Workshop on Technology and the Future of UK Cities - 21 September 2015

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In September 2015, the Foresight Future of Cities project held a workshop on technology and the future of UK cities, to discuss and articulate the implications of sociotechnical systems change for contemporary planners and policy makers. The workshop was co-sponsored by the Foresight project and the ESRC Urban Transformations Programme, and held at the Future Cities Catapult.

Introduction

A 2050 suburbanite climbs aboard their driverless car, punches the destination into their smartphone, then sits back while the car starts up, pulls smoothly to the corner, turns… and joins an endless queue of others inching their way into the city.

The scenario, easy to imagine because so many places see daily traffic congestion, suggests an aim for the future is not to provide people with smarter cars, but to get them out of cars altogether. More, it indicates that a single new technology usually has to realise its potential, or hit its limits, as part of a complex, evolving system.

This is true, above all, in modern cities. A city, among other things, is a dynamic assembly of technologies geared to allowing people to live, densely-packed, in largely artificial surroundings. How might those assemblies evolve in the next few decades?

Most technology is *not* IT

The dominant conversation about the future of technology in cities mirrors the near-obsessive discussion of computers and information technology in the media and in much policy talk. It is all about sensors, systems modelling, and big data. This meeting –organised by the GO Science Foresight Project on the Future of Cities and the ESRC Urban Transformations Programme - was, in part, an effort to outline some ideas about all the other aspects of technology that may shape, or be shaped by, the life and work of future city dwellers over the next 25-50 years.

Dealing with future city prospects demands adopting a more expansive definition of technology. It might even be better to do without the word altogether, it was suggested. It has only come into widespread use relatively recently: “people did perfectly well without the term for a very long time”. Still, it seems like a category with some value. But it needs to be wrenched away from an identification with shiny things that talk to the internet. It includes tools, devices, apparatus, engines, machinery, and techniques, habits and routines. All of them have histories, and are embedded in social arrangements. All of them are continually remade through repair and maintenance, and all of them – including the social

arrangements – may change even in the absence of some supposedly startling technical novelty. Yes, the future transport of goods in cities *might* involve drones, but place your bets for now also on the adaptability of the white van, or the cargo bike.

As that suggests, useful thinking about future technology is also helped by avoiding the equation of technology with innovation, or transformation, that also crops up regularly in policy discussion. This techno-hype is often generated by interested parties and generates narratives that may be as unlikely as unhelpful. At worst they tend toward a kind of exaggerated technological determinism: technology is some kind of abstract force, driving "our age". This neglects that technologies are developed, selected, and installed by people, within the institutions they create, for particular purposes.

Moving away from a limited notion of technology also invites recognition that it is very diverse. The language to deal with this diversity is not easy to come by. For instance, a suite of what might be termed "mundane" technologies are vitally important for modern cities (though not only there). The flush toilet, electric light bulbs, and the OTIS elevator safety mechanism are all essential underpinnings of the twentieth century city, although "these were not the subject of futuristic narratives". At the same time, mundane is an awkward term as things that sound simple can turn out to be "intricate sociotechnical complexes". The London cycle superhighway, under construction, is a good example just now.

The cycleway is just one example of the many, often interwoven, systems that underpin city life. But it is hard to generalise about them, too. Zoom in, and what matters are often the many differences in detail. To take just two important technological domains in cities, "the kinds of systems involved in sewage and water are not really the same as those involved in transport."

With all that said, can we do technology better? It isn't possible to predict what is coming, and the technologies that gain ascendancy usually emerge from among several contenders. The often-cited prediction that New York or London would be immersed in horse manure by the mid-20th Century is a classic example of how problems foreseen can be circumvented by novel technologies – in this case motorised road transport. But the same classic case also reveals that there were a variety of transport technologies competing for dominance in major cities around 1900.

Lock-in: too tight, or not tight enough?

Once technological systems are built, they may stay built. Early commitments, especially on complex or heavy infrastructure, or in defining standards, constrain future decision-makers. The daily-renewed familiarity of what exists can make it seem inevitable, even immovable. Technology analysts refer to this as "lock-in".

Again, whether this is apparent or real, tight or loose, differs from case to case. It may simply be a way of describing how history is embodied in cities as long-lived human creations. Central London still has routes the Romans would recognise.

Systems differ here, too. Transport routes can adapt to a variety of uses, and patterns of use, over time, even though they don't fit all departure points or destinations. Water systems are more difficult to modify once they are in place. They are typically deep underground, and hard to reconfigure. Planners responsible for the movement of clean water, dirty water, and storm water in an existing city aren't in a position to say "I wouldn't start from here." Still, novel approaches can be accommodated. Slough, for example, is now selling phosphorus pellets recovered from sewage treatment plants for fertiliser. Seeing waste as a resource, the key idea of the "circular economy" can change approaches to system design, but is more often encountered in the shape of small examples like this than as a formally promulgated standard

Thus "lock-in" can stop you opting for something better later on, although the way systems and users' habits change and evolve together may still mean its hold is not as tight as the term seems to imply. On the other hand we might wish, in hindsight, that lock-in had been stronger in some cases. Los Angeles, famously, once had a tramway system. Other cities have ripped up old tram tracks along routes that are now being expensively reinstated.

Finally, lock-in can be institutional as well as physical. Try and highlight a particular problem – congestion, say – and you will be dealing with a local department called transport, not congestion. Forms of expertise and professions are also built-up historically. And regulations impose their own constraints. Building codes are typically shaped by past events, not future possibilities.

For decision-makers, this is one reason it is worth thinking harder about how things change, and how policy can stay flexible, "to allow transitions with minimal grief". We have an advantage on one side of the pairing technology-city in that most of us, as urbanites, have "particular, rich understandings" of cities – in contrast, perhaps, to a narrower view of technology.

Technology evolves as part of a larger system

Those understandings, and the diversity of domains encompassed by any serious attempt to grapple with "future", "technology" and "cities" makes it even more important than usual to move away from these abstractions and consider particular functions, particular systems and – probably – particular places. A much-vaunted technology like the driverless car, for example, offers not just one model for future transport, but a whole collection of them that would meet different needs and preferences (see Box 1).

Box 1 - Where is this car taking us?

Suppose you want to consider the real potential of driverless vehicles. We might simply add more and more driverless features to individually owned cars, culminating in private vehicles that are completely autonomous. There might be more of them, as taking the driver out of the control loop resolves insurance problems for younger drivers and allows older people to drive safely for longer. Alternatively, the next level of computer-control could usher in fleets of dial-up people-movers, allowing city-dwellers to give-up car ownership. Those are already radically different scenarios, with distinct implications for street design, parking provision, resource use, and air quality. Asking which one might be preferable, and to whom, then brings in broader considerations of a transport system, with all its other components. Where might driverless vehicles fit with public transport? With mass transit? What are the implications for cycle use? For pedestrians? And what assumptions does the whole system embody – about the need for mobility, about what generates demand, and at what times? Why do so many people go to and from work at the same time? Will more of them shop online, substituting delivery traffic for personal trips to buy stuff?

Overall, that perception shifts the focus away from technology, or innovation, and emphasises other features of the system. A good prescription, it was suggested, is to define a problem, ponder how the future could be different without any additional technology – then think how technology might assist in moving things in the desired direction.

Such discussions nonetheless have to take account of the differences in existing systems. A transport system, for example, can be monitored analysed and assessed using accurate, real-time information. We know what links what, and what condition the infrastructure is in. (Even filling potholes is a commitment to one kind of future, which preserves elements of the existing infrastructure, rather than another).

The water and sewage systems in a typical British city, on the other hand, are likely to harbour buried mysteries. Nineteenth-century tunnels and pipes don't have in-situ monitoring of capacity, flow-rates, or structural integrity.

All this complexity is a further challenge to a prevailing "predict and provide" mentality, which tends to assume "there is a potentially knowable future coming, and it is the role of the state to enable people to do what they do now". Policy is more often a case of patching up, and catching up.

Innovations in city governance matter as much as changes in technology

There was broad assent that thinking about the future involves thinking about the future of policy-making or, the more general term, about city governance. Some harked back to the 1930s, or even the 19th century, when British cities wielded local powers effectively, often building and running local utilities and services. They argue that these powers have since

been “stripped out”. On the other hand, in a developed country like the UK, existing or past structures may have been better suited to building the cities we have already got, rather than retro-fitting and adapting technologies to suit the cities we want to have in future. The unfolding of policy futures nationally and regionally will be a continuing influence, and often a constraint, on what cities can achieve in this domain.

Again, there are differences in several dimensions to consider. A study of retrofitting buildings to improve energy efficiency found that different ways of framing such projects shaped the way householders viewed them in different cities (see Box 2).

Box 2 - Updating energy use in buildings

The EPSRC Retrofit 2050 project examined some early efforts at accelerating urban transitions in the two long-established urban areas in South Wales and Manchester. In the North West, retrofit was seen mainly as getting ahead in a new market, with Greater Manchester positioning itself to benefit from the Green Deal and following a largely “top down” approach. In Cardiff and SE Wales, in contrast, the guiding principle was improving sustainability, and a wider range of interests came together to fashion particular projects. Local, bottom-up retrofit initiatives, which appear in both localities, have to find ways of relating to these larger agendas. A headline finding from this study was that “governance does matter in technology roll-out, and to how technology evolves.” See www.retrofit2050.org.uk

If we want to insist on an explicit democratic element in shaping the future of cities and technology, in the face of new forces like Uber – a corporation committed to the view that the market is the one best way to organise absolutely anything – then flexible approaches call for institutional innovations whose shape, it seemed, isn’t yet quite clear. Some promising experiments were cited, though (see Box 3).

Box 3 – Experiments elsewhere

Models for involving communities in future-oriented discussion of city planning include the BMW-Guggenheim labs. These were lengthy engagements with individual urban communities, in New York, Berlin and Mumbai, each orchestrated by large teams of interested outsiders and local consultants. They ran over weeks or months, after a lengthy planning phase, and featured discussions in specially created spaces tailored to each location. www.bmwguggenheimlab.org

Another initiative to note is the Mayor’s Office of New Urban Mechanics in Boston also emulated in Philadelphia, and Utah. This is an avowedly experimental initiative, which organises and evaluates piloting of innovations in the city. Projects have included a solar powered park bench which incorporates phone chargers and sensors that monitor air quality and a trial of smart sensors that tell drivers which parking spaces near them are vacant. www.cityofboston.gov/newurbanmechanics

We need “places for envisioning the future in conjunction with communities”. A free-floating discussion must “touch down”, and become relevant in time and place to the people involved.

A good way to get city leaders thinking may not be prompting them to contemplate innovations, or “the future”, but simply to think about other cities, and other times and places. How do things look there? Does that suggest how things could be done differently back home? This is the alternative, it was suggested to “futurism as la la land”. Reviewing already existing experience leads to “a more grown-up conversation”.

One point of contact with the much-discussed digital city futures is the use of modelling and simulation. Modelling of some aspects of cities is now good enough to allow one to play with the system before changing it in real life.

Like cities themselves, we want future city governance to be responsive, creative and flexible. Present and future problems, like congestion, or catering for an ageing population, cut a cross disciplinary and institutional divides. They also call on new combinations of efforts and inputs from the state, markets and civil society. Somehow, all these things need to be orchestrated at the level of cities, not nations, and in ways that represent the interests of urban citizens. And building in flexibility implies a need for policy-makers to make multiple bets, or side-bets on the changes they will try to roll out city-wide. There is a need for “slow” as well as “fast” modes of policy-making, arising from processes that are both deliberate and deliberative.

How to progress this ideal governance agenda? There isn’t any simple answer. The diagnosis is that there is a need for “a new piece of governance infrastructure for the twenty-first century city”. We do not know exactly what it will look like at the moment, or how it might be developed in our national context.

As with experiments with technology, though, there are plenty of exemplary initiatives to draw on – a more systematic review might be helpful. It is clear it needs to involve as many local people and organisations as possible, and to trade ideas with other urban centres. Cities that have close ties to their universities often have an advantage here, too. And the models that appear promising are smaller scale, and more distributed and responsive than those typically operating in British cities now. The ones that prove most successful in future, like the applications of technologies new and old, will be carefully tailored to the particularities of places and people. Future cities will learn best use of technology from each other but also grow increasingly diverse as they develop their own answers to local variants of common problems.

Annex 1: Agenda

10.00-10.30 Welcome

Introductions, outline of the day

10.30-11.30 Framing the Concepts

How is "technology" conceptualised/defined in relation to "the city"? – By social scientists? By technologists? By architects, engineers and planners? By business? By governments? By citizens? What do we know about the relationship between "mundane" technology and "infrastructure"?

11.30-11.45 Coffee

11.45-12.45 Imagining the Future

What is the role of technology and technological imaginaries in forming urban imaginaries and outcomes? How do both technical and urban imaginaries touch down in real places? How does our understanding of the present and the past shape our expectations about the future?

12.45-13.30 Lunch

13.30-14.45 Obduracy and Disruption

What do we know about socio-technical obduracy, path dependency, and technological disruption? When is lock-in an asset or a problem? Can cities build-in flexibility and resilience? What are the implications for cities as systems and for the UK (and beyond) system of cities?

14.45-15.00 Coffee

15.00-16.00 Technology and Urban Governance

Who exercises "technological choice" in the city? What could or should be the future role of citizens in urban sociotechnical change? What is the role of technology in the evolution of key relationships such as those between the state and the city, the city and its citizens, or between governments, markets and civil society?

16.00-16.30 Summary and wrap-up

Annex 2: Attendees

Steve Rayner – James Martin Professor of Science & Civilisation, and Director of the Institute for Science, Innovation & Society, University of Oxford.

Michael Keith – Director of COMPAS, Co-ordinator of Urban Transformations, Co-Director of the University of Oxford Future of Cities programme.

Nicola Headlam – Urban Transformations & Foresight Future of Cities Knowledge Exchange Research Fellow, University of Oxford.

Anique Hommels – Associate Professor at the Department of Technology & Society Studies, University of Maastricht.

Igor Calzada – Research Affiliate, COMPAS, University of Oxford.

David Edgerton – Hans Rausing Professor of the History of Science and Technology, and Professor of Modern British History, King's College London.

Simon Giles – Senior Principle, Global Cities, Accenture.

Dan Hill – Associate Director, Arup.

Simon Joss – Director of University Graduate School, University of Westminster.

Elizabeth Shove – Professor of Sociology, Lancaster University.

Michael Thompson – Senior Research Scholar, International institute for Applied Systems Analysis

Claire Mookerjee – Project Lead, Urbanism, Future Cities Catapult.

Malcolm Eames – Chair of Low Carbon Research Institute, Director of Postgraduate Research, Welsh School of Architecture, Cardiff University.