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Post-Coronavirus Regional Innovation Policies: From Mega to Giga and Beyond through Sustainable Spatial Planning of Global Tourism

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Abstract

This contribution is critical of Neo-Schumpeterian innovation studies for an historic tendency to reify capitalist industrialism as its main conceptual framing model, including blind-spots concerning the sustainability-free advocacy of 'green revolution' practice in industrialist food production. Nor is it particularly impressive regarding worker wellbeing or broader health and even life sciences interest, while space-time theorisation of territorial innovation under conditions of urban congestion, sprawl and hyper-commuting alongside environmental degradation is largely woeful. The Coronavirus contagion has alerted regional scientists to these lacunae and this contribution attempts to re-balance the prevailing traditional industrialist bias by considering alternative, more sustainability-informed innovation emphases. These include efforts to conceive innovative sustainable spatial planning models. We do this by analyses of 'territorial innovation', including considerations of 'new urbanism' solutions to prevailing discontents, and advocating 'GreenSphere' design of 'circular economies' to escape from the negative effects of the environmental despoliation by urban congestion, widespread pollution (including pandemics), global tourism and human wellbeing. We exemplify aspects of these conditions by running through three post-urban Model-types - Megacentres (e.g. Bioregional); Gigacentres (e.g. Global Tourism GigaSheds) and GreenSpheres (New Circular Ecologies) before concluding our contribution.

Keywords: Global tourism; Attention; Surveillance; Sustainability, RIP, Territory, GreenSphere.

Introduction

This contribution has been stimulated by joint reflections on the 'real' and 'conceptual' imagery and circuitry that is either observable or easily imaginable due to the impact of the Coronavirus contagion on the preceding framing of global capitalism. To remind ourselves of how that framing was constructed at the end of 2019, the following components of key 'scaffolds' as connected by the 'networks' that integrated it were prominent (Curzio & Fortis, 2002; Lane, 2002). First, receiving payment from work was the main means by which most employees and households earned an income. By early 2020, large portions of the labour market received subsistence through a partial basic income contribution from the state. By May 2020 in France, Germany, Italy,

Spain and the UK, furloughing reached 40 million accounting for between 22% and 43% of the workforce (Fitch Ratings, 2020). Additionally, official unemployment for them was 14 million at April 2020 (Partington, 2020). In the USA, 30 million workers received partial basic income while a further 42 million had filed for unemployment by June 2020. The latter figure is much closer than could ever have been anticipated for 2020 by those who predicted 60 million unemployed over the 2013-2043 period in the US (47%) due to the combined effects on the US jobs market of automation by AI and Robotics (Frey & Osborne. 2017). Comparable simple arithmetic at the same estimated rate of change shows an equivalent of 63 million (47%) would similarly be affected for the five large European economies. In that respect Coronavirus created considerably more labour market disengagement or 'idleness' in the US (72 million) than in the five leading European economies (54 million) by 2020. Either way, Coronavirus had its effect unthinkably more swiftly than the anticipated coming labour market shakeout from mainly, though not only, gross service class automation.

Second, employed workers and their families expected to engage partially in international travel (business, conference events and trips), sports attraction trips (games, tournaments and other competitive events) or wholly (family, group and individual vacations) in global tourism (including domestically). It transpires that, first, international tourism has been one of the most negatively affected industries under the 'lockdowns' contingent on government responses to the global outbreak of Covid-19 disease. But secondly, it was already one of the greatest sources of climate change through the enormous quantities of energy, transportation, food and accommodation consumption (conferences, tournaments and vacation attractions) on the planet. The United Nations World Tourism Organisation (UNWTO, 2020) first quarterly estimate was that international tourist arrivals had reached 1.5 billion per year in 2019. Accordingly, the Covid-19 effect on the first quarter 2020 results showed global tourism had actually declined by 22% and would more than likely decline by 60% - 80% annually compared to 2019's 1.5 billion.

A little earlier than that peak date, in 2016, 505 million spectators 'consumed' international *sports* events (GSI Report, 2017). *Wikipedia* data showed the totals for worldwide sports tournaments in 2019 included: 77 for men; 67 for women; 17 open; and 20 mixed – a total of 181. Moving on to business tourism, according to Littlefield (2016) there were 1.9 million global business conferences involving ten or more persons for a minimum of four hours in a contracted venue worldwide in 2016. The estimate of the annual cost of such events was $1.1 trillion. There were 1.9 million business meetings in that year attended by 251,236,000. At that time, the industry employed some 25 million direct and indirect employees (Oxford Economics, 2018). Thay/UNWTO (2019) reported that carbon emissions from international and domestic tourism would rise from 5% in 2018 to 5.3% by 2030. Projected international and domestic arrivals were expected to increase from 20 billion to 37 billion, mainly driven by domestic tourism (from 18.8 billion to 35.6 billion), followed by international arrivals (1.2 billion to 1.8 billion). Lenzen et al (2018) estimated that global tourism's carbon footprint was higher already at 8%. According to the Lenzen

study, the tourism carbon burden consisted of 2.1 billion tons CO_2 equivalent from tourist transportation and 2.2 billion tons CO_2 equivalent from tourist subsistence and accommodation – at 2013. The non-CO_2 global warming burden from aviation contrails are not part of these calculations but are estimated by Peeters *et al.* (2016) as at least twice to three times the CO_2 from the global tourism effect. Cohen, Hanna and Gössling (2020) and Gössling, Scott and Hall (2020) have explored the downsides for healthcare for business tourists and victims of Covid-19 in telling accounts of the travel care implications for both 'hypermobile' business travellers and the pandemic effects on the restructuring imperatives of the global pandemic. This resonates substantively with the narrative provided in this paper on the pressing needs for a fundamental, innovative realignment of global tourism principles and practices. In what follows this contribution begins by mounting a critique of current health and planetary implications of global tourism, laying out some potential remedies. Second it maps key innovative needs and prospects for radical solutions. Finally, the contribution teases out the governance implications for tourism innovation which interacts fruitfully with a revitalised and egalitarian regional innovation policy.

Post-Urbanism in General: Two Contrasting Regimes of Change

We start with an outline of common discontents but also perceived benefits of infra-urban or regional and rural life. We deploy *infra-urban* to mean degraded serviceability, mobility and habitability in remoter regional and rural settings, and ultra-urban to mean substantially upgraded – especially – digital access to virtual serviceability, mobility and habitability. Given the space available we will confine ourselves to three of each of the degraded or upgraded qualities listed.

Regional and Rural Serviceability, Mobility and Habitability

Even before the Covid-19 pandemic of 2020, the serviceability of regional infra-urban and rural life had, in most such settings been under severe strain. Services that had prevailed for generations to enable functional modern living were being drained away precipitately in the late twentieth and early twenty-first centuries' *fin de siècle*. In *La France Profonde* decades of reasonably civilised living had evaporated as baker's shops, hardware shops and even artisanal restaurants, *bistros* and cafés closed. While French *cuisine* was mainly to be seen on TV cookery programmes with the demise of the village *bistro*, occasional entrepreneurs were to be seen re-equipping redundant buses as mobile *table d'hôte* restaurants that might visit once a week to service the needs of otherwise deserted village customers in search of a traditional *bistro* meal experience. In infra-urban Britain, bank branches closed at a rate only marginally slower than the village pubs that had been mainstays of the rural social scene. But once hospitals, clinics, general practices, village schools, garages and bus services began their final closure, rural depopulation that had previously characterised the flight to the towns in the 1960s entered its latest near-death experience. Mainly, the car became the main if not only form of mobility available to established rural residents, meaning

lengthy commutes for employment, often in public sector labour markets. In touristic sub-regions small jobbing builders, plumbers, electrician and gardeners could survive as handymen in the domestic construction and repair economy buoyed up by the second home market. Many local citizens rented average social housing or variably modernised or unmodernised, inherited dwellings. Unsurprising, therefore that loss of serviceability, high cost mobility and less than satisfactory habitability in the infra-urban setting became once again common in the new century. The move to the town or city thus became inevitable, especially following big blows like the downgrading or closure of a local or regional hospital in the offing.

Ultra-Urban Serviceability, Mobility and Habitability

If, in the 1990s and first decade of the 2000s, ultra-urban living grew in attraction as the service deficits that had grown in the infra-urban settings worsened, the gathering problems of dangerous urban pollution, traffic congestion lengthening hitherto moderate commutes and neoliberal mis-management of unaffordable housing markets, had begun to cause increasing concern over the mental and physical health of ultra-urban residents. Recall our coining of the terms *infra-urban* representing significant degrading of standard expectations of serviceable modern life in remoter regional and rural life and *ultra-urban* signifying superior serviceability, not least through high quality digital access, food delivery and just-in-time delivery (e.g. for healthcare, wellbeing, fitness and ready-meals services). Contemporary 'food scares', obesity concerns and ambient particulate, NOX and CO_2 pollution had fuelled ultra-urban obsessiveness with diet (organicism, vegetarianism and veganism *inter alia*), exercise and body-consciousness and 'lifestyle' consumption characterised by ultra-urban tourist travel, particularly in mobility, subsistence, accommodation and shopping, we find the following quote on the subject particularly apt:

> 'Celebrities in particular maintain personal brands based on frequent flying. This paper assesses the aeromobilities of celebrities, for which it develops a netnography-based methodology that tracks spatial movement on the basis of social media posts. Data is (sic) analyzed to determine travel patterns, distances flown, and fuel consumed. Findings are discussed in terms of the energy-intensity of celebrity lifestyles and the struggle over moral and social norms regarding personal accountability for contributions to climate change.' (Gössling, 2019: 1)

Even before Covid-19 ultra-urbanism had lost many of its attractions later experienced by the demonstration effect of alternative work-life balancing occasioned by Covid-19 'lockdowns'. Accordingly, the need to reflect these changed norms by urban innovation had already been articulated in more profound ways:

> '...contemporary transport systems are characterized by injustice, as they tend to favour and prioritize motorized transport, accepting that considerable environmental and social burdens are put on more sustainable forms of transportation, other traffic participants and society as a whole. To conceptualize 'urban transport justice', the paper discusses three dimensions where injustices are apparent: Exposure to traffic risks and pollutants; distribution of space; and valuation of transport time. It is argued that public and political recognition of urban transport injustices provides a significant argument for changes in urban planning, transport infrastructure development and traffic management.' (Gössling, 2016: 1)

To conclude this sub-section on the recently latent but now emerging demand for 'urban transport justice' we draw upon a further finding of research from the Gössling team, this time on the relative external and private costs and benefits of 'automobility, cycling and walking' to citizens of the European Union:

> '...each kilometre driven by car incurs an external cost of €0.11, while cycling and walking represent benefits of €0.18 and €0.37 per kilometre. Extrapolated to the total number of passenger kilometres driven, cycled or walked in the European Union, the cost of automobility is about €500 billion per year. Due to positive health effects, cycling is an external benefit worth €24 billion per year and walking €66 billion per year' (Gössling, Choi, Dekker & Metzler, 2019: 1).

Ultra-Urban life has clearly become socially unjust to the extent that it can both be observed in practical perception and experience by its citizens due to the brief glimpse of an alternative reality imposed by severe territorial lockdowns. But it has also been shown to have agglomerated excessively due to the unleashing of discriminatory and polarising social forces that have threatened the serviceability, mobility and habitability of the infra-urban areas that it has also increasingly denuded.

Re-Thinking Urbanism: Attention, Surveillance and Sustainability

The Attention Economy

The reference to 'celebrities' means they are at the heart of what Franck (1999; 2016) referred to as the 'Attention Economy' or its cognate 'Attention Capitalism'. It is pertinent to our outline schema for 're-thinking' urbanism even if, in the form of 'seasteading' it represents an extreme libertarian utopianist ideology of urban planning located 'in international waters where there is no tax' (Dean, 2020). Seasteading was crafted in 2008 by neoliberals Peter Thiel (co-founder of PayPal) and Patri Friedman (son of economist Milton Friedman) as expressed at the Seasteading Institute in San Francisco. Its president is quoted by Dean (2020) as saying the sea is 'The safest place to be in a pandemic'. Seasteading luxury dwelling 'pods' access energy from solar panels and natural gas, have rainwater capture, hydroponics, greenery murals, and touch-screen glass, with (questionably) 3D remediation to 'restore coral reefs'; though probiotic (yogurt) bacteria have proved more effective in fulfilling that task (Turnbull, 2020). These and a further dozen or so would-be 'entitled' Silicon Valley billionaires treat their New Zealand apocalypse bolt-holes as vanity projects that polish narcissistic egos. Many were taught the crucial nature of attention as a weapon through Stanford psychologist B.J. Fogg's (2003) implementation of 'digital attention capture' at his Persuasive Technology Lab working with his graduate class at Stanford University. Among these, Instagram's founders Kevin Systrom and Jack Krieger were known for promoting 'vanity' among its users, a trait that attracted Mark Zuckerberg's Facebook to acquire their start-up for $1 billion in 2012. Subsequently, Systrom and Krieger resigned from Facebook in face of Zuckerberg's autocratic management style (Foroohar, 2019).

Other 'attention apostates' have included Evan Spiegel founder of Snap, Jack Dorsey of Twitter, and Roger McNamee former Facebook investor and mentor to Mark Zuckerberg. A moment's reflection shows this celebrity paranoia has little but a thin veneer of 'greenwash' etched into which are the Seasteading Institute's few social, as against directly egotistic, norms. These number only three: curing the sick; feeding the hungry; and advocacy of sustainable energy. Each chime with the fear fuelling the narcissist's paranoia at confronting potentially apocalyptic societal disorder (e.g. Covid-19; 'Black Lives Matter'; rampant unemployment). So 'attention' (after Herbert Simon, 1971) has the trait of scarcity (an economic value) but attention is also a basic human need (a psychological value). Second, attention can be given a value ranking in the form of concrete and comparable 'currency' units such as 'likes', as used by Facebook and others. Third, accumulated attention by a 'celebrity' is correspondingly value-enhancing for the 'follower' too. In this transactional landscape the equivalents of the financial system are the media. Fourth, commoditisation mutates into 'brands', which foments new inequalities between 'celebrities' and 'nonentities'. 'Attention capitalism' to quote O'Connell (2018) reflecting on its New Zealand runaways is '*the moral vortex at the centre of the market*' rather than a template for socially-minded spatial planning innovation.

The Surveillance Economy

Sidewalk Labs (a subsidiary of Alphabet, the parent company of Google) recently (May 2020) terminated its plan for the harbourside, brownfield site of Quayside in the former docks area of Toronto, Canada. The Sidewalk CEO Dan Doctoroff, former private equity financier, CEO of Bloomberg the privately held financial, software, data, media firm, and deputy mayor of New York in the Bloomberg administration, blamed the shutdown on Covid-19 uncertainty. Doctoroff is a colleague of Hal Varian, Google's Chief Economist who crafted the targeted advertising model that became the source of Google's billions. In Zuboff (2019) Varian is parsed as outlining four forms of monetisation. First, 'Big Data' extraction and analysis allowing the necessary scale of raw statistical material for human identity surveillance. Second, new forms of enhanced contract monitoring, meaning new ways of enforcing control by automatic digital monitoring of customer behaviour, including instant contract (e.g. car insurance) termination for infraction. Third, 'personalisation' and customisation as represented in the 'personal digital assistant' (e.g. Amazon's Alexa) that extracts the 'dark data' of personal identity and brings it into the light for the profit of others. Fourth, Varian proposed permanent innovation as crucial to future Google profitability by 'continuous experiments' such as predictive analytics, machine learning, automated mobility and Google Glass....some failing fast, others more slowly. Quayside was planned as a 'smart' neighbourhood to extract and implement all these and more 'data exhaust' from 'Surveillance Capitalism' (Zuboff, 2019). Such was explicit in Doctoroff's presentation of Quayside street furniture masquerading as targeted advertising:

'...ubiquitous connectivity; incredible computing power, including artificial intelligence and machine learning; the ability to display data; sensing, including cameras and location data; ads to people in proximity, and then obviously over time track them through things like beacons and location services as well as their browsing activity...' (Doctoroff, 2016).

This was clearly the apotheosis of 'ultra-urban' planning. Nevertheless, beneath the smart-tech veneer, Quayside remained inescapably a property-driven machine for profit-making for its clients through predictive advertising exploiting surplus user 'data exhaust'. The scheme had faced widespread critique since late 2017, when Sidewalk Labs' plan to fashion a neighbourhood 'from the internet up' was first revealed. So Quayside was the joint effort by the Canadian government agency Waterfront Toronto and Sidewalk Labs to develop 12 acres of valuable waterfront in the near southeast of downtown Toronto. But Sidewalk Labs got greedy, wanting not 12 but 190 acres from the City of Toronto. By May 2020 the decision had been reached by Sidewalk Labs' CEO Doctoroff to pull the plug on what former Research In Motion digital entrepreneur Jim Balsillie called Google's 'defanged and mangled mess' (Hackett, 2020). Even if the excuse of economic shutdown related to the Coronavirus pandemic provided the final blow, the writing was on the wall for the project well beforehand.

Sustainability Capitalism and the Macro-Design of Productive Plans

Despite these failures of Silicon Valley narcissism, vanity and manipulation in the 'darker entrepreneurship' often associated with its denizens, one of its former and occasionally still practising acolytes maintains a distance from his former extreme libertarian personality traits by virtue of his adherence to fundamentally sustainable development principles. This is Elon Musk, early investor and later CEO of Tesla, the world's leading electric vehicle (EV) company. He continues to display his penchant for egotistic expressions of a contrarian nature but not in the 'attention' or 'surveillance' – seeking manner of other techno-entrepreneurs, as will be shown. According to Hammerbacher (2017) Musk says: '*I think there are probably too many smart people pursuing internet stuff, finance, and law. That is part of the reason we haven't seen that much innovation.*' He further criticised the mass displacement of carbon from the ground to the atmosphere, and ultimately into the oceans, as an incredibly dangerous experiment whose ultimate outcome is unknown, saying: '*We should not do this. We know that sustainable energy is the end point. So why are we doing this experiment? It's an insane experiment. It's the dumbest experiment in human history'.* To that end, Musk created an innovative platform of firms in solar panels, lithium batteries, solar roof tiles and storage systems (Megapacks), electric vehicles, artificial intelligence and healthcare (Neuralink) bionics and robotics, and SpaceX which profits from government and corporate satellite positioning rocketry and payloads. It operates as an integrated global innovation network (GIN) which is designed at so-called 'giga-scale'.

The planning idea at the heart of Musk's business innovation model (BIM) is to reduce 'friction' in logistics and production. At the centre of Tesla is its 'Gigafactory' (1) three

times the size of Central Park. Here Tesla BIM influence is shown in its main site, which is a recycled automotive assembly factory, site of the former GM-Toyota NUMMI joint venture from 1986. On old UPR railyards a new 'innovation district' featuring a 'Tesla campus' with an advanced manufacturing plant, an 'innovation cultivator' for technology start-ups in cleantech, life sciences and advanced manufacturing, exist on 850 acres of former railyards at Warm Springs, Fremont, centrepiece of a new Bay Area Rapid Transit (BART) interchange (see, for detail, Nunes & Cooke, 2020).

Fremont Local Economic Development Agency and Lennar, the Warm Springs developer's guide demands at least one publicly accessible urban plaza per planned housing scheme; such plazas to be linked by streets or pathways that include dedicated bike lanes; areas near rapid transit to be built to a density of 50 housing units per acre, allowing higher density according to demand; and limited high rise buildings. The Shanghai and Berlin Gigafactories (3 and 4) are similarly structured. Gigafactories for LIB and EV supply chains are in construction or planned for China, South Korea, Ohio (US), Scandinavia and Wales (UK). The construction of integrated 'friction-free' geographical 'battery belts' is innovative, as is their scale and dedicatedly sustainable construction. In China they are built by automotive battery firms BYD (2) and CATL (1) also another in Germany at Arnstadt, Thuringia; in South Korea (2) and Ohio (Lordstown) by LG Chem; and from Japan, Panasonic and Toyota in an EV partnership. In Scandinavia, the 'Nordic Battery Belt' links Mo-i-Rana in Norway (1) - Skellefteå (Sweden; 1) – to Vaasa in Finland (Ostrobothnia region's 'Lithium Province') where CATL has a 22% share in Valmet Clean Energy, contracted to clean-up Umicore's nearby Kokkola cobalt refinery, Europe's only one. A further Gigafactory is planned at Salzgitter, Germany by the Swedish Northvolt partner to service VW's LIB needs. Recently a first Gigafactory (10 GWh) was announced for Wales next to Aston Martin's EV plant near Cardiff by Britishvolt, affiliated to Vladimir Antonov, Northvolt's Swedish investor (Lea, 2020).

Post-City Urbanity

Covid-19 has caused some to begin a re-think of what needs to be in cities, given the ultra-urban problems of congestion, pollution, healthcare and fitness deficits, stress, anxiety and crime they have attracted. Through the Gigafactory optics and the 10-day build time to create Wuhan's Intensive Care hospital, realisation has grown that modern steel-frame building techniques even with retractable roofs are remarkably swift, light and affordable in times of zero-interest, quantitative easing crisis credit. Contrariwise, working from home (WFH) has shown that – despite the WFH worker keystroke surveillance instincts of global accountants like PWC (Smith, 2020) - many workers would feel better and work more productively with WFH for at least part of the working week. They would be less stressed by commuting, seeking car parking or being psychologically 'canned' sardine-like in commuter trains. This likelihood will mean a reversal of urban 'megacentre' concentration of the kind boasted by cities like Toronto, New York, London and many others. Toronto had in 2000 designated a

downtown health megacentre called MaRS Discovery District, adding the Alexandria Building in 2010 (Alexandria Real Estate Equities [US] specialises in healthcare hubs). London has had a central Knowledge Quarter at King's Cross since 2014, a partnership of 35 academic, cultural, research, scientific and media organisations centred upon the Crick and Turing Institutes, specialising in genomics and AI respectively. Also in 2014, New York announced that Accelerator, a biotech investment firm, had raised more than US$30 million from pharmaceutical investors, including Eli Lilly, Pfizer, and Johnson & Johnson, for initial funding to create biotechnology startups at the Alexandria Centre for Life Science, which encompasses more than 700,000 square feet (65,000 m²) in downtown Manhattan. This promotes collaboration among scientists and entrepreneurs at the centre and with nearby academic, medical, and research institutions.

Nunes & Sousa (2020) defended the argument that tourism should be conceptual and analytically framed as a territorial singularity, that is, it can configure a manifestation of economic ubiquity (production, consumption and consequent value creation) in the same territory, based on a coherent, shared and desired integration of '*perfect resources*' with '*territorial coherence*'. Nunes & Cooke (2020) introduced the concept of ST.i based on the idea that the territorial dynamics that contribute to the construction of the territorial singularity should mostly be developed within the scope of the territorial innovation models (BIM/TIM).

However, this dynamic needs its own political-institutional body to guarantee the coherence and consistency of the construction of the territorial singularity. This dynamic gains effectiveness if it is pursued through the construction of '*shared governance models*', dedicated to the task of building and developing territorial innovation processes. Such regional innovation policies (RIP) make it possible to articulate (perfect) resources with the (territorial) coherence expressive of the characteristics of each territory. The construction of a model of shared governance, which emerges directly from the *territorial coherence* component (Nunes & Sousa, 2020: 34), allows assignment of territorial coherence to resources and is a way of explicitly incorporating territorial innovation mechanisms.

The main consequence of this step is that innovation automatically gains a concrete territorial meaning: actors (local community fully involved), resources and integrated and interdependent activities in a specific territorial context. This is reminiscent of self-organised systems (no 'global controller'; Lane, 2002) that is, not 'administratively' managed but related through the 'shared governance' of the territorial innovation model. Such TIMs result from the interdependence between 'related variety' – sometimes also, seemingly, unrelated variety (see below). These invoke the facilitation of Chris Freeman's seminal 'cross-fertilisation' (NIS, or national) innovation systems model (Freeman, 1982; Nunes & Cooke, 2020) that we since updated with 'shared governance' TIMs.

We now take the notion of 'megacentre' (Cooke, 2005) and apply to it the Tesla model of Gigacentre, as described above. The further innovation is to apply it to a destructive climate change force, namely global tourism, by re-thinking its current provision. We

think, for the moment, that megacentre hubs of the kind described will stay in their CBD locations until environmental, healthcare and congestion conditions drive them away. This is unless cleaner, healthier, less stressful mobility and energy usage conditions come to prevail by use of battery, hydrogen, geothermal or other fossil-free renewable power. We suspect emptied retail and commerce CBDs will revert to parkland, landscaped 'prairies', ecological 'biomes' like Eden Centre, and popular infotainment settings like Promenade Plantée, in Paris of 1993, the forerunner of New York's High Line Park, of 2009. Accordingly, we think it more likely that the 'revolution in the head' may take root first because of the destructive forces embodied in research such as that of Gössling (2016); Cohen, Hanna & Gössling (2018); Gössling (2019); and Gössling, Scott & Hall (2020). This approach amounts to a demonstration of the transport injustices imposed upon citizens by the priorities given in ultra-urbanism to the continuing use of fossil fuels in automobility. It further embodies the negative 'celebrification' effect created through the 'aura' endowed by social and mass media. Accordingly, our proposal is for a competitive form of global tourism replacement that is 'post-auratic' (Nunes & Cooke, 2020 for further detail).

Thus, we now know the nature of the spatial planning requirement to create an innovative new system and structure to transition global tourism at 1.5 billion annual visits away from unsustainable pollution, disease and climate change towards a new cleaner, renewable a sustainable future. The key is, putting it simply, to think big. Clearly, the favoured activities of global tourists require amenities, subsistence and accommodation among suitably large-scale facilities (World First, 2017). Obviously, the most popular, yet passive 'Walking' 'Sightseeing' and 'Eating' activities are taken for granted, meaning 'Shopping' the fourth most popular activity must be catered for. This may recombine VR browsing, fumigated fitting or handling, online or offline delivery and in-store recycling. In descending order: Sunbathing, Reading, Swimming and Beach-Lounging can be catered for by internal or external 'Tokyo Ocean Dome' wave-machine bathing facilities, which can accommodate 6,000 bathers. Tenerife hosts the world's greatest lagoon-wavepool at three metres (9.8 feet). Here, too, are the body sculpting gyms, climbing walls, basketball courts, running tracks and hiking trails, indoor football pitches, massage rooms, vegan and hanging gardens, and performance venues much-beloved of the millennial demographic. Next in order of tourist interest are Historic Attractions and Museums to cater for. This calls into play augmented reality (AR), gamification and immersive theatre, cinema, music and literature. Recent crossover innovation has helped enable music and gaming fans to endure Covid-19 lockdowns by means of the following three 'event' types. First, 'virtual concerts' have 'stars' performing concerts on the popular video game *Fortnite*, and the even more popular Lego videogame *Minecraft* (see also, Nunes, Cooke *& dos Santos, 2020). Second, ten years after Sweden's 'Fiber Optic Valley' (Hudiksvall) pioneered VR theatre drama in 'virtual' geographic space, New York's Metropolitan Opera House in May hosted a 'virtual gala' streamed together from performers' Zoom terminals (VINNOVA, 2011; Fisher, 2020). Third, immersive theatre is offered by *Secret Cinema* a company that combines film, theatre, music and art to create performative audience-engaging experiences. These have included the films; *Back to the Future, Alien* and

Moulin Rouge. A further potential 'event' is the post-auratic art gallery. Modern curators complain that perceived 'aura' is lost nowadays due to restrictive viewing conditions behind thick security glass or high-up security hanging, while modern laser scanning shows truer, unfaded colours (Sanderson, 2020), which could satisfy the 32% of tourists who are art-appreciators according to World First (2017).

The logic of this analysis is that we turn these 'crossover' innovations into a Giga-tourism template. For initial inspiration we refer to New York's *The Shed* at Hudson Yards. This is a new cultural centre rather than a tourist complex which commissions, produces, and presents a wide range of activities in performing arts, visual arts, and pop culture. Built, like Warm Springs, over rezoned railyard land, The Shed is a 170,000 sq. ft. (16,000 m. sq.) complex built on a 26-acre industrial site. Combining the concept of 'Giga' and 'Shed' gives us *GigaSheds* as descriptors for the large-scale seeding of post-global tourism, post-auratic, yet 'photographable' icons of future mass leisure consumption. Note that Baudrillard (1994) influentially identified the 'simulacrum' as the post-auratic photo-replication of a sublime but inappropriable 'reality' (also Nunes, Cooke & dos Santos, 2020). Unlike the New York exemplar it would be apposite to site such very large installations on remoter 'infra-urban regional-rural' modal interchanges for EV tram or trunk railway lines running on battery or mains electric renewable energy, serviced by EV aeronautics, where feasible, EV taxis or rental guided cars with amenities serviced by Tesla-type semi-trucks (articulated trucks). These are now produced at Tesla's Gigafactory (1) extension at Reno.

As suggested, the capitalist industrialism model produces a multiplicity of global deficits and wastes. These consequences are associated with the global dynamics of (un)sustainability, although its manifestation is, initially, always local or regional. In these terms, both the mitigation and management dynamics must begin by being local and regional. We are particularly interested in two types of waste and deficits: solid waste and health deficits. Modern society is not only metaphorically ill, it is literally ill. Thus the 'hauntological' concept proposed by Derrida (1993) and expanded by Fisher (2013; 2014) is appropriate for our objectives. In this way, the two types of deficits and wastes presented can be understood in the cemeteries of plastic, old industrial spaces, cars, buses, trains, coaches, planes and boats that are shaming examples of this disused global materiality. On the other hand, the congeries of problems associated with urbanization and the nature of labour relations (increases in workloads, too many trips, too much cement and closed doors) in the capitalist model, as presented, also have psychological effects in terms of personal alienation, mental disorders, cardiovascular diseases, anxiety, loss of self-esteem, claustrophobia, agoraphobia, etc., all manifestations of techno-stress (Brod, 1984). 'Hauntology' has recently been proposed also to analyse the future of tourism. It is suggested that 'the analysis of the spectral elements of human experience may be a useful tool to open new ways of conceptualizing the path forward, by looking at that which drags behind the present' (Pedro, 2020: 92). We want to step forward and take what 'drags behind the present' and use such burdens to transform future economic and mental

structures. Our proposal tries to deal with this 'dark past' and use it, through models of territorial innovation, to illuminate the future.

GreenSpheres and circular solutions through territorial innovation models: 'exaptation' and 'well-being for life'

We now turn our attention to a set of experiences associated with cases of exaptation and well-being for life. We finish with the case of the city (and surrounding region) of Tomar, which combines dynamics, recombination and extends the concept of exaptation to territorial exaptation. Below are listed complementary, but distinctive, forms of sustainable environmental and individual healing innovations cross-fertilisable for alternative touristic as well as daily living uses in what we call GreenSphere settings centred on circular economies.

Exaptation and circular solutions

Exaptation is a biological metaphor (Gould & Vrba, 1982) expanded to innovation studies by Johnson (2011) and other authors (Andrianini & Carignani, 2016) which seeks to illustrate an application from one use to a different but related one. Figure 1 tries to synthesize a set of experiences that integrate the principles of circular economy and sustainability. Our perspective impels us to develop activities and business models (BIMs) that respect the principles of the circular economy (EMF, 2012; EU, 2015). The circular economy allows us to build the ability to integrate our way of life into a wider, though finite, system: our planet. A wide range of experiences is presented, both in terms of sectors of activity, location and types of associated strategies.

[insert figure 1]

Well-being for life, 'forest baths' as Shinrin-yoku: from forest to people and policy

Since the 1930s and the famous 'Kinder Scout' occupation of aristocratic private land by Manchester 'ramblers' the possibility to roam legitimately in the countryside has been substantially improved (Tong, 2019: 201). More recently, the practice of 'forest baths' began to spread throughout the world. The term "Shinrin-yoku" was coined by the Ministry of Agriculture, Forestry and Fisheries in Japan in 1982. Shinrin-yoku is a process in which activities in forest environments are used to improve the mental and physical health of people (Park *et al.*, 2007; EFTI, 2019). The innovations of 'forest baths' have shown diverse positive consequences on human well-being: for instance: on comfort, calmer feelings, total hemoglobin concentration and salivary cortisol concentration (Park *et al.*, 2007), effects on blood pressure and heart rate (An *et al.*, 2018), on anxiety and heart rate variability (Farrow & Washburn, 2019) and physiological and psychological relaxation (Bielinis *et al.*, 2019). Forest baths are not

just healing processes but are part of an individual and collective (material and mental) transformation.

This practice is relatively recent in Portugal; in 2019 the first Forest Bathing Guide training occurred in 'Mata do Buçaco' and the first Forest Therapy Guide training in Sintra, by the Forest Therapy Institute with widespread adoption. For reasons of international certification, the ALTRI company maintains 10% of these largely private (97%) forests as 'natural refuges'. Altri Florestal managed these spaces in piecemeal fashion until their new approach emerged during 2019. It was important that the natural heritage started to be valued and biodiversity managed by a different policy: to double the conservation area in 10 years; produce and plant 1 million native plants per year; expand the network of biodiversity stations and 'biospots'; conserve and restore high conservation value ecosystems; and integrate other activities with value (economic, social and environmental) with forest management (Altri Florestal, 2019). The opening of this company for the integration of forest baths has high future potential, both in terms of access to spaces normally inaccessible to the population and to shared governance models of sustainability practices.

Tomar and Médio Tejo experience: territorial exaptation and building learning communities

The experience of Tomar is broader in scope and part of the construction of a territorial strategy that articulates with the strategies of both the region's higher education institution (Instituto Politécnico de Tomar - IPT) and some key companies in the regional economic and social fabric. Tomar (and Médio Tejo region) is undergoing a process of structural transformation. The industrial strength of the recent past has been losing momentum. This 'infra-urban' region needs repopulation and re-employment urgently, typified by old industrial structures and real estate market problems caused by tourism over-development. Accordingly, the territory is seeking to reinvent itself economically - with natural, social and institutional consequences - seeking to combine Science, Technology and Humanity: *'Tomar, Smart Human City'* is the name of the regional strategy. 'Scientific', means development must aim to be supported by scientific knowledge; 'Technological', because Tomar understands the ongoing technological revolution and its consequences for competitiveness and territorial cohesion; also 'Intelligent', because the strategy aims to build a territory that learns but also forgets, and innovates in tune with global dynamics; while, finally, 'Human': means a territory that highlights human values; where knowledge, innovation and technology are socially determined; solutions must be environmentally sustainable, socially inclusive and economically shared.

Territorial Exaptation of public and institutional spaces as learning communities

The *'Territorial Exaptation'* project is part of the strategy referred to for Tomar and seeks to integrate, through a shared governance model, the urban space (an old

abandoned campsite in the prime area of the city) and within the IPT an innovative solution. This solution integrates the Municipality of Tomar, the region's HEI and some regional companies with interests in this matter (Softinsa-IBM, Critical Software and others). This solution takes as a primary resource a set of solid residues (cars, boats, locomotives, train coaches, buses, planes, trucks) and transforms them into value for society through circular processes and mechanisms that society itself values and wants to enhance. It then turns them into habitable, artisanal and alternative, adaptively re-used and re-purposed artifacts and systems. The project aims to achieve territorial integration of multiple dimensions: physical, technological and cognitive. The interdependence and organization of these dimensions intend to stimulate a set of conditions that have been recognized by the literature as being associated with innovation and creativity: exploration of the adjacent possible (exaptation); proximity and the meaning of distances; serendipity; slow intuition and the dynamics of networks, with the aim of enhancing learning and valuing error.

This type of experience can be used for sustainable tourism (e.g. 'glamping'), to accommodate students, researchers, families between new housing choices – which, faced with innovative solutions (dry bathrooms, energy saving systems, energy production systems) can potentially envisage a reconceptualized mental picture of a greener and more sustainable future for housing and thus a more responsible way of life. Thus, these are cognitive and technological spaces, they are also contexts of experimentation. The physical and connective structure of this experience is constantly changing. Their physical circumscription is just one layer (appealing, rebellious, personalized and efficient) of their technological, organizational and cognitive sophistication.

Hydrogen and regional green solutions

Hydrogen and fuel cell technologies (FCH) have been identified as key RIP solutions for reducing greenhouse gas emissions and energy consumption in the European Union (EU). The Intermunicipal Community of Médio Tejo (CIMMT), responding to the challenge of Fuel Cells and Hydrogen 2 Joint Undertaking (FCH2 JU), constituted itself as a pioneer region in hydrogen issues, having signed a Memorandum of Understanding with FCH2 JU. A Working Group was also formed involving specialists and entities, namely the Polytechnic Institute of Tomar, the Polytechnic Institute of Portalegre and the Regional Environment and Energy Agency of the Middle Tejo and Pinhal Interior Sul.

Through the Working Group, a strategic plan for Hydrogen in the region has already been drawn up, entitled "Hydrogen - Proposals for an Action Plan 2020-2030". Since transport is one of the sectors that consumes the most energy, with a high emission of air pollutants, the intention is to encourage the use of energy alternatives with the potential for decarbonization of the sector. Additionally, the creation of an intermunicipal hydrogen public transport network, based on public road, or preferably, rail hydrogen public transport, allows a better response by the sector to the

needs of population, contributing to a greater use of public transport to the detriment of private transport (CIMMT; 2019).

'Mata dos Sete-Montes' as a place for forest baths

Located in the centre of Tomar, next to one of its main avenues the 'National Forest of Sete Montes' covers about 39 hectares. This forest connects to the castle, being used by a religious order as an area for cultivation and gathering. Amid the leafy vegetation that comprise cypresses, olaias, oaks and secular olive trees, this is a particularly suitable space for forest bathing. Accordingly, RIP crafting among the municipal authorities in conjunction with the IPT are studying ways of implementing this solution.

In summary, Tomar and the surrounding region are good examples of an attempt territorially to integrate an RIP as a set of strategies and actions through circular economy and sustainability principles. In the process it engages directly with global Grand Challenge issues in a rich and decentralised manner, communicating with but not dominated by 'global controllers' (lane, 2002). Municipal authorities, in conjunction with HEIs and companies, are trying to adopt an innovation policy supported by a ST.i governance approach, as first formulated in Cooke & Nunes (2020).

Conclusions

This has been a reflection on an innovative approach for helping mitigate in at least two ways the effects upon relationships among climate change, biodiversity, healthcare and globalisation. For guidance on each we quote Italian observer Paolo Giordano (2020), who adheres to the theory that SARS-CoV-2 originated in the 'wet market' in Wuhan, where live animals were sold until it was closed by the Chinese authorities. Eco-disasters, like wild bush fires or rainforest felling create 'ecosystem refugees' among viruses losing their hosts from such mass-extinction events; namely, animals, birds and insects. So, the microbes seek new hosts among increasingly proximate candidates – human beings. A further example concerns deforestation which also reduces the abundance of fruit. Fruit bats host the ebola virus which may transfer to gorillas also in search of a diminished supply of forest fruit. Gorillas pass ebola to humans (including through consumption of 'bush meat'). Climate change stimulates other diseases such as malaria, dengue fever, cholera, Lyme disease and West Nile virus. Travel and food, once again, invoke the necessity severely to control our mobility consumption more sparingly as it affects the complex chains of geographical interaction human agents exert on the world.

Global tourism has been shown to have negative ecological consequences because of its currently inescapable despoliation effects upon the environment. This arises from its excessive creation of greenhouse gases, deleterious consumption demands, and burdens placed upon food, accommodation and transportation systems over often

considerable spatial and temporal zones. This is a contributory and significant element in the current crisis of global mis-management by capitalist environmental exploitation and a lack of innovative impulse from a fundamentally compliant regime of compliant states and NGOs. Since at least the eighteenth century and even as far back as the Romans, the idea of luxury consumption of 'sublime' or 'auratic' space as a refuge from imperial administrative strain has been an abiding presumption of aristocratic and celebrity elites. This became a 'mental model' to be emulated and democratised – not entirely for malign reasons – by monopolising corporations and populist politicians. But global tourism has outlived the validity of such a model and demands innovative policy-thinking of the kind we have essayed here. In other words, global tourism has failed to innovate, resulting in deleterious effects upon the planet.

Utilising various cultural tropes from currently imaginable and implementable tourism-relevant innovations we have mapped out decentralist forms of mega and giga-scale alternatives to the all-consuming 'auratic' tradition of global tourism. It is influenced by three major lines of recent and contemporary cultural thinking and action. First, at the psychological level, it takes Baudrillard's idea of the 'simulacrum' which is post-auratic, in demonstrating alternatives to the notion of the landscape as a major vehicle for the 'sublime'. Thus we have elsewhere discussed 'mechanical reproduction' in the trope of 'the most photographed barn in America' as a post-auratic attraction substitute popular with tourists (Nunes & Cooke, 2020). Second, we see sustainable infrastructure conceived and implemented on a gargantuan scale to produce and consume sustainable mobility and habitation meeting the Grand Challenge of Climate Change. This occurs through Elon Musk's 'gigafactory' model that also gives rise to new, sustainably planned 'battery belts'. Finally, with a view to translating these tropes into practical alternatives to existing global tourism innovation, we proposed decentralist regional innovation policy (RIP) that cross-fertilizes many existing cultural sub-innovations into a regional-rural 'infra-urban' sustainable locational setting powered by renewable energy. This will compete with traditional tourism that has created, through excessive exploitation and consumption of planetary resources, adding a Biodiversity crisis to the list of Grand Challenges headed by the Climate Change Challenge, currently confronting the failed generations of capitalism's 'global controllers'.

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Figure 1 – Some exaptation and circular principles experiences

Company	Slogan	Location	Foundation	Sector	Strategy	Key-words
Tailored Tile	Reusable tiles are made of plastic	Porto	2018	Plastics	Design and Eco-conception; recovery of by-products and waste	Plastic, construction, recycling, materials, design and reuse.
Sociedade Ponto Verde	Extruplás - Urban Furniture in 100% recycled plastic	Seixal and Maia	1996	Plastics	Design and Eco-conception; Valorization of by-products and residues	Plastic, furniture, recycling, materials, design, reuse
Mionho	Paper is made of old clothes… paper is made of flowers	Vouzela	1993	Pulp and paper	"Clean" production/eco-efficiency; Design and Eco-conception; Valorization of by-products and residues	Circular economy, used clothing, reuse
Spawnfoam	Mushrooms are born packaging	Vila Real	2017	Agrifood and Food (includes food waste)	Valorization of by-products and residues	Mushrooms, packaging, forest, plastic, start-up, climatekic
Coopérnico	Portuguese renewable energy cooperative	Portugal	2013	Energy	"Clean" production/Eco-efficiency	Circular economy, solar energy, cooperative
O Sótão	Toy exchange	Lisbon	2019	Waste management	Life cycle extension, reuse, remanufacturing, reconditioning	Circular economy, solar energy, cooperative
Zouri	From the beach to your feet	Braga	2017	Textile and footwear	Design and Eco-design, Valorization of by-products and waste	Footwear, textile, circular economy, plastic, ocean, sea, garbage, industry, vegan, sandals, sneakers, recycling, natural
Maria Maleta	Portuguese brand creates collection of bags with sustainable and recyclable materials	Portugal, Sweden, USA	2013	Textile and Footwear	Design and Eco-conception	Design and Eco-conception
Soditud	From disposable to sustainable	Lisbon University	2017	Waste Management	Innovative, biodegradable and edible dishes and straws	Plastic, straws, plates, cutlery, disposable, store

Source: Own elaboration

Figure 1 – Some exaptation and circular principles experiences (cont.)

Company	Slogan	Location	Foundation	Sector	Strategy	Key-words
Jinja	Eco-design products from textile waste	Porto	2012	Other services	Design and Eco-design, Valorization of by-products and waste	Jinja, recovery, by-products, waste, textile, design, ecological, reuse
MARE-IPLeiria/CAMPOTEC	Algaecoat	Leiria Polytechnic	2016	Agri-Food and Food, R&D and Education	Life cycle extension: reuse, remanufacturing, reconditioning, Design and Eco-conception	Natural, organic capital, agribusiness, food, extension, food waste, reduction
Banco de Óculos	Collection of used frames and lenses and their redistribution	Portugal	s.d	Other services	Life cycle extension: reuse, remanufacture, reconditioning	Portugal, social issues, glasses bank, Solidarity Association, Portuguese Ophthalmology Society
Repair Café Lisboa	Sharing knowledge, valuing objects for life	Lisboa, Porto	2016	Other services	Sensitization and social involvement, Life cycle extension: reuse, remanufacturing, reconditioning	Reuse and repair
The Greatest Candle in the World	Candles made from residues of vegetable oils and edible or cosmetic oils	Marinha Grande	2015	Waste Management	Valorization of by-products and residues	Collect used oils, environmentally friendly and flavored candles

Source: Own elaboration

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