The End of Walking? The Future of Transport Systems and its Impact on Pedestrians

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The future is here, it's just not evenly distributed yet.
— *William Gibson*

Abstract

In 1909 E. M. Forster wrote a daunting and disturbing short story about a dystopian world: “The Machine Stops”. Technology seemed to be the answer to the human desire for information and other basic needs. There is not much walking or movement until the machine stops.

However, “The Machine Stops” is also a cautionary tale about a technocratic society where well intentioned people like us had their way: the maximization of accessibility and the minimization of mobility had reached the final consequences. And it isn’t pretty. Once again, too much of a good thing leads us invariably to undesired places. Once again, art and a good story help us to understand the flaws of our own narratives.

In the context of the COST Action 458 Pedestrian Quality Needs this paper analyses possible future scenarios concerning transport systems and their impact on walking. Fully acknowledging the risk and difficulty of predicting what may happen in the future in a fast changing world, the paper argues that these thought exercises can be useful tools for exploring future narratives to construct powerful policy visions.

The mid-term scenarios will be crucial to prepare the ground for a post-car future. Two possible scenarios concerning the price of private individual mobility are explored: a ”business-as-usual” scenario where only city centres will pursue sustainable mobility policies, increasing the price of individual transport, while outside urban areas the price of individual transport will continue to be cheap and considered an integral part of individual freedom of choice. A second scenario will be a sharp increase in the price of mobility caused by a sudden and rather fast resource depletion - namely oil - and/or pricing policies that try to match the price of mobility with the true economic cost of each mode.

After exploring these mid-term scenarios (2020-2030), the paper describes the impact on walking of three post-car long-term future scenarios: Local Sustainability, Digital Networks of Control and Regional Warlordism.

The article also argues that trying to postpone difficult mid-term political decisions concerning mobility will lead us to dystopian communities and that only a true change of paradigm with the help of art, philosophy and good stories, will give us a glimpse of what David Harvey calls “Spaces of Hope”.

Bio

Mário J. Alves has a degree in Civil Engineering from Lisbon Technical University (IST, 1988) and a Master of Science in Transport from the Imperial College London in 1992. He worked as a Research Associate at the Centre for Transport Studies of the University of London. In 2010 he published as the co-editor the book "The Walker and the City". Over the last decade, Mario has been working as a consultant in many European institutions, wrote articles and presented numerous papers on topics related to transport and sustainable mobility.

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Introduction: acknowledging the fog of future

It is getting faster and jumpy

Predicting the future is always risky. Globalization, its intricacies and the accelerating pace of change, make attempts to predict the future even more complex. Globalization increases exponentially the number of geographic and human interactions. In the digital age technological and social changes accelerate and are more prone to discontinuities. From a world of reasonably linear trends, where the past helped to understand the future, we are entering what Taleb called "extremistan" (Taleb, 2007). The normal distribution curve that in the Twentieth Century helped social scientists to describe objects and people, no longer applies. The entrance of new players with global impacts has increased the standard deviation of most phenomena. Extreme events and discontinuities might be the drivers of the future. And these are, by their very nature, unpredictable.

Let us consider the energy crises for a moment - we will return to it later. Specialists from the petrol industry do not agree when peak oil will occur and what it might look like when it occurs. It is a good example of a highly complex system with global players. Nobody knows exactly how many reserves exist in the world in general and in Saudi Arabia in particular (Simmons, 2005). Consumption of oil depends on prices, which float with, and in turn influence, the world economy. At the same time the world economy has an impact on the price of energy. High energy prices can cause the global economy to slow down which will make energy prices go down. Technology (electric cars, nuclear energy, solar) will influence not only petrol consumption but also its production (tar-sands, new oil fields hitherto too expensive to explore will be explored above a certain price). The state of the world economy will influence consumption but also the investment in technologies that might be available or not for oil extraction and refinement.

Awareness of limits

One thing might be easy to predict – the Twenty-first Century will be about the attempt to manage limits (environmental, spatial, economic...). In the Twentieth Century the paradigm for planning and managing transport systems followed a pattern of "predict and provide" – after studying the past and extrapolating demand (land use, behaviours and transport supply), models were applied in order to predict stresses on the transport infrastructures of cities or even whole countries. Invented in Chicago in the 1960's these transport models gave technicians and politicians the

illusion that they could control the future. Over time these "four-step" models[1] became self-fulfilling prophecies – trying to anticipate the supply necessary to meet the predicted demand it led to road construction that "manufactured" the "predicted" demand. The idea of limits was absent in the first traffic models and only later, when entire populations started to fight against road-building, the political notion of the limits of road supply became apparent. More recently environmental carrying capacity and limits to car access to environmentally more sensitive areas started to be one of the major concerns for city management. In the last few decades these "four-step" modelling tools of "predict and provide" have become a motive for controversy and discredit[2]. However, alternative ways of planning and managing transport systems are still a motive of discussion among professionals. Nevertheless, until very recently, walking was absent and invisible from most modelling efforts. Even now the majority of the transport models do not include walking in their algorithms.

This awareness of limits (environmental, resources, physical space) and the willingness to tackle them or not will be fundamental to how we will plan and manage the future of transport systems. In terms of resources, the price of energy will also be crucial to theoretical planning and political approaches. In a few transport models environmental indicators started to be included only very recently. Politicians are, and will be, tempted to delay the internalization of the real costs of transport and reduce the increase in price to the consumer (for example by reducing taxation of fuel in case of dramatic scarcity). Thus the temptation to postpone dealing with the problems will exist from electoral to electoral term.

Approaching limits can be done through catastrophe or through management - most probably it will be a mixture of the two. For example, an increase in the price of mobility because of space constraints and environmental impacts in urban areas is easier for the public to understand than policies to reduce mobility and carbon emissions in general. It is therefore more probable to expect transport demand management in city centres rather than demand constraint policies at a national level. This kind of approach might increase urban sprawl if prices of private motorised mobility continue to be unreasonably low and access to city centres by private car increases its price considerably.

It will not be about A *or* B, but A *and* B

Another difficulty with predictions in this world of accelerating complexity levels will be the proliferation of paradigms – which is coherent with the increase of the standard deviation of the descriptive variables. Some people will have access to more resources while the majority of people will have less. The future was never very "clean" and it will be less so - the coexistence of conflicting and contradictory trends will be the rule.

It is certain that the population of Europe will be older in the near future. There will be very frail but also very fit elderly people. Africa on the other hand will have a very young urban population – even if this paper only tries to tackle the future of walking in western societies, it is clear that around the world some will be able to walk and some will not. At the same time for most, walking will continue to be the only available mode. There will be a trend of people returning to the city centres and families leaving the city looking for "exburbian" homes – the latter will be dependent on some form of individual motorized mode of transportation, while others in more compact areas will be able to walk and use public transport. In the same territory densities might increase and in other areas of the same territory the urban sprawl will continue. In the same cities some people will be able to use Public Transport and walk while others - living in lower densities - will not.

[1] Traffic Generation, Trip Distribution, Modal Split and Network Assignment.
[2] For a review on this crises in the Twentieth Century see Pas (1990).

Some experts claim that the world will be "flat" (Friedman 2005) and others that it will "spiky" (Florida, 2005) – probably the world will be both at the same time. In a "spiky" world where cities with reasonably high densities will thrive, walking will play a more important role. On the other hand, in a "flat" world the average distance to cover will be greater and thus walking will continue to decline.

In these coexisting paradigms it is reasonable to assume that the complexity of the offer and demand of transport systems will also increase. In terms of transportation the wider desires on the demand side (life-styles will vary more from each other than in the Twentieth Century) will induce the needs for more and varied modes of transport increasing the need for a more efficient intermodality (Peters, 2006). This fact alone might increase the amount of "invisible" walking - between activities for less than 3 minutes (Alves, 1995). Walking will be more indoors, inside transport interfaces but also short stages in public space – raising the importance of walking as the glue of the transport system in a city. On the other hand one can feel that technology will reduce the need of very hierarchical transport systems that increase the need for interchanging modes – tram-trains for example. In this scenario one can imagine the proliferation of small individual devices that can take the user door-to-door or are used between stages on public transport.

Transport planning will be more political

The need to manage complexity and limits will make planning and managing of transport systems more participatory and therefore more political. In the last decade it became more and more acceptable to use supply to influence demand. The aforementioned "4 steps models" treated demand as a fatality. It is now more accepted among transport professionals and politicians that supply does influence demand patterns. One of the most discussed phenomena in the second half of the Twentieth Century was "induced demand". More recently the opposite has also been observed: "traffic evaporation". The first hypothesis applied to car traffic entails that the more one supplies road infra-structure capacity the more car use will be induced by offering it. This was the subject of many studies and reports last century and was settled with a report by the United Kingdom government - the well known SACTRA report[3]. "Evaporation" on the other hand is still controversial but abundantly observed by many professionals (Cairns et al., 2002) – when there is a sharp reduction of supply in the road network (due to an earthquake for example) car use also reduces. This is perfectly explained by what is called the Jevons Paradox[4]. These obvious observations can and probably will radically change the planning and management of transport systems.

Contrary to the "predict-and-provide" paradigm where the objective was to optimize the performance of every mode, a more policy oriented planning and management can be envisaged. The two phenomena of traffic induction and "evaporation" are also empirically observed for other transport modes namely walking – during car oriented city planning and management, pedestrian infrastructure was drastically reduced and one could observe pedestrian "evaporation" throughout the Twentieth Century. When more space (capacity) is granted to pedestrians in new street reclaiming schemes (like Broadway in NYC or Trafalgar Square in London) an increased presence of pedestrians is easily observed. If "predict and provide" - taking car traffic as a fatality - was the absence of policies and therefore of politics, in the last few years it has become more acceptable to use "induction" and "evaporation" to attain policy objectives.

[3] SACTRA (Standing Advisory Committee on Trunk Road Assessment) a study for the United Kingdom government in 1994.

[4] In economics, the Jevons paradox (sometimes called the Jevons effect) is the proposition that technological progress that increases the efficiency with which a resource is used, tends to increase (rather than decrease) the rate of consumption of that resource.

To find equilibrium and pursue policy objectives, other paradigms have been proposed as alternatives to "predict-and-provide" such as: "debate-and-decide", "aim-and-manage", "cap-and-share", for example. Probably all of these will be necessary. But if "predict-and-provide" was the absence of policy and the realm of *laissez-faire* technocracy, using these new paradigms will increase the acceptable influence on demand through price and selective efficiency – charging more or making less efficient what we don't want and the opposite to what we want.

However, the path to real-price economics applied to transport systems will be difficult and therefore slow. Excluding urban road pricing, real-price economics will be controlled by central governments. Hence for local governments and city political managers it will become more acceptable to increase the efficiency of demand for modes that the policy vision wants and reduce the efficiency of the supply that induces the demand that the policy vision does not want. For policy making to attain these long-term objectives, to establish a shared vision of the future will be increasingly important - hence, the increasing importance of politics in transport and mobility planning and management. It will become clearer that the phenomena of induced demand do not only affect car usage and it can also work in favour of modes the policy maker wants to encourage. The same way pedestrians "evaporated" throughout the Twentieth Century by the reduction of their space, favouring safety and comfort of public space will be increasingly understood as a possibility to reverse this trend and induce pedestrian demand.

If reverting urban sprawl will take decades, preparing dense areas for more sustainable forms of transport is now part and parcel of transport policy in many urban areas. It is therefore predictable that sustainable policies in urban areas will continue. It is more uncertain whether or not policies to reduce the overall mobility will be implemented as they depend on the increase of the price of mobility in general. If implementation of the former is easier to understand by the public, the latter will need a sharp rise in petrol prices without a viable technological alternative and/or the political will to increase the price of mobility through general road pricing that will approach the real price of externalities.

2020-30: Mid-term Contrasting Scenarios

The price of oil will determine the future of transport systems (Muhrad, 2010). As it was discussed in the introduction chapter, the most likely trend will be the increasing price of fossil fuels due to scarcity of resources, internalization of externalities and policy oriented objectives to reduce motorised trips. These trends will increase the price of traditional motorized traffic and are very likely to happen in the short term. However, radical technological breakthroughs and lack of political courage may postpone this trend.

Two contrasting scenarios for the next two decades were assessed[5]:

Scenario 1: Business-as-usual

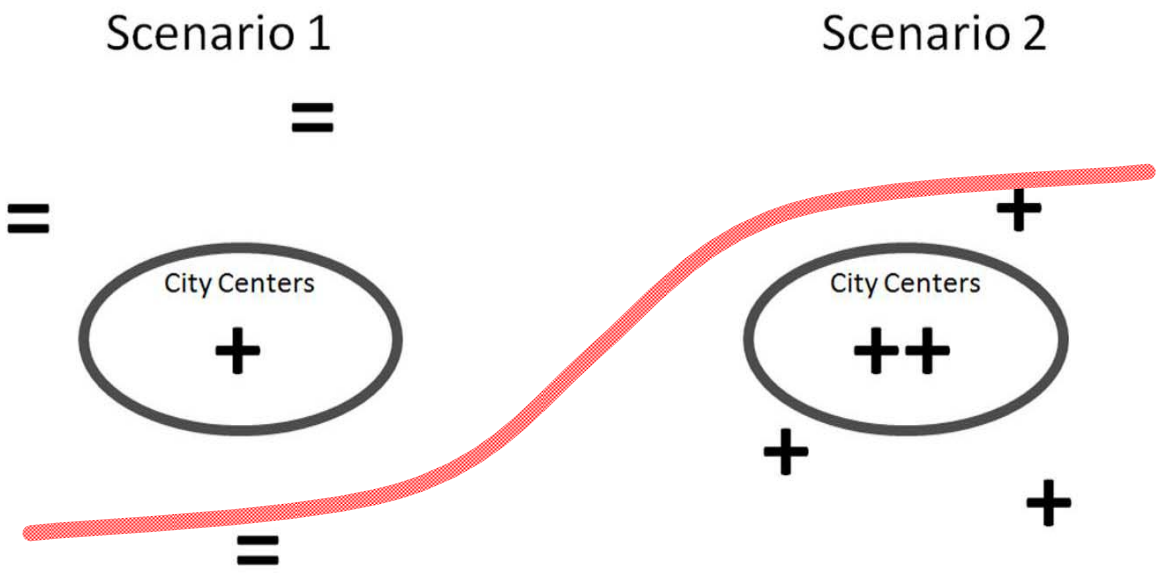
(cheap private motorised mobility, lack of political courage to implement real-price economics, reliance on techno-efficiency, …)

- Continuing trend of increased urban-sprawl
- Continuing increase of motorised trips (fossil fuels or alternative energy vehicles)
- Decrease in walking

[5] For a detailed analysis of the two scenarios refer to the extended version of the paper in the report from Work Group 3 in the COST project Pedestrian Quality Needs.

Scenario 2: Sharp increase of the price of motorized transportation
(peak-oil, carbon taxes, sharp increase of carbon in emission trading prices, generalised road pricing, ...)

- Gradual trend to more compact cities
- Decreased growth of individual motorised trips
- More walking



Real price of individual motorised mobility compared with today`s prices:

=	reduction or remaining approximately the same
+	increase
++	sharp increase
	amount of walking

Figure 1 Medium Term Scenarios: price of individual motorised mobility

On **scenario 1** there will be a greater usage of individual transport modes and a continual decline of walking will be predictable. The individual transport modes can be more efficient fossil fuel cars (albeit less performing), hybrids and also a myriad of electric vehicles – small, cheap and ubiquitous. For the smaller personal electric vehicles, there will be tremendous legislative pressure to allow their use in all forms of public space - on roads, pavements, indoors (transport interfaces, university campus, hospitals, airports, and so on). There will be a technological continuum in size and performance between very small devices, which will be sold to support walking, up to the two tonne cars that are used today. The ubiquity of the former will probably mean an acute decline in walking. The competition of these devices for space with the pedestrian, their short range and low speeds will be more attractive to pedestrians than to car drivers, especially because we are in a context of increasing urban sprawl. In this scenario it is reasonable to assume highly developed *Intelligent Transportation Systems* (ITS) (Tiffin et al., 2007). Higher levels of sophistication will open the gap between the “haves” and “have-nots” even more. ITS will transform pedestrians into passive and technology(less) elements in public space. Most in-vehicle safety devices will have their emphasis on passenger and driver safety leading to increased motorized speeds and endangering more whoever is outside the vehicle. On the other hand recently one can observe the rising concerns from car manufacturers for the safety of pedestrians and cyclists. All in all the pedestrian will stand to lose more in this technological environment - the same way the pedestrian

became a passive and invisible element in public space throughout the Twentieth Century with the use of traffic lights technology.

Under **scenario 2** there will be a push towards a gradual trend to more compact cities. This will help the shift to public transport, walking and cycling and a decrease in motorised trips. Intermodality will help to increase the amount of walking between stages and this might lead to an increased investment in public space which will lead to more walking creating a "virtuous circle". However this shift to more compact cities will be slow and painful. Prices of property in city centres and around public transport are likely to sharply increase and therefore become affordable only for some. At the same time with very high energy prices it is also to be expected that the use of small electric devices will increase – electric bicycles or motorcycles or even segway-type devices. The sharp price increase of transport will lead to a more local production of food and other consumer goods – more a mixed functionality city with edible gardens and more distributed jobs that will be integrated in diverse neighbourhoods – all this will cause an increase in walking and cycling.

Supply of transport infrastructures

Public space is the realm in which people meet and interact as pedestrians but it is also the infrastructure within which we walk. Until last century politicians and decision makers were part of the same time-and-space dome (Adams, 1999) as anybody else – their only transport infrastructure was the same public space shared by everybody. Therefore their perception of needs concerning mobility was similar to the majority of the population – it is remarkable how much public investment was made in public space during, for example, the 19th Century (wide sidewalks and promenades, gardens, squares, and so on) and within short distances public transport (lifts, trams, railways). With the popularisation of the car the differential of speeds among people increased. People from different social backgrounds, gender or age had a substantially different access to speed. In general politicians and decision makers started to live in a different world than the vast majority of people. This might partly explain the gradual lack of interest by decision makers and politicians in the amenities of public space and short distance travelling until very recently. In spite of the recent interest in walking and cycling as alternative transport modes to the car, academic and institutional inertia make real changes very slow. Albeit recently efforts have been made to include public participation in public space projects, but the political process is still very biased towards the vision, or lack of it, of the ruling classes (Sauter, 2010).

Public space and walking are the glue of a good transport system. The increasing specialisation of disciplines and professions that intervened in the city during the 20th Century was also a highly detrimental factor for public space design and consequently pedestrian quality needs (Methorst, 2010). Academic separation of disciplines like engineering and architecture enabled the creation of a substantial body of knowledge that ultimately did not relate to each other. Cities started to be designed with cars and buildings in mind. The buildings were designed by architects and the road space designed by traffic engineers. Environment carrying capacity, the social aspects of the street as meeting spaces and the quality of the public realm for walkers were issues usually ignored - life, people and spaces were left behind. Recently some effort has been made to integrate disciplines and the contribution by the social sciences has become more common. However, most projects are still subject to political timings and interdisciplinary and public participation are still perceived to be factors that slow down decision making[6].

[6] For a detailed analysis of the Supply of Transport Infrastructures for each mode of transport refer to the extended version of the paper in the report from Work Group 3 in the COST project Pedestrian Quality Needs.

Decisions taken in the next few years might seal our future. To do too little too late could have dire and irreversible consequences (Lyon, 2003).

Under **scenario 1** (BAU) radical changes on transport infrastructure supply will not happen. There might be localised increase on the amount of walking, for example in city centres and around major transport interfaces. But urban sprawl will continue its course. This might leading us to a sudden collapse of energy resources or/and prolonged recession of global economy towards deeper inequalities in access to technology, public space and transport infrastructures.

Scenario 2 and earlier rise of cost of private motorised modes of transport will lead necessarily to more compact urban settlements. This scenario can be the consequence of conscious political decisions due to an earlier but well managed peak-oil and higher level of awareness of the consequences of the BAU scenario. Even under this scenario we could tend to a highly controlled technological world focused on managing mobility demand or more gentle forms of participatory democracy and more equitable transport infrastructure supply and public space.

2050: Three post-car Scenarios

Whatever path is to be adopted in the next two decades will determine the post-car scenarios of the longer term future. Using and adapting John Urry and Kingsley Dennis post-car futures (Dennis et al, 2009)[7], towards 2050 three distinct scenarios could evolve: Local Sustainability, Regional Warlordism and Digital Networks of Control. These three future scenarios are substantially different but nevertheless consequence of the car culture and the path chosen in the next few years.

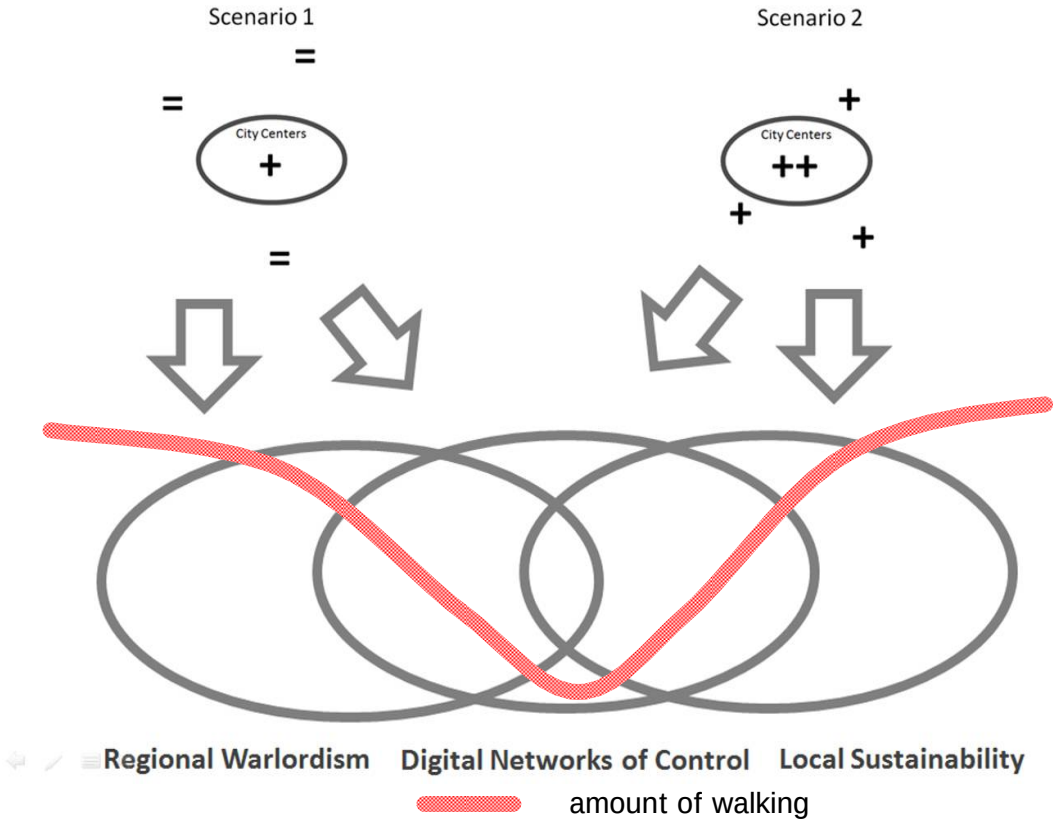


Figure 2 Post-car Long term scenarios

[7] They adapt these three scenarios from a report for the Department of Trade and Industry of the United Kingdom dated from 2006: *Intelligent Infrastructure Futures: the Scenarios - Towards 2055*.

Local Sustainability

The Local Sustainability scenario, which Urry and Dennis consider “possible” but not “probable”, would require a total reconfiguration of the economy and society around the idea of “local sustainability”. This could emerge from a gradual but strong consensus around ecological economic ideas. It could also be the result of a major breakdown of classical economic ideas of growth. This would mean the choice for smaller and more compact communities, the producing and eating of local food, and the increase of short walking or cycling trips while longer trips will be rare. This scenario would be more likely in a situation of a response to very expensive energy sources. Describing a similar scenario David Harvey, sees the future “spaces of hope” as much slower and quieter – transportation systems would become free but slow (Harvey, 2000).

Regional Warlordism

“Regional Warlordism” would be what some call the “barbarization” of civilisation as it came to be accepted this century. Climate Change and depletion of resources would implode and weaken most forms of institutional governance. This would lead to a sharp decline in most transport systems and infrastructures. Regions would be in the hands of warlords who would control mobility and weaponry. In the Western World one could envisage a softer version of this scenario by the ubiquity of closed condominiums and strong regional powers lead by organised crime. Under this scenario walking would be the mode of transport for most but also due to public space danger some would avoid going out of gated and highly protected communities. Long distance travel would be difficult and as in the Middle Ages - it would be necessary to organise protected convoys to avoid robbery by dispersed groups, mostly done occasionally by the very rich or dispossessed climate migrants.

Digital Networks of Control

This scenario combines digitalised and ubiquitous information systems within mobility systems. Most devices of movement will communicate with each other and with the infrastructure. Pedestrians who are not using any device will be excluded and will be mostly detected as passive elements to avoid. This will be immensely expensive to achieve but the reform of the tax system might force some degree of this scenario to happen in order for governments to keep the mobility revenues to flowing in. The traditional fuel tax will not be with us very much longer and other systems will have to be devised to charge individual mobility. This will also allow the pricing of movement (mobility) and regulate access and speeds according to geographical area, time of the day, week or season. Some travel will be substituted by virtual access to activities. This ubiquity and ease of access can and will increase mobility consumption – manufactured demand would be controlled by private companies and it might be part of their business model to stimulate it. Most likely these possibilities of micro-payments will allow the transference from a proprietary system of private mobility to more extensive use of paid access and shared based mobility.

The impact of these scenarios on mobility

These three scenarios, if they happen, will probably coexist around the world. Their degree will depend on how fast and acute Climate Change and resource depletion will be. Climate Change will have different impacts in different geographic locations. Depending on geopolitics, energy resources will be available in different degrees to different countries. Also within the same country or city Climate Change will have a different impact according to different social classes.

If political choice and the availability of resources or technology will allow individual mobility to continue to be cheap overall, urban sprawl will continue as will consumption of individual mobility. This might lead to a sudden and unprepared collapse of energy resources and/or a high rise in temperature with tipping points that will be difficult to predict. This might lead to the collapse of society as we know it, social turmoil and the weakening of traditional government institutions – the incapacity to levy taxes and regulate mobility. At the same time "tinkered" technological networks might protect some areas of access from local and migrant hordes. It is also possible that some will become part of the "grid" and will reap more benefits from it than a more democratic access – less congestion for the ones in the know, avoidance of dangerous zones, and so on (Rifkin, 2000). Pedestrians will be clearly the losers, having to face an undemocratic society with aggressive use of public space by some – either by other pedestrians or by armoured and relatively low-tech and fast cars. However, this scenario of sudden collapse of energy resources and rapid climate changes does not exclude enclaves of isolated sustainable communities.

The scenario that seems more likely to happen with different degrees of sophistication and ubiquity - whatever the path of the next decades - is that of the Digital Networks of Control. In the last decade internet and in the near future mesh networks will increase communication to unprecedented levels. This scenario could at the same time allow extreme scenarios to develop in different areas of the world or even within the same city. Pedestrians will lose ground because they will be the have-nots in society. Even if some kind of technology is in the hands of pedestrians such as mobile phones or compulsory wearing of electronic vests, these elements will try to include them in the mesh but could be instruments of control and comparatively low-tech compared with vehicles. However, the very nature of the limits of human reaction will make them passive elements unless society moves towards more sustainable scenarios that will strongly enforce electronic protocols for interaction that will clearly favour the non-motorised modes. Maybe few people will be non-motorised in the scenario that might reach a stage of abundant energy – a cornucopia of ubiquitous renewable energy harvesting methods, mainly solar and cheap storage of hydrogen (Rifkin, 2002). In this case very small devices will start to be used and other diets will have to be adopted to avoid obesity. This scenario can be more or less authoritarian depending how much energy will be available - a dystopian society that will approach the end of walking.

In the Local Sustainability future energy will be expensive and extensive revision of planning and management of transport systems will be required. Distances will be shorter, the number of trips might increase but speeds will decrease considerably. Compact cities will not allow speeds above a certain threshold that can potentially endanger pedestrians and cyclists – this will automatically give a relative advantage to slower modes. Outside cities this scenario will have painful consequences – the price increase of motorised mobility will make parts of society temporarily out of economic reach with their activities (jobs, schools or leisure). This might lead to a massive transference of populations to city centres that will have to increase their densities around transport interfaces. Walking will increase considerably in this scenario.

What is crucial to understand is that the long term future will depend to a large extend on what path we choose to follow now. From the downward flow of events (figure 2) one might conclude that following a business-as-usual scenario in the next few years will lead us to the less pleasant of the post-car scenarios – early and unprepared exhaustion of resources, collapse of formal governance or very authoritarian technocratic regimes. In either of these cases we might have quite high amounts of forced walking resulting from scarcity and less than perfect equity resource distribution. If, on the other hand, we start strong public policies that gradually but swiftly internalize the social and environmental costs of private mobility (scenario 2), then we are more likely to achieve Local Sustainability zones and more benign forms of technological control - achieving higher amounts of sustainable healthy walking.

Concluding remarks

The future is increasingly uncertain. Most likely the future will include many competitive and contradicting trends, beliefs and paradigms. The life-styles and travel patterns between social groups will be very different, even if our geographic context is confined to the western world. The sociological average that was used to characterise societies with as few numbers as possible is no longer an acceptable indicator. There will be "long tail" phenomena[8] – meaning many rare events and types of people and patterns (Anderson, 2006). It will be more and more a world of niches. In this context the question "The end of walking?" might be inappropriate and nonsensical. It might be just a provocation that becomes a tool to think with. It is our tendency to look for the number that explains it all.

Likewise, contrasting scenarios might be only caricatures of extreme situations. It is most probable that if the scenarios happen, they will coexist. However, the price of private individual mobility is a very measurable and factual indicator – one might describe it as the number of hours someone needs to work to move one kilometre in a motorised device. But even then it will depend very much on social differences and salary levels. What might be prohibitive for some might be a blessing for others – higher income people might have more road space the more people are priced out of their cars.

Whatever the mobility scenario other sociological and anthropological trends and values will have an important part. For example, health concerns might trigger higher levels of walking – most of it in the context of leisure but it is to be expected that some of these trends will make more people choose walking also as a transport mode. Culture is always a determinant to change behaviours and sometimes it is difficult to distinguish if culture anticipates or follows prices – it is common and socially more accepted for something to become fashionable and thus to allow someone to give up something else that became prohibitively expensive. Apart from health, other cultural triggers can induce more walking – in a complex world where machines are ubiquitous one can already feel some people yearn for simplicity and slowness. But all these cultural trends might not be strong enough to work against cheaper and cheaper energy prices. Even the ease of transmission of cultural memes[9] will depend on energy prices - low costs of mobility will increase average speeds and will exacerbate urban sprawl. This in turn seems to have an impact on reducing social capital (Putnam, 2000) and might weaken the transmission of memes and massive social changes – if some crave city life and slow walks in historic neighbourhoods, others might feel content with fast speeds and be a soccer-mum or a soccer-dad for at least a period of their lives.

There is a good measure for everything. Even planning paradigms that put to the fore accessibility instead of mobility have their caveats. As E. M. Forster showed in his cautionary tale of 1909 "*The Machine Stops*" even a world of full accessibility and very low mobility can turn out to be a dystopian nightmare. To find this good measure implies that the future of transport planning and management will be more and more political. It will need a variety of shared visions and to ponder their consequences. Visioning might become the most vital step in the policy process (Meadows, 1996). This will be more so with complex policy issues like mobility. Because it is increasingly difficult to predict the future, these scenarios will enable us to explore future narratives. Change based on different paradigms can only be achieved by constructing powerful policy visions. From policy based on modelling, we need to be able to share, ponder and discuss the consequences of our daily acts. Instead of modelling-and-decide we need more of debating-and-decide. David

[8] The "**long tail**" refers to the statistical property that a larger share of population rests within the tail of a probability distribution than observed under a 'normal' or Gaussian distribution.

[9] "a unit of cultural transmission, or a unit of imitation", term coined by Richard Dawkins in his book The Selfish Gene (1976). He used the concept for discussion of evolutionary principles in explaining the spread of ideas and cultural phenomena.

Harvey concluded his book *Spaces of Hope* with the description of a utopian world where he got to the bottom of his intimacy and values (Harvey, 2000). The philosopher Jean-Pierre Dupuy defends the opposite: "*Enlightened Catastrophism*" – where we build and ponder carefully the dire consequences of our current life-styles (Dupuy, 2004). Imagining and evaluating the extreme left hand side of **figure 2** (Dupuy) or its extreme right hand side (Harvey) can be the base of very potent narratives to avoid or hope for. Departing from these extreme visions it is also important to ponder the subtleties of the impact of technology on our lives and transport systems. Whatever the method, if our goal is to build a more sustainable future, the decision process cannot be entirely rational. We will need to embrace paradoxical values and ethical conflicts. If values are important then art, philosophy and a good story will help us to understand the flaws and consequences of our own narratives and to achieve our goals.

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