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## A framework for discussing the implications of future disruptors

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The following table is intended to be illustrative and in no way affects to be definitive or exhaustive. It is offered to stimulate awareness that the commonly recognized drivers and trajectories of urban development over the next half-century may be disrupted by processes and events that are conventionally disregarded as too improbable to worry about or are entirely unforeseen. Disruptors may also be disregarded, despite being recognised, if their consequences are judged to be insignificant.

The table represents a modest attempt to brainstorm some of these factors and identify representative (again, not definitive) questions that one might wish to ask about their implications for the six lenses through which the Foresight Programme is viewing the Future of UK Cities. The lenses are:

- **Living** - *Ageing, ethnicity, well-being, social interaction, identity, culture ...*
- **Economies** - *Jobs, industries, skills, education, competitiveness, ...*
- **Metabolism** - *Waste, energy, resource security, climate, self-sufficiency, ...*
- **Form** - *Density, size, housing, regional patterns, zoning, new towns, ...*
- **Infrastructure** - *Connectivity, intra/intra, smart decentralised, service provision...*
- **Governance** - *Devolution, accountability, representation, policy, regulation...*

The table currently includes 18 potential disruptors under five main headings

- Social
- Health
- Technological
- Environmental
- Political

Readers are encouraged to consider further items under these headings or to add new ones. However, we are clear that the purpose of doing so is not the impossible pursuit of completeness, but to develop sensitivity to the potential of disruption and ideas for developing resilience across a wide range of possible sources of disruption.

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1	<i>Social</i>  <b>Severe sectarian/ethnic/religious/polarization</b>		Could this lead to sustained outbreaks of rioting/ civil unrest & sense of personal vulnerability?	How would this impact investment in specific city neighbour-hoods?	How would this affect supply of food & other commodities & services (such as waste collection)?	Would this lead to “reticulation” of communities - more & larger gated areas, rapid decay of others?	What would be the affect on infrastructure provision/access-would post-code inequalities increase?	How would this challenge local governance & democracy? Demands of more policing? Growth of private security?
2	<i>Social</i>  <b>Rapid adoption of collaborative consumption/sharing economy</b>		What influence would this have on sense of belonging and community?	What influence would this have on the local & national economies?	What influence might this have on food security?	How might neighbourhoods be recon-figured?	What influence on travel patterns?	Should this be incentivised or discouraged? How?
3	<i>Health</i>  <b>Global or national disease pandemic</b>		Would this lead to social isolation & hollowing out of communities or, possibly, increase local cohesion & neighbourhood solidarity? How would this effect the population age-profile/ family structure?	How would this affect the labour force and consumption patterns?	What would be affect of labour shortages on supply of essential utilities, goods & services?	How would cities reconfigure for radically reduced population?	How would hospitals and public-health sectors cope?  How to handle large numbers of fatalities?	Would there be a state of emergency? What are the implications of suspending normal rules?
4	<i>Health &amp; Technological</i>  <b>Radical life-extension technology becomes widely available</b>		What would be the impact on the population-ageing trend? Would this  Increase inter-generational tension?	What would be impact on supply & demand for labour in health & social care sectors?	How would demand for goods and services change?	Would there be rising demand for specialist housing? How would this be met?	What would be impact on transportation demand, educational services, etc.?	Will intergenerational fairness need greater attention by policy makers?

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5	<p><i>Technological</i></p> <p><b>Explosion of connectedness</b></p> <p><i>Growth in demand massively exceeds capacity</i></p>	<p>Would this lead to increased social inequality? Would impacts be short- or long-term?</p>	<p>How would productivity be compromised e.g. Bandwidth, time-critical application?</p>	<p>What would be impact on delivery of goods and services?</p>	<p>Would there be increased service variation between dense centres and peripheries?</p>	<p>What is the capacity of current infrastructure to expand to meet increasing demands?</p>	<p>How could national and local governments respond to capacity limits?</p>	
6	<p><i>Technological</i></p> <p><b>Global attack on IT infrastructure</b></p> <p><i>(Scale of interconnected applications and things.)</i></p>	<p>What would be impacts on trust &amp; privacy?</p> <p>What would be knock-on implications for healthcare delivery?</p>	<p>What would be impact on broad range of industrial &amp; commercial activities?</p>	<p>Would supply-chain disruptions lead to serious food shortages?</p>	<p>Would threat to building information systems drive changes to building forms?</p>	<p>What would be impacts on transportation systems?</p>	<p>Would there be a state of emergency? What are the implications of suspending normal rules?</p>	
7	<p><i>Technological</i></p> <p><b>Rapid penetration of autonomous electric vehicles</b></p> <p><i>(Impacts will be highly dependent on business model)</i></p>	<p>Could widespread use of shared public access vehicles end private car culture?</p>	<p>Will “hands off” time be used increase productivity?</p>	<p>What will be consequences for petroleum supply and petrol stations?</p>	<p>Would massive reduction in demand for parking free-up land for higher value uses?</p>	<p>How would AEV technology impact road layouts, parking &amp; fuelling infrastructure?</p>	<p>Will governments encourage shared public AEV systems or continued private vehicle ownership?</p>	
8	<p><i>Technological</i></p> <p><b>Improved energy storage capacity</b></p> <p><i>(Important to distinguish here between “grid storage” and distributed generation &amp; storage)</i></p>	<p>How many people would move off grid? Would community groups prefer autonomy?</p>	<p>What would be implications for domestic and commercial energy costs?</p>	<p>Would this permit step-change increase in reliance on intermittent renewables?</p>	<p>Would improved distributed battery capacity encourage more dispersed development patterns?</p>	<p>What would integrated storage in smart grids imply for use of intermittent renewables to support dense urban development?</p>	<p>How much more progress could be made in meeting carbon emission targets?</p>	

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9	<i>Technological</i>  <b>Radical penetration of robotics at work and at home</b>		Would there be increased inequality between haves and have-nots (skilled & unskilled)? How would home robotics influence home healthcare (telemedicine)?	Would there be deskilling of work force & increased employment challenges for semi- and unskilled labour?	What would be massive application of sensors and robotics for utilities, commercial supply chains (drone delivery), etc.?	What are implications for building technologies?	What are potential impacts on transportation infrastructure?	How would government deal with likely changes in employment patterns?
10	<i>Technological</i>  <b>Additive manufacturing (3-D printing)</b>		What would be the social impacts of returning the manufacture of everyday goods to user communities?  Possible revival of “corner shop” as local manufactur-ring facility?	What are implications for retail business and supply chains? How would this impact employment patterns?	What are implications for materials flows? Will raw materials (filament) be centrally or locally supplied and recycled?	What is the potential for huge changes in land use and building stock due to obsolescence of supply chains, warehousing, & transportation?	What would be impacts of reduced demand for transportation of goods?	What capacity building could local governance foster?
11	<i>Environmental</i>  <b>Urban heat islands exacerbated by increasing densities</b>		How will individuals and communities respond to discomfort? Will people move out of cities? What are likely impacts on young & elderly?	Will health impacts adversely affect productivity?	Will there be increasing demands for electricity and water to alleviate effects of higher temperatures?	How might green & blue infrastructure be designed within buildings? Will demand for air-conditioning, exacerbate the problem?	Will there be widespread implementation of albedo-enhancing measures?	What is potential for national & local government regulation of land-use and building technology?
12	<i>Environmental/Health</i>  <b>Severe drought in southern Britain</b>		What are implications for vulnerable sectors society, especially young & elderly? Are tensions likely between urban & agricultural demands?	How will health effects of water shortages affect productivity? Might certain businesses (e.g., food processing) have to close?	What would be implications for drinking water supply and sewage systems?	Would development be diverted to other parts of the UK?	What opportunities exist to transport water from other regions (short- & long-term)? Is desalinization a viable option?	What planning, regulatory and water tariff reforms might be necessary?

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13	<i>Environmental</i>  <b>Global Catastrophe outside UK (e.g., an asteroid strikes central Europe or eruption of the Yellowstone supervolcano)</b>		How would communities cope with refugee pressure from the affected area? Would UK communities experience heightened anxiety about their own vulnerability?	What would be the implications for world trade and domestic productivity? How would cost burden of receiving refugees be borne?	What would be the implications of the collapse of global agriculture due to nuclear-winter type effects?	How & where would temporary housing be provided for refugees? What provisions would have to be made for longer-term resettlement?	How would public services be able to cope with additional stresses?	Would there be a state of emergency? What are the implications of suspending normal rules?
14	<i>Environmental</i>  <b>Runaway greenhouse effect leading to very rapid temp rise &amp; increase in sea level &amp; storms</b>		How would coastal & flood-prone communities respond to both direct water threat & political pressure to relocate?	How would requirements be met for hugely increased public spending on adaptation infrastructure?	What are implications of large-scale failure of sewage systems (&possibly freshwater supply)?	What is the capacity for large-scale coastal retreat?  What potential is there for "aquitecture" (floating buildings)?	How to respond to pressure for extensive new sea defence infrastructure? What is the capacity to provide it?	How would governance institutions respond?
15	<i>Political</i>  <b>UK becomes a federal state (one of which is London?)</b>		What are the implications for social cohesion within and between cities? What will be impact on national, regional & local identities?	What will be the opportunities & constraints for economic development? Where will capital go?	Are there potential implications for water supplies?	Will devolved governments have different planning rules leading to different urban forms emerging?	What are the implications for connectivity between cities? Will national infrastructure decisions take longer?	What powers will city governments have relative to federal & national? What asymmetric forms might state governance take?
16	<i>Political &amp; Economic</i>  <b>UK leaves EU and London's financial centre shifts to Frankfurt</b>		What would be the impact on population mobility & cultural diversity?	Would London's economy collapse? Would it drag other UK cities down with it or open new opportunities for them?	What would be impact on funding for essential services?	What would be impacts on real-estate sector? Would demand for commercial space in London collapse?	Would London's infrastructure deteriorate? What would be effects on other UK cities?	Would country face new austerity measures?

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17	<i>Political</i>  <b>World divides into “fortress blocs” (e.g., new “iron curtain”)</b>		How would ethnic/national communities in UK cities be affected?	What would be implications for global trade? How will these affect UK cities?	What would be implications for food security, oil & gas supplies, & rare minerals?	Would there be revival of “civil defence” planning & infrastructure – shelters, evacuation routes, etc.?	What would be implications for connectivity with other blocs?	How will government regard direct relations between UK city governments & foreign cities?
18	<i>Political</i>  <b>Zero-immigration policies enacted</b>		Would xenophobia increase or popular immigration anxieties be calmed?	What would be the economic impact on the higher education sector? Labour shortages in health- & social- care sectors?	Would there be impacts on provision of certain goods & services?	What would be the influence on housing demand?	What effect will this have on UK citizens’ connectivity with those on other countries?	What tensions might arise within different parts of the UK?

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