



**Climate change, flood risk management and public health:**

***Time to return to Victorian values?***

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# BEGIN: Blue Green Infrastructure through social innovation



- Interreg project with 10 partner cities
- Sheffield focus on collaborative governance with health agencies



# BEGIN North Sea Region Programme area

 Regions within the NSR programme area



## Partner Cities

**Belgium**

Antwerp, Ghent

**Germany**

Hamburg

**Norway**

Bergen

**Sweden**

Gothenburg

**UK**

Bradford, Aberdeen, Enfield, Kent

**Netherlands**

Dordrecht

## Technical Partners

**UK**

University of Sheffield, Royal College of Arts, Construction Industry Research Information Association (CIRIA)

**Netherlands**

IHE Delft, Erasmus University Rotterdam

**Germany**

Hamburg University of Technology

**1875 Public Health Act:**  
local authorities power  
to purchase, repair or  
create sewers and  
control water supplies



July, August, 1858 'Great stink'

# Why Health?



Social amenity

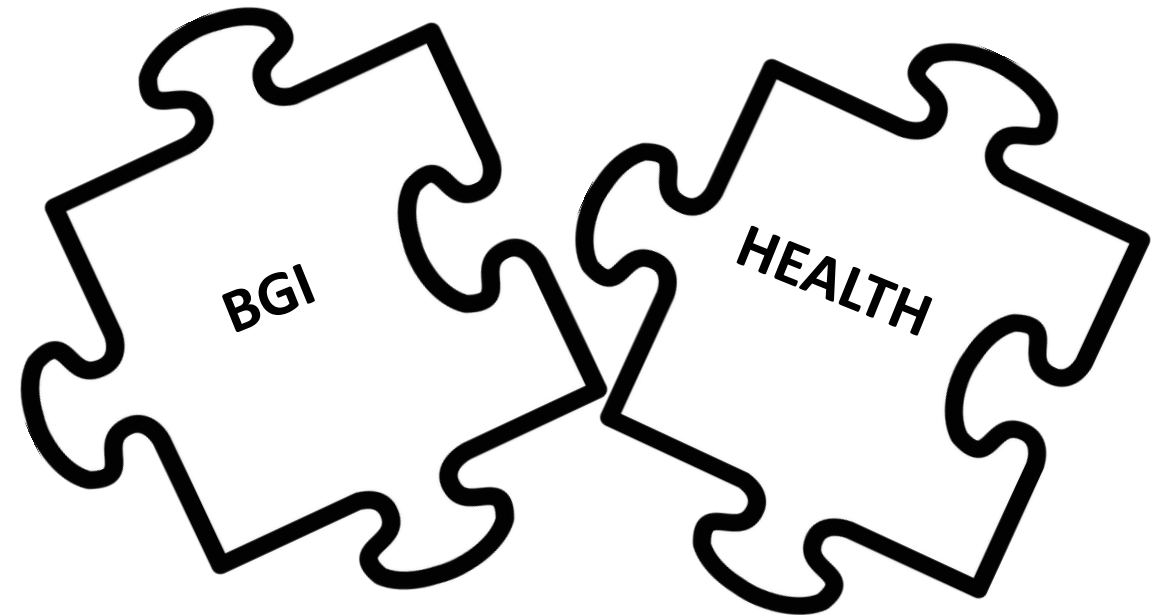


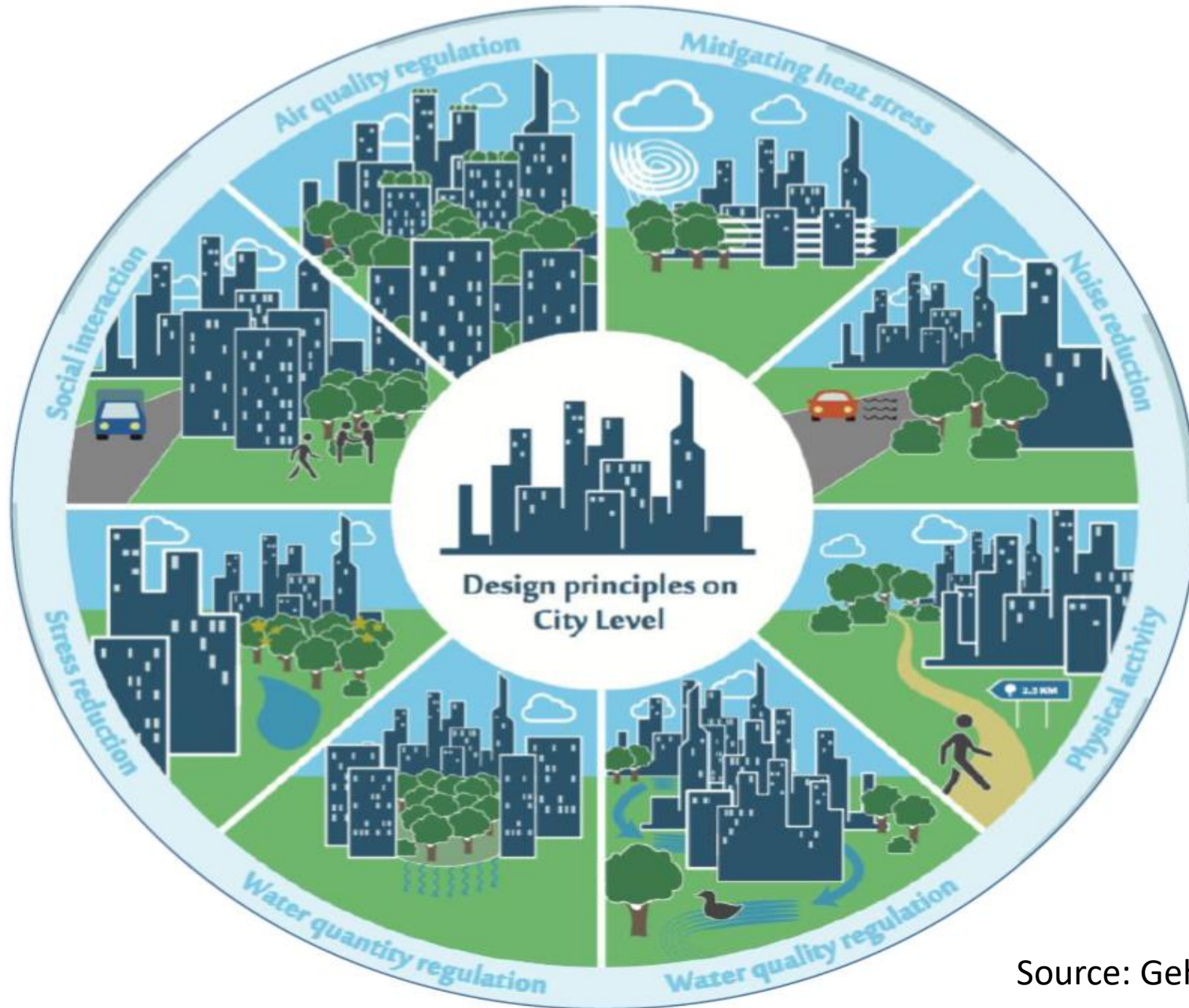
Mental health



Physical activity

Urban green spaces:  
*‘psychological relaxation and stress alleviation,  
stimulating social cohesion, supporting physical  
activity, and reducing exposure to air pollutants,  
noise and excessive heat.’*  
(World Health Organisation, 2016)





Source: Gehrels et al. (2016)



Blue infrastructure can contribute to:

- Healthy living: swim, play, row, sail
- Mental health: social interaction, resting, leisure, restaurants, design
- medical health: no toxic compounds, bacteria, pathogens

Source: Gehrels et al. (2016)

# Why bother? The policy agenda

- Good design of BGI can deliver multilevel solutions with best design. Bridging the gap between drainage and health
- *Urban drainage systems that incorporate elements of green infrastructure ...provide effective control of stormwater management whilst generating a range of other benefits. However these benefits often occur coincidentally and are not developed or maximised in the original design (Fenner, 2017)*





# A brief history of infrastructure governance

## 19<sup>th</sup> Century

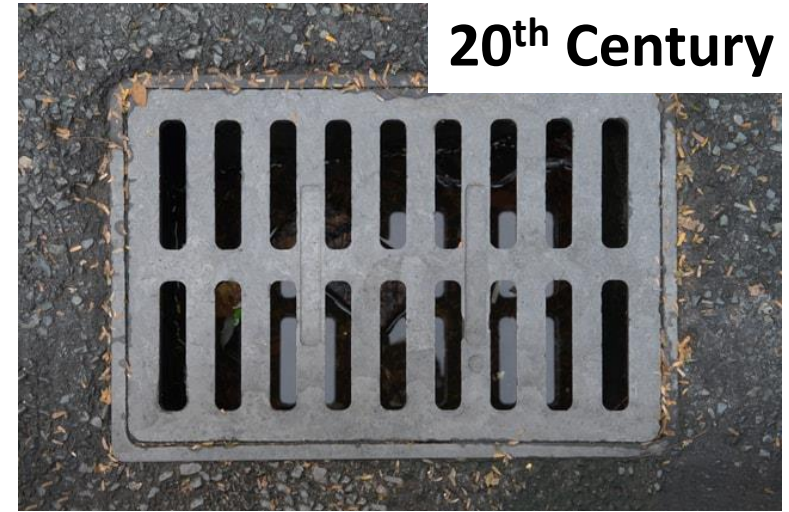


'islands of infrastructure'



move towards integration with expansion of state power, rational integration

## 20<sup>th</sup> Century

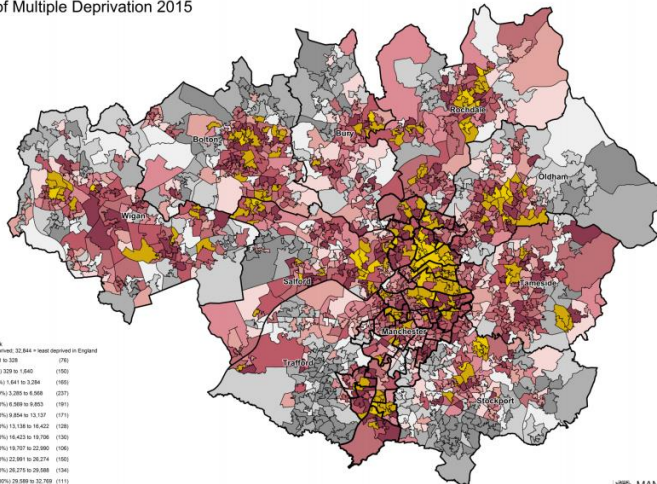


## 21<sup>st</sup> Century

towards economic liberalisation and development of digital and informational technologies. Archipelagos of 'global enclaves', contributing to urban sociospatial segregation.



Greater Manchester  
Index of Multiple Deprivation 2015



LD2015 by MSO ward  
Ward: 1 = least deprived; 32,844 = most deprived in England

Ward	Score Range	Count
Top 1%	1 to 328	328
Top 2-5%	329 to 1,642	1,313
Top 6-10%	1,643 to 3,284	1,641
Top 11-20%	3,285 to 6,568	3,283
Top 21-30%	6,569 to 9,852	3,283
Top 31-40%	9,853 to 13,137	3,284
Top 41-50%	13,138 to 16,422	3,284
Top 51-60%	16,423 to 19,706	3,283
Top 61-70%	19,707 to 22,990	3,283
Top 71-80%	22,991 to 26,274	3,283
Top 81-90%	26,275 to 29,558	3,283
Top 91-100%	29,559 to 32,842	3,283

Source: DCLG, Crown copyright

MANCHESTER  
CITY COUNCIL

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# Governance

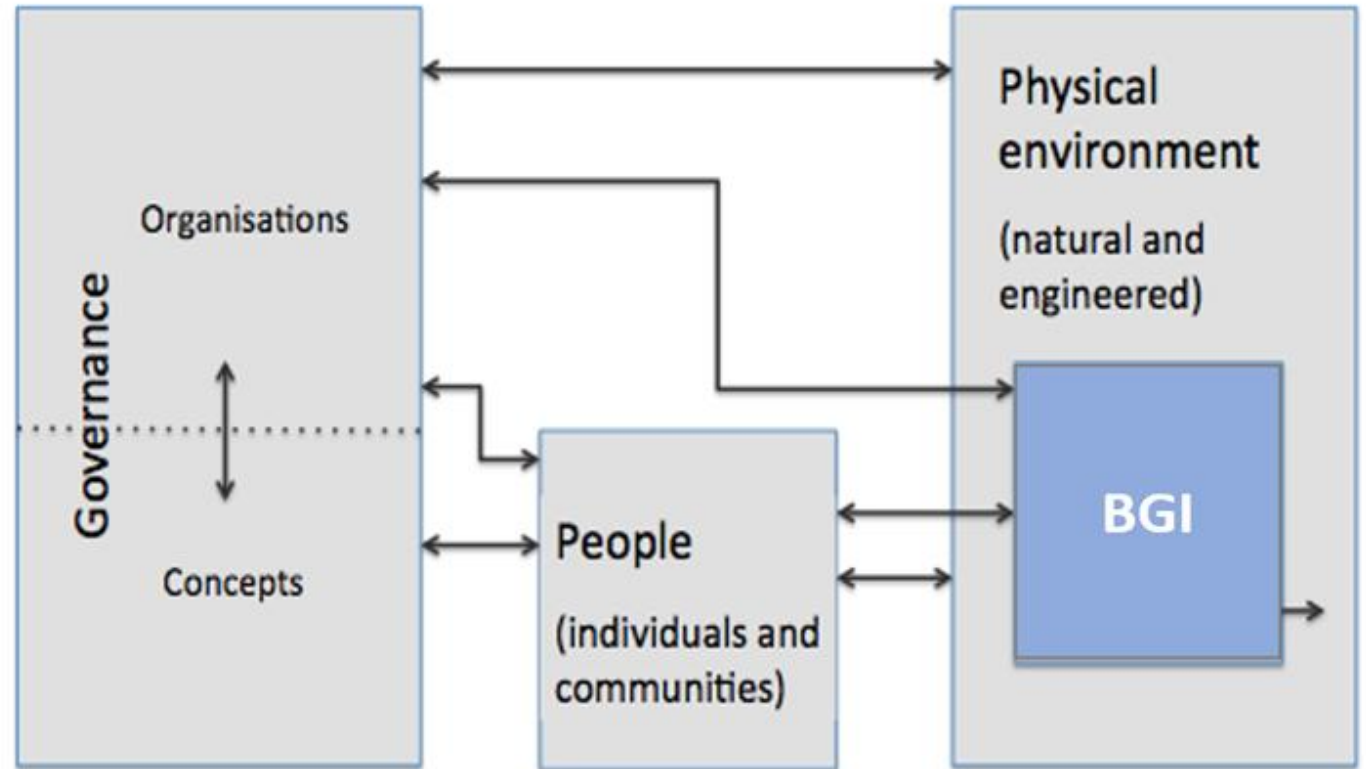
Traditional governance:

- Single function grey infrastructure
- Siloed governance context

Adaptive management:

- Plurality of perspectives
- Multidisciplinary, collaborative
- Multifunctionality

## Adaptive management model for BGI



Adapted from Sharp, 2017

# BEGIN case study: Enfield



- Enfield has more water courses than any other borough; high risk of flooding.
- Creation of seven new wetlands areas, large volumes of floodwater storage and reeds planted improve water quality, biodiversity, aesthetics and physical activity opportunities.
- Graham Campbell, senior engineer, Enfield Council, *'The developer may want to use traditional methods such as storing water in underground crates or building a floodwall, but that only ticks one box. The measures we recommend improve water quality as well as biodiversity and create an interesting place for people to be.'*

# BEGIN

## Case study: Bradford, UK

- Flood risk areas from Bradford Beck and River Aire.
- Linear park & greenways
- New housing development



### KEY TO DIAGRAM

- SITE BOUNDARY
- DALES WAY LINK PARK
- GREENWAY (Sustrans Cyclerooute 66)
- GREENWAY STEPPING STONE PARKS (PRIMARY)
- GREENWAY STEPPING STONE PARKS (SECONDARY)
- SHIPLEY MARKET SQAURE
- ▨ ECO SETTLEMENT PARK SPACES
- - - PEDESTRIAN / CYCLEWAY LINKS
- RIVER AIRE
- LEEDS- LIVERPOOL CANAL
- POTENTIAL SUDs FEATURES
- - - NATURALISED BRADFORD BECK - MEANDERS INTRODUCED AND HABITAT HIGHWAY
- BRADFORD BECK - SECTIONS OF DECULVERTING - HABITAT HIGHWAY
- EXISTING BECK AND HABITAT HIGHWAY
- ★ KEY DESTINATIONS
- RAILWAY LINE AND HABITAT HIGHWAY
- ⊕ RAILWAY STATIONS
- CANAL ROAD AND HABITAT HIGHWAY

# Bradford

Uncertainty as an opportunity not a flaw

Highways, landscape and architecture, drainage and health, local interest groups and the Environmental Agency.

*'...making a very 'hard' highway scheme move into different areas that they're not used to'.*

## Collaborations

Local council *'positively looking for partnership'*

Drivers included funding, agents of change, shared policy goals

Participants felt aims being met and agendas shared with collaborative partners.

Bradford

Health data used for joint funding bids

New but growing involvement of public health team. *'Opportunities'* for health

Child health, mental well-being, health impact of road widening (increasing traffic and air quality)

**Health**

*'... we're supposed to interact with the soil, with plants, ... our psychological need for certain types of stimulus.'*

Health agenda can *'take up all your energy and not achieve the long-term goals'*

Health not a key driver of projects

# BEGIN case study: Vogelbuurt neighbourhood, Dordrecht, the Netherlands



# Dordrecht

Initially plans were largely disconnected but the 'blue and green' team identified potential for collaborative working.

Dordrecht 'blue and green' team integrative projects included improving sport fields, replacing the sewage system and refurbishing social housing.

## Collaborations:

Challenge was the disconnection between city-wide tasks with the residents' daily life.

EU-funding bid with collaborations between enthusiastic local organisations (social entrepreneurs, sport clubs) and government departments.



Dordrecht

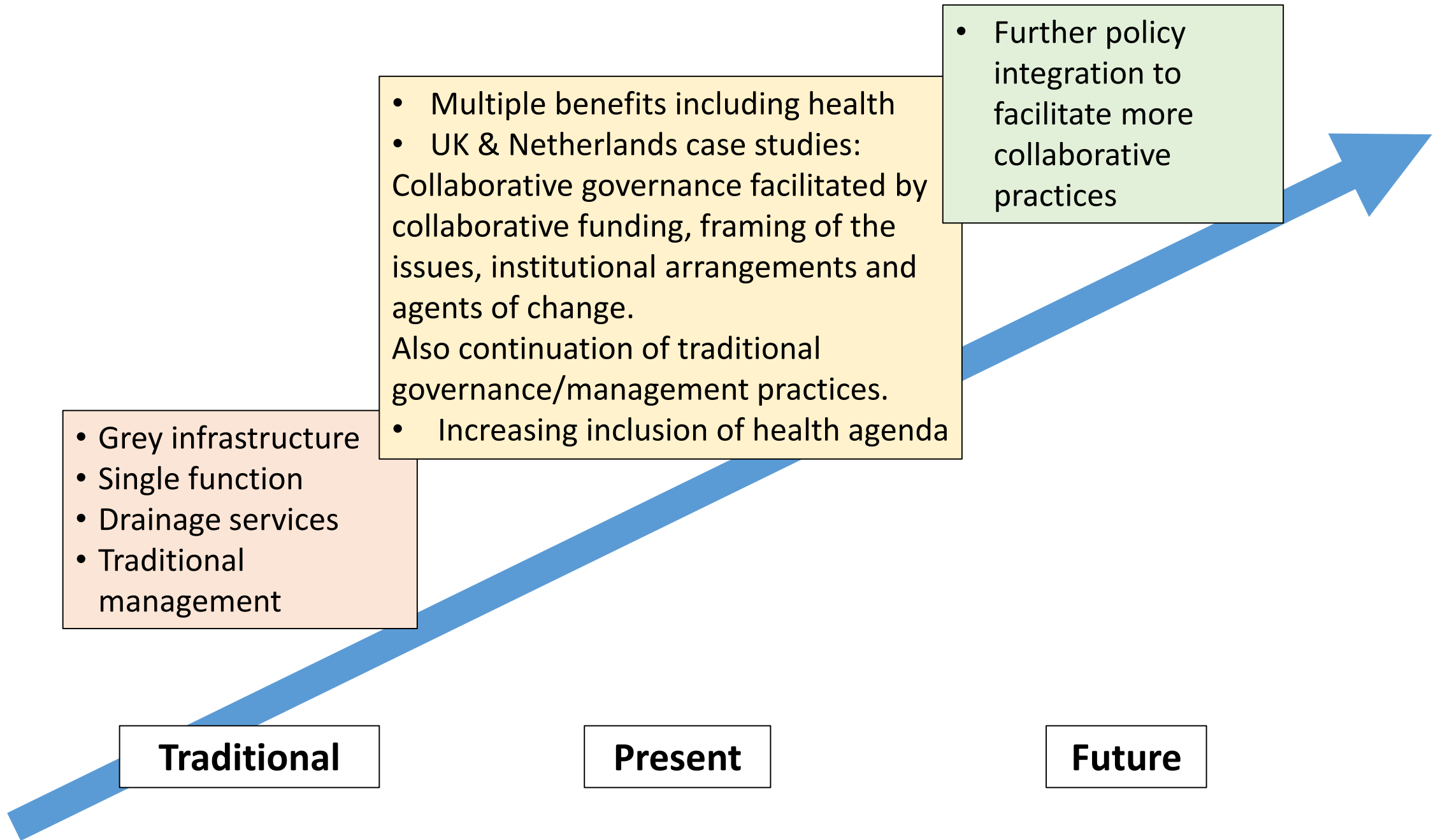
Better connections to sport facilities and green areas for recreation and better physical and mental wellbeing

Parks' maintenance involving unemployed local residents - practical and social/mental health benefits.

Health

Health agencies were not involved in the plans for the neighbourhood.

Mismatch between the (physical) city-wide tasks and the (social) neighbourhood challenges hindered incorporation of health issues



# Summary

- Integration of BGI and health can deliver multiple benefits
- Combination of old idea with new governance approach
- Policy integration leverages change
- Engineering design achieves results
- Future exploration, systems for learning from innovations.

