; before catching a high frequency, high capacity, non-stop bus (egress mode) to the destination.

BENEFITS OF AND BARRIERS TO INTERCHANGE
Interchange is theoretically appealing to operators because it increases the flexibility of how the levels of demand in particular locations can be matched to the available supply by disaggregating journeys into smaller pieces. This means there is a higher chance that each location will be served by the vehicle/service type that is most appropriate at the time and so allows operators to provide a far wider range of destination opportunities without increasing seat capacity. For example, enabling interchange could allow a traveller to use a car when in a rural area and then a bus or a train if s/he then travels into a congested urban area, instead of her/him having to use one or other mode for both journey portions. This traditional form of transport integration is illustrated in Figure 2.

However, in spite of these ‘attractive qualities’, the proportion of journeys where interchange is undertaken by travellers is actually relatively low – about 10% in the UK.
TRANSPORT INTERCHANGES

The letters represent:

A to B: Private car from rural origin to rural destination.
C to D: Walk from city centre origin to city centre interchange.
Take public transport from city centre interchange to interchange close to destination. Walk from destination interchange to destination.
E to D via F: Private car from rural origin to park and ride interchange. Public transport from park and ride to city centre destination.
G1 and G2 to H, via I: Private cars from rural origins, then meet at motorway junction car park interchange using mobile phones to arrange. Then both drivers share one car to a city centre destination.
J to K via L: Private car from rural origin to pocket park and ride site. Then bus to city centre destination.

Figure 2: ‘Traditional’ Transport Interchange
(DfT, 2012) – and this is due to several barriers. One is that interchange is considered as a (sometimes significant) cost by users, which means interchanges are not always favoured by operators. Next, interchanges can be expensive for operators to construct and to operate. Lastly, in some institutional operating environments: there is uncertainty over which operator is responsible for constructing and maintaining interchanges; there are commercial pressures pushing operators to avoid using (and investing in) interchanges; and there are legal barriers in place that seek to prevent cooperation (and hence interchange) between operators.

Figure 3: Contemporary Transport Interchange

FUTURE TRENDS
Looking to the future, several trends appear set to exert an influence. Politically, the key drivers recently have been economic, with the global recession pushing Governments towards adopting privatisation and liberalisation agendas. This in turn (theoretically) means reduced investment costs, improved service efficiency, and the emergence of new revenue streams. Additionally, in many areas there is increasing public opposition to development activity – including that of building more transport facilities.

Next, the economic effects of the recession on individuals will likely see a reduction in journeys overall, and in some groups being increasingly excluded from using cars.

Social trends in many societies reveal an ageing population coupled with less younger people being able to drive (due in part to driving tests becoming more stringent and rising car insurance bills) and these will have implications for transport. Meanwhile (some groups of) people seem to be rapidly embracing the use of social media, and are hence apparently more open to engaging with ever increasing networks of acquaintances – notwithstanding concerns about personal safety or the invasion of privacy.

This last shift has been enabled by perhaps the most influential change factor, technology. In particular, the merging of the mobile telephone with the internet in the form of the ‘smart phone’ – and its near universal adoption in some areas – promises to deliver real-time travel information both to operators and users, with hugely significant consequences. Similarily, new forms of payment systems system will soon mean that ticketing issues – especially revenue allocation between operators – will be resolved, even for individual car drivers sharing lifts.

Finally, changes already occurring within the transport sector will play a part. For example, a new range of ‘intermediate’ transport modes are now entering the mainstream. Modes such as ca: clubs, shared taxis and Demand Responsive Transport systems potentially offer services that are of reasonably high quality (almost door-to-door yet reasonably direct, available almost on demand, and in small comfortable vehicles); and at a relatively low cost (higher than a bus fare but far lower than paying for a taxi). Also important, is the growing reality of autonomous vehicles, which promise/threaten to deliver a revolution in how people and goods are transported in the near future.

IMPLICATIONS FOR THE TRANSPORT INTERCHANGE
Taken together, these trends presage a dramatic change to the interchange concept, which in essence looks set to evolve in four key ways.

First, the use of informal ‘minimalist’ interchanges (park-and-share sites, pocket park-and-ride sites) can be expected to rise exponentially. At these sites, the most basic facilities will suffice because waiting times between access and egress will be short thanks to real-time communication between ‘collaborators’. This means that meeting times and even locations can be continually adjusted to minimise transfer time for both parties. Examples of such journeys are illustrated in Figure 3.

Second, interchanges at the opposite end of the spectrum such as airports and large rail termini will be increasingly marketed as being destinations of choice in their own right so reducing the perceived cost of interchange by making such time ‘useful’ to the user and the space more profitable to the operator. Expect to see more shops, as well as hotel rooms, and service outlets offering dry cleaning, desks to let, meeting rooms and health checks in these locations.

Third, bus stations, smaller rail stations and formal park-
and-ride sites in the centre of the spectrum will increasingly struggle, unless they can somehow either reduce their costs, or else raise revenue. Here, multi-use spaces offer a way forward, whereby interchange operators partner with sport stadia, concert venues, retail parks or car boot sales to maximise activity.

Ultimately however, the future of the interchange (at the local level anyway) will be most affected by the shift to intermediate transport modes, the increased flexibility of which would reduce the need for people to physically interchange. Moreover, such a process will only accelerate as driverless vehicle technology develops.

Under one possible scenario, as automation proceeds then owning a vehicle becomes less necessary, meaning that some form of automated door-to-door taxi service – a ‘dial-a-pod’ – could emerge as the dominant local transport mode. For longer distance trips too, one could foresee these pods temporarily fusing into trains on trunk routes, perhaps even passing through vacuum tubes to cross the sea at strategic points for international/intercontinental journeys. Of course such an eventuality arise, the need for the transport interchange could conceivably disappear altogether due to the point to point nature of such a system, although in practice this outcome seems highly unlikely. Essentially, one suspects that people would always value an opportunity to take a break on a journey to stretch their legs, use the facilities and have a cup of coffee – how else could one explain the success of the humble motorway service station?

Such developments have major implications for policy. Crucially, they suggest that the medium term future of the middle range interchange is bleak, and so policy makers need to begin the process of deciding whether each facility will be either minimalist or a destination in its own right, and of directing resources accordingly. So, under the former approach, costs should be cut as far as possible by steadily downgrading facilities, unless of course they can be justified by broader policy concerns. Instead, the focus should be transferred to facilitating informal minimalist interchange phenomenon (e.g. by providing secure parking at motorway junctions as is happening in France and the Netherlands, and developing pocket park-and-ride sites as in Nottinghamshire in the UK). By contrast under the second model interchanges would need to generate sufficient revenues to cover operational costs as part of a broader area strategy – as many major rail and airport termini have recently done.

In addition, policy makers need to reflect on how current institutional operating environments can be better designed to support interchange activities where they are appropriate.

REFERENCES