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"Economia Circular: Oportunidades e Desafios"

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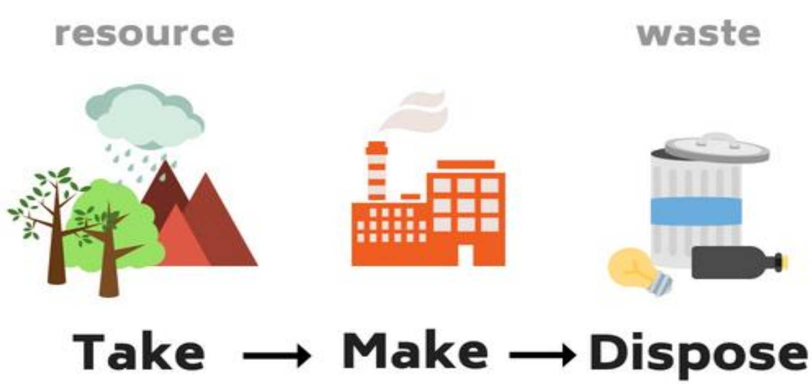
Agenda

- Economia ‘linear’.
- Circular economy.
- The ReSOLVE model.
- Limitações.
- Blocos de agenda de pesquisa (tecnologias, aspectos humanos, macro-micro e teorias organizacionais)

1. Quais são os desafios do atual modelo linear de produção e consumo?

1. Sistema Linear de Produção e Consumo

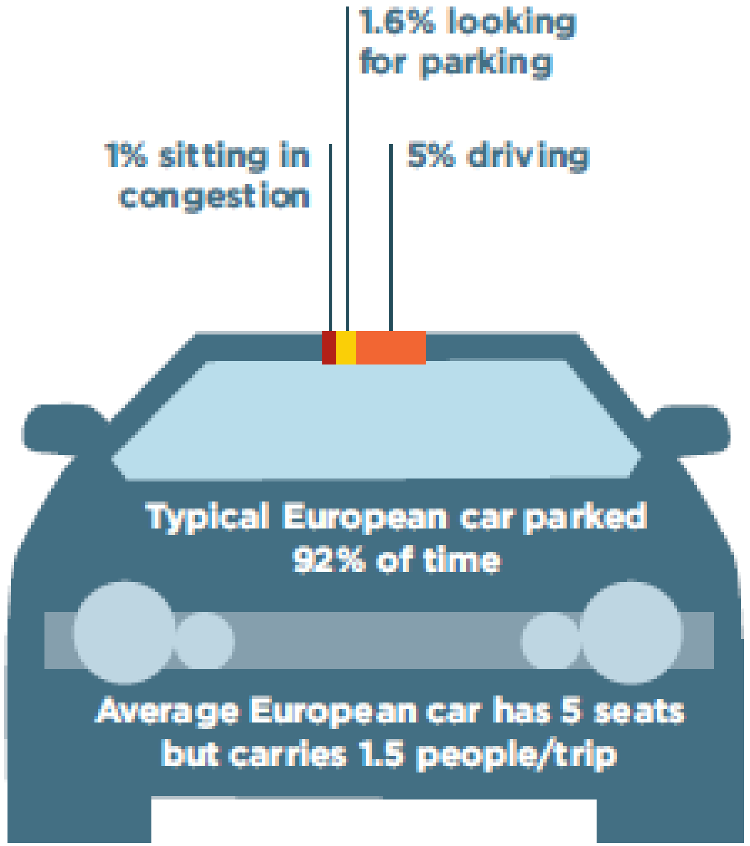
- *"Take, Make, Waste-Dispose"*:
- No ponto de venda, a propriedade dos bens, suas implicações legais, e resíduos passam do produtor para o cliente.
- O comprador do bem torna-se proprietário
- O comprador passa então a determinar o futuro do bem
- Essa linearidade encontra-se associada a uma série de externalidades, resíduos e ineficiências



- **“A linear economy flows like a river”, turning natural resources into products for sale through a series of steps.**

“Linear economy is like a river” (Stahel, 2016)

CAR UTILISATION[1]



Source: Ellen MacArthur Foundation, 2015

INDEPENDENT

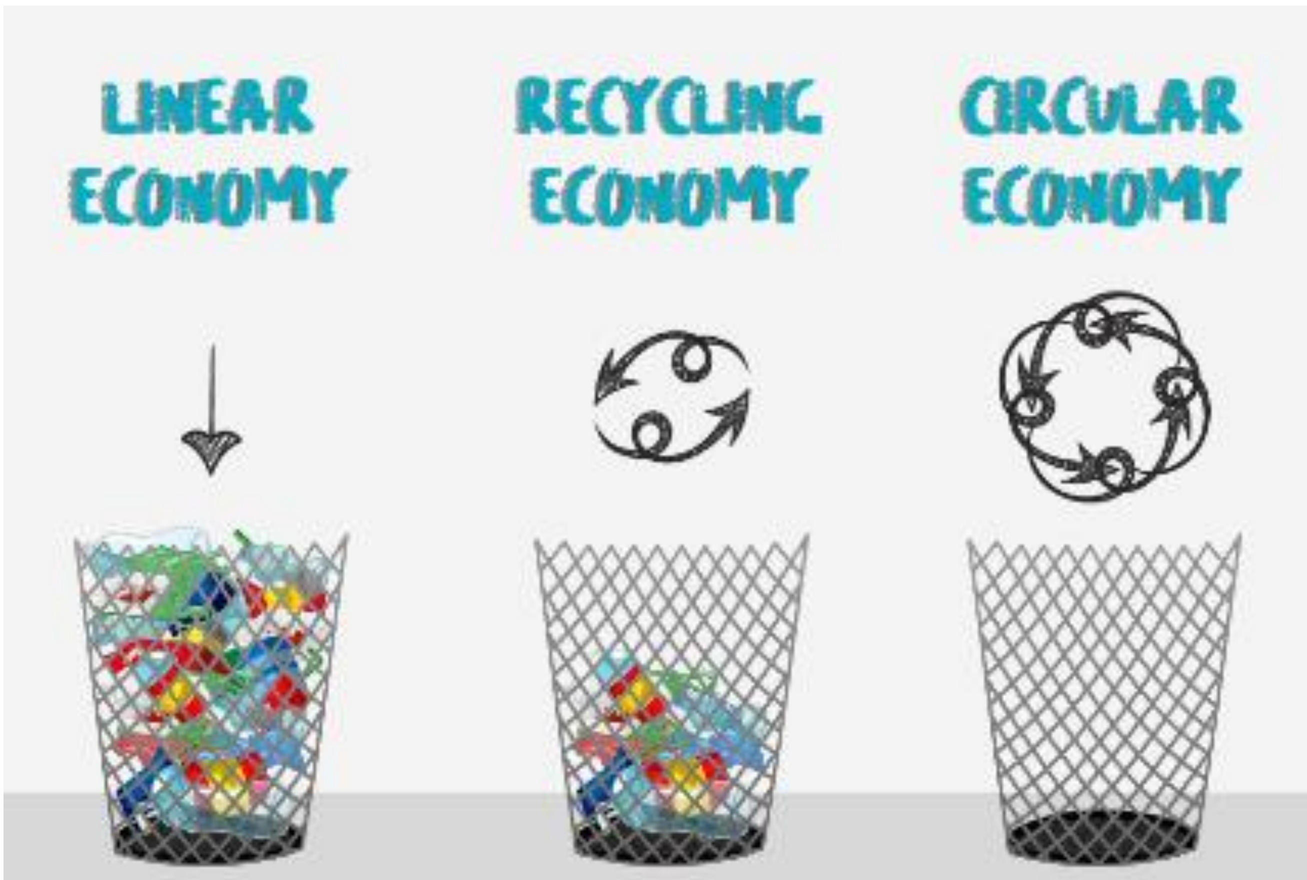
Environment

More than one third of fish caught never make it to human stomachs

“80% of the things stored in a typical home are used only once a month”

(http://fortune.com/2015/01/20/the-huge-challenges-and-opportunities-of-the-circular-economy/)

2. Quais são os fundamentos e as promessas da economia circular?



(https://pontsbschool.com/eu-circular-economy)

FINANCIAL TIMES LIVE Home Coming up

FT Circular Economy Summit

Accelerating a business model revolution

London | 25 May 2017

theguardian website of the year

Guardian sustainable business

Circular economy could create half a million UK jobs

Circular economy

ZERO WASTE SCOTLAND

Circular Economy Investment Fund

We are investing £18 million as grant funding to small and medium sized enterprises who are helping to create a more circular economy.

CNN Regions | U.S. Politics | Money | Entertainment | Tech | Sport | Travel | Style | Health | Video International Edition

Tokyo 2020 medals to be made from recycled mobile phones

Updated 1540 GMT (2340 HKT) February 1, 2017

pwc

Home Industries Issues Services

Sustainability services

Circular Economy Solutions

Circular economy

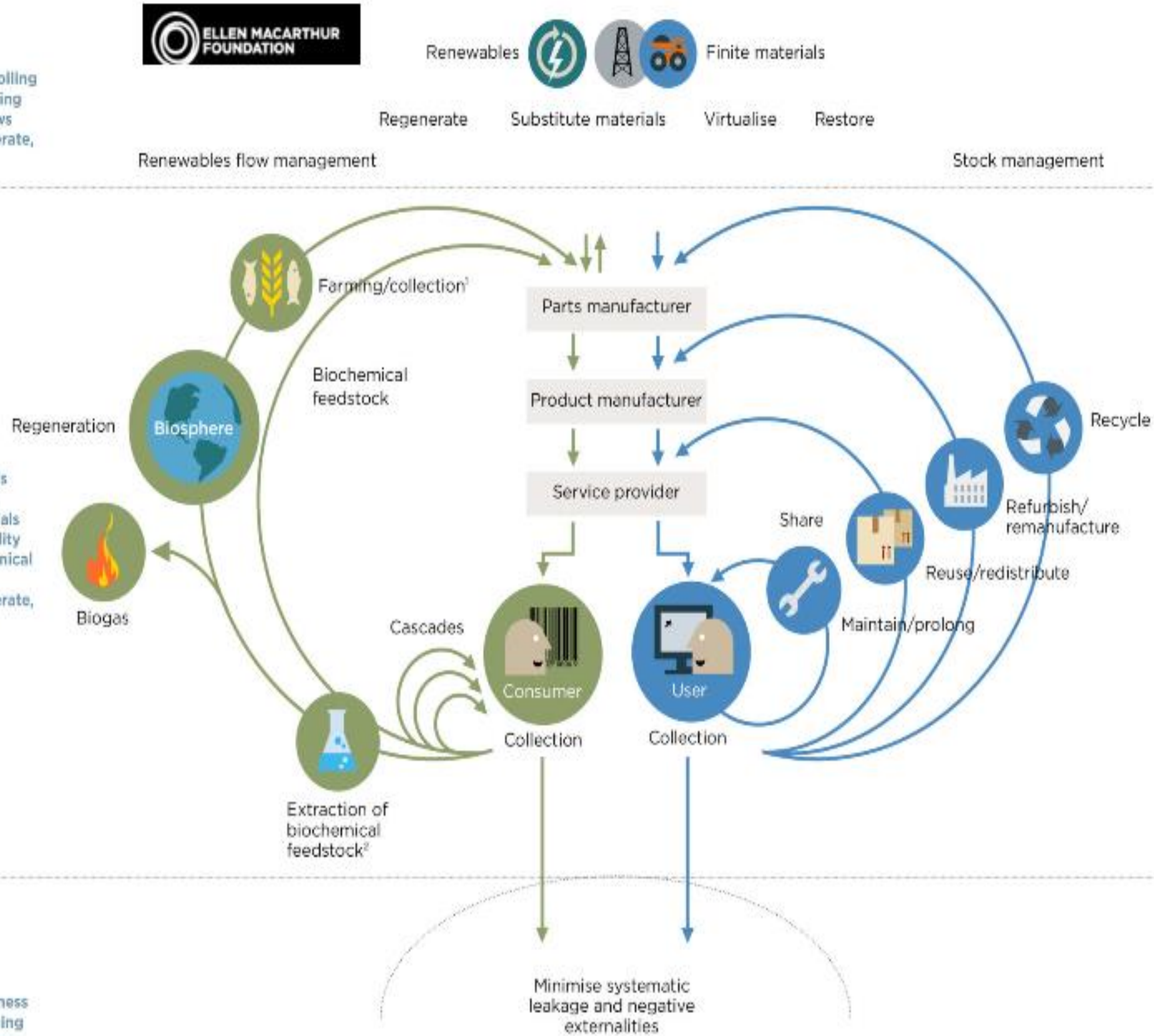
- *Uma 'circular economy' transformaria produtos que estão em seu fim de vida em recursos para outros, fechando os ciclos produtos e minimizando as perdas*

“The goods of today are the resources of tomorrow at the resource prices of yesterday” (Stahel, 2016)

“A circular economy is like a lake” (Stahel, 2016)

1 PRINCIPLE

Preserve and enhance natural capital by controlling finite stocks and balancing renewable resource flows
ReSOLVE levers: regenerate, virtualise, exchange



PRINCIPLE 2

Optimise resource yields by circulating products, components and materials in use at the highest utility at all times in both technical and biological cycles
ReSOLVE levers: regenerate, share, optimise, loop

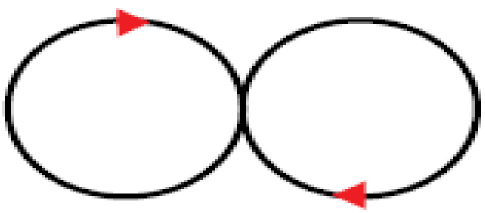
PRINCIPLE 3

Foster system effectiveness by revealing and designing out negative externalities

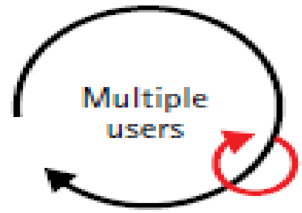
1 Hunting and fishing

Circularidade e valor (Lacy et el., 2014)

Figure 1: Areas of value creation in the circular economy

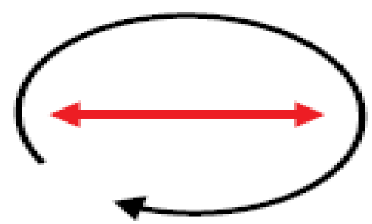


Lasting resources
Breaking the link between resource scarcity and economic activity by using only resources that can be continuously regenerated for productive use

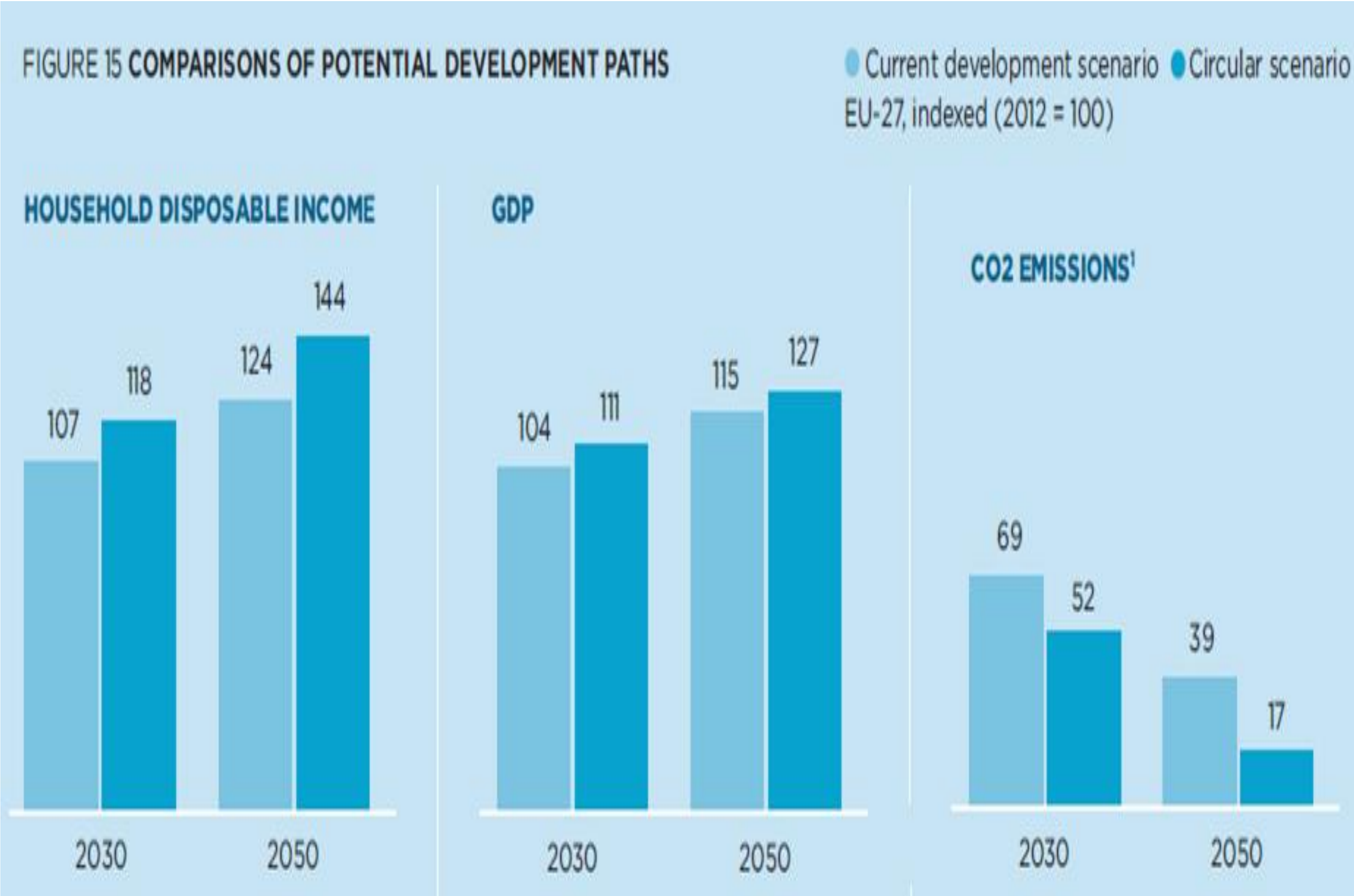


Liquid markets
Eliminating idle time of products in the markets in order to grow the number of users that gain benefit from the same volume of goods

Linked value chains
Minimizing resource value destruction in a value chain by reclaiming and linking up waste outputs as useful inputs into a next life production process



Longer life cycles
Keeping products in economic use for longer to satisfy a greater demand and provide more utility without needing additional natural resources



Source: Ellen MacArthur Foundation, 2015

3. ReSOLVE model: economia circular na pratica

(http://wwf.panda.org/wwf_news/?257498/EU-circular-economy-package-a-failed-promise)

"ReSOLVE" model

Source: Ellen MacArthur Foundation

REgenerate. Shift to renewable energy and materials; reclaim, retain, and regenerate health of ecosystems; and return recovered biological resources to the biosphere.

Share. Keep product loop speed low and maximise utilisation of products by sharing them among users (peer-to-peer sharing of privately owned products or public sharing of a pool of products), reusing them throughout their technical lifetime (second-hand), and prolonging their life through maintenance, repair, and design for durability.

Optimise. Increase performance/efficiency of a product; remove waste in production and the supply chain (from sourcing and logistics to production, use, and end-of-use collection)

Loop. Keep components and materials in closed loops and prioritise inner loops. For finite materials, this means remanufacturing products or components and as a last resort recycling materials

Virtualise. Deliver utility virtually – books or music, online shopping, fleets of autonomous vehicles, and virtual offices.

Exchange. Replace old materials with advanced non-renewable materials; apply new technologies (e.g. 3D printing and electric engines); choose new products and services (e.g. multi-modal transport).

FIGURE 10 **THE RESOLVE FRAMEWORK**

	EXAMPLES
REGENERATE	• Shift to renewable energy and materials • Reclaim, retain, and restore health of ecosystems • Return recovered biological resources to the biosphere
SHARE	• Share assets (e.g. cars, rooms, appliances) • Reuse/secondhand • Prolong life through maintenance, design for durability, upgradability, etc.
OPTIMISE	• Increase performance/efficiency of product • Remove waste in production and supply chain • Leverage big data, automation, remote sensing and steering
LOOP	• Remanufacture products or components • Recycle materials • Digest anaerobically • Extract biochemicals from organic waste
VIRTUALISE	• Books, music, travel, online shopping, autonomous vehicles etc.
EXCHANGE	• Replace old with advanced non-renewable materials • Apply new technologies (e.g. 3D printing) • Choose new product/service (e.g. multimodal transport)

Source: Company interviews; Web search. S. Heck and M. Rogers, *Resource revolution: How to capture the biggest business opportunity in a century*, 2014.

Source: Ellen MacArthur Foundation, 2015

Exemplo

EXAMPLE: BRASTEMP WATER PURIFIER

- The Brastemp water purifier has a product-service system model, and is the result of a long innovation process which began in 2001 – business model based on product rental.
- Currently represents one of the most profitable areas in the company; it is a source of pride and an example for new projects to follow.
- **Sustainability –** Brastemp is responsible for the product's entire life cycle, from production to responsible disposal of its components. The purifier is 97% recyclable and recycled.
- **Convenience –** Installation services, maintenance and refill exchanges are included. Every 6 months Brastemp contacts the client and schedules a visit; the client does not have to do anything. There is much more practicality and attentiveness.

ASSINATURA DE PURIFICADORES BRASTEMP

Assine o nosso serviço:

Fale com um dos nossos especialistas Brastemp e agende a instalação do seu purificador.

Tenha água purificada:

Antes de chegar à sua casa, o nosso purificador passa por 100 mil ciclos de testes, para garantir a excelência.

Sem se preocupar com nada:

Fazemos manutenção preventiva a cada 6 meses, para garantir o máximo desempenho. Além disso, a instalação, as trocas e os reparos ficam por nossa conta.

E para sempre:

Diferentemente de uma compra avulsa, a sua garantia não dura só alguns meses, quando você assina o nosso serviço. Ela é ilimitada.

4. As 6 Limitações da economia circular

Ecological Economics 143 (2018) 37–46

Contents lists available at ScienceDirect

Ecological Economics

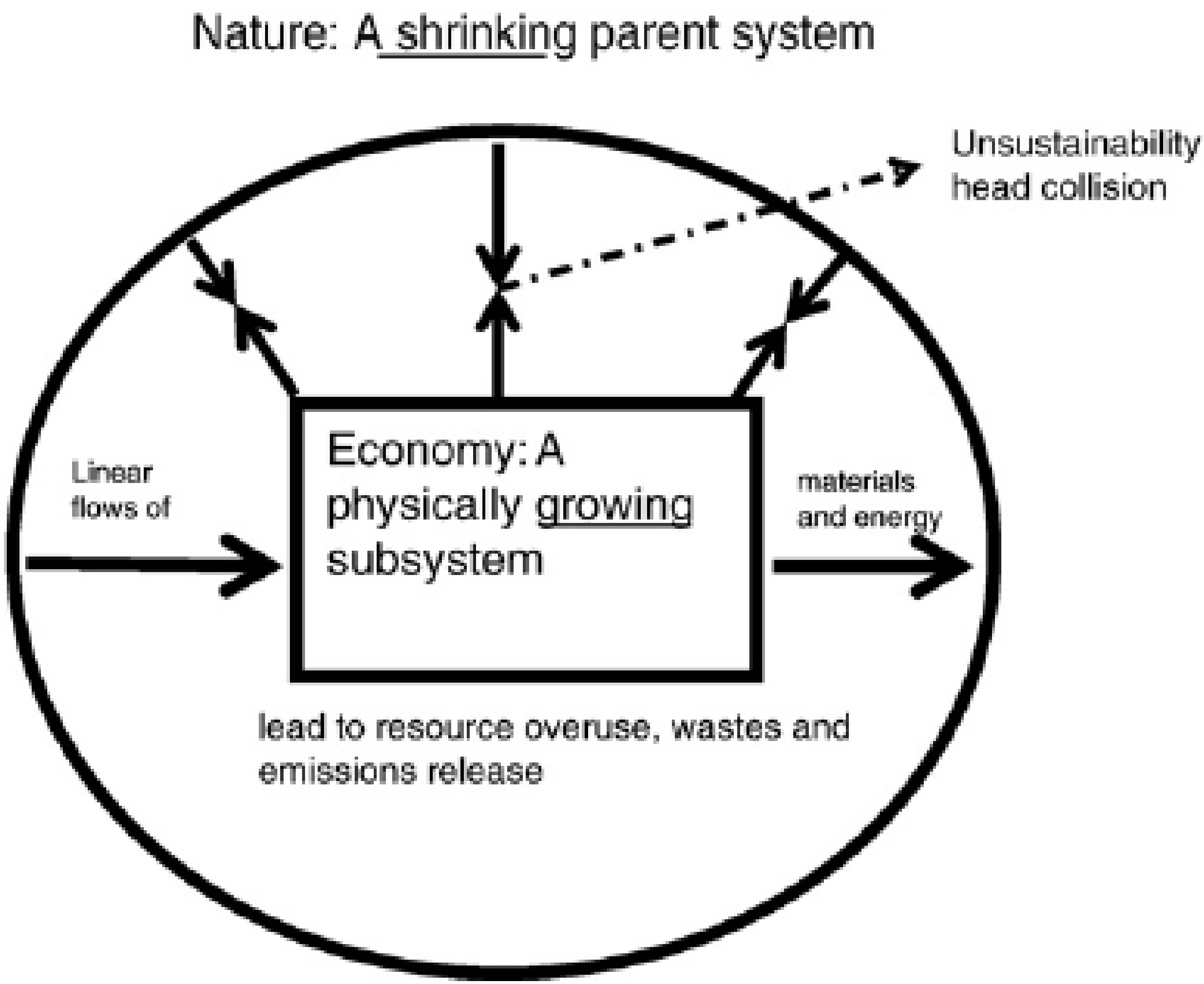
journal homepage: www.elsevier.com/locate/ecolecon

Circular Economy: The Concept and its Limitations

Jouni Korhonen [a,*], Antero Honkasalo [b], Jyri Seppälä [c]

[a] KTH Royal Institute of Technology, Department of Sustainable Production Development, Stockholm, Sweden
[b] Government of Finland Professor Emeritus, Finland
[c] Finnish Environment Institute, Helsinki, Finland

Relativo encolhimento da capacidade de suporte do planeta ao sub-sistema econômico



J. Korhonen et al. / Ecological Economics 143 (2018) 37–46

Six limits and challenges for the circular economy concept.

Thermodynamic limits
- Cyclical systems consume resources and create wastes and emissions
System boundary limits
- Spatial: problems are shifted along the product life cycle
- Temporal: short term non-renewables use can build long-term renewable infrastructure
Limits posed by physical scale of the economy
- Rebound effect, Jevon's paradox, boomerang effect
Limits posed by path-dependency and lock-in
- First technologies retain their market position despite of in-efficiency
Limits of governance and management
- Intra-organizational and intra-sectoral management of inter-organizational and inter-sectoral physical flows of materials and energy
Limits of social and cultural definitions
- The concept of waste has a strong influence on its handling, management and utilization
- The concept is culturally and socially constructed
- The concept of waste is always constructed in a certain cultural, social and temporal context and this context is dynamic and changing

J. Korhonen et al. / Ecological Economics 143 (2018) 37–46

Reducionismo ambiental vs. Perspectiva Holística

5. Agenda de Pesquisa: Tecnologias para Economia Circular

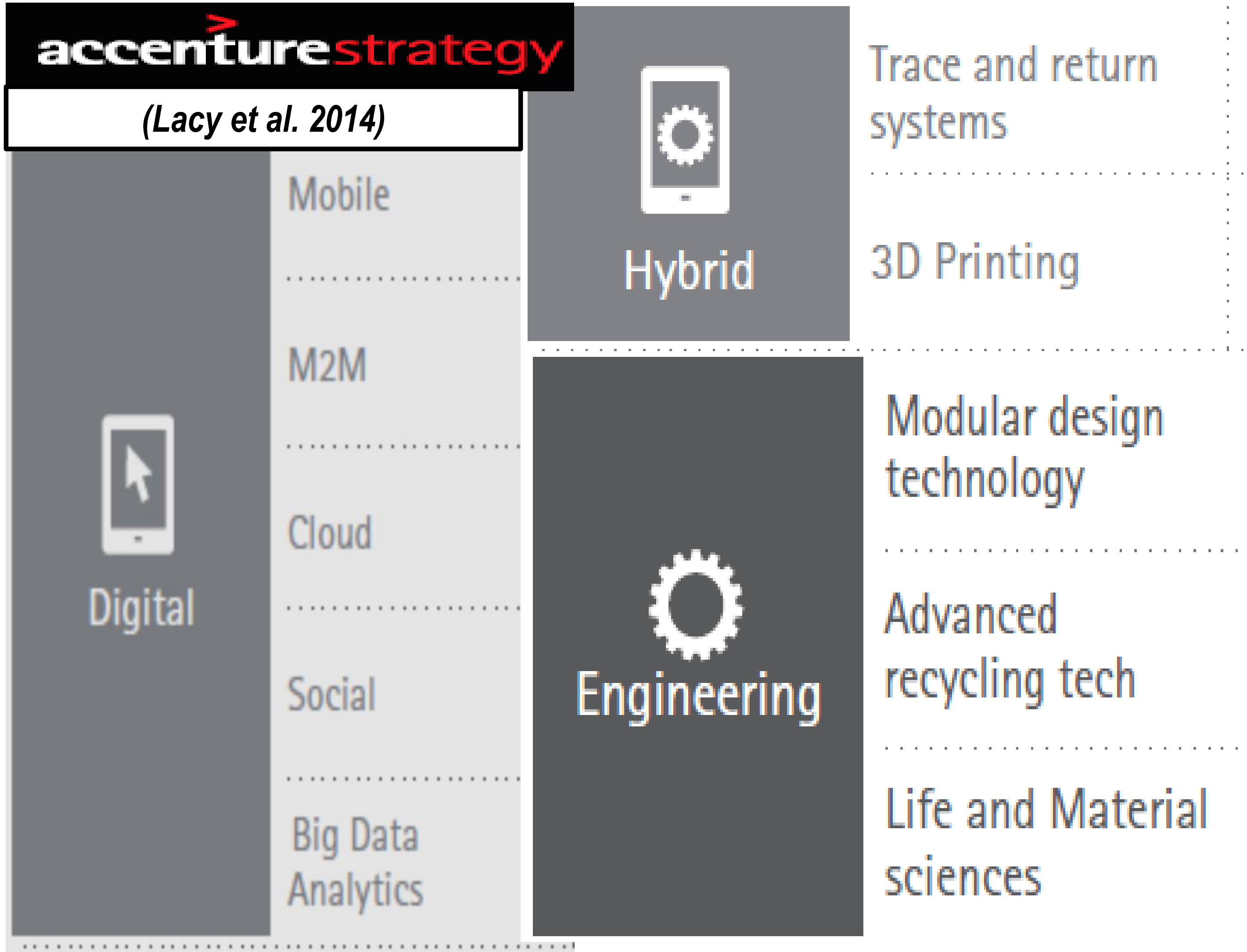
INDEPENDENT

Facebook, Airbnb, Uber, and the unstoppable rise of the content non-generators

One creates no content, one owns no property, the other owns no cars. The property is at the interface

Hamish McRae | @TheIndyBusiness |

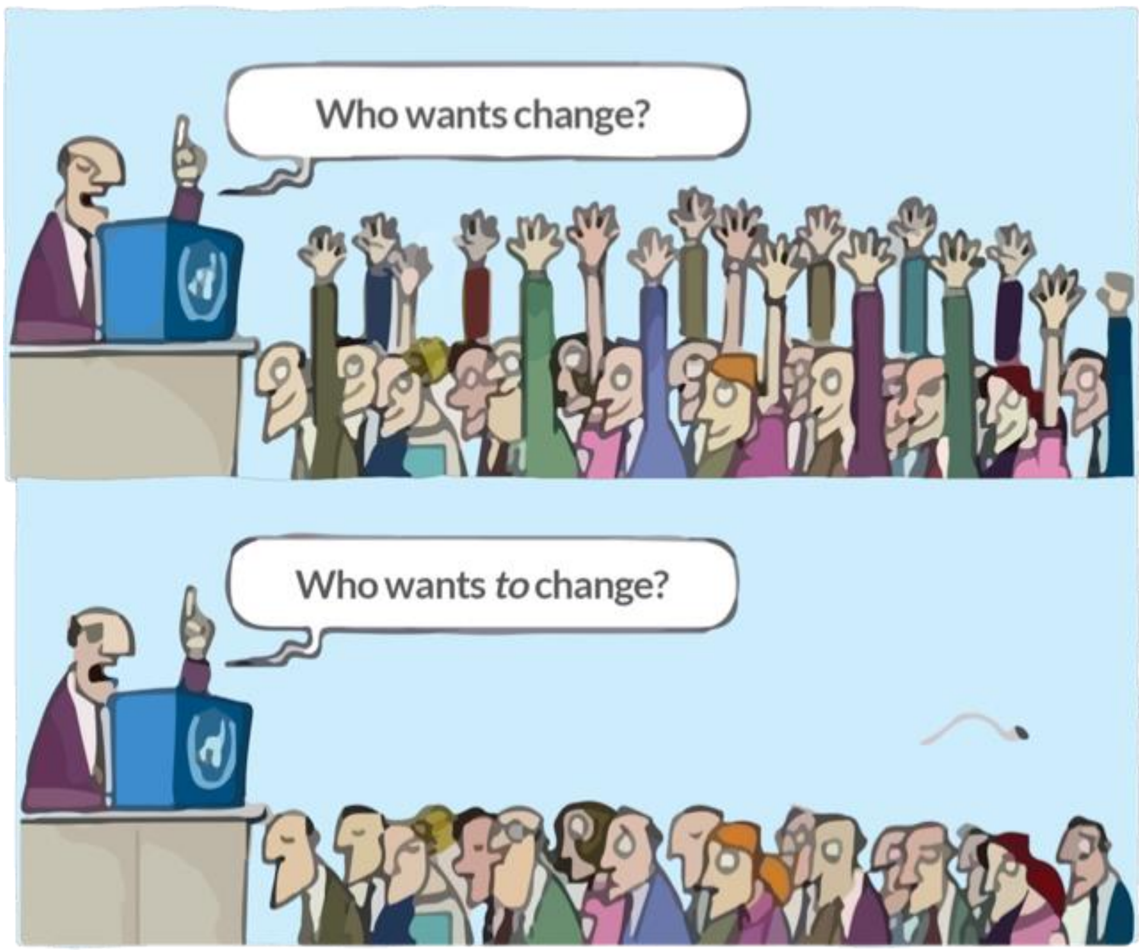
The world's largest taxi firm, Uber, owns no cars. The world's most popular media company, Facebook, creates no content. The world's most valuable retailer, Alibaba, carries no stock. And the world's largest accommodation provider, Airbnb, owns no property. Something big is going on.


accenture strategy
(Lacy et al. 2014)
Digital
Mobile
M2M
Cloud
Social
Big Data Analytics
Hybrid
Trace and return systems
3D Printing
Engineering
Modular design technology
Advanced recycling tech
Life and Material sciences


INDUSTRY 4.0


BLOCK CHAIN

6. Agenda de Pesquisa: Aspectos humanos e organizacionais



http://www.c4lpt.co.uk/blog/wp-content/uploads/2015/10/change.png

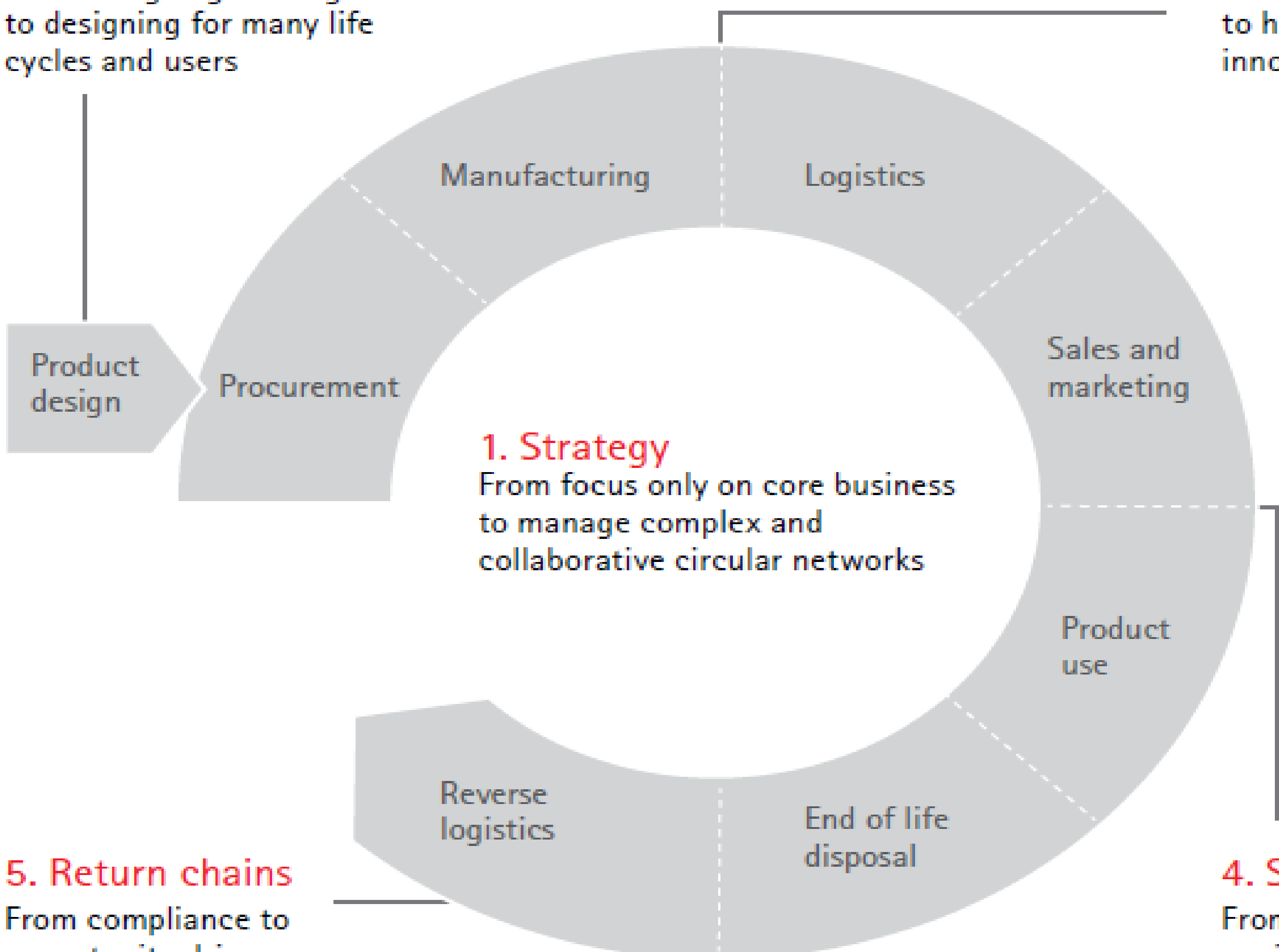
Lideres organizacionais com ‘circular mindset’ (Lacy et al. 2014)

2. Innovation & product development

From designing for single use to designing for many life cycles and users

3. Sourcing and manufacturing

From homogenous supply chain to heterogeneous resource flow innovation and cascading



1. Strategy

From focus only on core business to manage complex and collaborative circular networks

5. Return chains

From compliance to opportunity driven take-back

4. Sales & product use

From never seeing your product again to customer and asset life cycle management

7. Agenda de Pesquisa: Macro-micro perspectivas

Global net sustainability assessment – balanço holístico

(Korhonen et al. 2018)

Protecionismo e isolacionismo versus economia circular (ex. America first)

Crenças e aspectos culturais

(Exemplo: itens de segunda mão)

Governança global para verdadeira circularidade (quem esta liderando?)

Circular economy

Environmental win

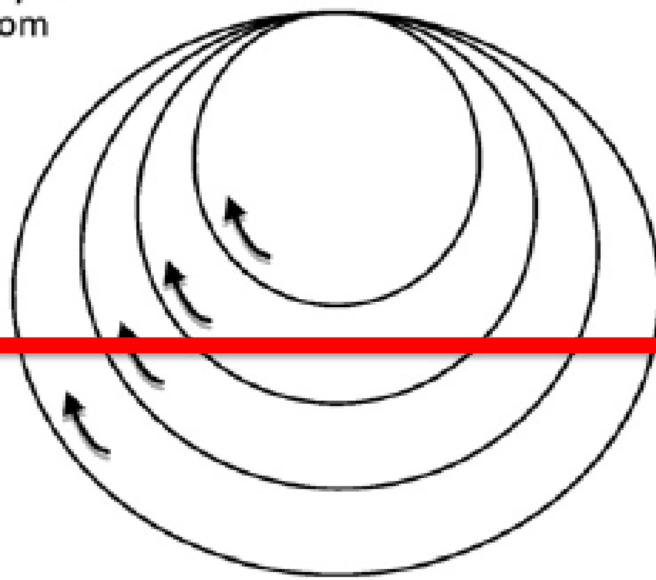
- Reduced virgin material and energy input
- Virgin inputs are predominantly / to the extent possible renewable from productive ecosystems

Environmental win

- Reduced wastes and emissions
- Resources in production-consumption systems are used many times, not only once

- Renewables are CO_2 neutral fuels and their wastes are nutrients that can be used by nature

INPUT



OUTPUT

Economic win

- Reduced raw material and energy costs

- The value in resources is used many times, not only once

- The use of costly scarce resources is minimized

- Reduced costs that arise from environmental legislation, taxes and insurance

- Image, responsible and green market potential

Social win

- New employment opportunities through new uses of the value embedded in resources

- Increased sense of community, cooperation and participation through the sharing economy

- User groups share the function and service of a physical product instead of individuals owning and consuming the physical product

Economic win

- Value leaks and losses are reduced

- Reduced waste management costs

- Reduced emissions control costs

- Reduced costs from environmental legislation, taxation and insurance

- New markets are found for the value in resources

- New responsible business image attracts investment

J. Korhonen et al. / Ecological Economics 143 (2018) 37–46

8. Agenda de Pesquisa: Teorias Organizacionais

Circular Economy: The Concept and its Limitations

Jouni Korhonen [a,*], Antero Honkasalo [b], Jyri Seppälä [c]

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System boundaries
Six limitations

A B S T R A C T

Circular economy (CE) is currently a popular concept promoted by the EU, by several national governments and by many businesses around the world. However, the scientific and research content of the CE concept is superficial and unorganized. CE seems to be a collection of vague and separate ideas from several fields and semi-scientific concepts. The objective of this article is to contribute to the scientific research on CE. First, we will define the concept of CE from the perspective of WCED sustainable development and sustainability science. Second, we will conduct a critical analysis of the concept from the perspective of environmental sustainability. The analysis identifies six challenges, for example those of thermodynamics and system boundaries, that need to be resolved for CE to be able to contribute to global net sustainability. These six challenges also serve as research themes and objectives for scholars interested in making progress in sustainable development through the usage of circular economy. CE is important for its power to attract both the business community and policy-making community to sustainability work, but it needs scientific research to secure that the actual environmental impacts of CE work toward sustainability.

Int. J. Production Economics 130 (2011) 1–15

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Invited Contribution

An organizational theoretic review of green supply chain management literature

Joseph Sarkis [a], Qinghua Zhu [b], Kee-hung Lai [c,*]

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Teoria da Contingência

Visão Baseada em Recursos

Upper Echelons theory

Dynamic Capabilities

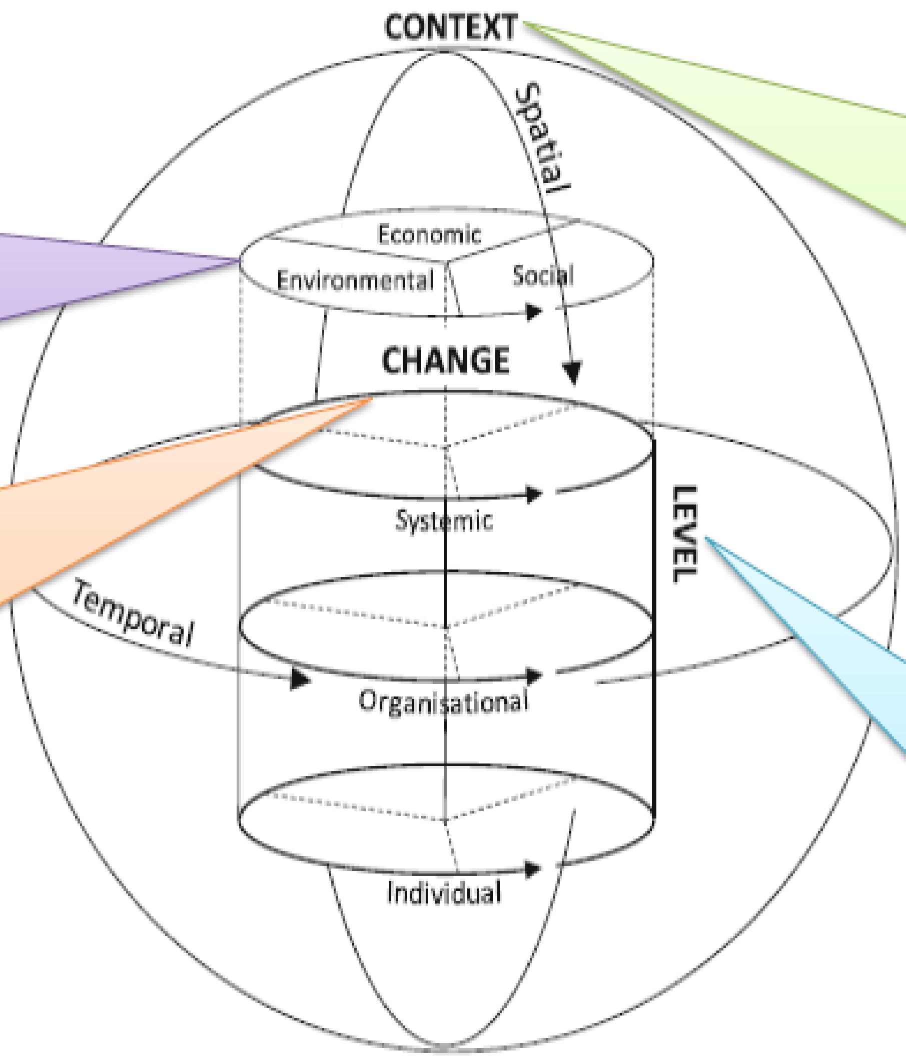
Teoria Institucional

Teoria dos Stakeholders

Perspectiva teórica promissora - Tensões da Sustentabilidade

DIMENSIONS OF SUSTAINABILITY (TBL): The very first tension that can occur is among the dimensions of sustainability (social, economic, environmental)

DIFFERENT POSSIBILITIES OF "CHANGE MANAGEMENT": This process has inherent tensions in terms of possible plans and alternatives to change toward sustainability



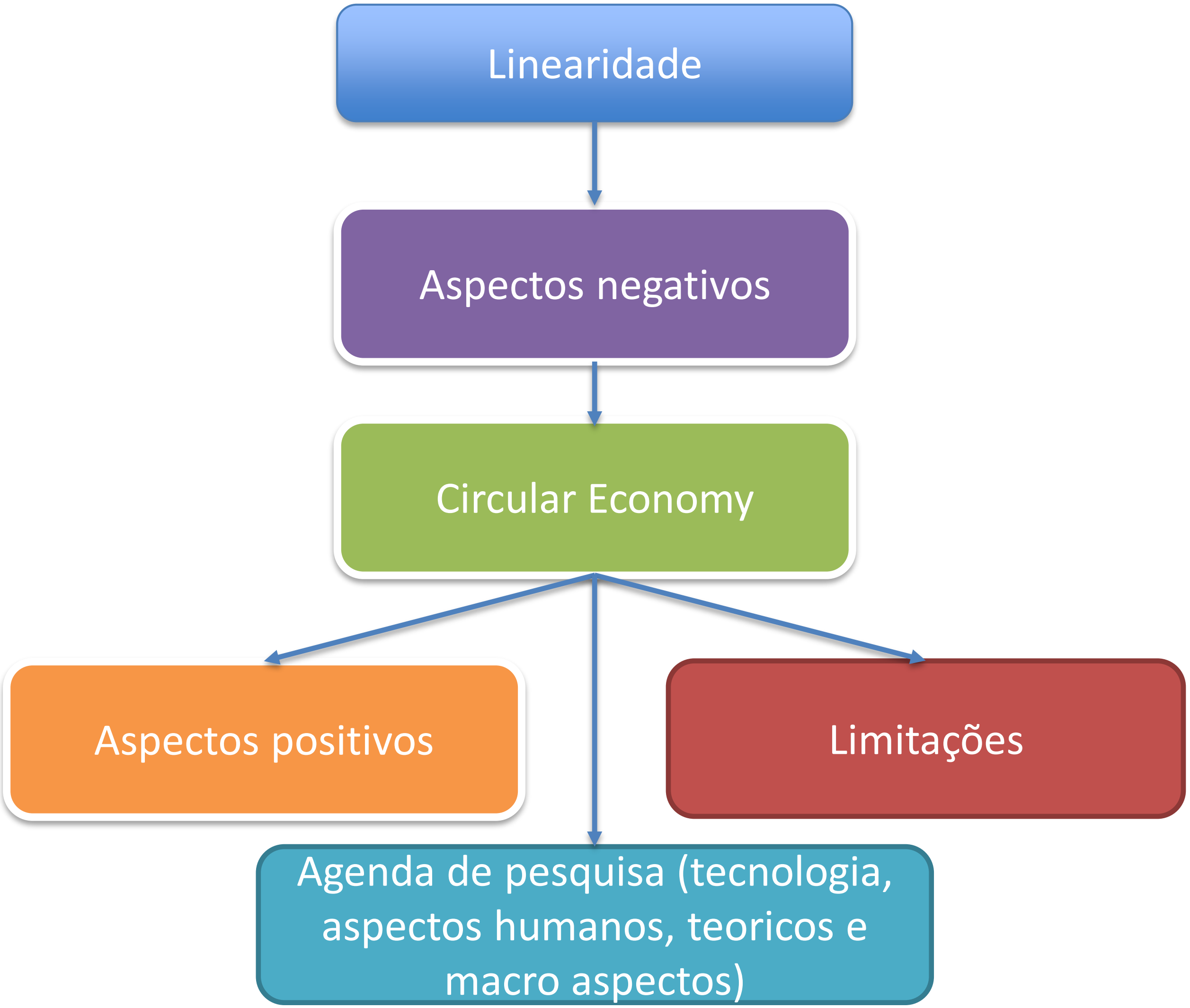
CONTEXTUAL COMPLEXITY: Context refers to "where" (spatial [place and generation affected]) and "when" (temporal) sustainability change takes place

LEVELS (hierarchy): Different perceptions of the relevance of sustainability (variety of stakeholders)

Fig. 2 Systematic framework for the analysis of tensions in corporate sustainability

Hahn et al. (2015)

Sistematizando…



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- McKinsey – *Moving toward circular economy* (http://www.mckinsey.com/business-functions/sustainability-and-resource-productivity/our-insights/moving-toward-a-circular-economy)
- Sarkis, J., Zhu, Q., & Lai, K. H. (2011). An organizational theoretic review of green supply chain management literature. International Journal of Production Economics, 130(1), 1-15.

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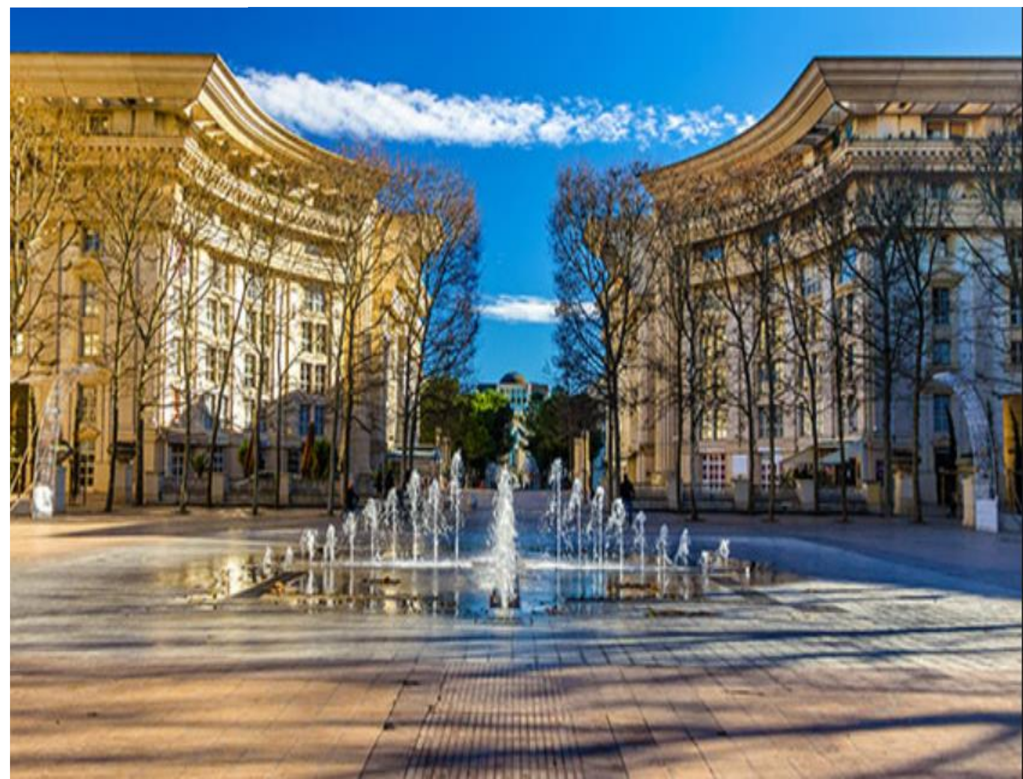

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Montpellier Business School since 1897

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