Kinotopic consumptionscapes: Impacts of autonomous mobility on consumption and sociotechnical futures

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THE AIMS OF THE PAPER

A 'post-car' world is very much determined by new forms of technologically enabled mobilities. The paper claims that autonomous 'mobility-things' are versions of Foucauldian heterotopias: *kinotopias* (moving spaces) that will have a deep impact on our future societies by rearranging consumptionscapes as well as the politics of interconnectedness. Kinotopic mobility creates spatial as well as temporal fluidity.

METHODOLOGY

Utilizing action-network-theory the paper analyses, through looking at different future world scenarios, how kinotopic mobility will rearrange our consumptionscapes.

MOST IMPORTANT RESULTS

The paper looks at the imagined worlds' potential impacts on sociotechnical futures and draws conclusions for present day innovation, research practices and policies in autonomous mobility.

Keywords: ANT, Latour, kinotopia, autonomous mobility, consumptionscapes

INTRODUCTION

There is remarkably little research on the societal impacts of the transition to autonomous mobility (AM). Before the emergence of the discourse on autonomous vehicles John Urry has already conceptualized the "post-car" world (Urry 2004) as characterized by developments of the „complexity turn" (Urry 2005) – contingent openness, multiple futures, unpredictability of outcomes and diverse and non-linear changes – and by certain "tipping point candidates" such as: new fuel systems; new materials; smart technologies; de-privatization; new mobility focused transport policy/communication and IoT interconnectedness (Urry 2004, 33-35). Post-car, autonomous, interconnected transportation, the possible future of mobility, may be theorized as a sociotechnical ecosystem in which the relatively stable "system of automobility" (Urry 2004) – the car-driver hybrid assemblage embedded in fluid but systemic interconnections – gives way to a more liquid arrangement (Bauman 2007, Sheller 2004) of mobility populated by interconnected, autonomous human–non-human mobile hybrids. Dystopic as this may sound, our shared spaces will most probably be populated by self-driving mobile "things" carrying people, objects and information in a fluid ontology best styled by the actor-network theory (Latour 1996, 2005). There are many questions and few answers. It is not yet clear how transformational the transition to autonomous mobility will be; nor is it easily foreseen who and what will drive this process, or will it ever fully happen as we today imagine it.

Much of what has been done by way of research in autonomous mobility until now is concerned with the short- or mid-term technological, economic impacts and/or the ethical, regulatory challenges that lay ahead (Cohen 2012, Knight 2013, DiClemente 2014, O'Toole 2014, Smith 2015, Braun 2016, Canzler & Knie 2016). Less work has been done on the complex sociotechnical and political processes, or on the social epistemology that may characterize this transition. Most of the techno-science research in AM is influenced by a fascination with "technology fix" (Von Schomberg 2013) – focusing mainly on the technical challenges and the potential societal impacts thereof – or show a considerable level of "path-determination" stemming from traditional expert or lay anticipation: a "technology fix" determined techno-optimism (Cohen 2012) or a science-fiction influenced culture of dystopic imagination (Miller & Bennett 2008, Gordon 2009).

This paper is to focus on some of the Urryan tipping point candidates, on the theoretical underpinnings of multidimensional interconnectedness and their effects on the transition to AM. The aim is to show that this process is not as path-dependent as it seems. Taking the "mobilities turn" (Sheller & Urry 2006) in the social sciences seriously the potential impact of this transition on (moving) consumption (Brembeck et al. 2015) and (mobile) consumptionscapes (Dholkia 2015) will be explored as an example to see how the interplay between different future worlds and the rearrangement of socioscapes, our temporary stabilized social networks, may play out. The main argument of this paper is that the future is not technologically determined nor is it "out there" behind a window to be opened. The future is created by our expectations, desires, strategies and social interactions as much as by the technologies that are invented by creative minds. STS (Science Technology and Society) scholarship recognizes that there is an element of reciprocity in creating our future: technology (as between other forms of knowledge and its embodiments) and certain building blocks of the social (practices, identities, norms, discourses and institutions) are intertwined in a system of co-production (Jasanoff 2004). Beyond co-production, "through the imaginative work of varied social actors, science and technology become enmeshed in performing and producing diverse visions of the collective good" (Jasanoff 2015, 15) technology and society are intertwined in what Jasanoff (2015, 6) calls sociotechnical imaginaries -- "collectively held, institutionally stabilized, and publicly performed visions of desirable futures, animated by a shared understanding of forms of social life and social order attainable through, and supportive of, advances in science and technology".

Multiple sociotechnical imaginaries of mobility coexist in Europe. There is a constant struggle between such imaginaries to elevate to a dominant position. The transformational power of the transition to autonomous mobility from the Urryan "system of automobility" to a post-automobility setup will depend on the contestation and power struggle between the system of automobility elevating from a techno-social system to a sociotechnical imaginary and getting in conflict with other, competing sociotechnical imaginaries of the post-automobility arena. One of our key questions for a car – non-car future is whether the 'system of automobility', primarily lead and defined by the 'car' and its makers, elevates to a dominant position over other potential post-automobility futures for upcoming policy (Jasanoff & Kim 2015). Alternatives of a car dominated system, and their corresponding imaginaries, may

include a diverse and fluid system of mobilities populated by self-driving mobile "things" carrying people, objects in multiple shapes, forms and designs, run by diverse propellants, limited in their speeds and covered by softer and lighter materials.

The aim of this paper is more modest. It is exploring scenarios of our potential sociotechnical futures, something less than sociotechnical imaginaries but more than just future worlds populated by technology, through the lens of consumption I hope to show how our future "scapes" (or topologies of imagination) are constructed in a complex interplay of social practices, sites of negotiations and animations of and by technology (Appadurai 1990). The future is open as are our technologies. This is also the case with such potentially transformative technologies as autonomous mobility. This paper is to conceptualize the confluence of autonomous mobility technology and consumption socialities as an example for this openness.

KINOTOPIAS

Autonomous connected vehicles may be seen as spaces of social interaction people may enter and exit at will that "re-bundle" territorialities of social practices divided by automobility (Urry 2006). The driverless, connected vehicle is conceptualized not as a container carrying people from A to B (connecting different territorialities like those of home, work, business or leisure) but as open spaces not fully controlled or owned by those occupying it or passing through it. AVs are like buildings, parks, roadside openings, intensities or pieces of urban infrastructure that have controlled open access by and to anyone.

Space in modern, post-structural academic discourse is the product of relations (including the absence of relations); a complexity of networks, links, exchanges, and connections (Foucault 1986, Massey 1994, 2005, 2009, Schröder 2006, Thrift 2007). Also, space is characterized by the simultaneous co-existence of more than one thing. It is always in the process of being made and re-made by relationships, interactions and identities: it is always 'under construction' and open to the future (Massey 2009); a multidimensional structure evolving through the interactions of identities moving in and passing through them. Michel Foucault conceptualized 'other spaces' – *utopias* and *heterotopias* – as unique spatial condensations of the political (Foucault 1984). According to Foucault heterotopias (like cemeteries, libraries, museums, boarding schools and brothels) offer a special type of connectivity: they are connected to *all other spaces* through a complex network of social interactions. Foucault himself had given some thought to moving heterotopias, calling the ship "heterotopia par excellence" (Foucault 1984, 9). Special, moving, heterotopic spaces – *kinotopias* – travel in and through space making spatial (multiple) and temporal (simultaneous) connectedness omnifold.

They are unique social condensations with spatial limits, and are at the same time connected to "everything else" through multiple channels of flows. Kinotopias are n-dimensional instances of space/time created by the unique condensations of complex networks, links, exchanges, and connections as well as by the multiplicity of both being in space and moving through it. They also create new networks every instance as they move in space, making - sometimes unexpected – social connections and relations. Kinotopias create spatial and temporal fluidity: they, as well as identities carried or passing through, move in and through space with no spatial or temporal disruptions.

AUTONOMOUS VEHICLES AS KINOTOPIAS

Autonomous vehicles (AVs) are self-driving, smart "mobility-things" („the socio-material mechanism for getting the job done") (Hansson 2015) that operate safety-critical functions, apply cameras, onboard sensors, and other telecommunications and algorithm driven complex, computerized infrastructure to respond to special situations as well as utilize automated navigation strategies. They are connected to acquire and share real-time information with an extended time horizon and improved awareness of distance that is beyond human capacity. They may also include complex technical and navigation information, remote diagnostics, maintenance, and safety warnings to provide flawless operation.

There are many types and forms of AVs being experimented with. Some are transporting people (one, few or many) others carry only objects, while some move both. As Mimi Sheller (Sheller 2004) indicated already more than a decade ago "vehicular cyberization" has been happening at a growing pace since converging infrastructures of transportation and information were created in the last decade of the previous century. Post-car mobility transforms the "car". Path-dependence as well as the lock-in of the steel-and-petroleum car will ease: new materials, new forms of propellants, new interior and exterior designs emerge recreating people

and object carrying mobility things. Post car mobility things will rearrange desires, inhabitations, socialities as well as urban 'scapes' and vice versa (Sheller & Urry 2000, Sheller 2004, Urry 2004, Sheller & Urry 2006).

Autonomous "mobility things" are part of the (social) present. Connected and autonomous trains, subways and buses are operational in several cities, electric cars run on autonomous drive and ride hailing companies are putting autonomous taxis on the road. Retailers are testing autonomous package carriers; the "transit buddy", an autonomous "mobility-thing" to carry heavy personal items while people are on the move, is also being experimented with (Walpot 2015). The technological transition to autonomous vehicles is a continuum: advanced autonomous vehicles are currently at automation level 3 (conditional automation), while most of the new cars on the road offer automation level 2 services (partial automation) with steering and acceleration, parking and stopping systems being autonomously operated. More importantly, autonomous mobility systems are the present from a policy and strategic planning point of view: the time horizon of strategic infrastructure and urban planning decisions (including public transportation systems; roads, tunnels etc.) are, in most cases, 50-100 years. The future is made in the present by our imagination, discussions and decisions as opposed to being found out there by those who get there first. I elaborate some of the autonomous mobility implications that may be conceptualized in the present and could (in)form the future.

AVs rearrange our socialities: they conflate our 'territorialities of home, work, business and leisure' (Urry 2004) by the fluidity of their offering. Doing something and being somewhere is 'unbundled'; moving spaces offer territorialities of action as well as spaces for transit. Action is not about filling empty commute time. A vehicle may be a moving office where one enters seamlessly from a "fixed" place to exit in another territory of business where the working process is to be continued. Through the multidimensional connectedness of AVs (as well as other forms of 'connectivities' or 'cyberization of networks' – computers, internet, wifi, hotspots, mobile phones, 3D printers) one can be at one place and be somewhere or do something else at the same time (Sheller & Urry 2006). Hyperconnectivity (Wellman 2001) creates new forms of mobility as well as sedentarism (to be content and stay in one place): there is no need to go anywhere at all to be somewhere (Sheller & Urry 2006, 209, Urry 2008). The interconnectedness or liquidity of people, places and things reinforces the human-non-human hybridity of our 'scapes', consumption included. (Sheller & Urry 2000, Brembeck et al. 2015)

AVs are kinotopias: they are not only "mobility-things" but also spaces that are "constructed out of the interrelations, as the simultaneous coexistence of social interrelations and interactions at all spatial scales, from the most local level to the most global" (Massey 1994, 264). They are open to whoever 'enters' them depending on the individual or collective choice of systems of mobility. AVs offer mobility to a whole new array of people and groups who were excluded from automobility – the young and the old, the physically or visually challenged, the less affluent to name just a few groups (Istituto per la Ricerca Sociale 2015) and also create new barriers (psychological, technological) of access to other groups yet not assessed (Church 2000).

The main feature of AVs is hyperconnectedness. They are spaces connected to every other place possible. AVs are multi-dimensionally connected to other people, to other spaces (roadside infrastructure, buildings and other vehicles) as well as to narratives (datasets of the past already interpreted by human or artificial intelligence). AVs are "post-car": multi-fueled, ultra-light, smart, de-privatized, multimodal and multi-dimensionally interconnected mechanized autonomous moving spaces (Urry 2004). They rearrange topographies of power: AVs do not have a driver, thus space is not organized around a designated and marked position of function or power. There is no one person in control, no specific human agency behind movement, choice of direction, stopping, going, turning and accelerating. There is no specific human agency behind the interconnections and intersections of movement either: etiquettes are reorganized, interruptions reconnected and topographies of disruptions reordered. A new "automotive consciousness" emerges (Pearce 2016) or it disappears altogether. While AVs move through space in real time they also create 'Thirdplaces' that are unbound by reality – one may be able to be there and not there, to be part of the social space and also be outside of it somewhere (virtually or really) else (Soja 1996). They are also special 'space of flows'– material arrangements that allow for simultaneity of social practices without territorial contiguity (Castells 2009). Through their multifold connectedness – to machines, to people, and to everything else – they lose their territoriality: people may enter and exit without disrupting connectedness that is bound to some real place in real time. Social practices may be continued without interruption or territorial link through the multifold connectedness to people, clouds, systems and platforms.

KINOTOPIC CONSUMPTIONS-CAPES

The „new mobilities" paradigm has called our attention to the importance of the early 21st century human condition of everything – people, objects, capital and information; large scale, and street-level, local and global – being on the move (Sheller & Urry 2006). This invites novel methods and theories across disciplines to better understand our mobilized socioscapes as well as networks of social interconnectedness. The „mobility turn" also redefined our understanding of objects, processes of consumption as well as the costumer as the subject of inquiry. The costumer, the main focus of consumption studies, is now seen less as an isolated free decision-maker but as a fleeting entity living, moving and swarming (Brembeck et al. 2015). Costumers and consumption are represented as being constantly on the move: the costumer became elusive (Ekström 2004) moving in complex fields populated by a multitude of actors, processes and practices (Brembeck et al. 2015). Actor-network theory (ANT) has guided us to not only look at human actors when studying societal processes but the networks made of human and non-human entities (Latour 1996, 2005). ANT influenced analysis of consumption now focuses on *„who and what goes with them* – their partners, but also their vehicles and their things" (Brembeck et al. 2015, 5). Thus, when looking at consumption in post-automobility and beyond, we need to look at the workings of hybrid kinotopic entities, moving actors, objects, spaces, netwoks, practices and processes.

The manmade synchronized rhythm of urban mobility gives way to (partially) algorithmic synchronization of the hybrid system of humans, machines and infrastructure, taking control out of the hands of drivers and their machines to give it (partially) over to algorithms. Shared rules and common sets of communication tools and mechanisms are replaced by cyber-physical systems rearranging socialities, power-geometries (Massey 2005) as well as urban structures. Vehicular cyberization reorders the time-space 'scapes' of urban denizens once again (Sheller & Urry 2000, Sheller 2004, Sheller & Urry 2006).

AVs cut through traditional moorings to real and fixed locations; territorialities of social exchange (home, work, consumption and leisure) become virtual and liquid. The social construction of the private and the public is challenged; in the "global fluids" of people, information, objects and risks moving in heterogeneous, uneven, unpredictable shapes and forms at different speeds and levels of viscosity mobile publics and privates are created in messy complexity (Sheller & Urry 2003). The system of automobility created drivers and passengers "dwelling" inside the iron cage of the car (Urry 2006), private "driving events" were part of the automotive consciousness of the individual (Pearce 2016). The social universe of hyperconnected kinotopic mobility is not constituted across the public-private divide. (Thomson 2011)

Post-automobility creates kinotopic consumptionscapes: consumption – consumers „living, moving and swarming" (Brembeck et al. 2015, 2), objects (goods, services, information, ideas) and „mobility things" (Hansson 2015) – flows through networks of interconnectedness involving human and non-human entities „assembling" (Latour 2005) the mobile moving connected costumer. The elusive ontology (Foster 2011) of the costumer is characterized by the simultainty of being mobile moving and connected, as much as being stationary and detouched while *being* connected. Kinotopias augment the already fluid 'scapes' of new mobility: temporal and spatial fluidity is complemented by political liquidity. Control, and thus power geometries, are rearranged and made liquid in the network of human and non-human agents as well as the network of flows (Castells 2009).

The liquidity of consumer identities as well as of institutions, objects and places of consumption (Bardhi 2012, 2012) contribute to the transition from a „consume-to-own" to „consume-to-use" culture. Liquid consumption (Eckhardt 2015) requires a more transient mode then the firm emotional, social and material relationships embedded in ownership. Access based consumption enpowers the costumer with more flexibility and adaptability suitable to its liquid social embeddedness as well as the elusive social ontology of consumption itself (Bardhi 2012b). It takes the burden of temporal and spatial responsibility and materiality off the shoulders of the costumer. Without ownership the flow of everything becomes even more swarming. Consumer relationships become temporary, losely bonded and characterized by non-committal instrumentality (Eckhardt, 2015). Furthermore, costumers are anchored to practices and processes, less to objects; this further enhances their mobility as well as their independence from pre-existing social (status) limitations (Bauman 2000).

"Fluid consumption", the delicate interplay of sedentarism and ubiqous mobility, at the confluance of access based consumption and the global fluids of people, objects and information create various new forms of consumptionscapes (Bardhi 2012a, Brembeck et al. 2015; Brembeck et al. 2016). Consumer behaviour as well as consumer subjects become elusive in late modernity: they are effects of the interplay of people, objects and meanings that flow through the "fibrous, thread-like, wiry, stringy, ropy, caterpillary character" (Latour 1996, 3) of modern societies. Consumption is as much mediated through mobility as it is informed, influenced and "assembled" (Latour 2005) by it; mobility in actor-network theory becomes constitutive of consumption discarding the "active" consumer and the "passive" object of consumption through the spatial, temporal, sensory, bodily interplay of hybrid entites walking, driving, passengering, wondering, carrying, pushing, placing and swarming through the maze of bodies, mobility things, infrastructure and objects of consumption (Cochoy 2009, Harman 2009, Jensen 2013, Brembeck et al. 2016).

Kinotopic consumptionscapes are a complex ensemble of traditional, hidden/secret, virtual and automated places and social networks of consumption. Most of the flow moves through large scale, extended, networked and secretive channels hidden from the eyes and concern of the costumers (Birtchnell & Urry 2015); hybrid human and non-human entities move in virtual spaces created by algorithm controlled networks of flows in isochronal (intermittent, individualistic, time shifted, repetitive and cyclic) temporality (Dholkia 2015), while much of the consumption itself is also liquid – identification avoiding, situational, use-value dominated and dematerialized (Eckhardt 2015). The temporal and spatial fluidity creates a vast kinotopic consumptionscape in which, very much in accordance with ANT ontology (Latour 1996), processes, interactions and power-geometries (Massey 2005) become elusive, temporal and liquid.

While all this is a theoretical construct I will try to live up to the challenge posited by Sheller and Urry calling for new ways to navigate "new material, mobile worlds, bringing into being ways of communication, mobilization and theory that are both and neither, public and private" (Sheller & Urry 2003, 122). In the further analysis I will focus on the elusive ontology as well as the social epistemology of kinotopic consumptionscapes in different scenarios of the future, and the different potential technosocialities such scenarios and their respective power-geometries entail. I will be using the foresight framework presented in the analysis of the future of freight (Birtchnell & Urry 2015), to examine potential future kinotopic consumptionscapes. The selection of the scenarios is contingent; I am using these because they pertain to mobility. This may be a limitation of the paper. I am aware of what the Danish physicist, Niels Bohr quoting a Danish showman once said: "Prediction is always difficult, especially if it is about the future". (Just by the way, this apparently also holds true for the past, since – according to other sources – the abovecited quotation is also attributed to K.K. Steincke, published in his *Farvel og Tak* book in 1948, and to Mark Twain, Samuel Goldwyn and Robert Storm Petersen) (Braun 2015). The focus here is less on the made-up worlds or the technologies that populate them, but on the technosocialities via consumptionscapes imagined by the author triggered by expert designed future scenarios.

FUTURE CONSUMPTIONSCAPES

Birtchnell and Urry present four future scenarios developed in the UK Foresight program in 2012 to map out distinct worlds of global freight encompassing issues on consumption, marketing and distribution. The four scenarios are (1) "Bigger Boats" (more economic growth, increased use of energy, more transport and higher volumes of moving objects) (2) "Onshoring" (returning manufacturing through the widespread adoption of additive manufacturing alongside high-tech industries creating regional connections between manufacturing and distribution) (3) "Internet of Things" (advanced manufacturing technologies rejuvenate long-lapsed industrial hubs to open small-scale manufacturing and boutique consumer-friendly production centers) (4) "Make Do and Mend" (reduced levels of output, powering down of societies, reduction of manufacturing, sustainable production and consumption) (Birtchnell & Urry 2015, 31-35).

In the "Bigger Boats" scenario increased levels of consumption and freight both local and global require enlarged flows of everything. "Behind the scenes" of markets there is already a vivid and complex organization of mobility to connect, manage and service the flow of goods from their place of origin (mainly the Global South) to the costumer (mainly in the Global North). The system of cargomobility, hidden from the eyes of the costumer, is characterized by high levels of standardization, economies of scale and ever increasing efficiency to establish the connection between places of material production and consumption (Birtchnell &

Urry 2015). Not only materials and objects travel with increasing speed and efficiency from South to North, but also negative externalities of labor, taxes, and emissions are containerized and offshored in the other direction from North to South.

Kinotopias offer more effectiveness, more standardization as well as a more dense utilization of the shared spaces both above the ground, on street level, and underground. Containerization made objects more affordable "to ship, buy and dispose of" (Birtchnell & Urry 2015, 28), autonomous mobility makes objects readily available to use, re-use and dispose of. Objects, and access based services are available "just-in-time" anytime, anywhere.

Instead of owning and using "cars", people are consuming mobility services. Price of access decreases, availability of the service is omnifold; ubiquitous mobility consumptionscapes require more vehicles on the road. The "car" loses its present shape, design and function: it will become a kinotopic space simultaneously offering mobility service (movement from A to B) and activities unbundled from their traditional territoriality. This is augmented by certain activities being "transduced" to kinotopias: one can (and must) always do something (work, rest, be entertained) while being on the move; empty travel time ceases to exist.

Access based consumption is the dominant form of consumption, therefore consumptionscapes are omnipresent. Autonomous "mobility-things" allow for more personalization of objects as well as services of desire; people consume everything everywhere. Consumptionscapes become multidimensional. Hidden, virtual and automated networked consumptionscapes coexist. Hidden and secret "magic" cargomobility (Birtchnell & Urry 2015) is extended to the last mile: from warehouses objects travel not to the shop-floor but on to the doorstep. Autonomous mobility-things carry preordered objects to be placed on the doorway mat. Some of these objects are purchased by humans, others by assemblages of human and non-human hybrids (in virtual consumptionscapes online), while again others by artificial intelligence driven non-humans (in automated consumptionscapes like the refrigerator "knowing" about consumption patterns, favored brands and price limits).

In access based kinotopic consumptionscapes the relationship of who-sells-what-to-whom become versatile and multifold. New business models emerge. Kinotopias become media selling access-based products and services to customers using them for the period of travel (or beyond). Mobility providers are selling accessible products and services to their users, but they also sell the "souls" of their users to use available products and services (including screens and sound) in the mobility device in a similar way traditional media is selling the "eyeballs" or "eardrums" of users as target audience to advertisers.

This world is "hypermobile" (Birtchnell & Urry 2015, 32) *while consumptionscapes are superfluid: temporal and spatial flows are uninterrupted and multidimensional; power geometries are elusive and temporal, publics are superliquid, private and public are conflated.*

The "Onshoring" scenario drives back manufacturing to the Global North, local production as well as local consumption is on the rise. Post-industry is organized around regional and local manufacturing as well as local consumption. Consumers in the Global North desire regionally produced, bespoke and innovative commodities, while middle classes in the Global South also have their own creative and innovative economies as well as hubs of cosmopolitan living. 3D printers are being used in additive manufacturing to spread-out manufacturing locally (Birtchnell et al. 2013). Together with the rise of local and additive manufacturing, long distance cargo decreases. While cargomobility between the Global North and the Global South shrinks shorter distance freight increases: kinotopic platoons of lorries populate highways and individual kinotopic freight equipment move on local roads.

Generic objects and services – objects having only use-value (Eckhardt 2015) – are consumed "just-in-time", expensive, unique and/or local produce is purchased to own and identify with. Access and ownership coexists as do a variety of consumptionscapes. Local shops serve costumers alongside virtual consumptionscapes; kinotopic mobility-things assist locals shop and carry objects strolling, walking and moving in revitalized urban environments. "Transport buddies" (Walpot 2015), autonomous object-carriers, populate networked urban consumptionscapes sharing space with kinotopic bikes and other autonomous mobility-things. Strategies of persuasive mobility (Anagnostopoulou 2016) emerge: people are incentivized to use mobility-things that are beneficial to urban livability and wellbeing.

Kinotopic platoons will change power geometries beyond those of transport. Trucking involves other systems of human exchange besides the transport of goods by lorries. Autonomous freight vehicles are moving in platoons without drivers. Thus the infrastructure for truckers, truck stops, service stations, restaurants and bars, become futile. Paid sex and sex related crimes, oppression of, mainly,

women (MacKinnon 2011) in those heterotopic consumptionscapes will disappear together with all other goods and services that are exchanged in truck stops. Roadside extortion will also be limited: soliciting illegal payments to police, soldiers and weigh station attendants is abundant in a number of countries (Olken & Barren 2009). Without drivers, trucks and their owners will not fall prey to extortion, violence on the roads or in stops, while there may be less demand for trafficking women and children to become sex workers for, at least, this purpose.

This world is multimobile while consumptionscapes are multifluid: several fluid interconnected networks co-exist; power geometries are elusive and temporal within networks, much less between networks; liquidity characterizes publics within the networks, while hierarchies and power structures are rigid amid networks.

The third scenario is called the "Internet of Things": robotics, nanotechnology, full scale autonomous mobility is now mainstream; industrial hubs are rejuvenated, manufacturing is small-scale, 3D printing is ubiquitous and emissions are reduced by government regulation, stakeholder concern and citizen engagement. Kinotopic mobility things co-exist with other forms of kinotopic hybrids: kinotopias are in, on, near and around the body. Nanotechnology allows for units to be placed in the body to be connected with medical devices to monitor health conditions, send and receive information from and to the body; wearables are mainstreamed and the body is n-dimensionally connected to networks through connected 'stuff' on the body (watch, eyeglass, rings etc.); garments are connected to change color, texture, energy levels; mobile communication devices (what once used to be smartphones) are sophisticated computers for human-to-human and human-to-machine interaction; kinotopic mobility-things are ubiquitous carrying people and objects with low emission energy sources, reduced speed in a smart city environment where big data assists reaching required levels of emissions, traffic density and speed. The coexistence of autonomous and non-autonomous vehicles was brief and now full scale autonomous mobility is mainstream. Urban environments are getting crowded by the mobile devices: more and more people and object carriers are occupying shared urban spaces; flows of people, objects and information are ubiquitous. There is a co-existence of mobility and sedentarism (Sheller & Urry 2006): while objects and information flow through n-dimensional networks and mobile devices, people become more stationary. Objects are customized and printed through 3D printers small and large; territorialities of home, work, business and leisure conflate into one space as access to information is unlimited through clouds; objects are either printed or delivered autonomously and overcrowded shared spaces deter people to be on the move. There is a revival of static experiences though; urban centers are kinotopia-free: people walk, sit and enjoy spaces of interaction without networked flows of everything.

Technology evolves in multiple trajectories: nanotech enabled networks connecting the insides of the body with equipment outside connect bodies to transfer memories, emotions, knowledge from one body to the other. "Caring" technologies emerge that create human-non-human interaction metaphorically referred to as "big mother": intergenerational transfer of knowledge takes place through kinotopic nano-devices[1] travelling through bodies. These 'devices' collect information that are then transferred to another body able to utilize the information because of the genetic similarities between kin (Heidingsfelder 2016).

Consumptionscapes are multifaceted. Everything from clothing to eating is interconnected and is part of the networks of flows (Castells 2009). Kinotopic consumptionscapes are also multilayered: people are travelling in fully connected autonomous mobility equipment and use their time moving to shop in virtual environments for objects and services that are also moving across networks (books, music, information) to mobile devices (music players, e-readers) or clouds that offer multiple access. Algorithms and new modes of exchange inspire the emergence of alternative currency systems both open (like blockchain based systems that are traded and exchanged for traditional currencies and closed systems created around bartering (Birtchnell & Urry 2015, 34)). The urge for sedentarism creates a revival of being "off" networks. Mass produced, non-printed objects are in vogue to be looked for and purchased in traditional, non-connected consumptionscapes. These shopping environments are modernized versions of traditional family stores without carts and other

[1] Such a "design-concept" was developed in a participatory foresight process as part of Fraunhofer CeRRI 'Shaping Futures' project; it's not a techno-driven vision, nor is it a technical vision that will soon be realised, but rather a principle or example of how people may want to interact with technology.

mobility-things. People touch, feel and try objects salespeople actually assist shoppers and costumers carry stuff home all by themselves.

This world is mixed-mobile while most consumptionscapes are superfluid: temporal and spatial flows are uninterrupted and multidimensional but co-exist with sedentaric off-the-hook 'scapes'; power geometries are elusive and temporal in the fluids, while heterotopic, intense and static in the alternative spaces off-the-hooks; publics are multilayered: parallel to the global interconnected network of flows local non-connected publics exist; the private and the public is elusive and temporal while spaces that show different levels of being "priblic" or "pubvate" (conflated public and private) exist.

The forth world is called "Make do and Mend". This is a powered down world of reduced emissions and energy use, individual travel as well as global flows of people and objects are falling. Low-tech solutions are preferred, recycling is the rule. Mobility as well as networks are scaled down; there is reduced consumer spending, more sustainability, community farming and craft production. While kinotopic mobility provides autonomous movement when needed, limits are placed on flows of travel, both of objects and of people. Beyond regulatory measures, powering and scaling down is also achieved by a change of culture reversing the trends of the twentieth century consumer and mobility culture. People treasure repairing skills, objects are robust and reused, mostly produced locally with new localized meanings and designs.

Global fluids are obstructed, technology is developed in order to control and limit flows instead of enabling them. Mobility is driverless; most autonomous devices in this powered down world are connected only in as much as this assists their accident-free movement. People use autonomous cars (which are very similar in design and shape to the cars of the twentieth century, while lighter and more energy efficient) for short distance travels. The Global South quickly emerged to the same levels of consumption as the Global North and is scaling down also. The dramatic effects of climate change are felt the globe over and therefore denizens of the urban hubs of the Global South are also giving up their newly enjoyed cultures of (over)consumption.

Consumptionscapes are waste-free in order to limit overflows of urban metabolism, unnecessary objects are excluded. Unpacked goods are consumed, people bring their own jars, boxes and other recycled materials to carry food and goods home (Beunpackaged 2017). Shopping occurs in farmers markets or unpacked stores. Autonomous mobility is restricted outside inner-city limits, people walk in the central areas of urban sprawls and would shop locally walking or biking. Technology "fixes" are triggered by a slower pace of living, more wellbeing and reduced personal debt (Birtchnell & Urry 2015, 35).

This world is semi-mobile, consumptionscapes are sustainable. Information and data flows are uninterrupted and multidimensional, while urban 'scapes' are sustainable, powered down and local; power geometries are intense and non-transparent; publics are multilayered: parallel to the global interconnected network of information flows local non-and semi-connected publics exist; the separation of the private and the public is revived.

CONCLUSION

Kinotopic mobility is, beyond technology, a sociotechnical construct of mechanized mobility populated by mobility things, hybrid human-and-non-human ensembles created mainly by and through the multiplicity of simultaneous human interrelations and interactions in and through space. This understanding of kinotopic mobility is influenced by ANT in as much as autonomous mobility is conceptualized as the workings of hybrid kinotopic entities: mobile actors, objects, spaces, netwoks, practices and processes. The kinotopic consumptionscapes described here are sociotechnical constructs imagined by the author.

The social epistemology (Haddock 2010) – what we know, how we know and what are the hierarchies, discourses and processes of knowing – of our sociotechnical urban order as well as the technosocialities of present mobilities (Sheller 2004) will inform, influence and determine or lock-in mobilities of the future. We need to apprehend the elusive ontology (Foster 2011) of our (mobilities) present and future in order to be able to deal with the complexity of our intertwined social & technological processes (Urry 2005). Kinotopic consumptionscapes are to be imagined as multi-hybrid entities: swarming human–non-human hybrids, moving objects, interconnected spaces, fluid practices and liquid processes. In our kinotopic futures shared rules and common sets of communication mechanisms will be replaced by interacting hybrid human–non-human systems rearranging socialities, power-geometries as well as urban structures and modes of societal operation. There is an ongoing discussion about whether post-automobility would bring societies heaven or hell (Minett 2016)? According to the scenarios presented not only do we not know whether AM will be heaven or hell, we don't even know which outcome is which.

Marketers will seek and find new ways to extract rents from the changing scenery of kinotopic consumptionscapes. This is not our concern here. Here we were concerned more with the "how" of the transformation process itself and less with the "what" of that future construct will look like. If we accept that kinotopic consumptionscapes create new forms and means as well as new meaning(s) of consumption this will also redefine our 'scapes'. What the analysis of the evolution of consumptionscapes shows is that "technology fix" or seemingly path determined trajectories of "locked-in" or emerging technologies (like autonomous vehicles, autonomous mobility things and other kinotopic entities or the 'scapes' they co-create) do not lead to similar sociopolitical futures. Our social 'scapes' are formed much more by the world we create by our social imagination and the political processes than the technologies that populate them.

Consumption is a good terrain to look at our complex sociotechnical futures. Our future liquid consumptionscapes are populated by swarming hybrid entities creating intense and fluid, if alternative, power geometries, publics as well as public and private confluences. The current dominant approach to our sociotechnical futures is heralded by 'technology push' (Von Schomberg 2013). Research and innovation in the autonomous mobility arena, with enourmous impacts on our markets as well as on our culture, is almost exclusively driven by technology advancement. Addressing social desirability and stakeholder involvement in the early stages of the innovation lifecycle is limited to the assessment of the regulatory landscape and discussion of some of the complex ethical challenges of autonomous vehicle deployment (Smith 2015). This is complemented by a threat of 'policy pull': to accept and promote, by key but uninformed stakeholders, the implementation of new mobility technologies beyond their technical feasibility or societal impact.

The elusive ontologies of our socio-technical realities call for a more subtle epistemological approach to such potentially transformative technologies as autonomous or kinotopic mobility. Instead of the top down, mainstream epistemology of technology push, a more democratic social or civic epistemology could be employed (Jasanoff 2007, Goldman 2009). The conceptualization of such an epistemology is beyond the scope of this paper. In case we are looking for examples how this could work, the "participatory prototyping" or "participatory foresight" method may provide a novel and effective illustration for mobilizing alternative regimes of knowledges through enabling and empowering laypersons to realize and explore their preferences toward prospective, yet unknown, technologies. This prototyping methodology applies a social epistemology in which laypersons' preferences are extrapolated from the aggregate data of, collected through a series of workshops, tangible objects, descriptions, audios and videos. The process and the results display to what extent human–machine interaction and the futures created by the socio-technological developments are interwoven with their co-evolution. (Heidingsfelder 2016) Such techniques combining laypersons' imagination with expert knowledge and prototyping processes translating meanings operable in seemingly different regimes of truths open up new avenues of collaborative sense-making, or a social epistemology, in the context of creating future technologies as well as shaping our complex social universes, consumption included.

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