D2.1 Short History of Cargo Cycling – lessons to be learnt from present and future
Overview of the use of bicycles for goods delivery in selected EU countries
D2.1 Short History of Cargo Cycling
Lessons to be learnt from present and future
An overview of the use of cycles for goods delivery in selected EU countries
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1. Introduction

Following the invention of the safety bicycle in the late 1880s, people soon worked out that transporting goods and luggage by bike was practical. The cargo bike
has been around for almost as long as the bicycle itself with some variations in use, take up and design in different countries. Over the decades it has been used to transport all sorts of “goods” ranging from letters to dynamite, from bread to beer, from newspapers to ice cream and from children to dogs.

Today, the cargo bike is definitely making a comeback, and in Denmark, for example, sales continue to increase and the demand is rising in some other countries too. The cargo bike has the potential to redefine the way we move goods, freight, luggage, shopping and other personal items around our cities and towns.

The purpose of this document is to offer an overview of the current uses for the bicycle in terms of moving freight around. It will also look at an analysis of potential user groups, some of the requirements necessary for transporting goods by bicycle, and the legal framework surrounding bicycles in Europe. Finally, there is a look back at the history of the cargo bike and some of the developments that have been made in the last 100 or so years.

2. Using Bikes for Freight in the 21st Century

Current Uses - Delivering Goods, Services, Daily Life

Bicycles are certainly being used for freight in developed countries in the 21st century. In Europe, amongst the project partner countries, not surprisingly, the Netherlands and Denmark are by far the biggest users of bikes for freight. However, it is encouraging to see that using cycles to transport goods is also beginning to develop in countries where a cycling culture is much less in evidence.

Austria
- Window Cleaner (Vienna)
- Food Delivery (Graz)
- Advertisement distributors
- Mail services (Graz)
- Bike messengers (urgent orders)

Bulgaria
- Festivals
- High School Proms
- Putting up posters
- Courier – some courier companies use cargo bikes as well as ordinary bikes

Denmark
- All sorts of goods transport
- Street vendors (ice cream, coffee, pancakes, cocktails, snacks, soup, sandwiches, sushi)
- Deliveries (post; packages)
- Shopping – DIY stores; supermarkets
- People - parents transporting children to day care centres
- People – cycle rickshaws
Italy

- private mail and small packages delivery
- garbage collection (relaunched by creation of pedestrian areas)
- child/children
- municipal police (pedestrian areas)

Romania

- delivery of refreshments such as hot dogs & coffee
- waste paper collection
- advertising
- courier services

The Netherlands

- All sorts of goods transport
- People – according to Dutch law, you can transport one other person on your bicycle

United Kingdom

- Post
- Packages
- The “last mile” – i.e. freight is delivered by lorry to a distribution centre and the last part of the journey is done by bike to individual customers (more practical than using a lorry or van in crowded and congested city centres)
- Deliveries – flowers; sandwiches
- Window cleaning
- Gardening; allotments
- Cycle rickshaws (transporting people around towns and cities)

3. What can we learn?

Unsurprisingly, in a country such as the Netherlands where cycling, as a means of daily transport has a long tradition, almost every bicycle is used not only for personal transport but is also used to transport stuff (shopping; leisure equipment; children; deliveries; equipment). This means that 65% (rough estimate) of actual bicycles are also used for freight transport. This explains the high number of cargo bikes (some old but mostly new) cargo bikes in Dutch cities. Cargo bikes take up more space than ordinary bikes which creates a need to provide adequate parking space in places where many bikes need to park (such as children’s nurseries, supermarkets and so on).

In Denmark, and particularly in Copenhagen, there has been a dramatic increase in cargo bikes over the last 10 – 15 years. The decision to start planning for bicycle traffic in the late 70s and early 80s led to increased levels of cycling. In Copenhagen, 25% of families with two or more children have a cargo bike to transport their children and “luggage” as a replacement for a car or a second car.
Therefore, it appears that when ordinary, everyday cycling as a way of getting around begins to re-establish in a place, then using bikes to move stuff around follows soon afterwards. Central London is a good example of this phenomenon – over the last decade, cycling has increased dramatically. Not surprisingly, cargo bikes are beginning to make a comeback and several companies are operating ranging from sandwich delivery to digital projectors. Gnewt Cargo in London specialises in urban ‘last-mile’ delivery of goods and currently uses electric bikes. Cambridge has a long tradition of cycling and people use bikes in their everyday lives there to transport children and shopping and so on. Outspoken Delivery (a Cycle Logistics project partner) is a successful cycle courier business using human powered freight bikes in Cambridge and delivering to London using the train and folding bike combination. In cities and towns outside London, bike delivery businesses are beginning to establish themselves.

4. Future possibilities and market analysis to establish user groups

Many opportunities for using bikes for freight are emerging, in particular in busy, congested urban centres where parking is expensive and journey times by motorised transport are slow. Pollution levels are also becoming more of a concern as air quality controls tighten up. The most powerful argument for using bicycles for goods delivery for the majority of businesses is the lower cost compared with motorised transport. For people in their everyday lives, cost is also likely to be a significant factor especially if the cost of motoring rises.

Transport for London’s scoping study (Cycling Walking and Accessibility and Freight Unit, TfL May 2009) provides a very useful insight into the potential sectors (using standard industry classifications or SIC) that may be suitable for shifting freight by cycle. It offers us a sliding scale of potential for use, and also some of the suggested types of freight they may be able to transport. Table 1 below highlights their findings. But in brief, it would seem there is capacity in most sectors for at least some things being moved around by bike.

Table 1

<table>
<thead>
<tr>
<th>SIC Sector</th>
<th>Potential for use</th>
<th>Suggested types of freight</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>High</td>
<td>Med</td>
</tr>
<tr>
<td>Agriculture</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fishing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mining &amp; Quarrying</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manufacturing</td>
<td>yellow</td>
<td></td>
</tr>
<tr>
<td>Electricity/Gas/ Water Supply</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
This makes the potential for delivery by cycle very large indeed. In fact, it is estimated that half of all light goods, and a quarter of all goods could be transported by cycle in an urban setting.

A 2010 study by Stephanie Mühlbacher did extensive research into the potential for providing various trades and services by bike in the city of Graz, but this research could apply equally to many towns and cities across Europe. Mühlbacher used a series of telephone interviews of organisations belonging to the various professions to find out:

- Size of the organisation
- Type and number of vehicles they used for this purpose
- Number of kilometres per trip
- Number of trips per day
- Weight or volume of an average load

This information was then used to establish the suitability for a switch of some or all of their delivery work to cargo cycle, and thus a potential saving of both fuel and CO₂
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Mühlbacher also drew on the expertise of Bakfiets who offered a proposal of suitable equipment for each different industry, and again this would be applicable in many other towns and cities across Europe. Overall, Mühlbacher hypothesised that 32% of kilometres driven could be transferred to cargo cycle. The table below shows the potential fuel and CO2 savings this would yield.

<table>
<thead>
<tr>
<th>Profession</th>
<th>Fuel savings (l)</th>
<th>CO2 savings (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Photographers</td>
<td>344</td>
<td>826</td>
</tr>
<tr>
<td>Florist</td>
<td>51</td>
<td>122</td>
</tr>
<tr>
<td>Baker</td>
<td>8</td>
<td>19</td>
</tr>
<tr>
<td>Pharmacies</td>
<td>48</td>
<td>115</td>
</tr>
<tr>
<td>Painter</td>
<td>336</td>
<td>806</td>
</tr>
<tr>
<td>Caretaker</td>
<td>350</td>
<td>840</td>
</tr>
<tr>
<td>Cleaners</td>
<td>221</td>
<td>529</td>
</tr>
<tr>
<td>Retirement homes</td>
<td>11</td>
<td>27</td>
</tr>
<tr>
<td>Catering</td>
<td>17</td>
<td>41</td>
</tr>
<tr>
<td>Chimney sweep</td>
<td>15</td>
<td>36</td>
</tr>
<tr>
<td>Locksmith</td>
<td>24</td>
<td>58</td>
</tr>
<tr>
<td>Refrigeration/ air con</td>
<td>2,261</td>
<td>6,290</td>
</tr>
<tr>
<td>Alarms</td>
<td>672</td>
<td>242</td>
</tr>
<tr>
<td>Nursing homes</td>
<td>28</td>
<td>67</td>
</tr>
<tr>
<td>Fire ext. Maintenance</td>
<td>257</td>
<td>616</td>
</tr>
<tr>
<td>Meals on wheels</td>
<td>11</td>
<td>11</td>
</tr>
<tr>
<td>Pizza delivery</td>
<td>972</td>
<td>2,333</td>
</tr>
<tr>
<td>Farms</td>
<td>12</td>
<td>29</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>5,638</strong></td>
<td><strong>13,007</strong></td>
</tr>
</tbody>
</table>

**Per year (220 days) in tonnes**

<table>
<thead>
<tr>
<th></th>
<th>1,200t</th>
<th>2,600t</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Source:</strong> Mühlbacher, Bicycle Logistic Thesis, 2010</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5. Legal Frame Conditions

The legal frame conditions surrounding cargo cycle use vary across Europe. Current EU Law says that a vehicle which has pedals, and a motor with less than 250 watts of power which is progressively reduced as speed approaches 25 kph, and cut out at 25 kph is not a motor vehicle. If the motor exceeds 250 watts, or does not reduce & cut out at 25kph, or has no pedals, then it is a motor vehicle and not a bike. The vehicle must also weight no more than 40kg, or 60kg if it is a tandem.

Working within these constraints outlined above means that cargo cycles may become an economically attractive solution to some organisations. Moreover, it may also mean they can provide a much more efficient service to their customers or end users.

Below is a summary of the legal frame conditions that exist in some of the CycleLogistics partner countries.

**Austria**
Legal framework for the use of cargo bicycles (As of July 2011)

Relevant legal text

1) Road traffic regulation 1960 (StVO)
2) Bicycle regulation
3) Law on motor vehicles 1967 (Kfg)

Important notes from the road traffic regulation

According to the definitions of the StVO (§ 2 Number 1), cargo bicycles are defined as “Bicycles”. The § 68 is also important to cargo bicycle users for it regulates the behaviour of cyclists. According to it, cycle lanes and paths are allowed to be used with cargo bicycles as long as they are not wider than 80 cm. The road has to be used if this width is exceeded. Also note if your cargo bicycle is single-tracked (z.B. Bullitt) or multi-tracked (z.B. Nihola) for different demands to the equipment of the tyres apply (see below).

Important notes from the bicycle regulation

In §1(1) of the bicycle regulation you will find what equipment your bicycle has to be fitted with whereas the definitions apply to your normal bicycle as well as your cargo bicycle.

In §2 are the definitions concerning multi-tracked bicycles. These include that two rear lights and reflectors have to be installed in the same height on each side so the outline and boundary of the cargo bicycle can be recognised. Further, the brakes must work on all tyres and within a single axis simultaneously and evenly.

Continuing, §7 is also important because it regulates the payload. It constitutes that the payload of multi-tracked bicycles must not exceed 250kg, the payload of continuously and overrun braking trailers must not exceed 100kg and that of non-braking trailers must not exceed 60kg.

A further interesting clause is the equal clause (§8) which says that bicycles (so also cargo bicycles) that have been manufactured according to the legal definitions in other EEA countries are allowed to be brought into our traffic.

Important notes from the law on motor vehicles

Should your cargo bicycle have an electrical drive then the following is relevant for you: According to §1 (2a) following electrical powered bicycles do not count as motor vehicles but as bicycles if they: do not have more than 600 Watt power and go no faster than 25km/h.

Denmark

- A cycle can have a maximum of four wheels. Trailers can have a maximum of two wheels.
- Bicycles must not be wider than 1 metre.
- The handlebars must not exceed 70 cm in width.
- Cycles with more than two wheels, however, are allowed a maximum width of 1.25 metres.
- Bicycles, including a trailer, must not exceed 3.5 metres in length.
- It is permitted to attach a trailer or a sidecar on bicycles.

**Number of Persons**
- A bicycle can be used by a maximum of three persons, as well as two children under eight. [I'm assuming this includes cargo bikes, otherwise this would make for some crowded bicycles]
- There can be a maximum of two children in a trailer.
- If there are passengers on the bicycle, the driver must be over 15 years old.

**Equipment**
- A bicycle must have two independent brakes, one on the front wheel and one on the back. Cargo bikes must also have a parking brake.
- A bicycle must be equipped with a bell. Horns, etc, may not be used unless there is also a bell.
- A bicycle must be equipped with a white reflector on the front and a red reflector on the back, two yellow reflectors on the pedals which are visible from behind and at least one reflector visible from the side. Alternatively it is permitted to have wheels with built-in reflectors - meaning a white strip along the tire. It is allowed to mount more than one reflector.

**Great Britain**

There is no legal limit on the size or weight of a pedal cycle in Britain. (see http://www.ctc.org.uk/DesktopDefault.aspx?TabID=4073). Within that document the only place where transportation of cargo is mentioned is with regard to tricycles. Goods tricycles (very sensibly) need brakes on all their wheels and can’t take advantage of the exemption which gives normal tricycles the option of putting both braking systems on the front wheel only.

Electrically assisted pedal cycles are not allowed to weigh more than 40kg if a bicycle or 60kg if a tricycle (unladen weight). This law was intended to stop heavy electric mopeds pretending to be pedal cycles, at a time when nobody was thinking about cargo cycles (See http://www.ctc.org.uk/DesktopDefault.aspx?TabID=4512)

Lights are not a legal requirement unless it’s dark. (see http://www.ctc.org.uk/DesktopDefault.aspx?TabID=4071).

In Britain there are very few roads – apart from motorways of course – where you cannot cycle, regardless of whether there is a cyclepath alongside and usually there isn’t. But where you cannot cycle, there is no exception made for cargo cycles, since these roads are virtual motorways where any slow vehicle would create a dangerous obstruction.

**Bulgaria**
There are no special rules for cargo bikes in Bulgaria. Here are the articles found in Bulgarian legislation that could potentially apply to cargo bikes:

- A bicycle has at least two wheels and is propelled by muscle power (Traffic Law).
- The definition in the Traffic Law of trailers is "one that is pulled by/attached to a motor vehicle". No mention about bike trailers.
- Bicycles with additionally installed motors are not subject to registration as motor vehicles (Ordinance on registration of motor vehicles).

**Italy**

*Towing and use of a trailer:*

- Do not walk animals on a leash as you ride or have yourself towed by another vehicle.
- You may use a trailer (max. overall length of bike and trailer 3 m; max. trailer width 75 cm; max. 1 m in height including load).

*Transport of children or other persons, objects or animals:*

- You may carry only one child in an approved child’s seat
- You may place the child seat between yourself and the handlebar only if the child’s weight does not exceed 15 kilos; behind you if the child is younger than 8 years irrespective of weight
- The carrying of other persons (max. 4, biker included) is permitted only on specially designed and approved wheeled vehicles; only in this case may two children be carried at the same time provided they are not over 10 years of age
- You may carry animals if kept in a cage or container
- You may carry objects only if securely bound, if they do not jut out from the bicycle laterally or lengthwise beyond a max. of 50 cm and if they do not interfere with or limit visibility.

6. **Ranking of priorities**

Taking into account the research on cargo cycling and some of what has been written here about the potential of cargo cycling, the priorities for people switching to provision of service by bicycle are as follows:

1. **It has to be economically viable**
   - Cost of staff
   - Capital cost of equipment (vans v bikes)
   - Potential fuel savings
   - Fixed costs savings (e.g. tax, insurance, congestion charges)

2. **Appealing to customer**
   - Efficiency of service (e.g. quicker, more reliable)
   - Green credentials
   - Carbon savings (local authorities have CO2 emission targets to hit)

3. **Legal conditions**
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7. Description of existing business processes

Using cycles for the ‘last mile’ deliveries is particularly attractive as they offer much greater efficiency and flexibility than motorised transport, saving time and money. Other points in favour of using cycles are the contribution they make to reducing CO2 and pollution which helps to create more ‘liveable cities’. At present, in many cities, deliveries are done in small vans and some of these deliveries could potentially be transferred to cycles. The Transport for London (TfL) scoping study found that where this had been tried by larger companies, there were successes in some European countries with high proportions of cycling, but a pilot in London by a large logistics company had not been successful. It was felt that some changes could prevent the difficulties that company experienced, including improved payload capacity and route planning, both of which have come about in the years since the study was written. Currently, international freight companies - TNT, FedEx and DHL – are experimenting with freight cycles for delivery, especially in cities.

See section 7 of the Transport for Greater London scoping study for a thorough description of various business models:

Amongst cycle-specific delivery companies, the TfL study found that most of the successful projects in Western Europe (but not the UK) were supported by local governments, at least at inception. Either they were supported by being the chosen supplier or the delivery had an alternative purpose such as offering employment to the long-term unemployed. Within the UK, successful delivery companies tended to have specific delivery items and clients, and often clients to whom it was important to have a ‘green’ public image.

Drawing on information in Mühlbacher’s thesis (2010), we note that beside the limits of weight and volume, the potential of moving from van to bicycle delivery may take place without increasing current staffing levels.

8. History and Origins of the Cargo Bike

Regarding the history and development of the cargo bike, similar designs were emerging at similar times in many countries, and this section of the document firstly gives an account of the developments from a historical perspective. This overview is followed by some country specific information.

a. General Background
The first bicycle is reputed to have been invented by Baron Karl von Drais, to get around his estates and supervise the work. We do not know if he carried any equipment upon his draisenne, but it was nevertheless a utilitarian machine. After a brief vogue as a plaything of the rich, real growth in the use of bicycles occurred when they acquired pedals and became a practical and convenient means of transport. At first only the well-to-do could afford one: professionals such as doctors and lawyers. The doctor, at least, would have needed to carry some essential equipment for his profession, probably attaching the ubiquitous “black bag” to the handlebar of his high-wheeled bicycle via the fitting illustrated below.

These adventurous and well-educated young men (they were all men) also used their bicycles to travel, leading to the foundation in 1878 of CTC: the world’s first touring organisation. Journeys of several days always involve some luggage, and the wisdom of putting luggage on wheels – especially when one has a pair already – was obvious to cycling’s pioneers, even though they appear not to have carried anything like as much as today’s cycle-tourists!

One reason for the popularity of the bicycle with the growing urban middle class was the difficulty of stabling a horse as towns became more crowded. Meanwhile the bicycle’s animal predecessors supplied names for the saddlebags and panniers by which our drahtesel (the “wire donkey” of German-speaking countries) may carry the necessities of travel and trade.

b. Tricycles

Whilst young and upwardly mobile men leapt onto their high wheels, senior colleagues preferred the stability of a tricycle, which was initially the only kind of cycle available to women. Three wheels also provided much greater scope for cargo. In 1881 the Bayliss-Thomas Company sold their first carrier tricycles to the British Post Office. Such vehicles were also adopted also by tradesmen for the delivery of goods and by artisans to carry the tools of their trade. The Quadrant Cycle Company for example, constructed a special tricycle to carry a travelling photographer’s bulky tripod camera,
glass plates, developing equipment and a dark tent. Early tricycles came in many forms: two-track or three-track, front, rear or side driven and steered by one or more wheels at the front, rear, or even both on one side. Most of these forms were adapted one way or another, more or less successfully, to the carriage of goods.

Further tricycle developments, of chain drive and front steering, paved the way for the safety bicycle, i.e. the modern bike. Tricycles simultaneously evolved along similar lines and from the 1890s most carrier tricycles took a similar form, with two wheels behind and a large rack, basket or box between them – a design that persists unchanged to this day, for example the Pashley Picabac.

The obvious alternative of placing a box between two front wheels, equipping it with a handlebar and simply hinging this unit to a bicycle-like rear frame, proved equally useful and persistent. One defect of this design is the disturbance of steering when one front wheel encounters an obstacle, which can be reduced by adding a steering damper. A complete solution is to fix the box and steer the front wheels as in a motor car, but this entails a smaller box or wider track, which would be is less convenient. Modern examples of these two forms are provided by the Danish Christiana and Nihola tricycles.
c. The ‘Safety’

In 1885 the Rover safety was marketed by John Kemp Starley and all previous designs soon became obsolete. The safety was (and is) far better suited to the carriage of goods than the ‘ordinary’ (penny farthing) and carrier or trade bicycles as they were called at that time, soon became available. They came equipped with cargo platforms, boxes or baskets fixed to the frame above one or other of their equal sized wheels, but most often in front.

These bicycles provided a most convenient means of making local deliveries and became a common sight in many countries. Shopkeepers found them especially useful, that a common name for this of bicycle in Britain is a ‘butcher’s bike’, in Germany a ‘baker’s bike’.

As road surfaces improved it became possible to reduce the size of the front wheel and increase the size of the front basket. In the 1930s Raleigh manufactured both equal wheel and large capacity carrier bicycles, but by 1980s such machines (apart from those still used by the Post Office) had become a rarity in Britain and most of Raleigh’s production of them was exported to developing world. Carrier bicycles are still manufactured in Europe, but nowadays in smaller quantities, by smaller firms.

d. Extended Bicycles

In the late 1920s an extended form of carrier bicycle first appeared in Denmark, in which a load-carrying platform was inserted between the rider and the front wheel, which now being entirely separate from the handlebars, was steered by a tie-rod passing under the platform.
This platform was low down for stability and ease of loading. These bikes became a common sight in the streets of Copenhagen and earned the nickname ‘long john’. Later models had a smaller front wheel, which allowed an even longer platform. A ‘short john’ version was also made, but it was not as popular as its big brother.

Although long johns spread to other cities, mainly in the Netherlands and North Germany (their immense weight ruled out anywhere hilly), this remained a characteristically Danish design – until very recently. Now the Dutch word ‘Bakfiets’ is commonly used.

Extending the rear end of a bicycle seems to be a very recent idea. Xtracycle (USA) claim originality for the ‘longtail’ when in 1998 they marketed a rear extension that allowed larger loads than normal panniers to be carried either side of the rear wheel. A heavy object however, requires an approximately balancing load on the opposite side, which limits the utility of this layout.

On a normal bicycle the cyclist’s heels overlap the rear wheel, so a much longer rear extension is required, compared to a front-extended bike, to make enough of a gap for a low and centred load. And because a bicycle rider’s bodyweight is biased rearwards, the structural compromises are also greater around a rear gap. Such a machine nevertheless appeared in 2002: the 8-Freight by Burrows Engineering.

More can be carried per metre on a long-fronted bicycle, the load is supervised by the rider and this design has stood the test of time. Longtails on the other hand, enhance comfort (because the saddle comes midway between the wheels) and from rider’s perspective at least, look much more like a normal bicycle. This may be more appealing to a cycling enthusiast and perhaps explains the origination and popularity of longtail bicycles in countries where you need to some kind of cycling enthusiast to cycle at all!

e. Trailers and Sidecars

![Image of Turners Patent carrier]

As used on our War Bicycles

![Image of The “NEW” Carrier Bicycle]

The “NEW” Carrier Bicycle

![Image of James carrier bicycle – 1914]

James carrier bicycle – 1914

![Image of Smaller wheel, larger basket – 1939]

Smaller wheel, larger basket – 1939
The earliest example known to the project of a cycle trailer for passenger transport, is as it says: “the Lady’s Sunday outing in The Park”! It seems likely that cargo trailers were also made, but given the widespread availability of trade and carrier tricycles, they were probably used mainly by private individuals – just as now. For if you already have a good bicycle and have only an occasional need to portage greater loads than can be accommodated in panniers, it is simple and cost-effective to add a trailer.

When there is permanent requirement for loads to be carried, it is generally most efficient to integrate freight with propulsion in one vehicle. Trailers have nevertheless been used commercially and municipally, and are still used, for example by gardeners and maintenance departments of Dutch cities. Trailers may also be favoured by small traders on a budget, who have a bicycle for personal transport but when working need to carry goods. Nowadays however, a bicycle is cheap enough in proportion to the income of most Europeans, that most traders should be able to afford a purpose-made work cycle in addition to their personal bicycle.

Two-wheeled trailers have always been more popular, but single wheel designs, in which the trailer is torsionally linked to the bicycle so that it leans in parallel around corners, are also possible and date back at least to the 1950s.

The means by which the trailer is coupled to the leading cycle is critical to the behaviour of the combination, in particular the height of the coupling and the braking performance. With a coupling that is much higher than the trailer’s centre of gravity, for example to the seatpost, the trailer runs under when the cycle decelerates, pushing up on its drawbar. A heavy high-coupled trailer may even tip the bicycle forwards, sending an incautious rider over the handlebars! For this reason, low couplings are favoured by the draft CEN Standard for trailers used by the general public.

Notwithstanding this safety defect, very large high-coupled trailers remain in everyday use by some business and municipalities – but only in very flat places where their weight prevents high speeds and where a cyclist’s right of way is not routinely challenged by motor traffic. It may also help that the main users are employed and presumably trained to use them. In other places, where high speeds are gifted by gravity and where cyclists are often forced to stop quickly, these trailers would not be safe. Any trailer capable of carrying more than 50kg, even if it has a low coupling, places a greater demand upon the braking system of the towing cycle, than it can reasonably be expected to deliver. Larger trailers than this are certainly in use. These trailers should ideally be equipped with over-run brakes, but seldom are thus equipped.
In Britain there is far more historical evidence for the use of sidecars, both for trade and private purposes, than there is of trailers. Previous generations of parents doubtless preferred sidecars because these enable conversation whilst riding along. Sidecar users could also be more certain that their children were happy and safe.

A sidecar also makes perfect sense for any trade involving ladders, and the cycling window-cleaner was such a familiar feature of the British street scene in the 1930s that Salco included one in their Toyland range.

Unlike motorcycle sidecars that are rigidly fixed, making the machine into a tricycle, bicycle sidecars were always hinged so that the bicycle can be balanced and leaned around corners as usual. The sidecar wheel however, was usually mounted rigidly – except for the French Vannod sidecar, where a linkage banked the wheel in parallel with the bicycle.

As far as we know there are no current suppliers of cycle sidecars.

f. **Pedicabs**

Some early tricycles and quadricycles were designed to carry a non-pedalling passenger, for reasons that in those days, physical exertion was considered unladylike. With one of these machines a couple might cycle together whilst obeying social norms.

Social norms changed, indeed the bicycle helped to change them, and I can find no record of the use of pedal cycles to transport passive passengers in Europe during the 20th century, until the last few decades, when cycle “rickshaws” were at first imported from India and later manufactured here.

These pedicabs, as they soon came to be known, are used mainly to give tourists sightseeing trips around picturesque areas, particularly in towns and other places where motor traffic is restricted. In that context they have a similar role to horse-drawn tourist carriages. However they are not restricted to tourist use and may compete with motor taxis where a pedicab is able to access routes too narrow for a car and areas from which all motor traffic is excluded. Or people may simply wish to ride on a pedal-powered machine as a novelty, or because it does not pollute. This, of course, is a very recent social phenomenon.

g. **Power Assistance**

Internal combustion engines were added to pedal cycles as soon as they could be made small and light enough not to over-encumber a two-wheeled machine. At
first they lacked the power to do more than assist pedalling. Ultimately however, this led to the motorcycle.

We are at a similar transition stage with electrical power. Until recently the weight and bulk of batteries put a limit on motor power, so that an electrically assisted pedal cycle was as much as one could reasonably have on two wheels. But thanks to better batteries, we now also have electric motorbikes, and there is pressure from manufacturers to increase the power of assistance permitted on a pedal cycle.

Electrical assistance is most useful on a heavy freight cycle or pedicab and should be encouraged, as it extends their usefulness beyond flat areas and into places with significant hills. Some legislative regimes however (e.g. UK) put an arbitrary limit upon the unladen weight of an assisted bicycle or tricycle. Freight cycles cannot avoid being heavier than normal cycles. Some weigh more than the electrical assistance limit even before a motor and battery are added. These limits will need to be removed before cycle logistics can realise its full potential.

Given the burden of a heavy cycle and its load, it is tempting to provide more powerful assistance than the permitted 250 watts. The rider however, is unlikely to provide more than 250W of human power, or even that much, except briefly, so any more powerful motor becomes the prime mover. In that case we no longer have an electrically-assisted pedal cycle. What we have instead is a human-assisted motorcycle, in other words a moped.

There is probably also a place for light electric delivery vehicles and taxis, powered by electric motors of however many watts may be necessary, with or without human assistance. If their top speed is similarly limited to 25kmph, they might also be permitted to operate in places where normal motor vehicles are banned. They are nevertheless a kind of motor vehicle and hence beyond the scope of this study.

h. Personal Logistics

In addition to the commercial and municipal carriage of goods by cycle, individuals also need to carry items such as shopping or equipment and have done so by cycle almost since the invention of the bicycle. All the usual panniers and carriers for touring luggage can be seen in any good bike shop or catalogue. Also individual needs can be met by any of the trade cycles already discussed – or more likely a trailer. It should nevertheless be acknowledged that history has seen a great many ingenious fixtures and fittings by which specific personal effects, weapons, musical instruments and items of sporting equipment can be attached to a bicycle.
The parental use of trailers and sidecars to transport small children has also been mentioned. Tricycles can also be used. A pair of small seats fit well between two rear wheels, or alternately: many modern box trikes are fitted out for child transport. Likewise the Bakfiets long-front bicycle.

A search through old catalogues and advertisements reveal that there are few, if any, entirely new ideas in cycling. Most things have been tried before and very much longer ago than seems credible. The bicycle child seat for example, goes back to 1891, when Dan Albone made something out of wicker to fit over the front wheel of a safety bicycle, which itself had been invented only six years previously. The trailer-cycle (also known as a Trailerbike, Slipstream, Tag-along etc.) on which a youngster may pedal and learn road sense whilst safely coupled to and guided by the bicycle of mum or dad, was invented by a Mr Rann in 1935 and known (in Britain at least) as a Rann-trailer until the 1980s.

i. Postal Delivery

The use of pedal cycles for postal delivery is one of its first logistical roles, the most universal, well-known and documented. It is useful to examine the history and development of this role in some detail, as one can learn some useful lessons from this example, about the problems and opportunities for using cargo cycles in other fields.
From the late 1870s, the British Post Office had experimented with delivery by ‘velocipede’ and in 1880 two regular tricycle posts were established in Coventry, the home of the UK cycle industry. The prospect of a prestigious and lucrative contract with the Post Office led to a period of experimentation in cargo cycles. Some of these extended the load-carrying capacity of an existing tricycle design by adding an extra wheel, thus making a quadricycle. In the “Ideal” designed by a Horsham architect in 1882, a large central driving wheel was surrounded by four small stabilising and steering wheels, with a mechanism to lift them off the ground once in motion. These machines were used with some success in the Horsham district, but other areas found it far from ideal! This heavy and complex contraption was also called the Centre-Cycle, but better known as the Hen and Chickens and soon abandoned.

Such detailed information is not available for other countries, but it is known that the Austrian Postal Service started using cargo tricycles in 1888 and it seems likely that many others will have adopted tricycles around this time and bicycles in due course.

In Britain, following the early trials, postmen received a weekly allowance for using their own cycle. Few could afford to buy one however, so the use of cycles increased but slowly to only 67 in 1895. By this time the safety bicycle was well established as a practical design on which moderate loads could easily be carried. The productivity gains from equipping their postmen to cycle rather than walk were obvious and in 1896 the Post Office purchased 100 bicycles. Many more followed, all made to the same specification. In 1897 the radius for free delivery of telegrams was increased from one to three miles (1.6 to 4.8km) and Post Office bicycles became ubiquitous.
By the turn of the century, many firms were making trade bicycles and tricycles for all manner of deliveries and after 1904 each Post Office was allowed to buy whichever they considered most suitable for local conditions. By 1929 the proliferation of spare parts became unsupportable and a Standard Post Office Cycle was once again adopted. It had 28in (700) wheels, a single 65in (5.2m) gear, weighed 50lb (23kg) and supported a postbag of equal weight upon the integral front carrier. By 1935 the fleet numbered 20 thousand machines covering an aggregate annual distance of not less than 120 million miles (200 million kilometres).

A British Post Office report of 1953 records the many revisions to that specification over the inventing years, such as 26in (650) wheels and a lower riding position for easier dismounting. By then the fleet comprised some 24 thousand bicycles, including 1,900 with a women’s frame. Unfortunately we do not have more recent data from the British Post Office, but we know that motor vans have entirely replaced bicycles in rural areas and partially in towns.

The distribution of mail has meanwhile been centralised away from local post offices, which are now called Post Office Counters and run separately from the Royal Mail. This restructuring puts most addresses too far from the depot for bicycle delivery, which accordingly occupies a smaller niche between the pedestrian and the van. Add van-assisted pedestrians and that niche disappears. Some areas have also introduced van-assisted bicycle deliveries. Driving bicycles out to the furthest points of their rounds approximately trebles their range, since the load is soon reduced and the empty bicycle is easily ridden back to the depot. This enables up to ten times as many addresses to be reached by bicycle, pending the restoration of a more localised distribution network.

As the hard physical labour has been removed from so many jobs, pedalling a laden bicycle stands out as different. Although many cycling postmen and women enjoy the exercise and appreciate the health it gives them, trade unions may assume that anything motorised is better for their members and too readily agree with plans to replace bikes with vans. Electrical assistance can answer such criticisms – but only once the UK weight restriction has been removed.
Another challenge for bicycles is the changed nature of mail. As email and the internet have killed the letter and spawned mail-order goods, the many small items of yesterday’s mail have been replaced by fewer larger and heavier ones. These items require a bigger container and longer distances between drops, more capacious cargo bicycles and tricycles, are needed to meet this challenge and provide an alternative solution to the obvious motor van.

The Netherlands, Denmark and some of the other great cycling countries of Europe, have been quicker to meet these challenges than Britain, adding trailers, tricycles and extended bicycles to their postal delivery fleets. These countries have also removed any regulatory obstacles to the electrical assistance of cycles that are necessarily somewhat heavier than usual.

9. Country Specifics

a) Austria
Bicycles, especially tricycles, were used for transporting goods in Graz and other parts of Austria as early as the 1890s and the Postal Service started using cargo tricycles in 1888. In 1900, the Styria factory’s catalogue stated that:

“...the tricycle has become indispensable for the business world...this is the most practical vehicle for deliveries, no running costs, and always ready for use....”

For a more detailed description in German see [http://graz.radln.net/cms/beitrag/10860707/25359581/](http://graz.radln.net/cms/beitrag/10860707/25359581/)

In 1900 Johann Puch, a cycling manufacturer, produced two types of cargo bicycles with 250 kg load with transport containers on two wheels with the load behind the driver. A year later, this principle was reversed and tricycles were created with the load at the front. This model was copied all over the world and still used today (see Christiania bikes). Meteor, another bicycle manufacturer in Graz, built similar bikes, with an optional basket or box. Cargo bikes cost about 450 Kronen (about twice as much as a touring bike). Benedict Albl, another manufacturer, produced cargo bikes without chains and with a “cardan” (propeller shaft) propulsion.

When cars became more popular, people used bikes less and fewer goods were transported by bike. However, bikes with trailers were used for longer than cargo bikes. From 1936 to 1950, Exel Trailers, a factory in Graz produced bicycle and motor trailers. These trailers were specially promoted to small businesses (e.g. painters, to transport their tools and paint). More recently, since the 1990’s, using bikes to transport children has increased and therefore bikes have lost the social stigma of “bikes are vehicles for poor people who can’t afford cars” which has led to new initiatives. Since 2007, the “bike kitchen” in Graz (an autonomous self-help workshop), as well as two bicycle shops, have been producing creative one-off pieces.
b) Bulgaria

In Bulgaria, cargo bikes have not been widely used as cycling has traditionally more of a sports activity and only for the affluent classes. However, cargo bikes were used extensively during the so-called Balkan Wars (1912 – 1913) as the cycling clubs which had started up at the end of the 19th century were drawn into the military structures of the time and used to deliver packages, telegrams and ammunition. At the end of the Balkan Wars, the cycling clubs moved out of the military structures and existed independently of the army. After World War Two, Balkan Lovech, Bulgaria’s first bicycle manufacturer was established and the price of bicycles dropped which increased the bicycle’s popularity significantly and people of all social classes started to use them.

However, apart from during the Balkan Wars, it was not until the 1960s that post, newspaper and telegram delivery boys used bicycles to move items around. The bikes used were generally not big Christiana style bikes but ordinary bikes with either a basket at the front or back or a platform for the packages and newspapers. Some bigger cargo bikes were used by craftsmen such as window repairers and merchants such as ice cream sellers but these were usually custom built. Cargo bikes were used for moving materials around the Balkan’s site (Bulgaria’s first bicycle manufacturer). Bikes are being used to these days to carry loads as diverse as dogs, posters and people.

c) Denmark

In the early years of the 20th century practical transport of light goods began to evolve when bicycles started to be adapted for such use. The earliest form of "cargo bike" was what is called the “Short John” in Denmark. It is known by a variety of names including: a delivery bike, a butcher's bike and a chimney sweep bike. Basically, a front rack was placed on the frame and, in time, the front wheel was made smaller to accommodate a larger load on the front. Two of the nicknames for the bike mentioned
above are an excellent indication of how this bicycle was used – i.e. butcher’s bike and chimney sweep bike. In the early 1920’s a new design was seen on the streets of Copenhagen and it quickly spread to the rest of Denmark. Called the Longjohn (which is why the bicycle above ended up with the nickname Shortjohn in Danish), this bike was intended for heavier loads. It didn’t take long before most light goods transport was carried out on a massive fleet of these two bicycles.

Many men, now in their 40s, in Copenhagen today did a tour of duty longjohns in their teenage years, delivering goods from local shops to residents - a case of beer to Mrs Hansen on the 4th floor and fruit vegetables to the Larsen family and so on. However, the advent of supermarkets has caused this local goods transport by bike to disappear.

The Longjohn and Shortjohn were perfect for light goods transport but in a bustling city centre there was a need to transport heavier loads. The horse and wagon was expensive - the horse more than the wagon - and in the early days of the last century a human-powered version was developed.

Three-wheeler with a large cargo bay out front, with the rider pushing the pedals behind, were soon a main feature on the urban landscape for transporting heavier loads. These heavy bikes were prominent during the Second World War but faded away in the 1950s when motorised transport started to dominate.

Fast forward to the 1980’s and urban planning started to focus on bicycle traffic once again - after a couple of decades of car-centric planning - the bicycles returned to the cities in Denmark.

Trailers for bicycles were popular in the 1980’s. One bikesmith living in the anarchist free town of Christiania, Copenhagen had an idea one day. He took the trailer box and put it in front of the bike, with two wheels under the box. It was a present for his wife so that she could get around with their child. It was an instant sensation and demand grew from Day 1. The Christiania Bike was born and it would end up transforming urban transport in Copenhagen.

Nowadays, over 10 brands of cargo bikes on the Danish market with boxes out front are on offer. Especially over the past ten years sales of these bikes have exploded to such an extent that there are now 35,000-40,000 of them in Greater Copenhagen. Twenty five percent of families with two or more children have one for transporting their children and goods - either as a replacement for a car or as a second car.

The two-wheeled Longjohn is also experiencing a revival with a new design and the Shortjohn is popular, as well. This modern armada of cargo bikes is also used for light goods transport and as vending vehicles for selling goods on the streets. You can eat and drink your way through Copenhagen on a summer’s day exclusively from
D2.1 Short History of Cargo Cycling

cargo bikes.

d) Italy

Although in present day Italy, the cargo bike or freight bike has almost been forgotten and continues to be neglected, it was a key element of social and economic development for at least 50 years during the 20th century of Italian history. According to some estimates, 20 to 30% of workers (in Florence) used cycles for delivering goods and carrying out services.

From the 1920s to the 1960s, for all those craftsmen and vendors unable to afford to either rent or to purchase a shop or truck to carry out their income generating activities, the bicycle, the tricycle, or the cargo bike, specifically customized and equipped for their activity, was the main business asset and indicator of status for these businessmen.

At one time many of them were active in the cities, but they really came into their own in the countryside and all the small villages, always driven by the will to bring the workshop to the customers where no workshop existed. The shortage of resources was the key element of this nomad economy. They had no money to fund premises (i.e a physical building) or for a truck, there was no money to replace broken domestic tools, and sometimes no money to pay for the service delivered. However, customers’ inability to pay for the service was not a reason for the craftsman to refuse the work, as they appreciated “payment in kind” such as a meal or shelter for the night.

Moreover, in these villages during the transition from a rural to an industrial economy, workers using cycles also played a cultural and social role through the social service deployed – for example - the mailman (who uses a moped today), the road sweeper, the policeman (both relaunched now in the pedestrian areas), the firefighter, the preacher and the soldier – or the spectacles and shows offered on market days by the puppeteer, the clown and the ballad singer.

Yet, these ancient bikes reveal much about the history of a country, its poor society and (once) creative economy: all originally customized for use by their owners – with reinforced and modified frames, special wheels, or a third wheel added, all kind of boxes, - and self-equipped – rotating devices, heating systems, tanks, so they were able to travel from village to village, from square to square (marketplaces), from door to door to do repairs, moving the workshop as required to make sales or deliver services. Numerous business opportunities were offered by the bicycle – or tricycle or cargo bike - in those years: sales or deliveries of cooked food, ice creams, chestnuts, vegetables - the fast disappearing - fish and clams, meat, milk, rags, paintings or newspapers; those delivering services such as the painter, the barber, the farmer, the turner, the photographer; repairers such as the mechanic, the tailor, the chimney sweep, the grinder - the legends – the cobbler, the blacksmith and the glazier. Many of them could be reinstated today – and many more could be created, mostly in urban areas, not only because they are always affordable and compare favourably with motorized options but for their versatility, agility and speed.
e) Romania

Cycling culture and cargo bike usage is in its incipient stages in Romania and as such there is very little information available regarding historic use of the cargo bike.

However there is some information available around cycling itself. The first mention in 1860 and the Tirul company provides its members, for a fee, with bicycles. In 1954, Tohan Zarnesti, produces the Victoria, the first Romanian bicycle. In 1967 the first children’s bicycle in Romania was produced, the Pioneer, and following on from that, in 1968 another two types of bicycle for teenagers, Junior and Pegas. It wasn’t until 1981 that multi-speed bicycles appeared in Romania. 2007 saw the foundation of the Romania Cyclists’ Federation and soon after that in 2008, the The Ecological Association, MaiMultVerde, opens the first bike rental centre in Bucharest.

f) The Netherlands

In the Netherlands, two kinds of historical cargo bike can be considered. Firstly, a two wheeled bike with the cargo in front of the rider. The cargo was mounted onto a rack which was mounted onto the front fork of the bike. These bikes were popular from 1920 to around 1966. They were used most frequently by bakers and butchers for deliveries. Goods were transported in large baskets of different sizes due to the difference in weight between bread and meat.

Secondly, the three wheel cargo bike another popular freight bike which was capable of transporting up to as much as 350 kg in some cases. The bikes themselves very heavy as the frames were so sturdy. versions were used by bakeries and the ones were used more by craftsmen providing services in different locations. historical cargo bikes can still be seen frequently in Dutch cities as their heavy construction means they last for a very long time.

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D2.1 Short History of Cargo Cycling

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