Avignon Digital
Collage by the author

Smart Stations[1]: Issues and Limits of Hyper Connectivity

Nils Le Bot

AREP

Université Toulouse II Jean Jaurès

For several years now, the dominant school of urban thought has been to leave 'sustainable design' behind for a more 'dematerialised and systemic approach to the city'.[2] It makes the 'Smart City' its new dogma for growth.[3] Many questions about the metropolitan interchange hubs that main central stations have become, however, remain to be explored. Intrinsically mixing space, ruled by the heaviness of the infrastructure, and movement,[4] regulated by information and time – quantifiable and trackable characteristics – stations are pioneers in the experimentation of smart concepts.

Constantly reaffirmed in their role as hyper hub, they will have to absorb an important part of the mobility transitions over the next 30 years.[5] Public authorities are relying on digital technology to achieve this. However, are we aware of the issues and limits of further optimization of station mobility through digital technologies?

Towards an Optimized Use of Space?

The station is a place sized by and for crowds. One of the first issues in the massive rollout of connected technologies is making uses more fluid, to free up space. We know of the productivity gains that the generalization of automation will bring, in subways for instance, which are seeing their frequency accelerate significantly. In consequence, platform doors are now required, and spaces for traffic have to be resized. As digitally 'oiled' as it can be, mobility cannot avoid the constraints of space.

Around stations, autonomous vehicles are seen as the key solution for accessibility and traffic congestion problems. As is the case with planes approaching the tarmac today, cars, buses or any vehicle tomorrow will be able to interact near stations, optimizing the use of lanes while avoiding traffic jams. Parking, particularly space- and time-consuming, could be replaced by automated drop-offs. The smart vehicle will park itself wherever it sees fit, or reinject itself into the network to benefit other users. The land thus freed from car parks around the station, whose value is currently under-exploited, can then be repurposed.

In this context, the 2017 initiative of RATP to link Paris Austerlitz and Paris Lyon stations by autonomous shuttles running on a dedicated lane should be mentioned.[6] This experiment paves the way to what could be called an 'augmented connection'. If frequency and efficiency are guaranteed, it becomes possible to consider these two stations as one single nodal point. After all, there is less distance between them than in some subway/bus or subway/train connections in the Paris-Montparnasse hub; the distance issue can be blurred by this type of solution.

To channel information, passengers and vehicles, stations overlay physical infrastructures with a sort of 'virtual superstructure', a digital mark-up that criss-crosses space and allows any sensor and any mobile thing to notify and be notified by a common database. Comparable to developments in logistics, this hyper-synchronization inevitably places stations in a just-in-time logic, for which they were not designed. As it is inconceivable to make

travellers wait like a mislaid package, the 'station system' will have to be given an absolute layout resilience.

To achieve full synchronization of physical and digital networks, without any disruption, is a work in progress, perhaps as challenging as the PRM accessibility of the last ten years.

Clearly, smart mobility cannot avoid what we might call the 'resistance of space': a kind of intrinsic heaviness of what is already spatially there, which is not always flexible and which will clearly not have the same reactivity as the immaterial layer that intends to rule it.

The Human Factor

Unless we limit the access of hubs to autonomous vehicles, multimodality will always have to deal with the presence of humans, sometimes not connected, moving rationally or not. Their unpredictability is scarcely manageable for algorithms. Today, however, it is still the human presence that helps to solve complex, emotionally loaded situations.

One goal of smart concepts is to replace human action, for reasons of efficiency and reliability. However, in France, during disrupted situations (rush hour, operating incidents, mass departures), both SNCF and RATP increasingly deploy staff to fluidify traffic and guide passengers. Paradoxically, they mostly confirm and explain traffic information displayed on connected screens, whose reliability is doubted by passengers. It will require technological revolutions to render algorithms empathic, patient or pedagogical. In stations, the benefits and limits of digitization reach far beyond the simplistic question of efficiency.

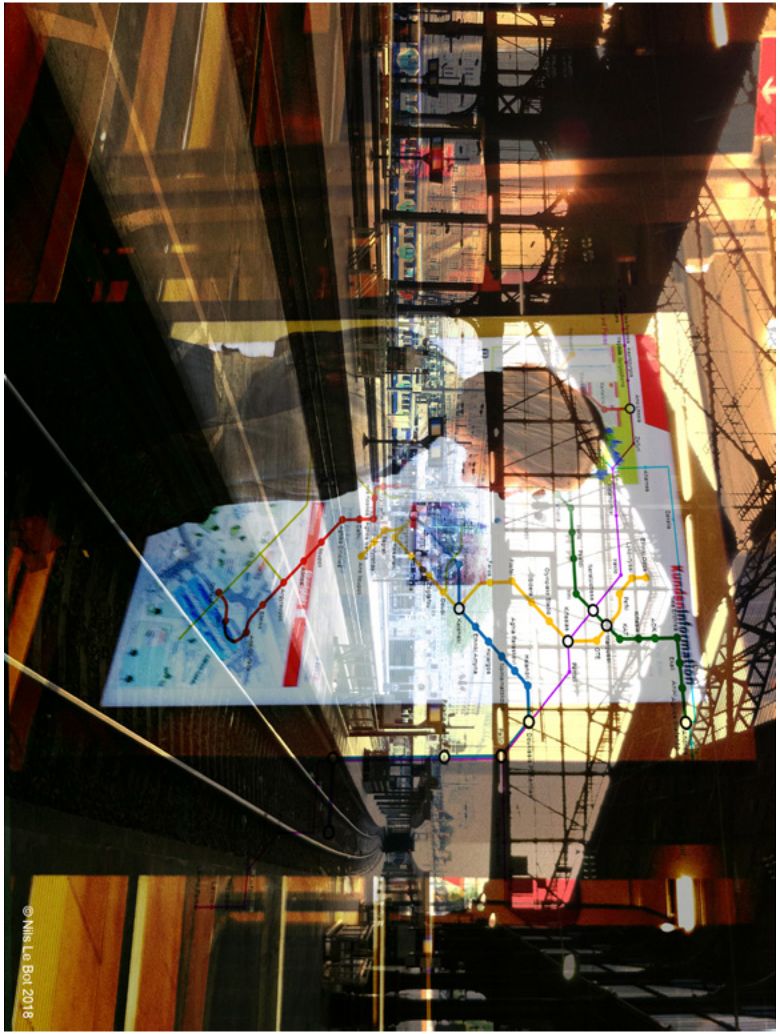
Observing passengers using their smartphones is highly instructive: they stop or slow down. In a flow of people, they become an obstacle. In this sense, online information, supposed to fluidify the passengers flow, might actually create the opposite result. Where mobile network stability and quality is poor, in particular in subways, passengers are not able to benefit from digital services such as route planners. In addition, security risks are not negligible. Apart from accidents due to inattentiveness, the use of connected objects in crowded places makes passengers feel exposed to delinquency.

These observations illustrate the connected user's condition: the need for immobility, security, reliability. The number of 'Wi-Fi areas', mobile recharging areas, or passenger lounges with restricted access are becoming increasingly common in stations.

Their service level, however, differs (Wi-Fi with or without advertising and profiling, quality of data transfer rate, free-of-charge, security). Where access to connected spaces is not merely a comfort experience, but actually becomes pivotal for travelling, smart stations risk becoming 'two-speed' stations. This development forms part of the already apparent segregation trend in mobility, with on the one end high-speed train prime customers, and on the other users of low-cost bus services.

Furthermore, a new type of spontaneous hub seems to be appearing in the cities, which we could qualify as informal. 'Informal hubs' are usually linked to an intense car-pooling activity, and combine three factors: the presence of efficient urban transport, the proximity of a motorway bypass, and the availability of parking space (for instance at the Porte d'Orléans and the Porte de la Chapelle in Paris). For now, informal hubs have no legal status and are based on a very precarious range of services provided by mobile apps. The development of these hubs manages to side-line the intermodal offer concentrated around stations, while the absence of

▸
Digital Station
Collage by the author


KundenInformation
© Nils Le Bot 2018

proper infrastructure in an informal hub makes one yearn for the station's intrinsic qualities.

Data Governance

Thanks to microsensor data, it will be possible within stations to prevent breakdowns, optimize maintenance and modulate replacement. Massively analysed, these data and those of station traffic could tomorrow be used for predictive models that allow for dynamic adaptations of modal offer and passenger information.

If proposing a mobility offer that will be based on data control in the future, it is the role of transport providers that will evolve. The FAMGA companies have already started an innovation race for the leading position in the future autonomous vehicle market, and seem to aim to become public transport providers managing fleets of vehicles.[7] It is worth noting the 10 May 2017 Court of Justice of the European Union judgement, requalifying Uber as a 'transport provider', to force it to comply with the regulations specific to this status. On the same day, Citymapper, the company that is developing the eponymous mobile app for the management of urban transport itineraries, launched a super-connected bus service in London.[8]

The arrival of these major companies will force public authorities to acquire new tools for data regulation, security and control. Regulation, because their functioning allows an unprecedented evolution towards transport liberalization, and with it, an exacerbated form of job insecurity. Control, because the level of expertise and knowledge necessary for massive data management is currently monopolized by North American web majors, over which European public authorities lack sovereignty.

Finally, if hypermobile stations operate on a just-in-time basis, the issue of hacking will also become crucial. At the end of 2016, the entire San Francisco public transport ticket system was paralysed by a Ransomware.[9] In May 2017, with the virus WanaCryptor 2.0 spreading across Europe, Deutsche Bahn railway screens were frozen.[10] These events, which could multiply, illustrate the weakness of the systems on which the resilience of mobility will be based in the future.

Spatial resistance, the human factor and Big Data governance question the self-sufficiency of the smart station concept as a response to the challenges of mobility transition. Current busy stations will not have the resilience to absorb this connected multimodality. Hypermobility will then manifest itself where it can: either on a German-Scandinavian model – several stations form a cluster, thereby reinforcing the multi-polarization of metropolises –[11] or through a proliferation of informal hubs.

Beyond these challenges, it is society's logic of mobility organization as a whole that needs to be questioned. Putting city and mobility into an algorithm also means accepting that stakeholders, for the moment private players, judge the relevance, or not, of certain parameters. Consequently, on what ideology will arbitrations be based? Is it appropriate that cost-benefit or return on investment be the variables chosen for such complex, fundamental and political phenomena as urban life and its movement?

Notes

1
I. Joseph, 'Gares intelligentes, accessibilité urbaine et relais de la ville dense', RATP-Mission Prospective 1999.

2
M. Castells, *The Rise of the Network Society* (2009).

3
A. Picon, *Smart Cities* (2013).

4
S. Allemand et al., *Le sens du mouvement* (2004).

5
R. Knafou, 'Mobilités touristiques et de loisirs et système global des mobilités', in: Bonnet and Desjeux (eds.), *Les territoires de la mobilité* (2000).

6
Le Monde, 23 September 2016, http://www.lemonde.fr/economie/article/2016/09/23/un-minibus-sans-conducteur-en-demonstration-a-paris_5002697_3234.html. Accessed 14 August 2018.

7
Business Insider, 11 May 2017, http://uk.businessinsider.com/apple-car-autonomous-driving-2017-5. Accessed 14 August 2018.

8
Le Monde, 10 May 2017, http://www.lemonde.fr/economie/article/2017/05/10/citymapper-teste-une-ligne-de-bus-a-londres_5125436_3234.html. Accessed 14 August 2018.

9
The Guardian, 28 November 2016, https://www.theguardian.com/technology/2016/nov/28/passengers-free-ride-san-francisco-muni-ransomeware. Accessed 14 August 2018.

10
Süddeutsche Zeitung, 28 November 2016, http://www.sueddeutsche.de/digital/ransomware-wannacry-die-letzte-warnung-1.3504595. Accessed 14 August 2018.

11
F. Ascher, *L'âge des métapoles* (2009).