

Towards Circular Cities

A transition towards a thriving city that is livable, sustainable and resilient city

Circular
=
Avoiding waste

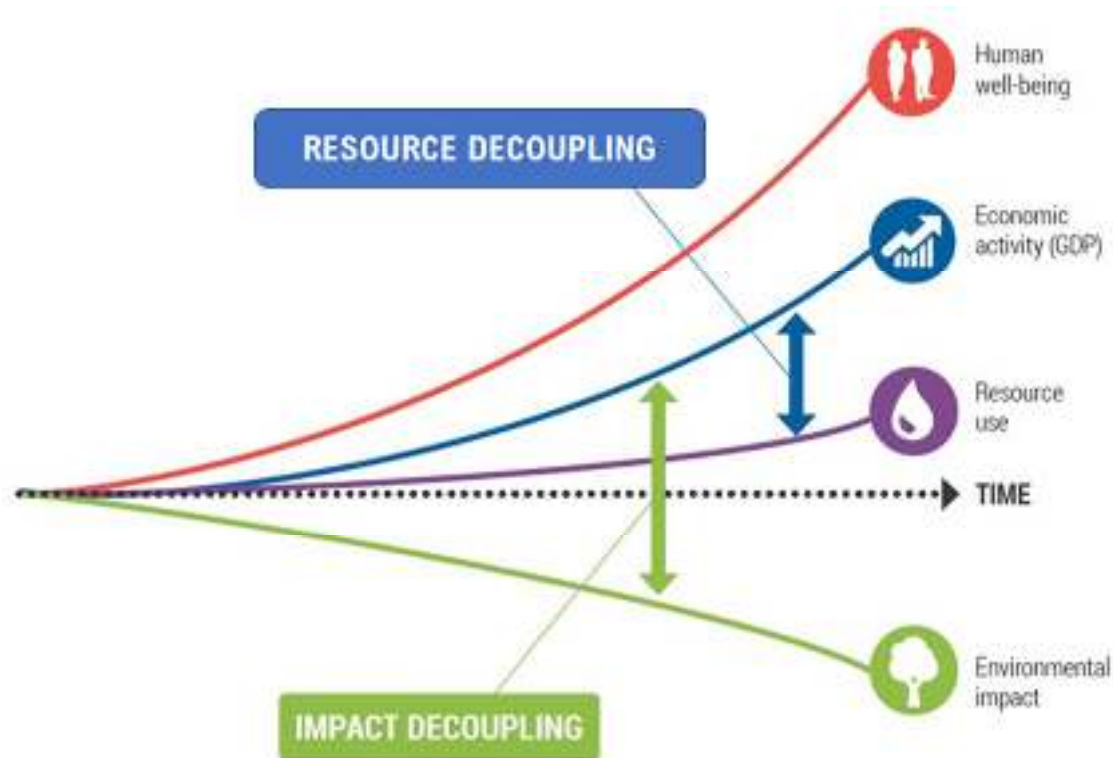
Economy

=

Everything else

Addressing total value of solutions

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Source: UNEP (2011)

Is it good for
the economy?






+

Is it good for
society?

+

Is it good for the
environment?

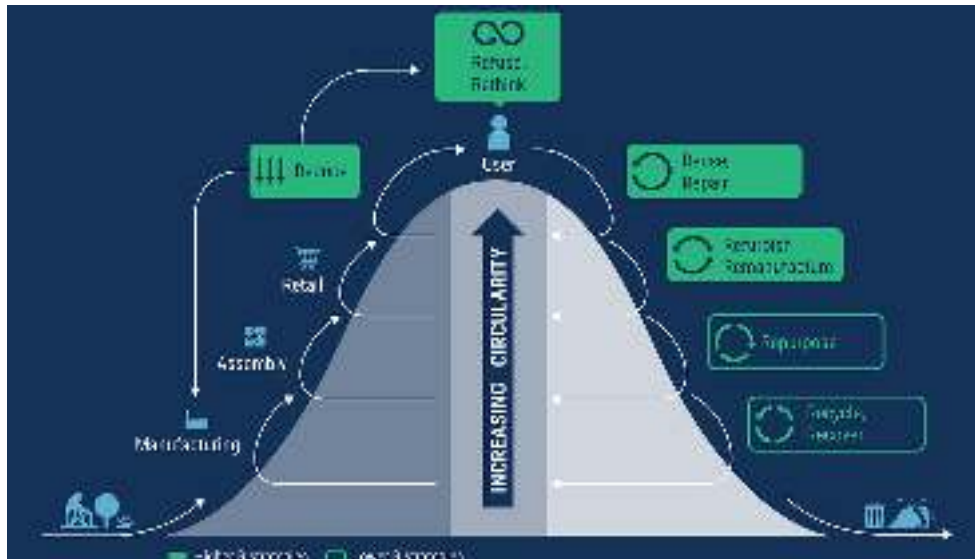
Action levers

REGENERATE 	<ul style="list-style-type: none">• Shift to renewable energy and materials• Reclaim, retain, and restore health of ecosystems• Return recovered biological resources to the biosphere
SHARE 	<ul style="list-style-type: none">• Share assets (eg cars, rooms, appliances)• Reuse/secondhand• Prolong life through maintenance, design for durability, upgradability etc
OPTIMISE 	<ul style="list-style-type: none">• Increase performance/efficiency of product• Remove waste in production and supply chain• Leverage big data, automation, remote sensing and steering
LOOP 	<ul style="list-style-type: none">• Remanufacture products or components• Recycle materials• Digest anaerobically• Extract biochemicals from organic waste
VIRTUALISE 	<ul style="list-style-type: none">• Dematerialise directly (eg books, CDs, DVDs, travel)• Dematerialise indirectly (eg online shopping)
EXCHANGE 	<ul style="list-style-type: none">• Replace old with advanced non-renewable materials• Apply new technologies (eg 3D printing)• Choose new product/service (eg multimodal transport)

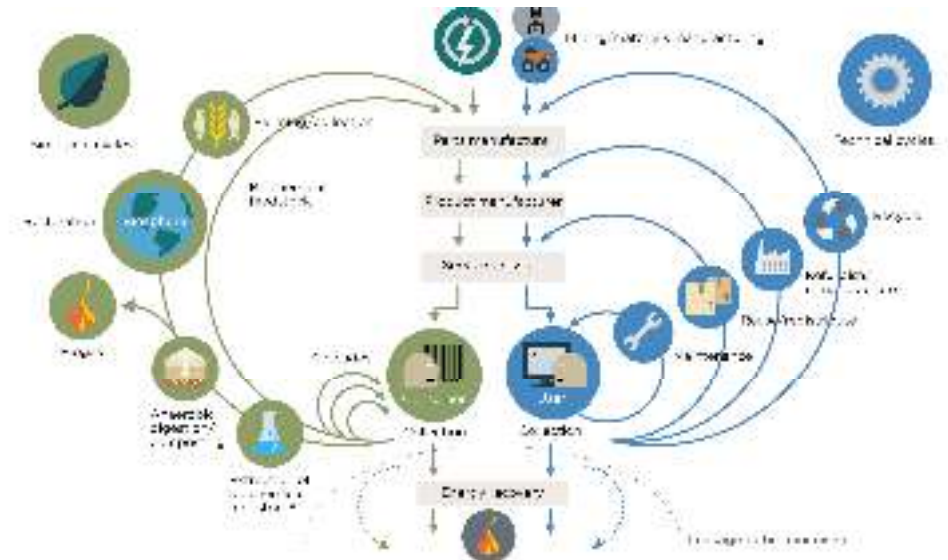
Quality of interventions

Leaving the take-make-dispose ethos of linearity

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9R model: quality hierarchy of outcomes



Butterfly diagram: addressing circular loops for biological and technical cycles to create an economy that is restorative and regenerative “by design”

A group of people are sitting on a grassy hill, looking out over a city skyline. The skyline features various skyscrapers and buildings, including a prominent spire on the left. The sky is blue with some clouds. The text "A world of city living" is overlaid in the center of the image.

A world of city living

Green Deal Going Local



Achieving climate
neutrality

Sustainable transport

Clean, reliable and
affordable energy

Preserving Europe's
natural capital

Financing
the transition

Transition to a
circular economy

Leave no one behind
(Just Transition)

A zero-pollution
Europe

Towards a modernised
and simplified CAP

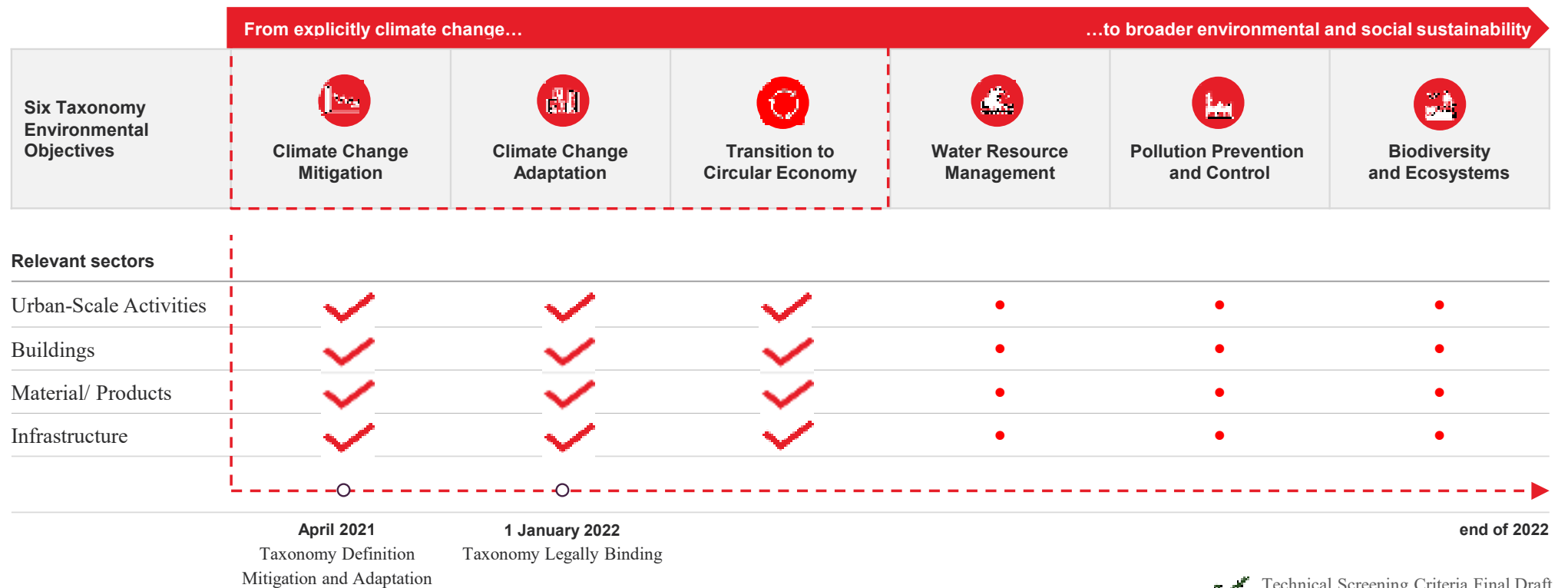
From farm to fork

The transformation
of agriculture
and rural areas

What is the EU Taxonomy

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First Europe-wide Classification System to define Sustainable Activity



Source: European Union, Arup

Circular Economy targets - Construction

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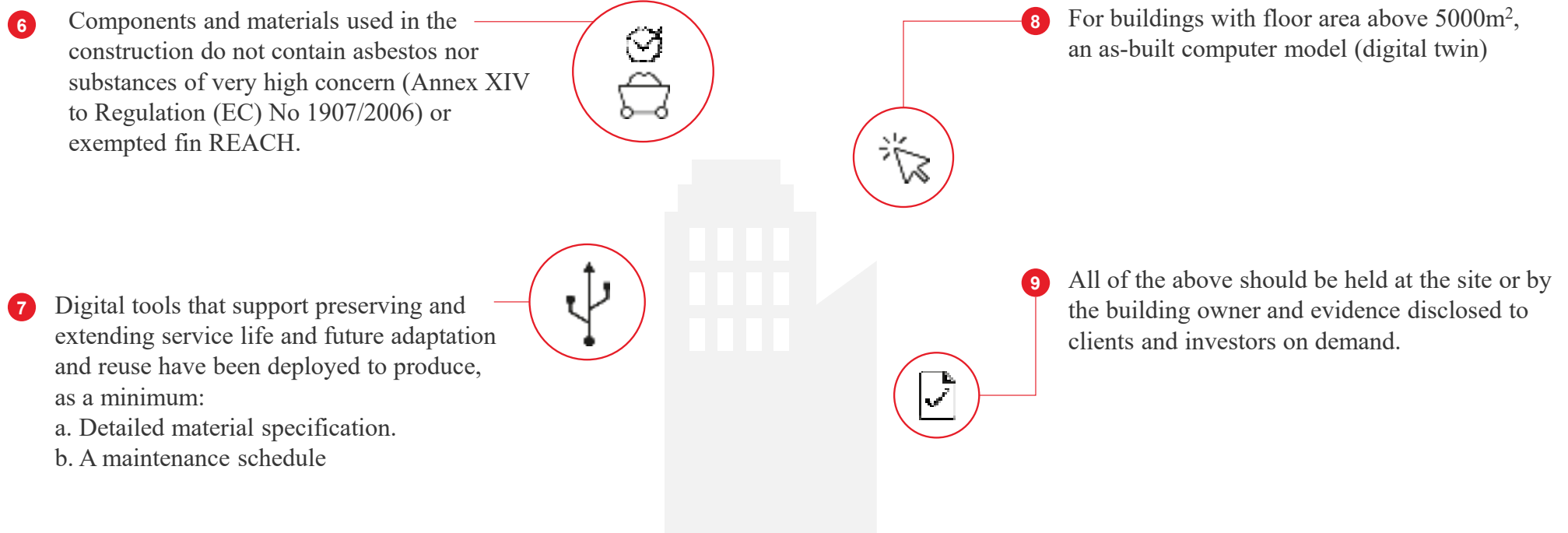
Circular Economy Draft



Circular Economy targets - Construction

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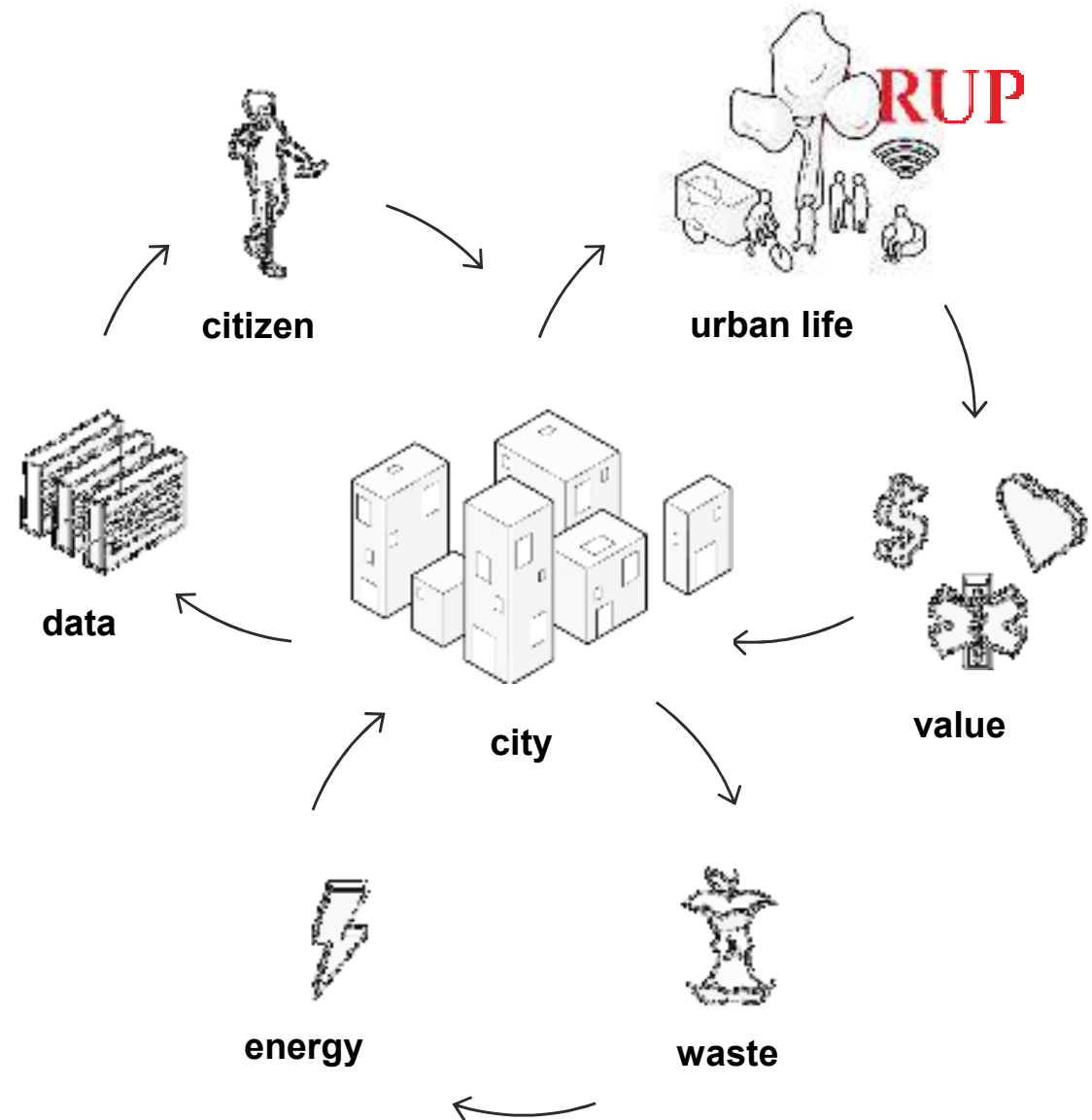
Circular Economy Draft



Towards a Circular and Regenerative City

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Designing for a resilient future requires an understanding of the relationships between these systems



A Circular Built Environment

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Six key circular interventions can be identified for the built environment

Principles of the Circular Economy defined by the Ellen MacArthur Foundation



Design out waste
and pollution



Keep products and
materials in use



Regenerate
natural systems

High impact interventions applicable in the built environment for design and operation



Construction

Enhance building utilisation

Switch to low-carbon materials

Use materials efficiently

Recover, reuse, repurpose materials



Operation

Energy retrofit

Low-carbon building services

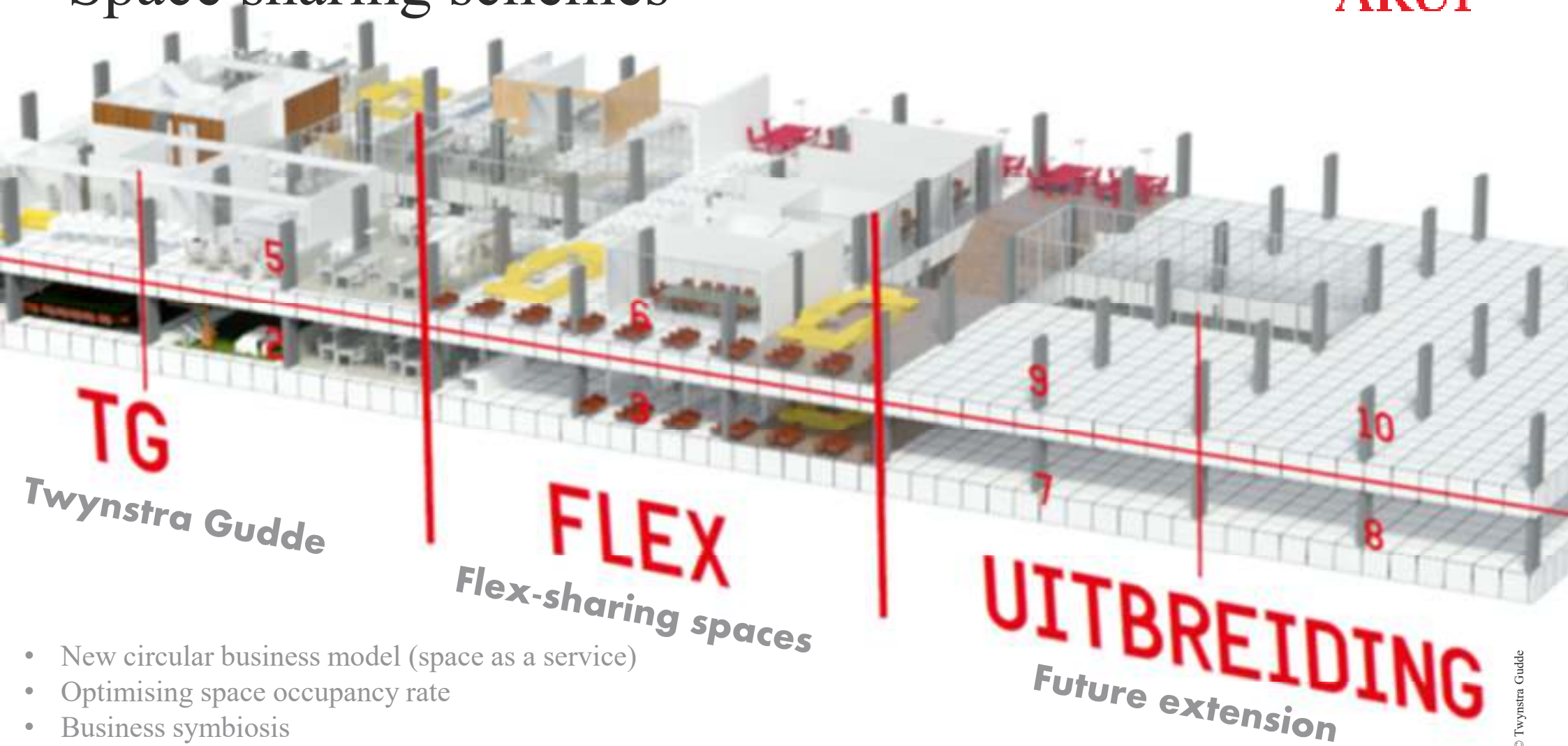
New business models,
new (local) economies

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Space sharing schemes

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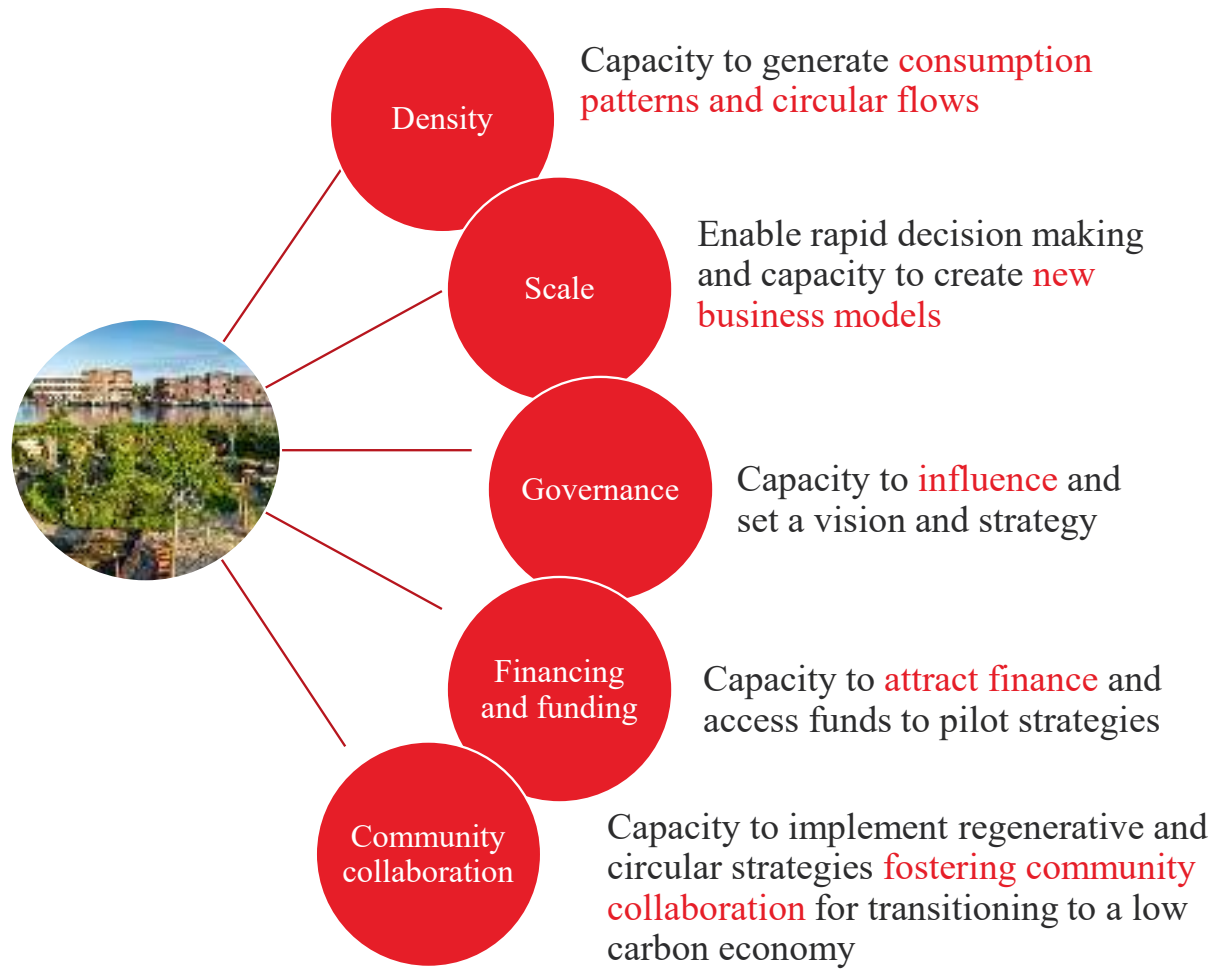


- New circular business model (space as a service)
- Optimising space occupancy rate
- Business symbiosis
- Repurposing existing industrial heritage (former Factory plant)

Seizing the opportunity

Neighbourhoods and communities

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Cities can be catalysts for the transition to the regenerative and circular model.

How a regenerative and circular city looks
like?

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Circularity

Circular city pillars

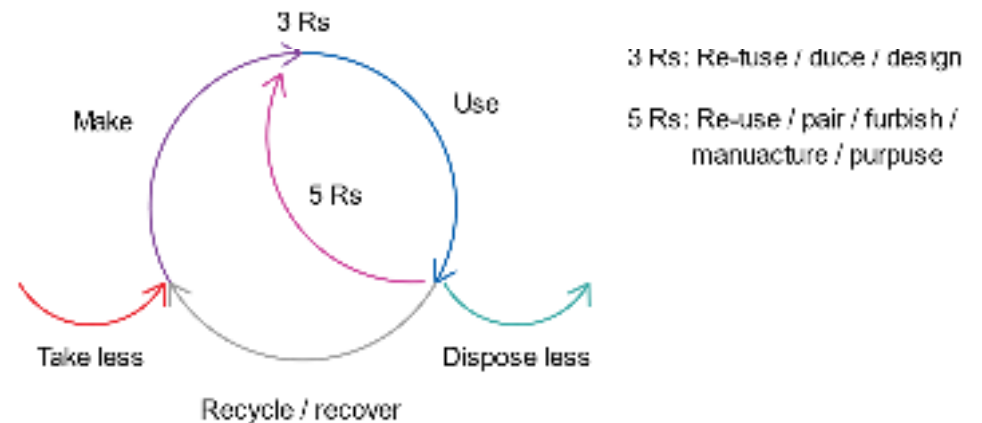
- **Efficient.** Uses resources efficiently and reduces the risk of supply chain constraints.
- **Technologically developed.** Encourages the use of new technologies to develop and monitor resources in their life cycle, making it possible to extend the useful life of products.
- **Inclusive.** All residents can access goods, services, education and employment in a fair and inclusive manner.
- **Socially developed.** Encourages the implementation of collaborative models of resource management that foster social cohesion.

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From a linear economy



To a circular economy





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Retos para la construcción circular y saludable

Challenges: Materials and Design

Design – Construction – Operation – End of Life

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- The quality of the circular design depends on the quality of the **data** used for the analysis.



Challenges: Materials and Design

Design – **Construction** – Operation – End of Life

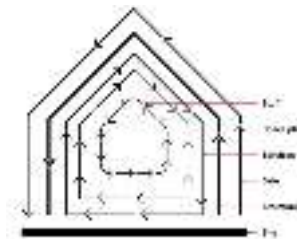
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Challenge 1

- Embed the principles of well-being, circularity and neutrality in construction: Energy consumption and emissions associated with the construction process (machinery, auxiliary means, etc.).
- Impact on the environment and health in the construction process.

Challenge 2

Quality and relevance of the data used to calculate the impact.



Challenges: Materials and Design

Design – Construction – **Operation** – End of Life

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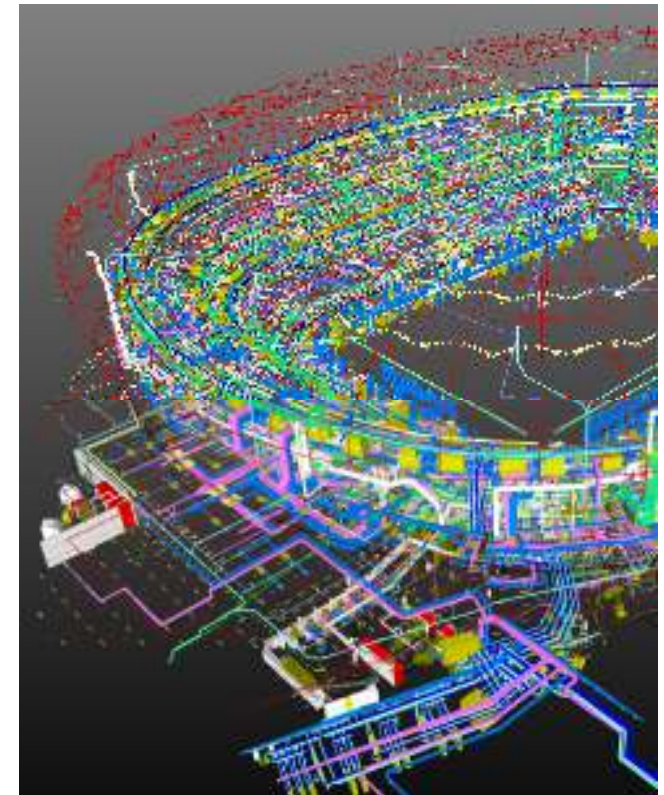
Challenge 1

Compilation of maintenance and performance data on materials in their life cycle:

- Materials Passport
- Energy consumption and emissions, environmental quality
- Management of waste associated with maintenance during service life

Challenge 2

Continuous re-assessment of the embedded carbon and life-cycle performance of materials and buildings.



Challenges: Materials and Design

Design – Construction – Operation – **End of Life**

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The Level(s) framework developed by the EC sets out design criteria and challenges for deconstruction and its relation to the Circular Economy.

“The building is a bank of materials”

Thomas Rau



Challenge 1 **Building design**

Current construction methods and materials are not conducive to material recovery.

Challenge 2 **Demolition Techniques**

Current programmes and practices do not favour the recovery of materials in a usable state.

Challenge 3 **Logistics**

Lack of storage space for recovered materials.

Challenge 4 **Market**

There is a lack of demand for recovered materials, uncertainty about their properties and previous use.

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