The fundamentals of designing an integrated infrastructure plan
27 March 2019

@natinfracom
#ukinfra2050
What are the key principles for developing an integrated infrastructure plan?

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Principle 1
Where do you want to be?

- Focus on infrastructure integration?
- More sustainable?
- Jobs led?
- Unlocking access for labour force and sites currently poorly served?
- Assessing financial frameworks and value add of infrastructure investment
- Combined in your vision and objectives and set out in all formal plans – e.g. Local Plans, LIS, DEFRA Environment Plans
Principle 2
Determining where you want to be – external influences

- Considering external context eg UN Sustainable Development Goals
- using scenarios
- horizon scanning
- forecasting
- SWOT analysis
Principle 3
Where will you be without any intervention: status quo projection

• Quality and condition of existing infrastructure in 10, 20, 30 years time
• What infrastructure investment is already in the pipeline – most frequently overlooked – aggregate Local Plan IDPs for a first go at this?
• What development is in the pipeline – planning consents and on site
Principle 4
Gap analysis – the difference between where you want to be and where you are now

- Quality of existing – traffic light assessment for each of ten year cycles for each infrastructure asset
- Type of infrastructure needed in which locations to meet gaps
- Positively planning integration
Principle 5
Options appraisal

• What are the different methods of meeting these gaps?
• Risk analysis of options?
• Selected approach
Principle 6
Programmes and delivery

- Generally less considered in front end loaded infrastructure investment planning
- Consultation with stakeholders needed early with continuous engagement – parties with interest in land, statutory consultees, statutory undertakers, community and other local authority departments
- Consider whole project into delivery
- Consider dependencies
Principle 7
review and re-set

- Monitoring and review essential
- Keep assessing surplus as well as pressurised capacity
The GLA is London’s strategic planning authority, with a statutory responsibility to promote London’s economic and social development and improvement of the environment.

**The Mayor of London and the London Assembly:**

- Mayor is directly elected
- London Assembly acts as scrutiny body
- Direct responsibilities over five functional bodies including transport, policing and fire.
- New devolved responsibilities for affordable housing and adult education
- Group corporate budget of c£18 billion (2019/20)
- 33 local authorities
The Mayor and Infrastructure

Infrastructure at heart of Mayor’s agenda; essential in supporting growth, prosperity and future sustainability, however Mayor’s powers are limited to just transport.

- Increasingly integrated planning, housing, transport and environmental strategies.

- No direct influence over London’s utilities, and regulatory frameworks do not require providers to have due regard to growth projections or policy priorities.

- Instead, Mayor approaches utilities from a housing perspective – setting policy priorities in London Plan; and leverages his convening power to ensure utilities:
  - **Develop plans that respond to London’s growth and enable development**
  - **Coordinate investments and works (with development, and each other)**
  - **Invest and maintain networks to ensure resilience**
  - The Mayor works to identify funding opportunities for transport and supports upfront planning of utilities at strategic growth locations.
The London Infrastructure Plan 2050 was the first attempt to prepare an integrated strategy for London’s infrastructure, given unprecedented growth and a range of policy challenges related to infrastructure.

- Evidence base

Scope:

- Energy, water, waste, digital, transport, green infrastructure aviation capacity and (housing)

Cross-cutting policy issues examined:

- Coordination, regulation, funding, innovation and data sharing, skills.
The Process of developing the Plan

Four key questions:

1. How much growth, and where will it occur?
2. What infrastructure is required?
3. How will we pay for it?
4. How will we deliver it?
Developing an agreed view on future growth was the key first step.

- Population projections – various growth scenarios were created
- Jobs projections
- Housing projections
- Impacts of transport investments (in particular new connectivity and growth on growth impacts)
- Data on forward planning applications
- New tools available to understand and model growth impacts.
Identifying London’s infrastructure requirements

2. The spatial view of London’s growth
2.2 Overview of growth corridors

Figure 7: London’s growth corridors
Source: Arup. Basemap: GLA City in the East/West
Crossrail 2 North

<table>
<thead>
<tr>
<th>Category</th>
<th>Is there a significant need?</th>
<th>Are needs planned for?</th>
<th>Are projects deliverable?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rail</td>
<td>High</td>
<td>Well Identified</td>
<td>Uncertain</td>
</tr>
<tr>
<td>Bus</td>
<td>Medium</td>
<td>Incomplete Assessment</td>
<td>Uncertain</td>
</tr>
<tr>
<td>Highways</td>
<td>Medium</td>
<td>Incomplete Assessment</td>
<td>Uncertain</td>
</tr>
<tr>
<td>Electricity</td>
<td>High</td>
<td>Incomplete Assessment</td>
<td>Under Conditions</td>
</tr>
<tr>
<td>Heat</td>
<td>High</td>
<td>Incomplete Assessment</td>
<td>In Progress</td>
</tr>
<tr>
<td>Water Supply</td>
<td>Medium</td>
<td>Incomplete Assessment</td>
<td>Under Conditions</td>
</tr>
</tbody>
</table>

Strategic infrastructure projects in pipeline

<table>
<thead>
<tr>
<th>Project</th>
<th>Driver / Enabler</th>
<th>Cost band (m)</th>
<th>Sponsor</th>
<th>Funding status</th>
<th>Planning status</th>
<th>Timeline</th>
</tr>
</thead>
<tbody>
<tr>
<td>STAR (Stratford - Angel Road)</td>
<td>Driver</td>
<td>≤ 100</td>
<td>Network Rail</td>
<td>Secured</td>
<td>Detail approved</td>
<td>2016-2020</td>
</tr>
<tr>
<td>Four tracking to Bexleyheath</td>
<td>Driver</td>
<td>501 - 1,000</td>
<td>Network Rail</td>
<td>Uncertain</td>
<td>Outline submitted</td>
<td>2021-2025</td>
</tr>
<tr>
<td>Crossrail 2</td>
<td>Driver</td>
<td>4,000+</td>
<td>TFL / Network Rail</td>
<td>Uncertain</td>
<td>Outline submitted</td>
<td>2026-2030</td>
</tr>
<tr>
<td>Overground Barking to Gospel Oak electrification</td>
<td>Enabler</td>
<td>101 - 250</td>
<td>Network Rail</td>
<td>Secured</td>
<td>Detail approved</td>
<td>2031-2035</td>
</tr>
<tr>
<td>Deephams sewage treatment upgrade - Phase 2</td>
<td>Enabler</td>
<td>101 - 250</td>
<td>Thames Water</td>
<td>Secured</td>
<td>Detail approved</td>
<td>2026-2030</td>
</tr>
<tr>
<td>Additional bus routes and infrastructure</td>
<td>Enabler</td>
<td>101 - 250</td>
<td>TFL</td>
<td>Secured</td>
<td>Outline submitted</td>
<td>2026-2030</td>
</tr>
<tr>
<td>Redev of Edmonton Eco Park</td>
<td>Enabler</td>
<td>≤ 100</td>
<td>North London Waste Authority</td>
<td>Secured</td>
<td>Outline submitted</td>
<td>2026-2030</td>
</tr>
<tr>
<td>A406 key corridor tunnel at New Southgate</td>
<td>Enabler</td>
<td>1,001 - 5,000</td>
<td>TFL</td>
<td>Speculative</td>
<td>No permission</td>
<td>No Permission</td>
</tr>
<tr>
<td>High Road West Regeneration Area (150+ units)</td>
<td>Enabler</td>
<td>251 - 500</td>
<td>Speculative</td>
<td>Uncertain</td>
<td>No Permission</td>
<td></td>
</tr>
<tr>
<td>Tottenham Hale Masterplan (150+ units)</td>
<td>Enabler</td>
<td>501 - 1,000</td>
<td>Uncertain</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Integration with London Plan
We costed investment requirements (CAPEX and OPEX) by sector and determined ‘funding gap’ based on known and potential funding streams.
Delivery

Coordination and leadership are essential. We established a high level forum for all the utilities, regulators, business and government. We are putting resource into coordination, having received funding from London’s utilities.

Examples of recent success:

Olympic Park Development (2012)
Kings Cross (2012)
Borough High Street utilities works (2009)
Croydon (2018/19)
Leveraging data: the IMA is an innovative tool designed to support coordination of planning and delivery.

- Brings together data on:
  - Forward investments of utilities
  - Proposed transport projects
  - Planning applications and completions
  - Relevant planning context layers

maps.london.gov.uk/ima
The Isle of Dogs will experience significant growth of approx. 31,000 new homes by 2041.

The Mayor is working with London Borough Tower Hamlets to support coordination of planning and development on the island.

Anticipated outputs:

- New governance arrangements
- Dynamic phasing information, accessible to utilities to inform investment prioritisation
- Delivery plan
Croydon Connect Project

- Epsom Road project led by London Borough of Croydon
- Supported by GLA
- First example of collaborative street works voluntarily undertaken by private sector (Thames Water and SGN)
- Tangible benefits emerging including potential reduction of programme by 14 weeks.

Collaborative Highway Works
98 days of disruption avoided
Key Lessons

Developing the plan is the easy part; driving forward delivery with limited powers and funding is the real challenge.

- Problem of scope and purpose
- Integration with other strategies
- Identify costs and funding opportunities to understand deliverability
- Evidence base is important and will be scrutinised
- Leverage relationships with experts and others
- Convening powers of Mayor and/or council leaders
- Work with government and NIC
- Anticipate your own growth!
Discussion

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West of England Joint Spatial Plan
Strategic Planning for Infrastructure

Laura Ambler, Head of Housing and Planning, West of England Combined Authority
The West of England Region

• A population of 1.1m
• Economy worth £26bn a year
• 22% employment is in the knowledge economy
• Quality of Life and good amenities
• Unique local environment
• Good connectivity to the UK
• International links
West of England Joint Spatial Plan

• A formal DPD, prepared 2015-2018
• Plan area is the combined areas of the 4 UAs covering the period 2016-2036
• Provides the strategic development framework for the West of England (WoE) to 2036 that our Local Plans will then follow
• Focused in scope
  • Sets the housing, employment and infrastructure needs of the WoE sub-region
  • Does not allocate sites
• 5 Chapters, 7 Policies and a Key Diagram
• Supported by Sustainability Appraisal and technical evidence base
Spatial Strategy:
integrating infrastructure and development

*The main cities and towns will continue to be supported as key locations for employment.
* Transport alignments in this plan are shown for illustrative purposes and are indicative only. Diagram excludes local bus service improvements.
Joint Transport work to support the Joint Spatial Plan
West of England Green Infrastructure Plan

Role of the GI Plan is to:

• Identify existing GI assets, opportunities and goals

• Identify strategic measures and mechanisms to support the JSP’s environmental ambitions

• Provide evidence to assist detailed assessment and master planning of Strategic Development Locations and other future development

• Provide framework to deliver strong and consistent Local Plan policies

• Play a role in the implementation of the JTP (JLTP) sustainable travel option to reduce dependency on private car
Delivery:

Detailed infrastructure planning & role of WECA

Corridor approach – maximising wider benefits

Masterplans sit within this

Brought together as a strategic IIDP
Lessons learnt

- Avoid project creep
- Be clear on the benefits
- Decide early on if to be a statutory plan
- Resources
- Senior champion and buy in
- Politics

➢ Plan is not the end of the process – it is the beginning of infrastructure planning and delivery
Outcomes: A strategic framework for growth

Policy Framework:
- Green Infrastructure Plan
- Local Plans
- Strategic Masterplanning

Delivery Framework:
- JSP & JLTP
- Strategic Solutions Panel
- Joint Assets Board
- Joint delivery and implementation

Increased investment in the West of England
SCR INTEGRATED INFRASTRUCTURE PLAN

Colin Blackburn
Assistant Director Housing, Infrastructure, Planning
NIC - 27 March 2019
Sheffield City Region

Integrated Infrastructure Plan

ARUP

www.sheffieldcityregion.org.uk
SCR INTEGRATED INFRASTRUCTURE PLAN

- Strategic Economic Plan (SEP 2014)
- Published 2016 (104 pages, 7 Annexes)
- 18 months to prepare
- Infrastructure Delivery Group (LA Directors, Consultant advisors)
- ARUP lead consultant
- David Simmonds and Aecom - FLUTE model (assessed potential land and transport availability to deliver jobs and houses across SCR 10 years)
- Process comprised:
  1. Evidence analysis
  2. Growth challenges and opportunities
  3. Funding options
  4. Benchmarking costs
  5. Briefing sessions and workshops
SCR IIP Document
1. Executive Summary
2. Background
3. Defining Infrastructure Priorities
4. Packages of Integrated Infrastructure Interventions
5. Driving Stronger Markets
6. Commissioning Approach
7. Funding Options
8. A Successful Legacy

Appendices
- Funding Options Report
- Benchmark Costings Report
- FLUTE modelling Report
- Evidence Analysis Report
- Challenges and Opportunities to Growth
- Skills Report

SCRIIP Results presented as:
1. Networks Analysis
2. Spatial Packages
3. Stronger Markets
PRIORITIES ... STRATEGIC ECONOMIC PLAN

More jobs

70,000

70,000 jobs to narrow the gap with other parts of the country

More businesses

An additional 6,000 businesses are required to reduce the enterprise deficit

More highly skilled occupations

Approximately 30,000 highly skilled occupations to create a more prosperous economy

Higher productivity

An increase in GVA in excess of £3 billion to narrow the productivity gap
**GEOGRAPHY**

Functional economic area

Employment and commuting patterns

Overlaps with LCR and D2N2

- Small flow out of SCR (3,000 to 8,000 commuters)
- Small flow within SCR (3,000 to 8,000 commuters)
- Medium flow within SCR (8,000 to 20,000 commuters)
- Large flow within SCR (>20,000 commuters)
- Very small flow out of SCR (1,500 to 3,000 commuters)
FLUTE RESULTS
Increase in Jobs and Homes
2014 - 2024

Local Authority

<table>
<thead>
<tr>
<th>Local Authority</th>
<th>Employment Change</th>
<th>%</th>
<th>Homes Change</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sheffield</td>
<td>29,269</td>
<td>11%</td>
<td>19,627</td>
<td>8%</td>
</tr>
<tr>
<td>Rotherham</td>
<td>8,939</td>
<td>8%</td>
<td>1,2937</td>
<td>12%</td>
</tr>
<tr>
<td>Doncaster</td>
<td>19,734</td>
<td>15%</td>
<td>20,687</td>
<td>16%</td>
</tr>
<tr>
<td>Barnsley</td>
<td>7,016</td>
<td>8%</td>
<td>15,243</td>
<td>15%</td>
</tr>
<tr>
<td>Chesterfield</td>
<td>6,604</td>
<td>13%</td>
<td>3,525</td>
<td>7%</td>
</tr>
<tr>
<td>N.E. Derbyshire</td>
<td>-1,440</td>
<td>-5%</td>
<td>2,057</td>
<td>5%</td>
</tr>
<tr>
<td>Bolsover</td>
<td>5,852</td>
<td>20%</td>
<td>2,669</td>
<td>8%</td>
</tr>
<tr>
<td>Bassetlaw</td>
<td>5,147</td>
<td>9%</td>
<td>6,976</td>
<td>14%</td>
</tr>
<tr>
<td>Derbyshire Dales</td>
<td>1,627</td>
<td>5%</td>
<td>3,596</td>
<td>11%</td>
</tr>
<tr>
<td>SCR Total</td>
<td>82,748</td>
<td>10%</td>
<td>87,317</td>
<td>11%</td>
</tr>
</tbody>
</table>

Local Authority

- Barnsley Centre
  - 565 (5%)
  - 410 (4%)
- Rotherham Centre
  - 711 (4%)
  - 579 (12%)
- Sheffield Centre
  - 20,503 (42%)
  - 12,469 (167%)
- Chesterfield
  - 3,070 (16%)
  - 1,654 (14%)
- A61 Corridor
  - 3,954 (9%)
  - 2,389 (8%)
- Dearne Valley
  - 2,098 (5%)
  - 6047 (11%)
- Doncaster Centre
  - 11,906 (38%)
  - 2,594 (24%)
- RHADS
  - 8,528 (88%)
  - 6,155 (51%)
- LDV and AMP
  - 9,273 (23%)
  - 5,712 (121%)
- Worksop
  - 1201 (7%)
  - 914 (5%)
- Markham Vale
  - 666 (54%)
  - 326 (63%)
Connecting Local Centres and Growth Areas in SCR

- Promote strong commercial bus service provision on key employment corridors
  - Improve access to M1 Junction 36 and Junction 37
  - Construct Goldthorpe / Wath / Bolton on Dearne Bypass

- Enhance Hatfield and Stainforth rail station
  - Enhance local bus services to serve EMR development
  - Construct Hatfield Link Road

- Address highway capacity constraints at M1 Junction 33 and M1 Junction 34

- Complete Bus Rapid Transit North
  - Complete Sheffield, Rotherham, Parkside tram train trial
  - Enhance capacity of Sheffield Parkway (widening)

- RHADS rail station on Lincoln Line with hourly service and supporting shuttle service
  - Enhanced airport bus services
  - Extend FARRRS to the airport

- Mass transit link between AMP / Innovation district, Sheffield and Rotherham
  - Enhance local bus service provision at AMP

- Construct Seymour Link Road
  - Access to Staveley HS2 Depot
  - Access to Peak Resort
  - Create Chesterfield Northern Gateway
  - A61 corridor enhancements

- Strategic Highway
- Fixed Track
- Strategic Bus Investment
- Innovation District
Advanced Manufacturing Innovation District

"The Advanced Manufacturing Park represents the largest cluster of modern manufacturing in the SCR and also includes a major retail centre, first class sporting facilities and popular cultural attractions."

M1 Junctions 32-35a Smart Motorways
Implementation of a smart motorway network to relieve congestion by using technology to vary speed limits. The scheme commenced in winter 2014/2015 and is expected to be complete by winter 2016/2017.

South Yorkshire Train-Train Pilot: Sheffield - Rotherham & Tinsley Chord
SYPTE were awarded £5.1 million from DfT to undertake a two-year pilot of a train-train network. Operating on both train and heavy rail infrastructure, the Train Train service will provide connections between Sheffield and Rotherham, providing an alternative option to the car and unlocking employment opportunities.

Key:
- Key Highway
- Rail Link
- Potential Future HS2
- Rail Station
- Urban Mobility Zone
- Sub-areas of AMD:
  - Foundation Anchors
  - Manufacturing and Technology Cluster
  - Foundation Industries
  - Sport, Leisure and Retail Corridor
- New Neighbourhoods
- Competitive Advantage
- High-speed
- Smart Mobility
- Delivering More Homes (70,000 - 100,000)
- Groover Growth
- Back Test: Proposed SCRIP Interventions

SR1: Advanced Manufacturing Park
Infrastructure to support expansion of Advanced Manufacturing Innovation District and enhance connections between Advanced Manufacturing Park, Sheffield Business Park and future development sites including those within Enterprise Zone.

SR2: Waverley Mixed-Use Development
The FHA are developing, led by Hanworth Estates, will result in the delivery of 4,000 homes, educational and health facilities, open space and new access.

Waverley Link Road
Provide new access to developments within the AMP / Waverley site.
**BENCHMARKING COSTS**

- A high level cost estimate derived from a benchmarking process of solutions to the infrastructure challenges and opportunities

<table>
<thead>
<tr>
<th>Infrastructure Sector</th>
<th>Indicative Order of Magnitude Cost (£)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land &amp; Commercial Property</td>
<td>2,379m</td>
</tr>
<tr>
<td>Housing</td>
<td>10,061m</td>
</tr>
<tr>
<td>Flood Risk</td>
<td>207m</td>
</tr>
<tr>
<td>Utilities</td>
<td>113m</td>
</tr>
<tr>
<td>Telecommunications</td>
<td>10m</td>
</tr>
<tr>
<td>Transport</td>
<td>1,579m</td>
</tr>
<tr>
<td>Waste</td>
<td>942m</td>
</tr>
<tr>
<td>Energy</td>
<td>1,231m</td>
</tr>
<tr>
<td>Competitive Advantages</td>
<td>25m</td>
</tr>
<tr>
<td><strong>SCR Value (£) Nett of Optimism Bias</strong></td>
<td><strong>16,547m</strong></td>
</tr>
<tr>
<td>Optimism Bias at 44%</td>
<td>7,281m</td>
</tr>
<tr>
<td><strong>SCR Value (£)</strong></td>
<td><strong>23,828m</strong></td>
</tr>
</tbody>
</table>
INVESTMENT PROGRAMMES

- LGF Transport and Infrastructure - £264m
- SCR Property Fund £8m
- JESSICA – £15m (+ extra £80m)
- EZ Enhancement Fund – £5m
- Skill Capital - £28m
- Business Investment Fund - £52m
- Housing Fund (£10m+ pilot)
- ESIF funding

Emerging funding opportunities
- Transforming Cities Fund
- Devolution Gainshare
- Shared Prosperity Fund
FURTHER DEVELOPMENT OF IIP

• Investable Propositions (2018)

• Spatial packages of investment for SCR Major Growth Areas:
  – Urban Centres, AMID, Doncaster Sheffield Airport, A61 Corridor, Dearne Valley and M1J36, DN7/Unity, Markham Vale
  – Environment Agency, Homes England, Utility Providers

• SCR Energy Strategy

• 6,000 Public Estate Assets

• SEP Review, Local Industrial Strategy

• Mayoral CA – devolution

• Potential Spatial Framework
INVESTABLE PROPOSITIONS
DONCASTER URBAN CENTRE
INVESTABLE PROPOSITIONS
SHEFFIELD URBAN CENTRE
Workshop: what works in local growth, and how to evaluate
The Partners

LSE
Leading
Building local and national evaluation capacity

Communicating
Creating engaging and accessible resources

centreforcities

Delivering
Providing evaluation workshops to practitioners

ARUP
Why evaluate (well)?
The key objective of almost all policy impact evaluation is to uncover causal relationships.

This is rarely straightforward.
WHAT WOULD HAVE HAPPENED ANYWAY?
Good evidence establishes causality

Change in outcome for those in the programme

VS

Change in outcome for those not in the programme

similar people
## Difference in difference

<table>
<thead>
<tr>
<th></th>
<th>Turnover Before</th>
<th>Turnover After</th>
<th>Increase in turnover</th>
<th>Causal impact</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Participants</strong> (Treatment group)</td>
<td>£10m</td>
<td>£14m</td>
<td>+£4m (40%)</td>
<td>+£2m (20pp)</td>
</tr>
<tr>
<td><strong>Comparison group</strong></td>
<td>£10m</td>
<td>£12m</td>
<td>+£2m (20%)</td>
<td></td>
</tr>
</tbody>
</table>

*Without a good counterfactual we will overstate impact by £2m*
## Difference in difference

<table>
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<tr>
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<th>Increase in turnover</th>
<th>Causal impact</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Participants</strong> (Treatment group)</td>
<td>£10m</td>
<td>£10m</td>
<td>+£0m (0%)</td>
<td>+£1m</td>
</tr>
<tr>
<td><strong>Comparison group</strong></td>
<td>£10m</td>
<td>£9m</td>
<td>-£1m (-10%)</td>
<td></td>
</tr>
</tbody>
</table>

Without a good counterfactual we will understate impact by £1m
Just comparing before/after: What haven’t we demonstrated here?

**Before**

100% of my trainees used to be unemployed

**After**

50% of my trainees are now employed

Training course

What would have happened anyway?
Just comparing your area with comparators: What haven’t we demonstrated here?

What happens when we move from here to here?

Note: * Determined by composite rankings against a range of indicators. Based on ranking of 24 international cities with #24 being the top rank. For more information on these see PwC Cities of Opportunity available at https://www.pwc.com/us/en/cities-of-opportunity.
(To make a slightly ridiculous point)

Source: http://www.tylervigen.com/spurious-correlations
What do we mean by robust evaluation?

- Good evidence establishes causality it doesn’t just describe change
- We need to understand what would have happened anyway
- Correlation is not causation
What is the counterfactual?

Choosing your comparison group
Impact evaluation

Evaluating impact

Change in outcome for those in the programme

VS

Change in outcome for those not in the programme

What is ‘similar’, anyway?

what works centre for local economic growth
What is a comparison group?

- Sometimes: control group; counterfactual
- We need to work out the alternate universe in which we didn’t ‘do the thing’ ("treatment": "the thing you got")
  - We use the comparison group as our proxy for this
- We can never know this for certain (get over it).
  - Our job is to recreate the alternate universe as well as we can.
- No method of doing this is perfect – but some are substantially better than others.
- The way in which we choose our comparison group affects the conclusions we can draw.
Question 1: What determines success? (other than my intervention?)
What is the outcome I’m trying to achieve?

“Treatment” (Doing the Thing)

New railway

“Outcome” (What we want to change)

Economic growth
Question 2: how do I decide who (where) gets my “treatment”? 
- what does this mean for the comparability of my group (area)?
To understand how our treatment affects economic growth, we want to compare with somewhere that’s similar on the relevant factor(s) – e.g. economic structure.
“Selection on observables”

Often those factors that determine whether someone is successful also determine whether they’re likely to be chosen to receive my intervention. This is to be expected because we don’t usually invest for no reason!

In these cases it’s even more important that our comparison group is similar on those selection characteristics.
“Selection on unobservables”

We run into trouble, when a factor that determines whether receive the intervention AND whether they’re successful is based on judgement or other less visible factors.

We worry that any differences we see just reflect these unobservable differences, and aren’t anything to do with our investment.
Okay, so how do I fix this?
The Gold Standard: Randomise

• The only way to be sure that your findings are not biased when there’s a likelihood of selection on unobservables is to randomise:
  – Between treatment/no treatment (tells you programme impact)
  – Between different types of treatment / different policy designs (tells you which type of programme is more effective)

• It doesn’t get rid of the impact of the unobserved variables on outcomes

• It means you will have stripped out the impact of those invisible factors.

JARGON BUSTER: “RCT”
Randomised Control Trial
I can’t randomise, should I give up?

• **No!** You can still evaluate well!
• Randomising is harder – usually impossible - for infrastructure-related investment
• If you can’t randomise, it’s possible to find a middle ground between the gold standard and a simple before/after comparison of outcomes
  – Exploit some natural randomness
  – At least define a comparison group that is ‘similar on paper’
• These are all much more robust than just before/after comparison, or a comparison with the area average
• They all get us past the minimum threshold to suggest there may be a causal relationship.
• Whatever technique you use, you need data on the relevant things to ensure you have a ‘similar on paper’ comparison
Second best: exploit some natural randomness

- **Timing / wait list**
  - Can’t support everyone at one time?
  - Programme rolling out in ‘waves’?
  - First come, first served?
  - Those who are ‘wait listed’ are a good comparator *whilst they’re waiting*

- **Thresholds**
  - Cut-offs or thresholds often quite arbitrary
  - Those just inside/outside the cut-off likely to be very similar

- **Coincidence**
  - Difficult to define – you know this when you see it!
  - E.g. a medium sized town on a motorway between two unique and fast-growing cities
If you can’t do that: similar on paper

- Where you have no sensible, proportionate way of getting around selection on unobservables
  - Or, where you’re not that worried about it
- Concentrate on properly defining the observable variables that are likely to explain outcomes
- Get a really good ‘similar on paper’ comparison
- This would still be some of the best evidence out there, and it’s very ‘do-able’

**JARGON BUSTER:**
- “difference in difference”
- “matching”
- “propensity score matching”
- “synthetic control”
Recap

What outcome am I interested in?
What determines who /where ‘gets’ my treatment?
Are those two things related?
How can I be sure I’m comparing like with like?

Can I randomise?

SMS5 : RCT
Gold Standard

SMS4 : quasi-experimental
Second Best

Can I exploit natural randomness: Timing?
Thresholds?
Coincidence?

SMS3: Create a comparison group that’s ‘similar on paper’ and use data on controls to ‘strip out’ the effect of other factors
**Exercise: is this a good comparison group?**

**Questions to ask yourself:**

<table>
<thead>
<tr>
<th>Project/ programme</th>
<th>About the programme &amp; selection into treatment</th>
<th>Proposed comparison group</th>
<th>Is this a good comparison?</th>
</tr>
</thead>
<tbody>
<tr>
<td>A new motorway</td>
<td>The government is making a major investment in a new motorway linking an important housing growth area with an important employment growth area with the intention of supporting employment growth and housing delivery.</td>
<td>Compare employment growth and housing delivery rates in the two places linked by the new road to national average employment growth and housing delivery rates.</td>
<td></td>
</tr>
<tr>
<td>Rural broadband loan scheme</td>
<td>Programme to increase broadband access in rural areas underserved by private telecoms operators by providing loans to small telecoms operators to expand access in rural areas</td>
<td>Comparing difference in broadband update for firms in rural areas to firms in other areas</td>
<td></td>
</tr>
<tr>
<td>Real time travel information</td>
<td>A city is putting in place a real time information system for buses, on displays at bus stops and accessible via a mobile app. The intention is that this encourages people to use the bus more often. The technology is rolled out on the most popular bus routes first, and the rest of the network follows.</td>
<td>Comparing the change in bus ridership in this city, with the change in bus ridership in a different city.</td>
<td></td>
</tr>
<tr>
<td>Subsidising public transport</td>
<td>Employers are given free public transport passes to encourage them to leave their cars at home and use the public transport system.</td>
<td>Public transport patronage is compared before/after to see the impact of the intervention.</td>
<td></td>
</tr>
</tbody>
</table>
INTEGRATED INFRASTRUCTURE PLANNING – PAST, PRESENT, FUTURE
How do you plan integrated infrastructure?
Open Data Infrastructure Map.

Where is Infrastructure? In one place.
http://www.mappinggm.org.uk/gmodin/
HOW TO GENERATE VALUE FROM THE GREATER MANCHESTER INFRASTRUCTURE MASTER MAP?

• contribute to the evidence base for the development of the Greater Manchester Strategic Framework;

• enable the key actors in planning, designing and delivering future developments to better coordinate and collaborate;

• provide robust evidence for the in-time or in-advance funding and delivery of infrastructure required for new development.
### Use Cases

**How could the map be used?**

**How could more data be added?**

<table>
<thead>
<tr>
<th>Understanding Network Inter-dependencies</th>
<th>Assessing &amp; Improving Resilience</th>
<th>Planning &amp; Engagement</th>
<th>Improving Data Reliability</th>
<th>Capacity &amp; Constraints</th>
<th>Demand on Infrastructure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electricity &amp; Transportation</td>
<td>Resilience Planning / Civil Contingency</td>
<td>Public Engagement Tool</td>
<td>Warrantying Utility Locations</td>
<td>Infrastructure Capacity Assessment</td>
<td>Infrastructure Requirements</td>
</tr>
<tr>
<td>Transport Mode Shift</td>
<td>Resilience Mapping (Buried Utilities / Ground conditions)</td>
<td>How to plan for demand on public infrastructure using multiple population data points.</td>
<td>Collation of Existing Demand Data to Improve Forecasting</td>
<td>Demand vs Capacity</td>
<td>Heat Networks</td>
</tr>
<tr>
<td>Energy from Waste</td>
<td>Infrastructure Resilience &amp; Business Continuity</td>
<td></td>
<td></td>
<td>Transport pinch points</td>
<td>Logistics Modelling</td>
</tr>
<tr>
<td>Platform for Innovation</td>
<td>Spatial Planning based on existing &amp; future resilience</td>
<td></td>
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</tbody>
</table>

**Does the city have the resilience to cope with future change / growth?**

**Using real-time data to improve prediction & forecasting**

**Data Portal for Planning Applications**

**How do we plan green infrastructure across developments, boundaries & economic infrastructure.**

**Agreement/alignment on underlying assumptions across infrastructure providers forecasting / planning models.**

**Sharing information on planned works and timescales between agencies.**
GREATER MANCHESTER
RESEARCH

Of the 36 ideas identified, we sketched out how three of these could operate.

Development infrastructure search portal
Mapping the cumulative impact of smaller developments
Forecasting the impact of growth on infrastructure capacity
Thank you

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#PlanTech
Follow the Commission on social media for event updates and the latest news

@NatInfraCom