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UK COLLABORATORIUM FOR RESEARCH ON INFRASTRUCTURE & CITIES

Inspired infrastructure for better living

Productive Cities – should they not also be Sustainable, Resilient, Liveable and Smart Cities?

Professor Chris Rogers

University of Birmingham

7th December 2018

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Urban Futures

Liveable Cities

urban living Birmingham

Resilience Through Innovation
Critical Local Transport and Utility Infrastructure

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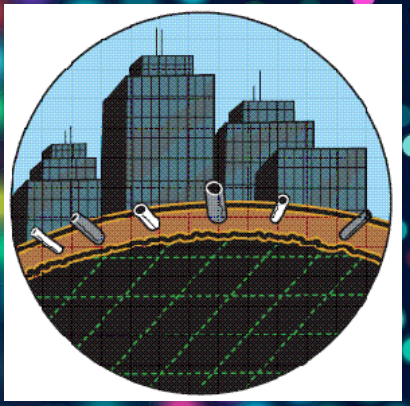
EPSRC
Pioneering research and skills



What is the Purpose of Cities?

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- A place to trade (especially food)
- A place of safety *... with a source of clean water*
- An agglomeration of people

puts people at the heart of the city

... a place to live, work and play

... an amalgam of residential, commercial, retail, industry, leisure, transport, open spaces, green spaces

... a place of business, busyness and peaceful solitude

... a place for dynamic 24 hour city living

... a place for biodiversity to flourish – trees, birds, bats

- I, as a civil engineer, need to support this by systems of *supply* (water, electricity, gas, etc.), *removal* (wastewater, drainage, solid waste) *and facilitation of movement* (people, goods)

... we need infrastructure systems

... designed to be sustainable and resilient and liveable and adaptable and 'smart'

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  - ... ***designed to be sustainable and resilient and liveable and adaptable and 'smart'?***

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What are the Essential Features of Cities?

We have many aspirations (needs) for cities

- **Sustainability** – ensuring we meet the needs of people today without compromising the ability of future generations to meet their own needs
- **Resilience** – ensuring that our engineering interventions continue to function, and deliver their benefits, no matter how the future develops
- **Liveability** – putting people at the centre of our thinking … embracing our responsibility of looking after people's health and wellbeing … and for this we need planetary wellbeing
- **Adaptability** – making sure that, wherever possible, our systems are able to respond to contextual change
- **Smart** – delivering all of the above

Unpacking ‘Smart Cities’

‘Smart’ is a contested term.

My brief: ***how pervasive digital connectivity and smart cities can optimise infrastructure and have a positive impact on the functioning of cities*** … and my interpretation

- **Efficiency** – ‘smart’ can enable us to do what we are doing now, only more efficiently
- **Optimisation** – of what, or for whom? Citizens? Businesses? The Planet? The City?
- **A Vehicle for Change** – enabling us to do things differently to benefit … what, or who?
- **Examples** – London, Copenhagen, Singapore

  Every city is unique – ***what is smart in one might be dumb in another***

  And might dumb be good, allowing … *er* … us to take back control?

- **Smart** is only ‘***truly smart***’ if it has ***a positive impact on the functioning of cities***

How do we Enable Change to Happen?

- First – Compile a rigorous Evidence Base
- Second – Make the Business Case for change
  Comprehensive, accessible, transparent
- Third – Create the Business Models to implement change
  Balance the (multiple) forms of value against the cost
- Fourth – Engineer all of the Forms of Governance
  To enable the business models to work
  The 'hard' systems of governance
  - *Legislation, Regulation, Taxation*
  - *Codes and Standards*

  … and the 'soft' systems of governance
  - *Citizen and societal attitudes and behaviours*
  - *Societal norms, social acceptability, practice norms … and avoidance of risk*

… to meet the city's and citizens' aspirations

… and reflect … and iterate

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… for a productive city

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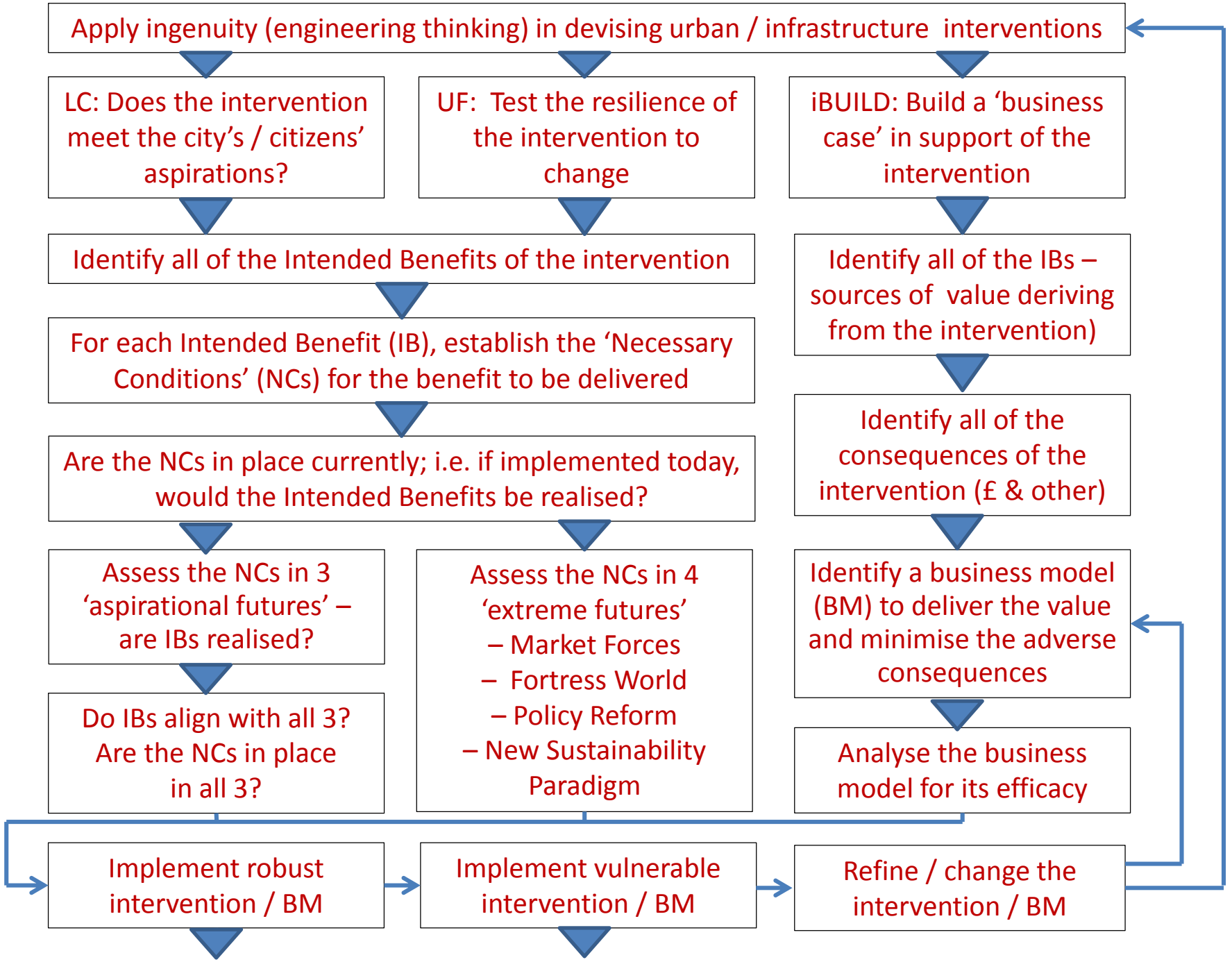
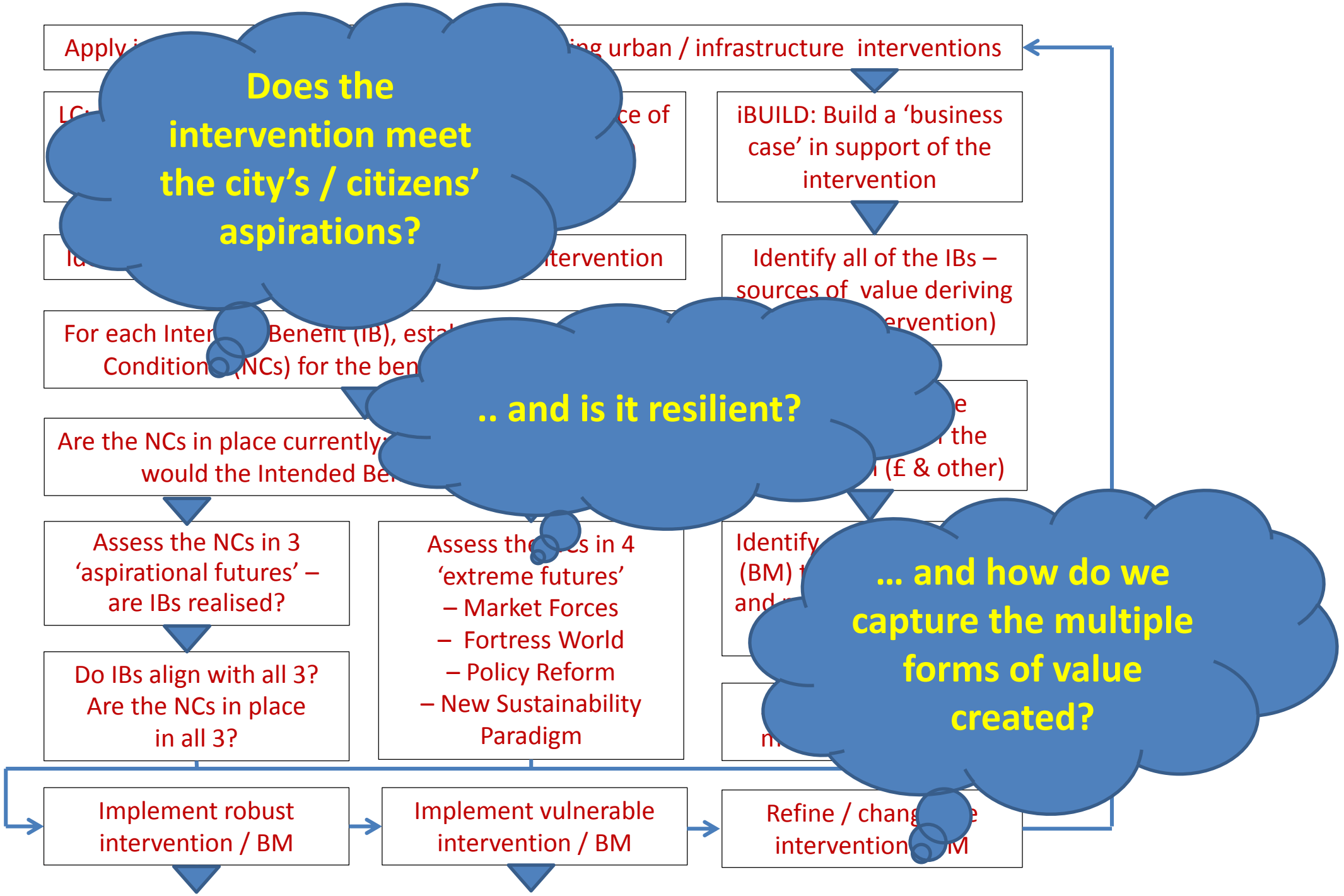

Apply ingenuity (engineering thinking) in devising urban / infrastructure interventions
LC: Does the intervention meet the city's / citizens' aspirations?
UF: Test the resilience of the intervention to change
iBUILD: Build a 'business case' in support of the intervention
Identify all of the Intended Benefits of the intervention
Identify all of the IBs – sources of value deriving from the intervention)
For each Intended Benefit (IB), establish the 'Necessary Conditions' (NCs) for the benefit to be delivered
Identify all of the consequences of the intervention (£ & other)
Are the NCs in place currently; i.e. if implemented today, would the Intended Benefits be realised?
Assess the NCs in 3 'aspirational futures' – are IBs realised?
Assess the NCs in 4 'extreme futures' – Market Forces – Fortress World – Policy Reform – New Sustainability Paradigm
Identify a business model (BM) to deliver the value and minimise the adverse consequences
Do IBs align with all 3? Are the NCs in place in all 3?
Analyse the business model for its efficacy
Implement robust intervention / BM
Implement vulnerable intervention / BM
Refine / change the intervention / BM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iBUILD: Build a 'business case' in support of the intervention
Identify all of the IBs – sources of value deriving
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.. and is it resilient?
… and how do we capture the multiple forms of value created?
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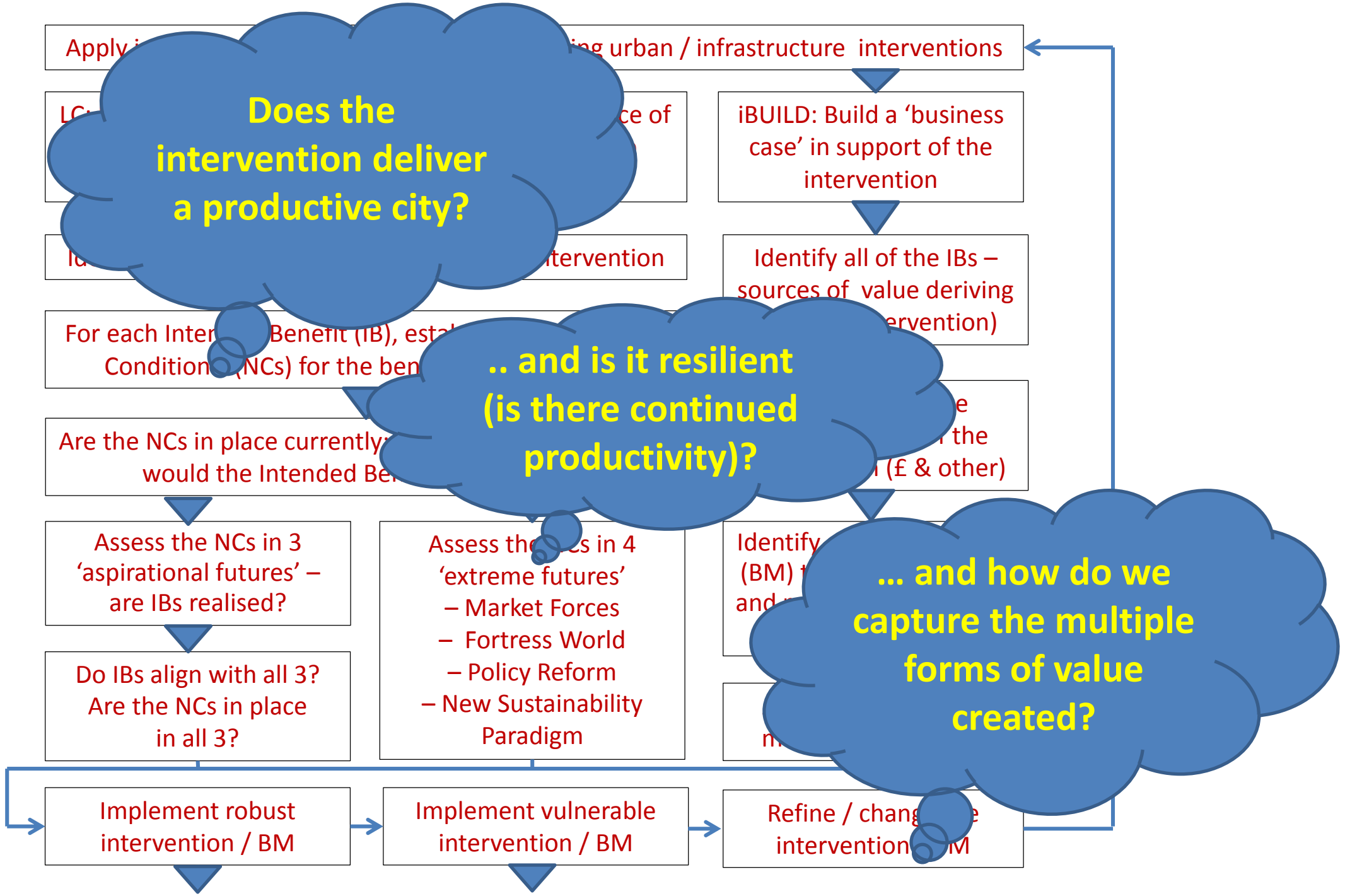
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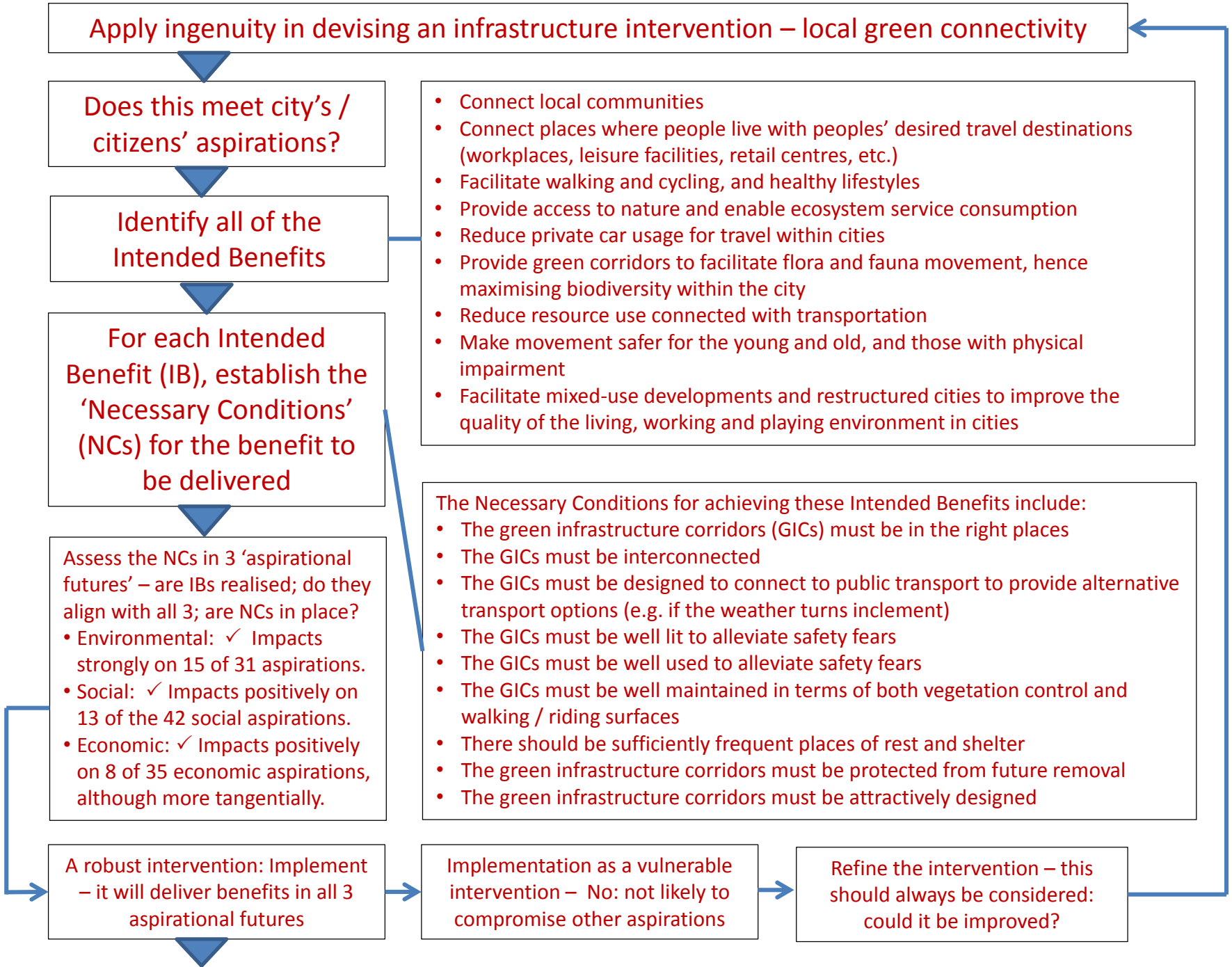
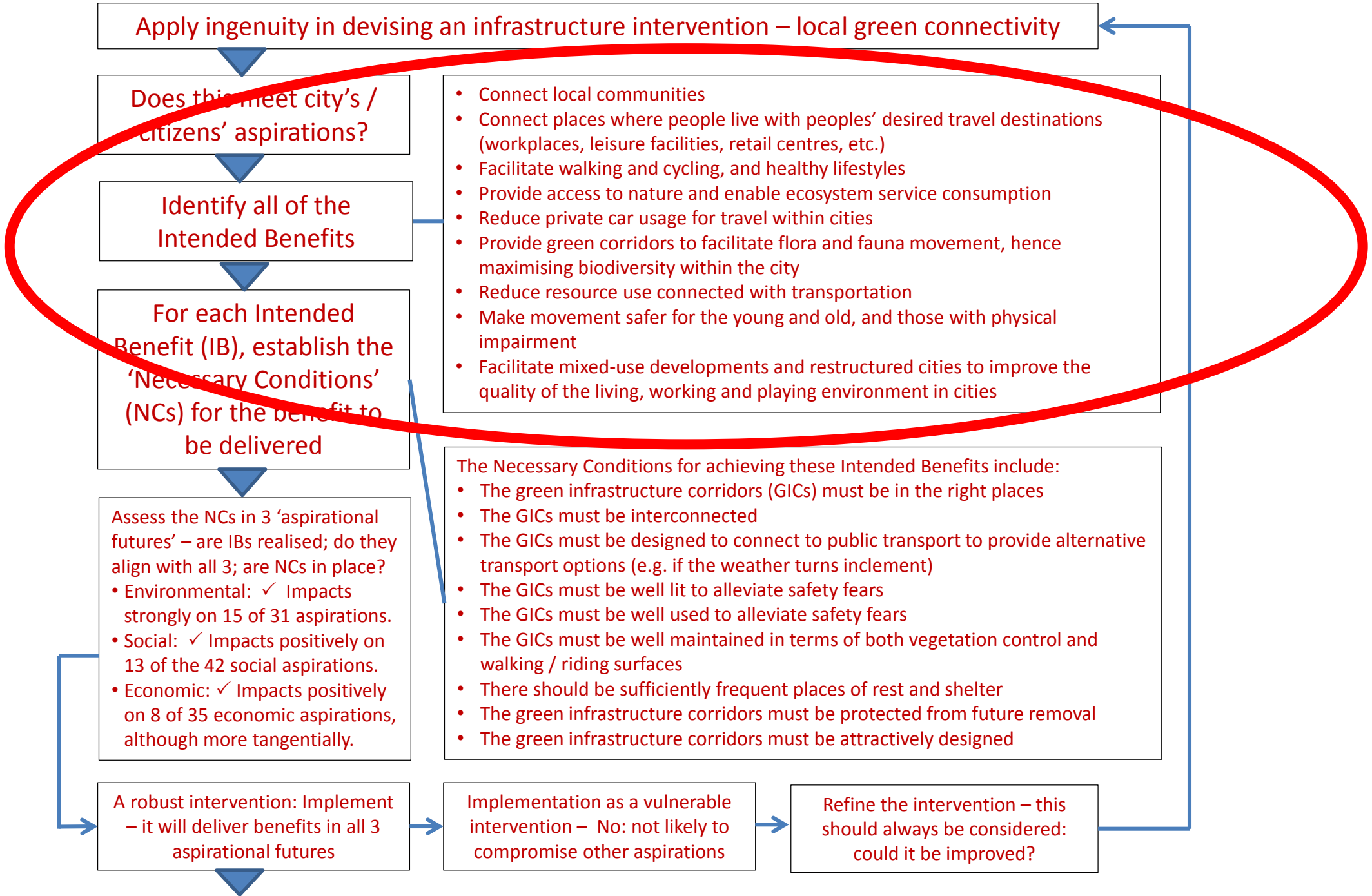
Does the intervention deliver a productive city?
.. and is it resilient (is there continued productivity)?
… and how do we capture the multiple forms of value created?


Apply ingenuity in devising an infrastructure intervention – local green connectivity
Does this meet city's / citizens' aspirations?
Identify all of the Intended Benefits
For each Intended Benefit (IB), establish the 'Necessary Conditions' (NCs) for the benefit to be delivered
Assess the NCs in 3 'aspirational futures' – are IBs realised; do they align with all 3; are NCs in place?
• Environmental: ✓ Impacts strongly on 15 of 31 aspirations.
• Social: ✓ Impacts positively on 13 of the 42 social aspirations.
• Economic: ✓ Impacts positively on 8 of 35 economic aspirations, although more tangentially.
A robust intervention: Implement – it will deliver benefits in all 3 aspirational futures
Implementation as a vulnerable intervention – No: not likely to compromise other aspirations
Refine the intervention – this should always be considered: could it be improved?
• Connect local communities
• Connect places where people live with peoples' desired travel destinations (workplaces, leisure facilities, retail centres, etc.)
• Facilitate walking and cycling, and healthy lifestyles
• Provide access to nature and enable ecosystem service consumption
• Reduce private car usage for travel within cities
• Provide green corridors to facilitate flora and fauna movement, hence maximising biodiversity within the city
• Reduce resource use connected with transportation
• Make movement safer for the young and old, and those with physical impairment
• Facilitate mixed-use developments and restructured cities to improve the quality of the living, working and playing environment in cities
The Necessary Conditions for achieving these Intended Benefits include:
• The green infrastructure corridors (GICs) must be in the right places
• The GICs must be interconnected
• The GICs must be designed to connect to public transport to provide alternative transport options (e.g. if the weather turns inclement)
• The GICs must be well lit to alleviate safety fears
• The GICs must be well used to alleviate safety fears
• The GICs must be well maintained in terms of both vegetation control and walking / riding surfaces
• There should be sufficiently frequent places of rest and shelter
• The green infrastructure corridors must be protected from future removal
• The green infrastructure corridors must be attractively designed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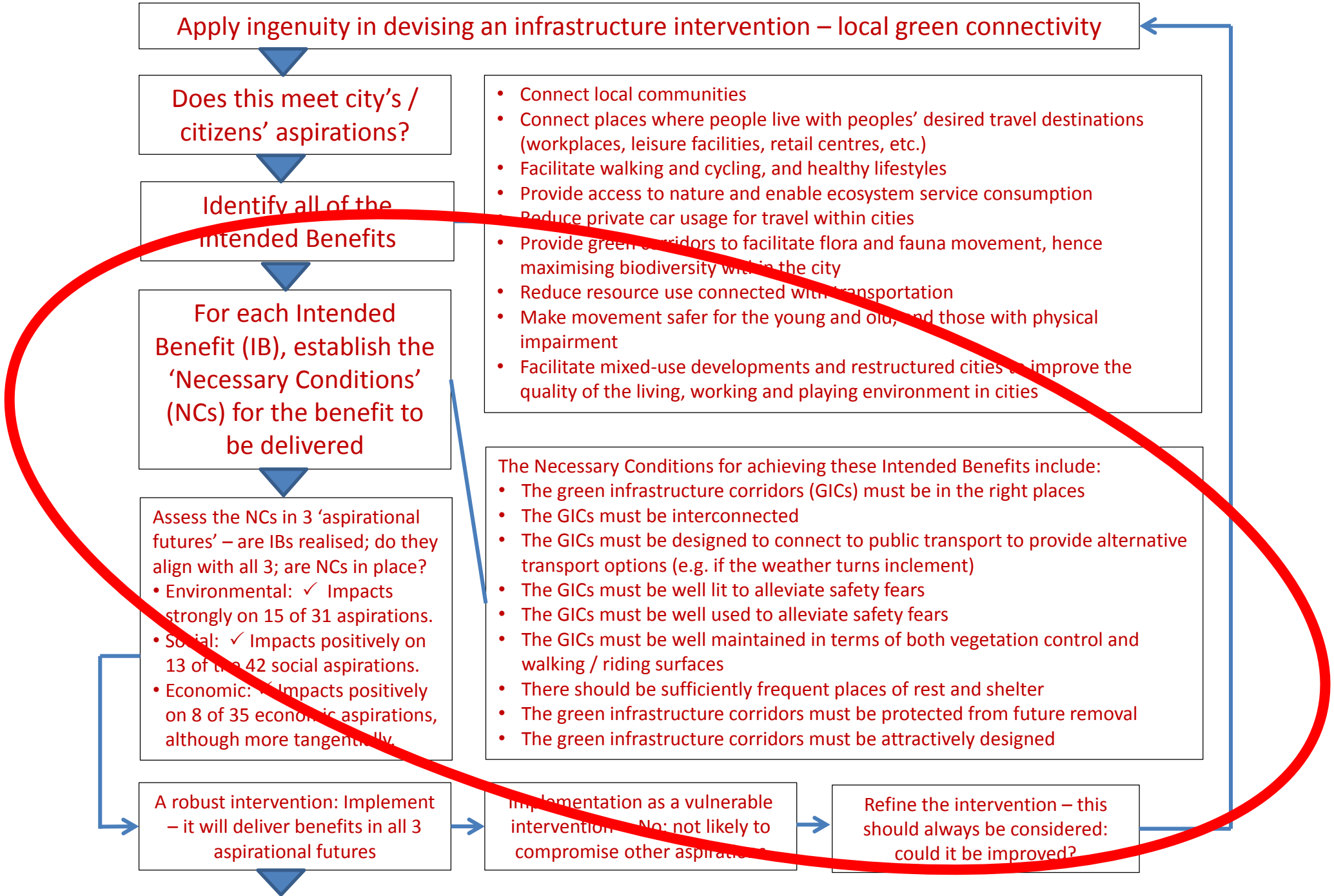
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Do they meet the Collective Aspirations?

Do the multiple identified benefits meet the citizens' and the city's aspirations?

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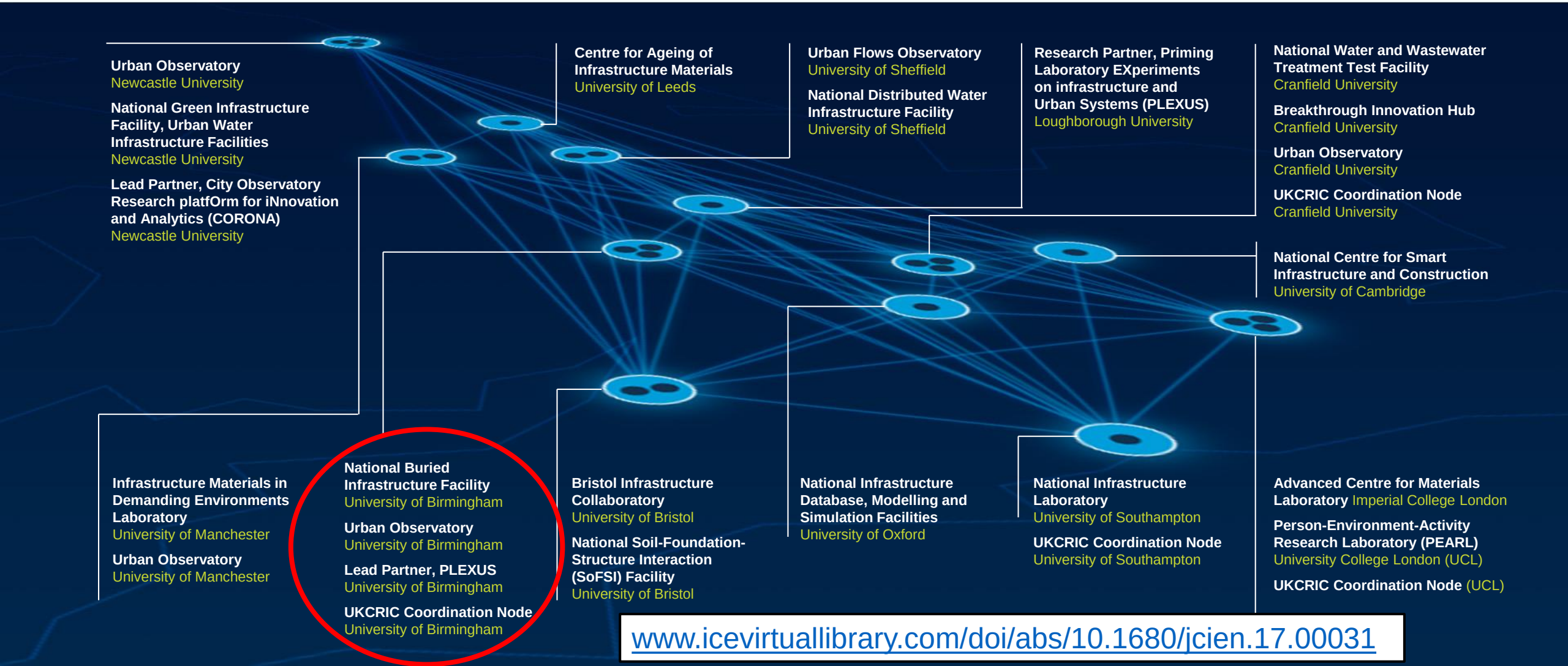
We can draw on the Evidence Base to make the case for change … and test for resilience

Assemble alternative Business Models – value capture frameworks balancing the multiple forms of value against the costs and adverse consequences

Engineer all of the forms of governance to make the Business Models work

UK Research Facilities and Programmes



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