CIRCULAR CITIES: STRATEGIES, CHALLENGES AND KNOWLEDGE GAPS

A Summary Report of the Expert Workshop - September 2016

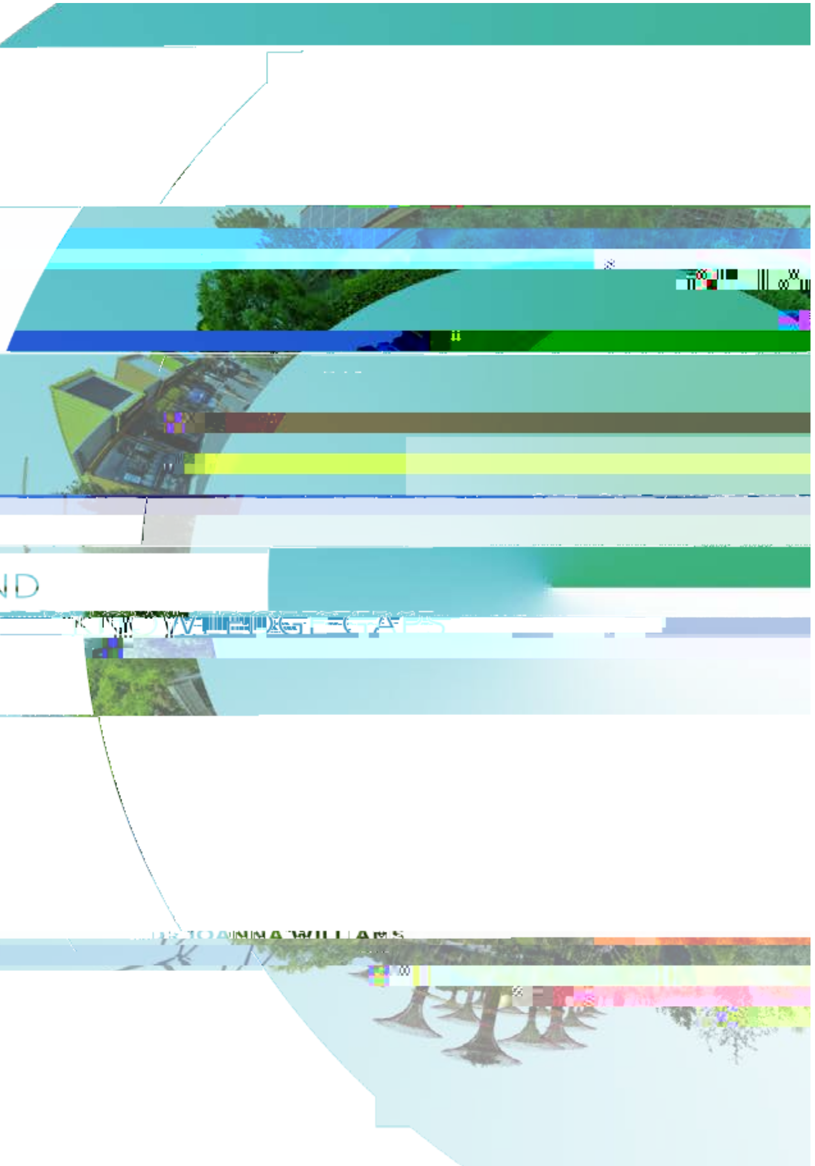

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Table of Contents

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Acknowledgements

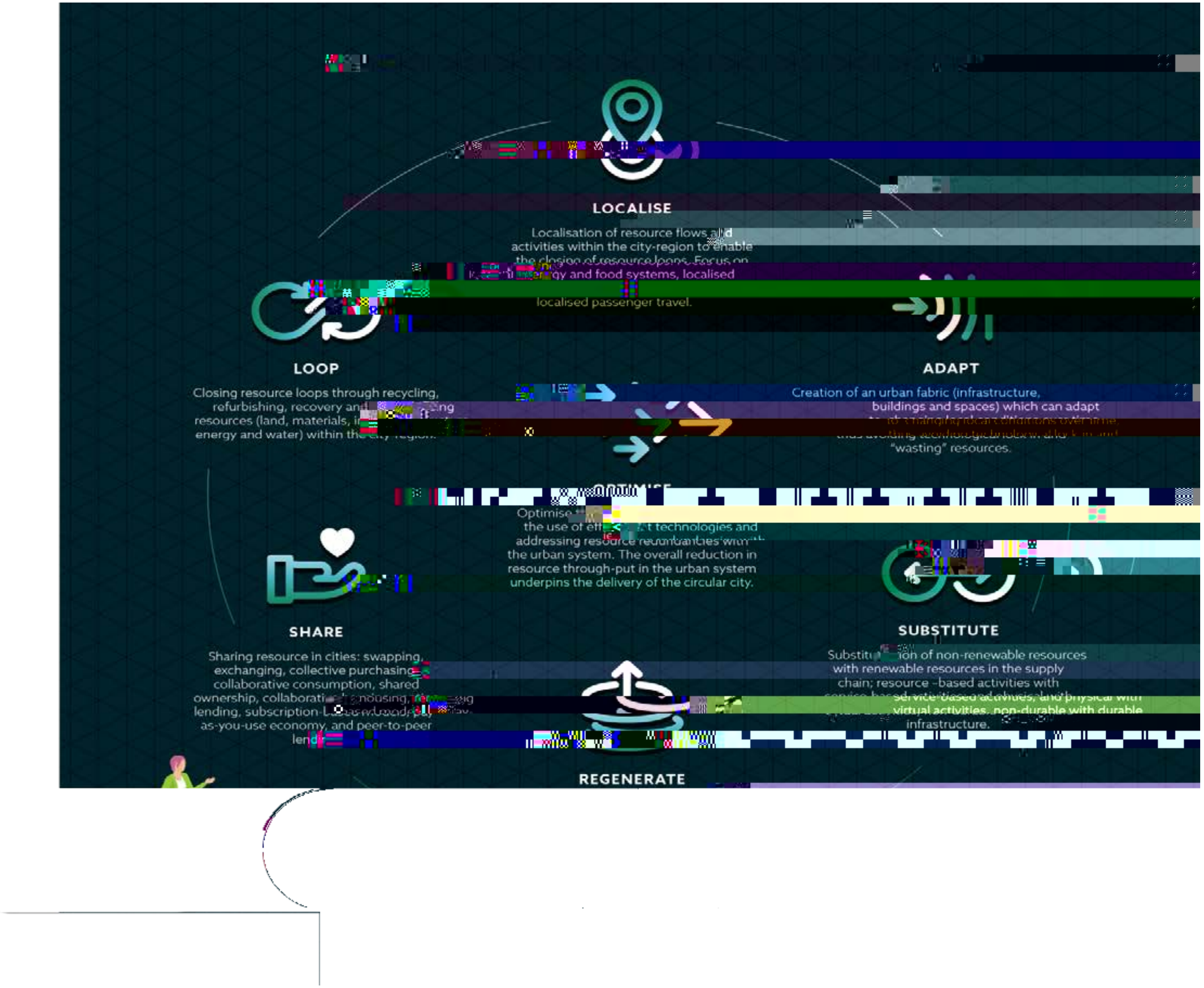
We would like to thank UCL Grand Challenges for its funding and support for the Circular Cities Hub and workshop. Also we would like to thank Ellen MacArthur Foundation for its ongoing collaboration with us on disseminating the research from the Hub. Special thanks go to Katrien Steenmans who organised the workshop. Also thanks to Hitomi Roppongi Fujii and Katrien Steenmans who helped with the initial data analysis. Thanks also to all those PhD students who acted as note-

Challenges

The key challenges to the delivery of circular cities are cultural, economic, political, regulatory, institutional, physical and informational. The analysis suggests that institutional and economic challenges are likely to create the greatest barriers to a circular transformation, followed by regulatory and political challenges. However the challenges identified varied across the seven strategies. The inflexibility of institutions; their lack of engagement with civil society, and the involvement of global institutions in local service delivery are seen as major challenges to the successful circular transformation. The restructuring of the macro-

1. Introduction

This document reports on the ‘Circular Cities’ workshop held at the Urban Innovation Centre in London on 26 September 2016 organised by the Circular Cities Hub, sponsored by UCL Grand Challenges and in association with the Ellen MacArthur Foundation. Presentations and information on city and


LOCALISE
LOOP
ADAPT
SHARE
SUBSTITUTE
REGENERATE
Closing resource loops through recycling,
Creation of an urban fabric (infrastructure,
buildings and spaces) which can adapt
"wasting" resources.
Sharing resource in cities: swapping,
exchanging, collective purchasing
collaborative consumption, shared
as-you-use economy, and peer-to-peer
the urban system. The overall reduction in
resource through-put in the urban system
underpins the delivery of the circular city.
with renewable resources in the supply
chain; resource -based activities with
infrastructure.

2.2 Data analysis

Data was collected from transcripts, video and sound recordings of the mapping exercises and plenary discussions. A qualitative approach was adopted to organise and analyse the data. The data was first aggregated and then coded. The team used an inductive approach to allow trends and themes to emerge organically without restricted guidance. The circular city strategies grouped around the seven themes outlined in Figure 2 (localisation, looping, substitution, adaptation, sharing, regeneration and optimisation). The challenges to circular transformations also grouped into seven themes outlined in Table 1. The knowledge gaps grouped around 4 key themes: definition, strategies, motivation and implementation.

Challenges	Description
1. Culture	Norms, ideas, customs and social behaviour of people
2. Economy	Production, distribution and consumption of goods and services
3. Physical environment	Natural and built environment
4. Political and leadership	Policy preferences, issues of government and leadership
5. Smart	Data, information, monitoring, knowledge
6. Institutional	Organisational structures, cultures and practices
7. Regulatory	Regulations, regulatory instruments and policies

Table 1. Challenges to transformation

2.3 Limitations

Due to the expertise and interests of the workshop participants the focus of discussion was on the European conceptualisation of a circular city. This will skew our understanding of a circular city, potential challenges to transformation and knowledge gaps. Of course context will significantly impact on the nature of a circular city and strategies adopted. The aim of the Hub is to extend its scope in future projects and workshops particularly to understand the nature of circular city strategies in the developing world context.

2. Strategies

The principal goal of adopting a circular approach within a city-region is to reduce resource consumption and waste production. It is also to ensure the long-term sustainability of the city-region's natural ecosystem and urban infrastructure. The resources affected by this approach include land, energy and water as well as materials (goods, infrastructure and materials). This can be achieved by adopting one or a combination of circular strategies. Seven strategies emerged from the workshop (Figure 2) and are described below. For each strategy, illustrative examples are given from the cities represented at the workshop.

2.1 The Local City

The "local city" is one in which resource flows are localised. Renewable energy and organic food is produced locally (e.g. Bristol Energy Coop and Grow Bristol; Sutton Community Farm, London). Equally "waste" is assimilated locally, enabled by the provision of green infrastructure (All Green Grid, London). A local currency helps to facilitate this by encouraging residents to buy locally produced resources (e.g. the Brixton Pound) and consume local services. Organisations which can build capacity (expertise, financial capital, etc) within communities to produce resources locally are essential (e.g. Repower London). Data platforms for monitoring resource flows in and out of the city-region help to establish opportunities for greater localisation (e.g. Circle Scan Amsterdam).

2.2 The Looping City

The "looping city" is one in which resources from one activity are recycled, re-used, recovered and used in another activity. Buildings and infrastructure are recyclable (e.g. Arup Circular Home, Sustainer Homes, Amsterdam) or can be refurbished; goods are up-cycled (e.g. Repair Cafes, Paris) and land is re-used.

2.8 Circular city plans from the workshop

Amsterdam aims to be a pioneer in Circular Economy. The city offers political support for the circular economy through funded experiments. It has adopted a range of strategies looping, substitution, sharing, adaptation, localisation and optimisation. It has funded localised circular experiments which and providing the communication platforms needed to facilitate discussions between local actors which will lead to the implementation of the circular agenda.

Parishas recently produced a white paper on the circular economy through a highly collaborative process. This outlines a comprehensive approach to a circularity covering looping, substitution, sharing, localisation and optimisation strategies. The drivers are social and

Description	Location
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Description	Location

3. Challenges

Challenges to circular transformations need to be better understood. Each focus group was asked to identify the key challenges to implementing the circular strategy they had been assigned. This data was collected and collated for the whole group (i.e. covering all circular strategies). A total of 43 separate challenges were identified across the seven themes (cultural, economic, institutional, political, etc). The challenges appeared to vary depending on the strategies, although some were common to all see Figure 3. Due to limited time (and arbitrariness) weightings of relative importance were not assigned for each challenge.

3.1 Cultural challenges

Circular culture (values, attitudes, identities and behaviours) will underpin the successful functioning of a circular city. Several cultural values and principles are fundamental for the adoption of circular practices. Culture's which value environmental protection, inter


CIRCULAR CITIES HUB
Figure 3 -
LACK OF SUPPORT FOR CITY-REGIONS

3.2 E.2

3.3 Physical challenges

In a circular city, urban infrastructure and morphology are critical for enabling circular resource flows. Urban infrastructure is adaptable, flexible or recyclable. Urban systems are integrated to allow waste from one system to be used by another. Spaces and infrastructure are shared and cities supplied with renewable energy preferably from a local source. Infrastructure and land-use are planned to enable localised resource production, flows and to ensure local resources are fully utilised. Space will be needed for the production of resources and regulation of "waste". Green and blue infrastructure will be needed to regulate and support the urban ecosystem as well as produce new resources (especially food and energy).

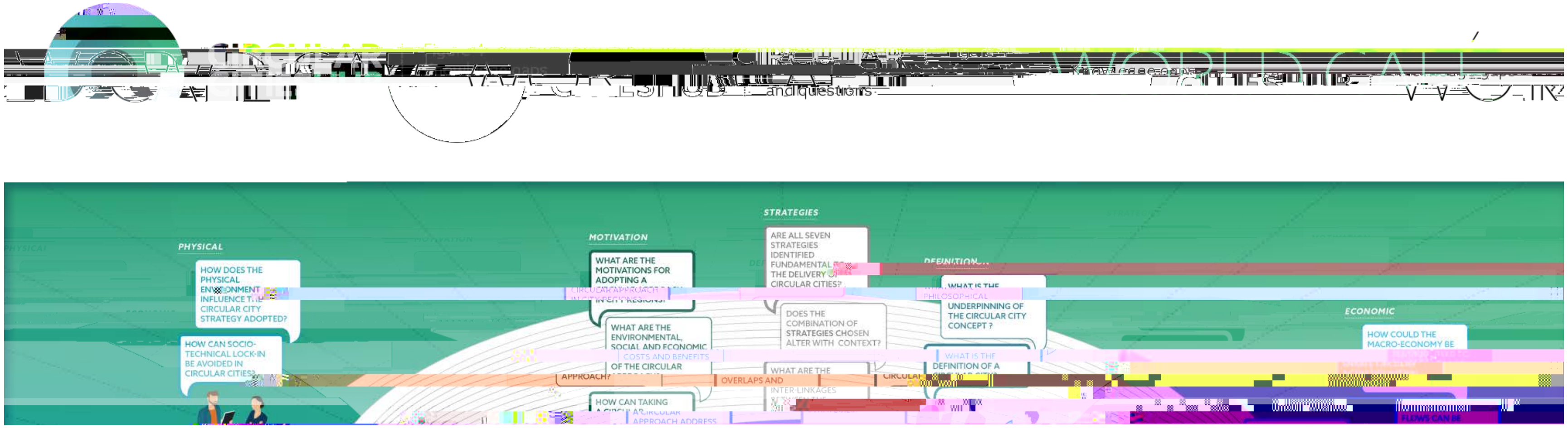
The natural environment (climate, vegetation, local resources, relief, etc) and built environment (buildings, energy, water, waste, transport systems) greatly influence the circular strategy to be adopted by a city. The inflexibility of existing infrastructure (due to cost of adaptation and socio-technical lock-in) reduces the adaptive capacity of a city and the potential for substitution, looping, localisation, sharing, regeneration and optimisation. For example, it is difficult and costly to adapt highly centralised grid energy systems to decentralised energy systems using renewable energy or waste.

Lack of space and vegetation also limits regenerative capacity and ecosystem services. Urban infrastructure systems (water, energy, transport, waste, etc) also tend to be linear and disconnected. This prevents the recycling, reuse or recovery of waste from one system as a resource for another (looping). However, the adoption of integrated circular infrastructure may also create a challenge to future adaptation within cities, as it can also create a socio-technical lock-in.

3.4 Political and leadership challenges

Political support for a circular agenda is essential for a successful transformation. Prioritising pro-environmental policy goals (e.g. resource stewardship, double-decoupling, low carbon) is helpful for delivery. A lack of strong political leadership on environmental agendas is a challenge to implementing all the circular strategies. However, circular solutions could be used to solve a variety of local problems for example housing shortages, fuel poverty, and unemployment, caring for an ageing population, air pollution, flooding. By focussing on these social, economic and environmental priorities, broader political support for delivery could be built. Thus, circularity should be seen by politicians as a strategy for achieving other policy goals (not as an end in itself).

A long-



and questions
PHYSICAL
HOW CAN SOCIO-TECHNICAL LOCK-IN BE AVOIDED IN
MOTIVATION
WHAT ARE THE MOTIVATIONS FOR ADOPTING A
STRATEGIES
ARE ALL SEVEN STRATEGIES IDENTIFIED
DOES THE COMBINATION OF STRATEGIES CHOSEN ALTER WITH CONTEXT?
UNDERPINNING OF THE CIRCULAR CITY CONCEPT ?
ECONOMIC
HOW COULD THE MACRO-ECONOMY BE

4.2 Strategies

Appendices

Mike Raco	UCL
Monica Lof	UCL
Na'amah Hagiladi	Arup
Nick Voulvoulis	Imperial College
Niraj Saraf	Innovate UK
Oksana Mont	Lund University
Patricia Canelas	UCL
Pierre Laconte	FFUE
Robin Yeoman	Google
Rosalind Malcolm	University of Surrey
Sam Bradley	GO-Science
Sarah Toy	Bristol City
Sharon Prendeville	University of Loughborough
Stefania Fiorentino	UCL
Stephen Passmore	The Ecological Sequestrian Trust
Stuart Smith	Arup
Tim Pryce	Carbon Trust
Tommaso Gabrieli	UCL
Ulf Ranhagen	KTH Stockholm
Yvonne Rydin	UCL

B. Workshop structure

9.00 – 9.30 Registration

9.30 – 10.15 Circular Cities Hub introduction

- Jo Williams, Circular Cities Hub Director, UCL
- Ashima Sukhdev, Ellen MacArthur Foundation
- Filippo Boselli, World Future Council
- Sam Bradley, Government Office for Science

10.15 – 11.25 Session 1: City strategies

- Jeremy Skinner, Greater London Authority
- Carine Saloff-Coste, City of Paris
- Ingmarie Ahlberg, City of Stockholm
- Ellen van Bueren, TU Delft,
- Sarah Toy, Bristol City Council,
- Emma McKenna, Peterborough City Council

11.25 – 11.35 Break

11.35 – 12.20 Visioning workshop

Break out into five groups on each of the themes

12.20 – 12.50 Plenary

12.50 – 13.45 Lunch and networking

13.45 – 13.50 Session 2: Identifying challenges

13.50 – 14.30 Challenges workshop

Break out into five groups on each of the themes

14.30 – 15.00 Plenary

15.00 – 15.15 Break

15.15 – 16.15 Session 3: Current research

- Ulf Ranhagen, KTH Stockholm / SWECO
- Oksana Mont, University of Lund
- Joerg Knieling, HafenCity University

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C. Circular city strategies

Strategies	
Paris	https://api-site.paris.fr/images/77050
Amsterdam	https://www.amsterdam.nl/bestuur-organisatie/organisatie/ruimte-

D. Experiment Links

Stockholm Cohousing

Sharing Peterborough	http://www.peterboroughdna.com/demonstrators/
Smart Grid Stockholm	http://www.s3c-project.eu/News/83/StockholmRoyalSeaport.html
Reflow	http://reflow.stockholm.se/#
RCube	https://api-site.paris.fr/images/77050
Repowering London	http://www.repowering.org.uk
Solidarity Bank for household articles	https://api-site.paris.fr/images/77050
Sharing ambassadors	http://www.sharenl.nl/amsterdam-sharing-city/
Repair Cafés	https://api-site.paris.fr/images/77050
All London Green Grid	https://www.london.gov.uk/WHAT-WE-DO/environment/parks-green-spaces-and-biodiversity/all-london-green-grid
Grow Bristol	http://growbristol.co.uk/

E. Experiment Details

Amsterdam

provides the opportunity to grow food locally, attenuate flooding,]u‰Œ}À]Œ ‹µ o]šÇU Œ µ K u]••]}v• local leisure space (localisation and regenerating natural capital).

- Repowering London is a not-for profit organisation enabling community-owned renewable energy projects. Co-production raises awareness and encourages pro-environmental behaviour. It also localises the production renewable energy (substitution and localisation).Schemes are currently running in the London Boroughs of Lambeth, Haringey and Hackney.
- Sutton Community Farm (London) is a community-owned social enterprise. It grows fresh, healthy, sustainable food and provides a shared space for people to cultivate skills, get exercise and socialise. The farm sells a wide range of organic veg boxes via their online shop (sharing, regenerating natural capital, substitution and localisation).
- Brixton pound (London) is local currency used to support the local economy in Brixton. It has encouraged localised resource flows and the generation of community renewable energy (substitution and localisation)
- Circular building (ARUP) the materials used in construction are leased and are re-useable or recyclable. The buildings are easily constructed, de-constructed or adapted for new uses (looping ,
- substitution and adapt) ZED Pods offer affordable, fully autonomous homes which fit over 2(t)-90.112 0.8(p)ao(o)1.3(m)1.8x(c)5.9(8c)so

know-how and expertise with those bringing objects for repair (looping, adapt).

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