Round and round – can the economy be more like biology?

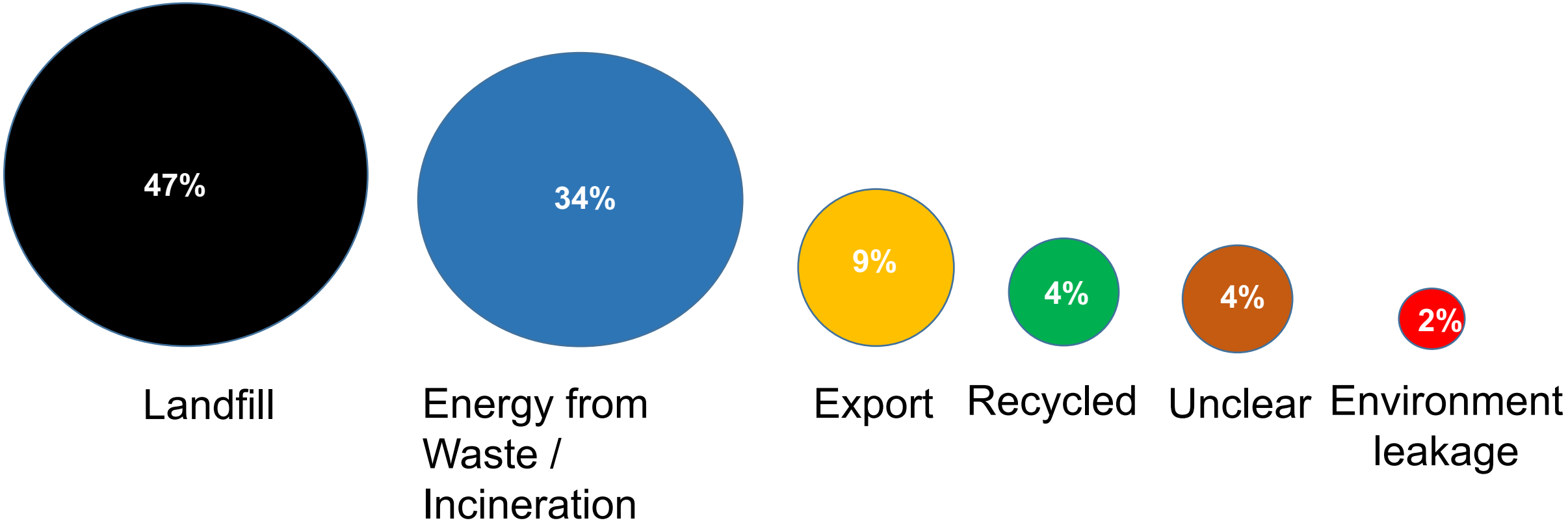
Prof Peter Hopkinson

12th November 2020

UNIVERSITY OF EXETER

UK Research and Innovation

Fate of household plastic waste in South West Region (%)



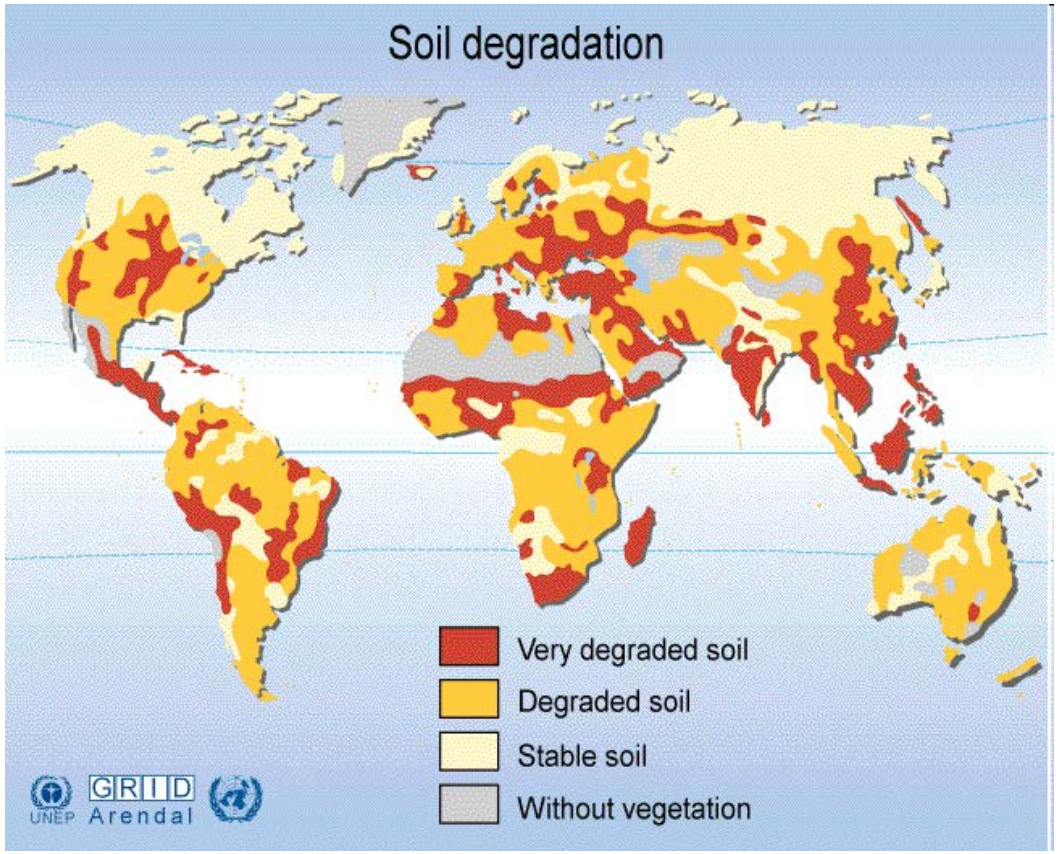
(Not to scale)

Round and Round: The Water Cycle ?

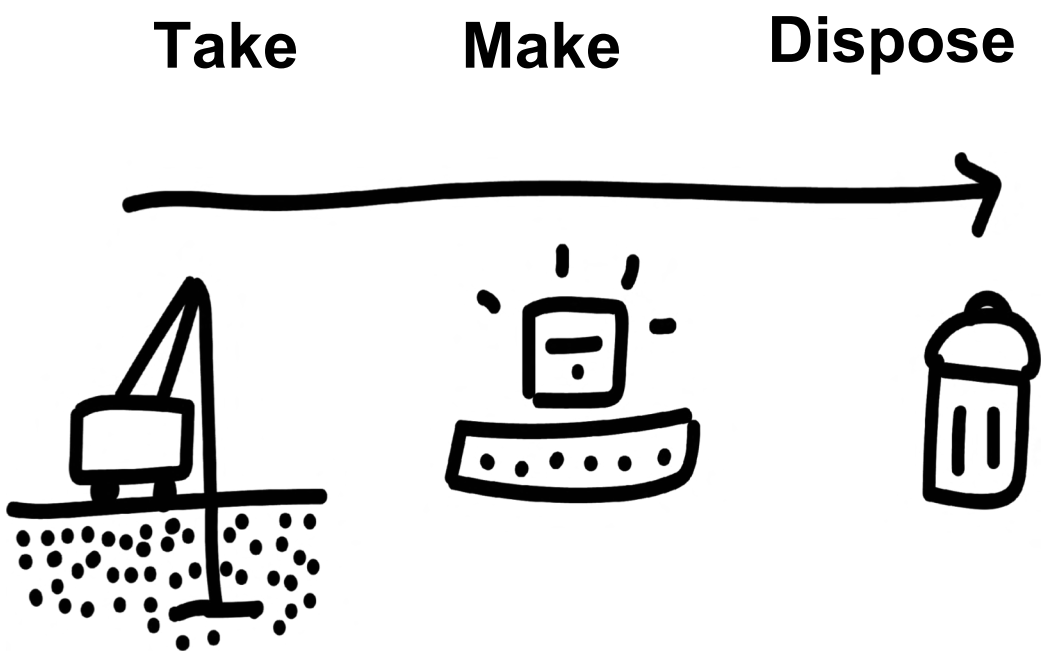
But….Ocean Plastic

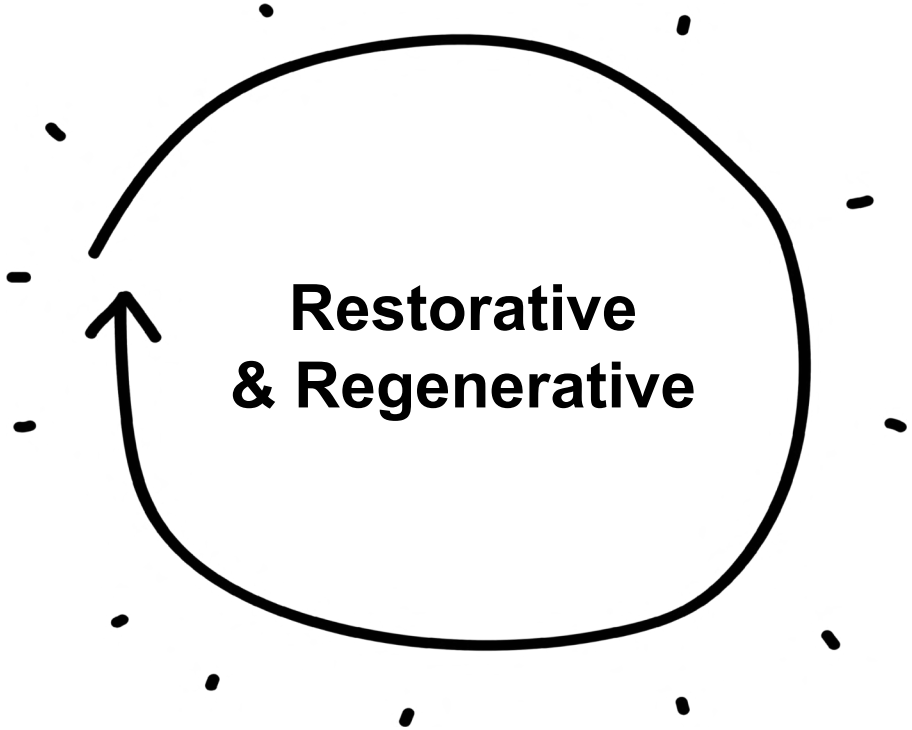
Soil degradation

- ~26 billion tons of topsoil is lost worldwide every year
- Food production depends on soil.
- Soil takes tens of thousands of years to form.
- Loss of soil due to:
  - Intensive over-farming
  - Incineration & landfilling of nutrients
  - Urbanization



The Transition: From Linear to Circular ?





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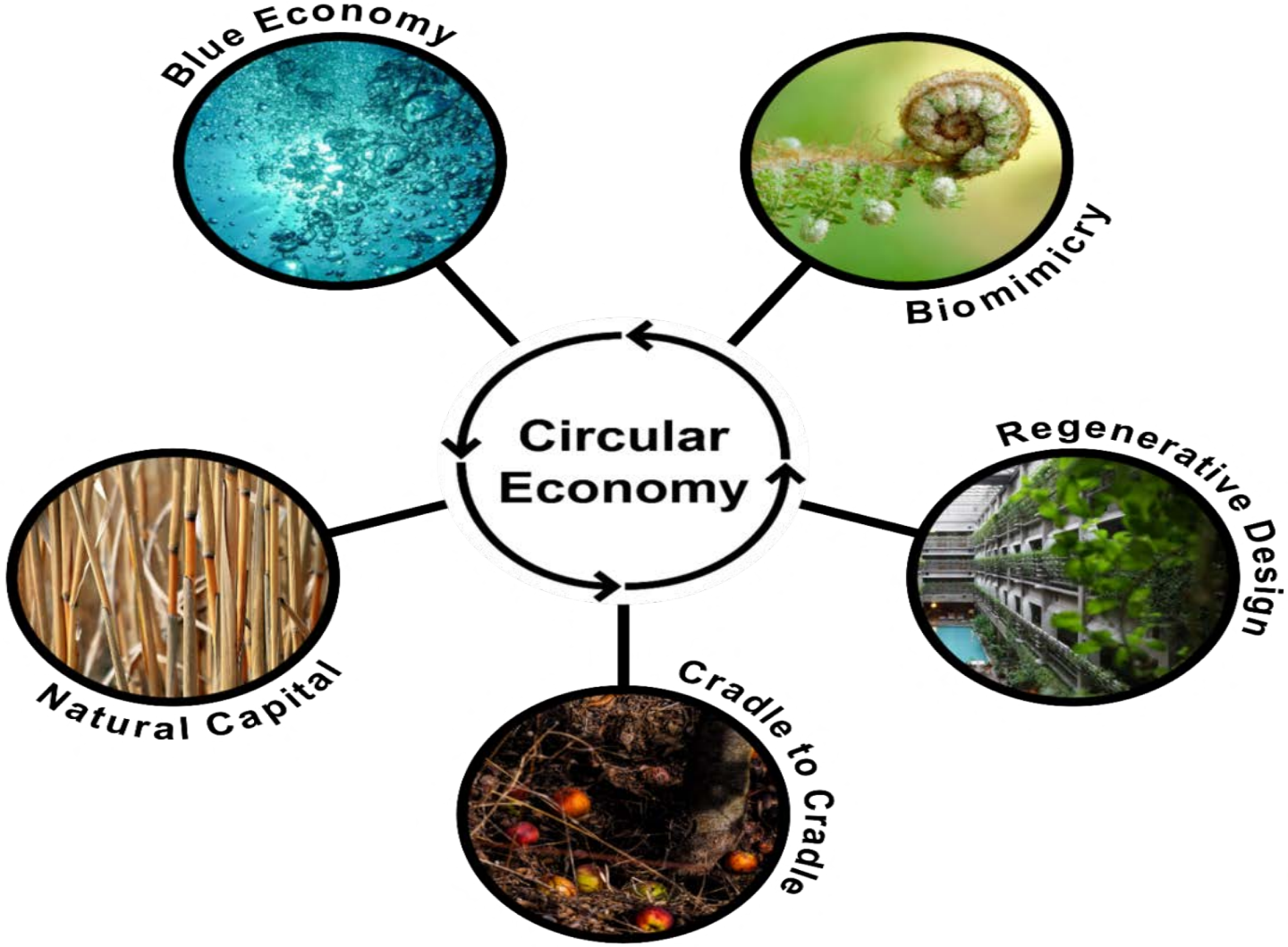
What is the Circular Economy – living system roots?



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3 Guiding Principles

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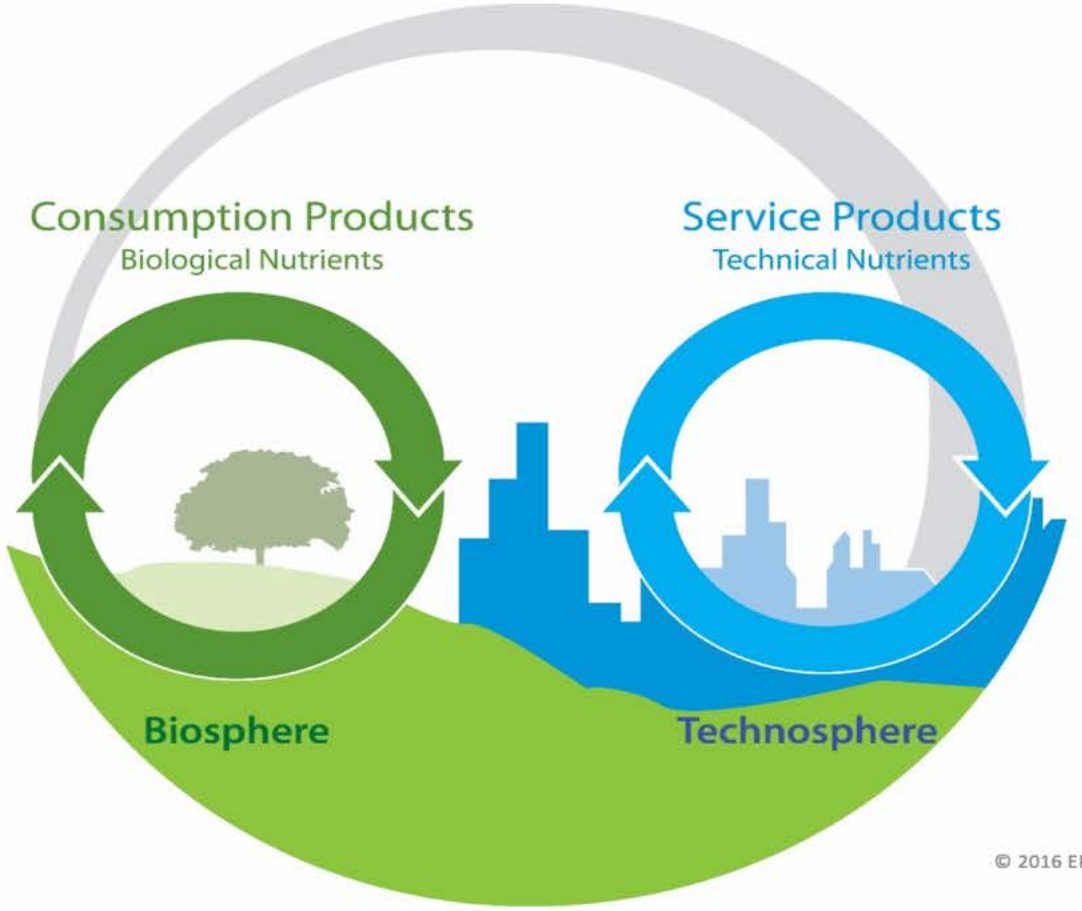
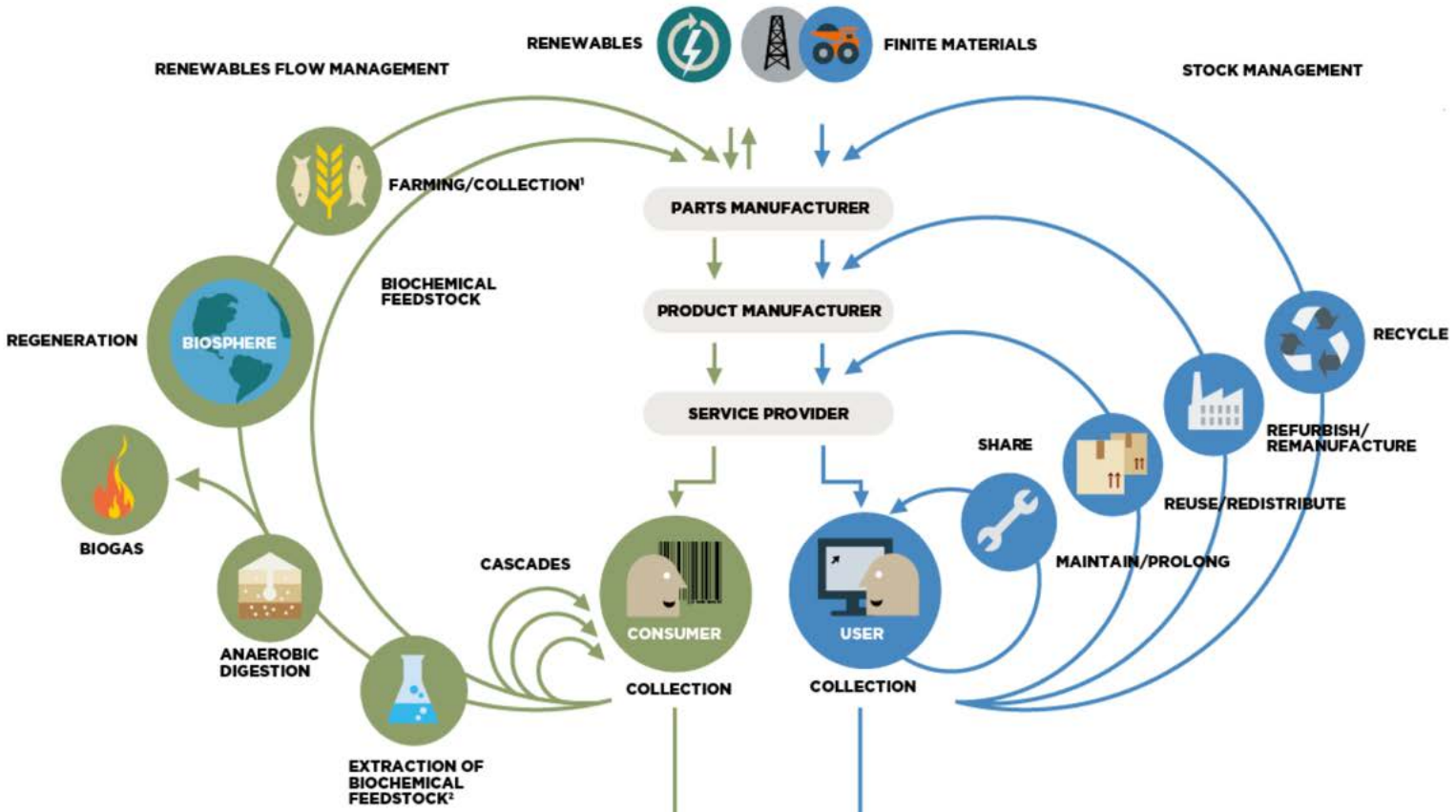
Biological and Technical Cycles and Cascades

CRADLE TO CRADLE POWERING THE CIRCULAR ECONOMY

Designing products for defined use scenarios



Circular Economy System ‘Butterfly’ Diagram



1 Hunting and fishing
2 Can take both post-harvest and post-consumer waste as an input

SOURCE
Ellen MacArthur Foundation
Circular economy systems diagram (February 2019)
www.ellenmacarthurfoundation.org
Drawing based on Braungart & McDonough, Cradle to Cradle (C2C)

ELLEN MACARTHUR FOUNDATION

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What's in it for me ?

Cost saving

Revenue generation

Risk reduction

Brand enhancement

Reduced externalities

More jobs

Better products and services

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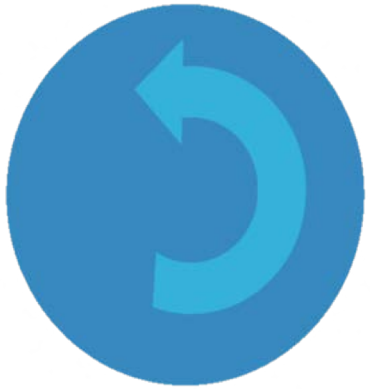
From linear to circular: building blocks of a circular economy

Circular product design

New business model



Reverse cycles / Cascades/

Systemx conditions

Circular Design

Smart material choices
Considering a product's end of life treatment in the choice of materials and inputs, i.e. durable, biodegradable, recycled or recyclable materials.

Pictured: Customers of Splosh subscribe to receive pouches of concentrated cleaning products which either safely dissolve as part of the product or can be sent back to refill.

Closed loop/Take back
Providing a service to collect old or used products and recovering the value in the materials by recycling or reusing them to make new products.

Pictured: Desso created a take-back programme for its flooring made of recyclable yarn that can be separated from the backing and used over and over again.

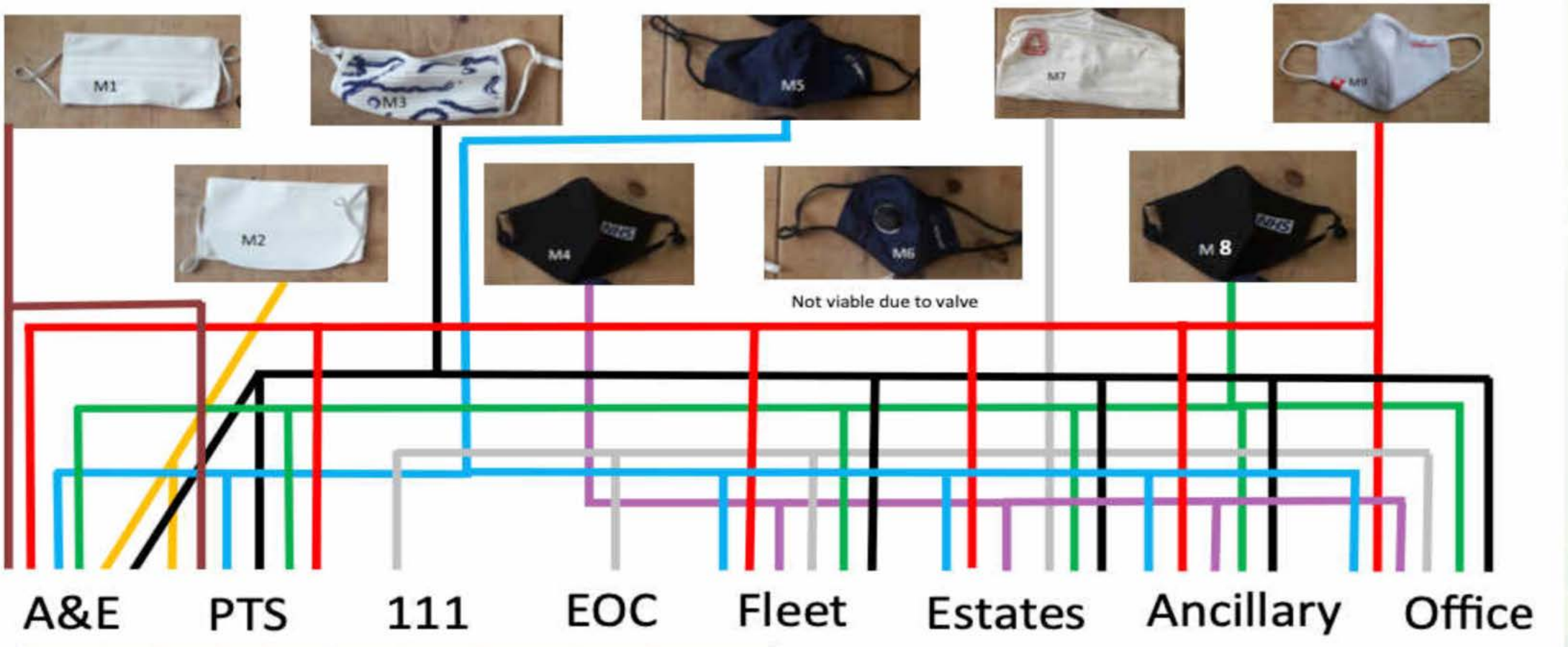
Modularity
A design that divides a product into smaller parts that can then be independently created, used and replaced.

Pictured: Fairphone's modular design and spare parts make it easy for anyone to repair, allowing its phone to last as long as possible.

Design out waste ? Avoiding single re-use products

Full range of masks taking part in the trial

Revolution-ZERO
A Rutherford Group initiative



New Business Models:

Product as a Service
Offers that focus on leasing access to a solution instead of selling ownership of a product. Services can reduce cost volatility and create stickier customer relationships.

Pictured: Koolmill are a rice mill supplier and are shifting their business model to include selling rice mills as a service. This will enable them to grow their business and maintain longer customer relationships

Embedding intelligence
Building technology into materials or products to gather user data and generate valuable insights to improve the circularity and reduce waste

Pictured: Winnow uses technology enablers to provide data on food waste generated in commercial kitchens to help improve processes and practices in order to reduce waste.

Product Life Extension
Extending the lifecycle of products to ensure they remain economically useful by maintain or even improving them through remanufacturing, repairing or upgrading.

Pictured: Philips Healthcare have focused on remanufacturing and refurbishing of high value products such as MRI machines. This practice reduces the demand on natural resources as well as costs, waste and emissions.

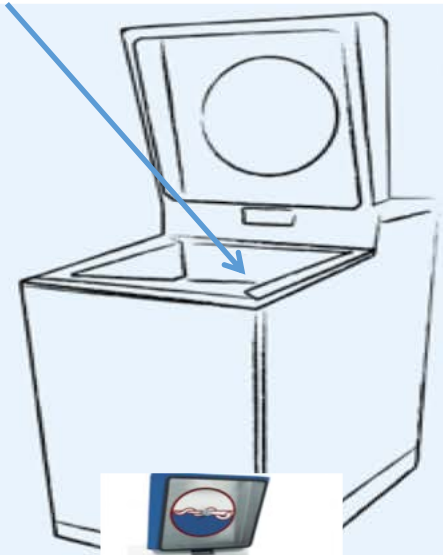
Reverse logistics

Closed loop/Take back
Providing a service to collect old or used products and recovering the value in the materials by recycling or reusing them to make new products.

Pictured: Desso created a take-back programme for its flooring made of recyclable yarn that can be separated from the backing and used over and over again.

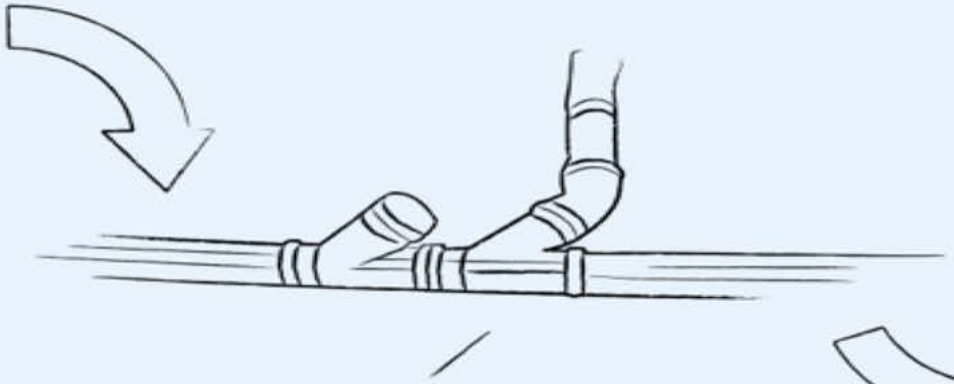
PHARMAFILTER

A CLEANER HOSPITAL, A CLEANER ENVIRONMENT



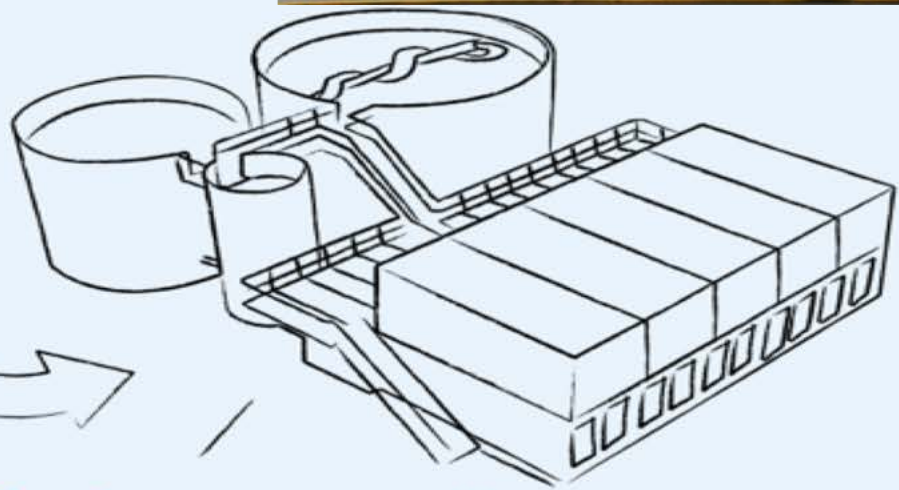
Shredder Tonto

Tonto shreds the hospital waste



Existing sewerage

Existing sewerage transports the shredded waste together with the sanitary water



Purification installation

Purification installation reduces the solid waste and purifies the water

https://pharmafilter.nl/en/

System enablers: Creating future regional plastic circular economy (2)

Problem

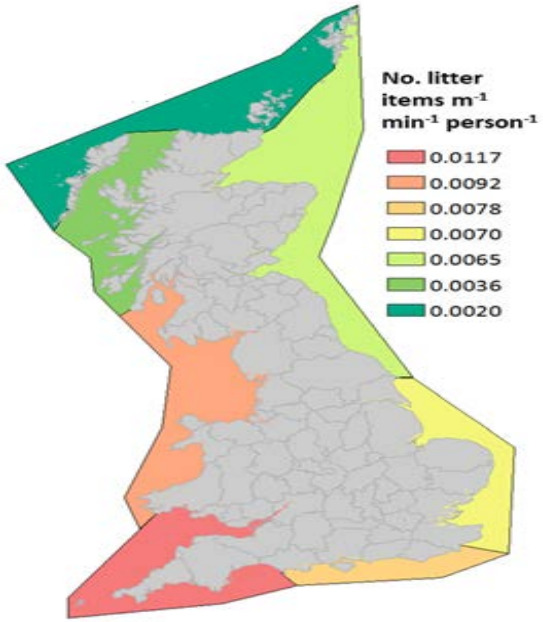
Impact

Solution

Economic Opportunity

System enablers: Creating future Regional Plastics Circular Economy (1)

Problem Plastic

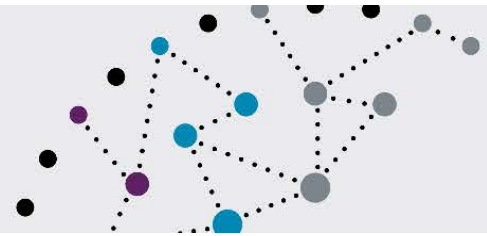


Impact

Solution

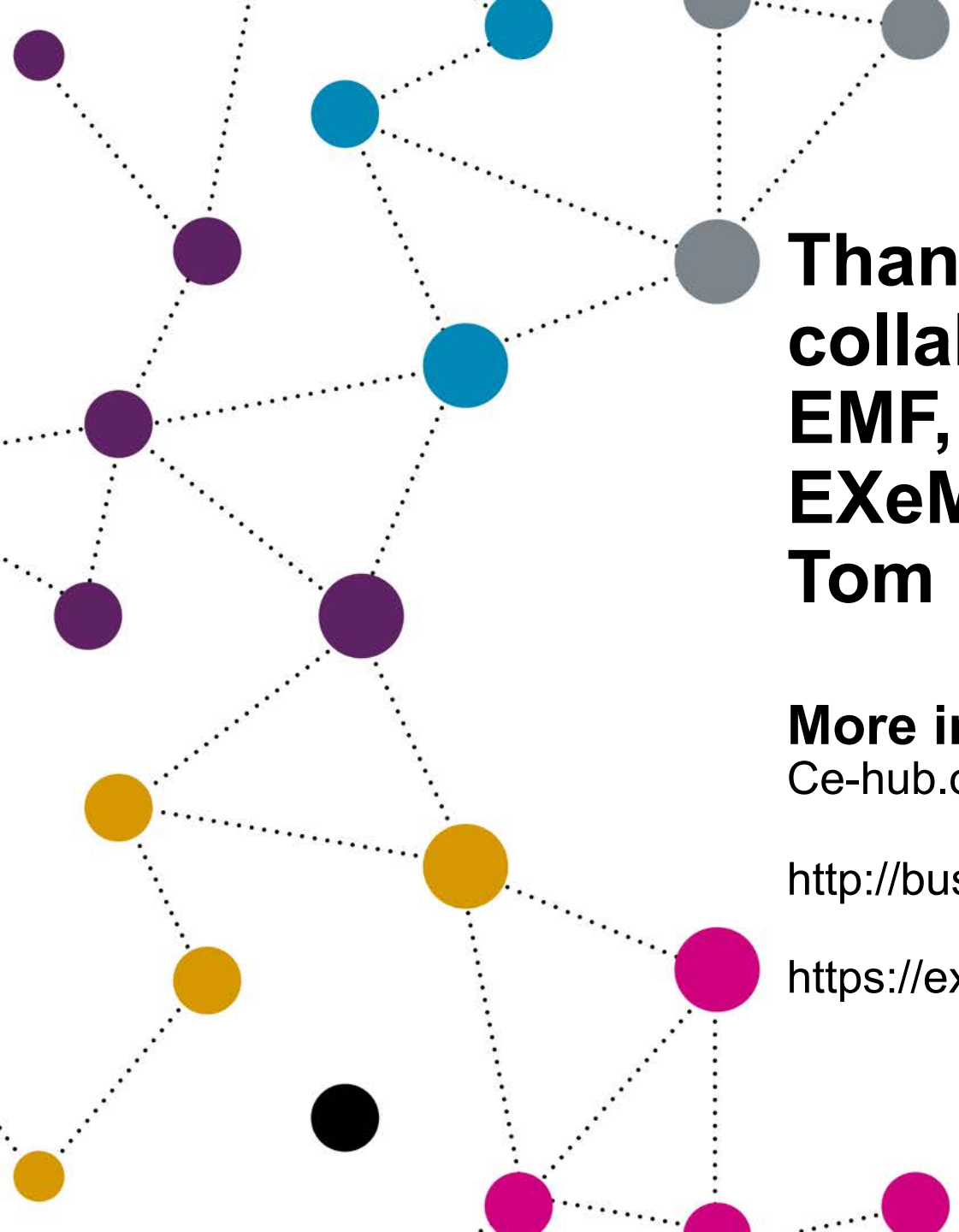
Economic Opportunity

Why we have to go circular ?



Zero carbon cannot be achieved in a linear economy

To replace all UK-based vehicles today with electric vehicles would take just under two times the total annual world Co production, nearly the entire world production of Nd and 75% of the world's Li production.



Thanks to all co-researchers and collaborators including Katje Hansen, EMF, members of ECCE, EXeMPlaR project team, Ken Webster, Tom Rutherford and many others

More information at:

Ce-hub.org

http://business-school.exeter.ac.uk/research/centres/circular/

https://exemplarnet.org.uk