# Concept Symposium 2018
# Governing Megaprojects – Why, What and How

## Opportunities in a Circular (Industrial) Economy & Performance Economy

Circularity is the basis of nature; similarly, a circular society of stewardship and caring has existed as long as mankind: the Global Commons and municipal commons are examples. A Circular Economy of poverty is omnipresent in poor societies and rural areas, where trading second-hand goods and the availability of local repair and maintenance services are the norm. Many of these crafts still exist today, such as blacksmiths, shoemakers, builders and building trades like carpenters, roofers, plumbers and electricians. The modern post-industrial society with markets near saturation for many goods faces three challenges:

- Shifting to a Circular Economy of abundance – the necessity of earlier times has to be replaced by a motivation for sufficiency-efficiency combinations and a caring attitude for existing stocks of objects,
- Moving to a Circular Industrial Economy – the knowledge and technologies of a Circular Economy exist in SMEs and with fleet managers (armed forces, railways etc), but needs to be brought to all classrooms and boardrooms in order to industrialise the Circular Economy and create synergies and motivations to transform the linear industrial economy into a Circular Industrial Economy (CIE).
- Transforming the CIE into a Performance Economy (PE) – a CIE where economic actors retain ownership and internalise all liability. Only a PE is really sustainable and durable, because it is driven by egoistic incentives of higher profits from less resource consumption and waste.

Key tasks to be tackled within these challenges are the adaptation of policy frameworks and public procurement procedures to circularity; new innovative technical and commercial solutions; the introduction of sustainable taxation (do not tax renewable resources including labour, as the CIE substitutes manpower for resources). The issue of ownership and liability, in shifting from hardware to systems solution (IoT), has to be clarified. Drivers need to be identified and pushed, and obstacles to be overcome, as a matter of competitiveness!

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Founder-director of The Product-Life Institute Geneva
Switzerland

***The Concept Symposia on Project Governance***

*The Norwegian Ministry of Finance and the Concept Research Program hosts every second year a symposium on project Governance. Project governance, in brief, is concerned about investments and their outcome and long-term effects. In view of the problem at hand, the aim is to ensure that the best conceptual solution is chosen, that resources are used efficiently and anticipated effects realized. Resource persons from ministries, governmental agencies, academia, international organizations, and industry are invited. In order to facilitate professional exchange and direct communication between participants, the number of individuals is restricted. The aim is to initiate further international cooperation and research on important issues related to project governance.*

8th concept symposium on project governance
Stavanger, 6 September 2018

# Opportunities in a Circular (Industrial) Economy and Performance Economy

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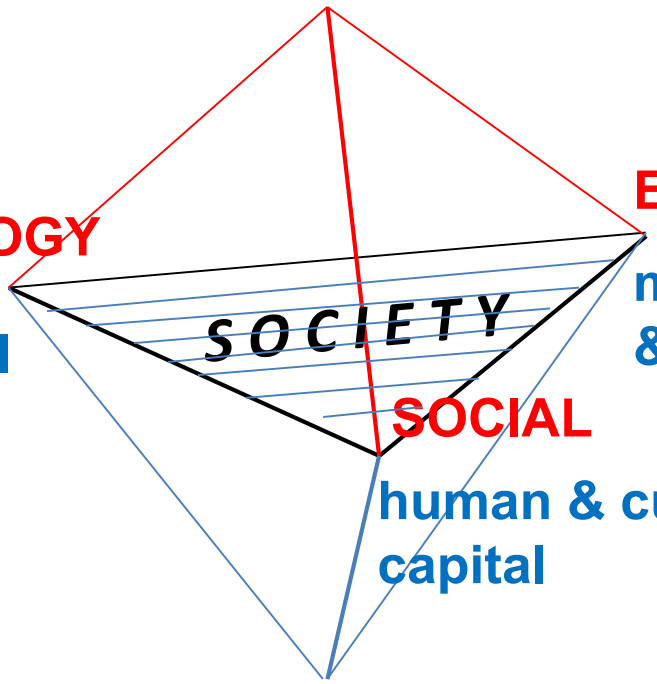
**OBJECTIF:** *HAPPINESS*

**QUALITATIVE** *WORLD*




**OBJECTIF:** *MANAGING CAPITALS*

**CIRCULAR INDUSTRIAL ECONOMY**

**PHYSICAL** *WORLD*

SITUATING SOCIETY, SUSTAINABILITY AND A CIRCULAR INDUSTRIAL ECONOMY

# Three economic options – their values and drivers

- **FLOWS** – the Linear Industrial Economy: value added, driven by emotion, fashion and progress; ends at the Point of Sale.
- **STOCKS** - the Circular Industrial Economy: use value maintained (Q&Q of stock), driven by systems innovation; starts at the Point of Sale.
- **PERFORMANCE** or pay-per-use **ECONOMY**, guaranteed results, driven by competitiveness, points of service replace the point of sale.

*http://product-life.org/en/3ecos*

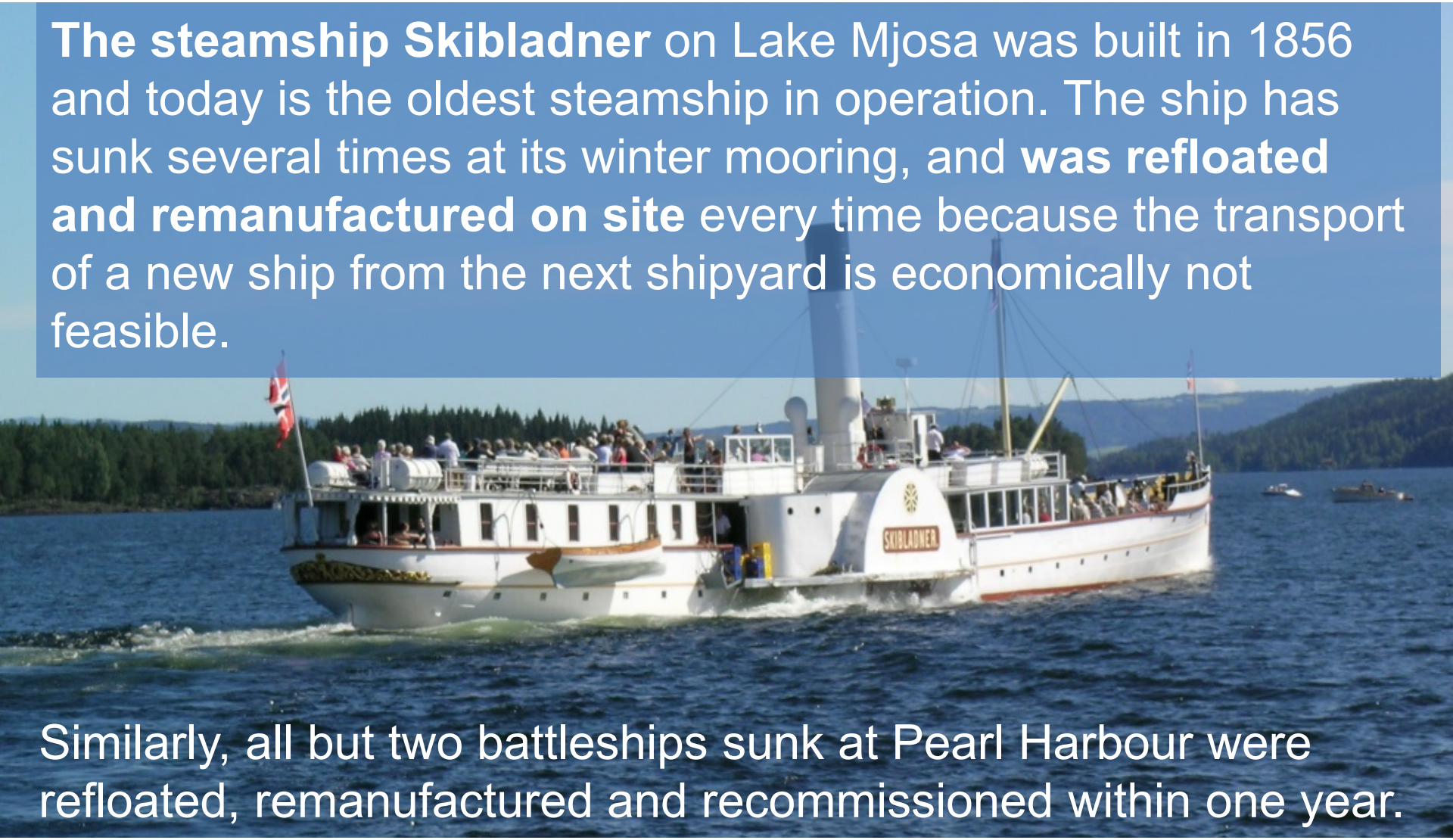
# what drives circularity ?

- Circularity in nature: water and solar cycle, $CO_2$, seasons, marine tides, ruled by nature.
- Reuse-CE of poverty, scarcity: remote areas, LDCs and poor people, driven by **necessity**
- C **I** E of saturated markets (abundance): most goods in industrialised countries, driven by **personal motivation, owners' caring**
- Circular Society: sufficiency, self-help & solidarity (repair cafés, Commons), religion (Amish, Buddhism), driven by **conviction**.

& eco-nomics

# CIE of common-sense necessity

**The steamship Skibladner** on Lake Mjosa was built in 1856 and today is the oldest steamship in operation. The ship has sunk several times at its winter mooring, and **was refloated and remanufactured on site** every time because the transport of a new ship from the next shipyard is economically not feasible.




Similarly, all but two battleships sunk at Pearl Harbour were refloated, remanufactured and recommissioned within one year.

**Linear**
Industrial Economy
**producer controlled flow**

PoS

**Circular**
**Society & Economy**
**owner controlled use**


**FLOW**
**VALUE ADDED**
global supply chains

Transfer of **ownership** and liability

**STOCKS of objects**
reusing goods & components
**VALUE MAINTAINED**
regional loops

Extended producer liability

**STOCKS of materials**
recovering molecules for reuse
**PURITY MAINTAINED**
global loops?

Source: Stahel, Walter R. (2018) Circular Economy for Beginners, Routledge, London

# Two distinct forms of the Circular Economy, **value** and **trust** in an object's '**function**' as common foundation.


**Circular Economy of changing ownership**


**Performance Economy of retained ownership**

# Where is the innovation in a Circular Industrial Economy (CIE) ?

- **techno-commercial innovation to reuse and extend the service-life of built and manufactured objects**,
- **technology innovation to recover atoms & molecules** (materials),
- **social innovations** (repair cafés, caring),

**Substitution of manpower for energy and materials**, reduced environmental impacts.

# **The challenges of a CIE**: innovation and spreading the knowledge

**The era of 'R'**: techno-commercial strategies to reuse, repair, remarket, remanufacture re-refine, recycle, reprogramme goods

**The era of 'D'**: technologies and policies to de-polymerize, de-alloy, de-laminate, de-vulcanize, de-coat materials, de-construct.

**R&D challenges**

**Spreading the CE knowledge** – technical and economic – to class- and boardrooms, to academia & technical training institutions to new professions (vehicle restaurers)

**education challenge**

# Why foster a CIE ?

To greatly reduce waste and emissions,
create local jobs,
reduce costs, increase competitiveness
and resource security.

# The Circular Economy is local, quiet, ecologic

No logistics- and shopping Centers

No ports, ships, trains

little packaging,

little global distribution logistics

little publicity

No warehouses on wheels, trucks at the Brenner pass

No delivery drones ?

# Why: societal benefits of circular economy

in comparison to the present economy Sweden & 6 countries:
**macro-economic I/O *Study*** *by Skanberg-Wijkman 2016.*

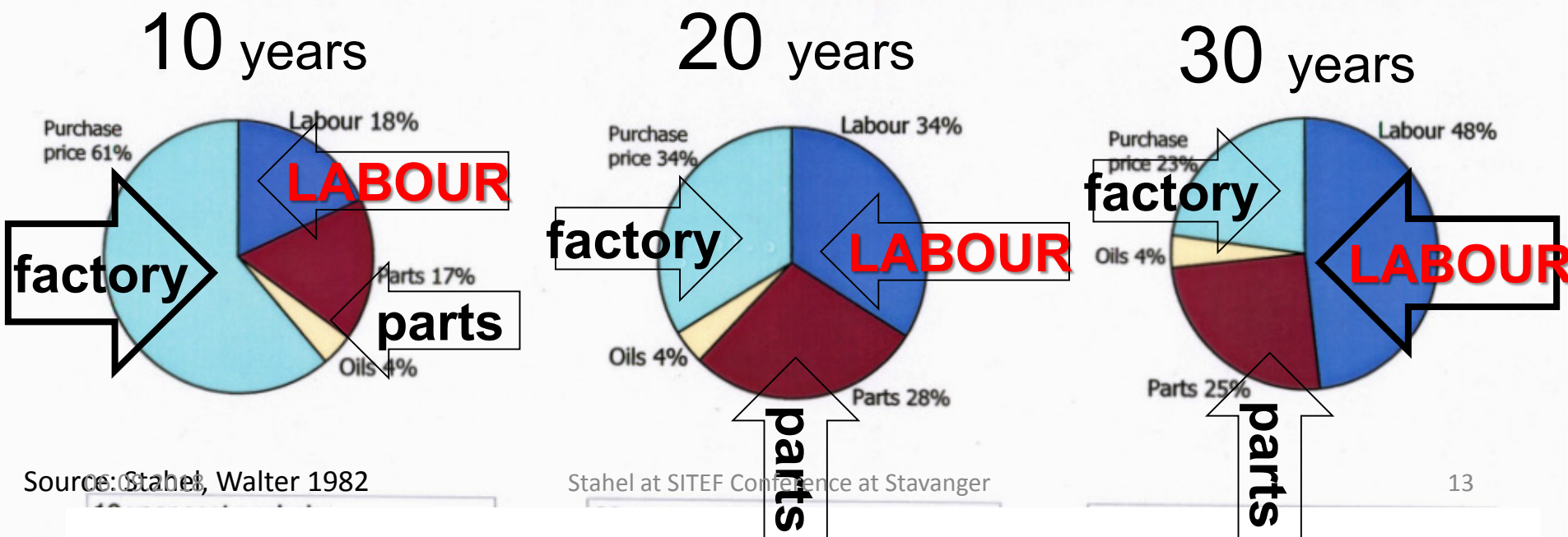
| | circular scenario | energy efficiency | material efficiency | combined scenario |
|---|---|---|---|---|
| **GHG** | **— 50,1%** | **— 28%** | **— 5%** | **— 66%** |
| additional **jobs** | **+ 100'000** | **+ 200'000** | **+>300'000** | **+ 4% +>500'000** |
| **trade balance** | **+ 0.4%** of GDP | **+ 0.4%** of GDP | **+ 0,2%** of GDP | **+ 0,25%** of GDP |

In effect, a substitution of manpower for energy.

*http://www.clubofrome.org/wp-content/uploads/2016/03/The-Circular-Economy-and-Benefits-for-Society.pdf*

# Societal benefits of the Circular Economy **micro-eco**: **product-life extension creates local jobs** and **prevents waste** **(substituting manpower for energy)**

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




Source: Stahel, Walter 1982

# In-house reman by fleet managers pays ! value maintained $ 120mio, spent $30mio

Remanufacturing of a passenger jumbo to cargo

| | B747-400F Existing Cargo | B747-400SF Remanufactured Cargo |
|---|---|---|
| Max. Takeoff load | 394 t | 394 t |
| Max. Payload | 117 t | 115 t |
| Max. Range | 8241 km | 7593 km |
| Costs of purchase/remanufacturing | $150 million | $30 million |
| Number of parts | | 42000 |

Savings 80%

Source: Chosun Daily Newspaper, 2 May 2007

# ICE 1 Redesign

**87% cost advantage**

In 1995, the 59 trains of German Rail had been in service for 15 years, covering 15 million km each.

- Redesign costs were **€ 3 million** per train, versus **€ 25 million** for a similar new train.
- Redesign **preserved 80%** of resources - 16'500 tons of steel, 1180 tons of copper, **prevented** 35'000 tons of $CO_2$ emissions & 500'000 tons of mining waste *per train*.

The Redesign included a technological upgra of the rolling stock, and allowed to add seats.

**80% green advantage**

# Mass remanufacturing substantially reduces costs, resources consumed, waste, emissions

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

- **lower economic costs (30-53%),**

**The reason why manufacturers love remanufacture**

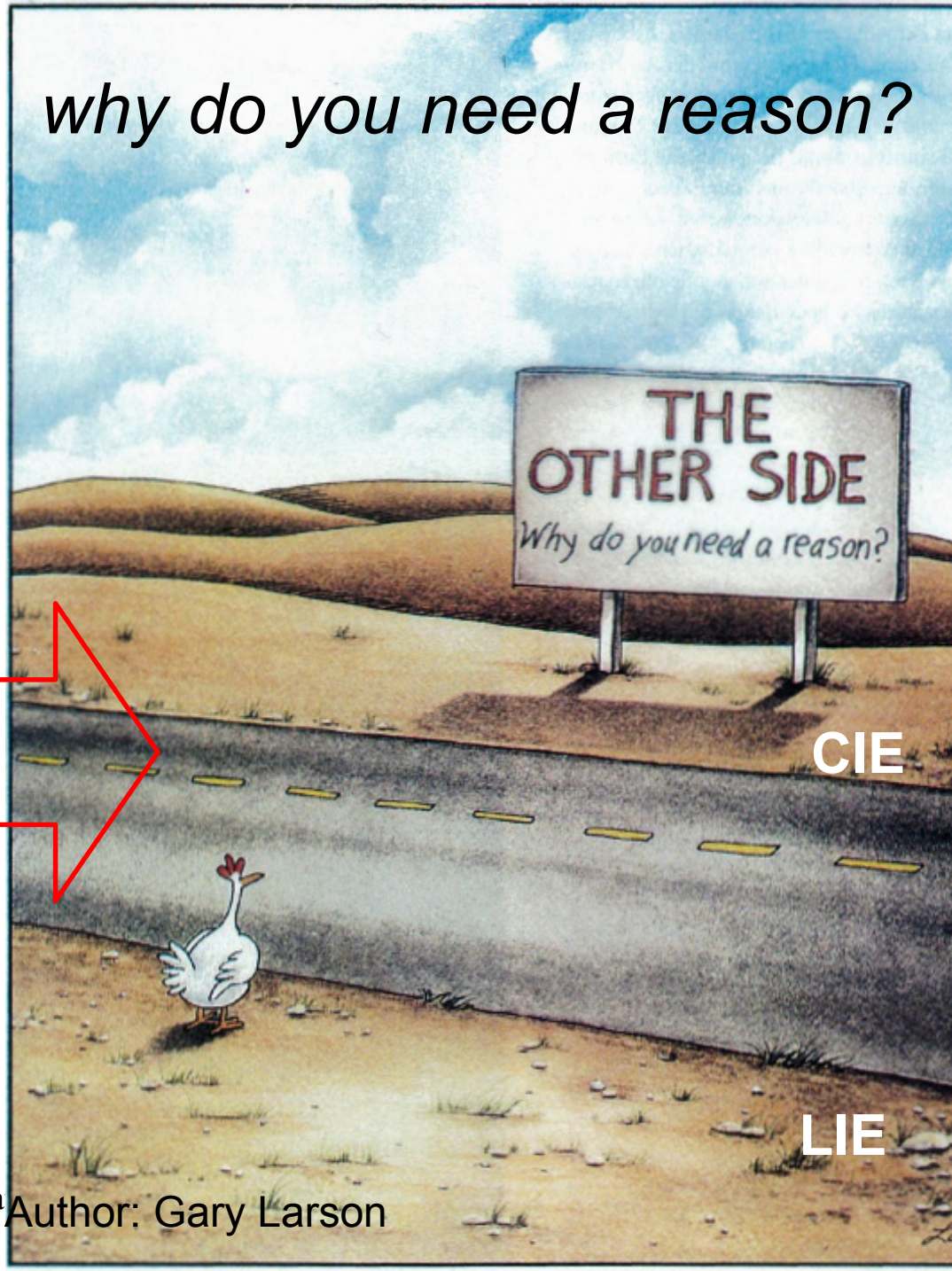
- **lower material consumption (26-90%),**
- **lower waste generation (65-88%),**
- **lower energy consumption (68-83%),**
- **lower emissions (50-88%)**
  - **73-78% less** carbon dioxide ($CO_2$),
  - **48-88% less** CO,
  - **72-85% less** NOx,
  - **71-84% less** SOx,
  - **50-61% less** non-methane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

**The reason why policymakers should love remanufacture**

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

# THE OTHER SIDE – *why do you need a reason?*

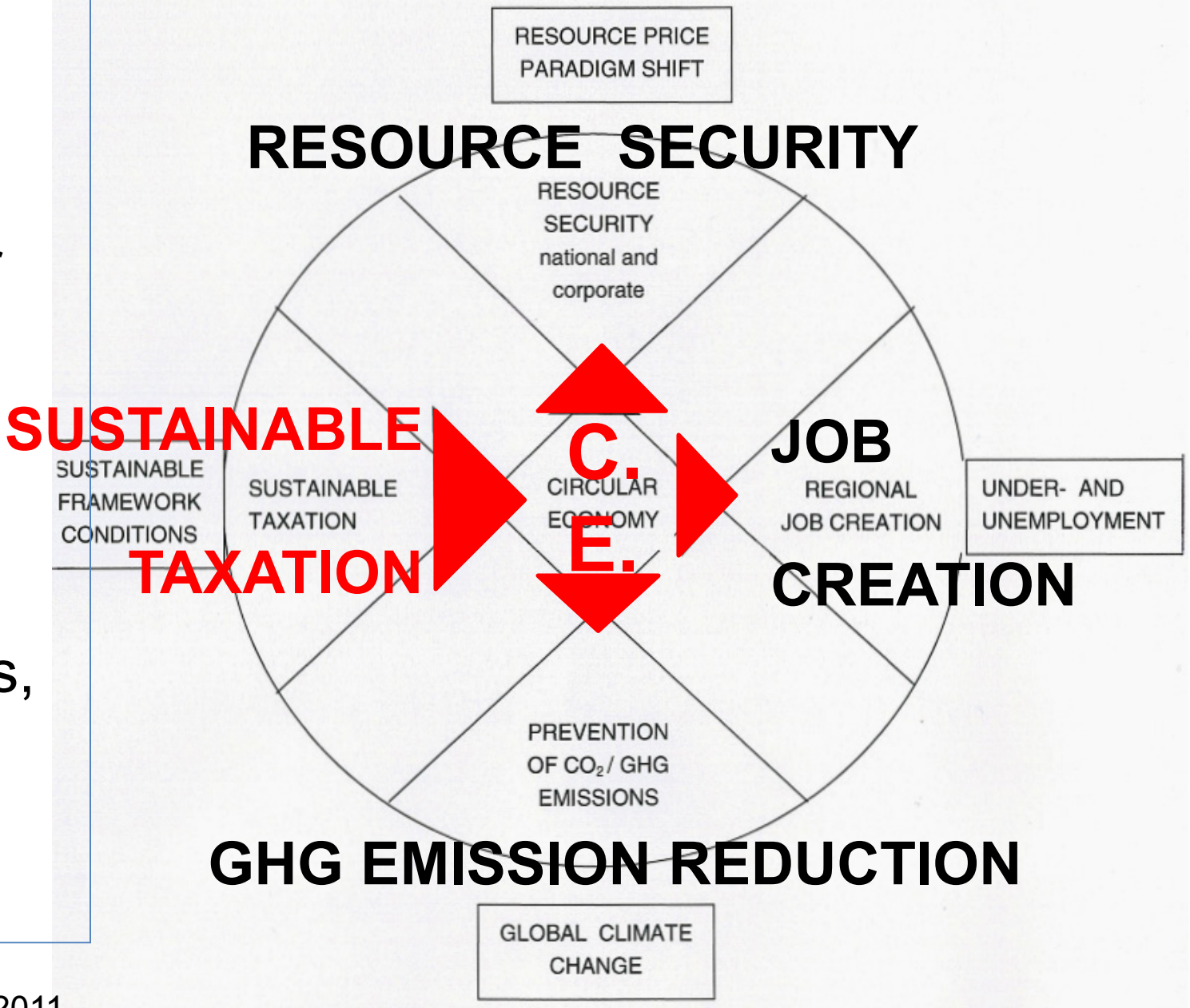
*framework conditions:*
*taxes & VAT,*
*producer liability,*
*education & training,*
*public procurement,*
*incentives*




Author: Gary Larson

**Not taxing labour**
boosts
the Circular Economy,

increases
resource
security,
creates jobs,
prevents
GHG
emissions



# Policy as driver & obstacle

In 2006, **China**'s Nation Development and Reform Commission (NRDC) presented the CIE as an alternative development model, integrated into the five year plan of economic and social development, and in 2008 released the Circular Economy Promotion Law, endorsed in 2009.

In 2016, **Sweden**'s Parliament halved TVA on repairs and made labour costs of repairs deductible from income tax.

In 2017, the **Europe**an Commission and EESC launched the European Circular Economy Stakeholder Platform (#CEStakeholderEU).

Policy as obstacle: Austrian energy farmers, producing heat from forest waste for sale to nearby buildings

# Buying performance in public procurement

**NASA buys commercial (launch) services**, not hardware, **only specifying mission unique requirements**

## NASA Launch Services Program

**U.S. Space Transportation Policy**

Commercial Space Transportation: **U.S. Government agencies shall "purchase commercially available U.S. space transportation products and services to the maximum extent possible . . . "**

**NASA Strategic Plan**

". . . It is imperative that all reasonable measures be taken to assure launch success." NASA will encourage a more competitive market to lower launch costs and provide better ROI to taxpayers

**Launch Services Program**

NASA buys commercial launch services, not hardware. NASA specifies mission unique requirements

# selling cheap space transport services using reusable rockets

propulsive rocket **landings**


New Shepard, Blue Origin,
Jeff Bezos (Amazon)

Falcon 9, Space X,
Elon Musk (Tesla)

# Public procurement

**Example: Private Finance Initiatives (PFI)**
Le Viaduc de Millau,

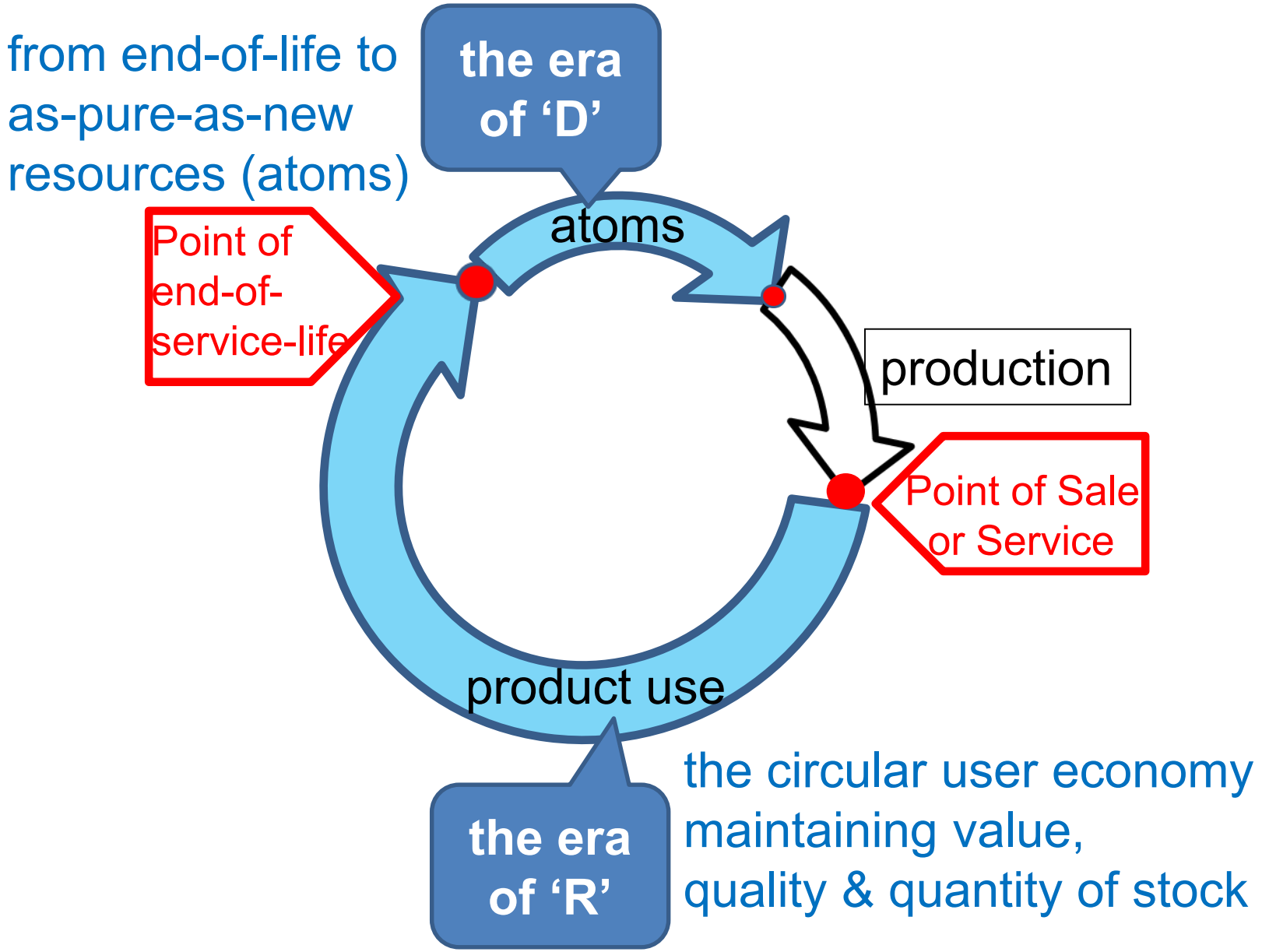
a 2001 **78-year contract** to design, finance, build and operate the bridge till 2079, with a maintenance contract until 2121

Le pont de Millau, France

# How to foster a CIE?

understand the issues,
identify the opportunities,
take action.

# The material loops of a mature CE



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

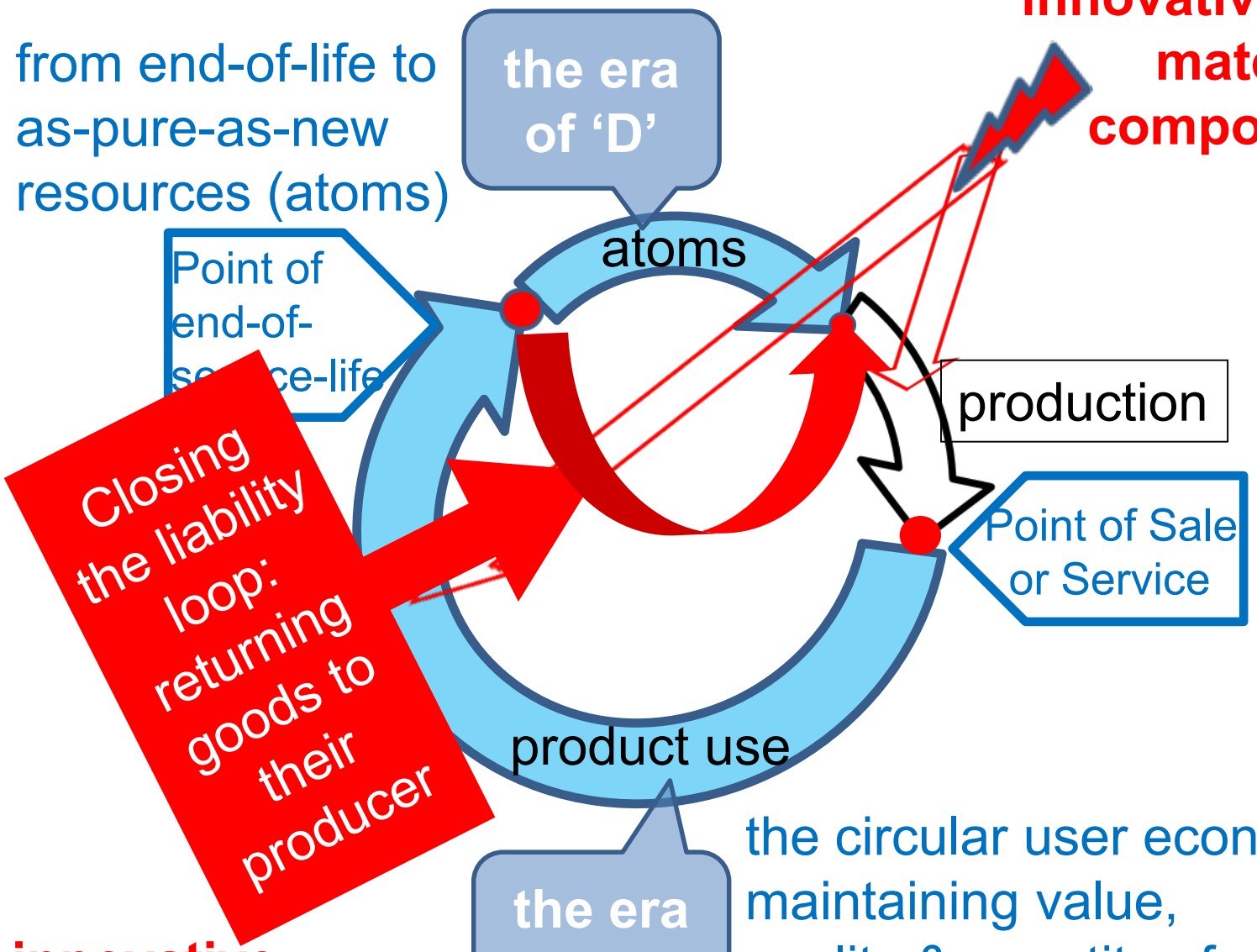
- the smaller the loops the more profitable and resource efficient they are (e.g. local reuse),
- the smaller the batch size, the more profitable,
- loops have no beginning and no end,
- the low speed of the circular flow is crucial, the law of reverse compound interests applies,
- It substitutes manpower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

# Value retained in the Swedish materials system

| | **Material value** in billion SEK | | ***in %*** | in bio SEK | **% of $m^3$ / tons** |
|---|---|---|---|---|---|
| | at end of use before collection | retained after one full cycle | | material value lost | national recycling statistics |
| all materials | 55 | 13 | ***24*** | 42 | *n.a.* |
| Steel | 29 | 9 | ***32*** | 20 | *75-95%* |
| Alu | 3.1 | 1.2 | ***40*** | 1.2 (- e) | *high* |
| Plastic | 10 | 0.8<br>+7% energy | ***8***<br>*15* | 92 | *53%* |

Material economics (2018) Ett värdebeständigt svenskt materialsystem (Retaining value in the Swedish Materials System. English Summary)

# The immaterial loops of a mature CIE



# Closing the liability loop through a an Extended Producer Liability policy

Society is a game of values, ownership and liability:

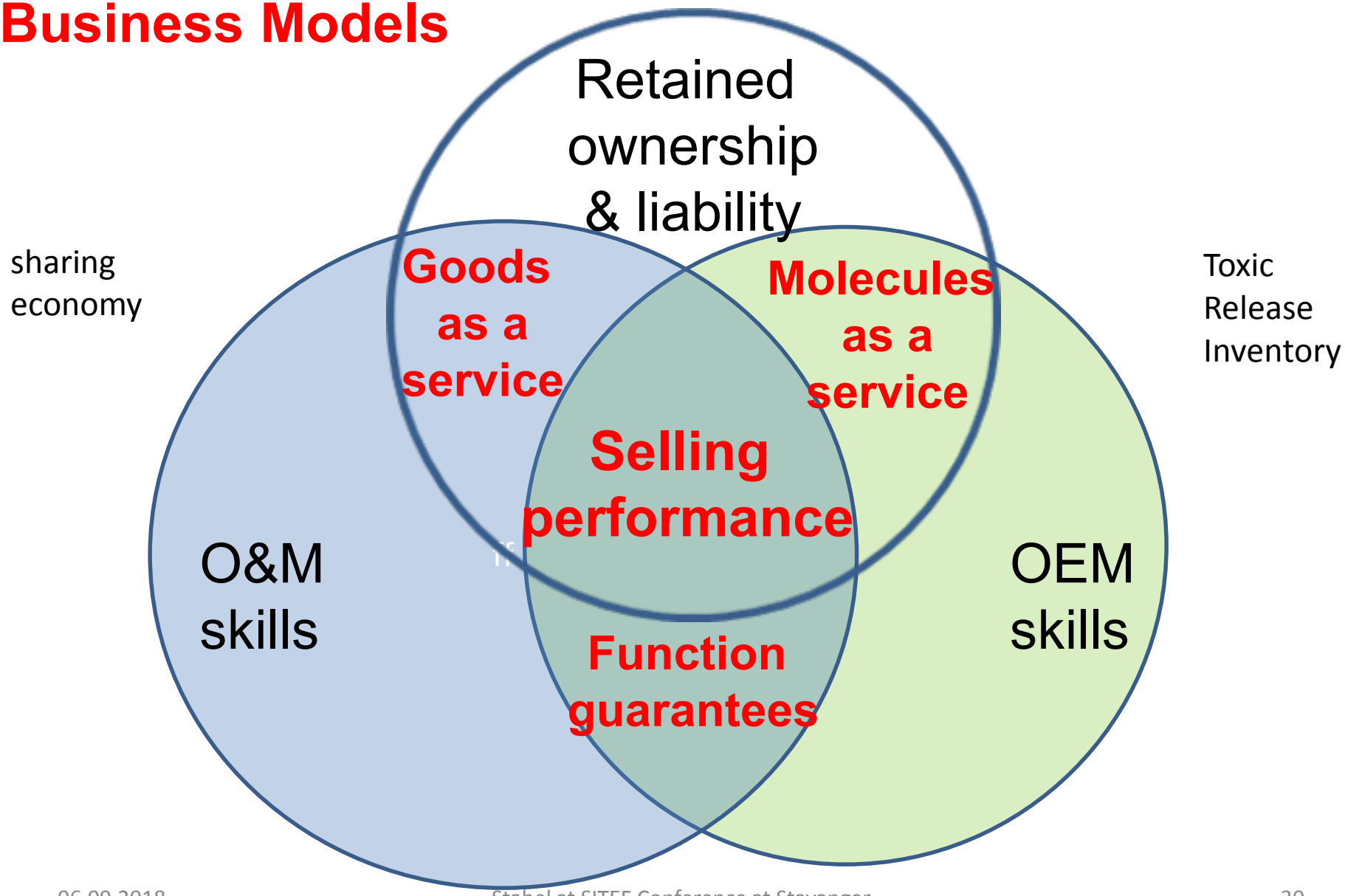
- waste is objects with no positive value and no legally liable owner, so
- give objects a positive value (material or immaterial),
- legislate an ultimate liable owner (ULO),

and economic actors will start shifting to a Performance Economy for profit reasons.

The Performance Economy:
selling performance,
renting (serial use),
use sharing (public transport),
IoT - the Internet of Things,

is a CIE with retained ownership and
internalisation of all liabilities and
costs of risk and of waste.

# Performance Economy Business Models



**Public** trains, concert halls, parks
**rent, share or lease** goods, space

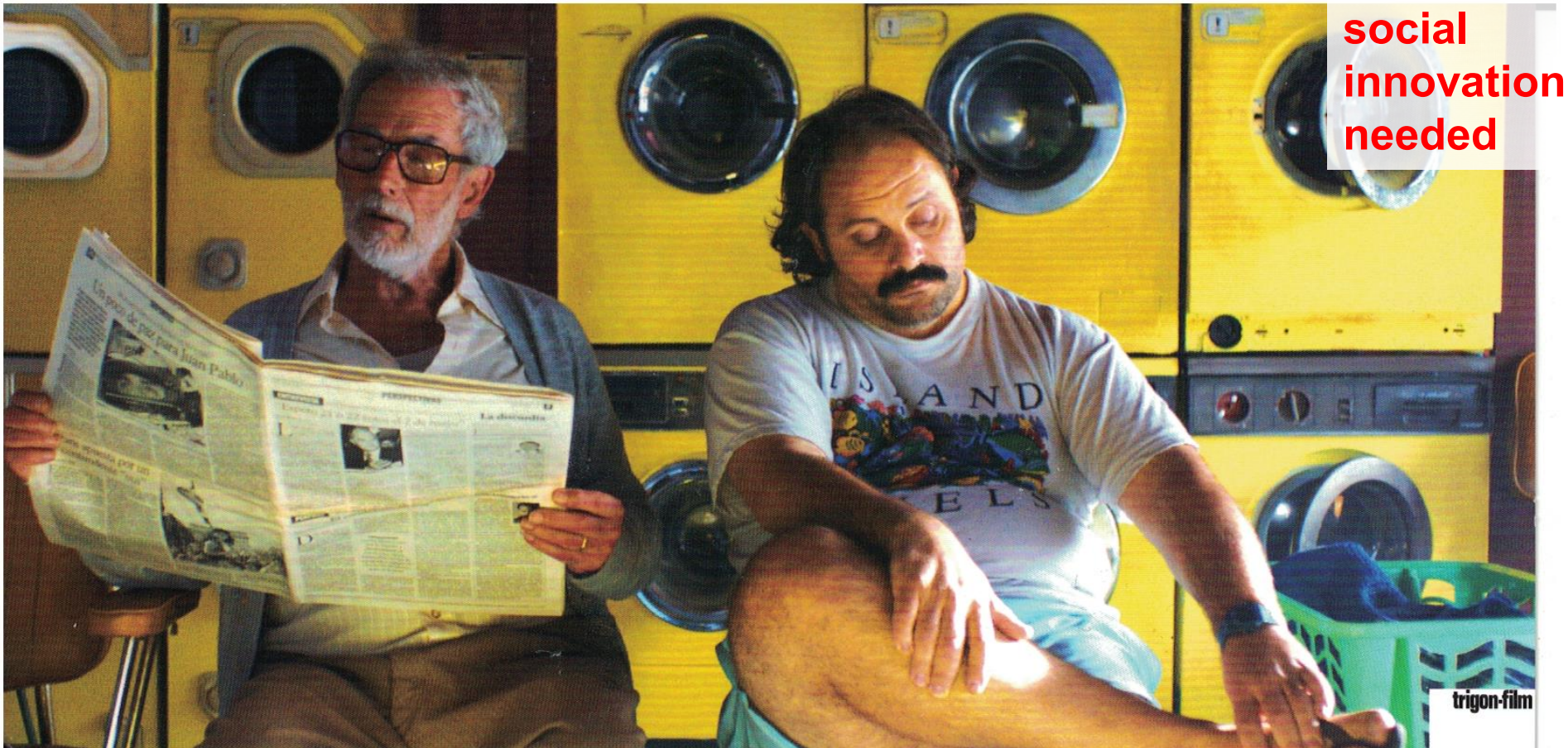



**Hired mission-critical equipment**, maintenance and tech updating are done in the factory on land

# USM modular furniture as corporate strategy

# Driver & obstacle: social system design innovation

Laundromats need to be combined with animation, dancings, internet cafés, sewing, to make them attractive for (single) clients; playgrounds?



# Performance Economy opportunities

Buying / selling performance is a policy to promote the national economy:

- promotes a more intensive use of rental goods
- enables to profitably exploit sufficiency, tilling at night, green vineyards,

and opens new fields and opportunities:

- "pay on performance" for pharmaceuticals,
- systems innovation (lighthouses, GPS farming).

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

**Systems solutions** instead of product innovation are part of the Performance Economy

# The Performance Economy

*Second Edition*

Walter R. Stahel

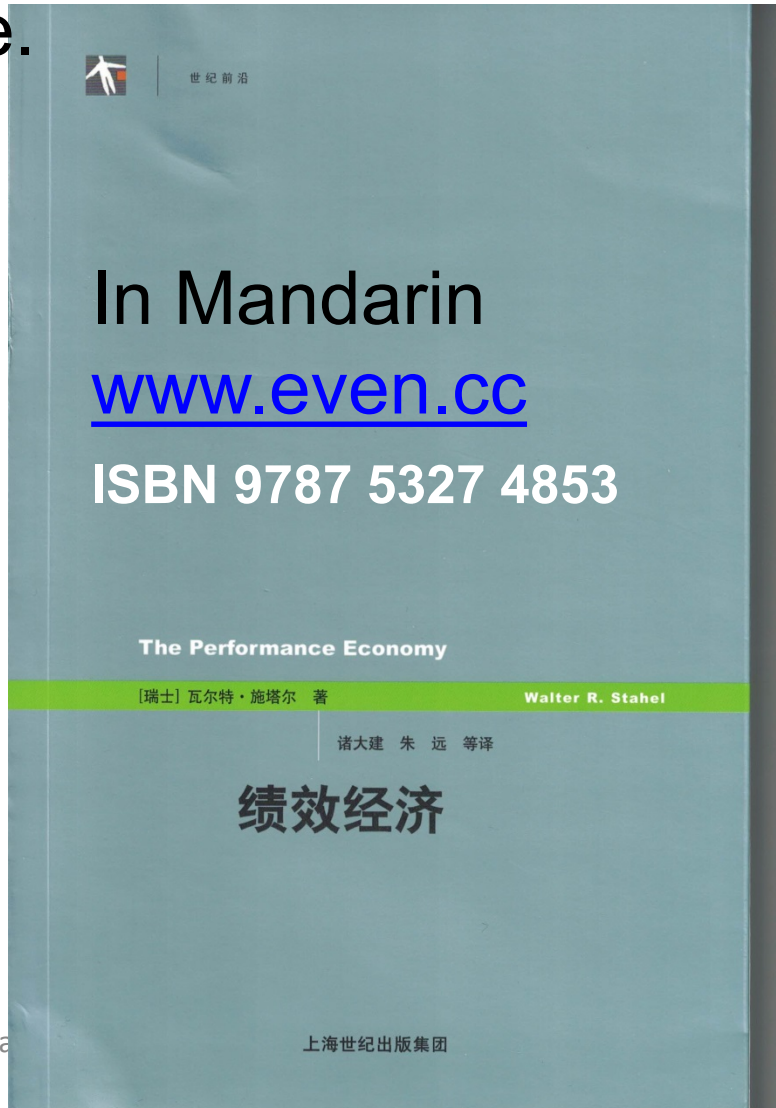
***Real wealth is based on use, not ownership***

*Aristotle*

Palgrave Macmillan London, March 2006, 2010

- Producing performance,
- Selling performance, and
- Maintaining performance over time.

NEW ?





# Thank you for your attention

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