

Systems approaches to accelerating the circular economy – Some food for thought

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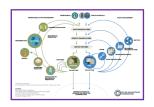
Outline



Interacting societal challenges require a systems approach



A perspective for action: system transitions

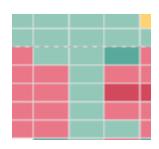


Circular economy and industrial symbiosis: a regime challenge?



Principles for systems-based action towards CEs





Interacting societal challenges require a systems approach

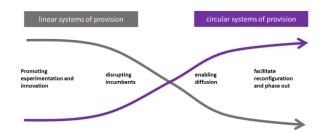




defining our systems approach:

- Systems approaches enable a perspective on the *interrelations* between a *set of entities* which fulfils a *function*
- A whole systems approach combines reflection with action
- (re-)defining the system boundary is key to impactful systems work
- three systems we are part of in developing the CE:
 - socio-ecological earth system
 - socio-technical innovation system
 - The political economy of provision (i.e., food system, housing system, mobility system, clothing system, leisure system)





A perspective for action: system transitions

LANDSCAPE EVENTS LINEAR CIRCULAR **ECONOMY ECONOMY** NICHE 2 NICHE 4 NICHE 1 NICHE 3



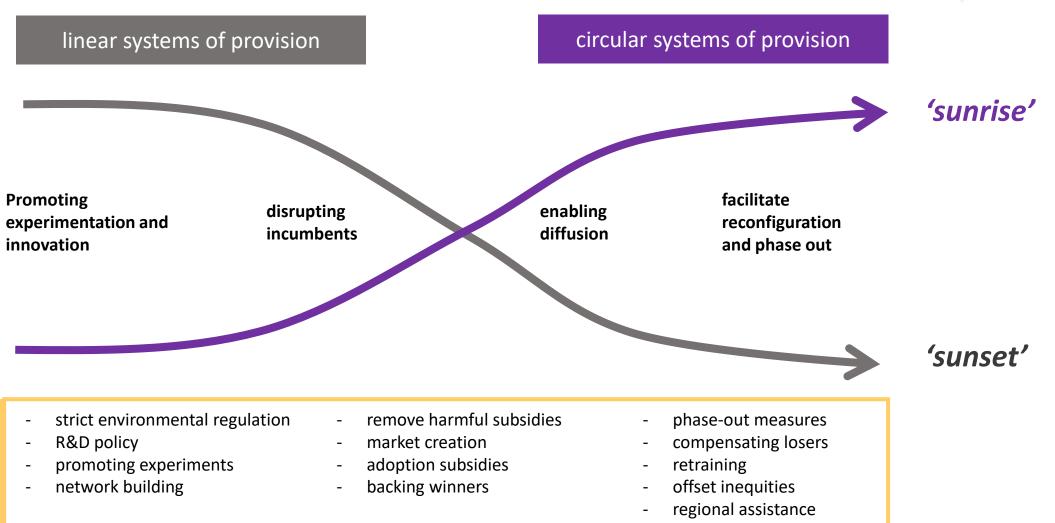
→ time

Single-Use Medical Devices LEGEND Lead-time to market NHS AND ITS Mass production economics Evolution of 1980s: Public demands single-use medical 1980s: Fear of HIV MARKETISATION international policies **HEALTHCARE INFECTUOUS** for improved AS CONTEXT devices already a Market dynamics performance of NHS and markets impacts DISEASES AS CONTRIBUTOR use of disposables TO USE OF DISPOSABLES and ageing population for safe use of Contestation put pressure on NHS. Post-war period: Plastics are 2018: Debate in UK 1973: NHS reform Strategic niche management increasingly prevalent in House of Commons on towards managerial medical applications. For Healthcare Infectuous Rules and standards example, PVC is popular for 1996: 10 Patients with tubing, due to its transparancy, 1973: Creutzfeldt-lakob Disease Identified in UK. RISE OF PLASTICS IN relatively low price. nurse society 1970s: Debat 1940-1945: WWII becomes a FIRST HALF 20th CENT about reusi Early 1960s: 1997-2009: New Labour seeks to boost for invention and large-1940-1945: PVC was introduced disposables Late 1980s: Increased marketisation scale production of plastics. issued for preventing correct failures in market-based during WWII to replace glass and partly inspired of NHS under Thatcher government prion contamination approach to care, investing more Introduction of 1920s to 1940s: Various types of metal packaging of public money and putting more disposable needles. plastic are invented and pharmaceutical products. and syringes in US 2009: NHS emphasis on quality. commercially produced in the pre-Sustainable and EU market. established 2019: NSH set long-1990s: EU regulations term goal to reduce Post-war period: By medical devices, EMERGENCE OF IV plastics. the 1950s plastic has including single-use From 1933: Use of replaced rubber in IV rubber tubes for IV. applications 2002-2018: Various guidelines From 1900: Development 1970s: and advices published by From 2000: European bags replace NHS and MHRA on (reuse of) of modern intravenous PVC Industry launches single-use medical devices. techniques (IV). plastics produced in US is 2014-2018: RecoMed PCV take-back stimulate PVC for medical use scheme for single-use medical devices recycling set up as partnership between Axion 1890s to 1915: Hospitals develop and British Plastics Foundation, with funding from VinyiPlus. The program wins several awards and spreads from 1980s: Increased adv 2 participating hospitals to 11 over the dispesable Catheter. of single-use devices. † 1970s: Increasing labour costs of sterilisation practices contribute 1964: First disposable to shift to disposables. catheter (PVC only). 2009: PVC Recyclin 1880s-1900: Various Inventions lay the Hospitals program From 1915: Debate basis for sterilisation practices in 1969: Introduction of From 1915: Sterilisation between industry and 1970s: Development of hospitals, including steaming of practices expand beyond Teflon leads to improved 1970s-1980s: Shift from hospitals about who can increasingly complex medical medical equipment, the invention of servicing surgery catheters. best guarantee optimal doctor to nurse 2017-2018: Rlue devices that uses plastics. rubber gloves and gauze masks, and departments, and grow sterilisation. administered catheters. Planet II airs. making them less resistant to the invention of the steam autoclave 2018: Government Into departments sterilisation. Post-war and 1950s: Plastic associated with large consultation on From 1970s to 1980s: catheters in development. First "Latte Levy", 1960s: Large-scale Introduction RISE OF DISPOSABLES Late 2010s: NHS plastics Emergence of minimially individually packaged and followed by of plastic, single-use medical EMERGENCE OF IN POST-WAR PERIOD use under increasing invasive surgery, which makes sterlised (reusable) catheter devices, thanks to flexibility, IN-HOUSE STERILISATION scrutiny, with use of use of tools that are difficult to introduced in 1957. safety, prevention of crossdecision. PRACTICES disposable cups as one contamination and low costs. of the focal points 2020 [Boons et al. 2019; Roedl, Boons & Spekkink 2021] 1930 1950 1980 2010 2015 1940 1945 1960 1970 1990 2000

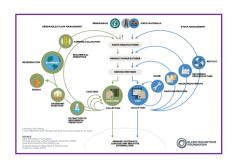


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Circular economy and industrial symbiosis: a regime challenge?

What about industrial symbiosis and circular economy?



Industrial symbiosis (IS): the networks (long or short term) exchange of waste flows and by-products between co-located production facilities

Circular economy (CE): the provision in human needs through closed loop processes that cover production, transport, and consumption

- → Building IS increases dependencies, which *lock-in* existing forms of production (i.e. enhancing existing regime)
- → Closing loops in systems of provision *CAN be* part of a systems transition towards sustainability

multiple boundaries of systems of provision: do they make one CE?



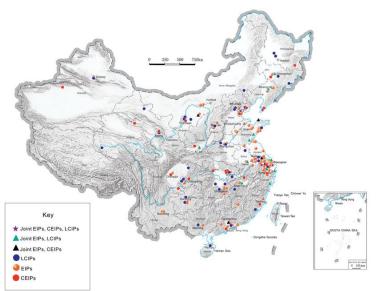


SCAP 2020

AMSTERDAM SHARING

CITY

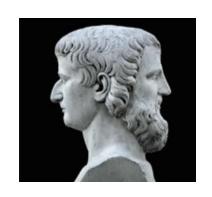




Sustainable Clothing Action Plan





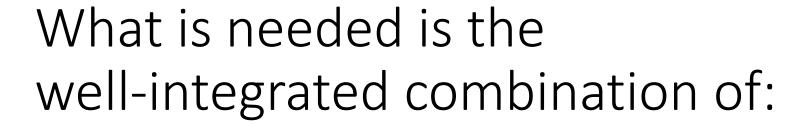


Principles for systems-based action towards CEs



Principles for a sustainable CE transition

- The system boundary needs to allow consideration of whole systems of provision in their ecological, technological, cultural and political complexity
- 2. Reduction of absolute levels of resource use within this whole system needs to be the objective
- 3. The system boundary defines who is to be *actively included* in shaping the transition
- 4. The process of transition requires *attention to 'sunrise' and 'sunset'* activities





1. Up-to-date *data* on material stocks and flows in systems of provision

2. Experimentation/disruption/diffusion/phase out based on *responsible innovation* with active & coordinated roles for government, business, users and civil society

3. Societal debate on sustainable provision that engages with the need for *reduced consumption*



Thank you! You can contact me on frank.boons@manchester.ac.uk



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