The Performance Economy and the role of design

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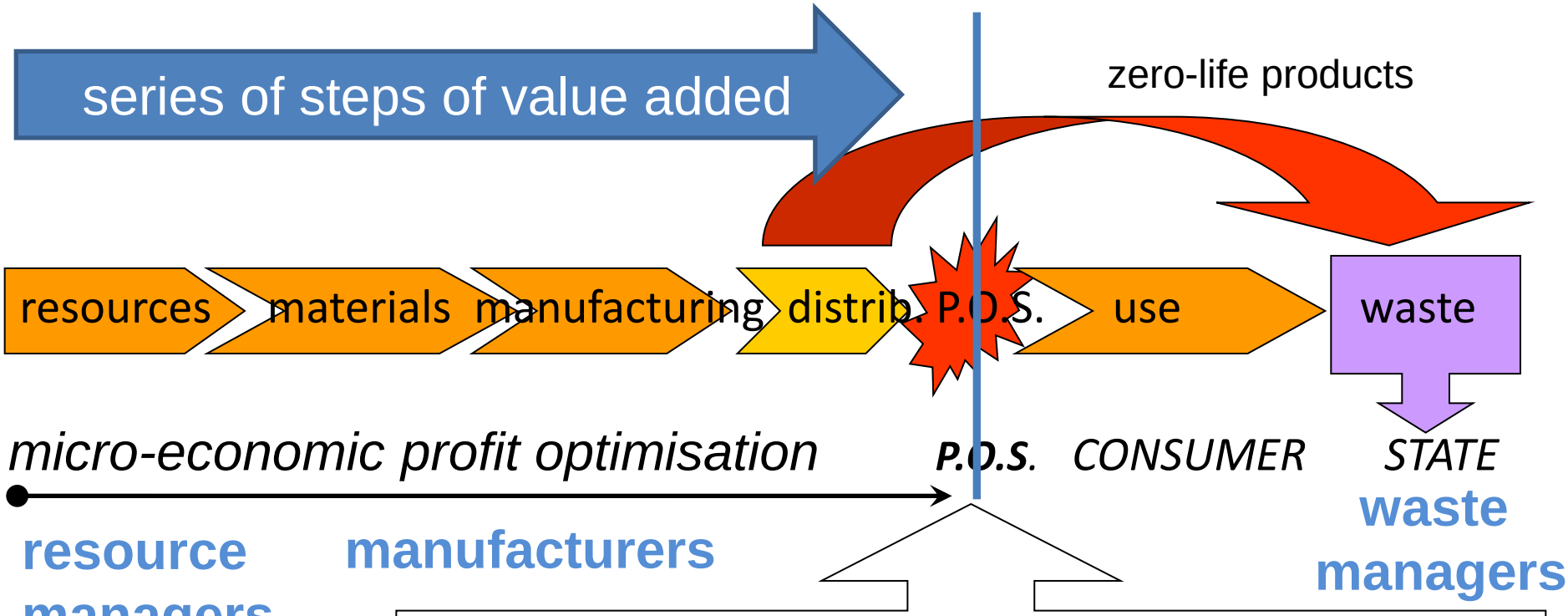
TOPICS

- Flow – the linear industrial economy, its values and drivers
- Stock - the Circular (Loop and Lake) Economy
- Pay per use - the Performance Economy, driven by the quest for competitiveness

LIKE A RIVER - the linear industrial economy

- is based on value added and flow management up to the Point of Sale, where ownership and liabilities pass to the buyer.
- externalises the costs of risk and waste.
- is resource intensive, driven by higher economies of scale, mechanisation, global sourcing, value depreciation, global brands.
- depreciated value dominates after the PoS.

1 Today's linear industrial economy: *growth means more throughput (no liability?)*



***The manufacturer's liability for industrial goods concerns the manufacturing quality*.**
Property and liability are transferred *at P.O.S.* to the CONSUMER (risk) *and the State (waste)*

(global) supply chains

Depreciated value – a pillar of the linear economy

Museum guard: *That is a 500 year old statue you have broken.*
Insurance agent: ***Thank God. I feared it was a new one***.

Industrial design in the LIE

In the linear industrial economy, the remit of design is to optimise production processes, minimise production costs up to the PoS and maximise sales (the bigger-better-faster-safer syndrome).

Component standardisation, such as platforms and engines in cars, are used to reduce unit costs in production (economy of scale).

2 LIKE A LAKE - The circular economy

- based on value preservation and stock management.
- ruled by the guiding principles of stock management -- caring and trust.
- is labour intensive, regional, substituting manpower for energy and material
- can be applied to any stock or capital (natural, physical, human, cultural, financial).

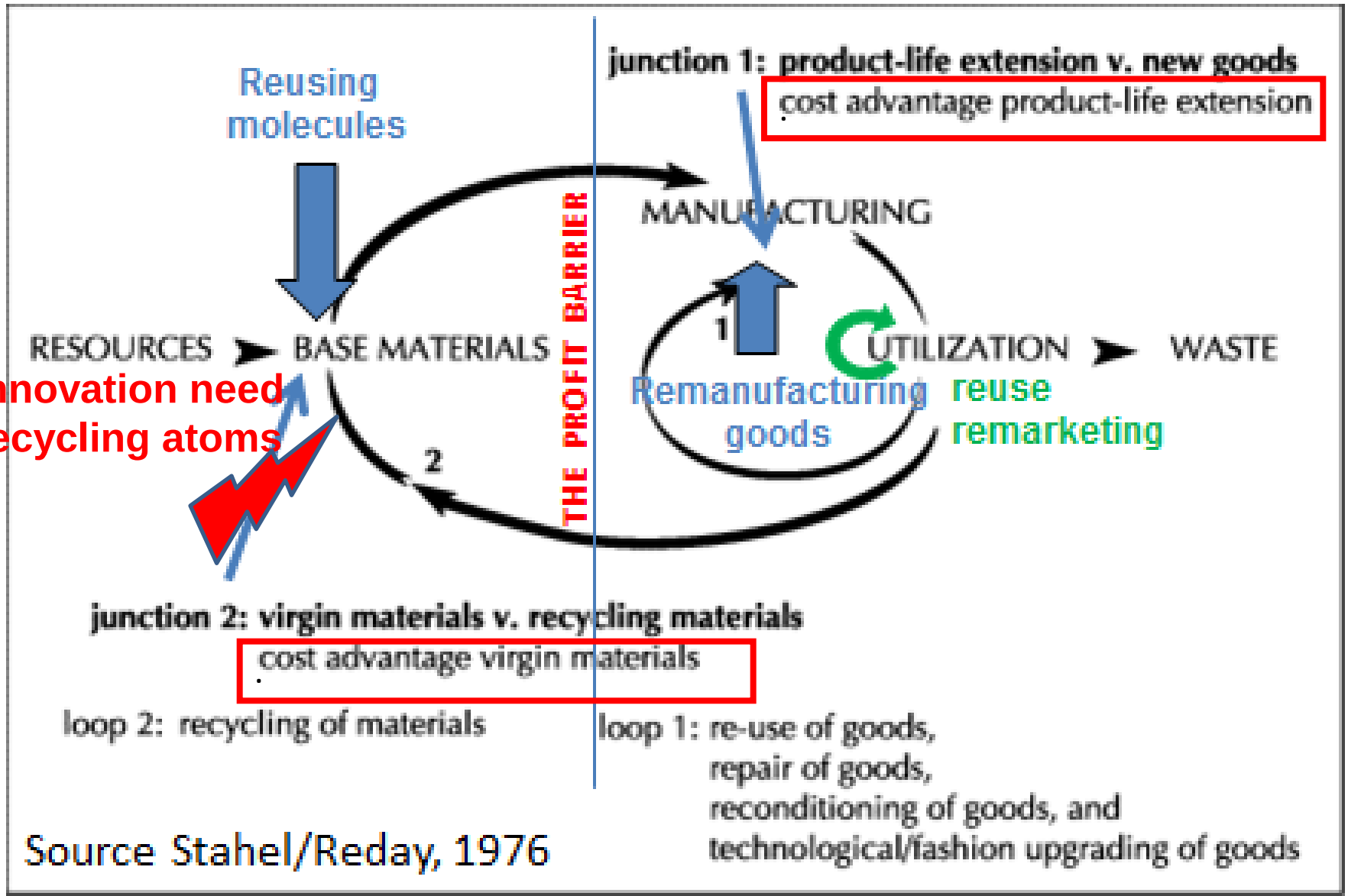
A CE of physical capital is about managing **manufactured stock** and preserving its embodied resources (energy, material, H_2O)

Infrastructure, buildings, equipment, (durable) goods, catalytic goods (lub oils, solvents) through

- **Reuse and remarketing**
  e.g. 2nd hand markets, eBay, rent-a-wreck,
- **Repair, remanufacturing and re-refining**
  e.g. NASA's space shuttle, catalytic goods,
- **Technologic and fashion upgrading.**

The C.E. compliments the industrial economy, which still contributes with producing quantum leap innovation, in e.g. information-, bio- and nano-technologies.

Managing performance over time - The Circular Economy:
reusing goods, remanufacturing goods and components (loop 1) and reusing molecules (2)



Source Stahel/Reday, 1976

Local and regional supply chains

Logistics- and Shopping **Centers**

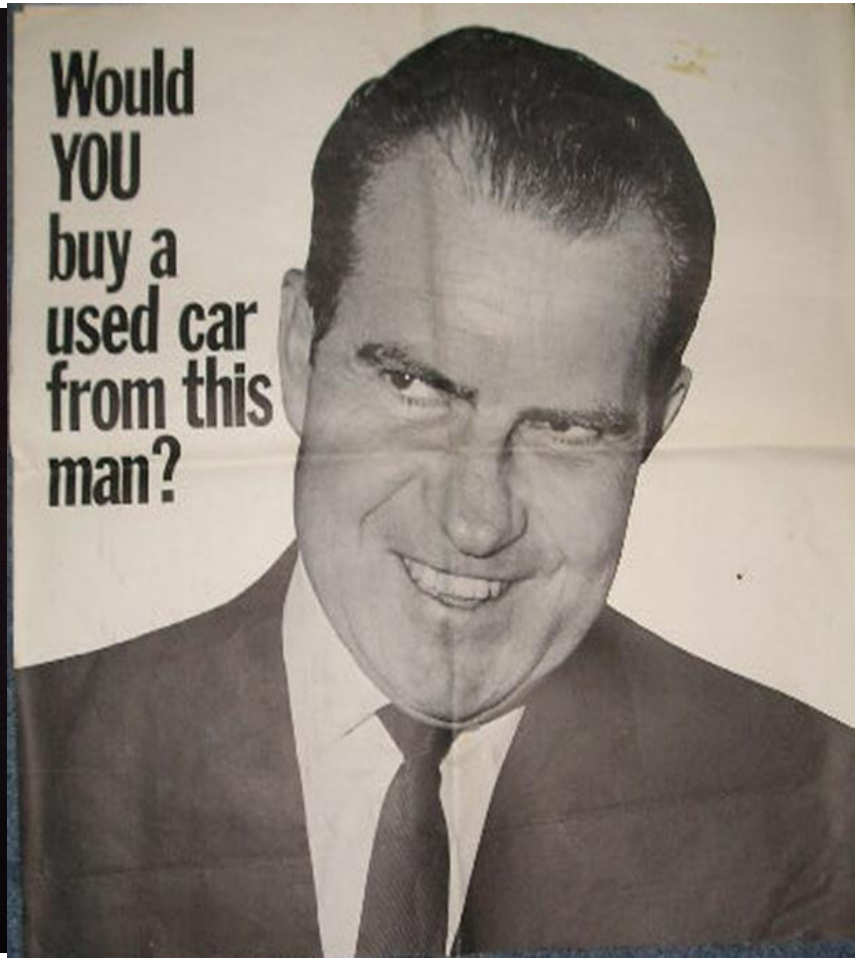
?

Container ports, ships, trains

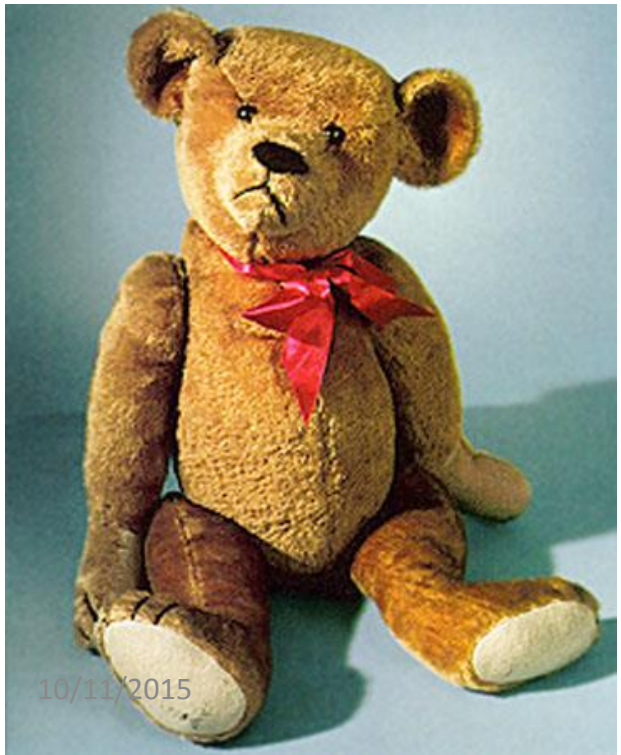
Warehouse on wheels trucks at the Brenner

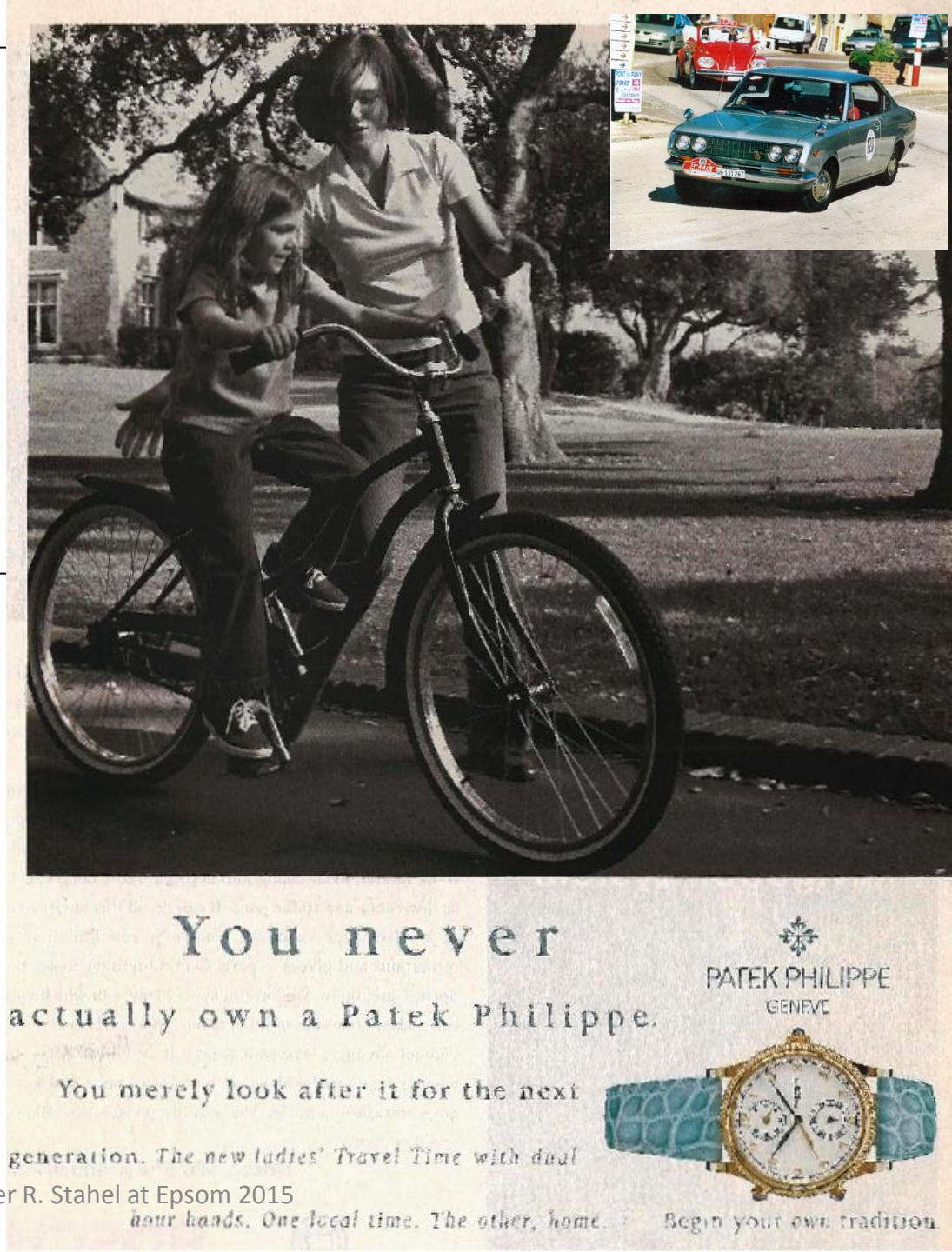
Delivery drohnes ?

Trust, guarantee for **value** and quality: the foundation of reuse and second-hand



Consumer drivers are CARING, socio-cultural innovation, a new stewardship relationship with goods





The Circular Economy is about **economics** but is counter-intuitive (local is beautiful)

- the smaller the loops the more profitable and resource efficient they are (e.g. local reuse),
- the smaller the batch size, the more profitable,
- loops have no beginning and no end (but an objective: value preservation),
- the low speed of the circular flow is crucial, the law of reverse compound interests applies,
- It substitutes manpower for energy and material resources,
- It manages (manufactured) stocks, not flows.

ICE-1 Redesign – a sustainable fleet management of high speed trains (ICE1)

Small batches

- 1995, the 59 ICE-1 trains of the German Railways had been in service for 15 years, covering 15 million Kilometre each.
- **Redesign costs were 3 million € per train, compared to € 25 million for a new train, with same service-life.**
- In addition, the ICE-1-Redesign saved € 1 million of social costs on a global level (applying the Stern report).
- **Redesign preserved 80% of materials and grey energy – a total of 16'500 tonnes of steel and 1180 tonnes of copper – and prevented 35'000 tonnes of CO_2 emissions and 500'000 tonnes of mining waste, per train.**
- Redesign included a technological upgrading of the rolling stock and seats, and allowed to add more seats.

Remanufacturing substantially reduces costs, resource consumption, waste, emissions

A 2004 sectoral study on restoring used automotive engines compared to a like-new condition showed, compared to manufacturing new engines, found:

large batches

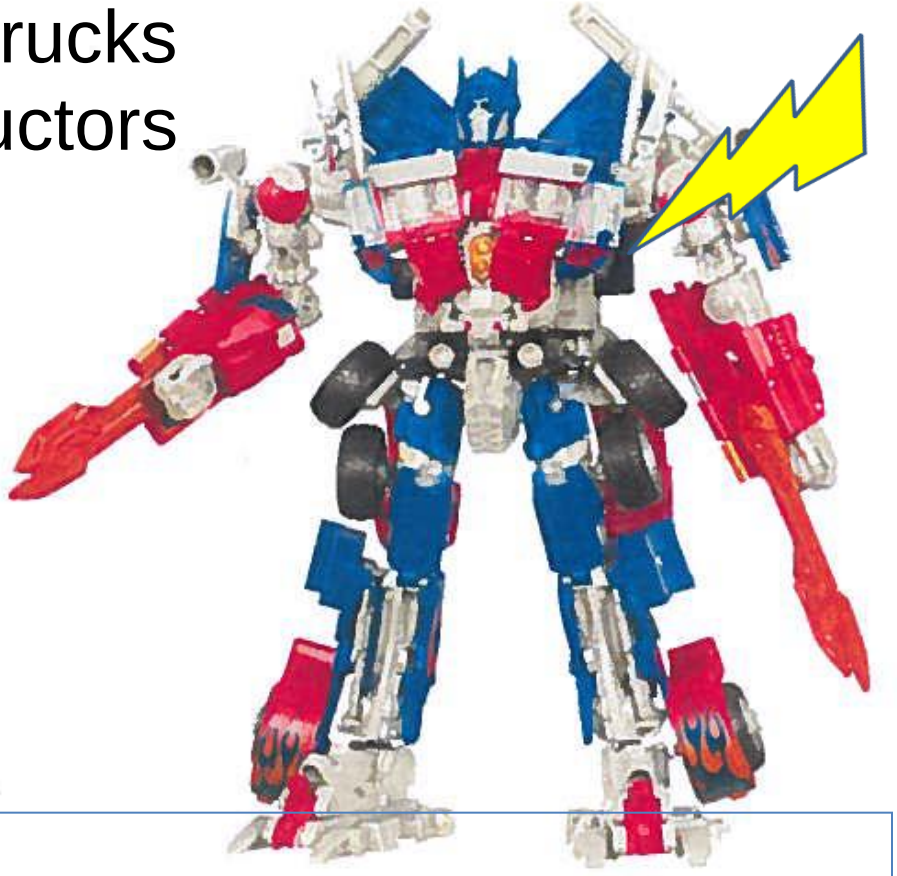
- **Lower economic costs (30-53%),**
- **Lower raw material consumption (26-90%),**
- **Lower waste generation (65-88%),**
- **Lower energy consumption (68-83%),**
- **Lower emissions (50-88%)**
  - **73-78% less** carbon dioxide (CO_2),
  - **48-88% less** CO,
  - **72-85% less** NOx,
  - **71-84% less** SOx,
  - **50-61% less** non-methane hydrocarbons emissions.

Source: Smith, VM and Keolian, GA (2004) The value of remanufactured engines, lifecycle environmental and economic perspectives, Journal of Industrial Ecology, 8(1-2) 193-222

Non-destructive collection of end-of-service-life goods: innovation and jobs

LABOUR

Transforming waste collector trucks into de-constructors



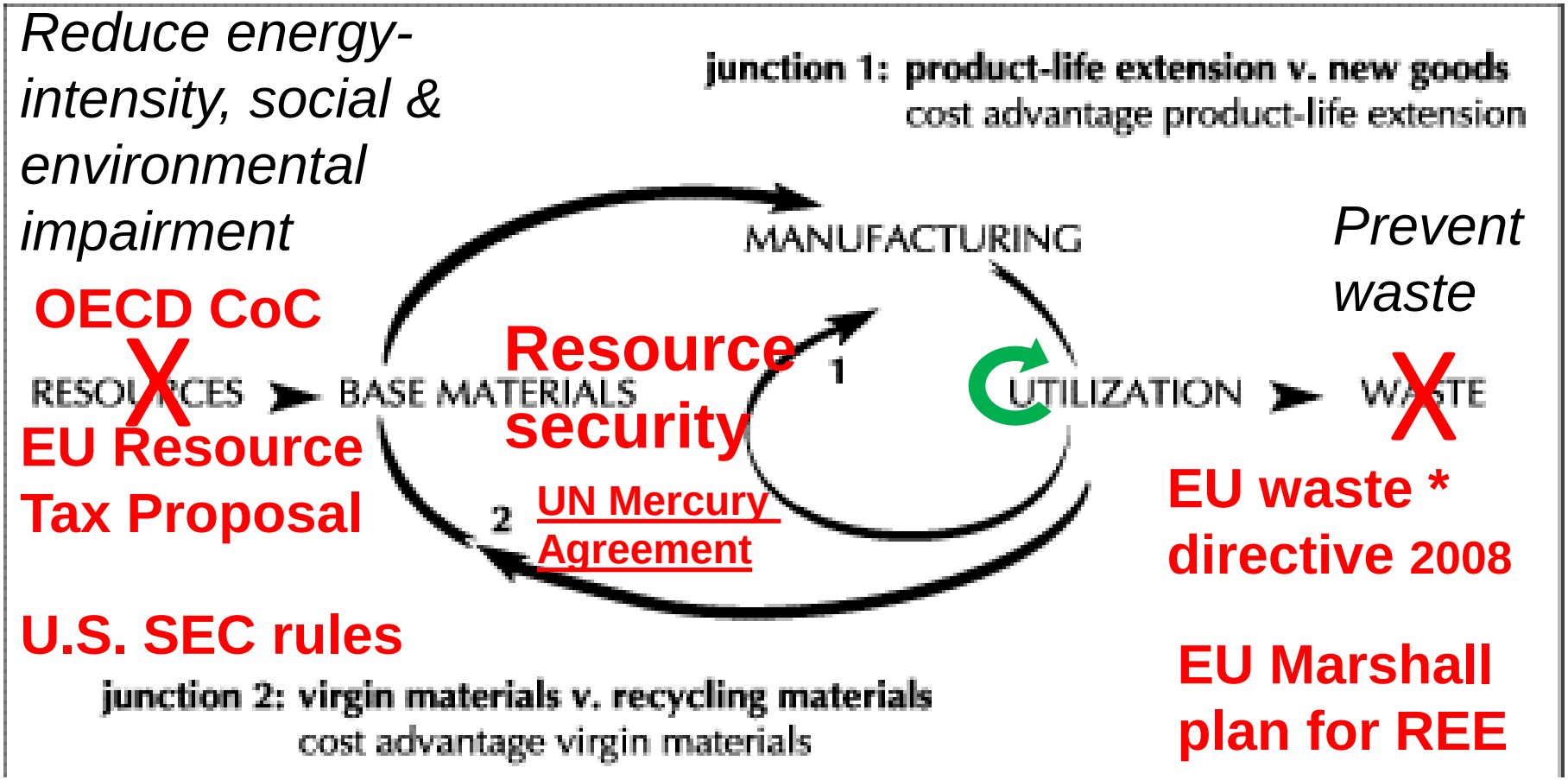
Source: transformer toys

Already working:
cargo- trams in Zürich; DHL et al take back services

De-constructing buildings: labour intensive!
The ANA Intercontinental Hotel in Tokyo

External drivers of the CE and PE: LIE's environmental legislation and sustainability rules

Reduce energy-intensity, social & environmental impairment



OECD CoC

EU Resource Tax Proposal

Resource security

UN Mercury Agreement

U.S. SEC rules

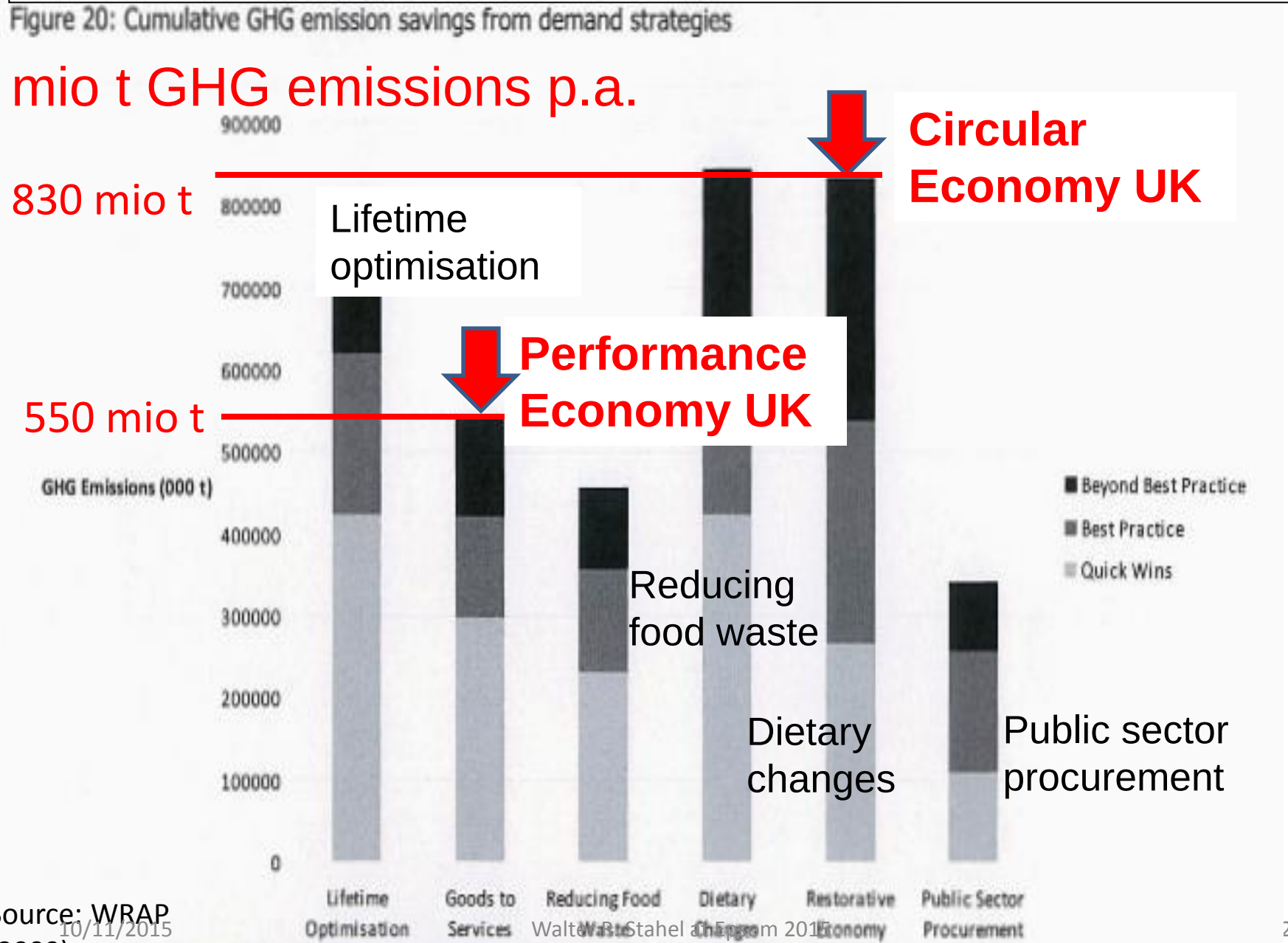
Prevent waste

EU waste * directive 2008

EU Marshall plan for REE

*In Europe, the EU Waste Directive 2008, to be transformed into national legislation now, stipulates that **reusing goods** and **extending the service-life of goods** are the two chief strategies to achieve the priority objective of waste prevention.

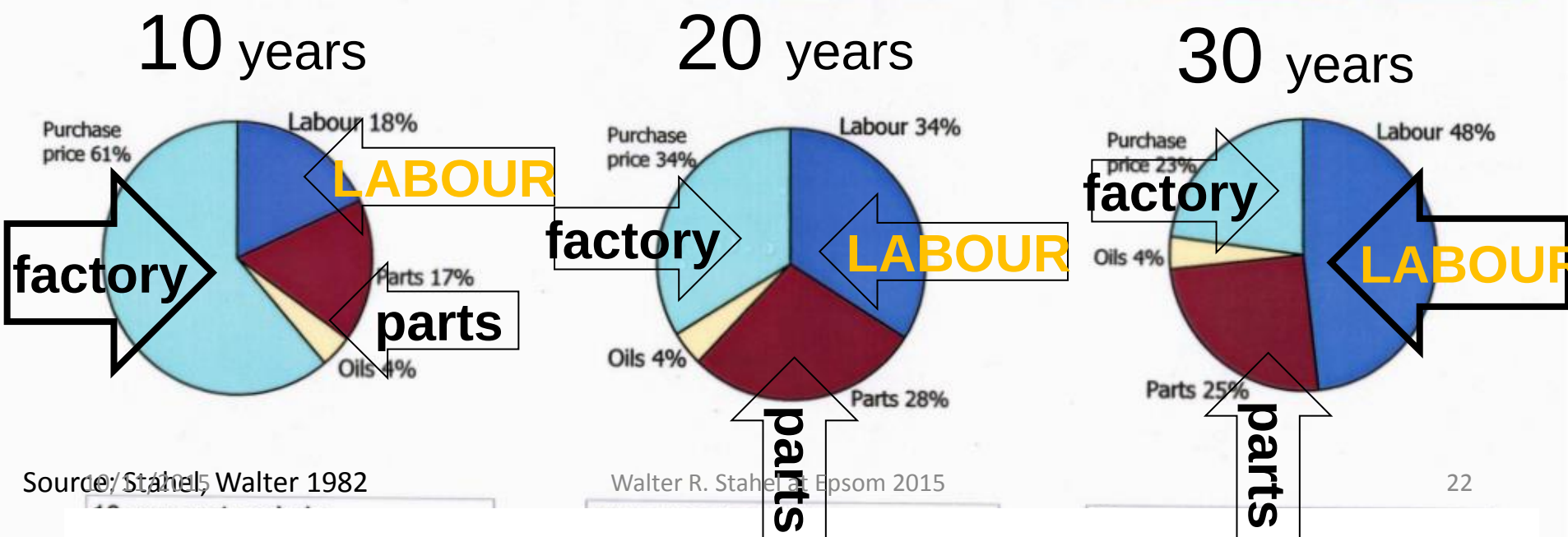
Some options to reduce national GHG, UK, p.a.



Source: WRAP (2009)

Jobs: product-life extension is a strategy to create local/regional jobs and to substitute manpower for energy and material

Figure 3
Analysis of the running costs of a 30 year old automobile: Toyota Corona Mk II 1969



Source: Stahel, Walter 1982

(Eco)**Design in a CE**

The Point of Sale stops designers' influence

Production governed by corporate strategy (IPR, technology, capital, RoI) marketing, legislation, *Konstrukteur* **DESIGNER** procurement costs, manufacture (labour cost)

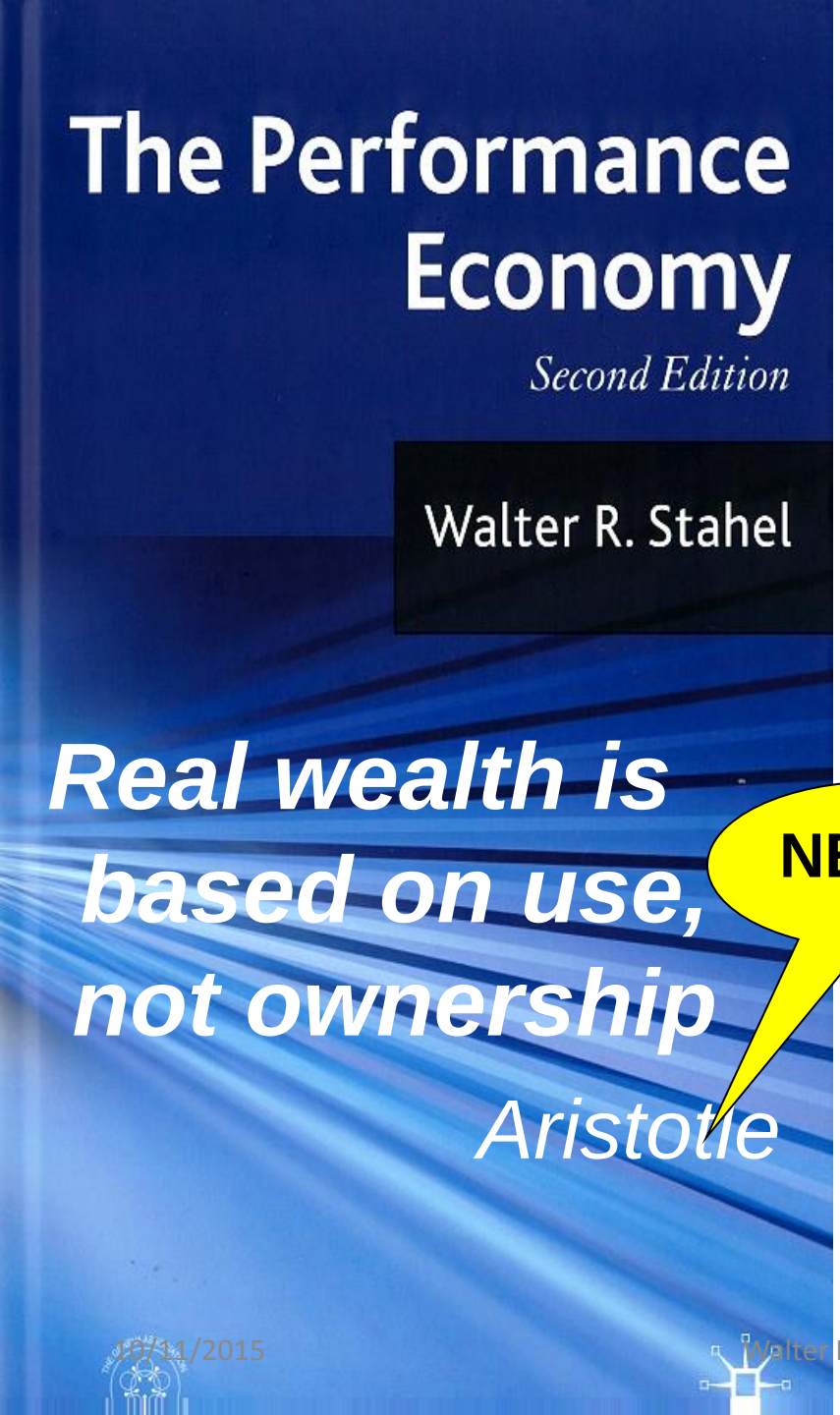
PoS

Utilisation governed by corporate (tools) and individual owners, end-of-life by: waste collectors waste managers waste recyclers

Design matters: 1965 pioneer manufacturer of modular furniture, today buy-back of furniture

3 PAY PER USE - the performance economy

- is driven by corporate competitiveness, the environmental benefits are a welcome bonus.
- sells goods and molecules as a service, retains ownership of goods and resources.
- internalises all costs of risk and of waste.
- focusses on systems solutions (not products).
- is based on use-value (function + stewardship) and exploits both efficiency and sufficiency.
- is the most profitable strategy of the CE, decoupling wealth and resource consumption.

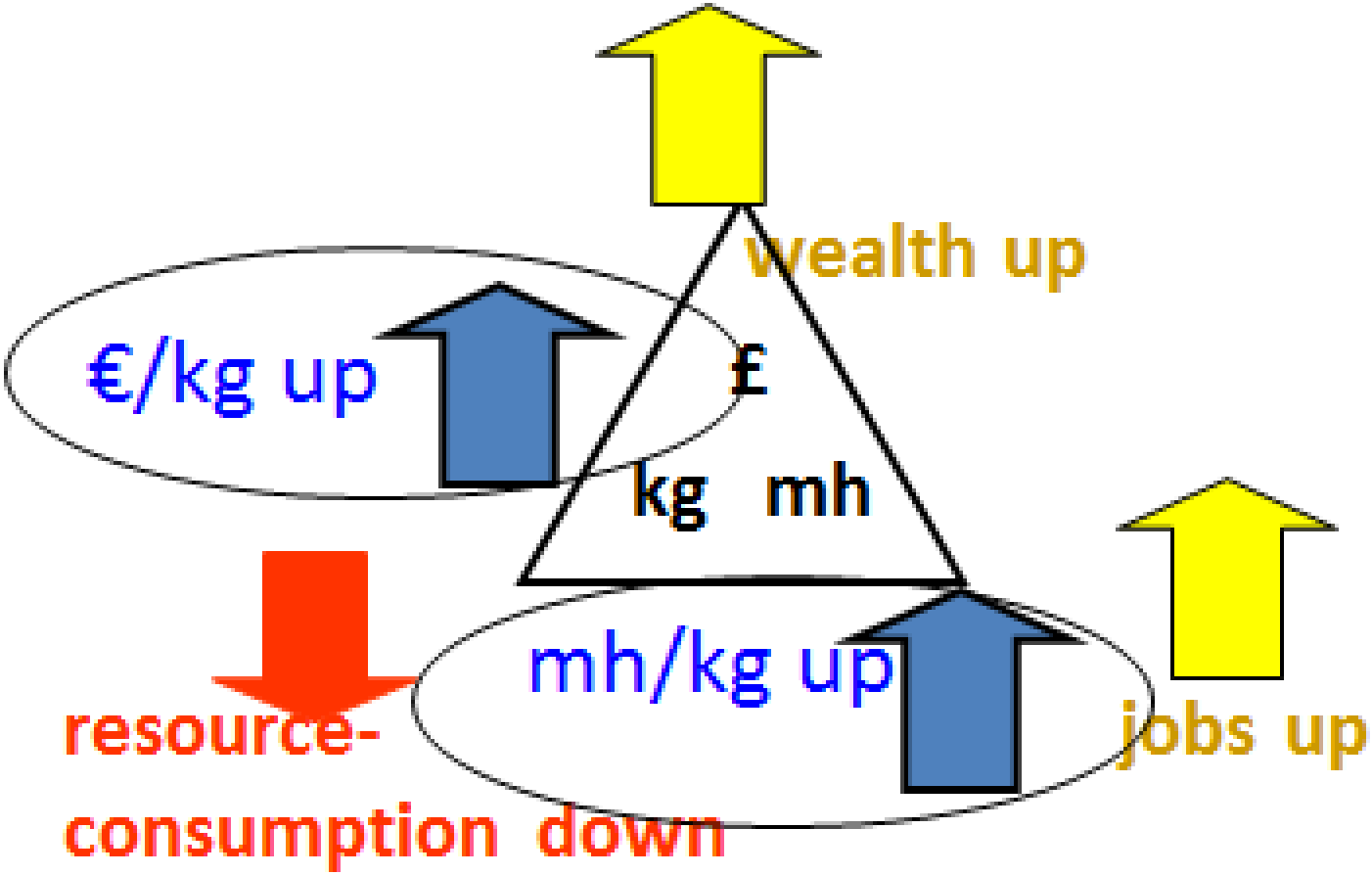


NEW ?

The Performance Economy
Walter R. Stahel
- Producing performance,
- Selling performance, and
- Maintaining performance over time.

Palgrave Macmillan
London, March 2006, 2010

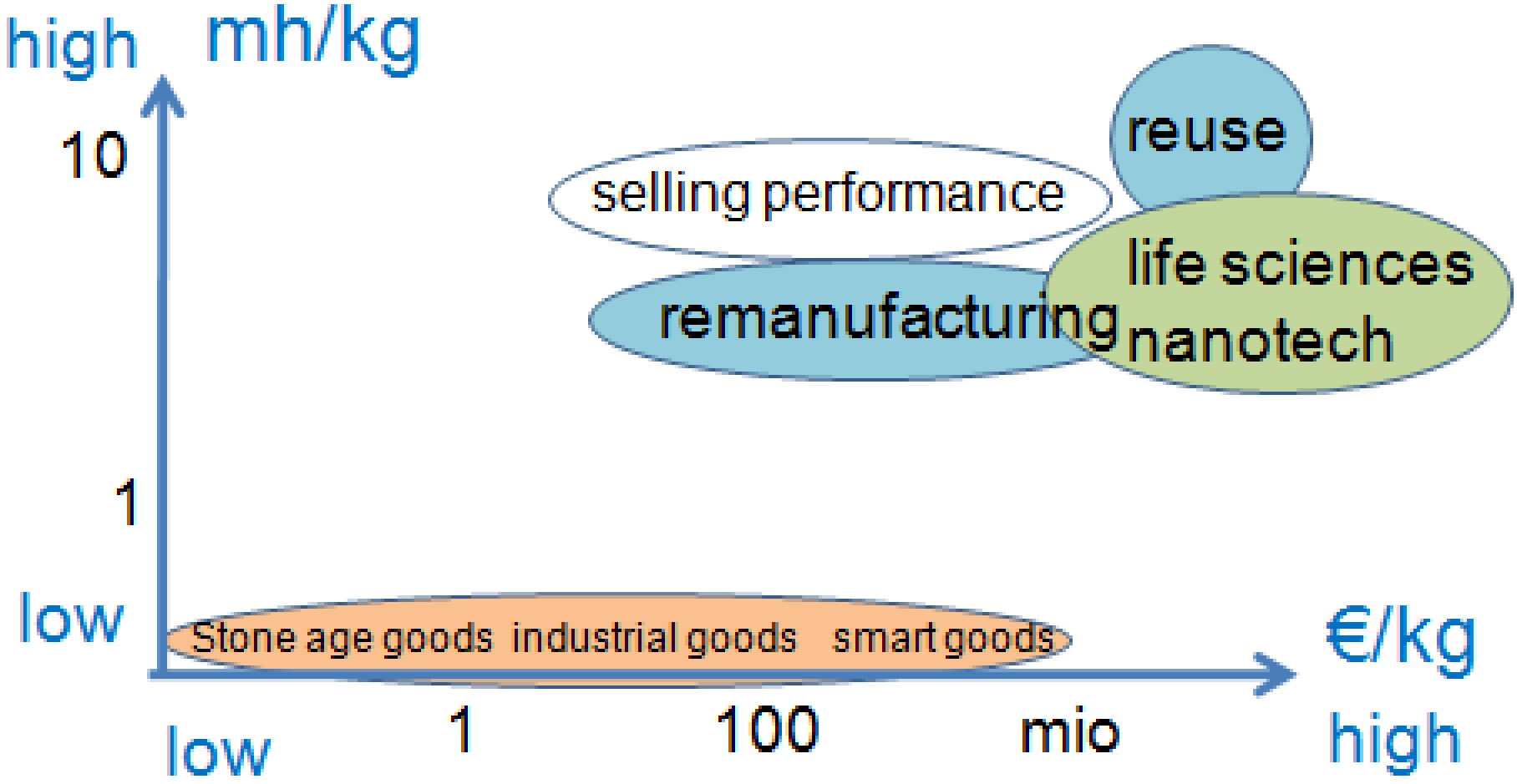
The Performance Economy uses absolute decoupling indicators to monitor more wealth and jobs from less resource consumption



Stahel, The Performance Economy, 2006/2010

Performance sustainability rating of sectors

using absolute decoupling indicators

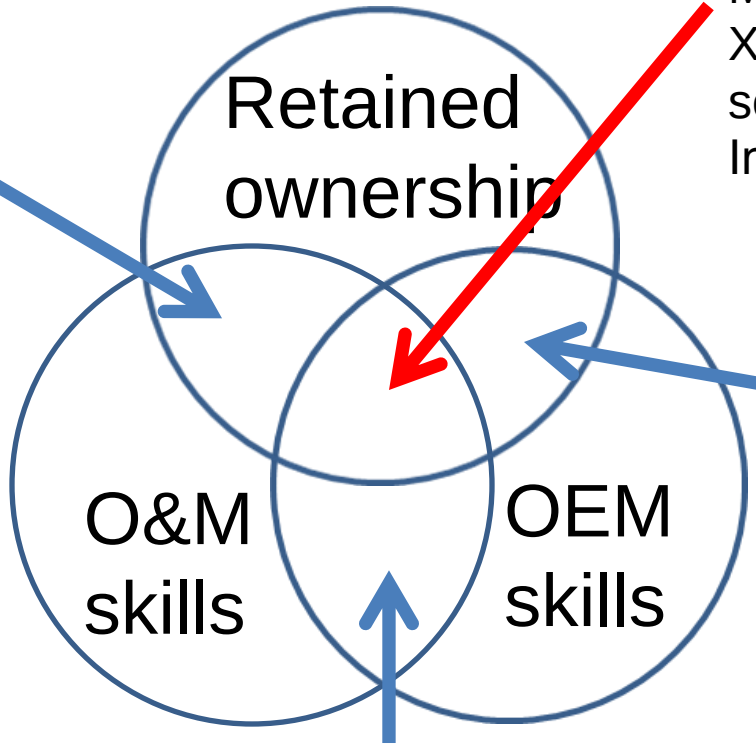


The mh/kg ratio of remanufacturing a car engine is 270 times that of manufacturing a new engine

The business models of the Performance Economy

Selling performance:
Michelin, RR, textile leasing
Xerox, PFI, Space X, DuPont
selling painted car bodies,
Interface's green lease

Fleet managers
selling goods as services:
transport, hotels,
rental goods,
real estate textile leasing



OEMs **selling molecules as services**:
rent a molecule,
chemical leasing,
licence to mine

Performance guarantees: commercial freezers, lifts with service contract, lifelong product guarantees

Systems innovation instead of product innovation, combined with intelligent decentralisation:

Lighthouses have done more for the safety of shipping than any improvement to ships.

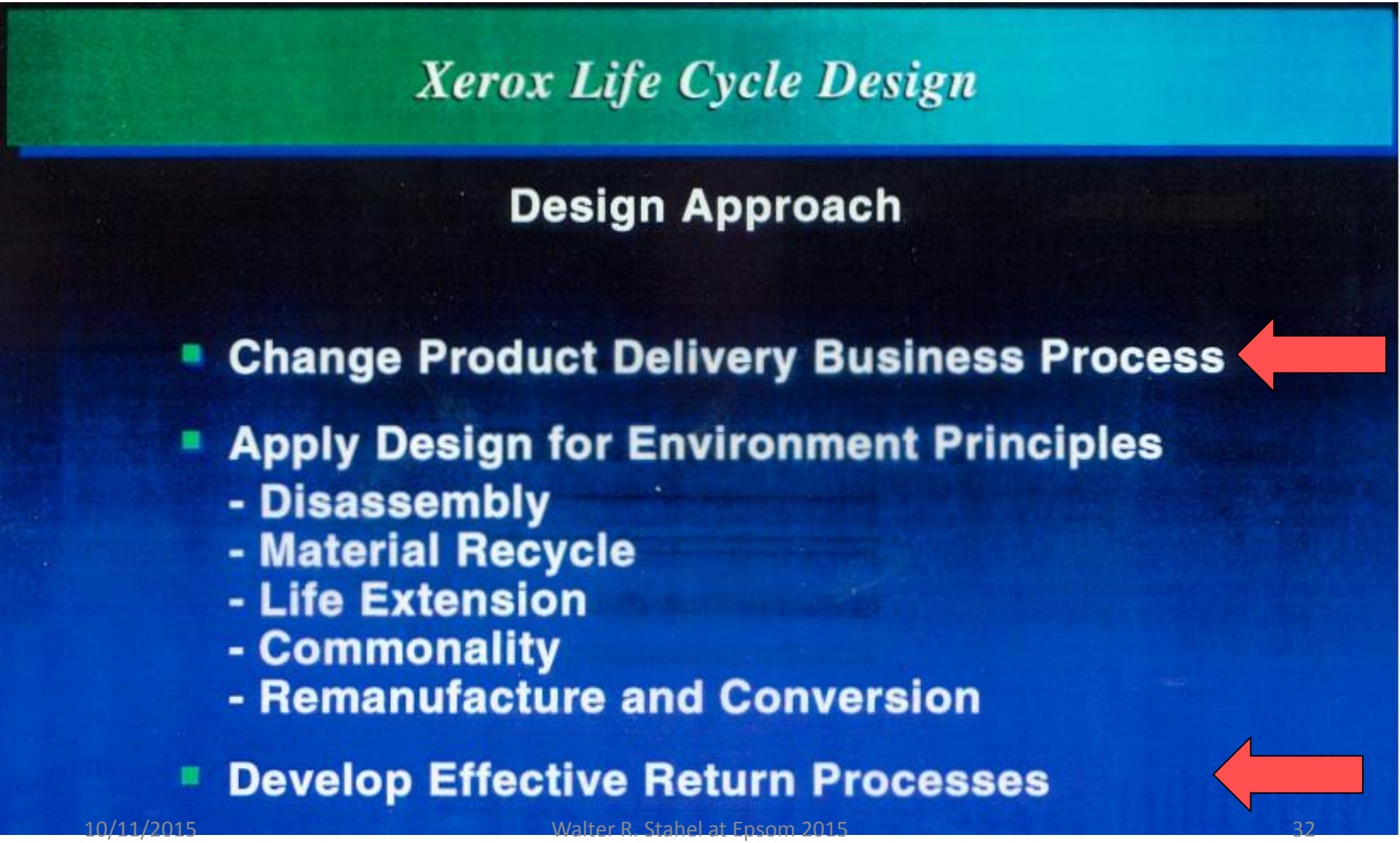
Design integrated in corporate strategy

In a PE, systems design aims for high overall performance, through component standardisation, maintenance-free goods, spare-less repair technologies & in-situ monitoring; longer life goods; technological upgrading.

Design in the PE is an integrated function

whole systems design for lowest life-cycle costs: marketing, **DESIGN,** take-back logistics & reuse, in-house repair-remanufacturing-recycling skills, exploiting sufficiency and efficiency

ECO-DESIGN (DfE) IS ONLY ONE PART OF ‘CORPORATE STRATEGY’ XEROX Corporation, Rochester NY, 1993



Drivers of the CE and PE in the 21st century in industrialised countries

remarket innovation need

- Saturated markets for most goods, (n° of goods sold equals n° scrapped),
- Components outlive goods – **reuse options** (electric motors, microchips, VIP panels, LED),
- Ageing populations and its silver workers,
- Ageing infrastructure need repair/reman R&D,
- Fears of resource scarcities /price jumps,
- Intelligent decentralisation (3D print, repair cafés, energy autonomous buildings),
- *Science and innovation, see the two team project.*

Conclusion: corporate drivers of the PE

- searching for better solutions to serve clients,
- minimizing operation & maintenance costs (e.g. maintenance-free deep water pumps),
- shifts in liability (tobacco, asbestos, next CO_2?)
- hidden (liability) costs (VW USA, Schindler Japan),
- ever increasing compliance costs (e.g. materials' origin),
- rising commodity prices and resource security,
- long-life upgradable parts (reprogram microchips)

to summarise – the CE / PE

will result in

- *a shift from flow to stock management,*
- *a shift from value added to value preserved,*
- *innovation needs (de-alloying alloys, reprogrammable microchips, eBay for used parts),*
- *decoupling wealth and resource consumption,*
- *a regional economy of intelligent decentralisation,*
- *a shift from global supply chains to local supply circles*
- *a substitution of manpower for energy and material,*
- *a shift in the central notion of economic value from exchange value at PoS to use value over the full service-life of goods.*

Thank you for your attention

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Corporate strategies and product groups in the PE

Table 3.2 Key business strategies of the Functional Service Economy

Corporate Strategies and product groups	S1 prevention strategies	S2 manufacturers selling performance, services of results	S3 manufacturers fleet managers with loop responsibility	S4 fleat managers with maintenance & operation responsibility	R independent remanufacturers
	SCIENCE				
consumption goods (fuel)	knowledge -based solutions	vertical integration	an economy in closed loops	utilisation optiimisation	product-life extension
disipative goods (paint)					
catalytic goods (engine oil, solvents)					
durable mobile goods (cars)					
durable immobile goods (buildings)					
		EPeR Extented Performance Responsibiltiy	JOBS job creation potential		

Source: Stahel,Walter (2006) The Performance Economy, Palgrave London

EXAMPLE 1: tyres in the three economies

- LIE: new tyres are sold to vehicle owners, used tyres end up in reuse (sandals, harbours) or waste streams.
- CE: repair, retreading, regrooving, recycling or incineration? used tyres are sold by waste managers to the highest bidder (cement kilns, material recovery or retreaders), (subsidies!)
- PE: stewardship—Michelin sells “tyre-use-by-the mile” to managers of lorry fleets; it repairs and regrooves its tyres in mobile workshops at the clients premises, retreads tyres at regional plants

EXAMPLE 2: cars in the 3 economies

- LIE: manufacturers sell sexy branded cars, with a warrantee limited in time and scope. Cars end up in scrap yards, metals are recovered.
- CE: cars are operated by the owner as tools or toys. Owners decide to have it repaired, remanufactured or scrapped.
- PE: "*autolib"* in Paris offers mobility at a fixed price. Simple no-name electric cars are available throughout Paris for short time; parking at recharge stations and 'fuel' included.

Example 3: design in the 3 economies

- LIE: industrial design optimises production processes, mini costs up to the PoS and maxi sales.
- CE: eco-design is driven by environmental laws and corporate strategy, following 12 principles, with no power on post-PoS decisions by owners.
- PE: systems design aims for high overall results, by component standardisation, maintenance-free goods, spare-less repair technologies & in-situ monitoring; longer life goods; techn. upgrading.