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User-made Immobilities: A Transitions Perspective[1]

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ABSTRACT In this paper we aim to conceptualize the role of users in creating, expanding and stabilizing the automobility system. Drawing on transition studies we offer a typology of user roles including user-producers, user-legitimators, user-intermediaries, user-citizens and user-consumers, and explore it on the historical transition to the automobile regime in the USA. We find that users play an important role during the entire transition process but some roles are more salient than others in particular phases. Another finding is that the success of the transitions depends on the stabilization of the emerging regime which will trigger upscaling in terms of the numbers of adopters. The findings are used to reflect on potential crossovers between transitions and mobilities research.

KEY WORDS: transitions, users, stabilization, immobilities

Introduction

The mobilities paradigm is defined by its aspiration to make sense of the causes and consequences of people, things and ideas on the move (Sheller and Urry 2006). The automobility system has occupied a prominent place in mobilities studies since its beginnings (Featherstone, Thrift, and Urry 2005). This is understandable since after all it is the car which has been a key enabler of the development of new forms of mobility changing the very nature of 'work, schooling, family life, politics and protest' (Urry 2007: 19). Car culture is embedded in our everyday life in ways that extend far beyond economic considerations and the automobility system as a whole exerts a 'specific character of domination' over society (Sheller and Urry 2000; Sheller 2004; Urry 2007) even when its harmful effects – pollution, congestion, injuries and deaths – are acknowledged virtually by everyone. Despite some recent promising developments overall the automobility system seems to have remained remarkably resilient to change (Urry 2004; Dennis and Urry 2009; Sheller 2013). Yet, looking for ways to create an after-the-car system is a key concern in mobilities research (Büscher, Sheller and Tyfield 2016).

Mobilities studies have drawn on transport history to answer the question how exactly this pervasive character of automobility came to be established (see Dennis and Urry 2009: 27–46). In this paper we draw on transition studies – a field which focuses on theorizing large-scale and long-term shifts from one socio-technical system to another – , to provide further insights into this process. Here mobilities and transition research meet each other as both have put considerable emphasis on system change, complexity, uncertainty, lock-in. Our main argument is a simple one:

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only if we understand how (im)mobilities are made can we understand how they can be unmade and remade. In particular, we show that far from being merely passive reproducers of the car society it is the users who, in various capacities and in different roles, have historically played a very active role in constructing the automobility system as we know it today. By implication, enhanced understanding of the role of users in path creation is crucial for making sense of how the current car-based automobility system can be eventually unlocked.

Since the reader may be somewhat unfamiliar with the transitions literature the following section begins with a brief overview of the approach, particularly focusing on the Multi-level Perspective (Rip and Kemp 1998; Geels 2002; Geels and Schot 2007; Grin, Rotmans, and Schot 2010). Subsequently we offer a typology of user roles, creating connections with existing mobilities research as we roll along. After exploring the typology on the US automobile transition we finally turn to the discussion of how, in the light of our findings, transitions and mobilities research could complement each other in the future.

Mobilizing transition studies

Transitions research focuses on explaining shifts from one socio-technical system to another (for an overview see Grin, Rotmans, and Schot 2010). The notion of a socio-technical system refers to a configuration of technologies, services, infrastructures, regulations and actors which fulfils a specific societal function such as communication, food production or transportation. The evolution of such systems is guided by socio-technical regimes, defined as shared, stable and aligned sets of rules or routines directing the behaviour of actors on how to produce, regulate and use transportation, food production, energy or communication technologies. These rules are embedded in the various elements of the socio-technical system and they shape innovative activities towards a specific trajectory of incremental innovation (e.g. increased processing speed in computers or increased fuel efficiency for cars).

New socio-technical regimes are developed in spaces called niches. These are application areas dominated by specific selection criteria which shield the emerging new and unstable technologies from direct market pressure. Compared to dominant regimes the actors in niches are few, their interrelations sparse, the focal technology immature and the guiding rules in constant flux. Niche technologies can then be seen as 'hopeful monstrosities' (Mokyr 1990): promising in potential, meagre in performance. For this reason niche technologies often need to be protected from pressures exerted by the incumbent socio-technical regimes until they have become mature enough to enter the market.

The Multi-level Perspective (introduced by Rip and Kemp 1998; further developed in Geels 2002, 2005) conceptualizes transitions as an interaction between niche, regime and landscape dynamics. The basic idea behind MLP is quite simple: niches can only break through if the dominant regime becomes destabilized. This, in turn, is often preceded by landscape pressures, that is, exogenous macro-events, trends and infrastructures such as wars, economic crises or climate change. This process which might take roughly 50 years to complete unfolds in three phases. In the first, start-up phase, niches emerge and develop. The reaction to these niche technologies from regime actors is lukewarm at best since the former are not yet being perceived as a threat. In fact, regime actors might even see niche developments as a solution for a number of specific problems: for example, early steam engines were used as auxiliary devices on sailing ships at times of little winds (Geels 2002). In this phase landscape pressure exacerbates the internal problems of the regime creating a window of opportunity for niche technologies. For example, in the second half of the 19th century increasing urbanization intensified the problems with horse-drawn carriage regime, including the high cost and low speed of horses or the amount of manure in the streets (Geels 2005).

In the second, acceleration phase, niches expand, attract more users, and become mainstream markets starting to compete with the incumbent regime (and other niches) for dominance. As new technologies diffuse and niches expand the accompanying rule-sets are redefined. For example, bicycles, electric trams, stream trams, electric cars, steam cars and gasoline cars all competed against horse-drawn carriages but also, to a certain extent, against each other for decades until the automobile regime finally became dominant (Geels 2005).

In the third, stabilization phase, the number of actors is high, the technology itself mature and the guiding rules relatively stable meaning that the former niche has established itself as a new regime. This allows for a sharp increase in adoption as the regime now provides a ready-made 'template' for largely routinized user behaviour. As we will see below, the dominant practices of car use had been defined by interwar users whereas the post-war adoption was largely based on imitative learning.

Mobilizing the analysis of this sequence leads us to formulate two propositions not developed as such within the transition literature so far. First, whereas the success of the niche can be measured in terms of the numbers of adopters as is often done in diffusion studies it is not the added number of users *per se* that actually explains this success. Instead we argue that the take-off in the number of users is predicated on the stabilization of the emerging new regime. This stabilization is reflected in many aspects of the socio-technical system, e.g. the existence of a dominant automobile design, an extensive road infrastructure, a mature industry structure, stabilized user preferences and use practices etc. Mobilities approach has conceptualized this process under a more general concept of 'immobilities' (see Hannam, Sheller, and Urry 2006; Cresswell 2010; Cidell 2012). The stabilization is also expressed in the emergence of relatively durable differences in the motility – access to mobility resources, competence to use them and their actual employment (Kaufmann, Bergman, and Joye 2004; Kaufmann 2014) – of various users.

Our second proposition is that users play an important role throughout this process, not only in the beginning as lead users (Von Hippel 2005) and prosumers (McMeekin and Southerton 2012) or at the end as (rather passive) consumers. Although users have been part of transitions accounts virtually from the beginning it is only now that a more systematic understanding of their roles in this process has started to emerge (Schot, Kanger, and Verbong 2016). In the following we will outline the typology of user roles highlighting their affinities with mobilities research:

- User-producers (or users-turned-entrepreneurs) construct niches by inventing and experimenting with new radical technologies, creating new technical and organizational solutions, articulating new user preferences, and enabling new rules and/or routines to emerge. Hence they are the active creators and shapers of what in stabilized conditions will become the 'driver-car' hybrid (Dant 2004).

- User-legitimators construct niches by developing discourses which provide a larger narrative for niche development. This narrative anchors the viability and significance of the niche, and its rule set. User-legitimators contribute to the stability of the routines and thus will make the rules more broadly acceptable. Note, however, that this does not guarantee that stability will emerge or, if emerged, will become permanent. In the context of heightened uncertainty various conflicting narratives can re-emerge as evidenced from the analysis of US automobility future (Reese 2016).

- User-intermediaries are system builders. They align the various elements of emerging socio-technical systems, such as products, infrastructures and regulatory frameworks. User-intermediaries play an important role in preparing ground for the wider adoption process of niche technologies. As such they help to orchestrate multiple mobilities, the movement of

people, objects and ideas, into a relatively coherent and immobile automobility system (Urry 2007).

- User-citizens focus on the political lobby for a particular niche and against the dominant regime (or other promising niches). Similarly to user-intermediaries they play an important role in accelerating niche development. Through the strategic deployment of material and communicative movements inseparably meshed together in events such as protest actions or boycotts these actors attempt to de-immobilize the existing systems.

- User-consumers invent ways to embed them in their daily practices. This process entails the testing, repair and maintenance of new technologies, which is often necessary to make these technologies work at all. And as the mobilities research (Dant 2004; Kent 2015) has made abundantly clear "car consumption is never simply about rational economic choices, but is as much about aesthetic, emotional and sensory responses to driving, as well as patterns of kinship, sociability, habitation and work" (Sheller 2004, 222). Through this process new modes of transport come to be cemented into multiply mobile everyday lives.

From this typology it can be inferred that we reserve the notion of consumer for a specific set of activities and use the notion of user to refer to a full range of activities as listed above. The term user also covers individuals as well as collectives and organizations (e.g. car clubs). The following section provides an historical narrative of the US automobile transition through the lens of our typology drawing on secondary literature.

Automobile transition in the USA (1891–1964)

Start-up (1891–1907)

Although various inventors had experimented with steam-propelled vehicles in the USA throughout the 19th century it was in 1891 when John William Lambert introduced the first gasoline-based vehicle, a three-wheeler with a price of $550. No buyers were found (Kimes 2004, 40). The cracks in the horse-drawn carriage regime, however, had already opened the window of opportunity for niches such as bicycles, trams and automobiles (see Geels 2005 for a full analysis). In 1895 Charles and Frank Duryea established the first US auto company. Different inventors experimented with different sources of propulsion: by the turn of the century electric vehicle had taken a lead in business applications whereas steam cars dominated the private passenger niche (Mom 2015b, 273). However, at this point gasoline cars quickly took over. In 1900 approximately 1,600 steam cars, 1,500 electric vehicles and 1,000 gasoline cars were produced in the USA; by 1904 the number of steam and electric automobiles had remained the same whereas the number of gasoline cars had risen to 10,000 (Kimes 2004, 172).

In this phase the production space of the automobile was rather empty: as a result there was no clear distinction between a producer, a user and an entrepreneur. Many inventors like Duryeas or Henry Ford moved quickly from initial experimentation with self-built vehicles to establishing their own company. In 1899, 30 manufacturers produced 2,500 vehicles but there were also thousands of experimental shops all over the USA (Kimes 2004, 91). The relatively low quality of early automobiles as well as the lack of a supply network often made it sensible for user-producers to build one's own vehicle instead. For example, of 1,000 cars listed in Detroit city automobile registry in 1904 44 were self-built (Corn 2011, 231). At the same time users were also experimenting with other aspects of the emerging automobile niche. A case in point is William P. Eno who developed the first traffic regulations for New York already in 1903. Working on a strictly voluntary basis Eno accepted no payment for his services until 1913 (Norton, 2008, 50–54). Early user-producers were

thus active in all the dimensions of the emerging socio-technical system: by establishing new companies they literally created new actors and new types of relations between existing actors, by technical experimentation they contributed to the emerging dominant design of the automobile, and by creating rules and aligning expectations they laid a foundation to the institutional infrastructure of the future regime.

In parallel users were also experimenting with the car's functionality. The multiplicity but also the unreliability of basic designs, the lack of fuel, repair and maintenance infrastructure, and the general absence of smooth roads – less than 10% of the roads in major cities had asphalt pavement around the turn of the century (McShane 1994, 59) – meant that user tinkering became an inseparable part of early automotive culture (Mom 2015b, 21). Compared to the considerable technological variety of automobile designs early uses remained mainly restricted to two niche areas. The owners, usually members of the elite or upper middle class, used the cars mainly for racing – including speed record attempts and long-distance runs – and touring (in city parks and in the countryside). The saturation of the luxury market around 1904–1905 signalled the turn towards another more utilitarian niche: countryside physicians proved to be a key group facilitating the expansion of the car to rural areas (Flink 1990, 28).

Initially, however, farmers perceived the automobile as an intruder to rural space emitting unpleasant odours, scaring horses and running over domestic animals. They employed various tactics to obstruct drivers, e.g. ploughing up the roads, burying rakes and saws in the ground or stringing rope and barbed wire from tree to tree (Kimes 2004, 190–191). Drivers and their cars were also attacked in cities. Rural and urban violence against drivers peaked around 1904-1905 when 13 incidents were reported in New York City (McShane 1997, 32). In general, however, anti-auto acts remained sporadic and fleeting, gradually subsiding by the end of the 1900s (Mom 2015a, 74–76).

This resistance reflected a profound uncertainty about the cultural meaning of the car. User-legitimators played a crucial role in establishing a niche for the car. They successfully framed it in a positive manner as 'a harbinger of modernity' (Mom 2015a, 80) or a 'democratic technology' (Benesch 2010). Their opponents, in turn, saw the machine as 'the devil wagon' (Berger 1979) or a 'plaything of the rich' (Seiler 2008, 37). The Automobile Club of America (ACA), founded in 1899, first attempted 'to establish motoring as its special and exclusive province' (Kimes 2004, 96). However, the Automobile Association of America, established three years later, provided a democratic response to ACA's elitism. This approach proved to be more durable and already in 1905 the president of AAA was proclaiming that 'yesterday it [the car] was the plaything of the few. Today it is the servant of many, tomorrow it will be the necessity of humanity' (quoted in Kimes 2004, 214). The exact societal narrative in which the automobile would fit was yet to be determined but user-legitimators were already contributing to a discourse which pictured car-use far beyond racing and touring, something which not only helped to stabilize the gasoline car niche but which also came to dominate in the interwar era.

User-producers and user-legitimators were thus crucial in the start-up phase by helping to create more stable rules. Yet in this early phase other user roles started to emerge too. By 'sponsoring tours and tests, lobbying for legislation favourable to motorists and propagandizing the automobilists' cause' (Flink 1990, 27) the early car clubs were also functioning as user-intermediaries and user-citizens. Having to justify their place in society these clubs often adopted a defensive stance and tried to persuade non-believers, e.g. by taking suspected stoners for free rides (Chicago Automobile Club) or holding a raffle of a car for the Free School of Crippled Children in New York (Kimes 2004, 190). The National Automobile Show, first organized in 1900 by ACA and the National Association of Automobile Manufacturers, functioned as an early 'mediation junction' (Schot and de la Bruhèze 2003) creating a space in which producers, automobile enthusiasts and general public could meet. Car clubs also started to configure the system, e.g. by providing maps and road signs

for travellers, outlining early drafts of local traffic regulation or arranging driving courses (McShane 1994, 185–189; Kimes 2004, 207). All this stimulated the first wave of diffusion in the interwar era.

Acceleration (1908–1945)

The introduction of Ford T in 1908 signalled a decisive turn to an affordable middle-class car, mass produced with ever-decreasing unit costs. By 1914 Ford T's annual sales amounted to 300,000: half of the total production in the USA that year (Kimes 2004, 327) and by 1929 more than half of American families owned a car (Mom 2015a, 297). A dominant design of the car was quickly stabilizing and innovations in various subsystems followed, from the electric starter (1912) to automatic transmission (1940). In parallel, users helped to construct the automobile regime along various dimensions including the advances in fuel, maintenance and road infrastructure (e.g. service stations, paved roads) as well as regulation (e.g. Federal Aid Road Act in 1916, Federal Highway Act in 1921). Around mid–1920s the car market reached a saturation point though: for the first time the sales of second-hand cars dominated over new ones. Additional shocks related to the Great Depression and WWII resulted in a relatively lower growth in car density for almost two decades. Nevertheless these setbacks were of temporary nature: by the end of the 1930s the automobile regime was largely in place and WWII merely delayed the beginning of the stabilization phase.

Whereas in the start-up phase user-producers had experimented with various technical designs, their efforts now became directed to improving on the dominant design, adapting it to local needs and developing various accessories. Farmers often re-built their Ford T-s to be deployed as versatile mobile power plants (Kline and Pinch 1996) whereas campers converted their cars into trailers. After 1915 the number of automobile-related incremental innovations patented by users, such as bumpers, windshields, anti-rattle devices, auto beds and auto tents, rose sharply (Franz 2005, 84–85). User-producers also experimented with new forms of urban mobility, for example, user-owned illegal taxicabs called jitneys, which offered cheaper and more flexible service than the officially sanctioned ones. During WWI jitneys experienced rapid growth in various cities, e.g. 150,000 passengers were carried daily in Los Angeles by more than 1,500 cars (McShane 1994, 195). Successful lobbying from transit firms and taxi owners managed to put an end to this practice quickly though, wiping it out by the end of the war.

Whereas initially the car industry had welcomed the user-developed innovations this situation started to change over the 1920s with the professionalization of corporate R&D. Already in 1921 the National Sextet manual contained a boldface warning 'DO NOT TINKER', citing this as 'the cause of as much trouble as neglect and abuse' (quoted in Corn 2011, 139). Over the next decade a number of factors converged to amplify this trend towards less and less user involvement: the Great Depression discouraged inventors with limited financial means from patenting, the increasing complexity of the car and the design changes, such as the adoption of automatic welding and closed streamlined bodies, required more knowledge, skill and the possession of special tools; many after-market accessories (e.g. trunk) became part of the standardized equipment, or the other way round – many user needs formerly fulfilled by the automobile or its accessories came to be delegated to other parts of the regime (e.g. the emergence of cheap roadside motels) (Franz 2005, 129). Judging by the decreasing technical content of user manuals this transformation was largely complete by the end of the 1930s when 'manuals … no longer spoke to operator-mechanics but to the driver-possessors who celebrated the pride and joys of automobile ownership but had little reason or necessity to pick up tools and tinker beneath the hood' (Corn 2011, 159–160). The car industry had succeeded in defining user involvement as a problem actively encouraging user-producers to become user-consumers instead.

If the start-up phase had been dominated by technological and symbolic work of user-producers and

user-legitimators, the acceleration phase was marked by the explosion in the variety of car use practices developed by creative user-consumers who integrated the car into their lives in new ways. Increases in commuting distance boosted suburbanization and enabled to re-define traditional patterns of neighbourhood as it became easier to extend one's range of social contacts beyond the immediate area. Youth could escape parental supervision thereby leading to new courtship patterns – dating increasingly required a car (Flink 1990, 159). The automobile also helped to re-define shopping and cooking: whereas previously the household had needed to shop on the daily basis now, with the added help of the electric refrigerator, shopping could become a weekly activity. This, in turn, facilitated bulk buying as evidenced by the emergence of the discount supermarket in the 1930s (Flink 1990, 158–168). From farmers' perspective the automobile also decreased rural isolation and contributed to the accessibility of shops, medical services and libraries – for those who could afford the car, of course. Others likely experienced decline in the quality of life as local shops, banks and family farms were gradually closed down (Flink 1990, 152–157). Thus in the acceleration phase user-consumers began to define the automobile as a true multi-purpose machine: the use profile 'consisted for a quarter in pure pleasure, another quarter in pure business, while the remaining was an inextricable mix of pleasure, utility, and business use' (Mom 2015a, 345). All these familiar practices, first developed by user-consumers of the interwar era, provided a 'template of normality' for later adopters in the postwar era when the diffusion curve really took off (see the following section). The acceleration phase thus crystallizes the car as a source of pleasure and comfort (see Sheller 2004; Reese 2016, for an extended analysis of this phenomenon).

User-legitimators, among other stakeholders, helped to crystallize the dominant narrative surrounding the automobile. As an instrumental machine, 'a status object and symbol of liberation' (McShane 1994, x) the automobile provided a winning combination of 'domesticated hedonism' (Mom 2015a, 373). For farmers the introduction of Ford T had signalled a turn to simplicity and utility (McShane 1994, 135). For many others it remained a status object: but whereas in the start-up phase it had served as means of distinction between the elite and the rest the growing market differentiation now enabled a distinction not only between the haves and have-nots but also between the car-owners themselves (luxury for the elite vs. mid-price range for the middle class). At the same time an increasingly coherent alliance of car industry, dealers and automobile clubs, the 'motordom', began to invoke the notion of 'freedom' to counter the arguments of other stakeholders worried about the problematic aspects of mass automobilization (e.g. increasing traffic fatalities). For example, 'freedom from custom' was used to delegitimate the concerns of policemen who viewed automobile as an intruder to urban space that had to adapt to customary city traffic, not the other way round. 'Political freedom', on the other hand, was employed to frame speed limits as breaches of the rights of an individual (Norton 2008). A parallel with decreasing technological variety is notable in the symbolic dimension: the more user-legitimators connected the car to the master frame of freedom and other familiar societal narratives the narrower the interpretive flexibility of the artefact actually came to be. This was reflected in many aspects, e.g. the increasing representation of women as passive and inept car users over the 1920s (Franz 2005, 52–68). In other words, in this period the motility (Kaufmann, Bergman, and Joye 2004) of car users increasingly lead to emergence of gendered mobilities, a situation which continues to date (Sheller 2011).

The acceleration phase, being mainly about building the regime, meant a key importance of two associated activities: aligning the various elements of the regime and engaging in regime politics. For if the automobile was to become a dominant regime its stakeholders needed to win the political battles for the city streets and against the railroad. Note the decisive change in character: whereas the pre-war user-citizens had been in a defensive position now their activities were about expanding the regime while attempting to push other niches and regimes aside.

Urban struggles largely occurred between 1915–1930 with user-citizens, as part of the motordom, playing an important role in shaping the outcome of the process. The mid–1920s sales slump plus

the 1923 controversy in Cincinnati over installing speed governors on automobiles served as signalling events for automotive stakeholders stimulating them to mobilize. AAA reorganized in 1924 to become the single representative of motorists with a mission to provide 'one national association, one national policy and one national service' (quoted in Norton 2008, 170). Over the next decade the wealthy and well-organized motordom, operating in favourable political climate, deploying effective rhetorical weapons and being supported by an increasing share of urban motorists, managed to reframe traffic congestion as a problem of insufficient supply of street space. Whereas so far traffic engineers had appealed to the better spatial economy of public transport (more passengers per vehicle) now the motordom suggested to solve the problem by rebuilding cities to accommodate more cars. This initiated the process of major urban reorganization, e.g. the emergence of first urban highway projects (ibid.).

The battle against the railroad was led by the powerful domestic car industry with users and user organizations mostly playing a supporting role. The resulting reversal of fortunes was dramatic though: whereas in 1922 rail passenger miles were four times as high as automobile passenger miles the ratio had reversed by 1929, while total volume of travel had increased fivefold (Flink 1990, 360). With business users such as travelling salesmen massively switching to the automobile the railroad was largely left with freight transport (Mom 2015b, 309). By the end of the acceleration phase user-citizens had then contributed to winning the battle on almost all fronts: urban and rural areas, short- and long-distance transport, the car was suddenly everywhere.

At the same time user-intermediaries kept aligning the elements of the system although in contrast to the Netherlands, for example (Mom 2015a, 581), they did not necessarily play a leading role in this process either. AAA was prominent though in taking over the school safety education from local safety councils during the 1920s. Traffic education started to stress shared responsibility: whereas earlier only drivers had been blamed for traffic accidents now user-intermediaries helped to re-define the street as a rightful place for drivers. Recklessness became a trait of drivers and pedestrians both (Norton 2008, 225–230). Car clubs also helped to draft uniform traffic regulation in some states, they participated in devising federal traffic regulations, and collected and disseminated traffic statistics (Norton 2008, 187–193). All these intermediary activities configured not only the regime itself but also the expectations surrounding it: after decades of initial experimentation and subsequent regime-building the automobility as a system, defined by its ability to permit 'predictable and relatively risk-free repetition of the movement in question' (Urry 2007, 13), was finally starting to become reality.

Stabilization (1946–1964)

By the end of WWII the automotive interests had managed to create a built environment in which the car had become *the* rational choice for transportation. Beginning from 1950 the urban working class massively adopted the car and by 1970 only 17% of the households did not have one (Flink 1990, 359). Rail passenger transport had been pushed aside: for example, Pacific Electric Railway, once the largest interurban service in the world, closed down in 1952 (McShane 1997, 103). The 'Road Gang' – a powerful lobby group of 'oil, cement, rubber, automobile, insurance, trucking, chemical and construction industries, consumer and political groups, financial institutions, and media' (Seiler 2008, 94) – backed by military leaders and president Eisenhower got the Interstate Highway Act passed in 1956, further expanding and consolidating the system. The automobile regime became seriously contested only from mid-1960s when safety and pollution issues and anti-freeway movement (re-)surfaced (Flink 1990; Norton 1996).

The marginalization of user-producers from mainstream car production activities led to the emergence of automobile subcultures such as the Antique Automobile Club of America (1935) (Corn 2011, 144–145), or the National Hot Rod Association (1951) which gained 15,000 members

during its first two years of existence (McShane 1997, 102). Although services like repair had become increasingly professionalized routine user activities such as weekly maintenance retained their importance. User involvement thus changed in locus by moving mainly into the domain of entertainment and recreation. Legitimation-wise the dominant narrative of 'domesticated hedonism' went unchallenged: if anything, reality gradually started to catch up with rhetoric when women had increasing chances to practice their freedom on highways and the battle against racial discrimination made black automobility 'a cold war imperative' (Seiler 2008, 111, 129). User-producers and user-legitimators then, though still active in many ways, had long ceased to be the key actors by the stabilization phase.

Having won the big battles in the acceleration phase user-citizens virtually disappeared from view during the next one: the conflict, if manifest at all, usually took the form of regime-internal quarrelling. For the first time in its history AAA became oriented to representing the consumers (McShane 1994, 181). That did not amount to much though: for example, in 1949 AAA's protests against the excessive size and styling of cars were simply ignored by the Big Three (General Motors, Ford, Chrysler) (Flink 1990, 284).

The stabilization of the regime also meant that user-intermediaries had less reason to continue configuring the regime as these tasks were increasingly taken over by other regime actors. The postwar era intermediation activities came to be predominantly defined by their informative character. Whereas the origins of product comparison and consumer recommendations can be traced back to the Consumer Research Bulletin in the 1920s and Consumer Research in 1936 it was in the postwar era when this practice, combined with road tests, started to diffuse more widely, eventually spreading to other technologies as well (Corn 2011, 171–173).

All these activities paled in comparison to the importance of user-consumers adopting the dominant car use practices as first defined in the acceleration phase. By imitative learning these new adopters could simply 'attach' themselves to the automobile regime and to reproduce it in a largely non-reflexive manner. This is well captured by an observation in the Life magazine in 1962 that 'in California, the car is like an extra, highly essential part of human anatomy' (quoted in McShane 1997, 117). Non-automobile practices came to be viewed as deviant: as stated by a reporter in 1958 'there are sidewalkless communities where the police look with suspicion upon anybody who isn't riding' (quoted in Segrave 2006, 74). There were also signs of emerging producer-consumer lock-in where new cars with potentially economic or life-saving benefits were rejected by user-consumers preferring 'big and heavy': this happened to Chrysler's attempt to reduce car weight by 600 pounds in 1953 (McShane 1997, 105) and to Ford's introduction of a safety package a year later (Flink 1990, 290). The added number of user-consumers contributed to the massive inertia towards regime optimization: the 'technological momentum' (Hughes 1987) of the car society was now in full swing and could not be easily reversed any more.

Discussion and conclusion: cross-fertilizing mobilities and transitions research

In this article we have drawn on the strengths of transition studies and ‘mobilised’ them to develop a middle-range vocabulary for theorizing user involvement in transitions. We began from two propositions: 1) the take-off in the number of adopters is predicated on the stabilization of the new emerging regime – in other words the freedom of mobility is based on making the automobility system relatively immobile first; 2) users play an active role throughout the whole course of transitions contributing significantly to the creation, expansion and stabilization of the regime. The exploration of these propositions on the historical case of automobile transition in the USA provided tentative support for both claims. In particular, the typology of user roles was shown to be a useful analytical device for making sense of the different ways in which users are implicated in

systems change showing many affinities with existing mobilities research.

But what exactly do our findings and our approach mean for the mobilities studies? This question can be answered on two levels: first, in the context of the particular case study and second, in terms of wider similarities and differences between transitions and mobilities research. We will start with the former.

The results reveal that the development of the automobility system contains many lock-in moments when system elements are put into place and choices made. Following Garud and Karnøe (2001) the gradual development of the automobility system can be described as one of path creation. This stands in contrast to path dependence literature (David 1985; Arthur 1989), frequently referenced in mobilities studies (e.g. Urry 2004, 27; 2007, 30-31), which assumes that lock-in only happens once, quite early in the technology's evolution. The reasons for this difference may lie in the fact that path dependence literature often focuses on a single technology whereas the systematic character of transitions entails many technological, organizational and institutional changes. It follows that there are many points, not one, for successful intervention, and therefore more space for agency than implied by path dependence literature. Both transitions and mobilities research would then benefit from further identification of various critical junctures of path creation and the exploration of associated opportunity space for transformative change. At this point we can formulate two observations which impact the opportunity space for path creation not present in current transitions or mobilities literature:

1. Each transition phase is characterized by an 'explosion' of sorts: an explosion in technological and symbolic variety in the start-up phase, an explosion in the variety of use practices in the acceleration phase and the explosion in the number of users in the stabilization phase. It is only when the regime and the associated practices have been turned immobile when the vast mobility-enhancing potential of the automobility system becomes unleashed.

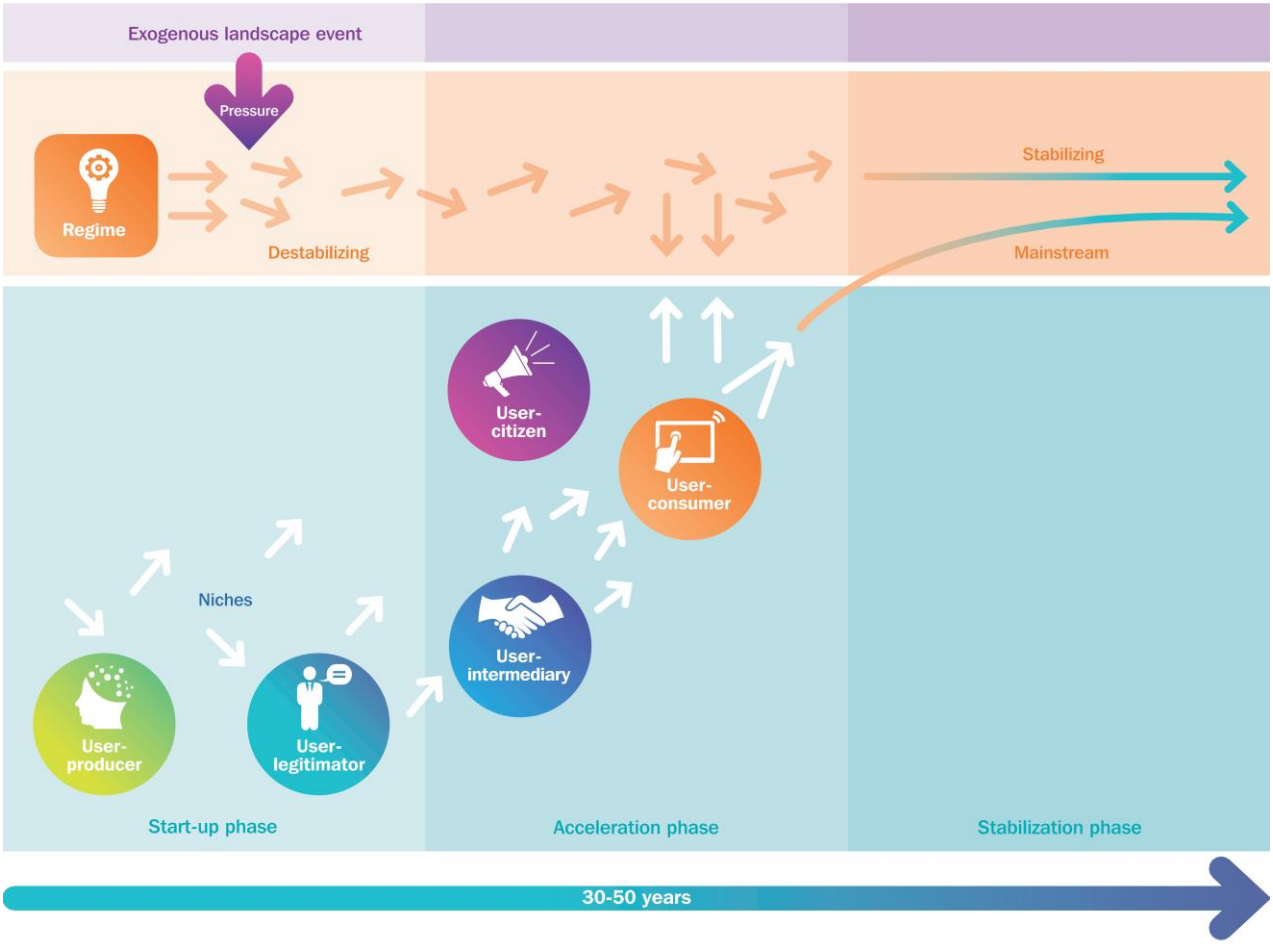
2. The salience of these roles varies from phase to phase: user-producers and user-legitimators are more salient in the start-up phase, user-intermediaries, user-citizens and user-consumers in the acceleration phase, whereas the stabilization phase is dominated by the latter only (see figure 1). The re-making of the automobile system requires the recognition of these users in various roles and capacities: the contribution of users in turning the mobile components of the automobile system immobile can also be drawn upon in order to shape the future of automobility in alternative, more sustainable directions. There is much more to users than currently meets the eye of transitions and mobilities research.

Transitions and mobilities approaches share some important similarities on a more general level: for example, both can focus and indeed have focused on a variety of actors operating on various levels. There are also important differences, however, which is why we have abstained from a full-scale synthesis and restricted ourselves to highlighting promising affinities instead. Here we would seize the chance to provide further reflection on these differences to explore the possibilities of sustained constructive dialogue between transitions and mobilities research.

We begin by noting that scholars working in the field of transition studies rarely engage in high-level sociological debates and when they do it is mainly to clarify their own assumptions. The basic ontology of transitions research – evolutionary theory with an added touch of constructivism and conflict theory (Geels, 2010, 2014) – is rarely contested (although see Shove and Walker 2010). As a result, a lot of work conducted in the transitions field is inclined towards middle-range theorizing: developing a set of related concepts to make explicit and specific propositions. One can quickly

notice that in comparison, the mobilities research casts its net much wider, focusing on a wide set of topics and problems related to multiple mobilities and explored through various angles. Moreover, mobilities as a research topic is only part of a more ambitious plan to re-write the ontological, epistemological and methodological premises of social science (Sheller and Urry 2006; Urry 2007; Sheller 2014). The borrowing from a variety of different disciplines and frameworks, however, has also resulted in the continued existence of irreconcilable positions, incompatibilities and contradictions (Büscher and Urry 2009, 109) that cannot be easily overcome (Büscher, Sheller and Tyfield 2016). In our view this situation reflects the trade-offs between scope and flexibility made by each approach: the increase in accuracy in transitions research also means less scope and flexibility in terms of viewpoints allowed to enter the accounts and vice versa – the greater the flexibility and the wider the scope of topics the more difficult it becomes to find a common ground in mobilities research. As this largely comes down to the differing preferences and styles of theorizing of scholars working in each field some differences between transitions and mobilities research are likely to remain durable.

Figure 1. User roles and transition dynamics.



In our view the major point of complementarity between transitions and mobilities research is found in their differing temporal perspectives. It seems that much of mobilities research tends to focus on how the immobility of existing systems allows certain types of mobilities and how these mobilities constitute social life: for example, Dant's analysis of the driver-car (2004) or Kent's discussion of the role of comfort in sustaining the automobility system tend to treat the car as an entity with largely fixed properties. However, to take the latter example, automobile was not always associated with comfort, on the contrary: as we have seen constant tinkering was an integral part of the early automobile culture. This directs attention to the fact that the elements of various socio-technical

systems need to be immobilized first, a process which can be achieved in various ways. Transitions view has developed a nuanced analytical vocabulary for explaining how the various elements of new systems come to be aligned to each other to form coherent and relatively stable configurations. In this respect it might provide a valuable complement to mobilities research which often tends to take stable systems as the starting point of the explanation.

At the same time, a particularly notable blind spot of transitions research is its lack of research on how stabilized regimes shape landscape and become part of it in the long term. Although this causal direction has been recognized in the transitions field from the beginning most empirical work has focused on transitions-in-the-making. In this regard the mobilities has a clear advantage in being able to provide clues for transition research on how complex wider societal and cultural developments embedded in, for example, in the ICT revolution or the formation of new type of cities and urban infrastructures, might shape transition dynamics (Sheller 2013). How mobilities are forged into immobilities and how immobilities shape mobilities: this is a fertile common ground for both approaches to benefit from.

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