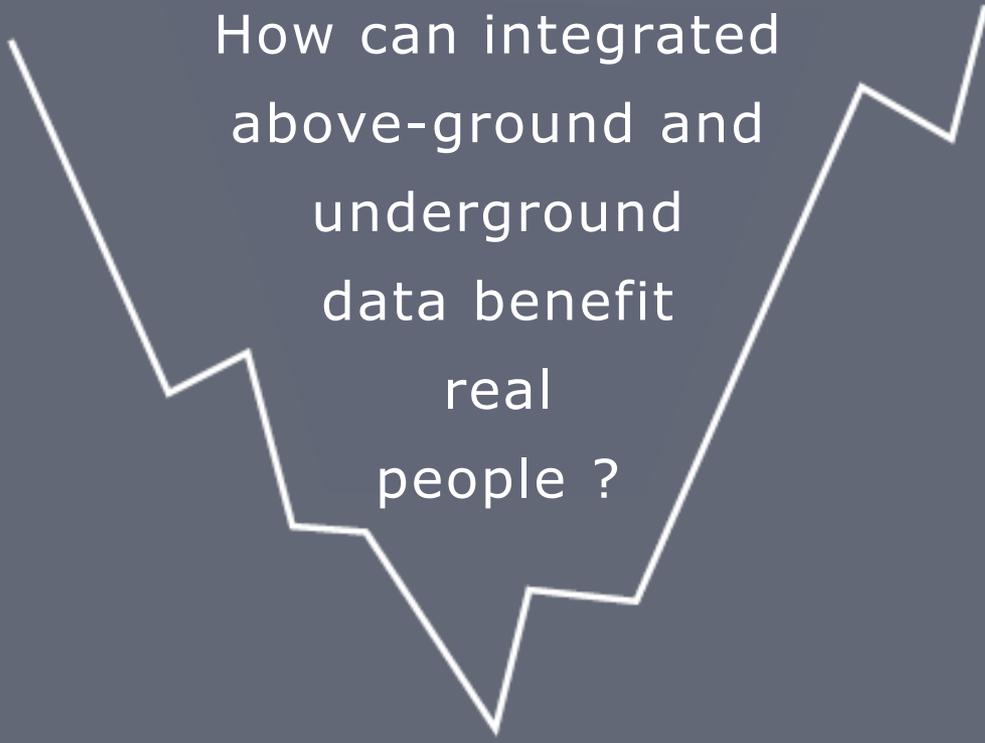# PROJECT ICEBERG

How can integrated
above-ground and
underground
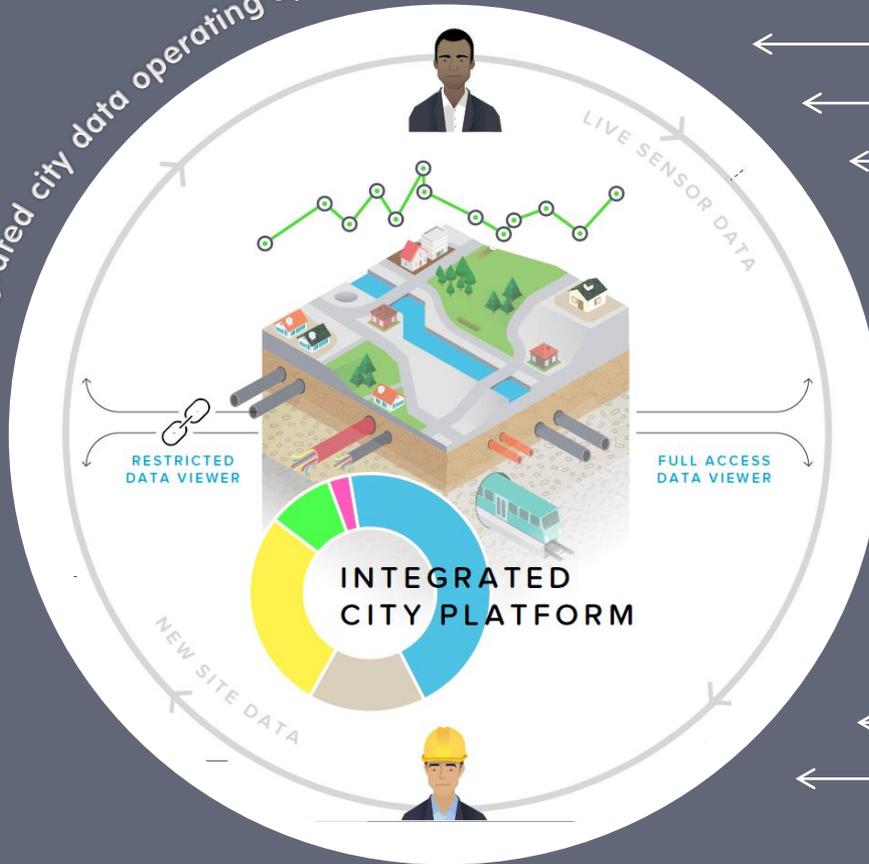data benefit
real
people ?

A collaboration between:

Future Cities Catapult

British Geological Survey

Ordnance Survey

An integrated data operating system above and below ground

integrated city data operating system

LIVE SENSOR DATA

NEW SITE DATA

RESTRICTED DATA VIEWER

FULL ACCESS DATA VIEWER

INTEGRATED CITY PLATFORM

← Utility data
← Transport infrastructure
← Building information
← Foundations, basements
← Land use
← Land value
← Topography
← Ground conditions
← Soil properties
← Rock properties
← Surface water
← Green infrastructure
← ....

Who might benefit?

MARK/37
URBAN PLANNER

I am an urban planner for London. A lot of time is spent working out how we can make our city a better place.

I need reliable data to review applications for new development and to inform our long-term city strategy. I work a lot with developers.

STRATEGIC PLANNING	PLANNING APPLICATION	DESIGN & CONSTRUCTION	OPERATION & MAINTENANCE

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STRATEGIC PLANNING → **PLANNING APPLICATION** → **DESIGN & CONSTRUCTION** → **OPERATION & MAINTENANCE**
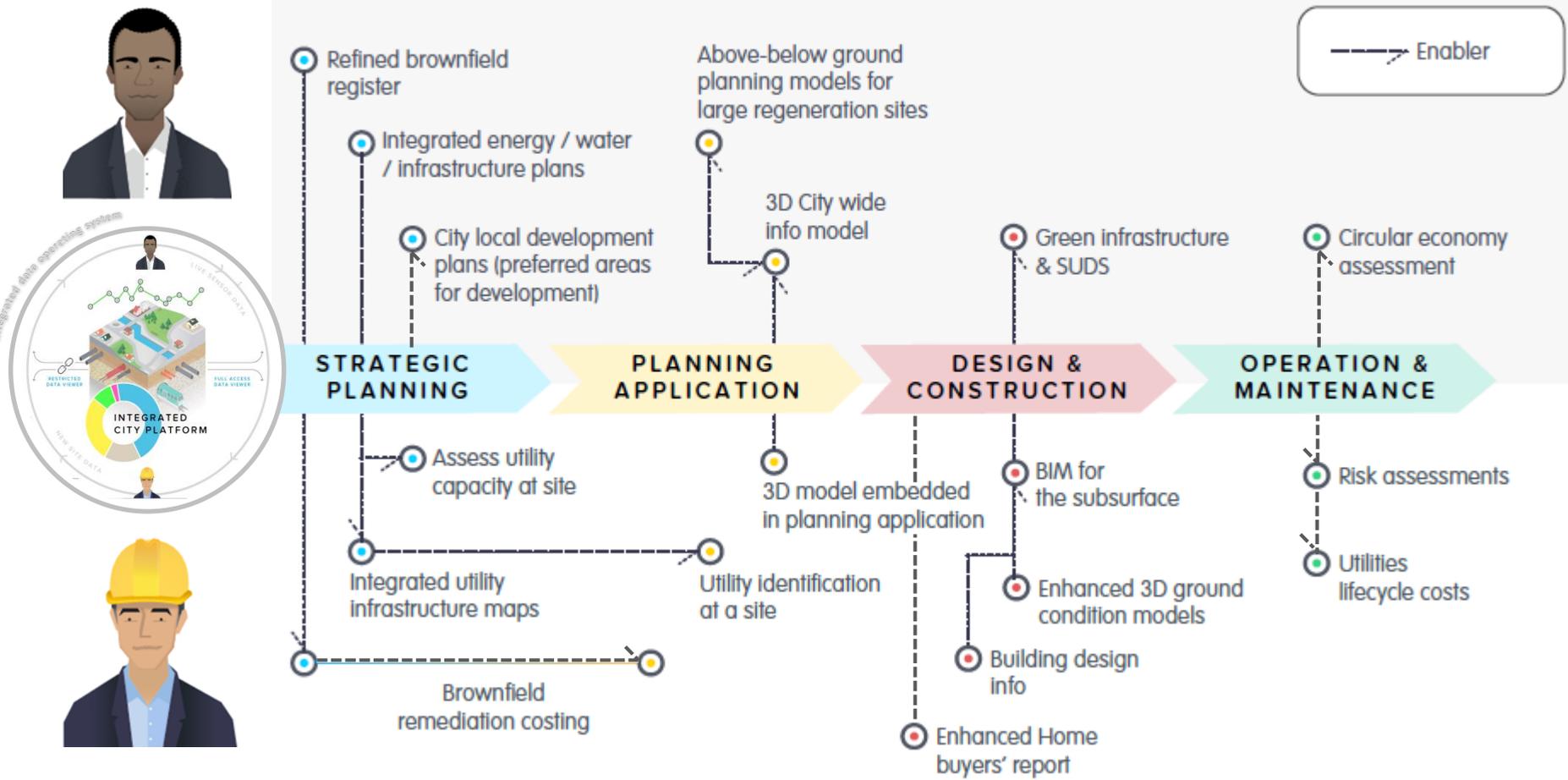
JOHN/41
(MID RANGE) DEVELOPER

I am a mid-sized developer, and work on projects like leisure centres and low rise building blocks. I run my own company so projects need to be profitable.

I need affordable data to help me design and construct my buildings properly. Data is also useful for my planning applications.

There are many **potential benefits** of an integrated data system.

A selection of these **are illustrated for Mark**, a local urban planner and **John**, a mid-sized developer.

BENEFITS OVERVIEW

- - - - ▸ Enabler

STRATEGIC PLANNING

- Refined brownfield register
- Integrated energy / water / infrastructure plans
- City local development plans (preferred areas for development)
- Assess utility capacity at site
- Integrated utility infrastructure maps
- Brownfield remediation costing

PLANNING APPLICATION

- Above-below ground planning models for large regeneration sites
- 3D City wide info model
- 3D model embedded in planning application
- Utility identification at a site

DESIGN & CONSTRUCTION

- Green infrastructure & SUDS
- BIM for the subsurface
- Enhanced 3D ground condition models
- Building design info
- Enhanced Home buyers' report

OPERATION & MAINTENANCE

- Circular economy assessment
- Risk assessments
- Utilities lifecycle costs

INTEGRATED CITY PLATFORM

LOCAL URBAN
PLANNER

Show me the preferred areas for development

?

LOCAL URBAN PLANNER
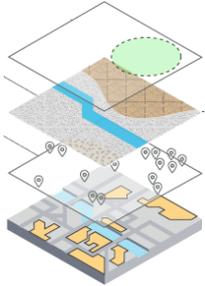
STRATEGIC PLANNING

Brownfield viability

Brownfield viability
Call for sites
Green infrastructure
Preferred areas

Refined brownfield register showing areas where brownfield remediation and redevelopment is more economically viable and strategically important.
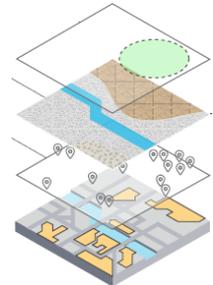
Show me the preferred areas for development

?

LOCAL URBAN PLANNER

STRATEGIC PLANNING

Brownfield viability

Brownfield viability
Call for sites
Green infrastructure
Preferred areas

Refined brownfield register showing areas where brownfield remediation and redevelopment is more economically viable and strategically important.

Integrated infrastructure water, energy, transport, telecommunications, green infrastructure map to plan new development and coordinate new works.

These already exist for some cities e.g. Manchester London

Utility data
Transport infrastructure
Tele-communications data
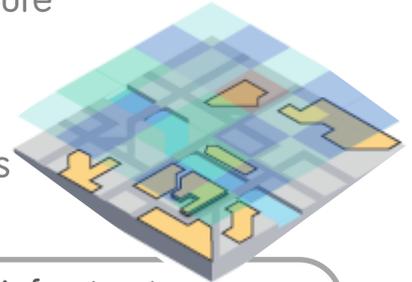## Integrated infrastructure map

Help me de-risk my investment

?

PLANNING APPLICATION

Transport infrastructure
Water utilities
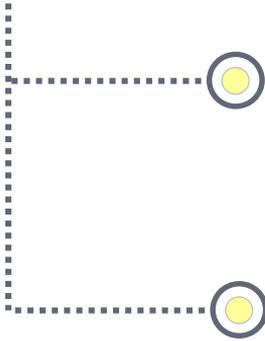Energy supplies
Telecommunications

Growth Mapper integrated infrastructure maps are used to identify where there is capacity across the various infrastructure networks and less new investment is needed. This has been trialled in Manchester.
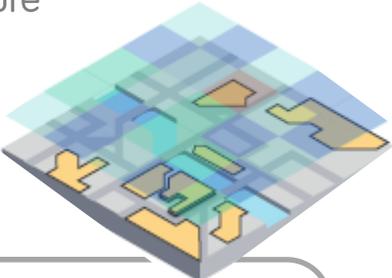
Geosure ground property maps and geo-hazard data is combined to show ground risks and inform insurance needs.

Help me de-risk my investment

?

PLANNING APPLICATION

Transport infrastructure
Water utilities
Energy supplies
Telecommunications

Growth Mapper integrated infrastructure maps are used to identify where there is capacity across the various infrastructure networks and less new investment is needed. This has been trialled in Manchester.

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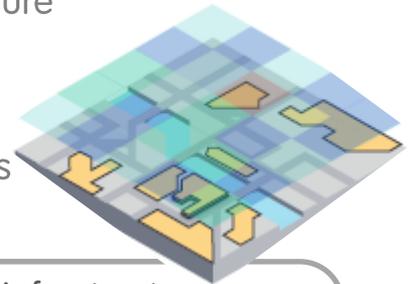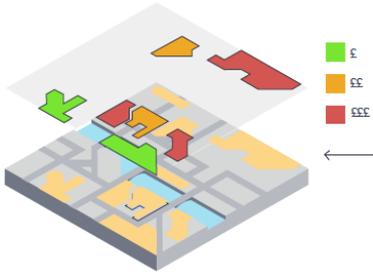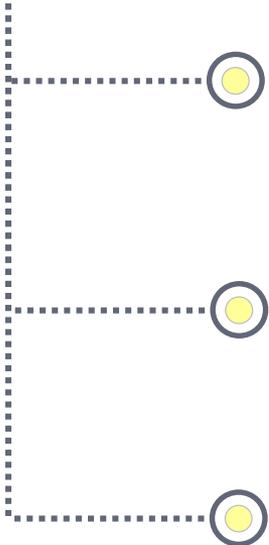
Brownfield remediation calculator Ground property data, previous land use, environmental data, economic data is used to estimate if land is economically viable for development.

£
££
£££

EXAMPLE
USE CASES

MARK/37
URBAN PLANNER

I am an urban planner for London. A lot of time is spent working out how we can make our city a better place. We live in the UK, so naturally weather plays a part in our conversations.

With an expanding built environment, flooding is one issue where there is much debate. The Thames tideway is one such contentious topic.

OBJECTIVE
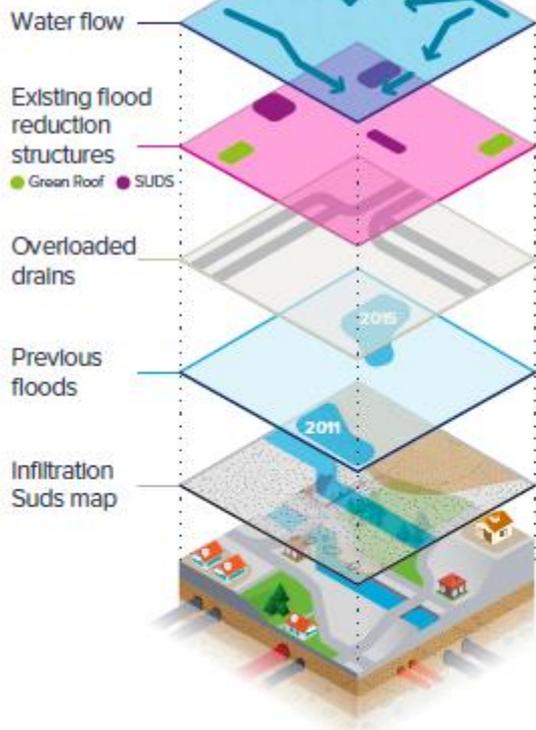We need to find alternatives to reduce flooding in cities.

PAIN POINTS
It is currently difficult to understand where and how we can alleviate flooding. Underground, there are many constraints, and I don't get a holistic view on them.

JOHN/41
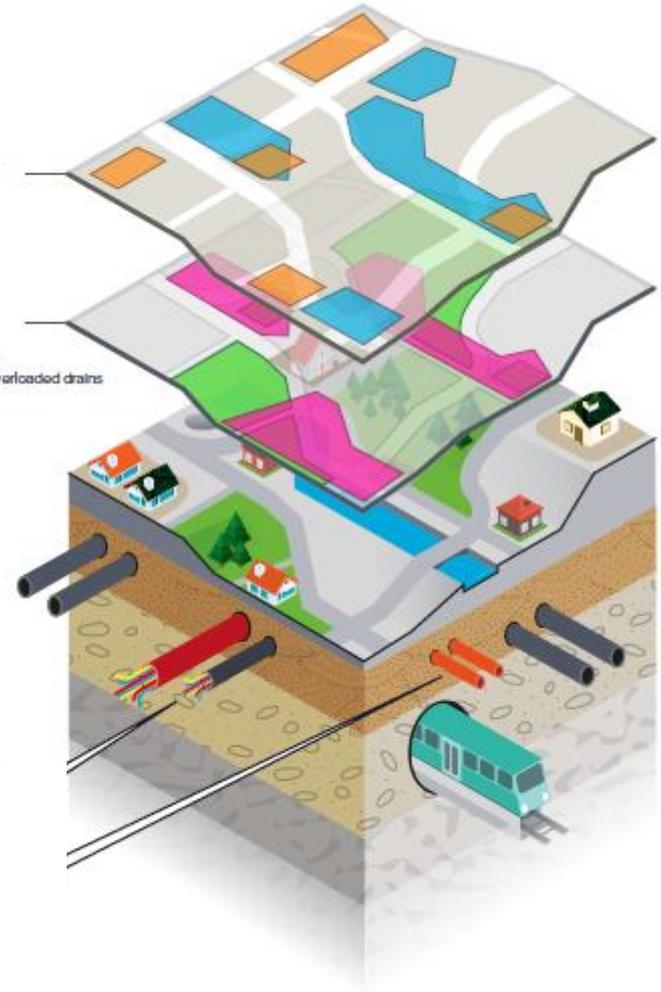# (MID RANGE) DEVELOPER

I am a mid-sized developer, and work on projects like Leisure Centres, Shopping Centres, and the occasional low-rise building blocks. I run my own company.

When we go into build, we clear the site area and perform a site survey. We'll go in and try to detect what is underground.

OBJECTIVE
I need an accurate picture of what's underground to inform my teams.

PAIN POINTS
It's not clear what exactly lies beneath the site until we dig. We then have to deal with the financial implications of adjusting the development. Sometimes we hit a pipe but don't know to whom it belongs.

utility detection

ACCURATE SEARCHABLE MODEL

1
Utility companies state ownership of pipes at postcode and update model

2
Through a non-invasive investigation the road developer finds the location of a cable end using underground scanners and MTU devices*

Inform   Update

GPR scanner

0.5 m (Depth)
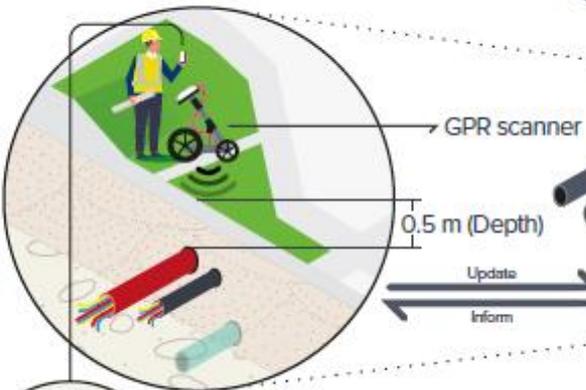
Update
Inform

These devices can help to determine the direction of the cables and adjust and update data in the model

*MTU Device
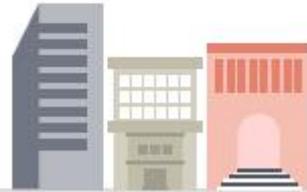
3
Through an invasive investigation an unknown pipe is discovered. The developer is presented with different solution/alternatives. Then the model can be updated
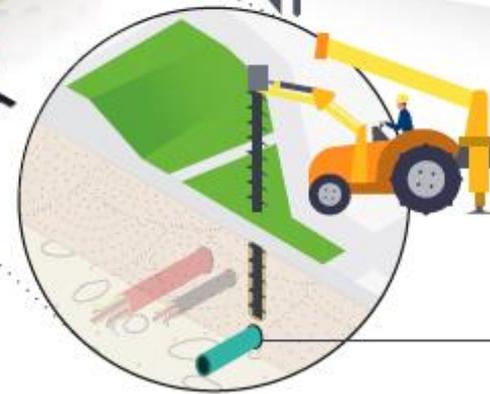
4
Searchable model with accurate picture of what's underground to inform developers and teams

Inform   Update

Unknown pipe.

*MTU: Mapping The Underworld Research Programme led by Birmingham University

"Access to subsurface information provides an **easier route to innovation** and optimised **cost-beneficial designs**".

An engineer's perspective

Developing tools, services and Solutions
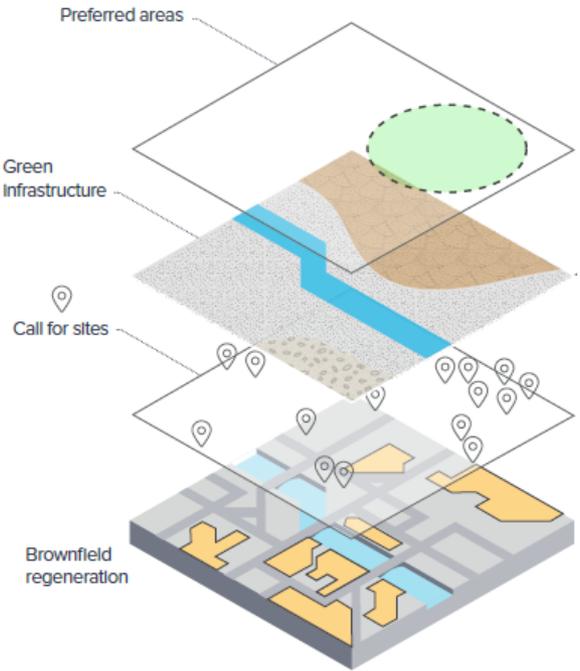
Integrated city data operating system

Preferred areas

Green Infrastructure

Call for sites

Brownfield regeneration

LOCAL DEVELOPMENT PLANS

Developing tools, services and solutions

Integrated city data operating system

GREEN INFRASTRUCTURE AND SUDS TOOL

CHALK SOIL

OVERLOADED DRAINAGE

Preferred areas

Green Infrastructure

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Brownfield regeneration

LOCAL DEVELOPMENT PLANS

Developing tools, services and solutions

Integrated city data operating system

GREEN INFRASTRUCTURE AND SUDS TOOL

CHALK SOIL

OVERLOADED DRAINAGE
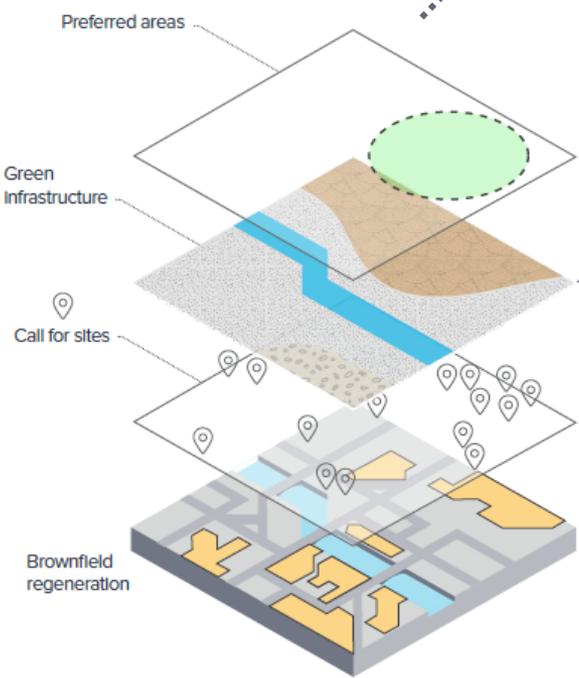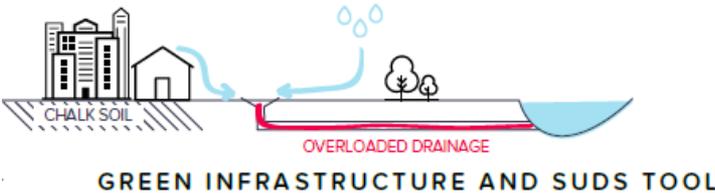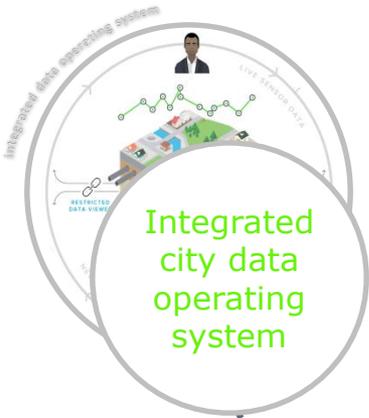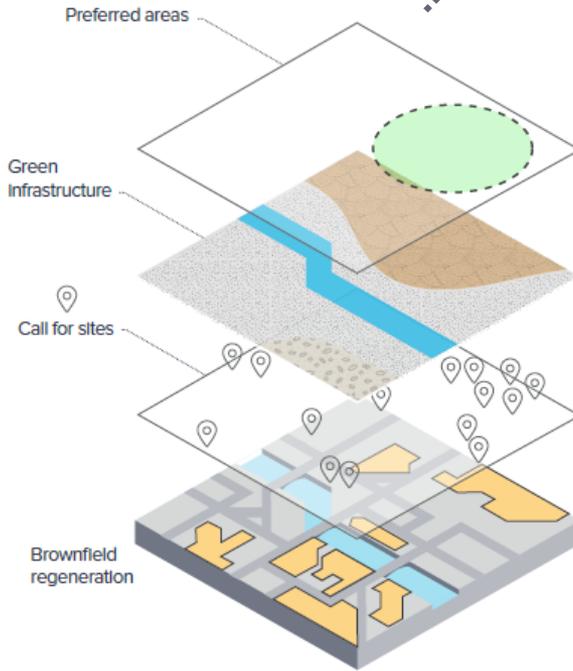
BROWNFIELD REMEDIATION COSTING TOOL

REFINED BROWNFIELD REGISTER

£
££
£££

Preferred areas

Green Infrastructure

Call for sites

Brownfield regeneration

LOCAL DEVELOPMENT PLANS

Developing tools, services and solutions

Integrated city data operating system

+
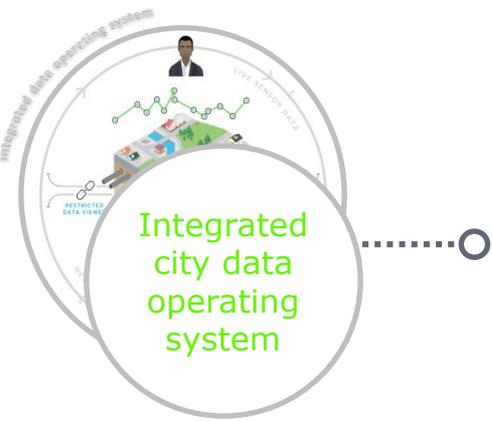
INTEGRATING SERVICES

- Infrastructure
- Water resource
- Energy

Developing tools, services and solutions

INTEGRATING SERVICES

Integrated city data operating system

+

- Infrastructure
- Water resource
- Energy

CIRCULAR ECONOMY ASSESSMENT

- Waste
- Aggregates
- Water re-use

UTILITY IDENTIFIER TOOL

TOOL TO ASSESS CAPACITY IN ALL UTILITIES AT A SPECIFIC SITE

INTEGRATED UTILITY INFRASTRUCTURE MAP
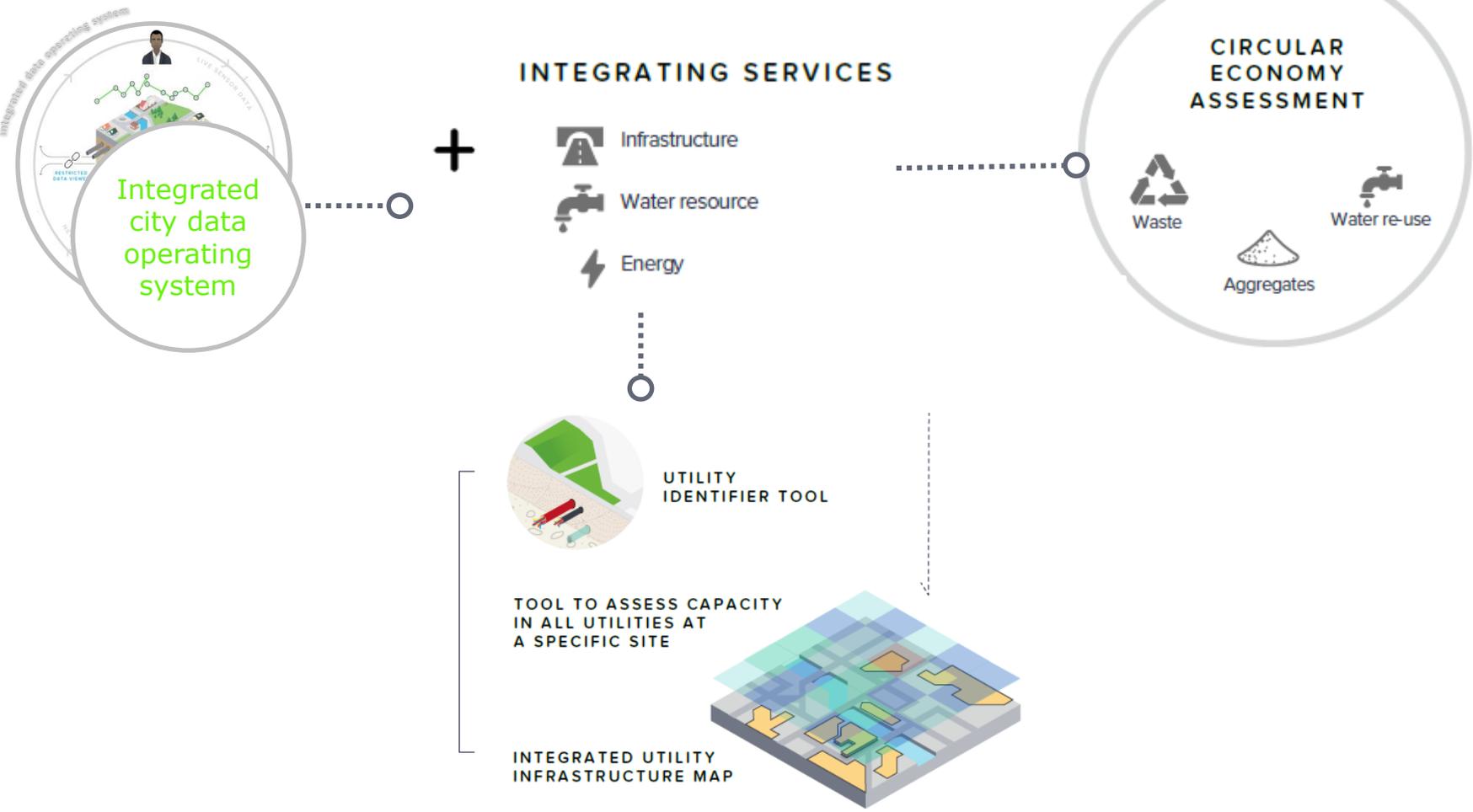
Developing tools, services and solutions

ENHANCED HOME BUYERS' REPORT

3D CAD MODEL + PLANNING APPLICATION

BUILDING DESIGN INFO

3D CITY INFO MODEL

Integrated city data operating system

Developing tools, services and solutions

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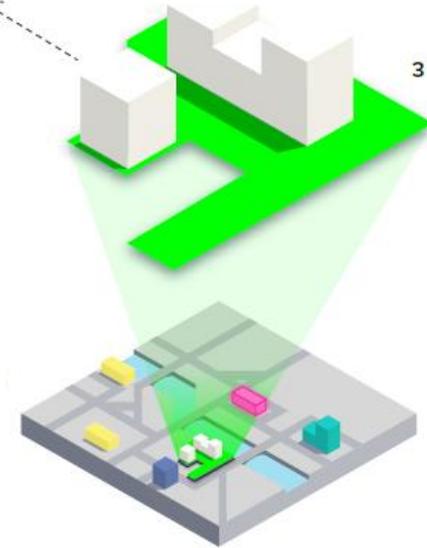
UTILITIES LIFECYCLE COSTS

RISK ASSESSMENTS

ENHANCED 3D GROUND CONDITION MODEL

- Flooding
- Underground Infrastructure
- Stability
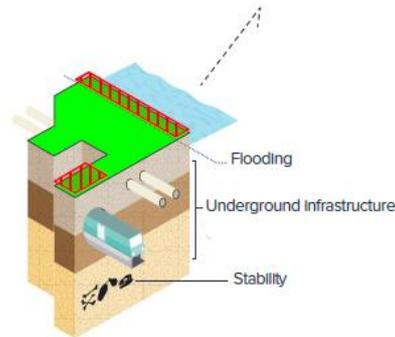
BIM

BIM FOR THE SUBSURFACE

'**Digitisation of utility services**
can enhance asset
management, and **increase
profitability by 20-30%'.**

Booth et al., 2016

Booth, A., Mohr, N., Peters, P. (2016) The digital utility: New opportunities and challenges, McKinsey & Company. [Online]. Available at:
http://www.mckinsey.com/industries/electricpower-and-natural-gas/our-insights/the-digital-utility-new-opportunities-and-challenges [July 2016].

Efficiency savings.
Business opportunities.

INTEGRATED CITY PLATFORM

Legend:
- Enabler
- £ Business opportunity
- Efficiency saving

LOCAL URBAN PLANNER

(MID RANGE) LOCAL DEVELOPER

STRATEGIC PLANNING → **PLANNING APPLICATION** → **DESIGN & CONSTRUCTION** → **OPERATION & MAINTENANCE**

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Taking it forward together

We are developing opportunities to showcase the benefits of an integrated city data operating system…

…OGC underground infrastructure pilot project
Remediation cost calculator tool
Integrated urban planning demonstrator…

For more information about Project Iceberg and follow on activities contact:

Stephanie Bricker (step@bgs.ac.uk)
Stef Webb (swebb@futurecities.catapult.org)
Rollo Home (Rollo.Home@os.uk)

PROJECT ICEBERG

how can integrated
above-ground and
underground
data benefit
real
people ?

Project Iceberg is an exploratory project undertaken by **Future Cities Catapult**, **British Geological Survey** and **Ordnance Survey**. The project aims to address the serious issue of the lack of information about the ground beneath our cities and the un-coordinated way in which the subsurface space is managed. **The long-term goal is to help increase the viability of land for development and de-risk future investment through better management of subsurface data.** To help achieve this, our study aims to enable a means to discover and access relevant data about the ground's physical condition and assets housed within it, in a way that is suitable for modern, data driven decision making processes.