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Deliverable 6.4: Developing strategy – working with uncertainty and an emerging “Stage 4”

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1 Introduction

1.1 This deliverable as part of Work Package 6

The goals of CREATE's Work Package 6 (Future Developments) were set out as follows in the grant agreement:

This work package looks beyond the current set of policies being implemented by Stage 3 cities, to consider future challenges and opportunities, with a focus on assisting cities where projected rapid increases in population and employment (e.g. in Copenhagen and London) are likely to lead to significant mobility densification and risk undermining the improvements in network performance and reducing levels of car use that have been achieved in recent decades. This aim is addressed through a set of four objectives and associated tasks.

Objectives

1. Identify likely future population and employment trends and resulting pressures on city transport networks
2. Assess the scope for advances in transport technologies and management strategies to address these challenges
3. Assess the scope for harnessing non-transport technologies to change underlying patterns of demand for mobility
4. Explore the nature of a future 'Stage 4' city and the set of policies that might be implemented there.

This deliverable arises from Task 6.4 within Work Package 6 (Future Developments) which aligns with Objective 4 above: "this final task looks at possible combinations of policy and technology changes that could address the challenges identified in task 6.1".

The principal relevant findings from Task 6.1 (as reported in Deliverable D6.1) were:

- All Stage-3 cities were predicting significant population growth, albeit over differing timescales (Figure 1); many are also expecting a growth in jobs.

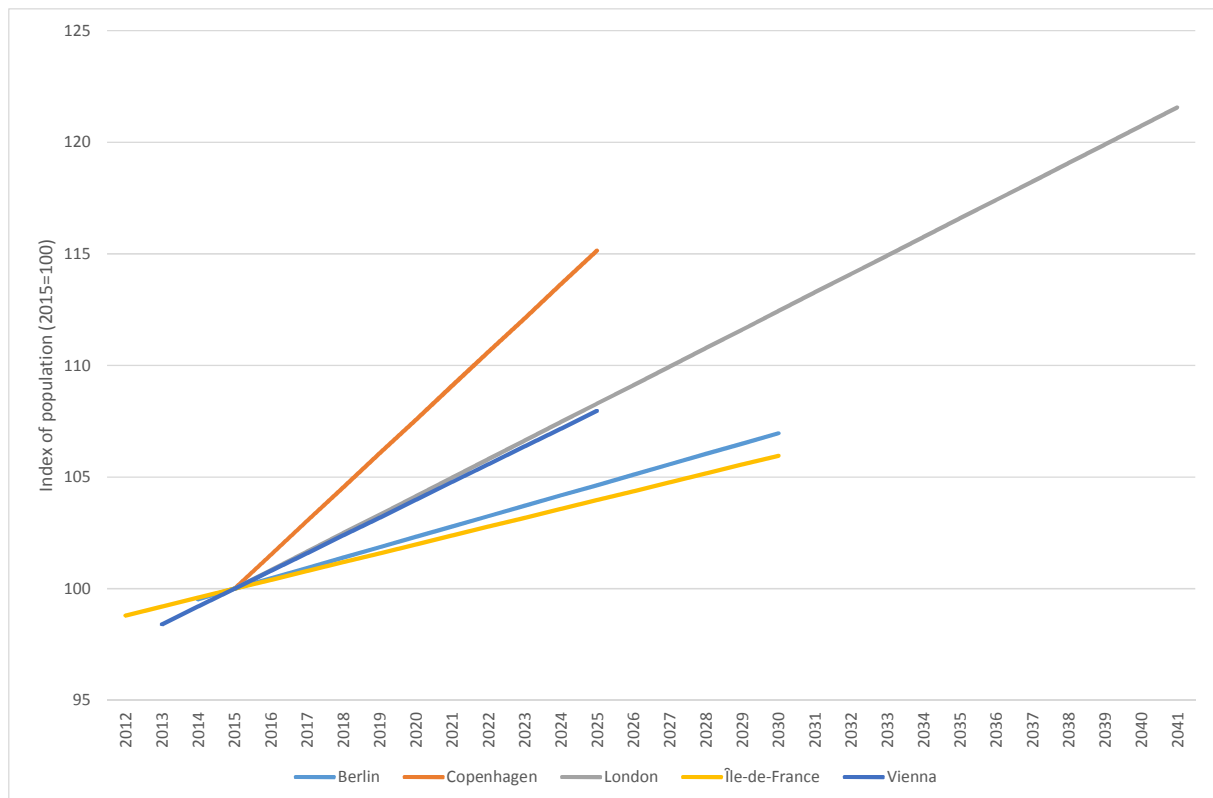


Figure 1 - Population growth rates across the five Stage-3 cities¹

- To a limited extent, the cities have analysed the likely performance effects of the additional loads this growth can be expected to impose on the network. One – London – has published predictions concerning changes in road delay (Figure 2).

¹ The chart is simplified to enable comparison: a straight line is drawn between representative starting and finishing years and cities' populations are indexed to their 2015 values. The Berlin values omit estimates of refugee numbers.

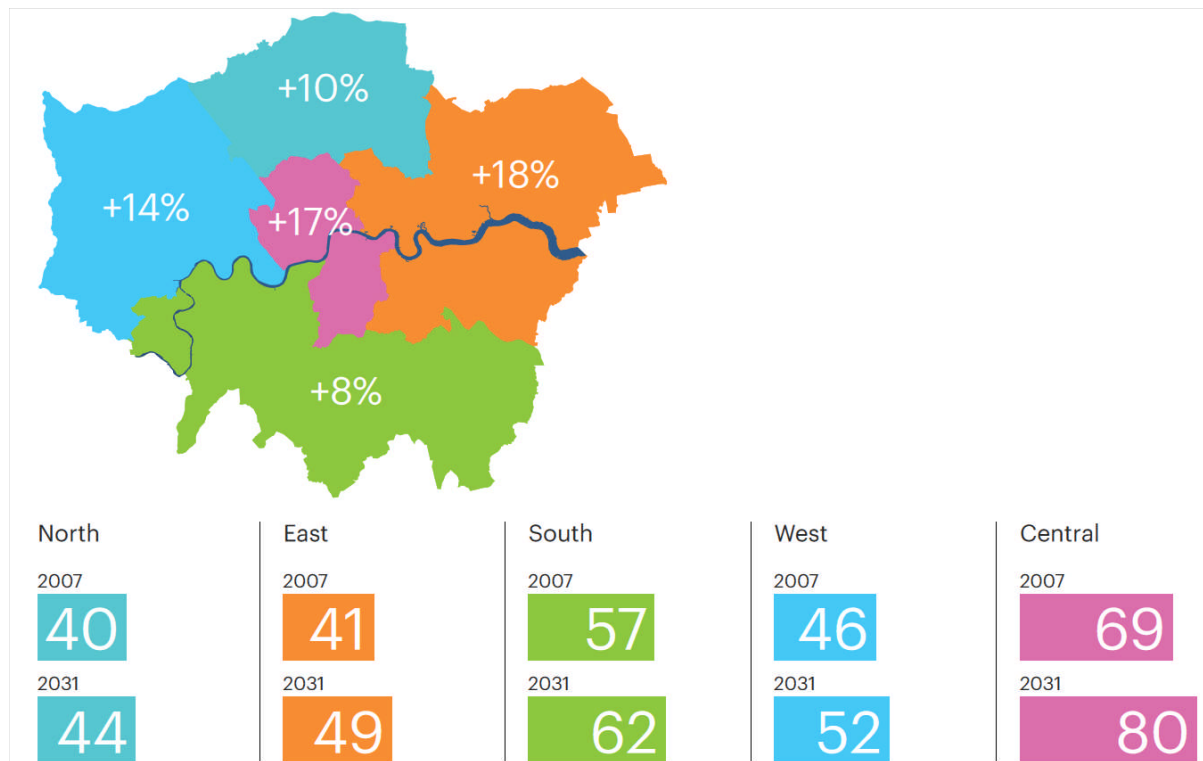


Figure 2 - Indicative increase in delay (seconds per km travelled) experienced by motorised traffic, London, 2007 and 2031²

- Less work than expected has been done on whether cities' networks can cope with predicted increases in demand. In particular, we were unable to judge whether there was a "saturation point" for Stage-3 policies, finding instead that there seemed considerable room for manoeuvre, that cities could apply policies with an increasing degree of intensity than they had up to now in order to achieve a particular goal or performance threshold.
- In particular, our analysis as part of Task 6.1 did not enable us to answer the question of whether a Stage 4 is inevitable in light of predicted growth.

1.1.1 Deliverable title

This deliverable was to be called "Developing a set of effective and politically acceptable Stage 4 city policies: an SUMDP" (where SUMDP stands for "Sustainable Urban Mobility Densification Plan"). As discussed, Task 6.1 did not produce as strong an evidence base as expected concerning the magnitude of challenges that cities would face as a result of population and other growth. Moreover, our work on thinking about the future has produced a range of other considerations alongside densification, leading to the thought that a focus on an SUMDP may be restrictive. For this reason, we concluded that a broader title was in order. Hence "Developing strategy – working with uncertainty and an emerging 'Stage 4'".

1.2 Context

All city governments create and publish plans for the future for the obvious reasons that government exists to achieve public good and that this cannot be expected to happen at random.

² Lower half of figure shows 2007 level of delay by area, with the forecast 2031 level beneath. Forecast by TfL's strategic models based on committed transport investment and forecast growth to 2031. Source: Roads Task Force (2013, p. 39)

But planning for the future is difficult because the future is unknown. We can amuse ourselves by reflecting that the primary preoccupation of New York City's transport planners in the early twentieth century was the removal of horse manure from the streets. They did not know (and perhaps should not have been expected to know) that horse manure would soon cease to be a major concern.

Our general anxiety about the future is heightened because we perceive the pace of change to be increasing. Whether or not this is actually true, the perception is important because it makes us even less trusting of our predictions. This is made harder still by events such as the UK's vote to leave the EU and the election of Donald Trump, both of which, whilst of course considered plausible, confounded the expectations of many. In transport, we see major technological developments, most obviously the automated vehicle, threatening to bring massive change to travel behaviour, land use and society in general.

A change which is already in progress relates to governance. The growing role of external "players" is altering (and generally reducing) the power wielded by conventional city government. But structural change (such as the growth in the number of city mayors and the developing role of the city region) is also changing the city's capacity to govern, in some cases creating new opportunities.

The message of CREATE on this theme is that the developments discussed above should not dishearten cities. In fact, it is imperative that they do not "give up", as the consequences of doing so could be very damaging. There are instead real benefits to be had from engaging positively with the "new city order" and practical ways of going about it.

1.3 Structure of this deliverable

- Section 2 addresses the practical business of planning in the context of uncertainty, including a description of a scenario-planning workshop organised as part of the work package
- In Section 3, the case of Uber is used to demonstrate the growing influence of external organisations on the operations of cities and discusses possible responses
- The idea of Stage 4 is explored in Section 4 and the characteristics of a proposed interpretation of Stage 4 are described
- Section 5 contains suggested methods, indicators and interventions reflecting the definition of Stage 4
- Section 6 contains a short discussion and a set of recommendations that spans the work package as a whole

In the appendices, a set of events that took place as part of Work Package 6 is described and a number of associated documents provided.

2 Working with the future

2.1 Setting a vision

“If you don't know where you are going, you'll end up someplace else.” Yogi Berra

Our analysis in CREATE of the planning practices of five “Stage-3” cities revealed that they define their destinations in quite different ways. Some city governments start with a clear description of the city as they wish it to be, in the form of a vision statement or a set of well-defined objectives. They then work back from that description, selecting transport policies that they consider likely to deliver it, taking account of expected background changes in population, economic activity and the like. Other cities articulate their desired future less precisely, paying more attention to the likely impact of background changes on “business as usual”. Their choice of policies is therefore guided more by a desire to stay on track or remain within acceptable limits of network performance.

A significant consequence of this variety is the differing emphasis on forecasting models: for the vision-based cities, models function mainly as a tool for validation, to check that the chosen policies assist or at least do not conflict with progress towards the achievement of the vision. Cities with less well defined visions rely more on models because they need to be confident that the policies, when interacting with external changes, will result in acceptable levels of performance on the network.

Whilst a vision statement (or set of well-defined objectives) is not essential to cities' planning for the future, it has the advantage of enabling a common understanding of municipal goals. And, if the vision is developed in partnership with stakeholders, it can foster a shared investment in pursuing it. Of course a vision also exposes the city governments to criticism if elements of it are not achieved. But city governments are continually criticised in any case; without a vision, cities have even less control over the range of complaints that may arise.

The obvious objection to setting a vision in light of earlier comments about the future is that cities may have limited influence over its achievement. Returning to the Berra quotation, the argument in favour of having a vision despite uncertainty concerning the future is this: cities with a vision are likely at least to move *towards* it, whether they reach it or not. Cities with less well-defined goals are much likelier to lose direction in the face of unexpected developments.

The guidance in management textbooks is to write vision statements that do not reveal much about “how we are going to get there”. The latter element is strategy and this is meant to be revised on a regular basis, whereas visions should remain valid for longer periods. Another argument for keeping visions free of the methods is to avoid circularity: if the vision contains high-speed rail, this constrains us to build high-speed rail if the vision is to be achieved. The reality, though, is that the boundary between strategy and vision is not clear: our description of the future we seek is very likely to betray some of the things we will need to do in order to attain it. But, reflecting on our discussion of technological advances in D6.2, what then should our city visions say about automated vehicles, for example? One answer is that whether the technology is mentioned at all should be a function of whether it is thought to be a) sufficiently likely to come about and b) sufficiently beneficial.

Taking as an example “mobility as a service” (MaaS), there is little doubt that it is emerging, though we are some way yet from its fullest manifestation (see D6.2). And there seem to be real efficiency and journey-experience benefits to be had from MaaS, with travellers spending less time and effort on planning journeys and travel being smoother and quicker. The principal concern, though, is a reduction in physical activity, as “seamless” journeys come to mean motorised door-to-door journeys. Another is that MaaS will foster an overall increase in energy used per passenger-kilometre if policies are not in place to promote the role of high-capacity collective transport.

A vision statement reflecting these observations need not mention MaaS explicitly but could describe personal travel as being painless and smooth, perhaps suggesting that waiting in the rain for a bus will become a thing of the past. But the vision could at the same time guard against the negative sides of

MaaS by describing large volumes of walking and cycling and/or the maintenance of a high level of sustainable travel. Thus MaaS appears in the vision by implication rather than by name, and the vision is framed in a way that will drive policies to promote its benefits and manage down its disadvantages.

2.2 Embracing uncertainty

It has already been observed above that it is preferable to set a vision than not but that cities' influence over the achievement of the vision is less than they might wish, partly because of uncertainties relating to the future. In fact, the acronym TUNA (turbulence, uncertainty, novelty, ambiguity) helpfully summarises a set of challenges to the planning process (Ramírez and Wilkinson, 2016). Here we discuss practical ways of responding.

Scenario planning has emerged since the 1970s as a useful method for thinking methodically about the future with a view to formulating strategies that will work well in a variety of future situations. Contrast this with the standard approach in transport of using a forecasting model to create a “central” case, perhaps supported by sensitivities to either side. The sensitivities are too close to the central case to challenge it and instead tend to reinforce it because the central case is seen as a reasonable average of cases tested. Meanwhile, the assumptions within the models that produce the forecasts tend to remain hidden from view.

A scenario is a picture of the future that may come about. It describes the world in which the city would need to operate. In more technical terms, it describes the “contextual environment”, things over which the city will have little control – wars, climate change, migration etc. The city then works with the scenario by thinking about actions in its “transactional environment”, its area of influence. In order to benefit from the scenarios, the planning organisation needs to work with a minimum of two; more than four can prove difficult to manage. But having two scenarios performs the crucial function of *legitimising uncertainty*: they are both plausible³ – they both could happen; but they are sufficiently distinct that they could not happen together. Given this, it is no longer reasonable to claim that there is one future and that we know what it is.

2.2.1 Planning in an uncertain world

In Figure 3, we depict an exaggerated version of the transport/city planning process: we start from our current situation; we have defined our vision (the city as we would like it to be) and we develop a strategy that would take us in a straight line from one to the other.



Figure 3: An idealised planning process

³ In fact, the most useful scenarios are those which lie at the very boundary of plausibility and challenge assumptions that have previously been considered sacrosanct.

Figure 4 presents a slightly more realistic picture of practice: we know that forecasts are never exactly accurate so we subject our strategy to some sensitivity tests and conclude that, within the defined bounds, we shall still achieve our vision.

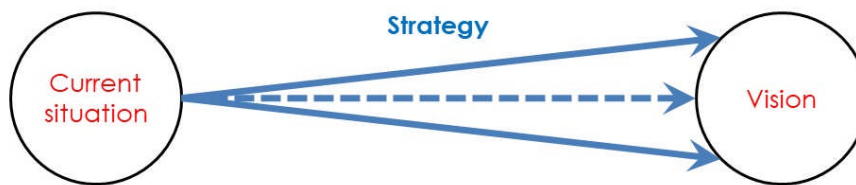


Figure 4: Idealised process with sensitivity tests

But this, despite being a slightly more stringent test of our strategy, still falls very short of what is realistic. In Figure 5, we have introduced two quite different futures, A and B. When we test our draft strategy (Strategy 1), we find that it interacts positively with Future A, taking us to the achievement of our vision. It, however, interacts less well with Future B, with the result that our vision will not be achieved.

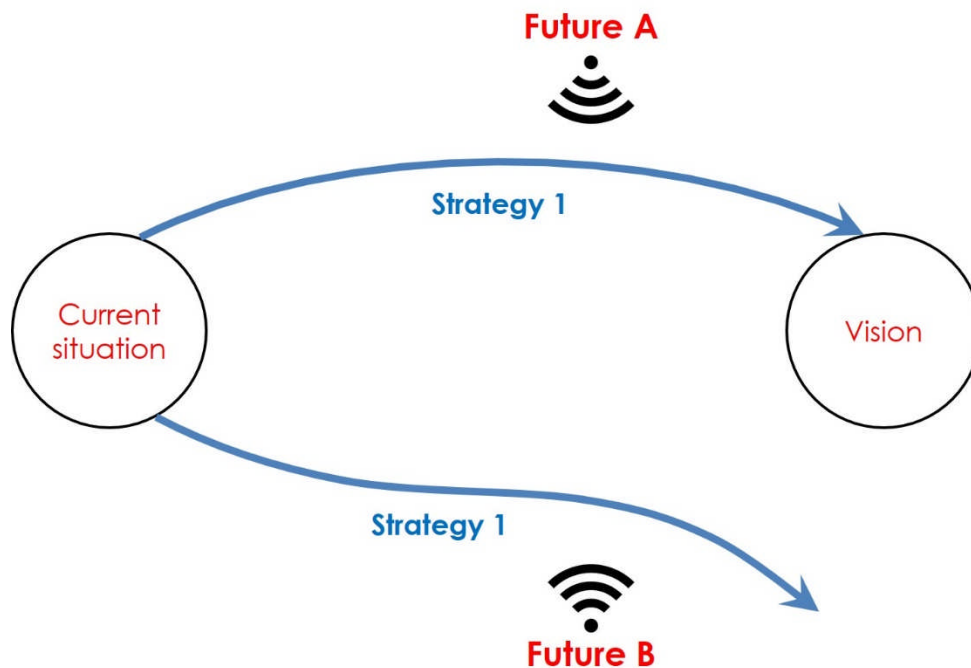


Figure 5: Partially successful strategy

So Strategy 1 is revised and its replacement, Strategy 1a, is tested against the two futures, with more satisfactory results.

This is, of course, a highly simplistic model but it serves to show the very different planning approach required when a deliberate effort is made to create distinct futures against which to test strategies.

This simplistic model implies that the future is fixed when, in fact, there is a dynamic relationship between a given future and the strategy employed. In Figure 7, we picture a strategy based on a major scheme, such as a rail project. A “technology-based” strategy features in contrast in Figure 8; let us suppose that this is the active promotion of automated vehicles. Because a technology is not spatially specific and because it may have more profound behavioural impacts, it enlarges the effect of the future which increases the extent of divergence from the original path. In practical terms, this

implies that policy makers need to allow for a wider spread of possible impacts when considering technology-based strategies.

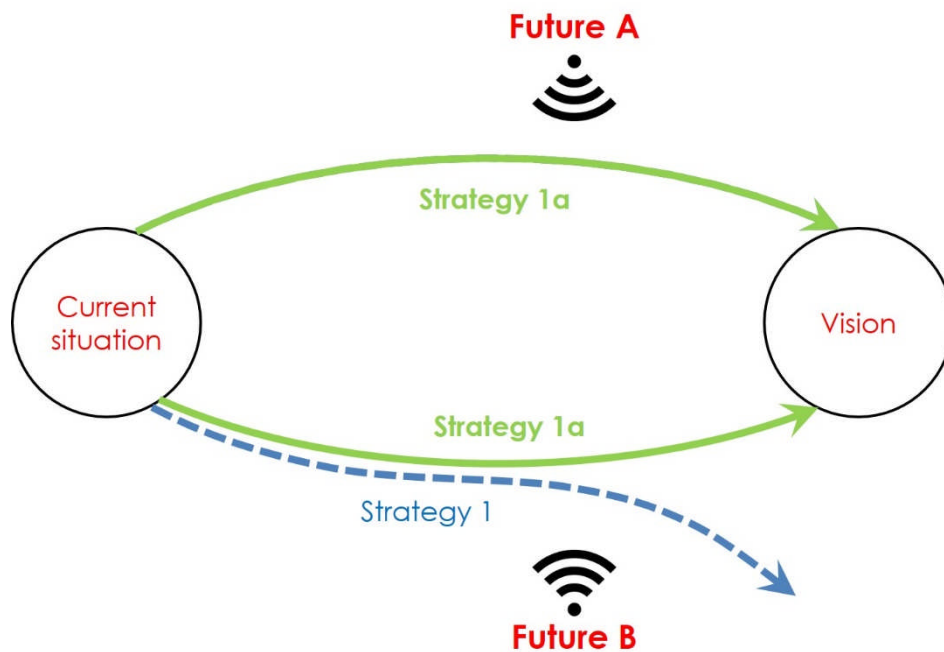


Figure 6: More successful (revised) strategy

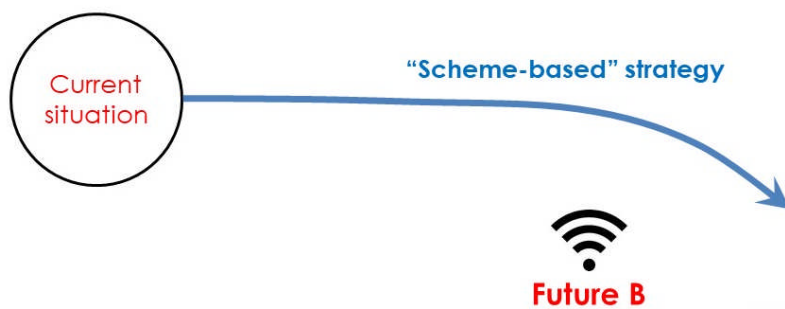


Figure 7: "Scheme-based" strategy

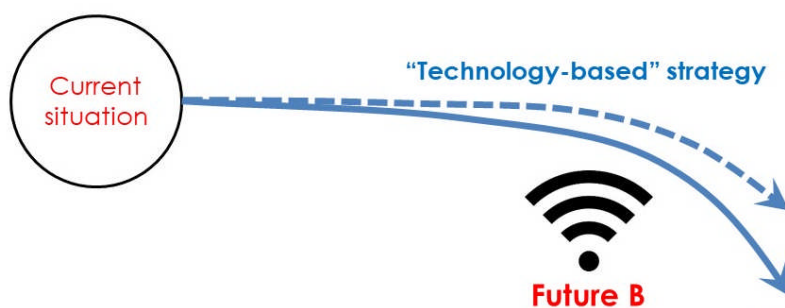


Figure 8: "Technology-based" strategy

2.2.2 A scenario-planning exercise

As part of Work Package 6, we convened a two-day scenario-planning exercise, attended by representatives of four of the Stage-3 cities and a range of other CREATE stakeholders. Whilst scenario planning is only one way of exploring futures and though the two-day workshop had a necessarily abridged format, it is worth setting out briefly what happened.

Initial interviews

A few months in advance, representatives of each participating city took part in a telephone interview which was used to explore the areas of uncertainty that were thought most relevant to the formulation of strategy. An example of the questions posed was “what are the drivers of change or the driving forces that are most central to the future of mobility?”

The interviews were transcribed and analysed, with distinctive themes picked out to inform the design of the workshop.

Preparatory work

Two months before the workshop, a list of approximately 25 “areas of uncertainty” was sent to all of the cities. Examples are *use and destination of public space* and *alternative forms of mobility*. These had been extracted from the interviews. Each city was asked to sketch out two distinct, plausible futures (in 2040) for at least ten areas taken from the list. These were used as inputs to the workshop itself.

Workshop Day One

After an introductory presentation, each participating city team was asked to set out what it saw as its three principal challenges and then to say what made their city special.

Time was then spent building *stories*. Small teams selected largely at random cards that reported the cities’ contributions from the preparatory work – their suggested futures in the various areas of uncertainty. The challenge to each team was to try to make potentially conflicting futures statements compatible where possible.

Each of these “mini” stories was then discussed in the plenary. Three larger stories (scenarios) were then created by combining seemingly compatible mini stories.

Workshop Day Two

Teams now worked on the scenarios, honing and elaborating them. During this exercise, delegations went between the three teams in order to ensure that there would be sufficient difference between the scenarios to render them all useful. The teams were asked to address in particular:

- a. Description of the global and European landscapes
- b. What would it be to live in this world?
- c. Who would win and who would lose in this world?
- d. Who would set the tone?

At the conclusion of this phase, each team gave a presentation to the others concerning its scenario and fielded questions on detail. The key characteristics of the three scenarios were then summarised.

The final stage involved teams representing each of the Stage-3 cities interrogating the three scenarios. They asked with respect of each:

- What would be the key implications for our city of this scenario?
- What aspects of our city and its policies will work very well in this scenario? What new collaborations would city planners and policy makers need to develop?
- What one thing should get top priority now if we knew for sure this scenario will unfold?

And there was a final question: “what message would we give to the mayor or the leadership of our city, given our analysis across all scenarios?”

A final task was the reassessment of the three scenarios: did they challenge sufficiently the range of prevailing assumptions concerning the future? (In a fuller scenario-planning exercise, the answers to these questions would be used to refine the scenarios in order to make them as challenging as practicable.

Following the workshop

All participating city representatives found the exercise stimulating and useful. Two cities – London and Copenhagen – have since taken active steps to embed a scenario-based way of working into their planning processes. A short report by the workshop’s facilitators is included in Appendix A.

2.2.3 The value of scenarios

Well-designed scenarios will challenge decision makers to reflect upon their preferred policies – will they still work if the oil price slumps? Or leaps? Put another way, transport is an area in which ideology plays a big part: people often start from a strong conviction that certain policies are good and others bad and they resist evidence that might conflict with these views. Scenarios can help create a safe space for circumspection: they invite people to question their assumptions without appearing to imply that the assumptions are wrong.

But, given the time it takes to deliver major infrastructure, decision makers find that they have to be exceptionally dogged in order to see something through; it is not good politics to say, having committed to a major scheme, that it might not work. A concern with scenarios is that they provide ammunition to those who wish to subvert the major schemes and flagship policies. So how can scenarios be a force for good rather than a source of conflict?

The answer lies in timing and inclusion. First, if scenarios are developed early and continue to be a reference point for the city, they will not be seen simply as a means to validate the preferred strategy. Instead, they will be used throughout the strategy-development process both as a means to generate possible policies and as a tool for testing the robustness of embryonic strategies. Second, if the scenario-development process is made open to a wide range of stakeholders (including those who often find themselves disagreeing with the city’s policy makers), it becomes more widely owned. And, just as decision makers can be fixed in their views, so can lobbyists and campaigners! Scenarios will also help them to question some of their assumptions.

Scenarios can be used more or less formally to support the development of strategy and cities will vary in their readiness and ability to take this work on. But a sensible starting point is to “unpick” the tools that are used to produce forecasts at present, typically computer-based models. What assumptions about the future are implicit in the way they are configured? Are those assumptions justifiable? What if something very different were to happen?

To finish, a word about the limitations of scenarios. They do not (and cannot) mark out exhaustively the range of possible futures. By developing a strategy that appears robust against two, three or four

scenarios, the city is not guaranteeing the success of that strategy no matter what. But well-designed scenarios will explore the most important areas of (known) uncertainty. Thus, a strategy that can succeed against two scenarios should be seen as stronger than a strategy that works in only one, and a great deal stronger than a strategy that has not been tested against an *explicit* picture of the future.

3 A changing governance landscape

3.1 Uber: case study of a disruptive player

Who predicted, ten years ago, that “ride-sharing” or “ride-hailing” organisations would dramatically alter the face of urban travel in cities across the world? That London would identify a significant level of traffic on its network attributable to new movements brought about by Uber? Or, most significant, that Uber would, in short order, become a major power broker in the transport systems of dozens of cities worldwide?

The story of Uber does not need to be told here because it has been covered extensively elsewhere. It is sufficient to say that it combines a well-designed app with attractive pricing to offer a step-change in the experience of using private hire. And it is no coincidence that Uber has flourished in places that had dysfunctional taxi/minicab services before its arrival. But what differentiates Uber from many other companies with good offers is, first, its audacious and aggressive business model and, second, the use of its constituency (riders and drivers) to campaign on its behalf, placing city authorities at a marked disadvantage. Whether Uber is a good or a bad thing is not the point. We discuss it here because it represents an excellent example of the private sector encroaching on what was previously the city’s sovereign territory and of using methods that greatly limit the city’s scope to respond.

Of course, cities have the power to refuse Uber and some, such as Seoul, have done. But this binary choice – yes or no – seems a blunt instrument. It is convenient in the case of developments that are seen as uniformly negative but few would argue this of Uber. Rather, the consensus seems to be that it is desirable to have the positive aspects of Uber – increased accessibility for those who struggle to use the mainstream transport system, for example – without receiving at the same time the various negative aspects, most obviously the intensification of traffic. But cities have so far proved largely unable to negotiate for themselves this happy medium. More to the point, it seems more difficult to row back once Uber has become established than it might have been to constrain the company’s development in advance.

3.2 A new role and *modus operandi* for the city

Uber is not unique but it is a very useful illustration of a change in the way of things. Other technology firms are developing a larger stake in urban transport systems and, where before they were providers, delivering to the city according to a contract, they are increasingly delivering transport according to their own designs. This presents cities with a major challenge. They are used to setting the agenda, especially in terms of transport: they own the highway network and, if they do not run the public transport, they have considerable influence over it. When changes to the transport system have taken place, this will generally have been at the instigation of the city or at least with its explicit approval. Put simply, the transport system has been managed by the public sector. No longer.

The challenge has two principal components: time and role. In terms of time, governments, as habitual agenda setters, are not used to moving quickly. Hence cities have been caught unawares by the speed of Uber’s expansion. With respect to role, the city is the master no more; it is perhaps more fitting to think of it as the manager of a football team. The individual players have their own objectives and, left to their own devices, may not perform to the benefit of the team as a whole. The manager has some sanctions available to her in order to promote compliance but using them is not likely to be as successful as attempting to negotiate with and motivate the players, and finessing game plans so that individuals’ objectives are brought into alignment with those of the team as a whole.

This is not a trivial matter, as any manager of an elite football club can attest. More to the point, transforming from a former role involving near-absolute authority to that of a team manager is a major task and one which will take institutions time. But something they can do in the short term is identify the power brokers and create a forum for discussion and planning that involves them. Like football superstars, those who attend cannot be relied upon to behave with complete propriety, but their simple

involvement creates a new set of relationships and builds a foundation for the more negotiation-based methods that are part of the new city order.

3.3 Regulating to create conditions for success

Can cities use “anticipatory governance” (Deliverable 6.2) in the case of Uber and the like? When Uber emerged in the USA, San Francisco actively sought to create the conditions that enabled it (and comparable firms) to develop their activities, having to overcome some strong resistance in the process. This reflects a broad enthusiasm for entrepreneurialism and innovation, coupled with a distrust of the system that was previously governing taxi services. European cities generally favour a higher level of regulation and may be less enthusiastic than their American counterparts about entrepreneurial companies. But the point is valid in both cases: cities can use their vision (their picture of the desired future) to assess a disruptor such as Uber. They can use scenarios to consider different ways in which such a phenomenon might affect the network and the wider city. And they can combine these to arrive at a stance concerning that disruptor. Perhaps employing the precautionary principle, they can start with regulation that is reasonably restrictive, knowing that it will be easier to relax it later than vice versa. And they may, for reasons of flexibility, choose to use temporary or experimental orders.ⁿ

4 Beyond Stage 3: defining Stage 4

This work package was predicated on investigating whether something lay beyond the three-stage model extensively explored in Work Packages 3 and 4. Here we address the question of whether there is, will be or should be a Stage 4.

Is there a Stage 4 already? The simple answer is that there may be but that it is not yet dominant so capturing it is more challenging than has been the case for the previous three stages. If there is, it will presumably be possible to look back, twenty years from now, and identify what Stage 4 has been but there appears no clear pattern at present. The same is true if Stage 4 has not yet begun to emerge but will in future. Everything that has been said above concerning the challenges of an uncertain future make it doubtful whether attempting to predict the nature of a future Stage 4 would be time well spent.

It may therefore be more useful to discuss whether there *should* be a Stage 4. This is equivalent to asking whether Stage 3 represents the furthest we can or wish to go. On the one hand, Stage 3 does describe quite effectively the kind of city that most people say they want. And property prices in many cities reflect this preference: housing is expensive in walkable areas with pleasant public spaces and good public transport. On the other hand, there are practical limits to the capacity of a network designed on Stage-3 lines. Movement by sustainable modes makes demands on the physical resources of a city – less than movement by single-occupancy car, perhaps – but, as cities' populations grow, the limits will once more be reached. And providing pleasant places means reallocating space from movement, so these limits will be reached more quickly under Stage 3 than they would under Stage 2, say. So there is an argument for conceiving a further stage which takes this into account.

But what should characterise Stage 4? It does not seem likely to involve the resurgence of the private car (automated or otherwise) or the lionisation of any mode in fact. Perhaps, in fact, instead of looking only at *how* journeys are made, Stage 4 should look also at *which* journeys are made, and by *whom*.

4.1 A “journey rational” Stage 4

All students of transport planning are told in their first week that transport is a “derived demand”, that journeys are mainly made not for their own sake but in order for the traveller to obtain the opportunities available at the destination. For this reason, it has been repeatedly argued that land-use and transport planning should happen in an integrated way. To an extent, it has also been asserted that better cross-sector planning could lead to more efficient use of the network. If people need to visit their doctor's surgery, they will have a shorter journey if their doctor's surgery is nearer to their journey origin. And the transport network shows the results of countless location and service-planning decisions made by numerous other actors that result in particular journeys to education, health, work and essential amenities such as shops. What may be “optimal” for the education sector, for example, is not automatically optimal for the transport sector. In Stage 4, the various sectors gather and plan their activities together, with the result that the transport costs associated with location and service decisions are *priced into* the decisions of the various actors. As a consequence, cities' transport intensity (in this case the distance travelled per head in order to achieve personal goals) is somewhat reduced through both shorter distances and some journeys becoming unnecessary. The temporal element of travel also features in Stage 4 to a degree: collective planning can identify opportunities to move away from the perennially peaked profile of travel demand to one which is smoother, thereby both relieving crowding at the busiest times and making use of the network at times of spare capacity.

The growing effectiveness of virtual presence and teleservices will support this push towards a more “journey-rational” paradigm, by providing a travel-free alternative for many activities that currently require a trip. In time, the growing impacts of 3D printing will also reduce pressure on the network. Though this will be felt more on the freight/logistics side, it will also affect personal travel, as individuals find that they can avoid or shorten trips made to collect items. And automation, more

generally, can be expected to make a proportion of current trips unnecessary, through drone-based delivery, for example.

4.2 A resource-efficient Stage 4

Hand-in-hand with this structural change, Stage 4 also includes increasingly intelligent use of the network, and thereby squeezes more out of it. This has two components: first, each person-km consumes as little of the network's capacity as reasonable, through space-efficient forms of transport (such as mass transit), and high occupancy. At the same time, close attention continues to be paid to the *energy* consumed in travel: in addition to the natural consideration of climate change (reflected in a preference for renewable forms of energy), there is a more general enthusiasm for economy as expressed by minimising the energy intensity of movement. Several technological advances contribute to the development of this aspect: the changing energy profile of the transport sector, with increasing electrification; the growth of "shared" mobility implying more intensive use of vehicles (and less time spent lying idle); and the developing role of mobility as a service (MaaS) which is intrinsically resource-efficient as providers seek to minimise cost by making the fullest use of vehicles and by routing optimally.

The second component is dynamic network management, moving from a model in which the highway is permanently allocated to various uses – footway, cycle track, parking, running lane, etc – to one in which this allocation can change in response to demand. Some examples of this such as tidal lanes have been with us for many years, but the improvement and spread of sensors and communication infrastructure, together with growing computing power, will allow considerable further improvements. Alongside this will be ongoing developments in the dynamic management of traffic, through "smart" signalling, variable speed limits, real-time scheduling of services and allocation of parking.

4.3 A balanced Stage 4

The other central aspect is *who* travels. It is nothing new that mobility is not equally distributed. Nor that relative ability to move is connected to a host of important life outcomes: if you cannot commute as easily as your neighbour, your neighbour may well obtain a better job than you. It is also well established that the costs of transport (danger, noise, pollution etc) are not equally distributed either, or that, very commonly, those who face limited mobility also experience a disproportionately great share of negative transport externalities. These inequalities are the rationale for Stage 4 to include a *justice* element. And this too is a natural progression from Stage 3. For, whilst Stage 3 has as its focus cities for living, all so-called Stage-3 cities contain considerable variations in liveability: some residents enjoy a pleasant environment and good connectivity; others considerably less so. So, whilst most city governments claim justice amongst their values, Stage-4 cities will be distinguished by an explicit aim and viable means to achieve this in the area of mobility. Not only because justice is a "good thing" but also because a just city is more liveable for all its citizens.

A Stage-4 city will thus be a **balanced** city. Here, balance has several meanings:

- A balance between the needs and interests of the various actors whose decisions affect the transport network (as expressed above by the term "journey rational")
- A balance in the distribution of the costs and benefits of travel
- A balance between the need to move and the need to have liveable places

The third type of balance represents another natural progression from the first three stages. Stages 1 and 2 are more about movement and Stage 3 is more about place. Because the two are in tension and because cities need both in order to prosper, finding a successful balance between them is crucial. This is one of the principal characteristics of our Stage 4.

4.4 A “post-modal” Stage 4

Each of the first three stages is largely defined in terms of the car: Stage 1 lionised the car; Stage 2 began a reaction against it and Stage 3 is articulated in terms of its generally negative effects on city living. This suggests that Stage 4 will, in some sense, be defined in terms of an attitude to the car. But the transport modes as we have known them for decades are in flux:

- The boundaries between individual and collective transport are shifting – if I use an UberPOOL, am I using a taxi (individual transport) or a bus (collective transport)?
- So are the boundaries between private and public – if I use a peer-to-peer application to rent a neighbour’s car, is that a private motorised mode or not?

Indeed, many of the orthodoxies of Stage-3 thinking are becoming open to challenge. The classic image from Münster in Germany (Figure 9) is a case in point.

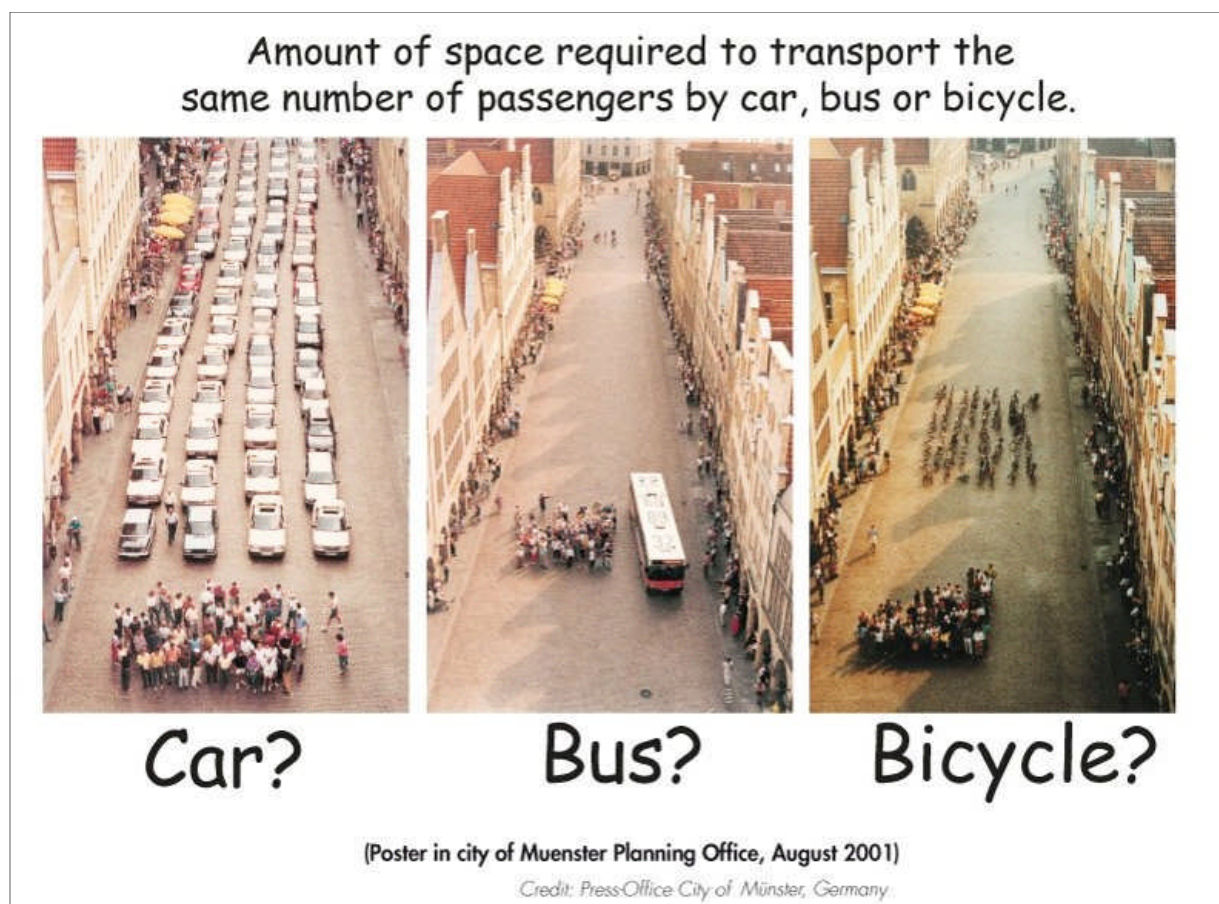


Figure 9: Classic comparison of modes (Münster)

The image is based on single-occupancy car use (left-hand image) and a completely full bus (middle image). But, as cars increasingly becoming powered by electricity, their footprints will alter. The growth in the sharing economy, supported by Stage-4 policies that reward high occupancy, could mean that cars typically have all seats filled. With the advent of automation, future versions of cars may in fact join together to form chains very like buses. Meanwhile buses, as we know them, frequently do not travel completely full along their whole route (and the resurgence of the minibus in many Stage-3 cities appears tacit acknowledgement of this); moreover, the bus fleet may not electrify as quickly as the car fleet.

This deliberately provocative challenge to the messages of Münster's poster is intended only to invite us to question our assumptions about modes.

There is little doubt that the car will feature in Stage 4. In fact, provided every seat is taken, it consumes as little of the network's capacity as possible and imposes minimal negative externalities, the car will in some cases be the most appropriate form of transport for a journey(s).

These observations combine to make Stage 4 "post-modal":

- The distinctions between the modes are becoming blurred
- The negative characterisation of the car is losing its validity and usefulness
- It is more meaningful to define Stage 4 with reference not to modes but to more fundamental concepts such as resources and the capacity to reach destinations of importance

One consequence of this is Stage 4 has "made peace with" the car and that it is now neither good nor evil (Figure 10). In more practical terms, the car has been "right-sized".

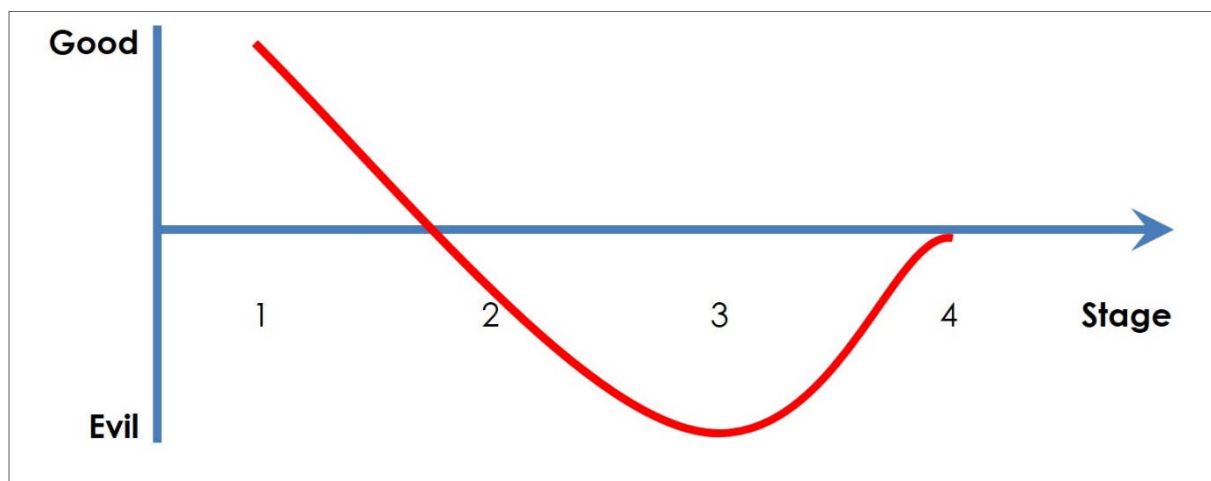


Figure 10: Car as "good" or "evil" across stages

4.5 Further observations concerning Stage 4

Not all of the technologies explored in this work package are automatically relevant to this definition of Stage 4. Automated vehicles (AVs), for example, do not appear necessary to its development. In principle, self-driving technology could reduce costs for the traveller so a narrow interpretation of "resource" would indicate that it is desirable to remove driver costs from the calculus. But a broader view must acknowledge that drivers represent a large part of any economy and that it is not obvious that their losing their jobs would be socially beneficial overall. We therefore remain agnostic about the cost aspect of AVs. More generally, they have the potential to support the achievement of a balanced and resource-efficient future, provided policies are in place to encourage the necessary behaviours, e.g. by encouraging high occupancy, promoting space-efficient vehicle sizes and ensuring that those with low accessibility are amongst the beneficiaries. But they also have the potential to push things in the opposite direction, if they are the preserve of the wealthy, are used inefficiently (e.g. with much empty running), or serve to reinforce inequalities of accessibility etc.

Moving on from technology, some *non*-technological elements also need to be in place in order to Stage 4 as described to come about.

To being with, the rationalisation of journey making starts with intelligent planning of land use and transport. This assertion is so well worn that it is now a cliché but it remains true nonetheless: if we

wish to reduce the distance people need to travel, the first task is to locate origins and destinations near to each other.

Of course, this is only one element. It is one thing to build housing near to a school; it is another for the children living in that housing to attend that school rather than another school some distance away. Here, we need to apply another well-worn phrase, “joined-up government”. When the transport-using sector makes its decisions in conjunction with the transport sector, activities and services are likely to be co-ordinated in a way that is conducive to rational journey making. This has been attempted in the past, with limited success (Lucas, 2012) but there are indications that governance structures are evolving to make it likelier in future, through the emergence of the city-region and the creation of more metropolitan mayors with influence over a range of public policy.

To support the achievement of balance (in the sense of justice), cities will need to have a thorough commitment to addressing inequality in transport and mobility. This will be supported by the use of suitable indicators and the availability of effective interventions (both discussed in the following section) but the commitment itself will be demonstrated by the adoption of meaningful targets as part of the city’s vision-setting process.

5 Stage 4 in action

In this section, we try to show how a Stage-4 city will act, bringing together the concepts from the previous section and the description of a new role for the city from the section on changing governance.

5.1 Methods

The methods of the Stage-4 city will include:

- The development and regular review of a vision or equivalent articulation of the city's desired future
- Active, institutionally embedded future-based planning, using scenarios or other proven methods
- Planning across sectors, drawing in those public bodies that impose demands on the transport network and those who deal with the consequences of its use, as well as the transport sector itself
- Building of open and constructive networks/partnerships involving transport "power brokers" outside government
- Using anticipatory governance appropriately (including pilots, trials and experiments) to prepare the ground for the successful emergence of new technologies, new providers etc
- Decision-making methods that reflect the values of Stage 4, as expanded on below

5.2 Indicators

The indicators that Stage-4 cities will use to support their strategy development and performance management include some that are not yet commonly seen.

5.2.1 "Journey-rational"

One set will capture the average **resources consumed** in the achievement of certain standard journey purposes, such as a day's employment or secondary education, a doctor's appointment, and grocery shopping. Here, by *resources*, we mean time, energy, money (both that of the traveller and that of government bodies) and quantity of network capacity.

If cross-sector planning and more integrated planning of land use and transport have succeeded in shortening the distances between people's homes and destinations of importance, this will be reflected by a decrease in the average value, as will the extent to which viable alternatives to travel (e.g. teleservices) have made travel unnecessary.

5.2.2 Resource-efficient

Complementing the metrics that capture change in the need to travel (above) will be a set that tracks the average **energy** and **extent of the transport network's capacity** used (per person or per unit mass of freight) to travel a set distance. As the city achieves increased vehicle occupancy and encourages the adoption of energy-efficient means of travel, these values will decrease. The values will also capture the role of vehicle size (a 12-seater being more space-efficient than three four-seaters, all else being equal) and the extent of use of human-powered transport.

A further set of indicators will monitor the **temporal profile of demand** on the network, reflecting comments above concerning the tendency for cities to have a "peaked" profile. These indicators will be supported by socio-demographic monitoring intended to guard against the creation of socially unsustainable lifestyles resulting from "peak spreading".

The interventions used to increase the practical capacity of the network will be supported by indicators that accurately capture the effective **capacity** of the network, reflecting semi-fixed quantities such as lane-km as well as the effects of dynamic network management tools mentioned above.

5.2.3 Balanced

Further indicators will address **distribution**, from a justice perspective.

The measure of resources consumed to achieve given journey purposes (introduced under “journey-rational”) will also have a distributional component which will allow the city to establish whether its strategy, combined with external developments, is narrowing or widening the profile of this value.

A further set of indicators will track the socio-demographic profile of the experience of **negative externalities** including noise and vibration, air pollution, danger and severance.

To capture the balance between place and movement, the proportion of the public highway that is **not available to vehicular traffic** (for either movement or parking) will be monitored at both a city level and a more spatially specific level, in order that variations between neighbourhoods are understood. Under Stage 3, there would be a presumption in favour of increasing this value; under Stage 4, cities will need to identify a target value that reflects the balance sought.

5.3 Interventions

What sorts of interventions will the Stage-4 city employ to achieve its objectives of being journey-rational, resource-efficient and balanced? The answer depends on the city’s starting point: if it is progressing from Stage 3, the city will presumably already have extensive facilities for speedy collective transport and good networks for walking and for cycling. If so, it may need to expand these further as the profile of demand changes but dramatic further development will probably be neither necessary nor feasible. A city that instead lacks extensive facilities for speedy collective transport etc. will require these but their nature may differ from that of conventional systems as a result of technological advances described in Deliverable 6.2. For example, it is already suggested that the standard bus will need to be replaced by vehicles of varying sizes, with 12-seaters perhaps becoming the commonest, reflecting the increasing role of demand-responsive services. And how much new rail will be needed? If the city manages the use of its highways very effectively (including giving priority to resource-efficient forms), perhaps not very much.

In order to maximise the effective capacity of its network, the city will need to employ the range of “smart” network management tools including dynamic road-space allocation, demand-responsive signalling, variable messaging etc.

The city may choose actively to pursue interventions aimed at reducing the energy demands of its transport network, by commissioning the design of lower-weight vehicles, for example.

Many of the other interventions employed in the Stage-4 city will be less visible. Smart pricing will be used to create the necessary incentives to achieve balanced use of energy and network resource, encouraging people to use efficient forms of transport and to travel by routes and at times that have spare capacity. (Smart pricing can also help to promote low-emission and low-pollution transport in keeping with Stage-3 values.) And subsidies will be used to help correct for disparities of mobility across the city’s population. These could be used in the form of concessionary fares, to reduce the cost of travel for those with poor accessibility; they could also help to pay for individualised transport in situations where it is uneconomic to provide collective transport, provided this was consistent with principles of low energy etc. The provision of a partially or fully subsidised electric bicycle may turn out to be standard Stage-4 practice.

Beyond this, cities will be using “soft power” extensively, both to encourage cross-sector planning and to engage non-government actors effectively in the negotiation of acceptable transport arrangements.

Where soft power proves inadequate, cities will need to use regulation and fiscal instruments to achieve the desired results.

6 Discussion and recommendations

Having presented a picture of Stage 4 and sets of methods, indicators and interventions associated with it, we now reflect on questions that Stage 4, as described, generates.

The first of these relates to collective travel. It is well established that humans, given the choice, avoid sharing space on vehicles with strangers, *ceteris paribus*. If, on a bus, there is only one unoccupied pair of seats, a traveller will choose it rather than share with another. And this preference helps to explain the popularity of the car, which secludes us from contact with those we do not know. But we also know that a city made up of people who share space only with those they know is unlikely to be a happy or safe place; regular contact with strangers, however fleeting or superficial, is good for us.

Our definition of Stage 4 does not address this issue directly, though a presumption in favour of resource-efficient travel may lead to a significant role for collective travel because optimal vehicle sizes will imply multiple parties travelling together much of the time. We can also expect a quantity of on-street interaction to continue. But a question for Stage 4 is whether collective transport needs nonetheless to be more formally promoted and supported to guard against the negative consequences of withdrawal.

Another issue is active travel. As with collective transport, there are aspects of Stage-4 thinking that point to a strong role for both walking and cycling: improved land-use/transport planning and better cross-sector planning should increase the number of trips that can feasibly be made using physically active modes; truly cross-sector planning should see at least the health sector appealing to the transport sector to create conditions conducive to travel by active means; and a presumption in favour of resource-efficiency will be reflected in policies that promote walking in particular. Cycling is considered somewhat less space efficient than high-capacity mass transit (if it is full) so the priority accorded to it will be a function of the relative emphasis placed on energy efficiency, on the one hand, and efficient use of the network, on the other. The exceptionally strong cases for walking and cycling (in terms of public health, environmental impact etc) do not need to be repeated here so the question is whether Stage 4 needs to include more explicit support for active travel.

A final issue relates to the relationship between the need to travel and actual mobility. The policy goal of reducing the need to travel can be justified from either a social-welfare or network-performance standpoint: we either wish to free people from the shackles of travel that is expensive, time-consuming etc or we wish to remove some of the trips from the network so that it will run more smoothly. But what will actually happen if/when we succeed in reducing the need to travel? One school of thought is that, on average, humans tend to spend approximately the same amount of time travelling. If accurate, this would suggest that people's mobility will not reduce dramatically in line with their need to travel. But it is probable that they will choose to make journeys when conditions are more tolerable and this would have positive effects on the performance of the network with reducing peak-time pressure. But this would need to be better understood through monitoring of behaviour over time.

6.1 Recommendations

Because this is the concluding deliverable from WP6, we provide below a comprehensive set of recommendations drawn from all of the work done across the work package.

Recommendation 1: Use scenario planning or another proven futures method to confront uncertainty and to stress-test your strategies.

All cities are facing the challenge of an uncertain future. The most positive way of dealing with this is to carry out methodical work designed to explore multiple possible futures. This will have two principal advantages: it will help your city to accept the impossibility of predicting the future and so promote flexibility. And it will increase the chance that your strategies are robust against a number of possible

futures. This second benefit will be achieved if you formally test your draft strategy/ies against the scenarios.

Recommendation 2: Conduct a forensic analysis of the tools used by your city for forecasting

Typically mathematical models, these tools will contain a number of assumptions, possibly hidden, about how people behave now and will behave in the future. Making what was implicit explicit will create the basis for an honest conversation concerning the interpretations of forecasts developed in the city. All forecasts are wrong so the question is whether they can be useful.

Recommendation 3: Conduct a critical analysis of your city's transport system.

This will help you to identify any "weak points" that might be identified by third parties as business opportunities. Once you know your weak points, you will be better prepared to engage positively if and when actors from outside your city start setting up business.

Recommendation 4: Set a well-defined transport/mobility vision for the city

A vision is a picture of the city as its stakeholders wish it to be. This vision can relate exclusively to transport/mobility or have a wider scope. The latter will be better because it will enable transport interventions to be justified in broad terms (e.g. quality of life, welfare) whereas a "transport vision" is likely to frame issues quite narrowly and limit one to interventions that can be expected to address "transport" problems such as congestion. It is essential that any vision is articulated specifically enough to allow one to judge whether progress is being made towards its achievement. This is where many such statements fall down, meriting the description "motherhood and apple pie", meaning that they espouse positive concepts in terms so general as to ensure that no one would disagree. The reality is that transport inevitably involves trade-offs and the vision statement needs to be clear enough to make such trade-offs explicit. Having a pedestrian-friendly town centre is not compatible with an average door-to-door speed of 40kmh (unless there is a comprehensive network of vehicular tunnels!) A vision that claims both will obtain is therefore unrealistic and, more important, unhelpful.

Recommendation 5: Adopt indicators that will enable measurement of progress towards the vision

"Measure what matters," runs the adage and justly so. The well-worn example of GDP as an imperfect measure of wealth reminds us of the risks of adopting metrics that are not good proxies for our objectives. Nor is an absence of indicators an acceptable alternative.

Recommendation 6: Review the interventions available to your city for managing transport/mobility

Cities typically use only a fraction of the interventions available to them. This is partly because of path dependence. And they do not often give much thought in advance to the possible impacts of employing interventions. A "light touch" examination of the full range of measures that cities can employ will remind officers and members of what is possible and may encourage them to expand their horizons.

Recommendation 7: Investigate methodically what a given technological advance could contribute to the achievement of your vision

This is a keystone of anticipatory governance and will help to ensure that new technologies do not simply "happen to" your city. This task can helpfully be done in the context of future scenarios. Either

way, the key word is “methodically” and here cities can benefit from work being done at a European level on many relevant technologies⁴.

Recommendation 8: Beware hype and policy entrepreneurs

Technological advances may offer considerable benefits but they may also pose real threats. The narrative surrounding them, in their early stages, will tend not to reflect this balance; instead, there will be more talk about the benefits than the costs, because of hype (a natural tendency to be excited by novelty) on the one hand, and the role of policy entrepreneurs (people with a vested interest in the adoption of the new technology) on the other. The wise policy maker is alive to both.

Recommendation 9: practise anticipatory governance

As defined in Deliverable 6.2, anticipatory governance provides a good chance of enabling authorities to reap the benefits of advances (technological and otherwise) whilst managing the risks of harm.

Recommendation 10: Consider experimental measures

The much-admired case of the Stockholm congestion charge started out as a trial. Only after citizens had seen the results of the charge being in place did they vote in a referendum on its permanent adoption. Experimental measures have the advantages that they can be implemented more quickly than “permanent” measures and that they can be reversed. This latter point makes them less controversial.

Recommendation 11: Create inclusive planning forums

Uber, Google and the next generation of disruptors may pose real challenges to cities but the challenges will be easier to manage in the context of an open and ongoing dialogue with them.

⁴ European Parliamentary Technology Assessment (<http://www.eptanetwork.org/>); European Parliament Science and Technology Options Assessment (<http://www.europarl.europa.eu/stoa/cms/home/about/panel>).

7 Events held/participated in as part of WP6

7.1 Beyond travel?

An evening meeting in London asking the question of whether humanity would at some stage be able to receive and achieve all it sought without physical movement.

The meeting was attended by an eclectic group interested in the topic for a range of reasons. It began with a set of “provocations”, given from the following disciplinary perspectives: economic/futurist; anthropology; and urban planner. A facilitator then invited those present to discuss a possible scenario using the “futures triangle”.

A note of the event is at Appendix A.

7.2 The future role of the car in towns in cities

A day-long workshop held in London in association with the RAC Foundation. Delegates were presented with evidence concerning the changing picture of personal travel in high-income countries and invited to discuss both distinct scenarios involving the car (“max” car, “minimum” car and “business as unusual”) and the future governance of the car.

7.3 Futures session at traffic engineering conference

At the annual Trafikdage conference, Copenhagen colleagues and the WP6 leader collaborated on a session entitled *new methods to forecast future traffic development*, including a paper on different ways of working with the future.

The event programme is at Appendix A.

7.4 Industrie 4.0

A workshop in Berlin, organised with various city stakeholders, at which a set of “scenes” concerning the future was used to explore stakeholder reactions to possible developments such as reshoring of manufacture, the extensive growth of 3D printing etc.

An example of the stimulus material and a short note of the meeting is provided in Appendix A.

7.5 Automated vehicle meeting

An afternoon event organised in London in partnership with the City of London Corporation, at which attitudes to the development of automated vehicles were explored through a series of snapshots of a future in which AVs are commonplace.

A note from the meeting is at Appendix A.

7.6 Acceptability of automated vehicles

A morning workshop organised in Paris in association with IAU at which a series of short presentations preceded plenary discussion concerning attitudes to the emergence of this technology.

A flyer for the event is at Appendix A.

7.7 Retail Travelution

An all-day event in London arranged with Transport for London and Addleshaw Goddard (law firm) which explored the possible future of the freight logistics sector in light of automation, drones and other relevant developments.

A short note is at Appendix A.

7.8 Scenario-planning workshop

A two-day event attended by four of the CREATE Stage-3 cities and a range of other CREATE stakeholders. This has been described in more detail in Section 2.2.2.

A note containing reflections on the exercise and recommendations for future activity is at Appendix A.

7.9 The future of walking

A day-long workshop in Copenhagen organised with colleagues in the city council at which stakeholders were presented with diverse perspectives on the role of walking before conducting a street audit using Transport for London's Healthy Streets Checklist.

A summary of the main points is at Appendix A.

7.10 Smart mobility for better cities

A two-day conference in Amman organised by the CREATE partner city, at which presentations were given by members of the CREATE team as well as guests from London and Vienna as part of a wider exploration of smart mobility in an Amman context.

The programme is at Appendix A.

7.11 Further presentations etc

In addition to the events listed above, papers/presentations were given as part of WP6 as follows:

- MINDSETS/Mobility4EU conference, Brussels
- ITS Europe, Strasbourg
- CIVITAS Forum, Torres Vedras, Portugal
- European Transport Conference, Barcelona
- EUROCITIES Mobility Forum, Toulouse
- Transport Research Arena, Vienna
- Symposium on the Role of Transport in Transiting to Liveable and Sustainable Cities in Europe and China, Hong Kong
- SUMP Conference, Nicosia
- EU Green Week, Brussels

8 References

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Appendix A – outputs from events

Beyond Travel? (London) – Event report

Programme of Trafikdage conference, Aalborg (CREATE event is from 8.30 to 10.00 on 29th August, Stream 3)

Industrie 4.0 event Berlin – stimulus materials and event note

Notes of City of London workshop on automated vehicles

Flyer for IAU event on acceptability of Avs, Paris

Notes from Retail Travelution event, London

Note following scenario-planning workshop, London

Summary from event in Copenhagen – Why Walking Matters

Agenda for Amman conference: Smart mobility for better cities

Appendix B

COWI note on walking/Copenhagen



Beyond Travel?

**Report from a workshop exploring
the future of personal transport**

By Tom Cohen, UCL Centre for Transport Studies

1 Introduction

As part of the CREATE project¹, UCL held an evening workshop on 26th April 2017, at which those present were invited to examine the reasons for personal travel and whether recent and ongoing technological developments might lead to significant changes in the journeys we make.

The event began with a set of three provocations, from [Peter Antonioni](#), [Dr Hannah Knox](#) and [Sofia Taborda](#). Then [Nick Price](#) set the scene for the participatory element before inviting delegates to spend some time in groups thinking about possible changes in travel, using a method called the [Futures Triangle](#).

What follows is a hybrid of reportage and subsequent reflection.

2 Humans and moving

2.1 An hour a day

Humans travel for approximately an hour per day on average² and have done for a very long time (Hupkes 1982). This despite truly massive changes in our transport networks and our ability to use them, together with major shifts in our settlement patterns and industrial structures. And, most recently, in technological tools that – some argue – could one day make much travel obsolete.

Contrast the hour per day with the very tired axiom that travel “is a derived demand”. This assertion, combined with the assumption that travel is a source of disutility, tells us that, if our need to travel vanishes, we will cease travelling. And there’s plenty of evidence to support the idea: given the choice, people will take a time saving and may well pay for it (Wardman et al. 2016). But this is only in the short-term; over time, people consistently extend their travel spatially in response to increased speed and end up with roughly the same travel-time budget as before (Metz 2014).

So there’s some truth in both of these characterisations. But our event participants were not convinced that travel would disappear completely. Rather, if today’s reasons for travel disappeared, we would develop new stories to convince ourselves that we weren’t simply travelling for the sake of it. That is, we appear to feel that our travel requires *justification*.

What is less clear is how we would respond if the experience of travel became very much more unpleasant or costly than at present. Is our one-hour budget immovable? This seems unlikely. That said, we are good at reconciling ourselves to the prevailing conditions of travel, be that in terms of the financial impact, the congestion we encounter or other such “negatives”. So travel would probably have to become quite bad for us to stay put.

2.2 Lots of different kinds of travel

Let us not forget that travel is not homogeneous. Many are familiar with the division of travel into work, education, shopping, leisure, visiting friends and relatives, etc. Another way of looking at travel is to differentiate between one-way (migration) and two-way (returning home, at some point); level of repetition (some trips happen only once whilst others may be wearily familiar); and frequency.

¹ *Congestion Reduction in Europe – Advancing Transport Efficiency* (www.create-mobility.eu). This project is investigating the relationship between cities and car use and, in particular, how that relationship might change in future.

² We should not ignore the phrase “on average” because there is a great deal of variation across people and communities. So, if we are asking what technology might do to that hour per day, we should also be asking what it might do to the underlying distribution.

2.3 What does travel do for us?

Cliché it may be, but the description of travel as a derived demand gives us our first answer to this question: travel gets us to the activities, opportunities, pleasures that matter to us. Perhaps preeminent in that list is human contact: as social animals, we rely on travel to bring us into contact with others, both casually (a chat on the bus for those that like such things) and in planned ways (school reunion and so on). There are interesting cases of technology changing this – gamers interacting with each other on-line, say – but the evidence clearly points to an ongoing preference for physical proximity.³ Whilst we may “hate” our commute, it does bring us together with our colleagues.

Our second most significant answer is that travel can bring us novelty. In the simplest sense, this may be new surroundings. But novelty goes deeper: a different location offers different options, perhaps unfamiliar people, processes and cultures. And the complement of this novelty is being removed from the day-to-day drudgery of home life: the dripping tap cannot be mended remotely.

Beyond this, travel *can* bring us excitement and aesthetic and/or sensual pleasure. The view from the window; the physical experience of acceleration; the sense of the vehicle responding to our commands. And some travel takes place in luxurious conditions – how many people catch the Orient Express just to get to Venice?

Travel also provides exceptional opportunities to make statements to the world about ourselves. We can communicate our status, our character and even our values in the way we move. We do not have a host of other chances to make such statements to strangers. If we value these opportunities – and many seem to – how would we respond if/when we could no longer appeal to a journey’s necessity to justify it? Or are we moving to other means of displaying our plumage? Through the smartness of our phones, perhaps. But even the smartest of phones is less prominent and therefore less noticeable than a shiny car.

Remembering our assertions above concerning frequency and repetition of travel, can we discern any relationships? It seems obvious that, in general, the oft-repeated journeys will be those which “get us what we need”, whilst novelty, excitement and pleasure may come from those less frequent, less familiar trips.⁴

3 The quality of the alternatives

Having talked about ourselves and travel, we turn now to the alternatives. Our questions: how effective are the technologies that promise to make travel unnecessary and how effective may they become?

These questions need to be considered in the context of what has already been said: if travel is a source of displeasure, then we would presumably embrace opportunities to avoid it, provided we could still obtain the “utility” that had motivated the journey. If, though, we enjoy the journey or actively wish to be in a different location, it is less obvious that technology has much to offer us. What of the hour per day? This is more complex: we may see technology enabling the less pleasant travel to be substituted by more enjoyable journeys.

The first observation is that we have already recently seen very significant technological change:

³ Data on journey making from the National Travel Survey, for example, shows that people consistently cover approximately one fifth of their total mileage visiting friends (Department for Transport 2016).

⁴ It is probably more complex than this, though, with some people deriving genuine pleasure from time at the wheel, even if the route is very well worn.

- Many white-collar workers can now do much of their work from any location offering a phone signal
- It is possible to avoid a vast proportion of shopping trips through buying online
- What used to be an expensive phone call between distant locations is now a costless⁵ video call

Would not changes of this magnitude be expected to have already prompted massive responses in our travel behaviour? Well, they have and they haven't. People do work from coffee shops, conduct personal and business meetings by Skype and its equivalents, and they certainly shop online⁶, so they have responded to the opportunities provided. Do they travel less overall as a result? Although the recent level of mobility is very close to that of the early 1970s, there has been a modest decrease in the last ten years.⁷

But technology continues to advance: it is not claimed that today's video-call is the same as being *with* your correspondent. Might tomorrow's "virtual presence" be so good as to fool us into thinking we are? This, of course, is hard to say. But it would have to be very good in order for the impression of physical contact (as opposed to merely visual or auditory contact) to prove compelling. Much of our desire to be with our loved ones involves intimacy. For other purposes – a trip to the doctor, say – the motivation is different and we may be satisfied with an enhanced video-call.

There is some travel which virtual presence does not seem likely ever to replace. A rock-climbing trip with friends, for example, seems to depend for its meaning on the collective experience of a physical object to which it is necessary to journey. We can, of course, posit a time when technology will be able to create an entirely convincing virtual experience of a rock-climbing trip with friends. But, as philosophers have for years rejected the notion that we might be "brains in a vat", it seems unlikely that we would submit to this experience without a very good reason. We use flight simulators in order to be able to crash an aircraft without killing people but would we not always rather fly for real?

As for additive manufacturing (or, more colloquially, 3-D printing), this seems less likely to influence personal travel given that many of us can already have the things we desire brought to our door. Our 3-D printer may be able urgently to provide an item that we would otherwise have to go to get but delivery of goods is becoming ever more responsive to our demands so the frequency of such emergencies will probably continue to diminish.

Before we move on, a few observations. First, it is very likely that these "substitutes" for travel will not be evenly available across nations and their societies. The supermarket employee will continue to need to go to the supermarket to work their shift. And certain of these technologies are available at a price that is beyond many. So, even if technology produces a true alternative to travel, it is likely to be the wealthy who can benefit, at least to begin with.

A connected point is that wealth has been expressed to some extent in distance, with richer people able to travel further in order to obtain the best quality or the best bargains, and poorer people having generally less choice. It seems quite likely that alternatives to travel will share this character of offering higher quality (a more realistic impression of lying on a sandy beach, perhaps) at a price to match.

⁵ Having the illusion of being costless, more accurately.

⁶ The profusion of delivery vehicles bringing parcels to us indicates that some substitution of personal travel (in this case, shopping trips) is likely to have negative knock-on effects.

⁷ This is being actively debated: travel time and trips are steady compared with a 1972/3 base but there has been a decrease in the last 15 years (Department for Transport 2016). An adjustment, or evidence that technology is having an effect?

To finish, a question about distance and alternatives. Whilst we can telephone someone who is ten metres away, the chances are that we will go to speak with them in person. That is, our willingness to accept forms of communication that fall short of physical presence is a function of the cost of achieving that presence. Thus, Skype is an impressive tool when we are dealing with someone thousands of miles away but is tiresome if that person is around the corner. Unless and until alternatives are indistinguishable from “the real thing”, we are surely likely to opt for authentic experiences where the costs of doing so are low.

3.1 Opposing forces

Our discussion of how good the alternatives might be needs to take account of two forces that oppose the substitution of travel through technology.

The first is the very substantial industry that enables personal travel. Actively supporting this industry is the belief, often presented as axiomatic, that transport investment promotes economic growth.⁸ However good the alternatives to travel become, this industry will have a vested interest in persuading us to continue to move ourselves. And there seems no prospect of the perceived link between mobility and wealth being broken, given the numerous failed attempts over the years to do this.⁹

The second force, rather less potent, is opposition to certain forms of technology, as espoused by the Neo-Luddites. These and other proponents of the simple life will presumably therefore eschew 3-D printing and virtual presence, the latter because it will “remove people from direct experience of life” (Glendinning 1990). Such people are relatively few so are unlikely to turn the tide but their numbers could swell if significant doubts arose concerning the safety and/or desirability of the technology.

4 A constrained world

We have so far discussed this topic as if we shall all remain free to make choices subject to only personal constraints such as time and finance. National and local governments may feel differently. Initiatives such as decarbonisation can do much to reduce greenhouse gas emissions and air pollution but problems such as congestion prove more stubborn. Cities with growing populations may have little choice but to rationalise the travel of their citizens in order to continue to function. If travel for an hour a day we must, better that this takes place on foot, which is good for public health, than in a motorised vehicle – the city can accommodate many more pedestrian-hours than it can car-hours. Moreover, if those walks are taking place near where people live rather than at their workplace, this may spread the intensity of travel demand, relieving the urban core somewhat.

Governments are generally very reluctant to impose significant restraints upon our movement so may hope that the improving quality of alternatives to travel will do their work for them. But our discussion above suggests they may have to apply a degree of force in any case. What then? If, for example, we reach the point of having personal carbon allowances, how might people trade off travel with other forms of consumption that use up their credits? The technologies we have been discussing may make the substitution of travel more likely, if attractive alternatives do not emerge as readily in other sectors. In another scenario, travel may become prohibitively expensive, in which case the alternatives we have been discussing may become the only way of having certain experiences.

⁸ Prominent UK examples include the Eddington Report (Eddington 2006) and the Transport Select Committee's report on Transport and the Economy (House of Commons Transport Committee 2011) but there are many others.

⁹ For example, SACTRA's considered work on Transport and the Economy (Standing Advisory Committee for Trunk Road Assessment 1999) pointed out that, in certain circumstances, transport “enhancements” could actually damage local economies. Such a nuanced argument is very rarely heard in the general transport policy discourse.

5 Conclusions

5.1 No massive change

Our discussion casts doubt on the idea that we will ever cease travelling even if technology greatly improves. What is more likely is that we will take advantage of opportunities to replace journeys where the travel offers no pleasure and where it is possible to achieve the same ends whilst staying put. Telehealth seems a good example of this. It is also likely that travel carried out for the pleasure of the journey will continue, at least until it is forcibly restrained.

5.2 Substitution – very likely a mixed bag with mixed impacts

But, given some substitution and a working assumption that the highly durable hour of average daily travel will persist, we must ask how these changes will be manifested. The evidence is that people who work at home rather than go to the office make additional local journeys (Andreev et al. 2010). If this change reduces pressure on networks in urban centres, this may be welcomed, especially if the additional journeys are also made using more sustainable forms of transport; but they may well not be.

If and when external constraints make it necessary to sacrifice some of the travel that we willingly undertake (eg to visit friends), where does this lead? It is conceivable that we will reorganise in social terms, returning to a world in which we spend time with people in close proximity, thus reversing a long-standing trend of increasing distance from loved ones (Malmberg & Pettersson 2007). Perhaps virtual reality will provide us with a convincing experience of a beach holiday without the need to leave home. What this cannot do is provide the physical separation that is crucial to the sense of being away. Would people be able to remove themselves from their day-to-day environment for a fortnight in order to simulate “the holiday”? Would not the temptation to “pop back” if only for a few minutes be irresistible? It seems hard to imagine that the two-week “constitutional” could survive this transition to virtual holiday-making.

This raises the intriguing notion of the “staycation” which would not rely on willpower in the same way. Instead, it requires us to make our home environment sufficiently pleasant and varied that we no longer yearn to escape it. Or perhaps we could warm to the idea of local holidays instead.

As for the journeys that we undertake for the thrill, a variety of substitutes may arise, including the simulator and the low-carbon race-car track.

6 Next step – decouple wealth and mobility

Most of this discussion has been predictive in style – what if? It seems appropriate to conclude in a more prescriptive vein, by asking what is desirable.

If we accept the “rule” of an hour’s travel per day, the question then may be how to accommodate that as sustainably as possible whilst retaining the value travel gives us. This is not a new policy question; it is merely now being asked in the context of emerging tools that may make acceptable the substitution (as opposed to suppression) of trips.

Not that this is straightforward: cities tend to speak of pursuing a vibrant economy and a high quality of life in the same breath. They do not acknowledge the tension between the two in transport terms, that a wealthy city is likely to be full of movement whereas a high quality of life is strongly associated with quiet, calm and, by implication, low/slow mobility. As discussed above, the dominant transport discourse reinforces the positive association between mobility and prosperity. But a brave city could break free and dare to redefine its success in terms of reduced movement per head. And this would provide fresh impetus to finding or developing substitutes for travel that do not leave us dissatisfied. Any volunteers?

7 References

7.1 Slides from the event

Peter Antonioni – <https://www.dropbox.com/s/dsam4unq275sg0x/Antonioni.pdf?dl=0>

Hannah Knox – <https://www.dropbox.com/s/wm3c5dlzeyjmi0b/Knox.pdf?dl=0>

Nick Price – <https://www.dropbox.com/s/ndd9ydfyk4zbcx/Price.pdf?dl=0>

7.2 Literature cited

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Wardman, M., Chintakayala, V.P.K. & de Jong, G., 2016. Values of travel time in Europe: Review and meta-analysis. *Transportation Research Part A: Policy and Practice*, 94, pp.93–111.



ny viden og netværk

Trafikdage
afholdes igen i 2017
i Aalborg Universitets
bygning på
Aalborg havnefront,
Rendsburggade 14

Efterkonference om
jernbaner:
Se programmet på
bagsiden

Indbydelse Trafikdage på Aalborg Universitet

28.-29. august 2017

Trafikforskningsgruppen
Aalborg Universitet

www.trafikdage.dk

Sponsorer:





Velkommen til Trafikdage 2017

Kære kollega!

Autonome eller selvkørende biler, kært barn har mange navne, men hvornår kommer de? Bliver det individuelle biler eller delebiler, og hvilken indflydelse vil de få på den kollektive trafik? Måske bliver små førerløse busser i fast rutefart det første skridt – det er i hvert fald, hvad Aalborg Kommune planlægger på en af hovedstierne i Aalborg Øst. Og hvad sker der, når danskere, der i dag ikke kan køre bil, fordi de er for gamle, for unge, handicappede eller påvirkede, får muligheden? Stiger antallet af kørte km i bil så eksplosivt? Og kommer der flere bilpendlere, når de blot kan lægge sig til at sove eller starter kontorarbejdet, når de sidder fast i bilkøen på Køgebugtmotorvejen? Spørgsmålene er mange, og selv om jeg ikke kan love dig, at du får alle svarene på årets Trafikdage, kan jeg love dig mange indlæg om emnet.

Men udviklingen i den kollektive trafik er også højt på dagsordenen på Trafikdage, lige fra den praktiske planlægning af en fjernbusterminal i København over fremtidens kollektive transport i Region Sjælland til en multimodal rejseplanlægger i Nordjylland.

Trafiksikkerhed har altid været en vigtig del af Trafikdage, og i år er ingen undtagelser. Blandt de mange indlæg om trafiksikkerhed kan du blandt andet høre om undersøgelser af trafikulykkernes store mørketal, men også hvordan man ved at inddrage registreringer af trafikulykker på skadestuerne i trafiksikkerhedsarbejdet kan opnå ny indsigt. Og ny indsigt er nødvendig, hvis vi skal nå Færdselssikkerhedskommissionens mål om max 120 dræbte i 2020 – i 2016 blev 215 dræbt.

Som noget nyt har vi i år givet mulighed for afholdelse af efterkonferencer i tilknytning til Trafikdage. Denne mulighed har jernbanefolket benyttet sig af. Jernbanekonferencen starter tirsdag eftermiddag (2. dag) og fortsætter til og med frokost onsdag. Du finder et særskilt program for jernbanekonferencen på bagsiden af denne indbydelse. Vi synes, jernbanefolket har sammensat et spændende program og håber, at mange har lyst til at udnytte denne nye mulighed.

Dette var blot nogle få nedslag i programmet, som du kan studere nærmere på de følgende sider. Jeg er sikker på, at du vil finde en vifte af indlæg, som er en rejse til Aalborg værd. Men Trafikdage er også netværk, det er her du møder gamle og nye kollegaer og får gode inspirerende samtaler og måske starten på nye samarbejdsrelationer. Og i år er der optimale muligheder herfor. Vi har nemlig efter mange opfordringer justeret lidt på tidsplanen, så der er afsat mere tid til pauser.

Teamet bag Trafikdage glæder sig til at se jer alle.

Gode hilsner

Harry Lahrmann

Tid

28. - 29. august 2017

Konferencested

Konferencen afholdes igen på **Aalborg Universitet, Rendsburgsgade 14, 9000 Aalborg (Aalborg centrum).**

Kort over området findes på Trafikdages hjemmeside:

<http://www.trafikdage.dk>

I detailprogrammet, der udleveres ved registrering, vil det være angivet, hvor de enkelte sessioner afholdes.

Socialt arrangement

Konferencemiddagen holdes i Aalborg Centrum.

Tilmelding

Tilmelding til både konferencen og efterkonferencen samt reservation af hotel kan alene ske på Trafikdages hjemmeside:

<http://www.trafikdage.dk>

Tilmeldingsfrist

24. juli 2017. Ved tilmelding inden 1. juli gives rabat på konferenceafgiften.

Ved tilmelding efter 24. juli kan der ikke garanteres hotelværelse på ønsket hotel.

Priser

Der tillægges 25% moms til alle konferenceafgifter samt konferencemiddag

Konferenceafgift (DKK)	1 dag	2 dage
Ordinære deltagere	3000	4150

Foredragsholdere samt arrangører af special sessions og workshops	2400	3300
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Oplægsholdere på workshops og special sessions	2600	3750
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Pensionister	600	950
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Studerende	250	500
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Konferencemiddag	600	600
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Tilmelding inden 1. juli

Ordinære deltagere	2650	3800
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Jernbanekonference

Deltagere der i forvejen deltager i Trafikdage		1000
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Deltagere der alene deltager i Jernbanekonferencen	1000	1500
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Konferenceafgiften inkluderer deltagelse i konferencen, frokost og kaffe/te samt middag tirsdag aften for deltagere i jernbanekonferencen.

Afbud

Afbud til konferencen modtages uden beregning til og med 24. juli. I perioden 24. juli-13. august beregnes der et annulleringsgebyr på DKK 200.

Efter 13. august gives ingen refusion. Tilmeldingen kan eventuelt overføres til en ikke tidligere tilmeldt person.

Transport

Der vil være to særbusser fra de ankomende morgenfly fra Aalborg Lufthavn til universitetet mandag morgen og én fra universitetet til lufthavnen tirsdag eftermiddag. De nøjagtige afgangstider og steder vil blive lagt på hjemmesiden.

Ved ankomst/afrejse på andre tidspunkter henvises til offentlig transport eller taxi.

Hoteller

Der er forhåndsreserveret et antal værelser på følgende hoteller (bestilles via tilmeldingsfunktionen på hjemmesiden):

Radisson BLU Limfjord Hotel, Ved Stranden 14-16, 9000 Aalborg
E-mail: reservations.limfjord@radissonblu.com
<http://www.radissonblu.dk/hotel-aalborg>
Priser: enkeltværelse DKK 1.045, dobbeltværelse DKK 1.245

First Hotel Aalborg, Rendsburggade 5, 9000 Aalborg
E-mail: aalborg@firsthotels.dk
<http://www.firsthotels.dk/Aalborg>
Priser: enkeltværelse DKK 945, dobbeltværelse DKK 1.145

Hotel Cabinn, Fjordgade 20, 9000 Aalborg
E-mail: aalborg@cabinn.com
<http://www.cabinn.com/hotel-i-aalborg/hotel-cabinn-aalborg.html>
Priser: enkelt Commodore DKK 670, enkelt Captains Class DKK 750.

Hotel Aalborg, Østerbro 27, 9000 Aalborg
E-mail: info@hotelaalborg.dk
<http://www.hotel-aalborg.com/>
Priser: enkeltværelse DKK 795, dobbeltværelse DKK 995

Spørgsmål

Spørgsmål i forbindelse med konferencen kan stilles til:

Sekretær Lilli Glad Tlf + 45 9940 8375 E-mail: lg@civil.aau.dk	Lektor Harry Lahrmann Tlf +45 9940 8381 E-mail: hsl@civil.aau.dk
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Spørgsmål vedrørende fakturering/betaling bedes stilet til:

VisitAalborg
Kjellerups Torv 5, niveau 13
DK-9000 Aalborg
Tlf. +45 9931 7502E-mail:
lr@aalborg.dk

Følg med i programændringer på www.trafikdage.dk

Opdateret 02.06.2017							For at se den enkelte abstract/resumé/beskrivelse klikkes på titlen for indlægget																
28. august																							
08.30-09.15		Registrering og kaffe										08.30-09.15											
Indledningssession																							
09.15-10.45		Velkommen til Trafikdage v/Lektor Harry Lahrmann, Aalborg Universitet Indlæg ved transportminister Ole Birk Olesen Sammenhæng mellem byudvikling og mobilitet v/Rådmand Kristian Würtz, Aarhus Kommune Klimarådets anbefalinger på transportområdet og transportsektorens andel af reduktionsmålet v/Niels Buus Kristensen, medlem af Klimarådet										09.15-10.45											
10.45-11.15		Pause										10.45-11.15											
10.15-12.45		Executive session 1: Grøn Vækst – Smart Mobilitet Moderator: Anna Thormann, Gate 21 Vækstdagsordenen er på alles læber. Både i Greater Copenhagen og i hele Danmark. Med vækst stiger behovet for transport. Mere aktivitet, mere transport. Samtidig bliver den kollektive trafik dyrere, og den kollektive service ude i landet er trængt og spares bort. Parallelt foregår der enorme forandringer i hele det private marked: forretningsmodeller ændres, teknologier ændrer mulighederne, og mange nye erhvervsbrancher bliver involveret i de nye mobilitetstilbud. Hvordan kan offentlige myndigheder bedst bidrage til, at de store teknologiske ændringer og nye muligheder giver os de mest samfundsgavnlige mobilitetsservices? Hvad er det offentliges rolle i fremtidens nye transportmuligheder? Region Hovedstaden præsenterer ”Megatendenser - Fremtidens kollektive transport i Hovedstadsområdet”, som efterfølgende debatteres fra forskellige vinkler.			Executive session 2: Vejen til en miljø- og klimavenlig kollektiv bustrafik. Moderator: Jeppe Gaard, Områdechef Strategi og Anlæg, Trafikselskabet Movia Alternative drivmidler som el, biogas og syntetisk biodiesel får i disse år en stadig større udbredelse i den kollektive bustrafik. Sessionen har fokus på miljøgevinster og økonomi ved drift med el-, gas- og dieselbusser, på Trafikselskabet Movia og Københavns Kommunes miljømål og praktiske tiltag for at indfase alternative drivmidler samt busoperatørernes omstilling til nye teknologier og forretningsmodeller og udfordringer forbundet hermed i forhold til at sikre en driftssikker kollektiv bustrafik. Oplægsholdere: Christian Hedegaard Gravesen, Teknologisk Institut Victor Hug, Trafikselskabet Movia Mikkel Krogsgaard Niss, Københavns Kommune Lasse Repsholt, Danske Busvognmænd			Executive session 3: Selvkørende biler - Fra 10 fugle på taget til 1 i hånden Moderator: Andreas Egense, Vejdirektoratet Vi skal begynde at tænke de nye biler ind i transportplanlægningen og på vejene. Vi skal være klar til at høste de fordele, der kan komme, men også planlægge, så vi sikrer sikkerhed og mobilitet og undgår fejlinvesteringer. Men hvordan planlægger vi til fremtiden, når vi i en lang periode har traditionelle biler og selvkørende biler kørende side om side, når vi ikke ved hvilke fysiske og digitale teknologier, der ”vinder kapløbet”, og når de offentlige initialinvesteringer kan være høje? Hvor er mulighederne, og hvor er fælderne? På sessionen vil danske og udenlandske eksperter inden for ”connected and automated driving” holde oplæg som ramme for drøftelserne af tekniske, forretningsmæssige og samfundsøkonomiske aspekter af den nye fremtid på vejen.			10.15-12.45												
12.45-14.15		Frokost										12.45-14.15											
14.15-15.45		1. Linje Trafikplanlægning, politik og organisation Sammenhængende beslutningsgrundlag Mødeleder: Per Als A-2 A/S Hvordan håndterer vi usikkerheder i fremtidige beslutningsgrundlag? v/Jesper Overgaard, Metroselskabet I/S Optimering af transportinfrastrukturevalueringer: En analyse af struktur og indhold af VVM redegørelser v/Ida Marie Olesen, Danmarks Tekniske Universitet Making room for complementary rationalities in transport planning: The case of Strategic Choice of Measures in Swedish transport planning v/Patrik Tornberg, KTH										2. Linje Cykeltrafik/Trafiksikkerhed Cykeltrafik/Trafiksikkerhed Mødeleder: Pablo Celis Aarhus Kommune Hjelmrapport - Brug af cykelhjelme 2016 v/Bjørn Olsson, Rådet for Sikker Trafik Bedre trafikkultur via målinger af passage afstande mellem køretøjer og cyklister v/Jens Peter Hansen, Cyklistforbundet i Randers Cyklistuheld - hvilken betydning har vejen, køretøjet og trafikanten v/Mette Møller og Kira Janstrup, DTU Management Engineering Fremtidens krydsdesign - sikkerhed og tryghed ved fremførte og afkortede cykelstier v/Pia Prebisch Behrens, Københavns Kommune		3. Linje Mobilitet og adfærd Bilister kan blive cyklister Mødeleder: Helle Huse Rambøll Thinking people in a Thinking City - Smart mobility in Aarhus v/Gustav Friis, Aarhus Kommune Strategi for delebiler i København v/Annette Kayser, Københavns Kommune Lancering af Supercykelstier v/Mads Søholm Secher, Sekretariatet for Supercykelstier Københavnerne vil erstatte bilen med cyklen v/Morten Steen, Københavns Kommune		4. Linje Transportøkonomi Kollektiv trafik og samfundsøkonomi Mødeleder: Annette Christensen Dansk Industri Opfylder den kollektive trafik erhvervslivets behov? v/Svend Torp Jespersen, COWI A/S Samfundsøkonomisk analyse af busprojekter v/Carsten Jensen, Trafikselskabet Movia Samfundsøkonomisk værdi af den kollektive trafik v/Ole Kveiborg, COWI A/S		5. Linje Trafikkens energi-, klima- og miljøforhold Transport og energiforbrug Mødeleder: Steen Solvang Jensen Aarhus Universitet Urbanization and transport demand v/Per Homann Jespersen, Roskilde Universitet Geografisk transportenergiregnskab ud fra Transport vaneundersøgelsen v/Hjalmar Christiansen, DTU Management Engineering Strategisk Energiplan for Transport - STEPT v/Niels Frees, Insero A/S		6. Linje Kollektiv transport WORKSHOP Mødeleder: Henrik Severin Hansen Danske Regioner Den teknologiske og trafikale udviklings krav til planlægning Formålet med sessionen er at debattere, hvordan vi kan sikre mobiliteten og fremkommelighed for personer og varer på kortere og længere sigt i lyset af de aktuelle udfordringer i vejtrafikken og den kollektive trafik og de nye teknologier. Debatemnerne vil bl.a. være: Vil den stigende automatisering af køretøjer bidrage til at reducere trængslen, eller vil trængslen tværtom øges? Og hvordan kan vi i givet fald regulere trængslen, ved kollektiv trafik, ved samkørsel, ved roadpricing eller ved? Hvad er mulighederne i den Multimodal Rejseplan i Nordjylland, og hvad er planerne på længere sigt? Er det vejen frem for Maas i Danmark? Hvad bliver den kollektive trafiks rolle – forsvinder den eller kan den kollektive trafik stå centralt ift. de fremtidige mobilitetsservices? Og kommer de offentlige myndigheder til at få indflydelse på den fremtidige trafikudvikling, ejerskab af biler, Maas løsninger mv? Oplægsholdere: Michael Knørr Skov, COWI A/S Jens Otto Størup, Nordjyllands Trafikselskab Dorthe Stigaard, Region Nordjylland Johan Nielsen, Danske Regioner Michael Svane, DI		14.15-15.45	
15.45-16.15		Pause										15.45-16.15											
16.15-17.45		Cykeltrafik Cykeltrafik Mødeleder: Allan Therkelsen Atkins Danmark Koordineret kommunal cykelplanlægning v/Jens Erik Larsen, Foreningen Frie Fugle Videreudvikling af Vejdirektoratets Cykelindeks v/Niels E. W. Moltved, Vejdirektoratet Region Hovedstadens Cykelregnskab 2016 v/Jonas Herby, Incentive Adfærdsfremmende tiltag ”The missing link” i cykelpolitik v/Joachim Parbo, Atkins Danmark		Trafiksikkerhed Adfærdsstudier Mødeleder: Lars Klit Reiff Rigspolitiet Skoleankomstanalyser v/René Lund Hansen, COWI A/S Videoanalyse af konflikter i Jammerbugt Kommune - hvad får vi ekstra i forhold til en traditionel uheldsanalyse? v/Tanja K. O. Madsen, Aalborg Universitet Risikoforhold i forbindelse med busstoppesteder v/Mathias Sdun, COWI A/S		Forsinkelser og samfundsøkonomi Mødeleder: Pernille Øvre Christensen, Vejdirektoratet Analyse af rejsetidsvariabilitet på veje v/Jens Foller, Vejdirektoratet Hvad koster forsinkelser af godstransporten v/Jakob Rosenberg Nielsen, Rambøll og Annette Christensen, Dansk Industri Samfundsøkonomiske gevinster ved samtidig projektgennemførelse af store anlægsprojekter v/Ole Kveiborg, COWI A/S		Luftforurening fra tunge køretøjer Mødeleder: Lars Overgaard Teknologisk Institut Scenarier for emissioner af drivhusgasser fra produktion af biogas og anvendelse i tunge køretøjer v/Steen Solvang Jensen, Aarhus Universitet Emissioner af drivhusgasser fra tunge køretøjer på biogas v/Morten Winther, Aarhus Universitet Hvordan vurderes effektiviteten af eftermontering af NOx og PM systemer på tunge køretøjer v/Kim Winther, Teknologisk Institut		Intelligente transportløsninger ITS og signaler - Nye perspektiver Mødeleder: Maria Wass-Danielsen Urban Creators ApS Bæredygtig mobilitet i København med udgangspunkt i ITS v/Mads Gaml, Københavns Kommune Signaloptimering af Åboulevarden og Jagtvejslinjen i København v/Mogens Møller, Via Trafik Rådgivning A/S Adaptiv signalstyring i realtid v/Andreas Berre Eriksen og Mikkel Færgemand, Aalborg Universitet		16.15-17.45											
Konferencemiddag																							
19.30												19.30											



Efterkonference om jernbaner

Arrangeret i samarbejde med Nordjyske Jernbaner, IDA Nord og IDA Rail

Program

Tirsdag d. 29. august

Kl. 15.15-16.30: Jernbanesession på Trafikdage – første del af konferencen

- Trafikplan 2017-2032 - Vækst på jernbanen og hvad skal der til?
v/Adnan Jelin, Trafik-, Bygge- og Boligstyrelsen
- Bedre banebetjening af Viborg Kommune
v/Anders Kaas, Atkins Danmark
- **TEASER:**
Jernbanetrafik i Nordjylland: Svend Tøfting, Region Nordjylland

Kl. 18-22: Besøg hos Nordjyske Jernbaner og kørsel Aalborg- Hirtshals og retur.

- Afgang fra Aalborg Station - kl. 18.12
- Besøg hos Nordjyske Jernbaner med spising
- Besigtigelse - Ny Station i Hirtshals, ny godsterminal og krydsningsstation under anlæg

Ankomst Aalborg - kl. 21.43

Post tur bar arrangement i Aalborg C.

Onsdag d. 30. august

Kl. 9.00: Overtagelse af den regionale togdrift i Nordjylland

- Historien - organiseringen: Svend Tøfting, Region Nordjylland
- Udviklingen af Nordjyske Jernbaner: Peter Hvilshøj, Nordjyske Jernbaner
- Køreplanerne og passagerudvikling: Jens Mogensen, Region Nordjylland
- Mobilitetsplanlægningen – koordinering af bus og tog: Ole Schleemann, Nordjyllands Trafikselskab
- Infrastrukturinvesteringer i Nordjylland: Betina Søreide Lose, BaneDanmark

Kl. 10.45: Pause

Kl. 11.15: Perspektiver for den regionale togdrift i Danmark

- Planerne på Sjælland: Lars Bosendal, Region Sjælland (ikke endeligt aftalt)
- Regional togtrafik og nye trafiksignaler: Jan Tilli, BaneDanmark
- Erfaringer fra Arrivas kørsel i Vestjylland: NN, Arriva
- Perspektiver set fra Transportministeriet: Lasse Winterberg, Transportministeriet

13.00: Frokost

Tilmelding på www.trafikdage.dk



Neue Aktuelle

Die neue Zeitung für Berlin

CREATE Workshop: Industrie 4.0 im Wirtschaftsverkehr

Freitag, 22. September 2017

Projekthintergrund CREATE

In CREATE, gefördert im Rahmen des Programms "Horizon 2020" der EU-Kommission, sollen zu einem Maßnahmen zur Reduzierung der MIV-Nutzung in europäischen Großstädten und zum Wechsel zu nachhaltigeren Verkehrsmitteln untersucht werden, welche zu einer Verringerung von Verkehrsstaus im Autoverkehr beitragen. Zum anderen werden Maßnahmen zum Stau-Monitoring der unterschiedlichen Partnerstädte analysiert.

Darüber hinaus werden u.a. zukünftige Innovationen und deren Wirkung auf das urbane Verkehrssystem betrachtet. Neben dem Thema automatisierte Fahrzeuge soll auch die Auswirkungen der Industrie 4.0 auf den Wirtschaftsverkehr berücksichtigt werden.



Create-Logo

Foto ©: Create Konsortium

Projekthintergrund IWVK

Zielsetzung des Integrierten Wirtschaftsverkehrskonzepts Berlin (IWVK) ist die zeitgemäße, daher effiziente und stadtverträgliche Ver- und Entsorgung der Stadt durch den Wirtschaftsverkehr. Dies bezieht sich gleichermaßen auf die Versorgung mit Waren und Gütern, deren Entsorgung, sowie den Personenwirtschaftsverkehr. Das IWVK stellt eine Ergänzung und Konkretisierung zum Stadtentwicklungsplan Verkehr dar. Zentraler Bestandteil ist die gemeinsame Erarbeitung der Inhalte mit relevanten Stakeholdern in thematischen AGs. In ihm werden Maßnahmen und Ansätze („Stellschrauben“) für den kurz- und mittelfristigen Planungshorizont erarbeitet. Ein wichtiger Aspekt sind neue, technologische Entwicklungen (wie Industrie 4.0) und deren Wirkung auf den Wirtschaftsverkehr in Berlin.

Neue Ansätze für zukünftige Technologien

Mit Methoden der Zukunftsforschung auf der Suche nach zukünftigen Entwicklungen.

Im Rahmen des Projekts Create werden auch zukünftige technologische Entwicklungen auf deren Einfluss auf das Verkehrssystem und die Nutzung von Straßeninfrastruktur untersucht. Hierbei werden Entwicklungen wie Automatisiertes Fahren, neue Mobilitätsangebote und Digitalisierung im Personenverkehr näher betrachtet. Daneben soll analysiert werden, wie die nächste Entwicklungsstufe der europäischen Metropole aussehen kann. Neben der Literaturrecherche werden hierbei auch Methoden der Zukunftsforschung genutzt, um Experteneinschätzungen zu den Potenzialen und möglichen Entwicklungspfaden zu erhalten. Für die Annäherung an die möglichen Herausforderungen des Wirtschaftsverkehrs durch Industrie 4.0 haben wir uns für eine qualitative Herangehensweise entschieden. Eine detaillierte und ergebnisreiche Diskussion über abstrakte Entwick-

lungspfade ist mit klassischen Methoden nur schwer möglich, da viele Innovationen unklar und unvorhergesehen sind. Aus diesem Grund haben wir versucht, mögliche Entwicklungen mit ihren potenziellen Konflikten zwischen dem urbanen System Stadt und der Industrie 4.0 in Form von beispielhaften Szenen zu illustrieren. Die gewählten Szenen sind bewusst überspitzt formuliert und sollen helfen, eine aktive Diskussion über mög-

liche Effekte der Industrie 4.0 auf den Wirtschaftsverkehr greifbarer zu machen. Die Szenen und die heutige Diskussion können der Anfang für eine intensivere Beschäftigung mit diesen Themen sein.



WORK IN PROGRESS

Impressum

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Inhalt

Senatsverwaltung für Umwelt, Verkehr und Klimaschutz, Abteilung IV Verkehr
Manuel Herrmann-Fiechtner, Dr. Julius Menge
Besonderer Dank gilt Brigitte Menge und Tom Cohen, PhD



Glückliche Partnerschaft?

Wohnen im Industriegebiet – Fabriken mitten im Quartier

Berlin, 22. September 2026. Am gestrigen Nachmittag kam es an der Kreuzung Zukunftsallee/Konrad-Zuse-Straße erneut zu einem schweren Verkehrsunfall, bei dem ein 7-jähriges Kind lebensgefährlich verletzt wurde. Der Junge, der auf dem Weg nach Hause war, schwebt noch immer in Lebensgefahr. Unfallverursacher war ein autonom fahrender LKW, der einem konventionell fahrenden PKW ausweichen musste. Wiederholt war es in diesem Quartier zu Bürgerprotesten gekommen, da die starke Zunahme des Wirtschaftsverkehrs die Anwohner belästigt und – bedingt durch die autonom fahrenden LKW – verunsichert.

Das Gebiet rund um die Zukunftsallee galt lange Zeit als städtebauliches Vorzeigeprojekt, da hier Wohnen und Arbeiten auf engem Raum stattfindet. Unternehmen wie Supra 3000, der Gastronomiegroßhandel Supermahl, das Logistikunternehmen Rolli und der Industriebetrieb Murr siedelten sich hier an. Gleichzeitig entstanden Stadtvillen, Town-Houses und mehrere moderne Wohnhochhäuser. „Da wir konsequent die Innovationen der Industrie 4.0 nutzen, erzielen wir vorbildliche Emissions-Werte.

Die autonom bzw. teilautonom fahrenden E-LKW sind das Umweltfreundlichste, was es auf dem Markt gibt“, so Max Murr, Inhaber des Industriebetriebes, der Zulieferteile für die Automobilindustrie erzeugt. „Wir haben uns bewusst für diesen zukunftsorientierten Standort entschieden, da für uns die Nachbarschaft von Arbeiten und Wohnen für eine neue Lebensqualität steht.“ Auch mehrere Start-ups fanden hier einen Standort und sorgen für eine moderne Renaissance der „Hinterhof-Betriebe“.

Die Produktion von Gütern braucht mittlerweile dank den Innovationen der Industrie 4.0 weniger Platz und erzeugt auch in der Produktion weit weniger schädliche Emissionen (Luftschadstoffe, Lärm). So positiv sehen es viele Anwohnende des neuen Quartiers nicht. Gerade ältere Menschen und Eltern verunsichern die autonom fahrenden LKW. „Ich beobachte oft Jugendliche, die sich einen Spaß daraus machen, Notbremsungen der LKW ohne Fahrer auszu-



Klassischer Lieferverkehr in der Stadt

Foto ©: Julius Menge

lösen und damit den Verkehr lahmlegen“, berichtet ein 77-jähriger Anwohner, der darum bat, seinen Namen nicht zu nennen. „Ich habe drei Kinder zwischen vier und elf Jahren. Wir sind auf der Suche nach einer neuen Wohnung, da dieser Verkehr hier nicht nur nervt, sondern lebensgefährlich ist“, äußerte Hendrike Sommer, die in der Konrad-Zuse-Straße wohnt. In der kommenden Woche soll es erneut eine Bürgerversammlung im Quartier geben, um die Situation zu besprechen. Wir werden darüber berichten.

Nach dem Off-Shoring: das Re-Shoring

H&M eröffnete erste vollautomatisierte Textilfabrik in Deutschland

Großer Bahnhof, Politiker und Wirtschaftsvertreter, Stars und Sternchen: Das schwedische Textilunternehmen H&M eröffnete gestern am Industriestandort in Schöneweide die erste vollautomatisierte Textilfabrik Deutschlands. Frieda Müller, Pressesprecherin der Wirtschaftsverwaltung des Berliner Senats betonte die Hoffnung, „dass die Fabrik nur ein erster Schritt ist und zukünftig häufiger ehemals ausgelagerte Industrien in westliche Länder wie Deutschland zurückkehren. Damit wird die Metropolregion für IT-Fachkräfte zu einem erst-rangigen Anlaufpunkt.“ Durch die Automatisierung werden zunehmend die betriebswirtschaftlichen Vorteile der Produktion in Billiglohnländern aufgehoben, was erhebliche Auswirkungen auf den Transport von Rohstoffen und fertigen Produkten hat. Darauf verwies Dr. Charlotta Lindner-Möwe, Geschäftsführerin des Verbandes der Berliner Wohnungsbaugesellschaften. Sie rügte nicht nur die Ausweisung von wertvoller Konversionsfläche für die industrielle Nutzung, sondern sieht den Senat in der Pflicht, neue Logistikkonzepte für veränderte Wirtschaftsverkehrsströme zu erarbeiten. „Wenn das nicht geschieht, ist der Kollaps nicht nur an diesem Standort vorprogrammiert.“ Verdi-Vertreter Hans Umlauf kritisierte die Errichtung derartiger Produktionsstätten, die „nur eine Hand voll neue Jobs schafft.“ Gerade mal 20 hochqualifizierte Arbeitsplätze bietet das neue Werk.

Aus Liebe zu den Kleinen

Interview mit Vorsitzenden der Interessensvereinigung 3D-Drucker Berlin-Brandenburg.

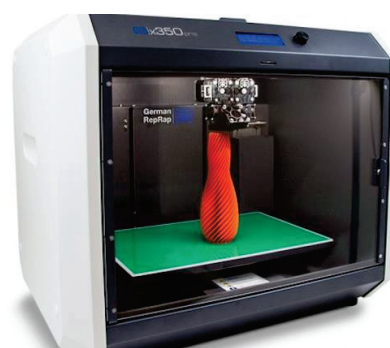
Selten haben so viele unterschiedliche Interessengruppen von Spitzenmanagern, Studenten bis Hausfrauen eine Entwicklung so übereinstimmend bejaht: Das Erstarken der kleinen, dezentralen Manufakturen in beinahe allen Winkeln der Stadt. Doch deren Datenhunger ist groß, gerade sie benötigen eigene Leitungsnetze für 3D-Drucker, wie es gegenwärtig im Innovationcluster Adlershof für Forschung und innovative Unternehmen entsteht. Das ist ein sehr kostspieliges Unterfangen, was die Freude spürbar dämpft. Warum das so ist, fragte unser Redakteur Andrew Question Dr. Peter Huber, Vorsitzender der Interessensvereinigung 3D-Drucker Berlin-Brandenburg.

Wie hoch waren die Kosten für dieses besondere Leitungsnetz am Standort Adlershof?

Eine endgültige Summe kann ich erst nach Abschluss aller Arbeiten nennen.

Dann frage ich anders: Liegen Sie im geplanten Limit?

Während der Bauarbeiten haben sich mehrere Sachverhalte ergeben, die bei



3d-Drucker

<https://www.gruenderszene.de/>

der Planung nicht berücksichtigt wurden, sodass wir den Kostenrahmen (die geplanten Kosten lagen bei 7 Millionen €/Meter, Anmerkung der Red.) wohl übersteigen werden. Aber wir installieren die Voraussetzung für eine Technologie, welche die nächs-

ten Jahrzehnte bestimmen und dem Wirtschaftsstandort Berlin enormen Aufschwung geben wird. Krämerseelen helfen da nicht weiter.

In Adlershof offenbaren sich Konflikte um den Platzbedarf und die Verlegungsart der Leitungen mit bestehenden Nutzungen. Ist dies auch an den weiteren geplanten Standorten zu erwarten?

Neue Technologien haben sich im Laufe der Jahrhunderte nie konfliktfrei durchgesetzt. Auch die Kutscher und Besitzer von Pferdefuhrwerken setzten Himmel und Hölle in Bewegung, um die ersten Automobile von der Straße zu vertreiben.

Müssen frisch fertiggestellte Rad-schnellwege für Bauarbeiten wieder gesperrt werden?

Natürlich nicht alle. Allerdings bleibt das an einigen Abschnitten nicht aus. In diesem Fall werden alle Beteiligten

sich dafür einsetzen, dass die entstehenden Einschränkungen schnellstens behoben werden.

Soll ein privates Konsortium den Leitungsbau planen und finanzieren oder wird die Errichtung als notwendige Investition der öffentlichen Hand in den Wirtschaftsstandort Berlin gesehen?

Diese Frage diskutieren gegenwärtig alle am Projekt beteiligten Partner sehr intensiv und teilweise kontrovers. Ich persönlich setze mich für eine Art Mischkalkulation ein, um die doch sehr hohen Kosten zu schultern.

Müssen oberirdisch Flächen neu verteilt werden?

Das ist abhängig von den Eigentumsverhältnissen vor Ort und muss von Fall zu Fall entschieden werden. Am Standort Adlershof war das nicht notwendig, da die öffentliche Hand Eigentümerin des gesamten Areals ist.

Es rollt zu viel

Bürgerbeschwerden über die Zunahme des Wirtschaftsverkehrs in den Wohnquartieren.

Berlin, 22. September 2030. Schwerpunkt der gestrigen Verkehrsausschuss-Sitzung des Bezirks Reinickendorf waren die zahlreichen Anwohnerbeschwerden über eine Zunahme des Lieferverkehrs durch die neuen Ansiedlungen in Borsigwalde. Der zuständige Stadtrat ordnete dies in die Zusammenhänge ein und erläuterte die Ursachen: „Die Optimierung von Fertigungsprozessen haben den Versorgungs- und Platzbedarf von industriellen Anlagen verringert. Die Etablierung von selbst-reparierenden Komponenten, ein reduziertes Inventar und die effizientere Nutzung von Rohstoffen haben den Platz- und Materialbedarf in der herstellenden Industrie stark reduziert. Die Folge sind kleinere Fabriken und weniger Ver- und Entsorgungsfahrten. Also all die Prozesse, die wir unter dem Begriff „Industrielle Nachverdichtung 4.0“



Neue Freiflächen werden nachverdichtet.

Foto ©: <http://cleantechpark.de/>

zusammenfassen können“, so der Bezirksstadtrat, der darauf verwies, dass die neuen Technologiecluster auf den nicht mehr benötigten Industrieflächen großer Industrieparks des

späten 20. Jahrhunderts entstehen. „Wir freuen uns über die neuen Ansiedlungen und die entstanden Arbeitsplätze.“

Kern der Anwohnerbeschwerden ist

die markante Zunahme des Wirtschaftsverkehrs. Wo liegen hierfür die Ursachen? Die Mitglieder des Verkehrsausschusses stimmten darin überein, dass das Ver- und Entsorgungsaufkommen der neuen Fabriken höher als erwartet ist. Da sehr verschiedene Unternehmen in unterschiedlicher Größenordnung am Standort Borsigwalde arbeiten, habe auch jedes einzelne Unternehmen seinen eigenen Lieferverkehr. Die Verkehrsinfrastruktur ist für diesen zusätzlichen Verkehr nicht ausgelegt, da die ursprüngliche Planung von einem Großunternehmen an diesem Standort ausging.

„Wir nehmen die Beschwerden der Anwohner sehr ernst“, konstatierte der Bezirksstadtrat, der kurzfristig einen Runden Tisch mit allen Beteiligten forderte.

Mein letzter Arbeitstag als Fabrikarbeiter

Wir begleiten Thomas Weber bei seinem letzten Tag als regulärer Fabrikarbeiter. Ab Morgen wird K5E-3000 seine Arbeit übernehmen.

Der Morgen ist strahlend schön. „Passt nicht ganz zu meiner Stimmung“, meint Thomas Weber als er vom Fahrrad steigt und sich ein Lächeln abringt. Es ist sein letzter Arbeitstag als Kurierfahrer am Berliner Standort des Logistikunternehmens Grande Five. Ab morgen übernimmt K5E-3000 seine Arbeit. Ein Erlebnis, das er nach der Umstellung auf eine vollautomatisierte Fabrik mit zwölf seiner Kollegen teilt. „Als ich hier anfang, haben sie sich mächtig ins Zeug gelegt, dass ich bleibe. Männer wie ich, die anpacken können und verlässlich sind, seien unverzichtbar. Da machte es auch nichts, dass ich nur einen Hauptschulabschluss hatte“, erinnert sich der Kurierfahrer, dem sein Unternehmen dann auch die Chance für einen Berufsabschluss bot.

Als die ersten autonomen Lieferwagen und LKW auf den Hof von Grand Five rollten, machten Thomas Weber und seine Kollegen noch Witze. „LKW, die sich ohne Fahrer durch die Stadt bewegen, hielten wir für eine Hollywood-Erfindung.“ Zwei seiner

Kollegen haben für die nächsten zwölf Monate noch einen Übergangs-Job als Notfall-Assistent, um bei Problemen mit der Autopilot-Software jederzeit eingreifen zu können. Doch sobald die Systeme verlässlich laufen, werden auch sie den



Autonome LKW machten Fahrer überflüssig

Foto ©: <http://www.autobild.de>

Gang zur Agentur für Arbeit antreten, die die Auswirkungen der Automatisierung auf den Arbeitsmarkt der Logistik-Branche als verheerend prognostiziert. „Es ist eine fatale Situation“, konstatiert Josef Hermann, Betriebsrat bei Grand Five. „Die Umstrukturierungen der Arbeitsprozesse in den letzten zehn Jahren haben dazu geführt, dass Fabrikarbeiter, darunter ein Großteil des Wartungspersonals, ihre Arbeitsplätze verlieren. Und nicht nur das: Auch IT-Fachleute, die keine hohe Spezialisierung haben, genügen nun nicht mehr den besonderen Anforderungen in einer vollautomatisierten Fabrik.“ Thomas Weber nimmt seine wenigen Sachen aus dem Schrank und schaut in eine Halle, die menschenleer ist. Wem soll er da noch Tschüss sagen?

Die Büchse der Pandora 4.0

Hackerangriff auf Liefer- und Kundendaten einer Spedition mit autonomen Sprintern verunsichert ganze Branche.

Nun ist es offiziell: Laut einer Pressemitteilung der Berliner Speditionsfirma Roll & Scroll wurden die Lieferdaten der autonomen E-Flotte des Unternehmens gekackt. In der Branche kursierte dies in den letzten Tagen hartnäckig als Gerücht. Zum Ausmaß des Datendiebstahls machte das Unternehmen keine konkreten Angaben, sondern umschreibt den Sachverhalt als „erheblich“. Ein Mitarbeiter, der darum bat, dass sein Name nicht in der Zeitung erscheint, berichtete von Hinweisen, wonach die Daten – darunter die kompletten Kunden- und

Lieferanschriften sowie die Warenlisten – einem Mitbewerber angeboten worden wären. „Da können Sie darauf wetten, dass die da landen“, so der Mitarbeiter.

Laut Informationen der Pressestelle des Landeskriminalamtes ist der Datendiebstahl bei Roll & Scroll der erste offiziell bekannt gewordene Fall in der Logistikbranche. Allerdings wird eine hohe Dunkelziffer vermutet, weil die Unternehmen davon ausgehen, dass eine Anzeige einen erheblichen Imageverlust bedeute. „Wir haben es durch die vollautomatisierten

und vernetzten Lieferfahrzeuge und die damit verbundenen Datenschutzrisiken mit einer neuen Art der Kriminalität zu tun“, heißt es in der Information der LKA-Pressestelle.

Hans-Christian Ullrich vom Branchenverband BIEK teilt die Befürchtung des anonymen Roll & Scroll-Mitarbeiters und spricht von einer aktuell extrem verunsicherten KEP-Branche. Ursache sei ein Update des Software-Herstellers aus Heidelberg, nachdem die Bordcomputer des neuesten Tesla-Lieferwagens ein nicht näher beschriebenes Sicherheitsleck

verursachte. Daten zur aktuellen Ladung, zu Menge und Art der Pakete, Kundendaten (Absender, Adressat), GPS-Tracks der Routen konnten so vermutlich aus dem Bordcomputer über die ständige Online-Verbindung ausgelesen werden.

Der Software-Hersteller bestätigt in einem ersten offiziellen Statement, dass es zu Sicherheitsverletzungen in Folge des Updates gekommen sei, sprach aber nur von „wenigen Einzelfällen, die gegenwärtig intensiv geprüft werden“.

Neue Mauern in Berlin

Heftige Diskussion: Teile der Stadtautobahn nur für autonome Fahrzeuge?

Bereits vor der Sitzung des Verkehrsausschusses des Abgeordnetenhauses am kommenden Montag schlagen die Wellen hoch, denn in der vergangenen Woche hatte Wirtschaftssenator Bertram Fuchs erstmals über die Pläne gesprochen, Teile der Stadtautobahn für ganze zwei Jahre nur noch für autonome Fahrzeuge zuzulassen. Er beruft sich dabei auf den Antrag eines Industrie- und Forschungskonsortiums, in diesem Zeitraum ausschließlich ISO93514-ready Fahrzeuge mit vollautonomer Autopilot-Software auf diesen Abschnitten fahren zu lassen. Dazu sei die Installation von speziellen Leitplanken und großflächigen Barrieren notwendig. Die bis zu zwei Meter hohen Mauern sollen eine bessere Identifikation der Bordsensorik der autonomen Fahrzeuge hinsichtlich der Straßenabschnitte, Kreuzungen und Gehwegbereiche ermöglichen. Letztendlich soll hier die Autopilot-Software lernen, Straßenraum fehlerfrei zu erkennen. Die Pläne von Senator Fuchs schlugen ein wie ein Zündfunke, die Posi-



Automatisiertes Fahren

<http://www.bild.de/regional/berlin/berlin/so-fahren-wir-in-zukunft-48611440.bild.html>

tionen könnten unterschiedlicher kaum sein. Wir fassen sie zusammen: Wirtschaftssenator Bertram Wolf: „Es ist ein wichtiges innerstädtisches

Testfeld, das elementare Erkenntnisse und entscheidende Innovationsimpulse generieren kann. Gleichzeitig setzt Berlin damit für Europa Maßstäbe.“

Mathilde Schellhase-Schreiber, Senatorin für Stadtentwicklung, Umwelt und Verkehr: „Eine derartige Einschränkung des öffentlichen Raums für einzelne Fahrzeugtypen und Gruppen von Nutzenden ist kaum vorstellbar und noch weniger vertretbar. Die Installation von großflächigen Barrieren, speziellen Leitplanken und Mauern zur besseren Identifikation der Bordsensorik der autonomen Fahrzeuge ist eine unzumutbare Verschandelung öffentlichen Straßenraums.“

IHK-Präsident Sascha Stober: „Ohne Zweifel wäre das ein wichtiger Test, dessen Ergebnisse zukünftige Planungen beeinflussen. Allerdings erscheinen mir die Auswahl des Gebiets und der Ausschluss von konventionellen Fahrzeugen praxisfern, man denke nur kurz an die vielen Pendler und kleinere Wirtschaftsunternehmen, deren ökonomische Situation keine sofortige Anschaffung der preisintensiven autonomen Flotten zulässt.“

Es wird sich zeigen, welche Positionen sich durchsetzen werden.

Summary: first expert discussion on „Industrie 4.0“/4th industrial revolution and urban freight

Short summary

As part of the Create research project, WP 6 examines the impact of technical development on transport systems and the use of urban road infrastructure. Relevant topics are for example autonomous driving, new mobility solutions and the digitalisation within passenger transport. Besides, the next stage in urban development towards suitability is analysed. With the help of approaches that originate from future sciences, we tried to get a better idea of possible challenges of 'Industrie 4.0' for urban and transport development with a focus on urban freight by expert options. We decided to have a German speaking workshop with participants from relevant Senate departments (Economics plus Urban Development and Housing), federation representatives, industry representatives, and from our municipal innovation agency. In addition, Tom Cohen (UCL) presented an introduction to Create and to the process.

Based on our and Tom's experience, we concluded that a fruitful and profound discussion on abstract development trajectories is not likely to be achieved with traditional methods due to many unclear and hardly predictable innovations. That is why we decided to illustrate potential conflicts between the urban system and 'Industrie 4.0' by using newspaper articles. The chosen stories were created in a slightly exaggerated style trying to initiate insightful discussions on the probability of specific developments and the possible effects of 'Industrie 4.0' for urban freight.

In total, 6 scenes or stories were created in a printed newspaper representing different points in time with a focus on the impacts of specific developments. The first scene dealt with possible problems of approaching residential housing areas close by modern, low-emission industrial sites on the former edge of the city. It focused on potential road safety issues and regulations due to automated delivery traffic and conflicts of mixed traffic with both fully automated and conventional vehicles. The second story described the possibility of a re-introduction of former outsourced industrial sectors due to the reduction in production costs by automation and the need for high-tech personal (from off-shoring to re-shoring). The third scene tried to describe a future of urban production that is strongly dominated by 3D-printers with new requirements for feeder infrastructure within the city. The fourth story described challenges for surrounding residential areas and surrounding traffic infrastructure with densified industrial areas due to the dramatic reduction of space and storage facilities needed for production. The fifth scene dealt with negative employment effects of fully automated vehicles and fully automated factories for local industries. The last story described a cyber-attack on a company with fully automated delivery trucks and possible risks for data vending of critical customer information.

One key result of the workshop was that the first expert discussion was a good starting point for a detailed discussion both within the responsible senate departments and between the relevant stakeholders. Potential possibilities, challenges and new options for action for urban production and urban freight with 'Industrie 4.0' need to be considered and elaborated hand in hand. The discussion showed the need for a smarter use of remaining urban development areas to directly influence urban production and a more intelligent use of urban infrastructure (including transport systems).

Insights into the expert opinions on 'Industrie 4.0' will be useful for both the currently developed integrated urban freight concept for Berlin and Berlin's new urban development plan for industry and commerce. Together with the Senate Department for Economics, Energy and Public Enterprises, concepts for further expert discussion on 'Industrie 4.0' and urban freight are developed.

City of London Automated Vehicles Workshop

8 November 2017

Agenda

13.00 – 13.30	Lunch and registration	
13.30 – 13.40	Welcome, housekeeping, structure of the afternoon	Paul Beckett, CoL Tom Cohen, UCL
13.40 – 13.50	What is an automated vehicle?	Tom Cohen, UCL
13.50 – 14.15	Perspectives on AVs (4 x 5 min presentations):	Lucy Saunders, TfL/GLA Gavin Bailey, TRL Giles Perkins, WSP Ryan Wood, Atkins
14.15 – 14.30	Panel Q and A	
14.30 – 14.40	Introducing the Scenes	Tom Cohen, UCL
14.40 – 15.15	Coffee break	
15.15 – 16.15	Facilitated discussion: The potential impacts of AVs	
16.15 – 16.45	Feedback and discussion	
16.45 – 17.15	Facilitated discussion: Five golden rules for AVs in the City	
17.15 – 17.30	Wrap up and close	Paul Beckett, CoL Tom Cohen, UCL

Scene 1 – What's my job worth

A delivery driver's frustration at how tedious his working life has become strikes a chord with other listeners of a local radio phone-in. He complains that he spends half his life sitting doing nothing between drops and fears that, once a robot can knock on doors, he'll be out of a job for good. Other listeners express sympathy – "it's not really a job is it?"

- The idea of automated freight is more relatable and more likely to be seen in the near future. Freight is a sensible place to start with AVs from a safety perspective, but needs to provide an economic benefit. How would it then occur? Perhaps through legislation
- According to Mark Carney a 3rd of all jobs will go due to automation. This should be seen as a real threat that will have a messy transition period.
- Currently two million driver jobs in the EU. The lorry driver sector cannot currently employ enough people due to length of training etc. Would it cause mass unemployment? Not just in transport but all sectors where machines and robots can/will replace human workers
- A very likely scenario, especially in an interim scenario when there are both AV and non-AV vehicles are on the road, or when vehicles are not fully automated/driverless.
- What need would there be for a human to be there at all? Surely wouldn't need a human to deliver the goods to the receiver – technology already exists to allow the vehicle to be a 'mobile' locker system that unlocks for the receiver to collect the goods.
- Big society – what is societal cost of introducing AV's? AV's will take away important skills. Will it introduce stress and boredom to jobs?
- Resistance – There might be human and political resistance to AVs. People don't like change and prefer the familiar.
- What does the introduction of AV's mean for the household? AV's might give further rise to the gig economy.
- There needs to be more collaboration across all sectors. The next two decades will see significant change and no one taking responsibility. Impacts of technology and employment must be picked up by central government
- We need to explore whether society can really cope with job losses? Or will this change in technology create an opportunity for more jobs.
- Would job losses of mundane jobs with little job satisfaction be a bad thing? Would it cause mass unemployment or would other job opportunities be created through this technology revolution.
- If jobs and skills change or disappear in the future as a result of AVs then this will create a societal shift and society will have to find a way to adapt to this shift. Are we better off being semi-autonomous?
- Feeling that the progress to driverless freight won't happen that quickly and there would be time for workers to re-train, but who would fund that re-training? Who is responsible for this is it? Must be a central government responsibility.
- The potential benefits of automated freight- More leisure time/ better quality of life, it will create tech leaders, create a new economy, create a universal wage model.
- Potential to provide lots of operational benefits regarding responsibilities of parcels and who is liable. Technology means it can all be tracked.
- Would there be an issue around mental health of the worker if this scenario did happen?

Scene 2 – It should have never happened

Thirteen-year old Peter Leicester was knocked down by an autonomous vehicle (operating in full self-driving mode). It is suggested that Peter and his friends had been playing “chicken”, forcing vehicles to make emergency stops. This is the first UK case of hospitalisation following a collision involving an AV and Peter’s condition is stable. The police are investigating and are in touch with the vehicle’s manufacturer.

- KSI’s on UK roads have been normalised. Any new AV technology will have teething problems and will be subject to media scrutiny but this doesn’t mean KSI’s from AV’s will be as bad or as high when compared to normal transport modes.
- Expectations on AV’s could be at odds with what an AV is capable of; e.g. People may expect an AV to have intelligent systems that avoids pedestrians at all cost but the AV may not be fully capable of doing this.
- Need to anticipate change – be on the front foot. Set desired outcomes for movement and allocation of space and time on streets. Form a view, don’t adopt a view
- Drive the standards through frameworks and KPIs – Local Authorities need to work together and jointly lobby. Representatives from cities need to be given a seat at the table by DfT
- We may create a society where AV’s are for wealthy and affluent people. Leaving a gap in communities that don’t have access to AV’s. At the moment, big multinational companies are the ones carrying out trials on AV’s.
- We should balance/regulate what owners or manufactures of AV’s do. We can impose CSR objectives, national minimum wage to bridge any gap AV’s may bring.
- AV’s may create a door to door service. We may have city bosses who used to get the train to work getting driverless AV’s and causing congestion. How would the City react to this?
- AV’s wouldn’t have on board a figure of authority so people may be less comfortable using them.
- The MTS is fully committed to Healthy Streets. The introduction of AV’s acts as a threat to this. The MTS needs to be revisited to make accommodation for AV’s. The rise of AV’s shows how new technology can change government agenda.
- We have made good progress with commuting and sustainable transport but disruptive technology may set things back.

Scene 3 – TLRN Conversion

The Planning Inspectorate is hearing an application under the Town and Country Planning Act to convert the A10 between Monument and the A501 to exclusive use of AV vehicles conforming to ISO93241

This will include:

- *Guard railing installed on both sides of the carriageway, required by the Act in respect of operations in high pedestrian volume areas*
- *Reconfiguration of major junctions to “gated” status for entry to the converted section of highway*

Oral representations will be heard from: City of London Corporation, Islington and Hackney Borough Councils and Dream Vehicles (whose “family vans” are designed in accordance with ISO93226)

- Public consensus on nature of city streets means this is unlikely to happen in reality
- London and other large cities a very different context – AVs need different functionality for different contexts
- Can't retrofit the city to fit the tech, tech needs to fit the City
- If we are gating AVs then we are prioritising AVs over other road users. The idea of creating a dedicated lane or space for AVs puts AVs first. AVs are still vehicles and vehicles that cause pollution.
- Adding railings might be considered as street clutter and restricting pedestrian movements.
- We need to think of how to safely introduce AV's into the environment, how much road space we dedicate to it and its interaction with people.
- A dedicated AV lane does not fit with the vision of the Mayor's Transport Strategy. A fitting move will be to pedestrianise the roads rather than create an AV highway.
- AVs may not maximise time, capacity or road space. Is this something we really want to encourage? We want to improve the capacity of our roads but if more AV's are on the roads with fewer passengers, this puts pressure on the roads.
- We should ask the question on who is promoting the AV agenda? Seems it is mostly tech firms and private companies such as Tesla, Google etc. This may affect how AV's are regulated. There stands a risk of private companies regulating AV's rather than local authorities. This will pose a threat on how much influence government has e.g. Uber.
- Consider introducing AV hours of operation.
- It will be useful to get data from recent AV schemes in order to analyse how AV's have interacted with people.
- AVs enable deliveries at different times – reduce conflict – share space over time
- Jay walking law? Would it be publically acceptable? Political response to AVs will be swayed by public opinion
- How do you compel connection? What about people who want to be 'off grid' or override the system
- Could AVs lead to higher speed limits if seen to be safer
- Benefit of AVs is joining up public transport networks not replacing them
- How many AVs should we allow in the City?
- Will AVs mean more people using cars or fewer?
- Will AVs lead to more sharing rather than owning private cars? Will families still want their own car to save hassle of moving car seats, etc? What about people who use the car as a 'mobile office?' Will 14 year olds be given an AV for their birthday?
- Will people who enjoy driving be prepared to use AVs?
- How will AVs impact on kerbside activity? Less parking but more circulating? Dead mileage e.g. empty vehicles returning to remote parking locations.
- What about loading and servicing?

Scene 4 – Automated muggings

Criminals have been taking advantage of AVs' programming to carry out car-jackings and muggings. They surround vehicles which automatically stop, then smash windows, threaten occupants etc. Passengers have complained that the humiliation of being robbed is compounded when the vehicles detect damage and go into a "complete stop" mode.

Following a series of high-profile incidents, the Transport Select Committee has announced an inquiry on personal security and autonomous vehicles.

- Real scenario
- Are AV's any different from the DLR? The idea of automated transport already exists.
- Are we prepared to see a rise in antisocial behaviour because of new AV technology? We could argue that some antisocial behaviour already occurs on the DLR, so this is not a significant threat when compared to the benefit of AV technology.
- We should be thinking of a bigger scope such as terrorism. How do we prevent malicious groups from using an AV as a weapon? Who becomes responsible? Resilience of the system. How secure is the system to theft, sabotage or terrorism?
- Panic button to call emergency services
- Manual override may not apply to all users? What if you can't drive?
- Street space use is currently a negotiation. Will AVs change people's behavior? Impact of pedestrian priority on capacity
- Very difficult at this stage to gauge extent to which change is positive or negative
- Knowing vehicles will stop will change the hierarchy – is this positive (we're meant to be putting pedestrians first) or negative (impact on capacity/congestion)?
- Is the risk sufficient to not embrace AV given potential benefits?
- Expense of adding security / luxury features offset by shared ownership models
- Connected vehicles – directed to travel routes that are 'safer' even if longer
- Programmed to use streets where social contract assumed to be more favourable to AVs
- Moral issues – personal judgment v programmed response
- The City has a lot of security features and might be able to cope with the theft of AVs.
- Luddite mentality – There is a danger in presuming the norm. AVs may be more advanced machines that can withstand theft, break ins etc.
- We should develop AVs that have further security features. E.g. able to talk to the police, track location, record footage, dash cams, alert features.
- People don't jump out in front of trams so this might also be the case with AV's because people are wary of new technology.
- People already make decisions about automated transport (e.g. DLR) based on their customer experience, safety, security and ease of use.
- Do we really need an authority figure on an AV type bus? For example, for some current bus passengers, the bus driver doesn't exist and isn't held as an authority figure. If something was to happen on a bus, the driver would not get involved, and will most likely call the police. The driver is also kept separate from the passengers with a glass barrier.
- The transition to AV's will be slow and people will need a long period to get familiar with AV's.

- The behavioural element- People want to feel safe with their possessions. Would you risk theft because you own an AV?

Scene 5 - Emergency meeting called by minister

The Daily Mail, through an FOI request, has learnt that cities pioneering AVs have seen a rise in delays to emergency vehicles, resulting from vehicles behaving inconsistently in response to the approach of ambulances etc.

The minister has announced legislation to ensure that all AVs sold in the UK are to have compatible vehicle emergency recognition and avoidance strategies. Vehicle manufacturers are expected to argue as to which maker's standards are the ones to be universally adopted.

- Idea of dedicated space for AVs quite provocative – who decides? How to regulate?
- Ideal is connected vehicles talking to each other – enable management of the network and response to emergencies
- Need protocols for connectivity – e.g., mobile phones sharing networks
- Connected may come before automation – trust issues and lots of items are connected already
- Need protocol and override for emergency services to 'finesse' vehicles trying to move out of the way
- Everything isn't perfect now, but people assume it is when considering the impact of AVs
- Lack of regulation generates chaotic outcomes
- How do starlings do it?
- Opportunity to review wider regulations about which vehicles get priority
- How do you move vehicles in the most efficient way? Vehicles need to move together – connectivity is key to this and allows sequencing/cascade of actions
- Connected rather than autonomous future – traffic lights are already connected? How much of this is actually new?
- Will the vehicles be different? Able to drive sideways? More maneuverable
- Different vehicles have different maneuverability characteristics – small car v large van or HGV
- Do we maintain the traditional street / carriageway? Or more shared space with pedestrian priority
- Time/access restrictions for AVs, linked to consolidation of freight
- Connected more efficient than autonomous – connected tech is already here
- Connectivity key to success of AV – allow coordinated response to emergency situations
- Strategies for different streets very different – very complex and relies on developing lots of potential scenarios
- Connectivity allows vehicles to move very close to each other
- What balance do we put on priority for emergency vehicles? Different protocol depending on severity, but need caution in letting emergency services define response
- If AVs move at a consistent speed is there a risk to people walking / cycling if introduce very fast emergency vehicles
- Will we still have sirens if vehicles are 'talking' to each other? How to alert people walking and cycling?

- Which comes first – autonomy or connectivity? To what extent do we allow the industry to self regulate? How do you get manufacturers to agree protocols?
- Need for research to establish response and develop protocols
- Can parked cars automatically move out of the way?
- Localised connectivity – cars talk to each other – and centralized connectivity
- Deconstruct circumstances and develop response
- There needs to be guidance on speeding times, following distance and reaction times.
- There are lots of variables that will determine our response to AV's.
- We need to balance societal expectations for AV's. Whilst there will be a messy period for AV's, we will also have a learning period where we can harmonise legislations, regulations and set realistic expectations.
- We need to prioritise our mobility approach and set standards on how to respond to AV space.
- Data is crucial to understand how AV's work and whether AV's should be given their own space.
- This scenario could be more controlled than the current scenario without AVs. If there were 2 or 3 dominant manufacturers, then there would be 2 or 3 different responses, and would be a better situation than we have now
- Is the emergency vehicle also driverless?
- Much discussion at what level it should be regulated. Local, national, international? What about foreign vehicles?
- It's felt this scenario could easily be programmable, could be implemented by central government
- What role would local government have? Already controls their local roads through signage, local traffic orders, speed limits. Would this be all passed over to the operator/programmer?
- Could local government still control things, plus more i.e. responses to emergency vehicles, through geofencing? Would allow for AVs to respond to a specific location/urban density/driver culture etc
- There is a new role for central government to have more involvement in local legislation
- Cities that provide the first test beds will provide the first legislation. These cities are typically small/medium, not global cities. Not the biggest or powerful but can be very influential. There should be more communication between cities, and should be communication about common necessary elements that manufacturers and programmers respond to
- Intelligent communication and connectivity between cars should eliminate the issues with this scenario
- Legislation is a huge issue for central government to address. Concerns it wouldn't be implemented quick enough or be broad enough

Five golden rules

- AVs should fit in to our aspirations and aspirations of London as a whole, rather than everything else fitting around AVs
- Maintain the distinction between footway and carriageway – keep small AVs off the pavement
- AVs shouldn't negatively impact on the pedestrian experience
- AVs shouldn't worsen congestion. Use congestion charging and/or metering to limit the number of AVs used for personal journeys
- AVs should support other transport policies to reduce traffic. Use the policies in the Mayor's Transport Strategy as the golden rules.
- Establish a transport hierarchy that incorporates AVs
- Prioritise walking, cycling, PT and freight over private AVs. Priorities shouldn't change just because something is an AV. Use this as an opportunity to make the user hierarchy reality.
- Require AVs to be connected to support traffic management
- Any efficiencies created by the adoption of AVs should be used to reallocate road space to walking, cycling or placemaking
- Be proactive - Set out desired outcomes. Provide infrastructure and set parameters for its use
- Clarify a line of liability - duty of care, manufacturer's responsibility and maintenance
- Have a transport strategy that recognises the challenges and opportunities of AVs
- Establish a framework and KPIs for AVs. Local authorities need to work together and jointly lobby and challenge loop holes in legislation. Representatives from cities need to be given a seat at the table by DfT
- Should there be a set speed limit? 5mph?
- Safety of vulnerable road users should be the first priority

General comments

- Emerging technology such as AV provides an opportunity to rethink the allocation of street space
- Experience with UBER highlights potential for innovation to have negative consequences. Suggestion that 50 per cent of UBER users have switched from walking, cycling and public transport (source?).
- Automotive industry is already used to sharing protocols, e.g. standardization of charging, and this approach could be used to standardize approaches to AVs
- Need to learn from other sectors – insurance industry has driven requirements for improved safety standards to reduce risk



AUTONOMOUS VEHICLES: ACCEPTABILITY AND IMPACTS ON SOCIETY

FRIDAY, NOVEMBER 24, 2017

AT IAU 15 RUE FALGUIÈRE,
PARIS, 15TH ARRONDISSEMENT



AUTONOMOUS VEHICLES: ACCEPTABILITY AND IMPACTS ON SOCIETY

Autonomous vehicles are held to be the next shift in the automotive and mobility fields. By affecting the way we approach mobility, these vehicles are likely to have a broad spectrum of impacts on our society. For example, they are likely to reduce pollution and accidents on road and to redesign our urban landscapes by introducing new urban practices.

Still, many questions and hurdles paves the way to autonomous driving. They are technological challenges, but also regulatory, ethical, socio-economic and societal questions in the short and long terms, which need to be addressed in order to have a better understanding of that rising and global thematic.

The purpose of this seminar, held in the context of the European project H2020 CREATE, is to gather experts from different fields approaching these questions and challenges from different angles to fuel the debate.

Audience:

- Experts, technicians and researchers
- Transport authorities and transport companies
- Students

Objectives:

Through different presentations and a debate, this seminar's objectives are to:
Have a better understanding of the different impacts autonomous vehicles might have on mobility, and, on a larger scale, on our society.

Apprehend and discuss the questions of acceptability and ethic existing around that new technology, and representing a serious hurdle on the path of autonomous driving.

ONLINE REGISTRATION:

<https://www.weezevent.com/autonomous-vehicles>

PROGRAM OF THE SEMINAR

FRIDAY, NOVEMBER 24, 2017

15 RUE FALGUIÈRE, PARIS, 15TH ARRONDISSEMENT

MODERATORS

Charlotte Halpern (Sciences Po Paris, École urbaine),

Tom Cohen (University College London)

8h45

WELCOME & INTRODUCTION

Stéphane Beaudet, Vice president of Île-de-France's regional council,
in charge of transports and sustainable mobility

Dany Nguyen-Luong, Director of the Departement of Mobility and Transports, IAU Île-de-France

9h10-10h40

PRESENTATIONS

Emmanuel Ravalet, Researcher in mobility and transport, EPFL

Jaâfar Berrada, PhD student in mobility and transport, LVMT/VEDECOM

Jean-Pascal Assailly, Researcher in transport security psychology, IFSTTAR

Questions

10h40-10h50

COFFEE BREAK

10h50-12h30

PANEL SESSION

Clemence Cavoli, Researcher in mobility and transportation policies, UCL

Florent Anon, European projects manager (projects BRAVE & TEVAC), Mov'eo

Sina Nordhoff, Researcher in behavioural science and cognitive psychology, WZB Berlin (Germany)

William Payre, Researcher in human factors and transportation, Coventry University (UK)

Questions

12h30

CONCLUSION

12h45

NETWORKING LUNCH



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RETAIL TRAVELUTION: THEMES AND QUESTIONS

The Retail Travelution conference on 23 January 2018 highlighted some key themes.

Co-operation

Our transport network, particularly in London, is becoming more congested. 89% of all freight deliveries are by road when there is a rail freight network extending to the heart of the city plus around 70 privately-owned port terminals along the Thames from Teddington to the coast. It's clear that retail (and other) freight needs to be moved from the roads, for a variety of reasons, but this is not something that one body can do alone. There needs to be co-operation between TfL and the London boroughs, the Port of London Authority and other bodies (local and national), working with the private sector. The big question is how to make this happen. Singapore for instance has strict central control where public transport is supported but private vehicles penalised. Would such a model work in the UK? Probably not as no central body has overall control – but maybe we need a more holistic view.

Governance

Governance was a recurring theme in the discussions. Innovation in retail and transport is happening very fast (who remembers "allow 28 days for delivery"?) and regulation can struggle to keep up. In the midst of all this new technology and the explosion of data it produces, it is important not to lose sight of ethics. There needs to be a holistic view of what is for the greater good. Ownership and use of data is key. Trust (that the governance is robust) is essential. The organisations that can garner the most trust will lead the agenda. Perhaps this will be the transport authorities as they have the public interest at heart. Ultimately we may see more power delegated to the transport authorities.

Behaviour change

If we carry on in the same way as now, then the centre of London will be 60% more congested by 2031. More people are having goods delivered to them at work: the top 1% of companies in London generate 10% of all trips. The behaviour of both customers and retailers needs to change, but how do we do this? Perhaps charging for deliveries is the answer. Customers have become used to free next day delivery on Amazon Prime; perhaps this should cost more, and overnight deliveries should be incentivised.

Retailers too should think about the impact their practices are having on transport. The margins in grocery retail are slim, so cost of deliveries is a major factor, but retailers also consider getting the product on the shelves on time, and CSR. We could be seeing a return to using waterways to transport goods. In a recent trial of carrying goods via barge vs lorry, the barge proved faster three days out of five. If water transport or rail freight can prove more reliable than road then they become viable alternatives. The problem is that – at the moment at least – the current system of moving goods by road works, so why change?

Place

Transport and retail are increasingly converging and at various points during the day the concept of "transport as place" was mentioned. St Pancras station is perhaps the best example. It is becoming a destination in its own right with non-travellers, with art programmes and pianos as well as a Champagne bar and a John Lewis (with click and collect). Yet it also has to service commuters who pass through it ten times a week, so it needs a quick turnaround in window displays and stock, to keep things fresh.

Innovation

Innovation was taken as read, but there was the question of whether it was always a good thing. Will drone deliveries be feasible when they involve overflying private properties? Will CAVs be safe (would you send your children alone in one)? For last mile deliveries, are cycle couriers or even a return to the Victorian porter a better option (albeit they will use innovative apps no doubt)? Who owns all the data on journeys and deliveries that is being generated? Will there be MaaS and MaaS-nots (those who can afford mobility as a service and those who can't)?

Summary

Overall it was a very thought-provoking event showing just what challenges need to be overcome to get goods (and people) moving freely around an increasingly congested city.

Scenario planning with European capital cities

Short report with findings, conclusions and recommendations after a two-day workshop (21/22 February 2018) on scenario planning held with representatives from the [CREATE](#) consortium, from stage 3 European cities.

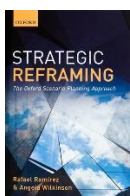
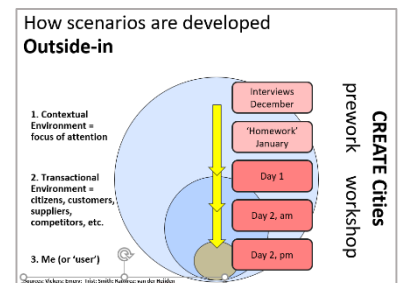
Background and approach taken

Background and scope This scenario planning project focused on sketching future contexts for European capital cities in 2040. The project included planners and academics from London, Paris-Ile-de-France, Copenhagen, Berlin and Vienna in the CREATE project. The purpose was to formulate shared challenges and opportunities across the five cities and a number of future logics that illustrate various plausible aspects of the future for cities. These future logics were used to draw implications for the represented cities. An additional purpose was to familiarise the CREATE consortium with the use of the scenario planning methodology for policy making.

Scenario planning is a way of dealing with contextual complexity through the systematic exploration of uncertainties in the 'contextual environment' (see diagram) of an organisation. It allows for the creation of a framework and foundation for strategic conversations about assumptions and interpretations of unfolding risks and uncertainties. Building scenarios encourages alternative understandings of possible futures rather than seeking to predict them. Linking scenario planning to strategy increases strategic flexibility and preparedness-for-action, enabling an organization to identify and act upon its strengths, weaknesses, and strategic options. Scenarios also enable managers and planners to get a better understanding of the systemic nature and the impact of changes in the contextual environment. Scenarios provide a safe platform for strategic dialogues with other stakeholders and interested parties. The purpose of making these images of the future is not to 'know' what is going to happen, but to see if existing and optional plans are viable in the light of what *could* happen.

Approach taken When producing plausible stories of how an organization's environment may evolve in the future, it is important to understand how key drivers of change in the contextual environment may influence the 'transactional environment', including how 'rules of the game' might change, how other relevant actors may act, and what key events may happen.

This outside-in approach to scenario planning first requires an understanding of how the contextual environment may change in the future. In order to accommodate for this, interviews were performed with representatives from five stage 3 cities in December 2017. This allowed for the identification a number of uncertainties in the contextual environment, as well as the existing assumptions made about the future. The uncertainties were explored further in a 'homework' assignment by the city teams, describing plausible and alternative developments. All material was then synthesized by NormannPartners into 'Factor Cards', each describing an area of uncertainty and two plausible and different outcomes, which were used as building blocks for producing scenarios during a two-day workshop on February 21-22, 2018. Relevant research materials from the CREATE project were also presented and incorporated into the scenario planning process.



During the workshop, we used the *inductive* scenario development approach. We included a seminar on the scenario thinking methodology, following the University of Oxford's Scenario Planning Approach (OSPA) as described in *Strategic Reframing*. The teams of city representatives initially produced multiple (16) draft proto-scenarios, which were ultimately combined into three sketch scenarios of alternative and plausible futures of European Capital Cities. The scenarios were presented and discussed in plenary and the workshop was concluded with drawing implications of the three sketch scenarios for the four cities present at the workshop.

The next section will briefly outline the three scenarios and implications for city planning.



The three draft scenarios and their implications

Scenario A: *The Tech Bubble*

In this world, the platform economy is dominant and the prevalence of technology cuts across all aspects of life. Public authority funding and power decrease and there are tensions between public authorities and the influential platform technology actors. There is global instability, and migration and cyber-crime is on the rise. Due to an increase in terrorism, cyber security increases, but people retreat from public places and public transport, increasingly working from home. Door-to-door services and home deliveries are common. Life becomes very convenient thanks to technology but there is less social interaction and more social inequity. People tend to engage in local social activities and society is becoming increasingly segregated and polarized. Public funding decreases. Unemployment increases for lowly skilled people and social state security and protection reduces. There is also a deterioration of public health for some groups. Automation and robotization increase across sectors. There is increasing public backlash against the societal changes and local political activism is on the rise. Public space segregation increases to allow for the increased use of autonomous vehicles, but trip rate decreases.

The **implications** from this scenario include¹:

- Public authorities are strongly influenced by the needs and desires of platform technology actors
- Public transportation is in a state of crisis, physical connectedness is less important, and trips are going down, there is a lack of confidence in public transport, and platform technologies take over
- Use of land and public space is challenged, and so is social cohesion and urban quality of life. Traffic safety is another challenge, which potentially can be resolved with intelligent surveillance systems
- Polycentric clusters work well. Smart cities win.
 - As public revenues shrink strong public finances are needed to deal with this scenario
 - High levels of (anticipatory) regulation of and engagement (collaboration?) with the tech sector is necessary
 - Priority needs to be given to rebuilding the welfare system at the regional scale

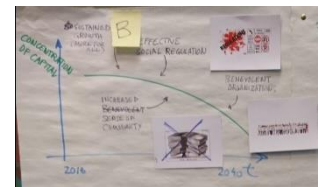


Scenario B: *Groovy Town*

In the Groovy Town scenario, people live in 'conscientious communities' with young and dynamic populations. Life is vibrant, and technology serves people. Communities drive the development and there is less need for public service. Economic growth is strong and sustainable, and new technology has low impact on socialization. Local communities and economies are strong and there is less concentration of capital. People are generally happy and appreciate what is near to them, co-creating value at the local plane. Urban communities are winners and mobility is centralized to these communities. However, there is a segregation on the regional level. Overall, there is no sense of environmental urgency. The use of fossil fuel energy increases but it does not affect the local communities as technology and effective regulation mitigates most of its adverse effects.

The **implications** from this scenario include:

- Public authorities are weakened, communities are strengthened, with increased density. 'Democratic communism' or citizen democracy is on the rise. The 'liveability agenda' is in focus.
- Greater focus on investments in 'social value', rather than economic growth and productivity
- Local adaptation to climate change
 - Revitalization of local public space is key
 - Bottom-up governance is key, particularly in the suburbs, and adaptive response to high expectations of citizens are necessary.
 - High involvement in community services and collaboration with unofficial groups works well.
 - Need to deal with migration, as location is what attracts people
 - Increased collaboration at national level is necessary (e.g. regarding distribution of wealth and migration)



¹ Coding: ● implications; ○ suggested anticipatory policy responses

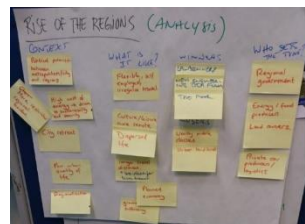
Scenario C: Rise of the Regions

In this scenario, the role of states and cities diminishes, and regions rise to become very strong actors. Climate change has contributed to this development. The urban quality of life is poor and cities cannot feed themselves. Some central metro lines are closing. People move out of cities and population spreads across the region. Automation and new self-sufficiency technologies contribute to the regional sprawl. Oil prices increase and locally produced renewable energy, such as wind power, becomes its replacement.

People work from connected homes, resulting in fewer trips. When they do commute to other parts of the region, they use private motorized vehicles, often travelling via orbital routes. Regional regulation increases, and regional borders are restricted. The first regional president is elected. Winners in this scenario are landowners and food and energy producers.

The **implications** from this scenario include:

- Populations of regions grow and cities are weakened. Regional cohesion is on the rise. Urban development halts; it's the end of urban vibrant life. Cities become the black hole in the donut.
- Public transport deteriorates but city congestion reduces.
- Policies focusing on compact city land use and urban density are challenged. Political change strengthens regions.
- Farming and local resources are key. Environmental and sustainability agendas are important.
 - Exodus management is necessary (from cities out into the regions)
 - A top priority for cities is to invest in the knowledge industry.
 - Collaborations with neighbouring (regional) authorities is necessary.
 - Metro developments should be halted or shifted to long-distance routes.
 - Regional transportation should be strengthened.

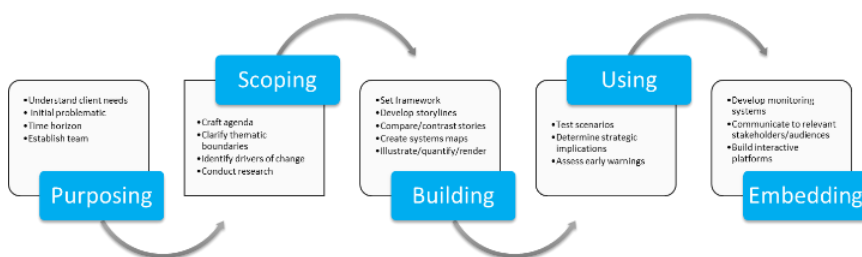


Key messages to city leadership across all three scenarios

Preserve manoeuvrability for dealing with new actors, maintain strong (anticipatory) regulation, and be ready to change strategies in response to technological and political change. Beware that initially helpful trends may have long-term negative consequences. Prepare for the worst (as well as the upside)! City governance and control can be challenged by new actors and collaboration with them is important; you cannot act alone.

Reflections on process

The advantage of having two days (not just one) for a scenario design workshop is that a slightly deeper and richer process for scenario can be followed: *inductive* scenario building (as opposed to using a quicker *deductive* process). Of course, as explained in the seminar, a two-day workshop is still just a light-touch approach to scenario planning. And, although it is sufficient to give participants the basic logic behind using the methodology and generate draft scenarios plus implications, a more thorough process is normally followed to develop scenarios. 'Complete' scenario planning processes, which can run over many months, follow the stages as shown in the diagram below.



Source: Dr. Cynthia Selin, Oxford Scenario Programme, 2013

The two-day workshop including the prep time before the workshop covered key elements of the Purposing, Scoping, and Building stage, and some of the implications aspect of the Using stage.

What went well

Interviewing the five cities beforehand generated a rich set of views on context and on challenges. This enabled active involvement and understanding of the process and we believe that, as a result of this, some harmonisation

and consolidation around a common challenge for these cities was achieved. An important contributing factor was that the materials were indeed the product of the city representatives themselves. Ultimately, the 'homework' stage allowed for generating a good set of alternative outcomes represented on the Factor cards. Compared to other 'short' scenario engagements consisting of just one workshop the output produced was quite impressive – with some limitations, as laid out further below.

Process limitations

As all cities are of course different, there is always a challenge in aligning the purpose and scope of the different 'users' of the scenarios. As we teach scenarios should be developed for one specific user, purpose and scope, ideally. Developing scenarios for a consortium of users is always more complex.

In 'complete' scenario processes a lot more time would be spent on **research**, especially on determining what areas are fundamentally 'out of the participants' view' and we are deeply uncertain, perhaps even ignorant, about.

The alternative outcomes produced in the 'homework' often tended to be of the 'good' versus 'bad' type, instead of the alternative A versus alternative B type. And some of the participants also talked about their *preferred* scenario, thereby risking introducing a bias before drawing implications.

To deal with such dangers, it is crucial that more '**outsiders**' are brought in, either as interviewees or as exploration workshop participants, to ensure more diversity of views. Examples of such outsiders are car companies, Uber, technologists, economists, social scientists, activists, homeless people (or those who represent them), etc.

As also explained in the workshop, complete scenario processes would at least have **two more workshops**, in addition to the scenario building workshop: an exploration workshop before the building workshop, and an affirmation or strategy (implications) workshop afterwards. The exploration workshop would be focused on identifying what is 'off radar'. The strategy workshop would explore deeply what new constellations of value creation might emerge, and what strategic options present themselves for consideration.

Some cities were slightly under-represented, which of course could also create a bias in the scenario development, and in its implications work.

Reflections on approaches taken by participating cities

We did not explore how each city plans for the future specifically, but it is very clear that modelling and extrapolation are key methods used. Participants themselves indicated some shortcomings of this approach. Some cities are somewhat constrained in their approach to planning more creatively and anticipatorily by the realities of governance, power and politics. It is clear that in every city visioning and empirically-based forecasting vie for some form of dominance, and the main challenge is to marry both approaches constructively.

Recommended next steps & areas for further research

We identify some areas for further work.

Modelling

All cities use forecasting and modelling systems, either developed in-house, or by other parts of the city bureaucracy, or by third parties. Considerable time was spent discussing how the field of quantitative modelling and forecasting and the field of scenario planning can support each other. Usually the first easy step is to articulate clearly what assumptions are made by the modellers, and in the model, about the future and about the relationship between variables in the real world. A second step would then be (once a set of qualitative scenarios has been developed) to attempt to quantify the scenario in the existing forecasting models. If this throws up challenges that the modellers cannot overcome it would be wise to investigate if that is due to 'unsafe' assumptions about the future that are hard-wired in the models used.

Dealing with pushback from managers

Oftentimes, alternative views on the 'official future' are not acted upon by management. (Scenario planners would say that the scenarios fail to influence the mental image, the picture of reality, held by decision makers.) So, a set of scenarios, however plausible and relevant they may be, is just seen as 'interesting' but is not given the chance to change strategic thinking. In such cases, it is recommended to first articulate clearly and concisely what the 'official future' looks like, how it works, what its logic is, what key assumptions need to be made to make this scenario 'work', why the future is *not* going to unfold in any other way than thus anticipated, and why it is thus 'totally safe' to bet on it. It is, simply put, about exposing and invalidating the potentially obsolete worldviews of

those who should become 'users' of the scenarios. In this approach, ideally, management *themselves* will start to doubt the wisdom of only having one future in mind and will then be more willing to consider alternatives. (This approach was well documented in the seminal Harvard Business Review paper by Shell's Pierre Wack, 'Scenarios: Uncharted Waters Ahead', 1985.)

Building bridges

Scenarios are often used to have new and different dialogues with other parties (stakeholders). There is the potential to use the sketch scenarios, somewhat cleaned up, for that purpose. For example, a short discussion could be held exploring what the implications of the set would be in the view of Uber, of different political parties, of climate change activists, etc.

Communicate and use the workshop scenarios

The scenario created at the workshop could possibly be combined into a set of two, based on scenarios A and C. One set could bring together concepts such as platform economy, funding issues, artificial intelligence and automation, less social cohesion (smaller communities), reduced commuting and retrenchment of (city) government. The other set could combine regionalisation, more effects of climate change with higher oil prices, reduced quality of urban life, community driven planning, segregation, more consumerism, more sprawling, localisation, increased regional regulation and demise of city governments. These two scenarios could then be simplified and summarised in a few slides each and shared and used more widely.

Monitoring and signalling

A further recommendation is to ask the city representatives to monitor signals of any one scenario developing. By tracking the development of factors in each scenario, the planners can be more prepared for the development moving towards any one of the scenarios, and thereby increase their awareness and improve their planning. For example, if all stage 3 cities that participated would track the same 'dashboard' of indicators and regularly compared their findings that would enhance the sense-making capability of the collective.

Exploring new collaborations

More rooted in the 'implications and strategic actions' stage is the suggestion to do what seems a good idea in *any* scenario, which is to build new collaborations with unfamiliar partners such as technology companies, regional players, and private sector actors.

Gerard Drenth and Dr. Fredrik Lavén
9 March 2018

NormannPartners AB, 2018
www.normannpartners.com

WHY WALKING MATTERS

Symposium on how walking contributes to urban mobility and the overall transport system

Introduction

The City of Copenhagen in cooperation with University College London held the symposium 'Why Walking Matters' for key stakeholders, interest organizations and public officials in the City of Copenhagen as well as the wider CREATE community. The purpose of the symposium was:

- to create a common understanding of the contributions of pedestrians to urban spaces and mobility
- to assess the walkability of streets and qualify planning for pedestrian infrastructure

The following keynote speakers talked about their field of expertise covering the themes:

Walking as a mode of transport



Mario Alves, President of the International Federation of Pedestrians (IFP)

- Walking as the sustainable mode of transport
- Future mobility scenarios and the development of walking
- The progressive policies of walking in European cities

Walking as a precondition for other modes of transport



Helge Hillnhütter, Senior Adviser at Analysis and Strategy

- Why walking is important for public transport
- How urban environments influence walking – understanding measuring the effect
- Urban planning and design to increase walking and the use of public transport

Walking in the dense city



Birgitte Bundesen Svarre, Researcher at Gehl Architects

- How to plan for the dense, sustainable and living city in human scale
- People First Mobility and active transport
- Examples from cities around the world



CREATE has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N°636573

Summary of discussions

Reflections on the Healthy Streets Check

Transport for London's Healthy Streets Check (<https://tfl.gov.uk/corporate/about-tfl/how-we-work/planning-for-the-future/healthy-streets>) was used on a sample of five street segments in central Copenhagen to promote reflection amongst participants concerning how the city's streets currently perform and how they might be expected to improve in terms of walkability.

The tool was seen as very useful with a row of qualities such as:

- Pointing out challenges and important elements missing in existing infrastructure, especially with regards to intersections.
- It was seen as a good supplement to existing evaluation procedures in CPH. However, it will need a "translation" into a Danish context for further use. For example this will include adaption of metrics and scoring thresholds.
- It was a rather fast assessment scheme and thus efficient to apply to smaller projects, which can have rather large impacts for pedestrians and the sections' walkability.

Reflections in terms of usability and potential development of the tool:

- It could be considered to include other themes in the Health Street Check metrics, such as traffic safety, architecture and aesthetics, sense of street life, shops, urban space stimulation etc. It depends of course on the targeted purpose, which the tool has been developed for.
- The tool could also be modified and tailored to various stakeholders, thus taking the local context in to account to a larger extent. E.g. the residents of the street could be the assessors (seniors, school kids etc.). In this case some less technical metrics could be used.
- The inclusion of the various stakeholders could support a more open and political process for the planning and development of the physical infrastructure.
- A more political process would stress the critical aspects of objective and subjective assessments; that the result of a check to some extent will reflect the point of view of the assessor.
- In the light of Helge Hillnhütter's presentation, it could be interesting to assess longer routes and/or pedestrian networks, e.g. to and from stations.

A general conclusion was that there is real value in having a structured conversation about the performance of our streets from the perspective of walking (amongst other things). London's Healthy Streets Check is one of many tools that can support this process but the most important thing is to bring stakeholders (including children, seniors, politicians and so forth) together on the street to conduct a critical appraisal of our walking infrastructure.



Shared Insights

At the symposium discussions focused on what walking is, what role walking will play in the future, how to strategically plan for walkability and specific examples from various cities were provided (see the presentations of Mario Alves, Helge Hillnhütter and Birgitte Bundesen Svarre).

It was stressed that it could be beneficial to:

- Highlight examples, where the planning for pedestrians had led to a failure, as these examples can visualize insights and knowledge that can be valuable.
- Underline risks of planning for pedestrians to avoid the creation of “Disney worlds”, where no residents live and only tourists are visiting.
- Work strategically with walking as a main mode of transport in itself, and not just as a precondition for the other modes of transport
- Apply a broader understanding of walkability and mixed use city planning to smaller centers in suburban and residential areas as well as city centers and across city districts.
- Develop measurements and standards for pedestrian infrastructure and walkability
- Include the different types of people and special needs in the traffic planning schemes

It was identified that there is a need for a broader perspective on walking shared by various administrations, as everyone work very focused in their field of expertise. The symposium, however, supported the development of a common understanding of “walkability” and the contributions of pedestrians to urban life and the overall transport system.



CREATE has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N°636573

"Smart mobility for better cities"

2nd–3rd of May 2018, Amman/Al Hussein cultural center

First day 2/5/2018

- 8:45 - 9:15 AM

Registration and Coffee

- 9: 15 -10:15 AM

Opening Ceremony and welcoming speech

(Moderated by David Bull Board member of the CREATE project)

Speakers:

1. David Bull, transport advisor and Board member of the CREATE project
2. His Excellency the Deputy Mayor of Amman
3. Olfa Alouini –EU delegation to Jordan
4. Dr. Bashar Hawamdeh - int@j

- 10:15-10: 45 AM

Coffee break

- 10:45 - 12:30 PM

Panel session 1 (To what extent can smart mobility accelerate a transition towards sustainable mobility in growing cities?)

(Moderated by Dr Tom Cohen /CREATE project)

1. Dr Tom Cohen Work Package 6 leader CREATE project.
2. David Bull, transport advisor and Board member of the CREATE project.
3. Mr. Bruce McVean, City of London,
4. Alexander Scholz, City of Vienna, CREATE project.

- 12:30 - 1:30 PM

Lunch Break

- 1:30 - 2: 45 PM

Panel session 2 (private sector role in improving mobility)

(Moderated by Dr Bashar Hawamdeh / int@j.

1. Sultan Al Kharabsheh head of IT department/GAM
2. E-Fawatercom service
3. Optimiza company
4. infograph company

- 5. 2: 45 - 3:00 PM

Coffee break

- 3: 00 – 4: 15 PM

Interactive session 3 (Youth initiatives role in improving mobility)

(Moderated by Nisreen Al Tarawneh architect/GAM)

In collaboration with ZINC, TANK, (Jordanian innovation platforms) & Mesh Mostaheel TV show.

Second day 3/5/2018:

- 9:00 – 9:30 AM

Registration and Coffee

- 9:30-10:30 AM

Panel session 1 (Opportunities for municipalities to adopt smart solutions in improving mobility)

(Moderator Mohamed Al Rahahleh/head of Traffic department/ GAM)

1. HE Deputy Mayor Greater Amman Municipality
2. Salim Korkmaz /UCLG-MEWA
3. Faith Gundogan /ISBAK

- 10:30 -11:00 AM

Coffee break

- 11:00 - 12:00 PM

Panel session 2 The role of international organizations in financing smart solutions projects

(Moderator Dr Tom Cohen /CREATE project)

1. Omar Al Lozi /Amman city manager
2. Kari Eik /USC
3. Dr Mischa Lentz /EBRD
4. Khalil Nasr/KBW

- 12:00- 1:00 PM

Lunch Break

- 1:00– 2:30PM

Presentation Session 3 launch a package of smart solutions services in Amman

(Moderated by Mohamed Al Rahahleh/head of Traffic department/ GAM)

1. Transportation directorate/GAM
2. Traffic department manager/GAM
3. Dr Hossam Abdeljawad SETS North Africa /Cairo university

- 2:30 – 3:15 PM

Closing Session 4 and preparation for the site visit.

1. Dr Tom Cohen, Work Package 6 leader, CREATE project
2. David Bull, Ex-politician and head of transport, UK

- 3:15 -5:00 PM

Site visit

(Optional)

Proposed locations for adopting smart solutions services in Amman.

Analysis of potential for more public transport passengers by improving pedestrian access to stations

- Example from the Copenhagen area

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3	Methodology	3
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1 Introduction

During the work in CREATE, WP6: Future Solutions, it has become clear that walking as a mode of transport indeed is part of future transport solutions in urban areas. It is already today an integral part of urban mobility, but the potential in urban and suburban areas is higher than the situation today. Specifically it has been identified that a better interconnection between public transport and walking/walkability can be seen as having potential to improve the competitiveness of public transport, thus changing transport patterns away from private car use to the more space efficient and environmental modes.

Senior Adviser at Analysis and Strategy, Helge Hillnhütter, has made in depth analysis of the relation between public transportation and walking. His results includes following insights (see also Figure 1):

- > The acceptable walking distance to public transport stops varies in different environments
- > The catchment area can be enlarged if the urban planning and urban design favor walkability

VERSION	DATE OF ISSUE	DESCRIPTION	PREPARED	CHECKED	APPROVED
1.0	31 May 2018	Prepared by COWI	James Richardson	Henrik Grell	Henrik Grell

CREATE has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N° 636573



- > The acceptable walking distance can be extended by 30 %, which results in a 70 % larger catchment area and a potential of tripling the amount of public transport passengers.

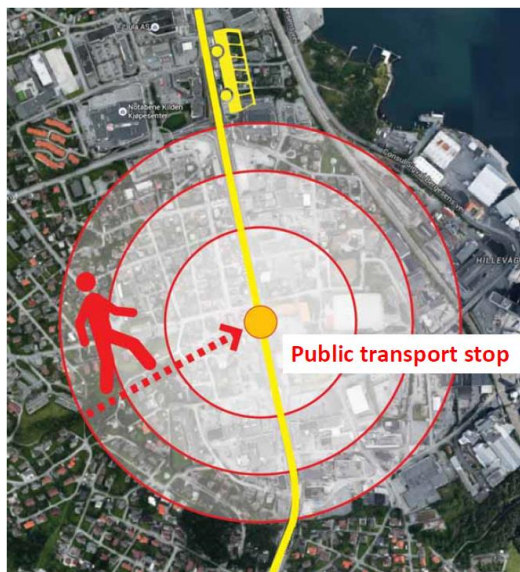


Figure 1 Illustration of the catchment area to a transport stop

Inspired by these findings and with the desire to continue working in new directions towards a livable and sustainable city, the City of Copenhagen and COWI decided together with the WP6 leader to investigate such a potential a bit further using the Copenhagen area as an example. For this example it was decided to examine the potential between 600 meters and 800 meters distance to stations.

This note is prepared within the framework of CREATE and describes the results of the first steps in such an approach:

- > Test of a method for screening the potential for a whole region with the purpose of giving a first indication on the potential size of individual car trips being possible to change in to walking-PT trips based on analyses of catchment areas for stations (suburban trains, regional trains and metro).
- > An identification of a gross list with the station catchments areas having highest potential for improvements using analyses of real walking distances taking physical constraints in to consideration compared with most direct paths.

The next steps – not included in the test described in this note – will be to work with each of the station areas having the highest potential. The detailed will identify measures that can improve (shorten) the walking distances. By doing this and calculating the expected costs for these improvements, it will be possible to make a cost effectiveness assessment using the assumption of potential changes in modal split.

2 Data Sources and Software

COWI has cooperated with the City of Copenhagen and MOVIA¹ on getting access to data suitable for the analysis. These data are described in the following.

Demographic data

Movia has acquired demographic data in 100 x 100 meter "cells" (square polygons in GIS) that cover most of the area of the Copenhagen region². Each cell contains data describing a number of demographic statistics. In this analysis, only the Daytime (equal number of people working or studying in the area) and Nighttime populations (equal number of inhabitants) were used..

Data / software for analyzing walking distances

Google Maps Directions API: The Google Maps Directions API is an API (Application Programming Interface) which can be used to request walking directions from two specific points. The API returns its best estimate of the shortest walking trip from the two points.

GIS tools to analyse data

Open Street Maps: Open Street Maps is an open source map which contains different layers that can be directly imported into a GIS program. For this analysis, the stations (S-Tog and Metro) were taken from Open Street Maps.

QGIS: QGIS is an open source GIS software that is used for the analysis.

3 Methodology

The methodology is based on aggregation of 100 x 100 meter cells around stations in the Copenhagen area. These cells were isolated to a 200-meter wide buffer-ring around stations called the target catchment area. The next figure shows the stations in the study area overlaid with the 100 x 100 meter cells.

¹ MOVIA is the public transport company for the Copenhagen area

² MOVIA has acquired these data from a private agency and given COWI permission to use them within this exercise.

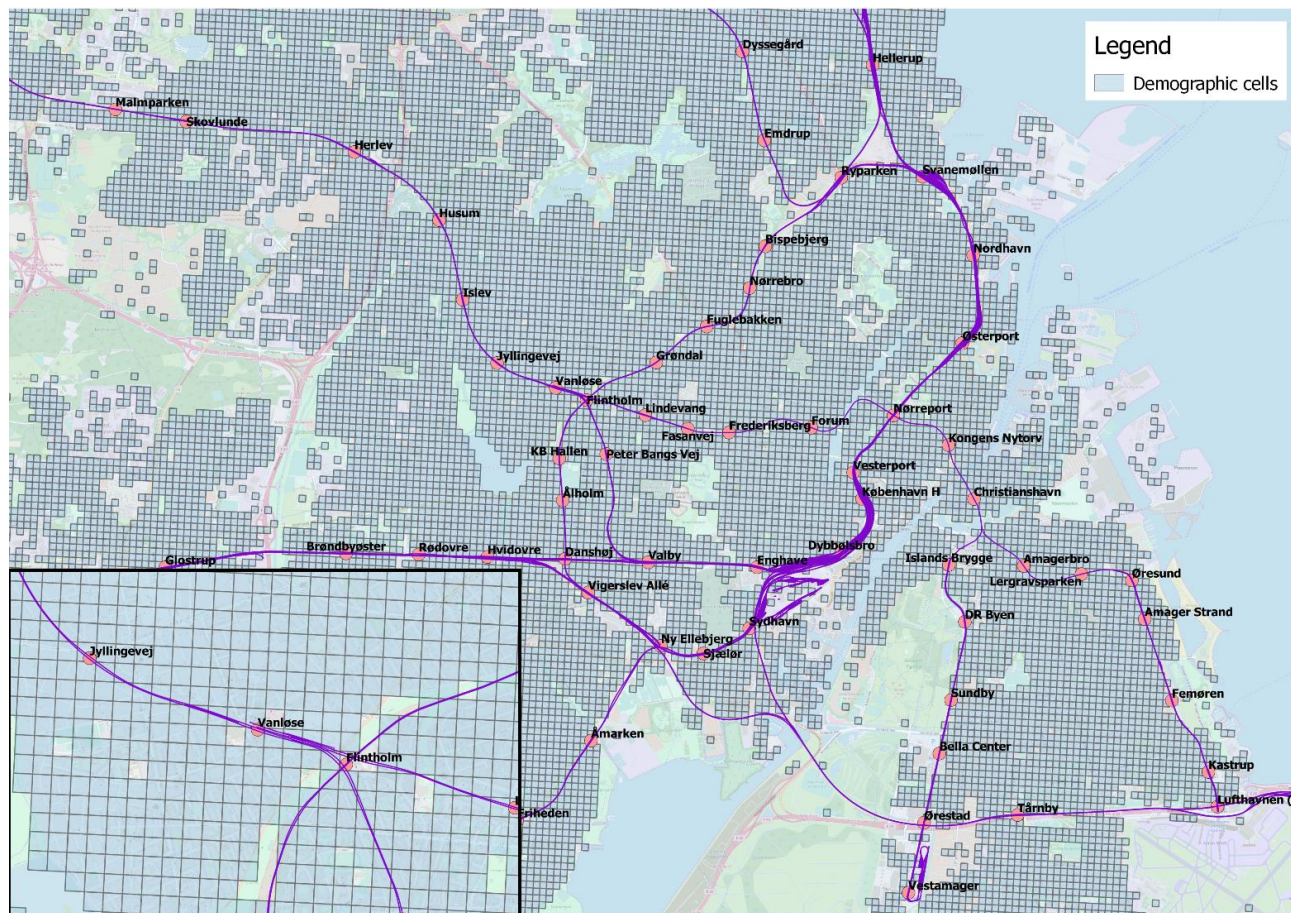


Figure 2 Overview of analysis area and demographic cells

Each 100 x 100 meter cell contains information about the number of inhabitants and the number of people working in the area. Furthermore, the centroid of each cell was used as the starting point for a routing calculation using Google Maps (Directions API). The calculated route from cell-centroid to station was used as a "best estimate" of the route a typical pedestrian would follow in getting from that area to the station.

A cell was assigned to a station if it falls within a specified "catchment area". For this analysis the catchment areas of 600 meters radius and 800 meters radius are used. The resulting circular areas overlap each other with a ring of width 200 meters centered on the station. This ring is used as the basis for assigning cells to the aggregation area for a cell.

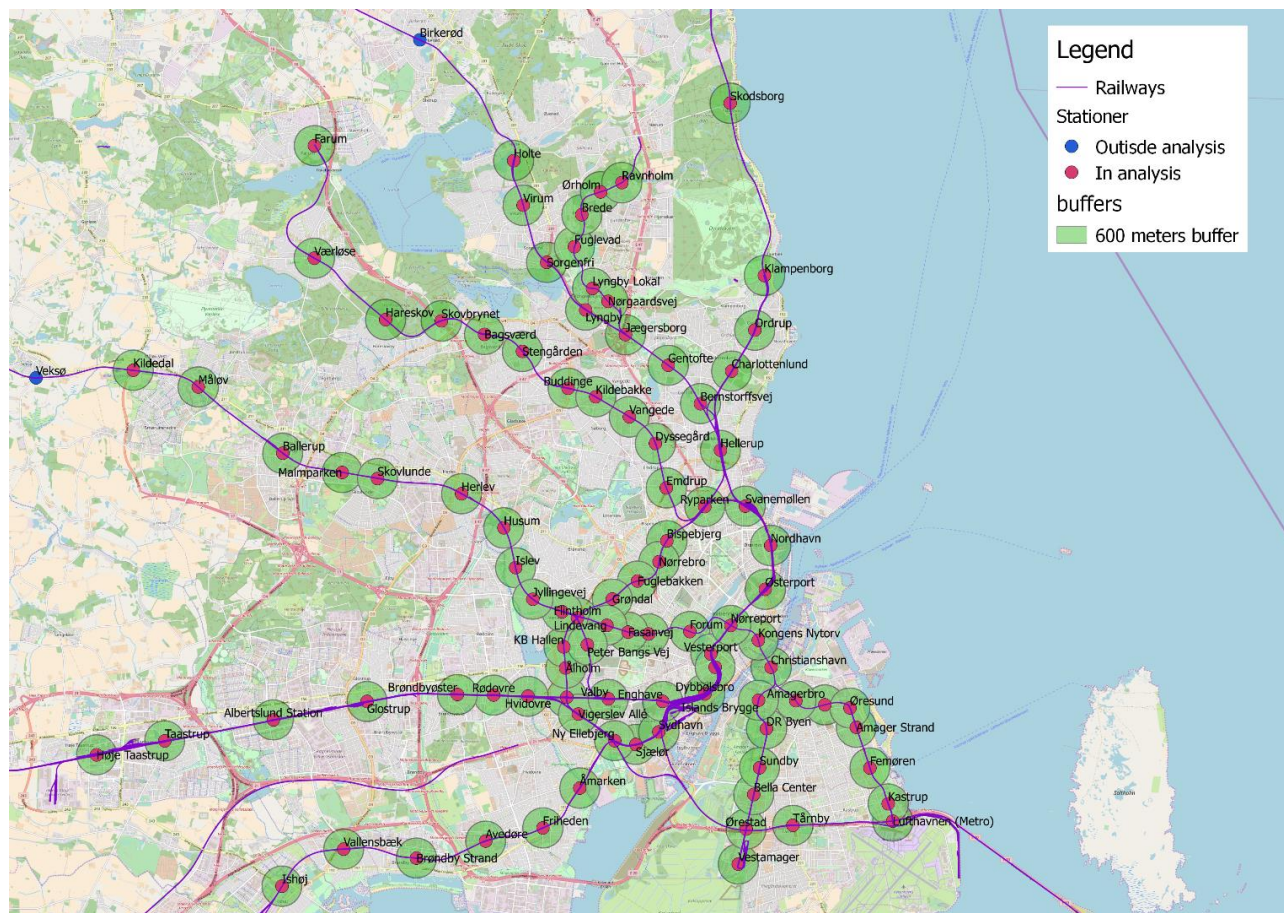


Figure 3 Analysis area with 600 meters buffer around stations

The following series of images shows the process for assigning cells to the 200-meter wide rings around the stations.

First, the analysis was limited to stations in the Copenhagen region. This resulted in 95 stations, including metro stations in the analysis. In cases where both an S-Train and Metro station are located together, they were considered to be one station (see for example Flintholm Station). For each station, a 600 and 800 meters-radius circular buffer was created around the station.

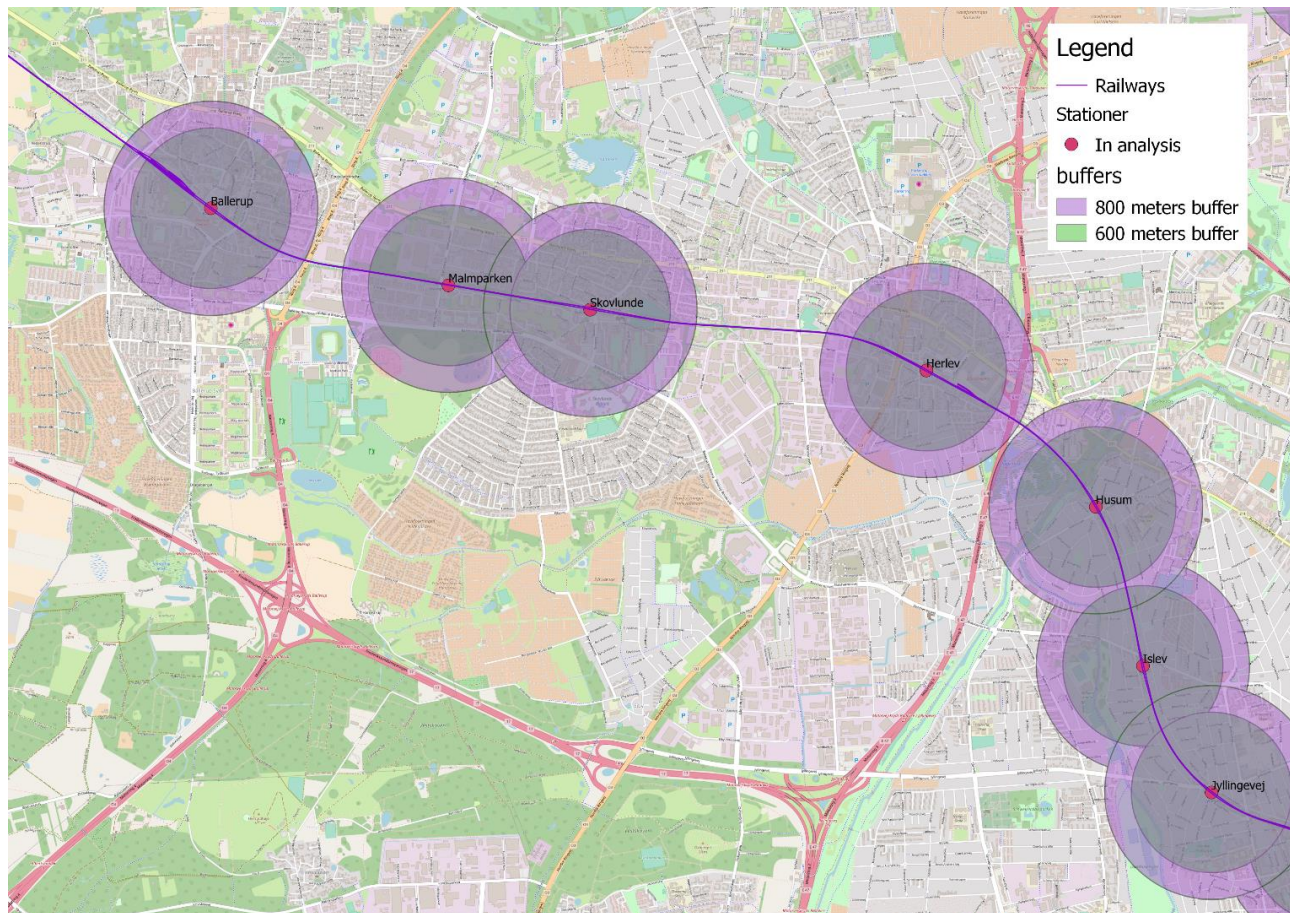


Figure 4 Example of 600 and 800 meters buffer around selected stations

The differential area between these buffers resulted in a 200-meters wide buffer ring around each station. This served as the basis geometry for selecting cells. This buffer ring is the “*target catchment area*”.

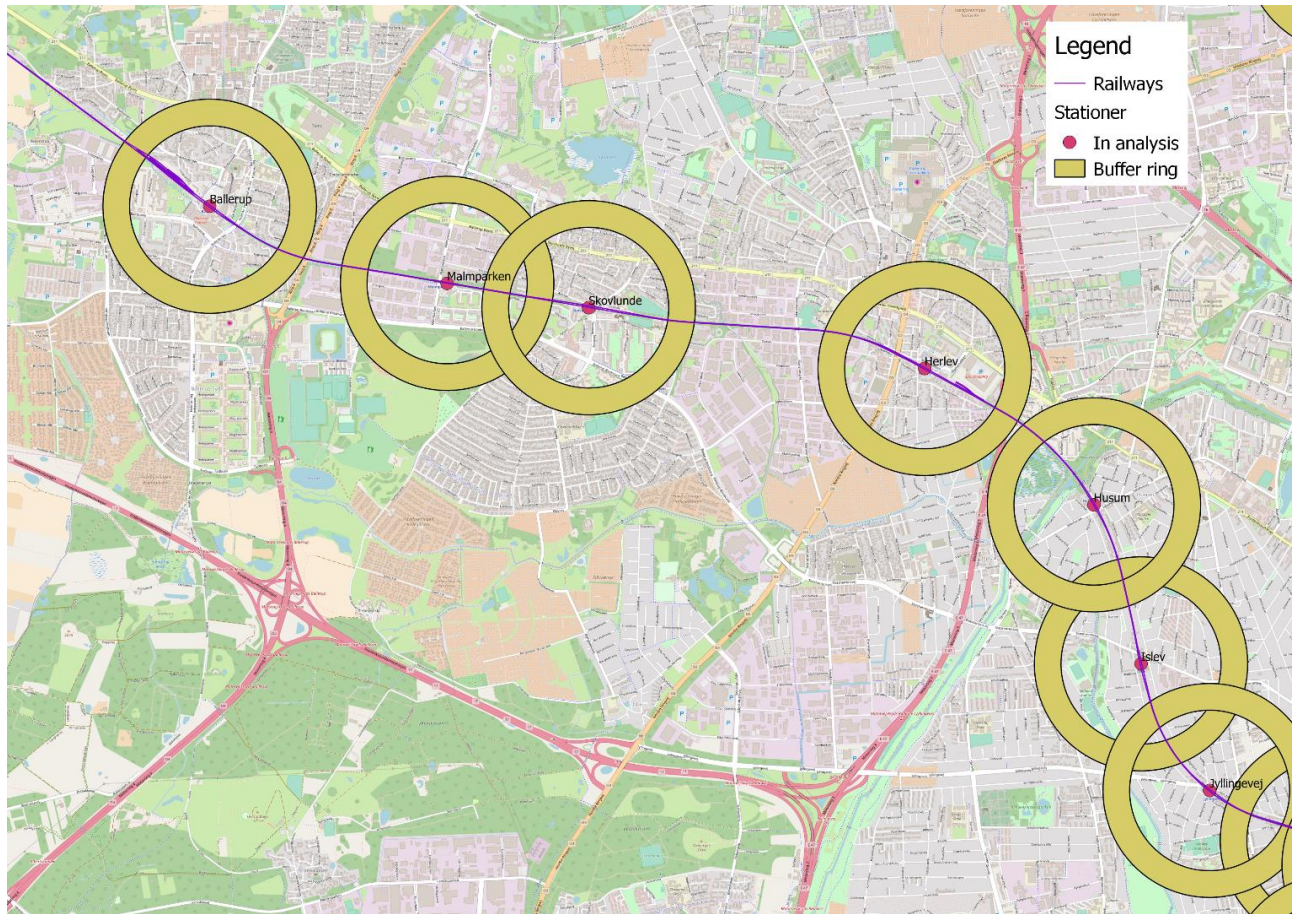


Figure 5 Example of buffer rings representing target catchment area

After creating the buffer-rings around all stations in the analysis area, the demographic cells were overlaid and then intersected with the buffer rings. This is described in the next series of images.

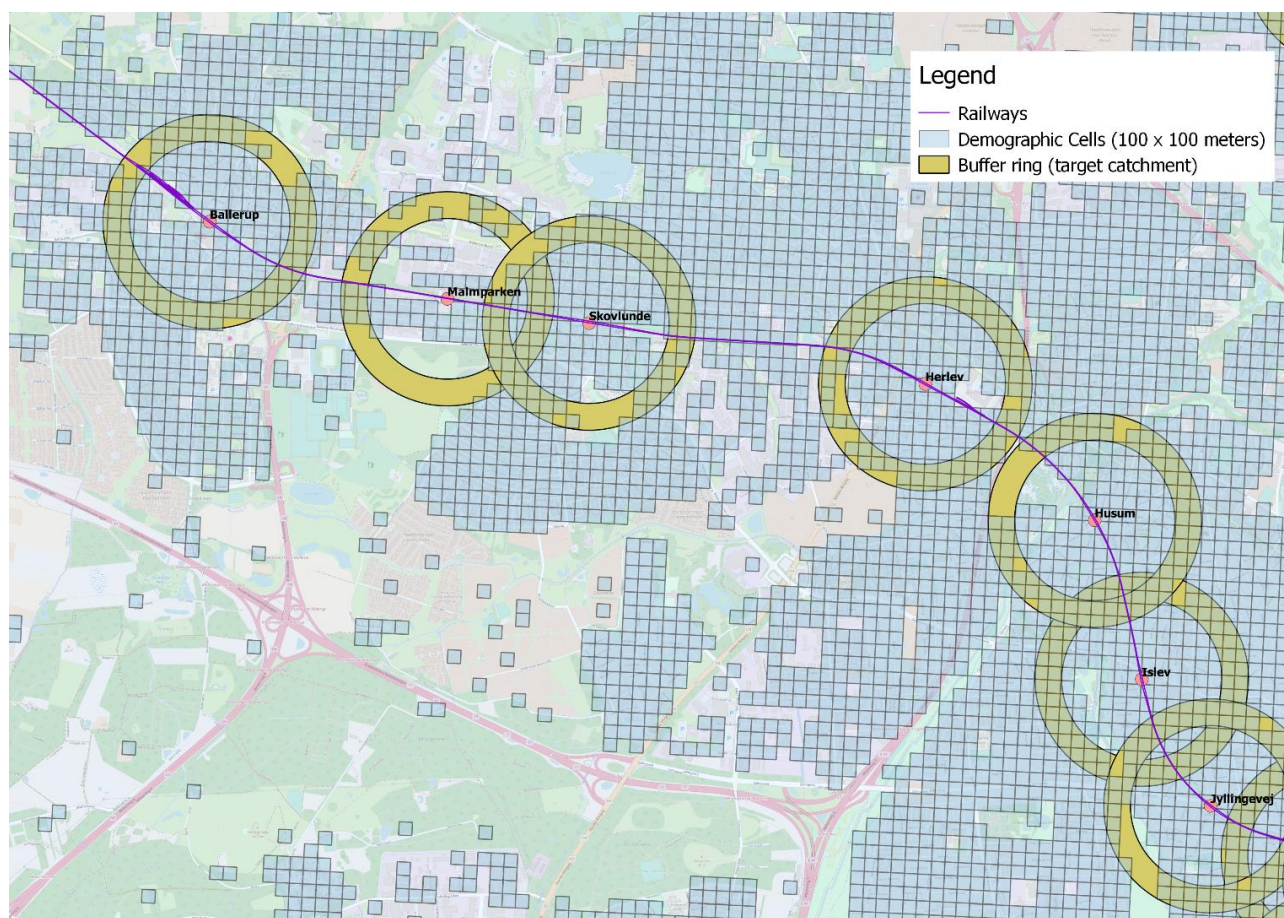


Figure 6 Example of target catchment area and demographic cells

The intersection between the *target catchment area* and the cells gave the first assignment of cells to stations. However, it can be seen in the next image that some cells fall within the 600 meters catchment area of nearby stations. These cells were not included in the analysis since a person would choose the closer station. See for example, the cells in the rings around Skovlunde and Malmparken stations in the following images. Note, however that cells that overlap in two separate rings are included in the analysis and assigned to each station. This reflects the fact that a person could equally choose between two equi-distant stations.

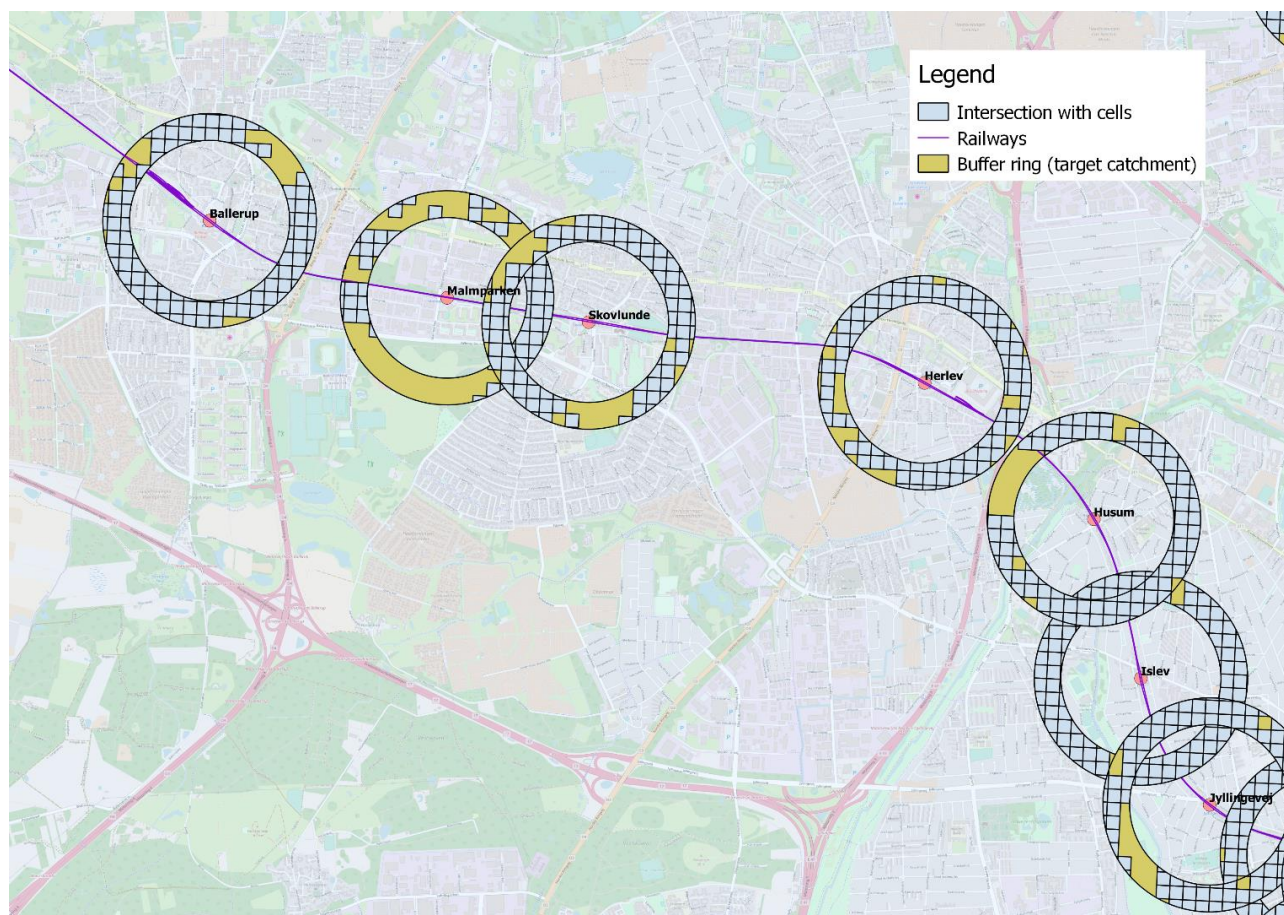


Figure 7 Example of intersection with target catchment area

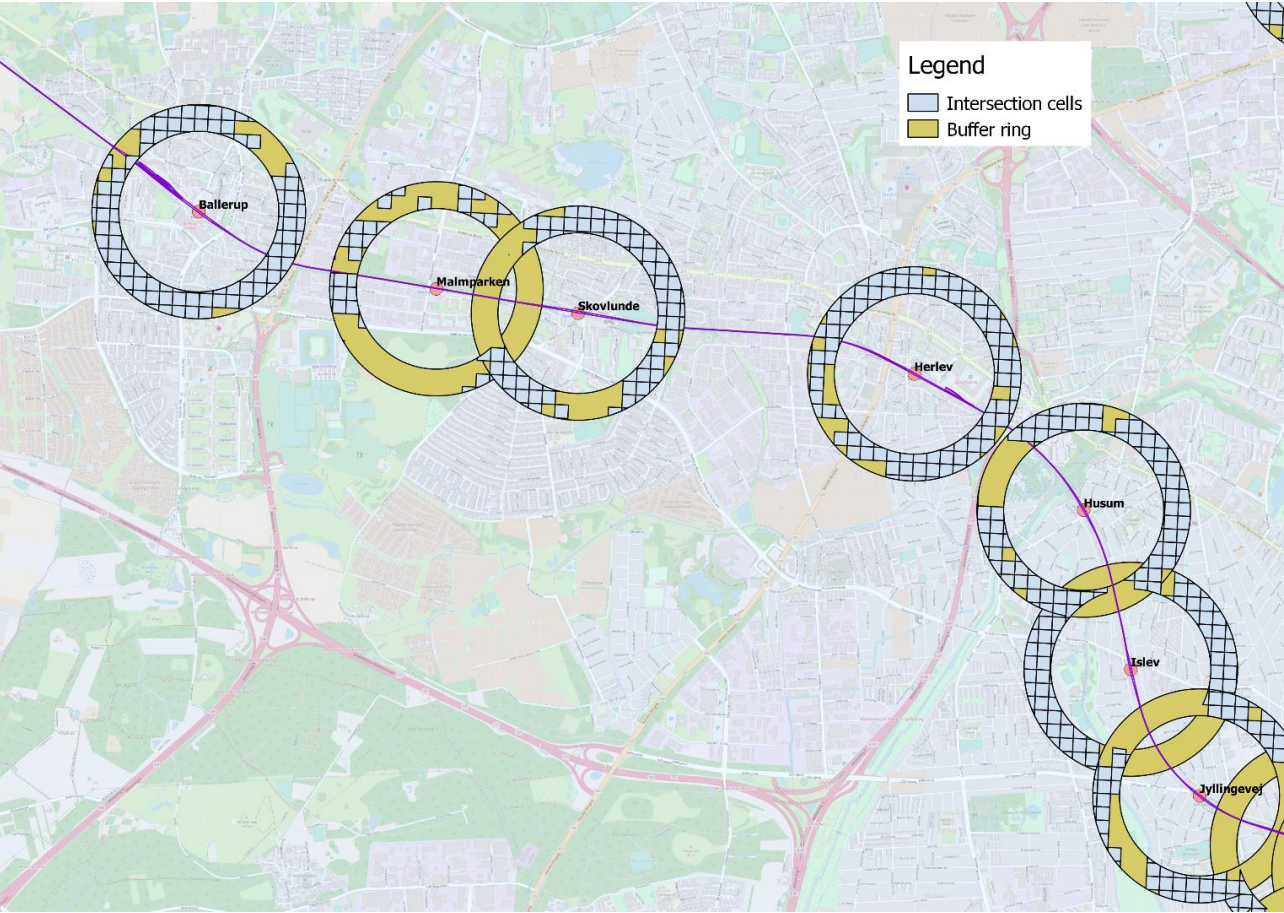


Figure 8 resulting cells in the target catchment area

The resulting cells served as the basis for the regional analysis. There were 6476 cells in total assigned to the 95 stations. The following table shows the number of cells for each station.



Station	Cells	Station	Cells	Station	Cells	Station	Cells
Ordrup	141	Farum	94	Femøren	63	Bella Center	40
Friheden	140	Islev	93	Enghave	61	Christianshavn	39
Hellerup	134	Buddinge	93	Nørrebro	58	Sydhavn	39
Værløse	134	Skovlunde	91	Brede	57	Kastrup	35
Taastrup	129	Gentofte	89	Høje Taastrup	56	DR Byen	35
Bernstorffsvej	127	Hvidovre	89	Hareskov	55	Sjælør	35
Ishøj	126	Vangede	88	Kongens Nytorv	53	Ålholm	35
Glostrup	125	Holte	86	Dybbølsbro	52	Ravnholm	31
Stengården	122	Åmarken	85	Vigerslev Allé	52	Danshøj	31
Ballerup	120	Bagsværd	80	Lergravsparken	51	Fuglevad	30
Avedøre	118	Ryparken	78	Grøndal	51	Islands Brygge	29
Herlev	116	Bispebjerg	78	Klampenborg	49	Fasanvej	27
Virum	114	Kildebakke	77	Vestamager	48	Vesterport	26
Måløv	111	Nordhavn	77	Sorgenfri	47	Peter Bangs Vej	26
Tårnby	109	Rødovre	76	Nørreport	47	KB Hallen	25
Dyssegård	109	Lyngby	73	Amagerbro	45	Nørgaardsvej	24
Charlottenlund	107	Valby	72	Ørholm	44	Kildedal	23
Husum	106	Jægersborg	71	Ny Ellebjerg	43	Ørestad	22
Brøndby Strand	105	Frederiksberg	70	Lyngby Lokal	43	Flintholm	16
Albertslund Station	103	Forum	70	Malmparken	43	Skodsborg	10
Vallensbæk	102	Fuglebakken	69	Amager Strand	43	Øresund	10
Emdrup	102	Svanemøllen	67	Vanløse	42	Lindevang	6
Østerport	99	Jyllingevej	66	København H	42	Lufthavnen (Metro)	5
Brøndbyøster	94	Skovbrynet	65	Sundby	42		

Table 1 Stations in analysis area and number of cells per station

CREATE has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N° 636573



The number of cells assigned to a station is related to the number of cells in the area around the station and the proximity of other stations. For example, Øresund station has few cells largely due to the fact that it is located close to a waterfront and two other stations (Lergravsparken and Amager Strand). Whereas the stations outside of the city area in the developed suburban areas tend to have a larger number of cells due to the distance between stations and the development of land around the station.

As mentioned before, each cell has information about the number of Nighttime and Daytime persons in the area. A walking distance from each cell to the station was also computed by querying Google Maps Directions API. This data serves as the basis for the results in the next section.

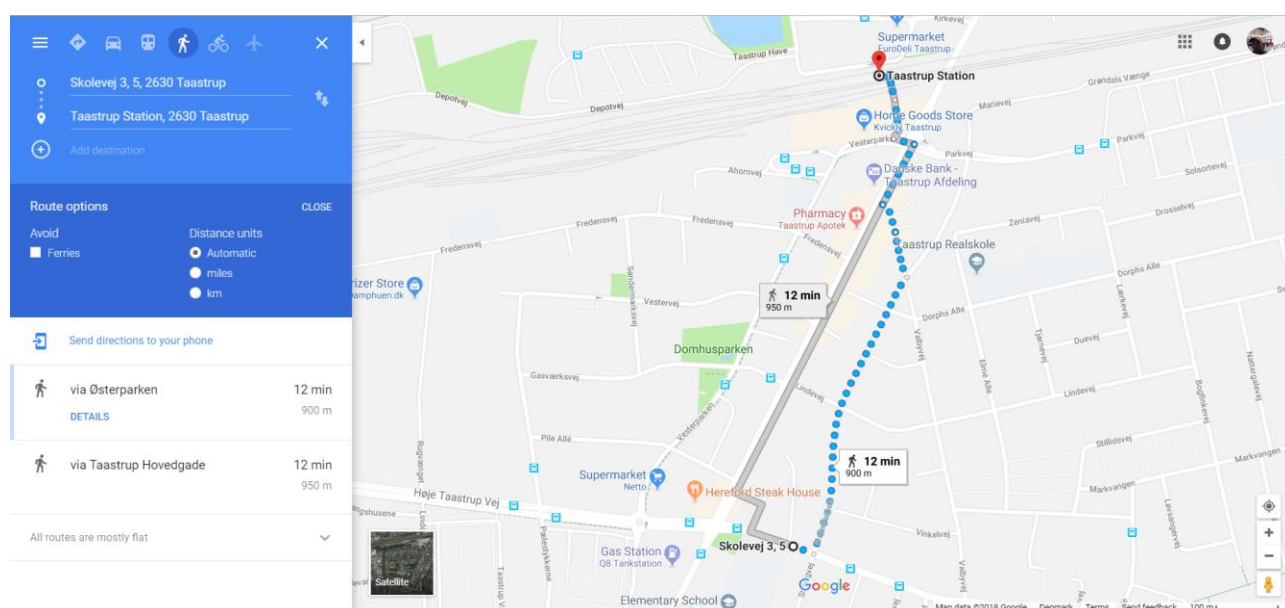


Figure 9 Example of Google Maps Walking Distance

4 Results

Using the above-described methodology, aggregations of cells at the station level were computed to yield statistics about population and walking distances in the target catchment areas. The next figure and accompanying table show results for aggregation of target catchment area Total Population and Average Walking Distance.

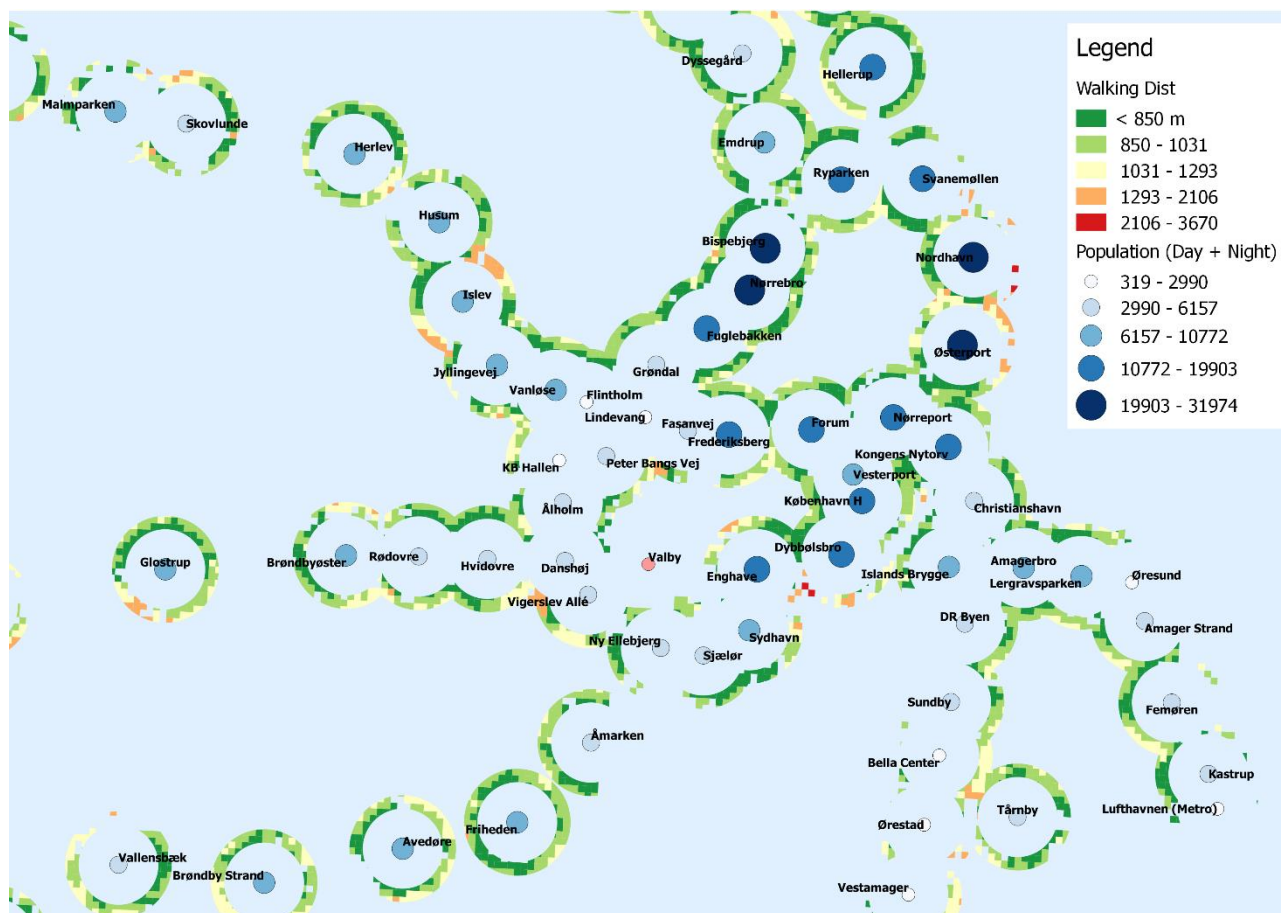


Figure 10 Example of Average Walking Distance and Population around Stations

The following table is sorted by "Person-meters" which is the product of Total Population * Average Walking Distance in Meters. This gives a "total" measure of the station's potential since it includes both the population and distance factors for the station.

Station Name	Nighttime population	Daytime population	Total Night + Day	Avg. Walking Distance (m)	Person-meters (Total Pop * Dist)	Number of Cells
Østerport	17069	14905	31974	1060	33882266	110
Nordhavn	15385	11519	26904	986	26517848	51
Bispebjerg	12940	11506	24446	920	22486460	95
Nørrebro	15940	5905	21845	846	18482403	57
Forum	12893	7010	19903	907	18043800	92
Frederiksberg	11836	6418	18254	960	17522812	71
Dybbølsbro	9963	4238	14201	1099	15603952	53
Ryparken	10461	6321	16782	928	15570663	83

Station Name	Nighttime population	Daytime population	Total Night + Day	Avg. Walking Distance (m)	Person-meters (Total Pop * Dist)	Number of Cells
Svanemøllen	10682	5229	15911	923	14687762	75
Enghave	10637	4498	15135	932	14111641	52
København H	4231	10403	14634	944	13811494	39
Fuglebakken	12928	3019	15947	846	13484732	62
Kongens Nytorv	5155	10048	15203	879	13367107	87
Nørreport	7485	8709	16194	801	12968395	27
Hellerup	5911	6756	12667	907	11485933	121
Sydhavn	2746	7499	10245	983	10071973	36
Albertslund Station	4805	5118	9923	971	9632728	103
Ishøj	7392	2568	9960	955	9513302	126
Bernstorffsvej	3371	7312	10683	890	9504184	142
Vesterport	4522	6250	10772	862	9284387	10
Lergravsparken	5921	3201	9122	927	8459222	70
Ordrup	4846	3307	8153	981	7998839	164
Avedøre	5797	2354	8151	953	7769561	118
Brøndbyøster	4352	3371	7723	991	7657315	99
Husum	6565	1544	8109	931	7549889	99
Malmparken	268	7038	7306	1005	7343443	48
Glostrup	4807	2553	7360	984	7241946	125
Taastrup	5147	2766	7913	909	7189850	129
Islands Brygge	3638	4573	8211	874	7174068	28
Islev	4676	1912	6588	1086	7156865	109
Amagerbro	6464	1829	8293	845	7004130	36
Ballerup	5825	1339	7164	947	6787472	120
Brøndby Strand	5795	1126	6921	977	6762740	105
Emdrup	6087	1501	7588	881	6683085	82
Herlev	3933	3253	7186	923	6633750	114
Jyllingevej	4092	2747	6839	919	6288176	48

Station Name	Nighttime population	Daytime population	Total Night + Day	Avg. Walking Distance (m)	Person-meters (Total Pop * Dist)	Number of Cells
Friheden	6253	513	6766	896	6060035	147
DR Byen	4762	1395	6157	961	5919164	35
Vanløse	4992	1442	6434	902	5803366	63
Skovlunde	2973	3074	6047	947	5724118	86
Tårnby	3961	1731	5692	972	5530666	125
Stengården	5003	610	5613	967	5426688	114
Høje Taastrup	4374	909	5283	1019	5384037	56
Kildebakke	4139	888	5027	1064	5346668	61
Værløse	3637	2128	5765	917	5286634	134
Dyssegård	4207	1314	5521	948	5235862	113
Charlottenlund	4238	1534	5772	903	5213258	96
Buddinge	3892	1039	4931	1048	5167156	102
Virum	3617	2306	5923	869	5145537	107
Skovbrynet	2969	1400	4369	1141	4986062	55
Gentofte	2654	2739	5393	917	4946650	68
Hvidovre	4356	883	5239	942	4932541	119
Vangede	3467	1975	5442	899	4894260	103
Jægersborg	2185	2117	4302	1101	4737952	89
Lyngby	3571	1868	5439	857	4659215	65
Vallensbæk	4104	579	4683	961	4498251	102
Rødovre	3792	1260	5052	886	4475658	61
Grøndal	4142	865	5007	890	4454084	35
Christianshavn	2707	2057	4764	925	4407395	48
Farum	3336	1366	4702	900	4231300	94
Ny Ellebjerg	3092	1628	4720	891	4206966	62
Åmarken	3349	1235	4584	900	4125424	78
Kastrup	1844	3240	5084	802	4078276	28
Fasanvej	3873	1095	4968	812	4032709	19



Station Name	Nighttime population	Daytime population	Total Night + Day	Avg. Walking Distance (m)	Person-meters (Total Pop * Dist)	Number of Cells
Måløv	3641	329	3970	1011	4012239	111
Vigerslev Allé	3085	870	3955	993	3925895	39
Danshøj	2672	708	3380	1117	3775200	26
Sjælør	3531	1085	4616	817	3770433	33
Femøren	3436	474	3910	938	3667471	72
Holte	2145	1290	3435	1019	3500080	93
Peter Bangs Vej	3197	231	3428	943	3234128	18
Brede	2047	1542	3589	888	3187775	58
Ålholm	2961	641	3602	849	3058278	20
Amager Strand	2517	746	3263	928	3028903	35
Bagsværd	1609	1938	3547	853	3025917	98
Sundby	2328	900	3228	890	2872920	31
Ørholm	936	1447	2383	1103	2628708	46
Lyngby Lokal	2180	693	2873	848	2435286	48
Sorgenfri	1847	1143	2990	795	2377936	54
KB Hallen	1840	410	2250	1038	2335725	20
Nørugaardsvej	1211	446	1657	1294	2143768	17
Kildedal	672	1056	1728	1165	2013571	23
Bella Center	1781	114	1895	1013	1919412	34
Vestamager	1479	217	1696	1117	1894166	51
Lufthavnen (Metro)	14	2239	2253	810	1824648	8
Flintholm	1920	150	2070	848	1754670	15
Ravnholm	1211	645	1856	894	1660152	23
Hareskov	1129	123	1252	927	1160103	55
Øresund	196	1003	1199	912	1093488	5
Ørestad	850	141	991	1024	1014520	15
Klampenborg	623	190	813	1166	948207	49
Fuglevad	507	137	644	1081	695966	26

Station Name	Nighttime population	Daytime population	Total Night + Day	Avg. Walking Distance (m)	Person-meters (Total Pop * Dist)	Number of Cells
Lindevang	502	32	534	1297	692812	15
Skodsborg	235	84	319	827	263877	10

Table 2 Results of cell aggregation ordered by Person-meters

It can be seen from the image and table that stations such as Østerport, Nordhavn, and Bispebjerg have a large population in the target catchment areas. Furthermore, the average walking distance from cells in the catchment area for these stations was significantly greater than the approximately 700 meters which would be optimal. The difference in walking distance can typically be attributed to physical barriers in the network which cause a route to be extended. Another factor can be the placement of a station and the location of access points to the station.

However, a significant limitation of the methodology is that stations are treated as “point” geometry in the analysis and therefore do not take account for the possibility that a pedestrian can reach the station in a possibly much shorter distance. This is due to the fact that a station in reality is a large area with multiple access points.

A more detailed analysis would help to mitigate this shortcoming. However, these results do give an indication of where potential improvements to pedestrian access to stations would perhaps give the greatest benefits when viewed from a regional perspective.

Finally, one can also look at the percentage difference between the “optimal” walking distance for a station and the computed average walking distance. Here the “optimal distance” is 700 meters which is the midpoint of 600 and 800 meters in the target catchment area. The following table shows these percentages for the top 20 stations.



Station Name	Total Night + Day	Avg Walking Dist	Person-meters	Optimal Person-meters	% Difference
Dybbølsbro	14201	1099	15603952	9940700	57%
Islev	6588	1086	7156865	4611600	55%
Østerport	31974	1060	33882266	22381800	51%
Malmparken	7306	1005	7343443	5114200	44%
Brøndbyøster	7723	991	7657315	5406100	42%
Nordhavn	26904	986	26517848	18832800	41%
Glostrup	7360	984	7241946	5152000	41%
Sydhavn	10245	983	10071973	7171500	40%
Ordrup	8153	981	7998839	5707100	40%
Brøndby Strand	6921	977	6762740	4844700	40%
Albertslund Station	9923	971	9632728	6946100	39%
DR Byen	6157	961	5919164	4309900	37%
Frederiksberg	18254	960	17522812	12777800	37%
Ishøj	9960	955	9513302	6972000	36%
Avedøre	8151	953	7769561	5705700	36%
Ballerup	7164	947	6787472	5014800	35%
Skovlunde	6047	947	5724118	4232900	35%
København H	14634	944	13811494	10243800	35%
Enghave	15135	932	14111641	10594500	33%
Husum	8109	931	7549889	5676300	33%
Ryparken	16782	928	15570663	11747400	33%
Lergravsparken	9122	927	8459222	6385400	32%
Herlev	7186	923	6633750	5030200	32%
Svanemøllen	15911	923	14687762	11137700	32%
Bispebjerg	24446	920	22486460	17112200	31%
Jyllingevej	6839	919	6288176	4787300	31%
Taastrup	7913	909	7189850	5539100	30%
Hellerup	12667	907	11485933	8866900	30%

Station Name	Total Night + Day	Avg Walking Dist	Person-meters	Optimal Person-meters	% Difference
Forum	19903	907	18043800	13932100	30%
Vanløse	6434	902	5803366	4503800	29%
Friheden	6766	896	6060035	4736200	28%
Bernstorffsvej	10683	890	9504184	7478100	27%
Emdrup	7588	881	6683085	5311600	26%
Kongens Nytorv	15203	879	13367107	10642100	26%
Islands Brygge	8211	874	7174068	5747700	25%
Vesterport	10772	862	9284387	7540400	23%
Nørrebro	21845	846	18482403	15291500	21%
Fuglebakken	15947	846	13484732	11162900	21%
Amagerbro	8293	845	7004130	5805100	21%
Nørreport	16194	801	12968395	11335800	14%

Table 3 Top 40 stations with percentage differences for optimal walking distance.

To better illustrate the potential for having an impact on the number of persons choosing to use the train rather than use a personal motor vehicle, we can look at a sample from Danmarks Transportvaneundersøgelse (TU)³. Here we examined data from 2012 – 2016 in the analysis area and looked at the percentage of trips where the primary mode was a personal motor vehicle. Of these trips, TU results show that approximately 20% were associated with a person living within 600 – 800 meters of a train station.

Using this as a basis we can therefore hypothesize that a subset of this group could be enticed to use the train rather than drive if walking time to the station is improved. A conservative estimate could be 10% and an optimistic estimate could be 50%. Therefore, approximately 2% - 10% of all vehicle trips in the study area could be moved to train following this simple logic.

To further illustrate the potential, we know that approximately 1 car trip per person per day is the trip rate for this region and therefore the number of car trips that could be shifted by improvements are between 2% - 10% of the population of each cell. Thus, just using the top 3 stations as an example, there are roughly (14201 + 6588 + 31974) car trips and therefore between 2% - 10% of that sum or 1000 – 5000 car trips that could be converted to train trips per day.

³ These data were also used for the analysis in WP3.



Naturally, this is just a very rough first estimate of the potential. However, it tells us that it appears to be worthwhile investigating further what measures may be possible to implement in order to reach the potential.

An example illustrating this is the case of Islev Station (no 2 on the list). Some of the cells having a relatively long walking distance compared to the direct path are dwelling areas west of the station. Two major barriers exist. One is the green area with a small stream providing a barrier as no walking bridges cross the stream on this section. The other barrier is the railway line itself. People will have to walk up to the major street Slotsherrenvej to get access to the station platforms from the Eastern side of the tracks. The figure below illustrates the actual walking route from one randomly chosen address in this area.

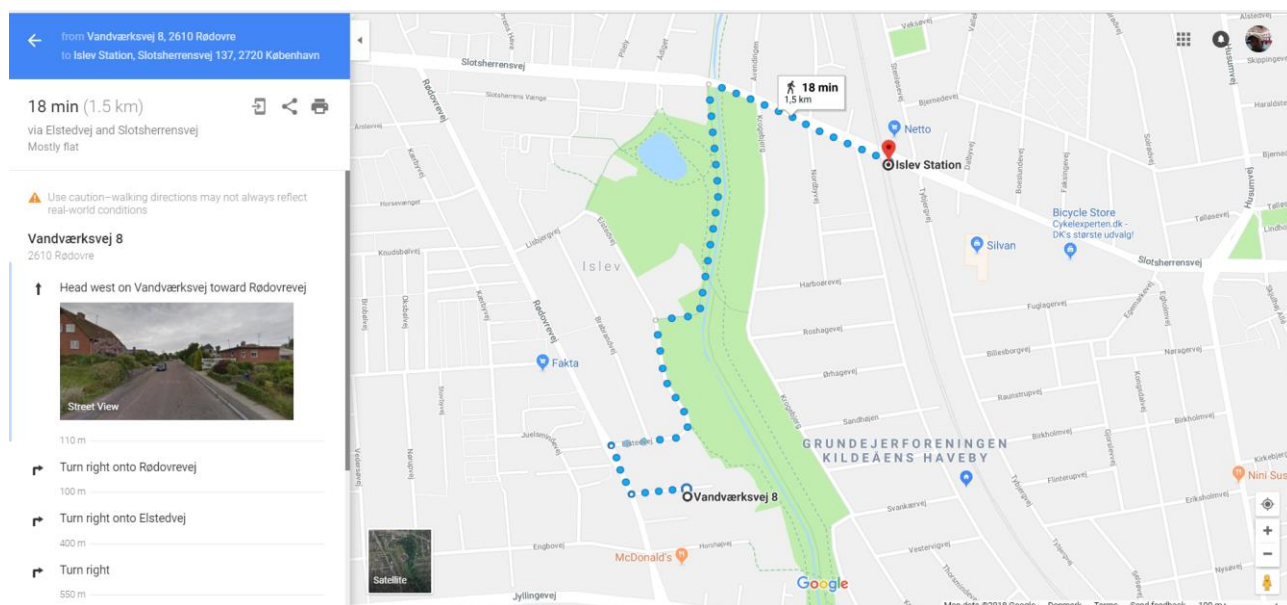


Figure 11 Example walking trip for Islev Station