

# Freight systems of the future

Innovative solutions for urban freight transport have a place in evolving urban planning says Jolyon Drury

With the increasing development of e-commerce both in the B2B and B2C markets with customer expectations of same day deliveries the pattern of the supply chain is radically different from that served by UK's post War infrastructure and it is continuously evolving.

There is no longer "the right way" with distribution channels increasingly selected to match demand whilst minimising emissions and cost. The availability of infrastructure is key to making this evolution work.

To curb emissions, London including the City at both Mayorial and Assembly level have set a target of a reduction by 50% in the number of goods vehicles by 2030, a serious challenge when volumes and service expectations are still rising. To successfully implement this, the integrated design of infrastructure, spatial planning and the design of urban populated space must all play a part. A number of initiatives by Transport for London (TfL) over the last few years such as the Healthy Streets Programme have approached this.

There are still developer-led mixed use projects intent on maximising land use and return on capital (nothing wrong with that if properly designed) that are just logistically "too hot". The planning guide lines for urban goods vehicle access and parking are way out of date, neglecting the implications from the fragmentation and frequency of deliveries originating on-line from the destination address. Without a secure consolidated concierge service, manned or by secure lockers, delivery couriers having to navigate through a maze of multi-storey pavilions may be parked for more than half an hour, and there may be multiple delivery providers at a time with their vans queuing to inhibit both residential parking and pedestrian movement, itself a security risk. This can be avoided by building designers and

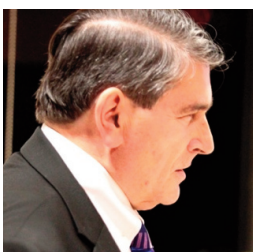


Click and collect concierge lockers

developers understanding the demands of the gig economy driven by the habits of the occupants.

One of the dichotomies is that inner-city land suitable for distribution is now at a premium as competing with housing and retail demand, and that the proliferation of supply chain service providers (such as FedEx, DHL, UPS, known as "integrators") competing for deliveries plays against the requirements to reduce emissions whilst increasing service levels. The latest interim report on freight by the Infrastructure Commission highlights the conflict of land availability and cost and the necessity for the provision of inner city sorting and despatch centres. <http://www.nic.org.uk/uploads>

Various research projects such as CITYLAB are addressing different paradigms for different city environments and markets but the key factors remain constant- delivering the right order to the right customer at the right time at the least cost and sustainably. [http://www.citylab-project.eu/events/final\\_conf.pdf](http://www.citylab-project.eu/events/final_conf.pdf)



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Manned electric district delivery carts operated in pedestrian areas by the Dutch post in Amsterdam

**Air freight plays a key role in perishable transport, part of the global supply chain direct to your door**

Breaking bulk, even if loads are delivered 'pre-picked', ideally involves direct transfer into the final delivery medium- 'cross docking'. But the reality of distance and land availability linked with the emissions saving ambition to reduce the number of delivery vehicles, autonomous or manned, implies collaborative re-aggregation where service providers share 'big data' relying on track and trace technologies to interchange items between themselves for certain zones of delivery without being penalised for anti-competitive behaviour.

Consignments for home delivery range from a single packet (formerly Post Office territory) to a crate of groceries. Conversely administrative business to save unproductive on-site storage at high rental cost has evolved purchasing techniques to draw down stock for just-in-time delivery rather than the former pallet quantities which are now held in suppliers' warehouses. The Regent Street consolidation scheme demonstrated success with the proposed City of Westminster and City of London outer zone distribution villages set to follow it.

The paradigm of bulk delivery of unit loads of one type of goods from a manufacturer or wholesaler to a regional distribution centre to be stored until ready to be picked into individual replenishment orders for retail outlets who in turn will sell one or more items by direct order to customers is now generally redundant.

Developments in the global supply chain have for example resulted in ratio packs derived from intelligent forecasting of retail commodities being delivered pre-sorted, brand packaged and priced in deep sea ISO containers from Far East suppliers. The container is in itself a warehouse. Channel management, the selection of the speed and predictability of the mode of transport to match the market characteristics such as the use of air cargo for fashion launches in a business climate which risks only 15 days to counterfeit, though expensive is amply justified. Similarly air cargo is used effectively for first to market fruit and vegetables- no longer considered "exotic". London's Heathrow Airport is UK's top port by cargo value with its own on-airport border inspection post to validate the cleanliness and quality for imported fresh food, hence the importance given to ground access infrastructure.

Government's current ambition to modernise and smarten the trunk and major roads networks linked with the change in supply chain patterns as a likely result of Brexit provides a generational opportunity which may avert the compound effect of the continuing indigenous shortage of distribution labour and under-funded devolved planning legislation: offering the opportunity for new coordinated levels of automated order fulfilment and reverse logistics.

Developments of regional pallet interchanges for smaller logistics service providers as well as those of the major supply chain contractors might be located as tactical automated pallet



"hotels" at key interchanges of the trunk and main road networks. This will provide nodes to attract intermodal facilities and the range of low emission smart technologies such as unit load transporters running in pipes, unmanned electric vehicles running on the public highway or drones flying in a hierarchy of closely controlled three dimensional airborne conduits.

Such developments will rely on a hierarchy of multi-modal logistics zones including secure truck parks and intermodal transfer sites reserved within the planning process adjacent to trunk, distributor and urban gateway interchanges. The infrastructure, a hierarchy of intelligent roads, heavy and light rail, and sub-surface freight tunnels need to be in place to facilitate these concentric rings of physical distribution operation. The Government Office for Science with DfT is actively researching technologies for low and zero emission freight distribution infrastructure under the Future Mobility programme.

The infrastructure challenge for Government remains the timely provision of the networks to facilitate these evolving technologies to service the variety of delivery options compliant with environmental town planning and societal aspirations.

#### **Trends to follow**

##### **Crowd shipping**

The most efficient way to service deliveries direct to homes and to businesses is under review: whether space saving secure click and collect lockers or some form of robot in basements serviced by a human on a zero emission device such as a cargo cycle or an automated electric van still requires replenishment of the loads from a consolidation centre somewhere within range.

The automation of vehicle loading and unloading and warehouse technologies such as automated pallet handling, order picking and packing into the final delivery medium such as a crate is now well proven as "the furniture of the workplace" with track and trace technologies making the interchange consolidation and later pre-delivery re-aggregation with customer alerts by text message robustly achievable.

"Crowd shipping" is a key potential development with the service providers (integrators) agreeing to share the whole van and cycle fleet to combine the reduction in emissions by dra- >>>

Intermodal transfer: takes trucks off the road, but currently not accommodated by UK loading gauge



>>> matically cutting vehicle numbers to maximise load volume and minimise delivery dwell times to raise productivity. Various "multi packer" optimisation packages are in development. There is some concern about future reliance on an unregulated public concierge network (volunteer delivery stock holders for a block of flats for example) in terms of security, but the advantages for the circular economy (order, delivery, retain or return) are clear to see.

munities. But similar exercises even with less sophisticated communications more than thirty years ago highlighted the importance of an integrated supply chain for materials supply and product distribution in turn driving clustering of small scale manufacture to benefit from economies of scale. Perhaps it is in the conversion of historic city centres back into productive employment environments beyond tourism where automated out of hours zero emission delivery and collection may flourish? ■

**Autonomous delivery vehicles.**

There is still caution over the rapid adoption of autonomous urban delivery technologies mixed with conventional traffic and pedestrian movement, but more supportive of the use of big data for cooperative consolidation to reduce urban delivery vehicles and to increase delivery efficiency. External delivery automation trends risk running a parallel stream as was experienced with automated guided vehicle systems in factories and warehouses thirty years ago. Many were installed as fashionable technology and discarded shortly after. The enduring systems were first by simulation and then real time physically tested against several operating scenarios to ensure flexibility and adaptability against a changing demand environment. A current trial with autonomous delivery vehicles is in hand in Milton Keynes, but this is not the pedestrian pavement density of London.

The FTC2050 partners research program running with the Universities of Westminster, Southampton and University of Lancaster seeking algorithms to rationalise inner city deliveries is a good example of current progress.

**Manufacturing technology.**

There are lessons to be learned still. For example 3D printing - additive manufacture - not just of "solid" products but woven fabrics as well- offers the promise of sophisticated cottage industry bringing local employment to post-industrial com-



RIGHT: Milton Keynes Delivery Robots by Starship Technologies

Further reading: CIVITAS Urban Freight Conference Planning for freight and logistics: practical solutions and longer-term policy. Ian Wainwright, Director, Future City Logistics. <http://www.citylab-project.eu>

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