Transport Analysis in an Uncertain World

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"Uncertainty is an uncomfortable position. But certainty is an absurd one." Voltaire (1694-1778)

In recent examination of future mobility and our approach to policymaking and investment, I have heard more than once the replaying of the quotes 'if you always do what you've always done, you will always get what you've always got' and 'if all you have is a hammer, everything looks like a nail'. I am strongly of the view that our approach to transport analysis is facing testing times and needs to be questioned in terms of whether or not it remains sufficiently fit for purpose.

A contextual cocktail of deep uncertainty and bias

There is more capacity for interconnectedness in the world than ever before, with colossal amounts of information created and circulated. News travels fast, including hype, and this can amplify the sense that we are in highly dynamic and uncertain times. Whether or not we are in more uncertain times than ever before, is debatable. However, we face major challenges, changes and unknowns socially, technologically, economically, environmentally and politically. This suggests we are in a time of what Walker at al (2010) refer to as 'deep uncertainty'.

The digital age gives us so much information at our fingertips. We are able, like never before, to explore ideas, discover insights that are new to us and to form, inform and reform opinions. The global knowledge base is comprised of theories, empirical evidence and interpretations. Within this knowledge base we search for heightened understanding, increasingly across disciplines. However, given the potential extent of information available, our searches can typically only be partial. In the views we seek, the views we form and the views we impart to others, we are synthesising the complexity of reality in a particular way. There are biases at work.

The perseverance of transport analysis

Transport analysis has many forms. Nevertheless, a key thrust of analysis has been an ultimate purpose to inform or guide the decisions of policymakers and investors. The goal is to: (i) establish how the transport system can be developed and operated to achieve particular aims and at what costs; and (ii) determine how demand and system use will respond and with what consequences. We have evolved modelling tools that can represent supply and demand. Such tools are a basis for forecasting, and their results feed into appraisal methodologies that are used to weigh up costs and benefits. Such analysis does not purport to be deterministic. Stochastic processes and input assumptions can allow for uncertainty (though not for black swans (Taleb, 2007)). However, such assumptions are likely to be subject to bias, and there can be a tendency for a false sense of confidence in the results of the analysis, such that the degree of uncertainty is (even if unintentionally) concealed.

It can be tempting to believe that it is possible to overcome the uncertainty challenge by developing ever more advanced and refined analytical tools. After all, uncertainty arises from an insufficient understanding of cause and effect. In the era of 'big data' and growing computational power, maybe

analytical capability will rise to the challenge? If we can break the phenomena under study down into their component parts and undertake more research to understand them, can we not nourish the effectiveness of our transport analysis?

Confronting wicked problems

This might be the case if we were trying to improve understanding of steady-state phenomena and to make sense of 'only' difficult or complex problems. However, some problems are termed 'wicked' (Rittel and Webber, 1973). Rittel and Webber contrast wicked problems with those they term 'tame' and which they describe as being "definable and separable and may have solutions that are findable" (Rittel and Webber, 1973, 160). Kolko (2012) outlines four reasons for a 'wicked' problem being difficult or impossible to solve: "incomplete or contradictory knowledge, the number of people and opinions involved, the large economic burden, and the interconnected nature of these problems with other problems". What would be the most appropriate course of action to ensure better, or the best, future prospects for the transport system and its use? How will travellers respond to future conditions? How valuable is (the saving of) travel time to the economy or to the traveller now and in the future? Such questions, in my view, are reflective of wicked problems. Yet in a rather illusory way we have treated them as tame.

Camillus (2012) suggests that when we have a fundamentally sound strategy, the use of feed-back from application of that strategy can help refine the strategy. However, he suggests that feed-*forward* techniques are called for when facing wicked problems that "arise from unanticipated, uncertain, and unclear futures". Amongst developed economies with mature transport systems, we have been living through a period in history that has been termed the regime of automobility (Geels et al, 2012). This has been characterised by a presumption of responding to ongoing road traffic growth and of the fundamental coupling between economic activity and road traffic activity. Our analytical tools have been honed and applied on the basis of feed-back during a period of regime stability and, perhaps, refinement. They are designed to handle increases and growth. This regime may continue, but the deep uncertainty we face may be symptomatic of regime *instability*. There has been an interruption to historic road traffic growth in a number of countries. There has been a weakening of the link between economic activity and road traffic activity. Trip rates have been in recent decline. In these circumstances it would be prudent to give greater attention to feed-forward techniques.

The need for stronger planning to shape and respond to the future

Feed-forward techniques are concerned with looking to *shape* the future as a more proactive agent of change, or are concerned with how to scope and monitor the future and develop business models and policy paths that are flexible and resilient to the uncertainty faced. It is suggested that "the best response to deep uncertainty is often a strategy that, rather than being optimized for a particular predicted future, is both well-hedged against a variety of different futures and is capable of evolving over time as new information becomes available" (Lempert et al, 2003: 5).

Recent work I was engaged in to look at scenario planning, aimed to expose uncertainty as an aid to subsequently examining the way in which we approach decision making and investment in transport (Lyons and Davidson, 2016). This led in turn to engaging with the UK transport profession to consider its views on the matter (Lyons, 2016). Scenario planning in this context identifies critical

uncertainties as a framework for depicting plausible yet divergent futures. With a focus on future demand for (car) travel, two critical uncertainties were considered: the relative price of energy; and society's preference between physical and digital connectivity. *Plausible* future scenarios to 2042, based on how these critical uncertainties could play out, suggested a range of change in total car travel compared to 2014 levels from +35% to -53%. In a series of workshops involving over 200 UK transport professionals, participants gave a collective indication that a change of -53% was as plausible as, if not more plausible than, a change of +35%. Frustration was expressed with a current approach to decision making and the supporting transport analysis in which processes are followed by rote, with insufficient acknowledgement of uncertainty and a lack of strong planning that seeks to shape a better future though better engagement with the many stakeholders concerned.

Your views and mine are biased

Such work underlined the importance of the biases referred to earlier. Biases are at play all around us as we engage in the design of research methodology and analytical techniques, when we participate in dialogue with others and when we seek to determine appropriate courses of action. Decision biases are not a new discovery in either the academic literature (e.g. Carter and Kaufmann, 2007) or business strategy guidance (e.g. Hammond et al, 1998). However, this does not mean that there is as much sustained awareness of biases or effort to control for them in practice as there might or should be, not least because such biases are often unconscious. The following 5-minute video provides a helpful overview of four common biases - https://www.youtube.com/watch?v=3Ux3pm6UfCo. These biases are the *self-serving bias* (if it works it is down to me, if it does not work it is down to others), *cognitive fluency* (something that is easier to understand is more believable), *sunk cost fallacy* (aversion to loss can mean a temptation to persist with an unsuccessful approach in which we have already invested) and the *confirmation bias* (looking only, or predominantly, for information that supports my beliefs). It is poignant to ask of ourselves – are we subject to such biases? If we are, we need to consider whether and how to counter them as part of our role as transport analysts.

Points for reflection

What could this mean for transport analysis? This needs debating. However, in drawing to a close I offer some suggestions to reflect upon:

(i) *Knowing and declaring limitations* – Being authoritative as an analyst is something one would expect if the analytical results and interpretations are to be taken seriously. This should include being aware of, and prepared and able to articulate, the limitations of the analysis in relation to the problem being addressed. There can be a fear that this might diminish standing if too openly acknowledged. Yet to do otherwise is to diminish our collective capacity to challenge and evolve the approaches to analysis that we take.

(ii) *Being objective and impartial* – Digital connectivity, both to other analysts and to multidisciplinary resources, broadens the scope of potential enquiry. Strengthening our own credentials as analysts concerns taking advantage of such connectivity but in a way that keeps us conscious of confirmation bias and cognitive fluency. We should seek to ensure we are as active in seeking and examining views and information that are counter to our instincts as those which may be confirmatory. We should be prepared to devote more time

to making sense of the less familiar rather than only pursuing analysis and interpretation within our existing comfort zone.

(iii) *Valuing diversity* – If the problems we face are more inclined towards wicked than tame then we need to be open to the value of multi-disciplinary if not inter-disciplinary working with others from different backgrounds in order to bring new combined thinking to bear. Rather than working in different constituencies which either ignore or challenge each other, collaborative challenge means that established and orthodox approaches to analysis can be constructively questioned as to their continued fitness for purpose.

(iv) *Greater complementarity* – Mixed methodology approaches to analysis can be more complex and resource hungry. However, they may also help build greater confidence in the analytical findings and interpretations, thereby proving ultimately to be more cost effective. A case in point would be scenario planning and travel demand forecasting. These should not necessarily be seen as substitutes or alternatives to choose between. Instead they should be seen as techniques that can be used in tandem to expose uncertainty and probe plausibility (feed-forward) while being able to draw upon prior empirical analysis and understanding (feed-back) (see for example Chatterjee and Gordon (2006)).

(v) *Rebalancing the analytical remit* – In the face of a highly uncertain future, analytical scope and priorities needs to be appropriate. There are at least two spheres of potential analysis: (a) analysing past and present cause and effect in pursuit of greater explanatory power that can in turn deliver assessment of future states, based upon policy and investment options; and (b) developing and examining strategic goals for a better future, and in turn developing and examining policy and investment options for realising these goals in terms of the flexibility they offer in responding robustly to a changing world. It is suggested that the second sphere should warrant greater attention than has been the case in the past.

Returning to the quote at the start – uncertainty is an uncomfortable position. However, it is one that transport analysis must embrace and indeed one that can be turned into opportunity if we are willing to review the purpose of transport analysis and the techniques we employ.

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