

Transport Resilience Review – Evidence from the Disruption Project

1. Introduction

The Disruption project is a 3 year project funded under the Research Council UK's Energy Programme seeking to identify new ways to develop and implement lower carbon and more energy efficient travel.

The project has collected data on disruptions to mobility at a household level, organisational level and a community level. The data involves a mixture of quantitative and qualitative data sources collected both during the course of normal life and during periods of disruption. The different case studies have included significant pre-planned events (e.g. London 2012 Olympics) and unplanned events (e.g. winter flooding in 2013).

This document provides a short response to the Transport Resilience Review published for the Department for Transport in July 2014. The Disruption project has a broader goal than assessing resilience, exploring the wider implications of people's ability to cope with, embrace and innovate when faced with change. This document therefore focuses on what we can understand about social adaptability and the implications of extreme weather events on society rather than on the details of infrastructure modifications. There are clearly overlapping interests from the Disruption project and the Review around the goal of minimising the severity and duration of major events. We would see additional opportunities available for action if the framing of resilience is expanded significantly beyond infrastructure.

2. Infrastructure Resilience and Social Resilience

The Transport Resilience Review sets out three layers to resilience:

- Increasing the physical resilience of transport systems to extreme weather, so when extreme weather is experienced, people and goods can still move
- Given the expense of ensuring total physical resilience, resilience is also about ensuring processes and procedures to restore routes and services to normal as soon as possible after the weather abates.
- Thirdly to ensure clear and effective communication to passengers and transport users so that the impact of disruption on people and businesses is minimised.

We would support these three elements as part of future transport policy. However, our evidence suggests that this draws the net too tightly around infrastructural adaptations as

the key solution, does not challenge the idea that lower mobility for short periods is something to plan for and implies that top down communication alone will be sufficient to inform travellers. Some key findings from our studies are set out below to highlight why a broader framing is necessary:

- Not everyone wishes to travel to the same extent during extreme weather. People travel less for leisure, for shopping, for work and to work. The reasons for this can relate to attitudes to or experiences of personal risk, to the time spent travelling when the network capacity is reduced, to needing to take on 'knock-on' caring responsibilities (i.e children who cannot go to school), or to the availability of alternatives. Around 25% of people report cancelling any activities with around 20% being postponed to some later but known time. On the first day of the flooding people were more likely to postpone than cancel for most activity types.
- Those people who have experienced flooding more regularly are better prepared to cope. This suggests that community planning might be helpful.

Table 1: Survey of winter flooding in Thames and Severn river corridors (n=)

Number of times affected	Carried On	Conducted at Home	Another Form of Transport
0 times	37%	5%	15%
1-2 times	44%	10%	14%
3-6 times	38%	11%	19%
7+ times	27%	12%	25%

- There is significant potential for some workers to work remotely but their ability to do so depends on having robust facilities to do so (e.g. poor quality broadband did not allow for teleconferencing) and clear workplace policies.
- The available network capacity in affected areas can lead to very significant delays (journeys of 20 minutes taking 2 hours or more). In York, cycling was identified as a very time effective way to continue making short journeys. A broader conceptualisation of 'highway capacity' in an urban context is necessary. This was supported by data from the large scale quantitative survey which showed that those with high car use experience less frequent disruption, but when they do they are less able to cope.

We recommend that a broader conceptualisation of highway capacity is considered taking account of the role of non-motorised modes of transport.

- Attention needs to be paid to the availability of schools during flooding. The closure of sites for health and safety reasons (and also in winter weather work because staff could not get to school) was a significant source of cancelled work journeys.

We recommend that the Department evaluate the significance of broader social adaptation to extreme weather events as part of its response strategy and evaluates the cost effectiveness of non-infrastructure interventions.¹

The Resilience Review further recommends the prioritisation of key points of failure and critical links (such as access to ports and airports). Prioritisation is clearly a necessary and productive process. However, the review does not provide any clear insights as to what the right priorities are. Access to ports and airports clearly has a strong industry focus. However, what are the critical links for people? This might best be answered by looking at what activities cannot be time shifted or which, if they are shifted, result in significant distress. This would identify activities such as health care and looking after vulnerable people over an above accessing work, going shopping or taking leisure opportunities. Video conferencing is seen to be an acceptable option for business meetings in these circumstances (as well as being used more widely in some others). It suggests also that investment in community capacity building and social bonds would be valuable even if this is not always driven by the state.

We would therefore recommend that infrastructure resilience planning is seen as a central part of community resilience planning, at least for local authorities, rather than being an activity in and of its own right. This would be a broader interpretation of the recommendation in para 41 of the Executive Summary.

3. The Economics of Disruption

As part of our work to understand how disruptive events are conceptualised we undertook a piece of work looking at the economics of disruptive events and how they are assessed. As the report notes, “the economic rationale for investing in transport resilience is currently poorly developed and needs to be strengthened” (see also recommendation in para 49 of Exec Summary)

Intermittent but highly disruptive events have strong implications for behaviour as well as social and economic welfare. This is particularly the case when they lead to catastrophic failures in the transport system over a prolonged period of time. Our evidence indicates that during disruptive events certain economic conditions occur, and these challenge the appropriateness of the application of standard cost-benefit analysis methods for evaluating the cost of disruption (and by implication the benefits of interventions that reduce the impact of disruptive events). The conditions violated are associated with large changes in transport costs and/or the loss of a mode, both of which invalidate the use of the Rule of Half, a key method applied in typical CBA.

¹ A report on lessons from the York Floods of 2012 is available on www.disruptionproject.net



Whilst it can be the case that some disruptive events can be contained to just the transport system – for example transport closures of several hours due to fatalities on a railway line or a road – our case studies demonstrate how large parts of a local or regional economy can be affected by some disruptive events. The transport network is high profile, but other aspects of the economy and society are affected too. School closures lead to a large reduction in trips to school, but often the cause of such a closure is not transport related but due to the fact that the car parks, the pavements and the playgrounds within the school grounds are unsafe. Outdoor sports facilities become unusable therefore such activities (as a participant or a spectator) are cancelled. Property damage is also clearly evident as well as business closures. In all these instances the primary market that is affected is not transport. Transport in each of these situations is a secondary market. Evaluating the impacts of such disruptions in the transport market will not therefore capture all the impacts of the disruption. There becomes a need to adopt a more general framework which is extremely challenging.

These conditions combined with the uncertainty in what the marginal costs of disruption (per unit of delay) are means that studies to date on the costs of disruptive events are likely to have not measured their full costs. There therefore exists a need to better understand the full costs of disruption using methods that can address the unique economic circumstances present during the disruptive event. Furthermore there also exists a need to examine the benefits of different policies, including non-transport related policies (e.g. land use intensification and changes in working practices), that can make society more resilient to disruption under a more complete economic paradigm. In some instances methods exist for a fuller assessment of the impacts of disruption, but in other areas – particularly that of multiple market impacts – considerable research effort will be necessary to assess the interesting situations that disruptive events create.

We would be happy to share data sets and to co-convene a seminar on the challenges of valuing the impacts of disruption and a full suite of resilience responses.

4. Communication

The Resilience Review provides some clear recommendations on the importance of diverse yet consistent communication. The suggestions around the use of images on social media have been shown to be effective during the recovery from Hurricane Sandy in the US. However, we also see there being a need to maintain a broad approach to communicating, which raises some challenges to consistency of message. In our work on snow and ice we asked specifically about what sources people used and whether they found it useful.

14% of people used central government advice, 20% local authority advice, 17% emergency services and 56% other national organisations (which includes transport operators). 88% of people followed some of the advice. The table below shows how diverse the process of



accessing information is. Whilst the internet is growing in importance it is essential to not lose sight of the different channels still in use.

Table 2: Sources of information during snow and ice events from Winter 2013

Mediums		Mediums	
TV	81%	Facebook	8%
Radio	54%	Other Social Media	1%
Newspapers	22%	Family & Friends	19%
Internet	48%	Other	2%
Twitter	4%		

The work on flooding in York also highlighted the need for ‘useful’ information. In that case, the Environment Agency was recognised to be good at producing peak river levels and timings but the implications of this for specific road sections were not clear. This may fall into what the Resilience Report calls ‘technical jargon’. The traffic information was also not available to this level of detail.

We recommend that further work is undertaken to understand what to communicate as well as how to communicate it, further developing recommendation in para 37 of Executive Summary.

The recommendation that public transport operators should advertise and run the best service they think can reasonably be delivered is, we feel, very helpful. Passengers reported most stress when they started out on journeys which they then realised they had little reasonable prospect of completing. Some very poor choices are made. We would however point to the need to be clear with passengers about their rights in situations where they decide not to travel. In particular, many people continue to try to reach airports in difficult circumstances in case their flight is able to leave. The Ash Cloud crisis in 2010 was a case in point where airline support desks were overwhelmed and websites were down so passengers were making trips to the airport to see what could be done at the airport. Airlines and airports should work together to be clearer about the wider implications of disruptions far earlier.

Highways Efficiency



The Resilience Review makes some important points about the importance of maintenance spend in the context of the additional damage costs that flooding can cause to roads which are not in good condition. Although not part of the Disruption project, within the Highways Maintenance Efficiency Programme (HMEP) ITS Leeds and partner M2I have been developing cost benchmarking of highways function across local authorities in England. The work consists of determining how costs are impacted by the scale and quality of highway maintenance provision and controlling for how the public perceive the service (via measures of citizen satisfaction). A measure is also provided as to the likely size of cost savings should a specific authority be able to adopt best practice. The results will be used to; identify the best performing Authorities for any maintenance activity (those at minimum cost), to help an Authority identify those areas of activity in which they have the greatest potential for improvement (the largest efficiency gaps) and to measure the efficiency savings achieved by individual Authorities and the sector as a whole (reductions in efficiency gaps over time). This statistical work is being supported by 'bottom-up' work to identify specific efficiency measures that authorities can adopt to close the identified gaps. More details can be found at <http://www.nhtcgc.org/>.

We would be happy to present this work to teams within the Department for Transport beyond the existing HMEP programme group.

