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Interactive Metal Fatigue; A critical lens for the assessment of socio-technical reconfigurations in traffic

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Abstract

Interactive metal fatigue (IMF) is an elegant re-appreciation of the concept of 'interpassivity', describing how it develops through minifractures in subjects' attempts to keep up with societal demands for interactivity. Other than the original art-philosophical and psychoanalytical understandings, this rather historical conceptualization opens up the 'interpassivity' notion to sociological and political research. Particularly promising, it will be argued, is its aptitude to diagnose and articulate the often so elusive (side-) effects of socio-technical 'system innovations'. Currently these tend to be evaluated in terms of 'sustainability', but this notion seems insufficient to capture the multi-sidedness of the reconfigurations involved. Socio-technical innovations are known to be contested social changes. *Yet what is it that makes them contested? How can their societal relevance be appreciated? And considering that assessment in terms of 'sustainability impacts' leaves certain problematic aspects underexposed, how could the notion of 'interactive metal fatigue' enrich our understanding of socio-technical innovations?*

These questions are answered through analysis of contemporary reconfigurations in the Dutch traffic management field. Generally for reasons of safety and efficient circulation, interventions in traffic reconfigure a socio-technical web of human and non-human elements. As elicited earlier by Latour and others, many ordering tasks have been 'delegated' to the latter. This contribution shows four simultaneous yet dispersed reconfigurations. Particularly salient is the initiative to stimulate the social sharing of space – rolling back the 'colonization of the life-world' by traffic lights, speed bumps and road lineage in favor of a more interactive and 'humane' traffic order. On the other hand, the advances in Intelligent Transport Systems (ITS) indicate reconfigurations that rather seem to *increase* interpassive traffic relations. Looked at in terms of IMF, this seemingly odd contemporaneity can be understood as closely related moments in the dialectic of enlightenment. Traffic innovation is thus shown to involve not only efficiency and environmental impacts – it also raises the questions whether traffic is becoming our 'interactive vacation', and whether it should.

0 Introduction: The quest for sustainable 'system innovations' and the elusiveness of socio-technical impacts

Currently there are widely felt concerns over sustainability challenges. Increasingly these challenges are seen to reflect systemic flaws in societal systems such as energy, agriculture, health care and mobility. Further reasoning that these systemic problems are in need of correspondingly systemic solution strategies, more and more researchers and

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practitioners embark on a quest for sustainable 'system innovations' and 'transitions' – encompassing and long-term systemic transformations, involving changes in dominant cultures, structures, and modus operandi (Rotmans, 2003, 2006, Loorbach, 2007, Grin et al., 2010). The quest for system innovations responds to the diagnosis of system pathologies, of locked-in development patterns that are increasingly out of tune with the fulfillment of actual and future societal demands. Against these system pathologies, 'conventional' technological innovations or behavioural changes are considered to fall short. Instead, solution strategies should integrally address the structures they seek to change. This is why 'system innovation' revolves around the reconfiguration of entire socio-technical systems (Geels, 2005, Smith et al., 2010).

As mentioned, the quest for system innovation is motivated and legitimized by the diagnosis of system pathologies. These diagnoses tend to focus on the perceived unsustainable character of current socio-technical 'regimes'; the emission of greenhouse gases, the exhaustion of critical natural resources, pollution, or in the case of health care, the increasing mismatch between supply and demand. The system pathologies at hand in a socio-technical system can be diagnosed through the so-called multi-level perspective on societal transitions (Geels, 2005, Smith et al., 2010). Yet as has been frequently pointed out, this model cannot establish system pathologies 'by itself'. As a model it is meant to render complex matters tractable, of course, but various commentators have pointed out the risks of oversimplifying what appear to be layered, diverse and spatially dispersed issues (Shove & Walker, 2007, 2008, Meadowcroft, 2009, Stirling, 2009, 2011, Coenen & Truffer, 2012). Not surprisingly therefore, empirical investigations into system innovation 'in the making' have brought forward that this tends to be a deeply contested practice, in which involved parties entertain divergent ideas about what counts as systemic problem or solution (Smith, 2007, Voß et al., 2009).

The controversial nature of socio-technical system innovations is to some extent inherent to its transformative ambitions, and the attendant aim to disrupt (Grin, 2010). Yet another source of controversy is the establishment of distinct system pathologies within complex societal structures. Now there may have arisen a global consensus on the insufficiently sustainable nature of the current energy system – some system pathologies like the overreliance on fossil fuels can be agreed upon. Yet often things are not that clear. The mobility system, and the associated notion of sustainable mobility, is a case in point: As discussed by Cohen (2006), it is only recently that the problems of an automobile-dominated mobility system are becoming acknowledged to their full complexity. Next to the problems associated with fuel use and congestion, he notes a growing attention to a third category of problems; the car's role in the emergence of sprawling settlement patterns and unhealthy 'sedentary lifestyles' (29). In this respect Cohen notes that solution strategies hitherto have tended to target only one of these problem dimensions, yet such 'reductionistic segmentation often has perverse effects' (31). Adams (2005) phrases it even more strongly, pointing out that the environmental externalities of mobility have wrongly started to overshadow its social externalities. He brings forward the counterfactual situation in which the environmental constraints on mobility have all been surmounted, and mobility growth could go on unfettered. In such imaginary situation not all things would be fine, to say the least: Arguably, society would become

more dispersed (more suburban sprawl), more polarised (greater disparity between rich and poor), less culturally distinctive (the McCulture will be further advanced), less child-friendly (children's freedoms will be further curtailed by parental fears), more anonymous and less convivial (fewer people will know their neighbours), more dangerous for those not in cars (more metal in motion), populated by people who are fatter and less fit (less exercise built into daily routines), more crime ridden (less social cohesion and more fear of crime), subject to a more Orwellian style of policing (more CCTV surveillance), less trusting (the rise of the audit/risk-assessment culture) and less democratic (the majority will have less influence over the decisions that govern their lives).

Left aside the question how the above 'social externalities' flow from the car-dependent society (see for example Jeekel, 2011), they do seriously challenge narrow conceptions of 'sustainable mobility' that focus on fuel efficiency, congestion abatement and traffic safety only. In this respect it has been remarked how vested interests seek to push forward their own particular 'sustainable mobility' agendas to the detriment of less well-positioned stakeholders (Hajer, 1996), and the quest for system innovation better not overlook the importance of 'socio-spatial' impacts (Zijlstra & Avelino, 2012, see also Cohen, 2010). The condition of living in a car-dependent, hypermobile society poses not only challenges of ecological sustainability – as is elaborated under the 'mobilities' paradigm, it changes the very fabric of society in many, not always foreseeable ways (Urry, 2000, 2004, Sheller & Urry, 2006). Yet a crucial difficulty with these miscellaneous societal impacts is that they tend to be elusive to analysis and evaluation. Unlike safety, congestion and fuel efficiency they are hard to measure, in the first place. Yet apart from this issue of measurability, there is also the more fundamental challenge to articulate these 'social externalities' as pathologies: When emphasizing that the condition of hypermobility sets everything 'in flux', it is all the more difficult to diagnose any alienation or 'colonization of the lifeworld' (Kelly, 1994, Sheller & Urry, 2003). As mentioned, such diagnosis is particularly important when embarking on system innovations, seeking to transform socio-technical evolution towards more sustainable and 'less pathological' states. Hence the following questions: *How can the societal relevance of socio-technical innovations be appreciated? And considering that assessment in terms of 'sustainability impacts' leaves certain problematic aspects underexposed, how could the notion of 'interactive metal fatigue' enrich our understanding of socio-technical innovations?*

The latter question runs ahead of the main argument presented in this paper: Socio-technical innovations, and especially those occurring in the mobility system, can be better understood and articulated through the lens of Interactive Metal Fatigue. In the following section it is therefore exposed what IMF is, how it helps to grasp (possibly problematic) turning points in socio-technical relations, and how it seems to be particularly apposite to analyze changes in traffic practices **(section 1)**. Next, the IMF perspective is used to briefly analyze four innovation attempts in the Dutch traffic management field: Particularly interesting for our purposes is the appeal for the 'social sharing of space', seeking to roll back the 'colonization of the lifeworld' through traffic management **(section 2)**. The other cases are innovation processes that unfold 'in parallel': The

'network turn' in mobility policy towards cooperative governance **(section 3)**, the development of the 'travel information chain' and the associated advances in 'traffic intelligence' **(section 4)**, and the imposition of 80 km/h zones on Dutch highways, 'greening' traffic through a controversial enforcement system of 'section controls' **(section 5)**. Finally, the four cases are assessed as dispersed but interrelated reconfigurations in traffic. Particularly striking is the odd simultaneity of developments that increase and those that decrease interpassive traffic relations. *Is traffic becoming our 'interactive vacation'? And if so, in what sense does this constitute a system pathology to be addressed by system innovative action?* The IMF perspective insightfully interrelates the contradictory trends as intertwined moments in the dialectic of enlightenment. For system-innovative endeavours this implies an argument for a differentiated, spatially sensitive approach **(section 6)**.

1 Interactive Metal Fatigue: Socio-technical reconfigurations as turning points in interactivity

The quest for system innovation, as an attempt towards reconfiguration in socio-technical systems deemed pathological, runs into difficulties when it comes to specifying the system pathologies involved. Relations in socio-technical networks are presumed to have congealed into problematic systemic structures[2], but how can this problematic nature be articulated? As demonstrated above, this often takes place in reductionist fashion, concentrating on the more obvious, measurable and politically salient issues. In the case of the mobility system this manifests in a focus on environmental externalities, to the detriment of the various social externalities that seem to be involved as well. The latter are rather elusive: The distancing between neighbours, road rage, the livability of streets, the advent of sedentary lifestyles and the erosion of trust – all of these phenomena lack an easy translation into 'sustainability indicators'. The various accounts of mobility-induced 'alienation' therefore tend to remain confined to rather abstract sociological-philosophical theorizing, and as yet fail to inform system innovative action. Theoretical work is needed to articulate, disclose and make operative these vague system pathologies. The notion of 'interpassivity', and especially its adaptation into 'interactive metal fatigue', promises to facilitate this:

'Interpassivity', a term originally coined by Žižek and Pfaller, seems an eligible candidate for the task at hand. First of all it needs to be noticed how the term bears an immediate pejorative connotation; the injunction of passivity is almost sufficient to bring home that problematic interrelations are referred to. This is, to some extent, indeed the case. In the original uses of the term, it refers to an inversed relation between a work of art on the one hand, and a spectator on the other. The first can have a passive life, waiting for spectators to accord meaning to it, but it can also be designed to function interactively, requiring the spectators' inputs for the artwork to be fully realized. Compared to the examples of passive consumption and interactive engagement, the

[2] System innovation addresses systems whilst socio-technical approaches tend to uphold an ontology of *networks*. This may seem to introduce incommensurable conceptualizations, but the difference is of a gradual nature. Networks can congeal into systems, and systems can break down or 'melt' into less structured networks (Law, 1992, Grundmann , 1999).

'interpassive' arrangement can be considered pathological: The artwork is designed to be sulf-sufficient, i.e. *no longer* needing the spectators' inputs for its active performance. This makes a mockery of the interactive relation, or a way to open it up for reflection. In any case, the active appreciation of an artwork is 'outsourced' from spectator to the work itself, and this is surely an odd subject-object configuration. *Yet in what respects can it be considered pathological? How could it help articulate what is 'wrong' with the social externalities of mobility?* Analyzing the 'interpassivity' understandings from Žižek and Pfaller, van Oenen (2008, 3/4) concludes that both fail to provide a satisfactory account of this: From the examples given it remains unclear what the 'outsourcing' means to the (supposed) art lover, and the pathological character of 'interpassivity' thus remains unclear. Furthermore, van Oenen notes that both on Žižek's and Pfaller's accounts interpassive pathology is to a large extent considered inherent to human psychology (and its situation in a modernist-capitalist social order). If interpassivity must be pervasive and eternal, van Oenen rightly concludes, it can hardly be used as a distinctive category – how to separate pathological from 'normal' socio-technical relations? (5).

Interpassivity in its basic form refers to an odd socio-technical configuration. However, it is especially its reworking into 'interactive metal fatigue' that allows to express in what sense it could be considered pathological, and how this relates to particular configurations in socio-technical evolution. First it is important to note that the metaphorical term IMF does not so much indicate a (problematic) *state*, but rather a *process* (that can become problematic). Indeed, van Oenen (2008, 7) argues, the concept is meant to describe a historical turning point in modernist praxis. In doing so he enables the social theorist to distinguish development patterns in interpassivity; the rise of the emancipated subject, the interactive epoch in which emancipation was for a large part realized, and the typical antithesis of interactivity fatigue and its outsourcing. These developments are treated as moments in the dialectic of enlightenment (Adorno & Horkheimer, 1973). Following this Hegelian approach, interpassivity and interactivity are historically related: Interpassivity is a product of interactivity, which is itself a historical achievement as well. Interactivity refers to a particularly emancipated and democratic relation people entertain with each other and with institutions; they assume that the norms through which they calibrate their behaviour have been established interactively – the validity of these norms partly relies on their consent (van Oenen, 2011b, 56). IMF thus refers to a psychological condition of overburdened interactivity, be it one that is induced by evolving societal structures (idem, 66). This historical treatment of interpassivity is attractive for the study of socio-technical innovation: IMF focuses attention onto structural turning points amidst long-term societal evolution, and this focus it shares with the quest for system innovations and transitions.

The IMF concept is promising as a structural-historical category, but it also usefully treats interpassivity as a *socio-technical* phenomenon. Also in this respect it brings the interpassivity concept closer to what is central in system innovation research – the changing (and sometimes problematic) relations between humans and their ecological-technological environment. The structural-historical concept treats the development of modern subjectivity as closely interwoven with the institutions and technologies that made emancipation possible. In van Oenen (2011b) this socio-technical evolution is

retraced for several societal practices: Politics, law and public safety, the public/private distinction, and public space. These concrete analyses allow him explain why IMF emerged only recently, and how this is inextricably connected with shifts in the socio-technical fabric of society. The modernist project started with the aim to emancipate from the shackles of tradition and determination, and become subjects as active creators of the world. This emancipation project took off especially through institutions, as vehicles for emancipation. Yet a turning point occurred once the formerly rather 'directive' institutions became subject to contestation; various cries for having a voice in these institutions eventually led to the creation of *interactive* institutions (van Oenen, 2011a, 7-9). In spite of several shortcomings, the interactive institutions were largely successful, van Oenen indicates. Yet the very success turned against itself, as it were, and the disenchantment with the interactive institutions led to a second turning point: *"Having created emancipatory institutions just some ten or fifteen years earlier, modern subjects had become so emancipated that they started to experience these very institutions as paternalistic and meddlesome. In other words, although they remained interested in interactive consultation, even insisting on being consulted on all issues that touched upon their personal interests, they no longer saw a connection between interactivity and the formation or representation of collective goals and values."* (idem, 9). This turn, in the early eighties, marked the transition to pervasive interpassive relations.

IMF is emphatically a socio-technical category. It indicates how the institutions operated as externalized carriers of outsourced (inter-)activity, in turn replaced by objects as 'placeholders' (van Oenen, 2011a, 12/13). This outsourcing onto 'placeholders' is similar to what Latour (1992) called the 'delegation' of agency to objects. Yet what is distinctive about *interpassive* socio-technical relations, is that this delegation is related to the historically emerged and apparently increasing incapacity to follow our norms without these 'reminders'. This analysis adds to actor-network-theory by helping to understand why ways of delegation change. Currently delegation no longer involves only silent and static artifacts such as the exemplary 'sleeping policeman' or the Berliner key. Instead, various 'intelligent' artifacts such as chip cards start to shape human agency more profoundly – partly because of our fatigue.

To conclude, IMF opens up the 'interpassivity' concept to the analysis of turning points in socio-technical evolution. As such it promises to help articulate the 'vague' system pathologies that are diagnosed to occur in the mobility system. The various phenomena of problematic interaction in mobility mostly concern practices in traffic – the interactions between road users. In the following the IMF lens is used to gain understanding of recent reconfigurations in traffic. Four innovation attempts in the Dutch traffic management field are briefly discussed as socio-technical changes, highlighting the (sometimes rivaling) problem diagnoses brought forward in these cases. These 'diverse transformations' (Stirling, 2011) are puzzling for their incoherence. *What is happening in terms of IMF? Can a turning point be distinguished and is traffic becoming our 'interactive vacation'?* These questions are answered in the concluding section, also confronting the ever-contested issue of system pathologies.

2 Shared Space: Rolling back 'colonization'

Historically, innovation in traffic has mostly been driven by concerns about traffic safety and efficient flow. A most prominent and fundamental innovation has been the introduction of the traffic separation principle (Buchanan, 1963): By keeping motorized traffic apart from slower transportation modes, the dangers of mutual frictions could be minimized. In the bicycle-ridden Netherlands, this principle can be read off most clearly from the separate bicycle lanes alongside the carriageway. More generally, the principle has materialized in road lineage, traffic lights, as well as in the many prohibition and admonition signs.

The by now familiar streetscape of traffic managing signs and artifacts is widely believed to have channeled the rise of mass car mobility into a relatively safe configuration[3]. Yet this streetscape and its socio-technical order also had its undesirable side-effects, critics have argued. A most elaborate expression of such criticism has become known as the 'Shared Space' approach. Its problem diagnosis and solution strategy are captured in Shared Space (2005): The key argument is that, under the sway of a dominant traffic management sector, public space has been transformed from a shared into a divided space: *"Over the past decades transport and traffic objectives, (improving traffic flows and traffic safety), have determined the way in which public spaces are designed. Often this was at the cost of quality in the public realm and the living environment of people. The Shared Space project employs a new approach to public spaces – an approach that exploits the many varied purposes of such spaces. In contrast to current design practice, Shared Space strives to combine rather than separate the various functions of public spaces. In this manner Shared Space strives to improve the quality of public spaces and the living environment for people, without needing to restrict or banish motorised traffic"* (5). The compartmentalization of public space is held to be problematic for two reasons: First the quality of public spaces is eroded by the rampant traffic signs and fences; a primarily aesthetic issue. Second, there is the rather social-cultural problematic that the interaction is public space is negatively affected: *"We are no longer sharing the space - we have split it up. Space has become a system of rules, prohibitions and orders and human beings are required to adapt to the system rather than the other way around. Social norms and values become subsidiary to traffic rules and man, as the user of the space, is reduced to a traffic participant. Shared Space succeeds by reversing these roles."* (idem, 12/13).

The impoverishment of public space and man's reduction to a traffic participant are distinct problems. The Shared Space initiators indicate that they stem from a common 'systemic failure', however; an unbalanced apportioning of responsibilities. *"The way in which public spaces were designed was determined more and more by the traffic sector and by isolated objectives and less so by politicians and the public interest they serve. Instead of being subsidiary to man and society, the sector started to determine and control the lives of individual people and groups. The situation has grown out of sync and politicians must turn the tide."* (idem, 28). Against the 'internal logic of the traffic sector'

[3] Other crucial factors being the introduction of the safety belt and the various measures against driving under influence, see Elias (1995). See Geels (2007) for the development of a Dutch highway system.

(27), Shared Space asserts the primacy of politics and the superiority of interdisciplinary design of public space. Yet the approach acquired its fame and notoriety especially for the role accorded to the road users (or rather the 'inhabitants' of *public space*). Shared Space argues for political leadership that takes responsibility rather than leaving it to bureaucracy, but this leadership should primarily facilitate and empower (29). Users should therefore be intimately involved with the design of public space, but with its functioning as well: The users are to share space through 'social behaviour' as opposed to the 'legal traffic behaviour' that is normal on highways, and use their 'self-regulating ability' (40). This means more concretely that they should to be able to coordinate without following the rules embodied by traffic signs, and rely on eye contact to negotiate right-of-way. *"Traffic rules make room for social rules. Perhaps it takes a little while to get used to it, but it is usually pleasant to stay in an environment where people behave socially, where they take each other into account. A reduction in the number of traffic signs, sleeping policemen, traffic lights, and other traffic elements that are alien to the environment immediately improve the quality of the space. So there are several reasons to encourage social behaviour."* (41). This reliance on social self-organisation also implies that car drivers should be treated with respect, instead of put upon through repressive traffic measures. Such shared and deregulated space may appear chaotic and feel unsafe, the Shared Space initiators acknowledge, but this does maintain the necessary alertness that tends to be diminished through compartmentalization: *"Better chaotic than pseudo-safe"* (45).

The latter plea for chaos in traffic has been Shared Space's 'unique selling point' in breaking through as an innovative concept. However, this also overshadows some of its less spectacular messages (Shared Space, 2008, Pel, 2012). This has falsely suggested that the concept is a solution for traffic safety, evoking predictable criticisms from traffic safety experts. This is ironic, as the key problematic expressed through the concept is precisely that traffic safety concerns have become too dominant in the shaping of public space. Shared Space signals a two-fold system pathology, with the spatial-aesthetic and social-cultural elements both tied to the dominance of a traffic sector. In terms of IMF, the Shared Space diagnosis can be considered as an outcry about excessive 'outsourcing' of interactivity from traffic participants onto interpassive objects. In Latour (1992) these 'delegations' were rather treated with wonder and as proofs-of-principle, but Shared Space states clearly that the embodied interactivity has led to spatial degradation and a net loss of interactivity – between citizens, but also between citizens and their elected representatives. The outsourced interactivity *cancels out* (Pel, 2009) immediate interactivity; a Habermasian line of thinking in which 'Verständigung' through eye-contact is thwarted, and the lifeworld is 'colonized' by crowd control. Shared Space asserts that a turning point in emancipation has been reached that leads to its inverse, in which the emancipated subject is degraded into a rule-following zombie[4]. The historical view thus highlights how the innovative concept is in many ways 'a well thought-through return to the past' (Peters, 2003), or a revival of the interactive epoch of 'building for the neighbourhood' (van Oenen, 2011b). The IMF perspective is particularly helpful in eliciting how the problematically interpassive relations are chiefly responded to by an

[4] This stark expression reflects the sometimes slightly hyperbolic vocabulary of the late Shared Space standard bearer Hans Monderman - who knew how to capture an audience.

argument for *more* (immediate) *interactivity*. Largely absent in Shared Space's problem diagnosis and especially its solution strategy is the interactivity *fatigue*. As far as it is acknowledged, it seems to be associated with the imposition of traffic management objects[5] by single-minded experts and unaware politicians, but the strains of interactivity are played down. These strains speak more clearly from various accounts of, or on behalf of, 'vulnerable road users'[6]: *To what extent can the elderly, bicyclists, children and the visually impaired be expected to self-organize? And how to have eye-contact with car drivers behind tainted windshields?* Still, notwithstanding the many possible objections and amendments, Shared Space should be considered an appealing innovation from an IMF perspective: It does raise awareness about a socio-technical turning point with time-specific tensions.

3 The network turn: 'Interactive' government

Traffic flows along endless networks, but governance remains confined to territorial silos (Urry, 2000). This discrepancy between 'system to be governed' and 'governing system', the administrative fragmentation, received increasing attention from the 1990s onwards. Especially the rise of customer-oriented New Public Management brought home the message that administration is there for the citizen, and not the other way around. This line of reasoning also inspired a variety of innovations in the Dutch traffic management field. Together these innovations can be subsumed under the 'network turn'.

The reasoning behind this 'network turn' has been exposed most clearly in the recommendations from the 'Luteijn commission'. This commission was called for by the minister of Transportation and Water Affairs, and consisted of high-ranked officials from both public and private sectors. Its mission was to devise solutions to the recurring accessibility problems on the A4 highway. In 2003 the commission published its findings in a booklet entitled 'Movement through Cooperation' (Cie. Mobiliteitsmarkt A4, 2003). Interestingly, this report reframed the very problem it was supposed to help resolve. It pointed out that the alleged A4 highway problem should instead be treated as a *network* problem – a problem concerning the traffic flows in the entire Hague metropolitan region. This network problem should be tackled integrally. However, such integrated approach would require changes in the deeply fragmented constellation of actors involved: Provincial, metropolitan and various municipal administrations were involved, as well as several public transport concession holders, NGOs and enterprises. This 'patchwork' should cooperate more for the network to operate smoothly. The commission devised a growth model for increasing boundary-crossing action. The relatively easy and operational cooperation projects in traffic light adjustment, traffic management, incident management and slippery road abatement would then create the trust needed for the more complex and controversial tasks. In the end the diverse governing actors would reach a quasi- centralized arrangement. The implicit aim towards a 'transport authority' the commission carefully sought to avoid, however. The proposed arrangement for boundary-crossing action was first tested in a 'pilot' in the Greater the Hague area, after which

[5] Interactivity fatigue does speak from the assertion that drivers are feeling 'put upon' and the acknowledgement of the attendant 'reactance' - the antisocial behavior evoked by overburdening.
[6] See Pel (2012) for more extensive treatment of these discussions.

other regions followed suit. The network-or area-oriented approach became a benchmark for mobility policy, and similar problem diagnoses and solution strategies can be found in many other innovation attempts. During this process the following expression became a mantra: *"For the road user, administrative boundaries are irrelevant"*. This user-perspective was to remind the administrators and traffic professionals of their ultimate goal – delivering smoothly flowing traffic networks, rather than particular sections of it.

With its report the commission seems to have signaled a system pathology primarily concerning the administrative structures through which traffic is governed. In Dutch public management circles the phenomenon is often deplored as 'administrative crowdedness', i.e. as fragmented and insufficiently decisive governance. The advocated network perspective is then a way to loosen up these introverted structures, and to seduce the involved parties into thinking out of their respective boxes. From an IMF perspective this innovation does not appear as a very spectacular innovation, however: The problem diagnosis brought forward, the introversion of institutions, reminisces somewhat of the disenchantment with institutions as described by van Oenen (2011b). Yet the 'network turn' was motivated primarily by the wish to have more *effective* institutions, institutions that deliver. In that respect both problem diagnosis and problem solution rather seem to stimulate interpassive relations; the passive 'traffic consumer' waits to be served through the measures concocted by mutually interactive institutions. These mutual interactions can be considered quite revolutionary for the latter, but the interaction with the first seems to have become only less relevant. From an IMF perspective the 'network-mantra' is therefore all the more intriguing: The road user/citizen is put on a pedestal, as it were, yet is hardly relevant at the same time – an abstraction[7] with instrumental significance to institutional coordination.

4 The travel information chain and the digital panopticon

The most obvious traffic innovations in the last two decades are those related to the ICT revolution. Speaking of systemic innovation, we seem to be in the middle of a major socio-technical transformation that gives rise to terms like 'ubiquitous computing' and the 'digital panopticon'. This technological revolution can of course not be ascribed to any singular innovation attempt. The governmental initiative to weld an 'information chain' tells a large part of the story, however.

In 1996 a group of policymakers from the Dutch ministry of Transportation and Water affairs launched a white paper dedicated to the development of travel information provision. The ICT boom of the 1990s had convinced them that great opportunities were laying ahead. Sketching how information provision had remained rather poor and inadequate to serve the traveler, they went on to present a future vision. In 2010, the traveler should be able to make an 'informed choice' about his travels, 'from door to door', as the then policy for 'chain mobility' read. In order to bring this desirable future

[7] It needs to be said that the 'network turn' also involved steps towards demand management, i.e. it helped establish the problem ownership of enterprises and employers as generators of traffic flows. Measures in this area, such as road pricing, are highly controversial. Hence the Luteijn growth model, paving the way through actions on behalf of citizens and enterprises.

closer, several advances would have to be made, however. The acquisition of data would have to move beyond the reliance on the rather poor detection loop systems and dispersed personal observations, to begin with. More elaborate systems based on signals emitted from cars[8] would greatly expand the data base. Furthermore it would be essential to merge the different data sources, and process them to produce reliable, coherent and easily transferable information. And thirdly, traffic information was to move beyond the state-provided traffic management guidance. Information should serve the individual traveler and lay out his options, rather than guide him to contribute to collective traffic order. These separate advances the innovators sought to secure by welding an 'information chain', to be developed by both public and private sector actors. Chain development would crucially depend on entrepreneurial innovation, the initiators held. They therefore established an independent traffic data repository and processing centre; allowing for new data sources and information services to be 'plugged in'. An associated legal measure was to restrict governmental activity in these developments – so as to create opportunities for market actors to seize.

The intended market for travel information took off hesitantly, however, and only after almost a decade the 1996 initiators could see their future vision coming closer (Pel, 1012, Pel et al., 2012). First of all, the navigation devices of TomTom had set in motion a commercial innovation race for customer-oriented traffic information services. In addition, road managers at several levels had started to pool their data, intensifying traffic monitoring and using more powerful and compatible systems. Traffic management was becoming 'dynamic', i.e. responsive to actual circumstances. And finally, the various transport operators started to develop and combine information services – even when remaining anxious to keep their information chain 'segments' under their own discretion. Meanwhile, technological advances in digital maps, data mining techniques and mobile internet continuously created new 'branches' to the information chain. By 2010, the projected horizon for 'informed choice', the information landscape had undergone drastic changes.

Somewhat similar to the previous 'network turn' example, the proposed systemic problem and its solution seem to pivot around coordination-amidst-fragmentation. Yet instead of coordinated management of traffic flows on behalf of road users, the information chain initiative was launched with an emancipatory goal: 'Informed choice' for the traveler. From an IMF perspective the innovation is striking for the move away from a 'directive' arrangement, i.e. information provision in service of collective order, towards a much more individualized arrangement in which the traveler is better informed to follow his own path. More precisely, the innovators' aim was to arrive at a mixture of the two[9] – individual choice through customer-tailored services, but also a more 'dynamic' traffic direction by road managers. Meanwhile, an IMF angle highlights especially the rather peculiar type of 'emancipation' that is at issue here. The informed choice of the traveler, – partly motivated by the wish to have people combine modes of traffic in travel chains, rather than stick in their cars -, involves a spectacular degree of

[8] Floating Car Data (FCD)

[9] This mixture between 'steering' and 'selforganization' accounts for a great deal of the tensions in the information chain innovation journey (Pel, 2012, Pel et al., 2012).

delegated activity. The well-known example is the voice from the navigation systems: 'After 100 metres, turn left'. Navigation, in many ways metaphorical for the self-directing subject, has undergone a shift from the social pole to the technical one[10]. From an IMF perspective it is therefore hardly surprising that tensions came up. Also high symbolic value has the phenomenon of the 'socially undesirable routes'. This term came up for the cut-through passages through low-intensity rural areas, taken by increasingly well-informed drivers to avoid traffic jams. Interestingly this issue was treated mostly as a matter of adequate information exchange between public and private 'chain' actors. Even when the phenomenon reached the political agenda through questions of concerned MPs, the attendant responsibilities of drivers received relatively little attention. Had politicians rightly diagnosed that traffic is already our 'interactive vacation'?

5 The 80 km/h zones: Contested greening and the limits of surveillance

The fourth and final case is closely connected to the previous, but it started out very differently. As discussed in section 0, the ecological side-effects of mobility have inspired many initiatives to arrive at a 'greener' traffic: Cleaner fuels, cleaner combustion technology, car-free zones and many other measures to curb environmental externalities. In the same vein, awareness of pollution fueled fierce battles on major road construction schemes, and this continues until today.

In 2002 the first 80 km/h zone was implemented on a road section of the A13 highway, a speed limit diverging from the usual 100 or 120 km/h. The zone was meant to reduce the air quality and noise problems experienced by citizens in Overschie, a borough of Rotterdam. The road cross-cuts this residential area, and is situated at a particularly small distance from the houses. The minister of Transport and Water affairs decided for the experimental measure under pressure: On the one hand she was held to comply with air quality regulations, on the other hand there had been an intensive campaign by Overschie citizens that attracted considerable media attention. Lowered speeds were expected to reduce the negative impacts not only because of calmer engines, modeled effects on the traffic flow dynamics accounted for another part of the environmental gains. This 'traffic calming' would by no means come about by itself, the ministerial initiators knew: The lay-out of the highway 'invited' a higher speed than 80 km/h. The intended divergence from the so-called 'design speed' was therefore consolidated through a system of section controls: Round-the-clock camera surveillance, combined with automated fining of speed excesses.

The experiment was closely monitored for environmental, safety, and traffic flow effects. Once the evaluations turned out positive, a broad societal support emerged, including pleas for more widespread application. The ministry of Environment and Spatial planning was ready to come up with additional air quality 'hot spots', but their colleagues from Transport took a more restrained approach – balancing potential environmental gains against mobility and financial concerns, amongst others. By the end of 2005 four other '80-zones' were implemented. Traffic intensity levels had only risen, however, and there had been a change of administration towards the centre-right. Soon the first congestion

[10] Even stronger examples are the 'communicating cars', and the long-awaited automatic vehicle guidance.

reports showed alarming figures for most[11] of the zones. This triggered a heated political debate in Spring 2006, in which the centre-right parties readily confronted the Transport Minister with the apparently self-inflicted congestion. And even when the minister sought to gain time to further await official evaluations, soon after she indicated to take remedial measures and 'reconsider' the zones. The apparent failure zones led her to speed up the preparations for experimentation with a more flexible, 'dynamic' speed regime. Subsequently her successor actually foresaw such measures to supplant the 80-zones. Meanwhile, environmentalists even sought to 'wrest loose' the zones by appeals to court, and populist/right-wing quarters continued to bring home their case against the resented section controls. What could be the use of these intrusive systems, other than serving as hidden taxation on already congestion-plagued drivers? As fiercely as the Overschie citizens had earlier threatened to occupy the A13 if no immediate action were taken, the section controls met with considerable resistance as well. And as the Traffic Enforcement bureau in charge of their administration had eagerly deployed the camera surveillance systems on other locations for other enforcement purposes as well, these cameras became popular targets for the militant few. Another indication of the controversy involved is the recent introduction of *130* km/h zones by the centre-right administration, a measure that featured prominently in the liberals' election campaign.

The 80 km/h zones are intriguing for the societal turbulence they created, and for their rather short-lived 'success'. For system innovation scholars it poses a rich case for its intricate governance and management aspects. For present purposes however, the most salient question is what made the zones that controversial. From an IMF perspective, the start of the case can be seen to signal the rise of interactivity: The Overschie citizens claimed a voice in infrastructure operation. This has traditionally been a highly 'directive' activity, guided by raison d'état (see for example Geels, 2007). On the other hand, air quality regulations stipulated *on behalf of* citizens posed no lesser important grounds for the zones. The IMF perspective highlights foremost the struggle to achieve the desired speed reduction, however, and the apparent necessity of the section control system. The initiators reckoned that the 'interactive' strategy would not suffice, even when they did place billboards of affected children as moral appeals. The discrepancy between the desired speed and the speed 'scripted' into the A13 they considered too great, however. The section controls and the attached fining system would be an essential physical reminder of the balance politically agreed to. In contrast with the rather 'rigid' 80 km/h zones, the later 'dynamic speed' arrangements took the above discrepancy as an even more fundamental starting point. Firmly footed in traffic-psychological wisdom, these arrangements are supposed to avoid the system pathology arrived at through the section controls: The emerging 'digital panopticon', as it has become known. On an IMF account, the observed resentment against camera surveillance reveals a turning point, beyond which delegation of interactivity is taken too far[12]. To a significant extent traffic is accepted to become our 'interactive vacation', but there turn out to be limits.

[11] Congestion effects varied widely amongst the zones; this variance was due to the so context-specific phenomenon of 'complex weaving sections'.

[12] The implicit assumption is that the section controls are not only resented for financial reasons (the fines issued), but no less for the intrusion on freedom and the denial of drivers' moral agency.

6 Conclusion and discussion: Traffic as interactive vacation?

The socio-technical reconfigurations discussed can be considered as various attempts to arrive at a more sustainable traffic system. Taken together they could be argued to have yielded a somewhat 'greener', more efficiently flowing (and therefore less dependent on infrastructure expansion) and better coordinated traffic system, with also more choice options for the traveler to change his transportation routines. However, this is not all that has changed. Returning to the aesthetic-social problematic brought forward through the Shared Space initiative, the various reconfigurations also had their impacts on traffic as a way of interaction. Not accidently van Oenen (2011b, 15) points out how traffic has become a practice in which erosion in interactivity manifests. Tailgating and keeping to the left are pervasive sources of annoyance and even aggression, yet somehow our capacities are lacking to resolve these almost generally deplored phenomena.

The IMF lens proved its usefulness in clarifying how Shared Space hits the nail of such relatively inarticulate problems on the head. What is more, it also discloses the irony of the solution strategy proposed, namely the plea for more (immediate) interactivity precisely when the resources for it are found to be lacking. This does not so much discredit the Shared Space approach; it rather asserts the relevance of conceptualizing 'interpassivity' in terms of a *dialectic* of enlightenment with unintended twists and turns. The IMF perspective also helps to unravel the not immediately obvious interconnections between these socio-technical reconfigurations; their co-evolution. While the Shared Space protagonists were seeking to prevent traffic from becoming our 'interactive vacation', other by all means reasonable innovation attempts rather seemed to exacerbate this system pathology. Administrative boundaries were dissolved on behalf of a largely absent 'citizen/road user', an information chain developed that enhanced but also eroded the traveler's self-direction, and an attempted 'greening' of traffic led to car drivers finding themselves even trapped in the information chain. Altogether the latter three reconfigurations seem to spell grim prospects for Shared Space's emancipatory mission-interpassive relations are resigned into, or even reinforced.

Then again, the dialectical perspective of IMF also warns against undifferentiated diagnosis of system pathologies. It reminds that both apparent paths to a 'digital panopticon' more or less generated their own bifurcations: The information-chain-guided driver does encounter the question whether he is driving a 'socially desirable route'. Similarly, the A13 drivers may need an external brake to keep them from their 'natural' speed, but the surveillance system is not merely a financial liability but also feels uncanny. These dialectical inversions close in on Shared Space.

Finally, the call for differentiated diagnosis of system pathologies can be reinforced by a dimension of traffic not treated with the detail it deserves. An integral part of the Shared Space analysis is the distinction between 'traffic space' and 'social space'[13]. Any practical-empirical engagement with traffic will bring out the relevance of speed, and of differences in speeds between traffic participants. In other words, there is little point in

[13] This distinction does echo the traffic separation doctrine as in traduced through Buchanan (1963), indeed.

seeking to Share Space on highways, as also the most enthusiastic proponents acknowledge, and the consequence of high speeds does seem to entail a certain degree of interpassivity. So traffic may generally be becoming our 'interactive vacation', but the question whether this is desirable should be answered in differentiated fashion. This reminds of Peter Sloterdijk's (2004) dictum that not the question matters *who* we are, but rather the question *where* we are.

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