# Belgian Royal Academy of Sciences

## Chaire Lavoisier
## Brussels, 15 September 2016

# The future of Europe:
# Co-creation and sustainability

## Domenico ROSSETTI di VALDALBERO

# Contents

## The future of Europe

➢ **A challenging world**
➢ **EU under pressure**
➢ **Future of work**

## Co-creation and sustainability

➢ **An open and forward-looking European Union**
➢ **Progresses and risks in man-technology nexus**
➢ **European sustainable lifestyles**

# CO-CREATION AND SUSTAINABILITY

# *AN OPEN AND FORWARD-LOOKING EUROPEAN UNION*

# Beyond silos

➢ *Mens et manus*

➢ **Theory and practice**

➢ **Coordination across sectors and among disciplines**

➢ **Connections between public and private**

➢ **Top-down and bottom-up measures**

➢ **Links between formal (eg. Institutions and bureaucracy) and informal processes (eg. Social networks and voluntary actions)**

**Source: D. Rossetti**

# Co-creation facilitated by Internet



**Source: Excelacom, 2016**
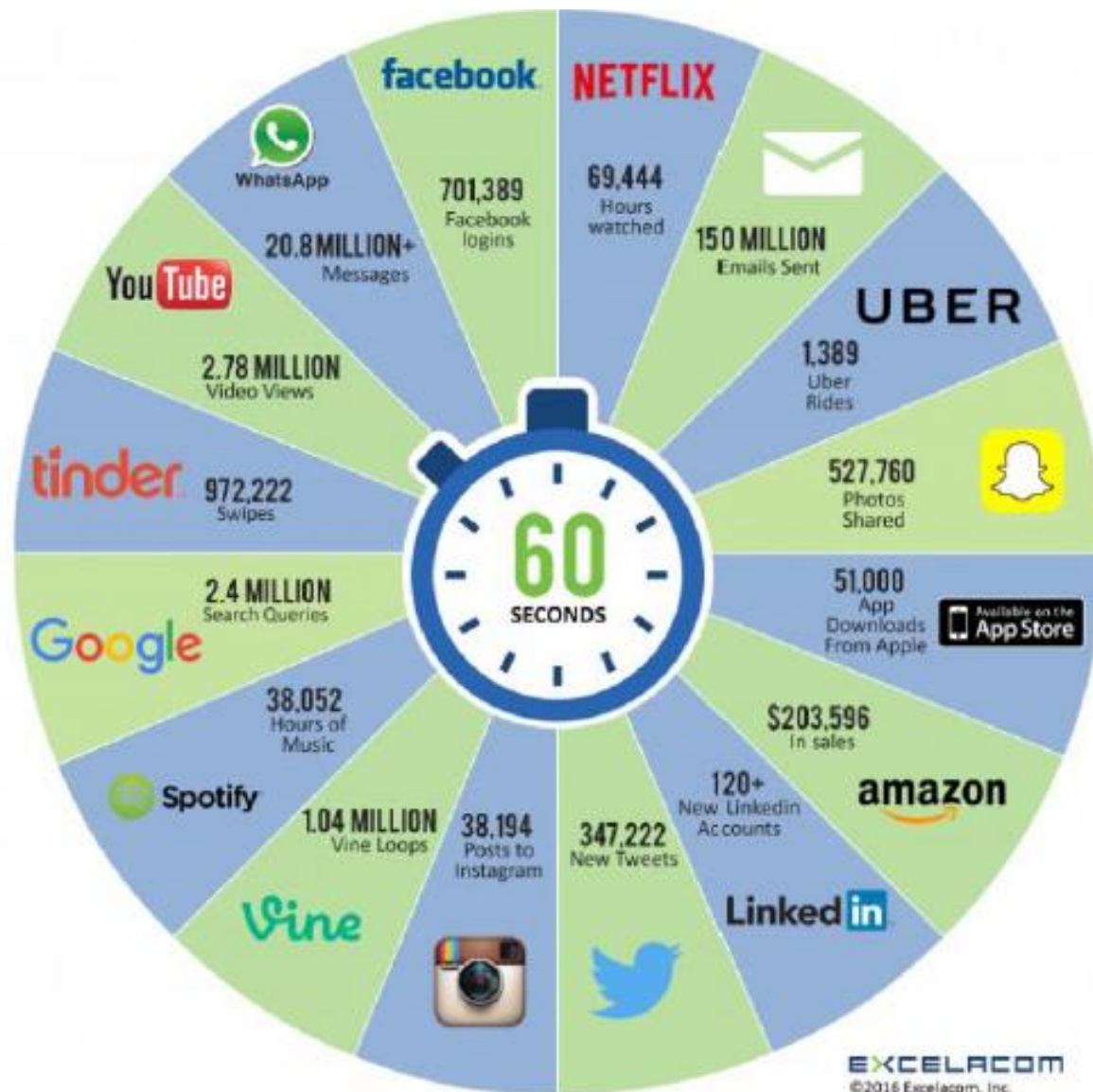
# Big data

- **Billions of records from different sources**
- **New units of measurement (beyond MB and GB):**
  - ❑ **Zettabytes ($10^{21}$)**
  - ❑ **Yottabytes ($10^{24}$)**

- **Sophisticated multiple storage devices**
- **Permanent influx of data**

**Source: EC, Commission en Direct (L. Augustyniak)**

# Industry and (digital) technologies



**Source: PwC**
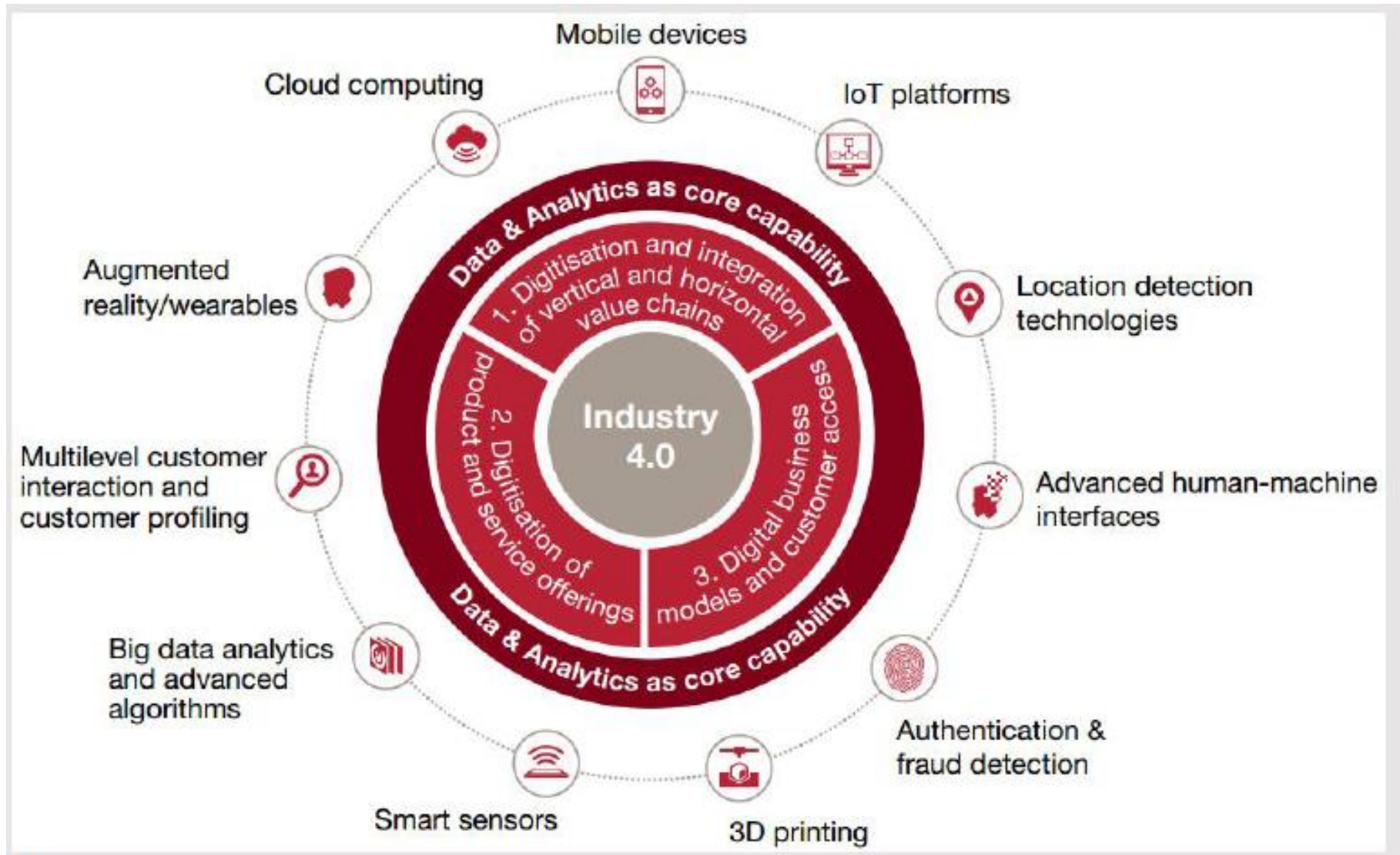
# Customer interface – radical change

- Uber, the world's largest taxi company, owns no vehicles

- Facebook, the world's most popular media owner, creates no content

- Alibaba, the most valuable retailer, has no inventory

- Airbnb, the world's largest accommodation provider, owns no real estate

**Source: Tom Goodwin, Havas Media**

# Knowledge management and co-creation

➢ **To help the organisation being more effective**

➢ **To structure the way colleagues collaborate**

**By improving:**

- ❑ **Collaboration of individuals / small groups**

- ❑ **Levels of transparency, "silo-breaking"**

- ❑ **Collaboration of organisational entities**

- ❑ **Business processes**

- ❑ **Communication and Intranets**

- ❑ **Formal organisational knowledge bases**

- ❑ **Staff motivation**

**Source: EC, DG RTD, R5**

# 3 Commission 'Os'

Commissioner Moedas:

*The **advent of digital technologies** is making science and innovation more **open, collaborative and global**. These exchanges led me to set three goals for EU research and innovation policy:*

➢ *Open Innovation*
➢ *Open Science*
➢ *Open to the World*

**Source: EC, DG RTD, A vision for Europe**

# Open Innovation

**The basic premise of Open Innovation is to open up the innovation process to all active players so that knowledge can circulate more freely and be transformed into products and services that create new markets, fostering a stronger culture of entrepreneurship**

**Source: EC from Henry Chesbrough, 2003**

# Open vs. Closed innovation principles

| CLOSED INNOVATION PRINCIPLES | OPEN INNOVATION PRINCIPLES |
| --- | --- |
| The smart people in our field work for us | We need to work with smart people inside and outside our company |
| To profit from R&D, we must discover it, develop it, and ship it ourselves | External R&D can create significant value |
| If we create the most and the best ideas in the industry, we will win | If we make the best use of internal and external ideas, we will win |
| We should control our IP, so that our competitors don't profit from our ideas | We should profit from others' use of our IP, and we should buy others' IP whenever it advances our own business model |

**Source: Henry Chesbrough, 2005**

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# Ecosystem for co-creation

| Actions needed |
|---|
| Put open innovation and knowledge transfer in the spotlight |
| Embrace innovative businesses, grow innovative markets, innovation hubs and networks |
| Make Universities and PROs more entrepreneurial |
| Smart integration of capital into the ecosystem |

**Source: EC, DG RTD, Open innovation report, 2014**

# Open Science
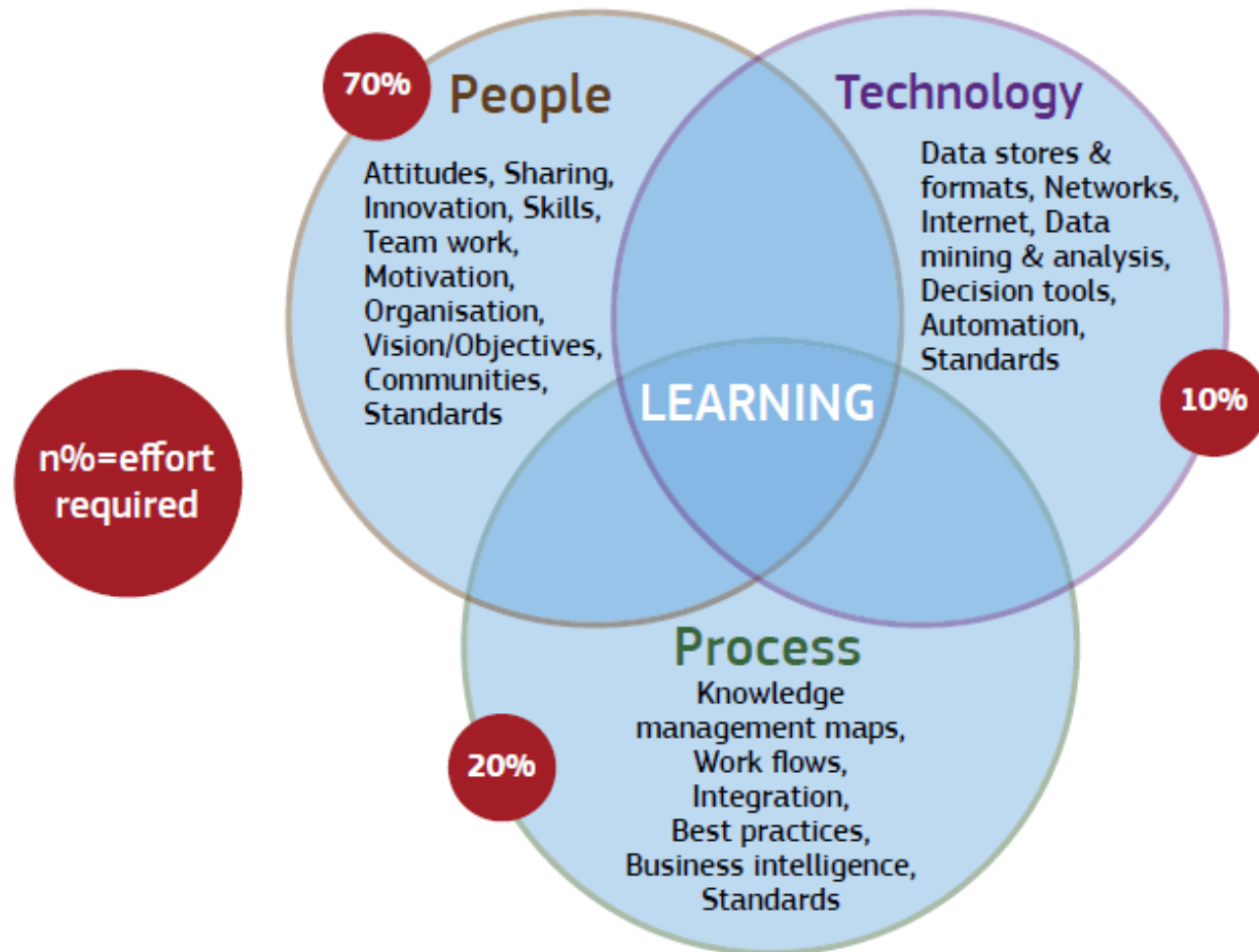


**Source: EC, DG RTD, A vision for Europe**
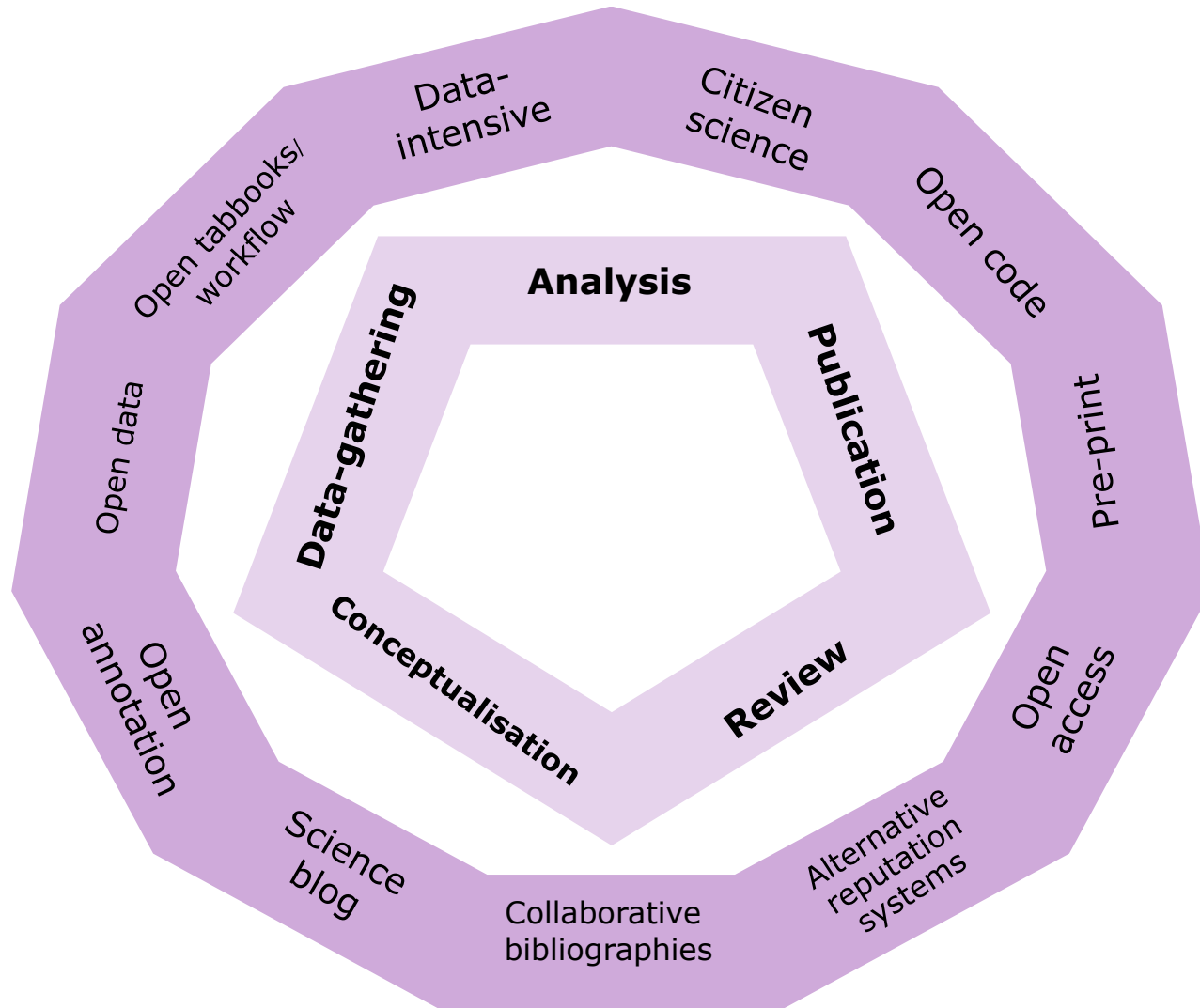
# Co-production of knowledge

➢ **Mode 1 : Academic monopoly of knowledge production**
   *Discipline based*

➢ **Mode 2 : Co-production of knowledge**
   *Problem-orientated and trans-disciplinary*

**Impact: - Positive societal and/or economic difference**
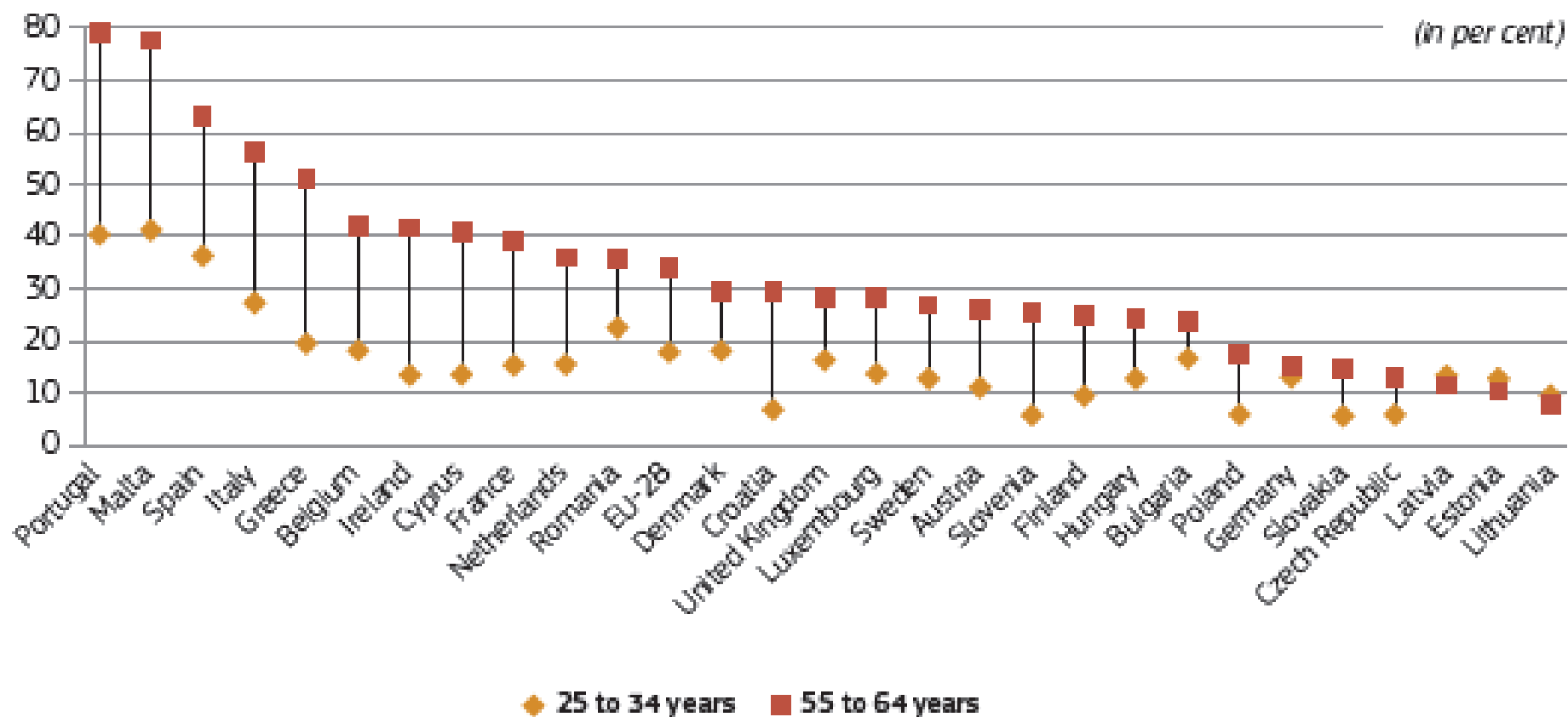**- More likely if research coproduced**

**But: Academic promotion linked to top journals controlled by disciplines – Potential changes with Open Access?**

# Values and knowledge components



70% **People**
Attitudes, Sharing, Innovation, Skills, Team work, Motivation, Organisation, Vision/Objectives, Communities, Standards

**Technology**
Data stores & formats, Networks, Internet, Data mining & analysis, Decision tools, Automation, Standards
10%

n%=effort required

LEARNING

20% **Process**
Knowledge management maps, Work flows, Integration, Best practices, Business intelligence, Standards

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**Source: EC, DG RTD, NET4SOCIET (Th. H. Davenport)**

# Education

## Population without secondary education (by age group)



Source: Eurostat, 2014, EU-Labour Force Survey

# Citizen's views on Science and Technology

**IDEAL SCENARIO**

Where scientific and technological innovations are truly designed to help people in current critical areas (for instance support for the disabled and elderly); ensuring increased safety and across-the-board energy saving, without becoming invasive or completely replacing humans.

Life will be even **simpler, better, timesaving, healthier, environmentally friendly & more gadgets and extensive automation of routine tasks will be part of everyday life.**

People will have more time to socialise, dedicate to pleasant activities, to travel.

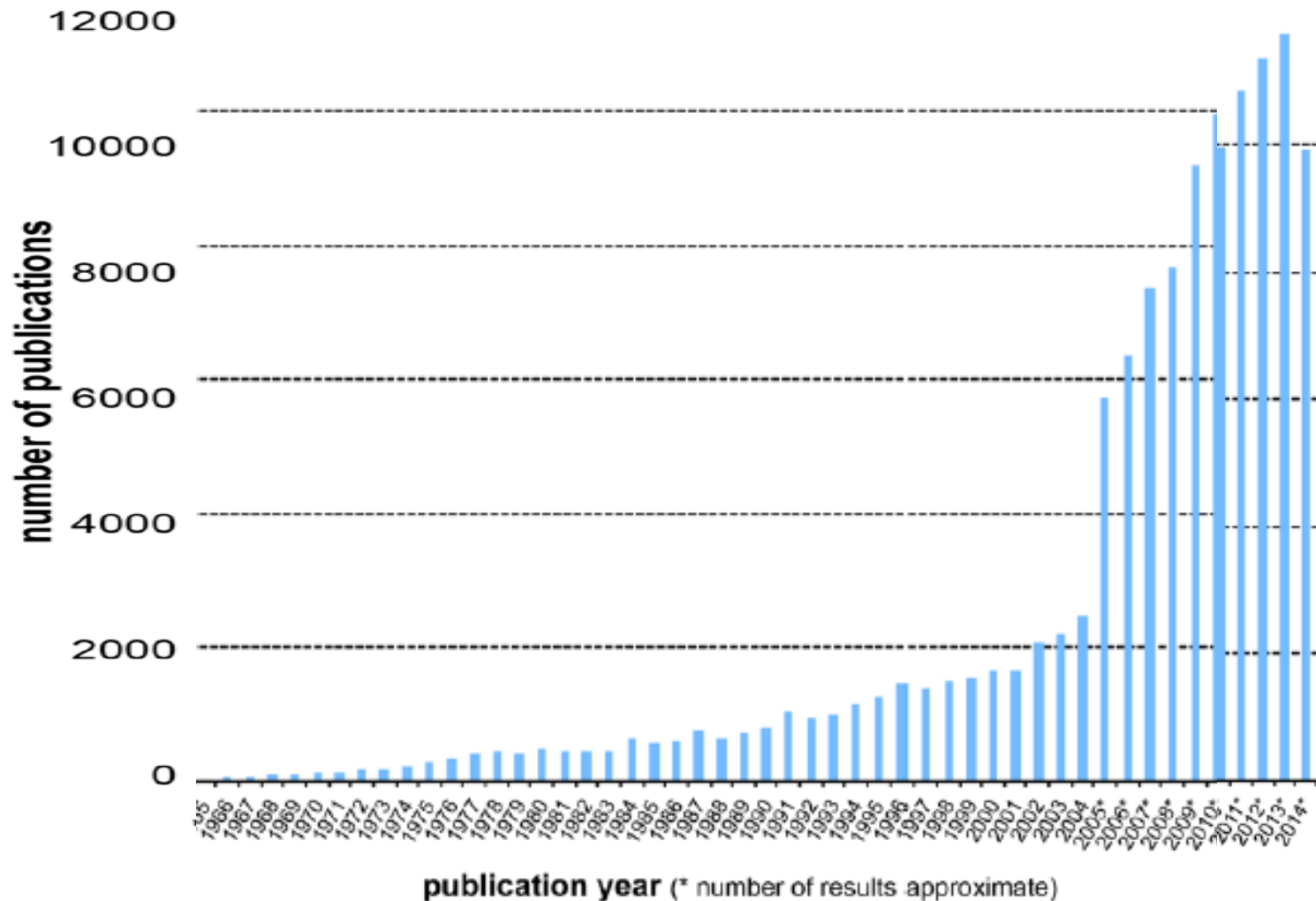**Life expectancy will increase**

**WORST-CASE SCENARIO**

Where machines replace humans, making people subservient and passive, taking away people's privacy while giving no benefits in return, and creating social isolation and absolute dependency on technology. More control over people, allowing them less freedom. Greater automation of work resulting in unemployment and deskilling. A widening gap between the rich and the poor as people have unequal access to scientific and technological innovation and the benefits thereof.

**Most feared is a lack of control** (dependence on technology, complete automation, deskilling), a lack of **human contact,** of **privacy, and unemployment.**

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**Source: EC, Eurobarometer on future innovations, S&T, 2015**

# Multi / Inter / Trans - disciplinary

- **Multi-disciplinary: Each discipline attempts to explain the same phenomena from its own viewpoint -** *Independent stories*

- **Inter-disciplinary: Looks at same phenomena from different viewpoints but tries to link the explanations –** *Connected stories*

- **Trans-disciplinary: draws together theories and approaches to form a shared conceptual and analytical framework – a new discipline -** *Integrated story*

**Source: EC, DG RTD, Net4Society (J. Doling)**

# Interdisciplinarity in Science



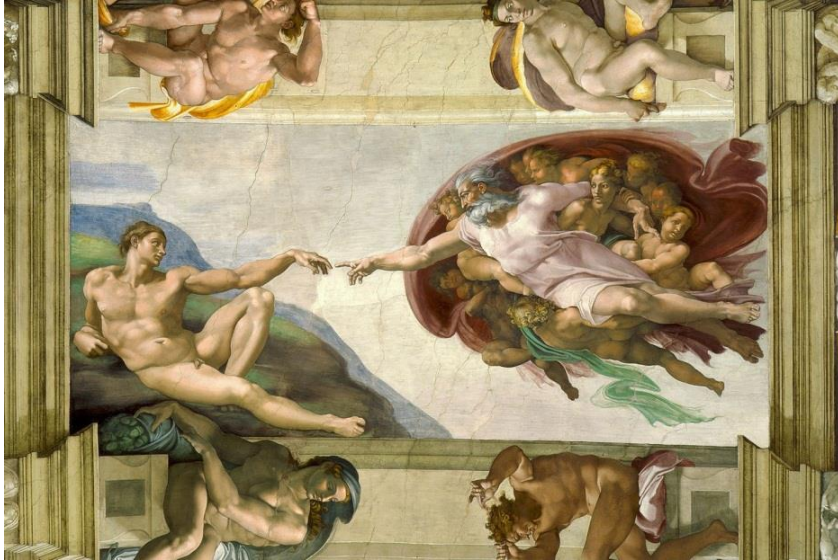publication year (* number of results approximate)

**Source: Web of Science, td-net publication radar, 2015**

# *PROGRESSES AND RISKS IN MAN-TECHNOLOGY NEXUS*

# Interface Man - Technology

Artificial Intelligence,
Robotic,
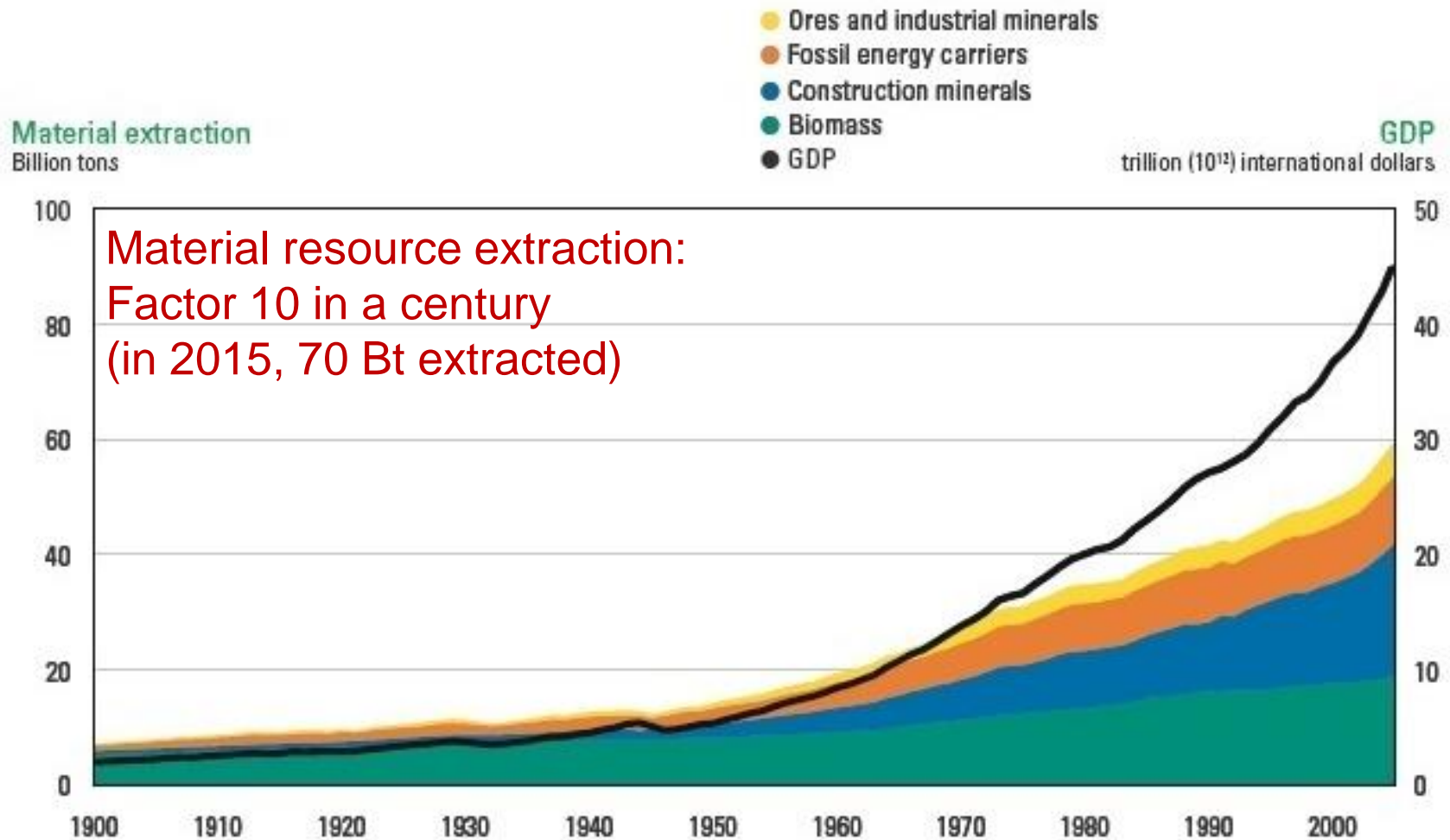NBIC (Nanotechnology, Biotechnology, Information technology and Cognitive science)



**Source: dpaonthenet**



**Source: Michelangelo**

# Acceleration of *destructive creation*

➢ **To get the same capacity of an iPhone 4 ($ 400) would have required $ 5 Millions in 1975**

➢ **Decoding the human genome required 13 years and $ 3 billion. In 2025, it will require 1 hour and $ 100**

➢ **From 2000, the price of a Photovoltaic panel has been divided by 7**

**Source: McKinsey Global Institute, 2013**

# Global economic & biophysical growth



Material extraction
Billion tons

Legend:
- Ores and industrial minerals
- Fossil energy carriers
- Construction minerals
- Biomass
- GDP

GDP
trillion ($10^{12}$) international dollars

Material resource extraction:
Factor 10 in a century
(in 2015, 70 Bt extracted)

**Source: Krausmann, 2009 (and M. Fischer-Kowalski, 2016)**

# Innovation – Beyond S&T

- ➢ **Product innovation**

- ➢ **Process innovation**

- ➢ **Marketing innovation**

- ➢ **Organisational innovation**

- ➢ **… And Social innovation**

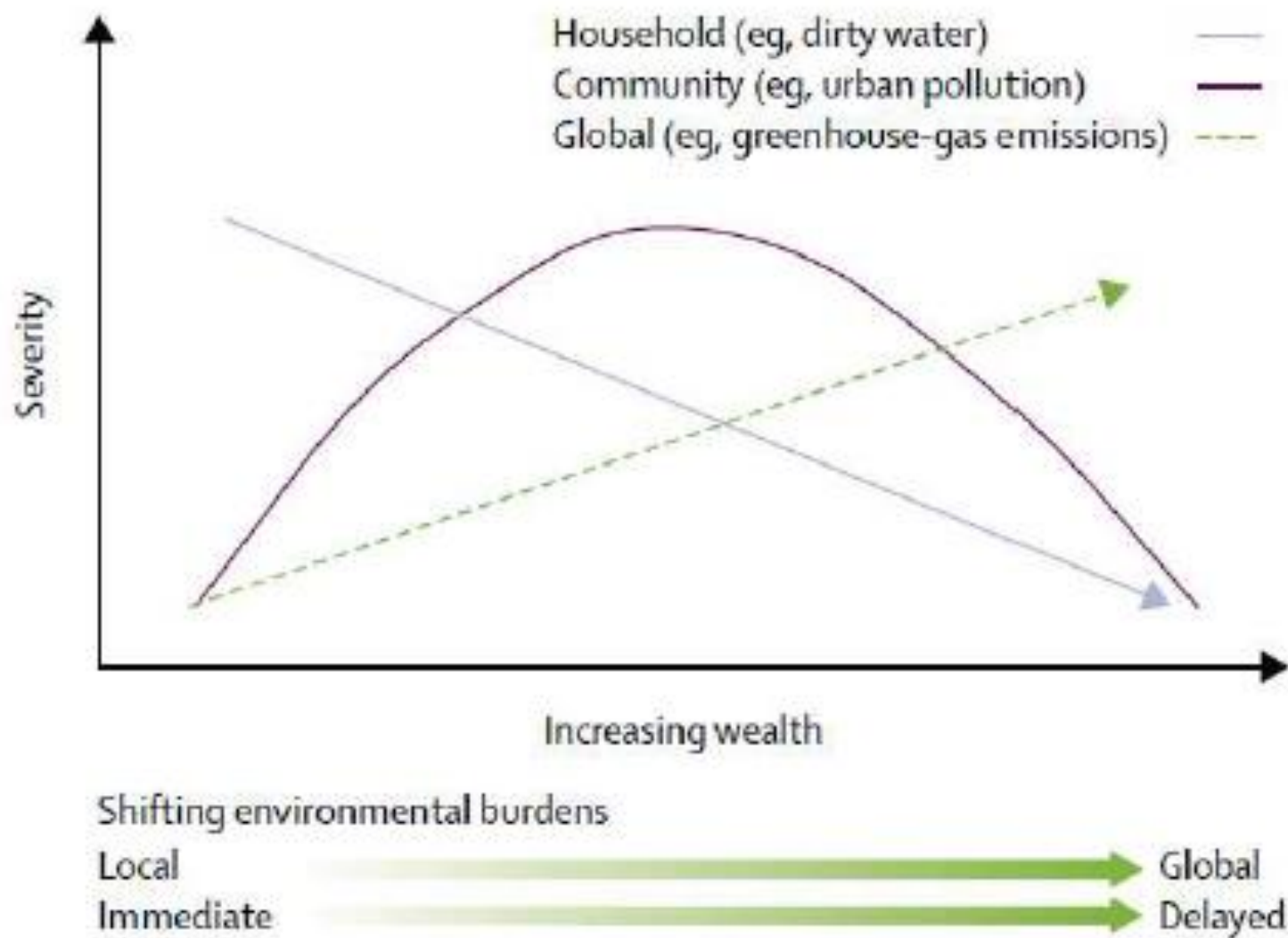**Source: Oslo Manual and EC**

# Technology and dreaming

**Technology allowed man to realise its dreams:**

➤ **To fly**

➤ **To live longer**

➤ **To travel everywhere**

➤ **To explore the space**

➤ **To communicate to everybody**

**Source: T. Gaudin, 2100: Récit du prochain siècle**

# Risks: Traditional and modern

**Source: UN, WHO**

# Risks: Global vs. local



Household (eg, dirty water)
Community (eg, urban pollution)
Global (eg, greenhouse-gas emissions)

Severity

Increasing wealth

Shifting environmental burdens
Local → Global
Immediate → Delayed

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**Source: EC, DG RTD, NEUJOBS (Smith and Wilkinson)**
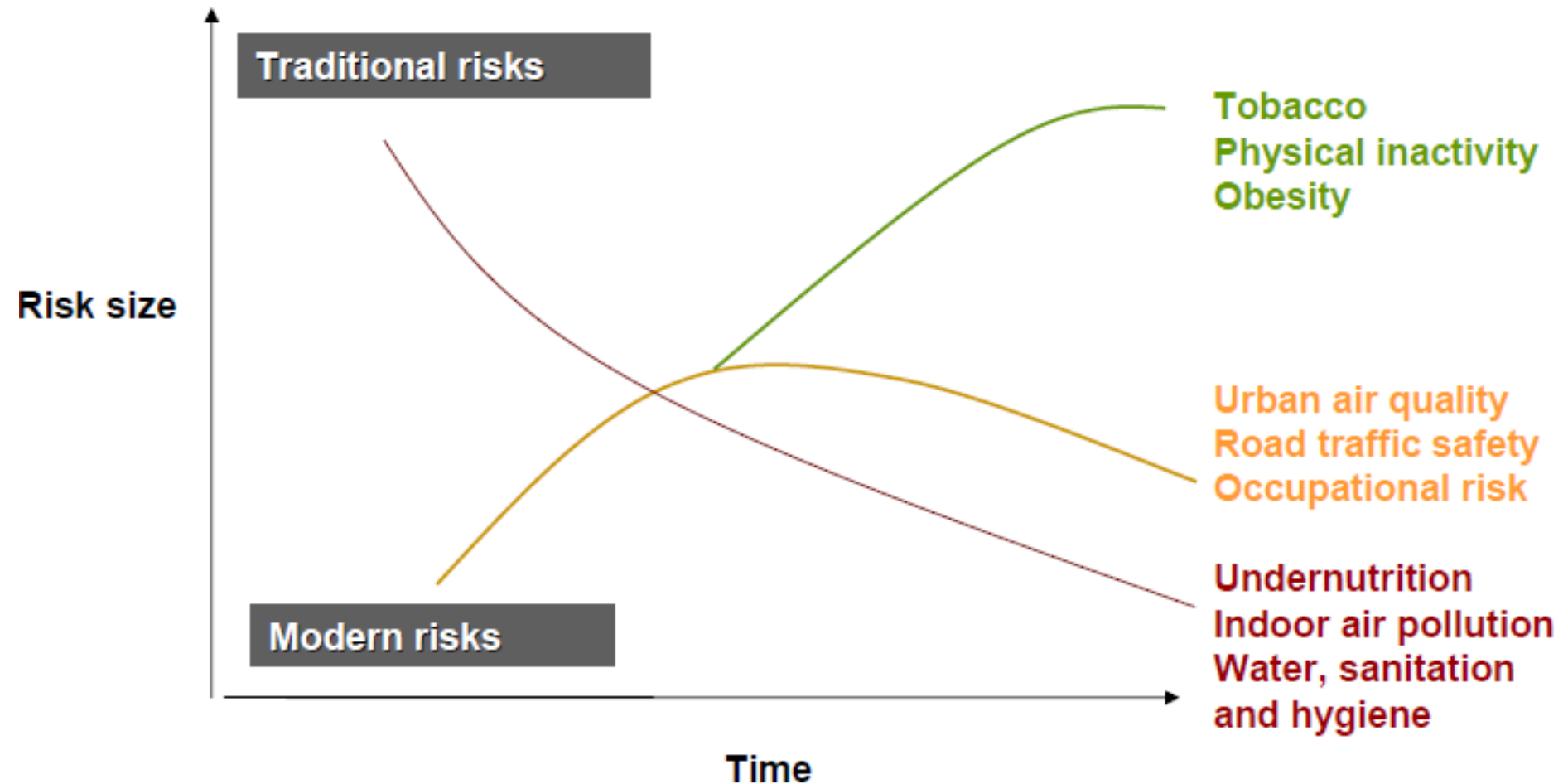
# Risks: Mixed use of infrastructure

- ➤ **Man-Machine**
- ➤ **Driver-less vehicles**
- ➤ **Urban areas challenges**

**Source: D. Rossetti, Uber-Volvo, Boeing X-47, Go-Pro**

# World CO2 emissions

**Source: IEA, 2015 in Nuova Energia, Feb. 2016**
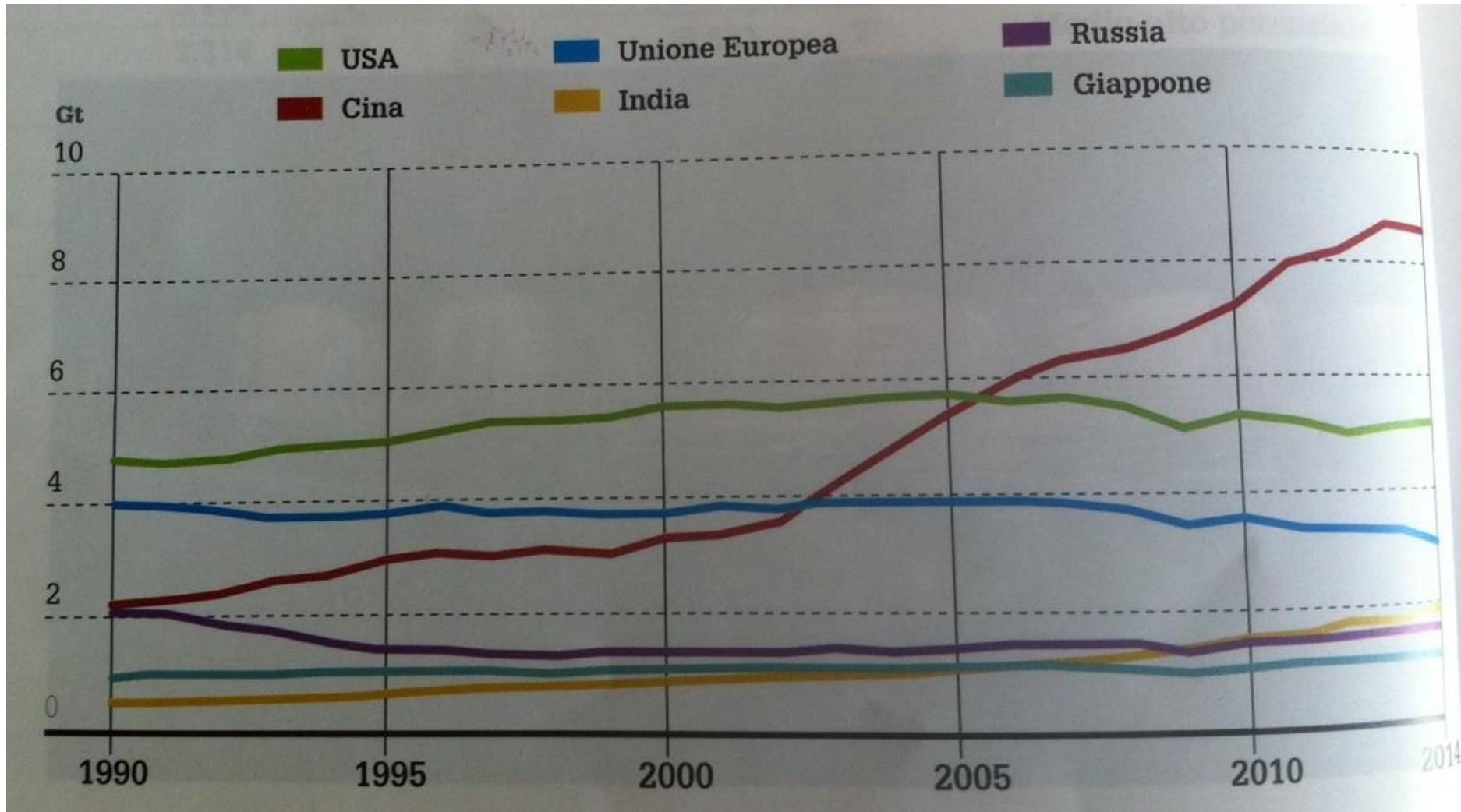
# GHG emissions intensity vs. per capita



**Source: EC, COM(2015)81**
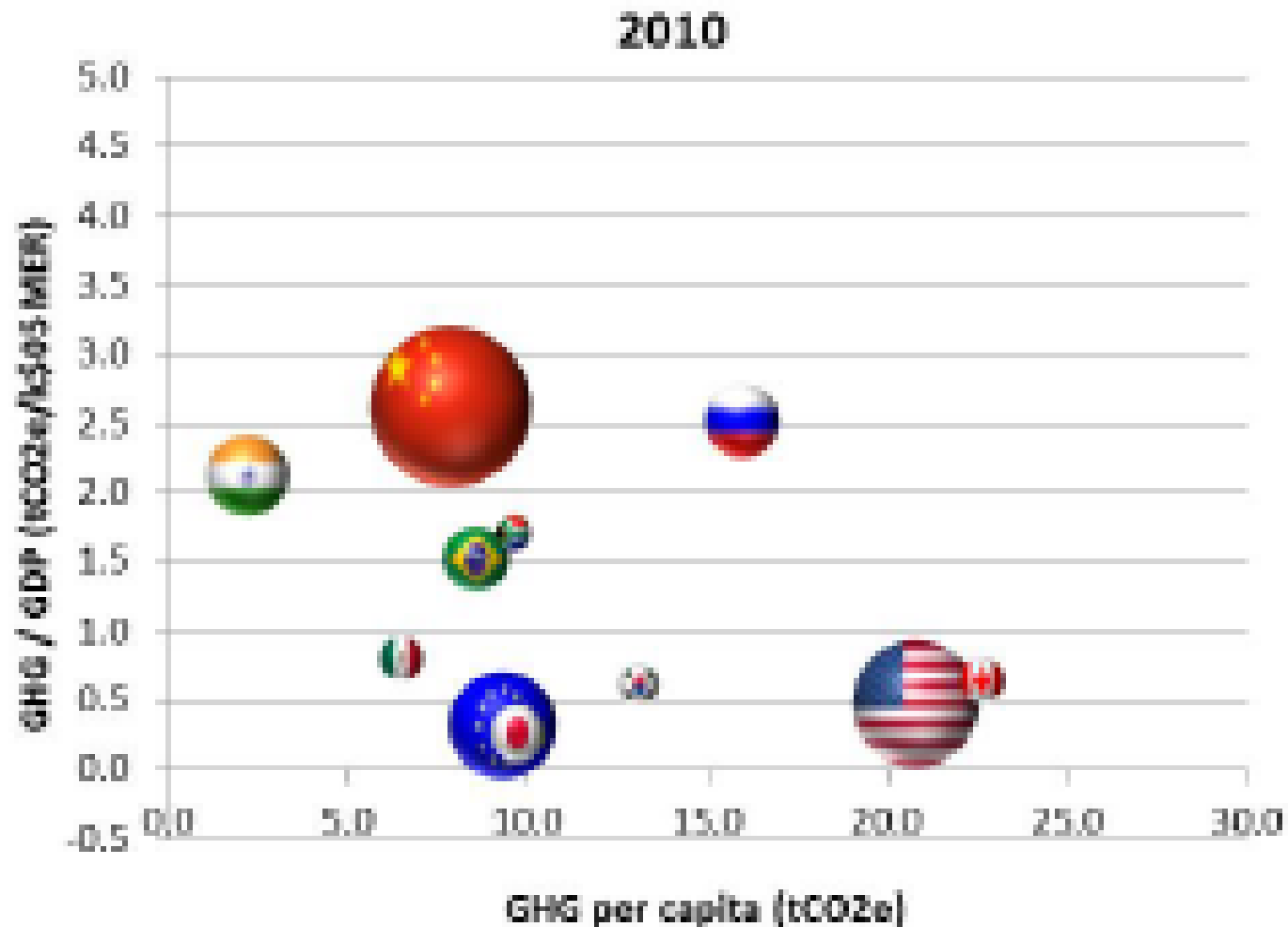
# EU targets for 2020 and 2030

**COP21 target (13/12/2015 with 196 States) :**
**Limit of the GHG emissions at 2°C and aspiration of 1.5°C**

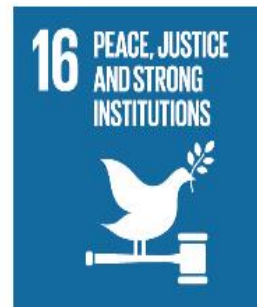| | |
|---|---|
| 20% by 2020 EU GHG reductions | 40% by 2030 |
| 20% by 2020 EFFICIENCY improvements | 27% by 2030 |
| 20% by 2020  RENEWABLES | 27% by 2030 |

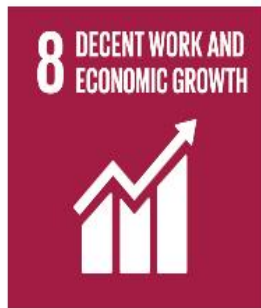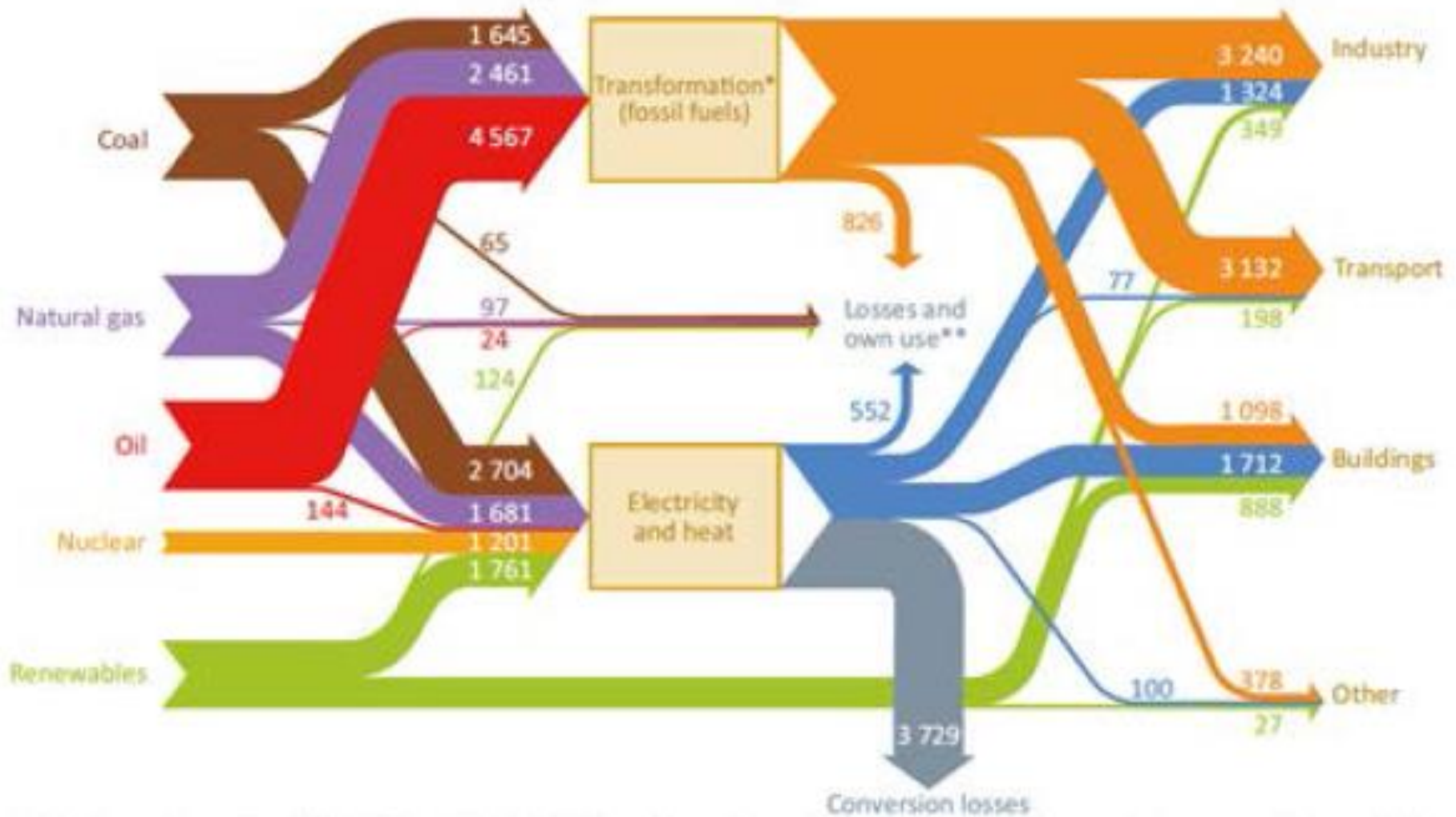BIOFUELS

E-ELECTRICITY

HEATING

AND COOLING

NATIONAL TARGETS and ACTION PLANS

**Source: European Commission**

# Sustainable Development Goals

**Source: UN**

# World energy demand in 2040 (Mtoe)

**Source: IEA, 2015**

# A new connected culture



**Social media competing Rembrandt**

**How we communicate with each other, how we look, behave, and experience the world around us**

Source: A. Taylor, The Atlantic Rembrandt

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# Two emerging concepts

➢ *Individual empowerment*

➢ *Collaborative economy*

**What these new concepts have as consequences on politics, trade-unions, infrastructures, housing, energy and transport?**

**Source: D. Rossetti**

# Shared economy

## *On the positive side*

- ➢ **Social exchanges, community life and new services**
- ➢ **Individual empowerment and social responsibility**
- ➢ *Paulo "humaniora" canamus*

## *On the negative side*

- ➢ **Precarity of work (cf. *eBay of work*, *uberisation*)**
- ➢ **From local/community platforms to world platforms**
- ➢ **From shared values to quasi-monopolies**
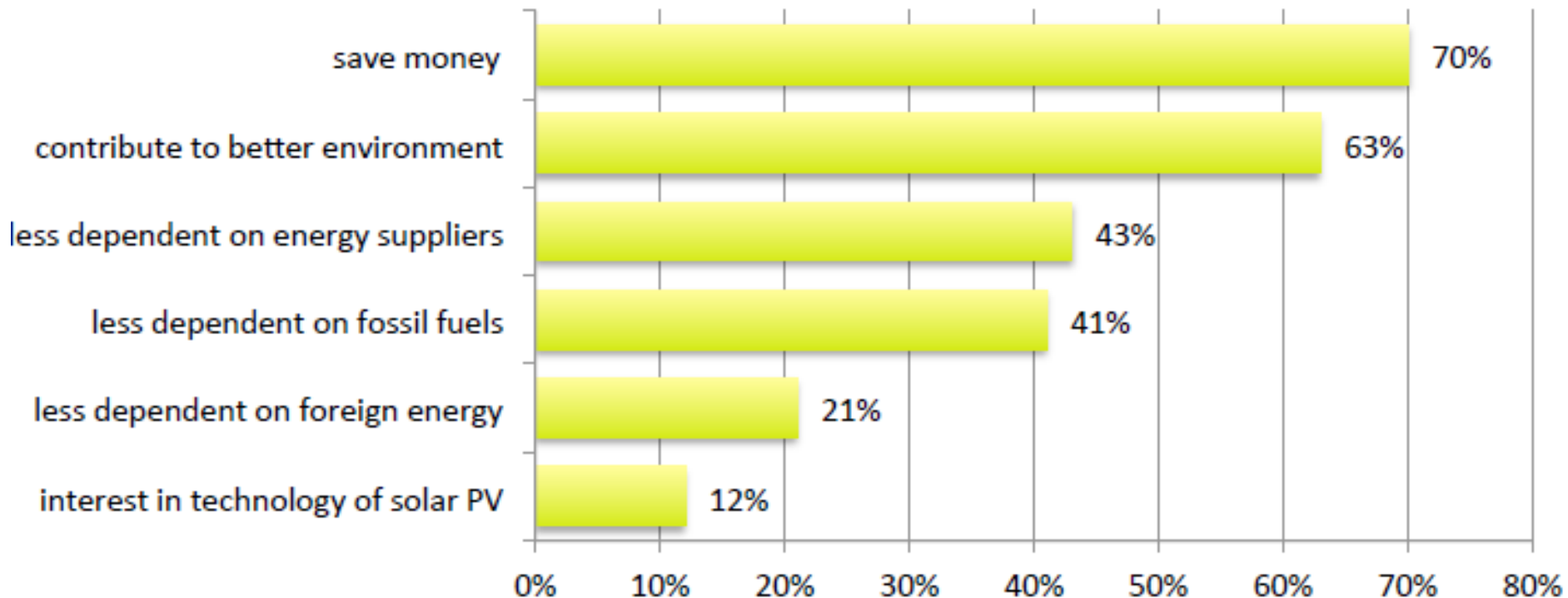
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**Source: D. Rossetti**

# Home ownership
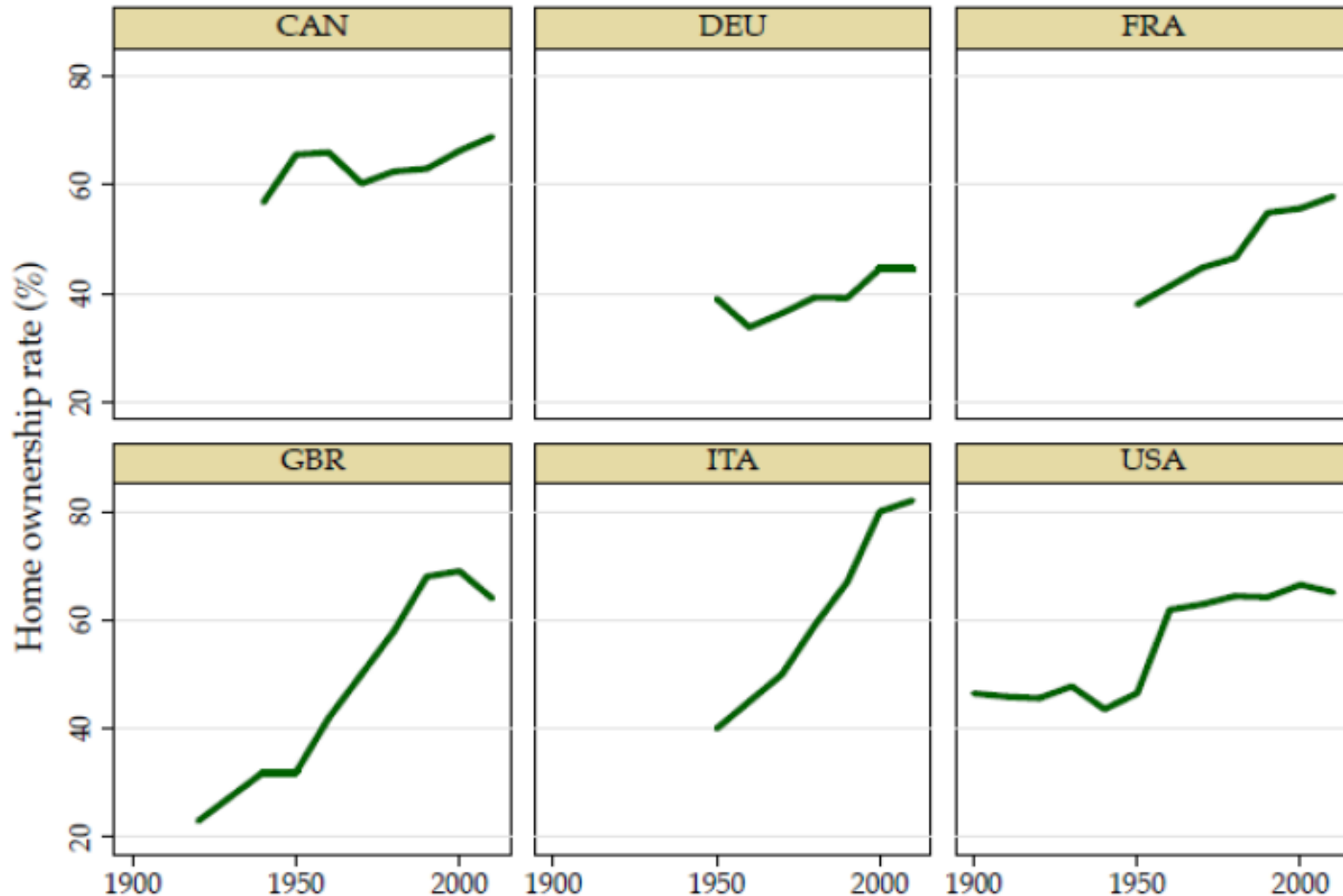
**Source: EC, DG RTD, FESSUD (Jordà)**

# People values and policy messages

➢ **Biospheric values** base their decisions to act on the costs and benefits for the ecosystem

➢ **Altruistic values** find understanding, appreciation, tolerance, and protection for the welfare of all people important

Effective policy message: **personal responsibility and effective ways to save energy**

➢ **Hedonic values** find pleasure or gratification for oneself important

➢ **Egoistic values** find social status and prestige, control or dominance over people and resources important

Effective policy message: **cost-saving**

**Source: European Commission, DG RTD, GILDED (N. Gotts)**

# Consumer reasons for using solar PV

**Source: NL, Stichting, Natuur & Milieu, 2013**

# EUROPEAN SUSTAINABLE LIFESTYLES

*Rules for happiness:*

*Something to do*

*Something to love*

*Something to hope for*

**Emmanuel Kant**

# Beyond GDP

➢ **Productivity more important than costs**

  ❑ **Enlightened version of cost competitiveness**

➢ **Competitive advantage**

  ❑ **Quality, sophisticated products, technology**

➢ **Growth drivers:**

  ❑ **Innovation, education, universities**

➢ **Ambitions/Institutions:**

  ❑ **Social empowerment, ecological excellence, trust**

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**Source: EC, DG RTD, WWWforEurope (K. Aiginger)**

# Future EU cities vs. urban sprawls



**Source: L. Schuiten**



**Source:  Las Vegas, G. Anselmi, Deviantart**

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# Human-Nature: A respectful relationship

- ➢ **Pope Francis:** *Laudato Si'* **(integral ecology)**

- ➢ **Edgard Morin:** *Terre-Patrie*

- ➢ **EC: Circular economy and 2030 energy/environment targets**

**Source: D. Rossetti**

# Current state of the oceans
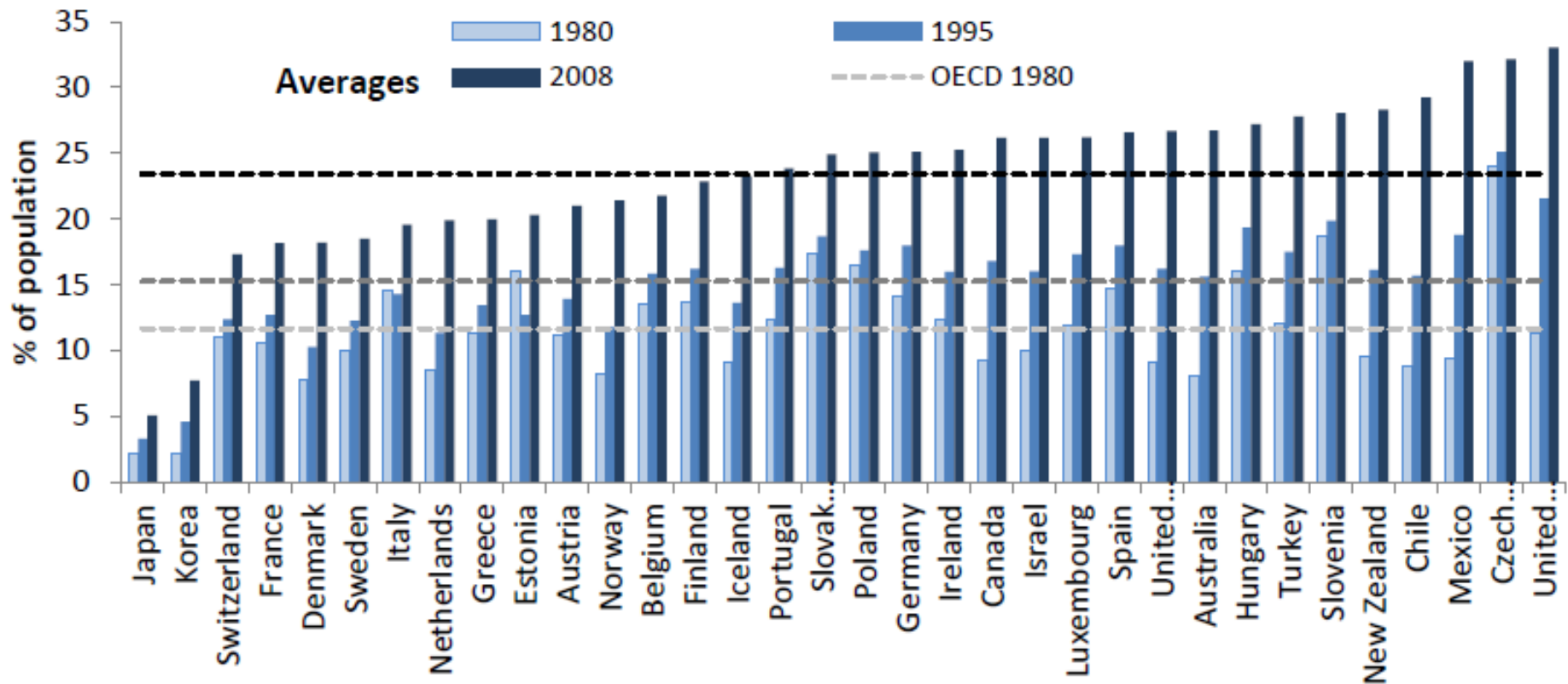
# New management paradigms

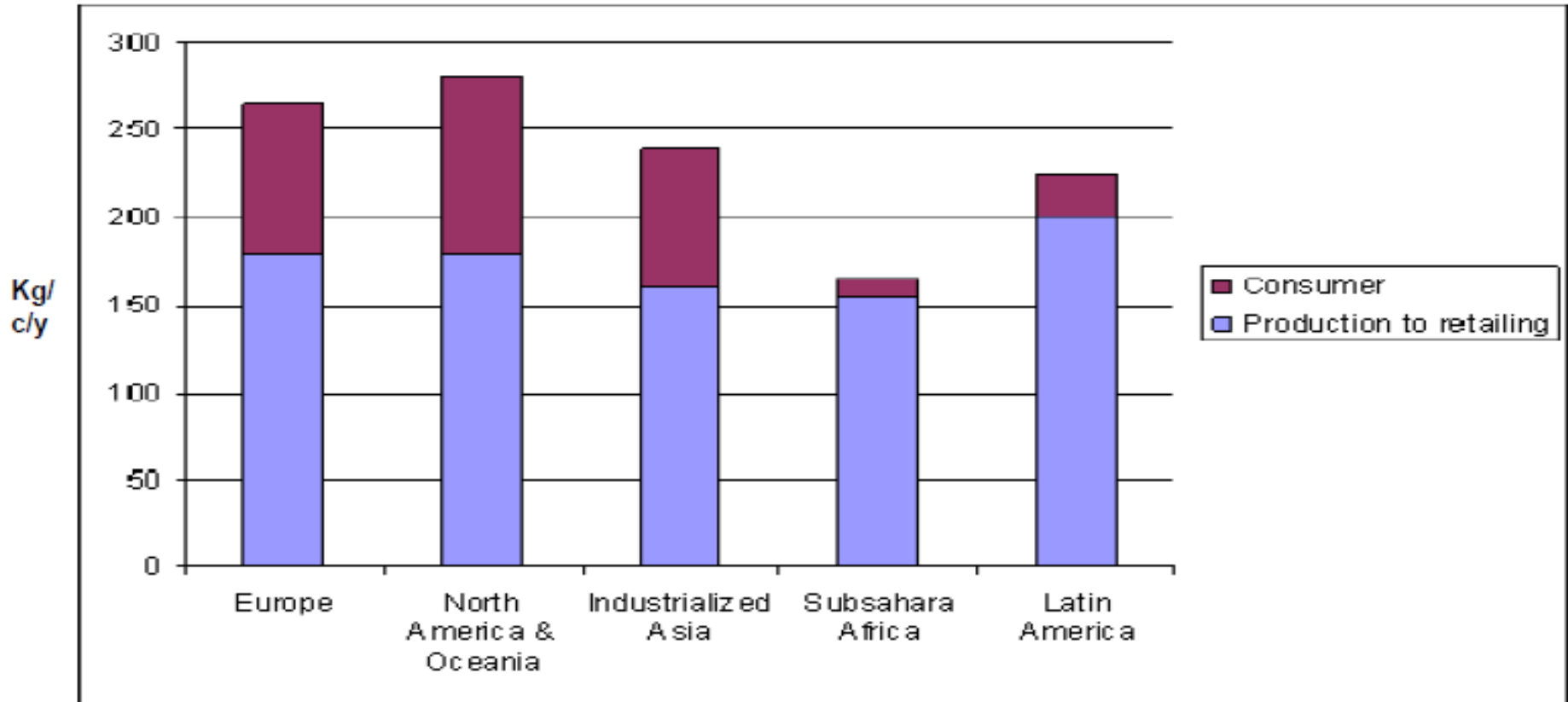| Currently dominating: 'Controlling water' | New approach 'Living with water' |
| --- | --- |
| Risks are quantified and optimal solutions are implemented | Participatory risk evaluation and negotiation about integrated solutions |
| Large-scale technical infrastructures (reservoirs, dams) | Multi-functional, resilient landscape with flooding areas combining ecosytem services approach and technical infrastructure |

**Source: EC, BESAFE-BIOMOT (C. Pahl-Wostel)**
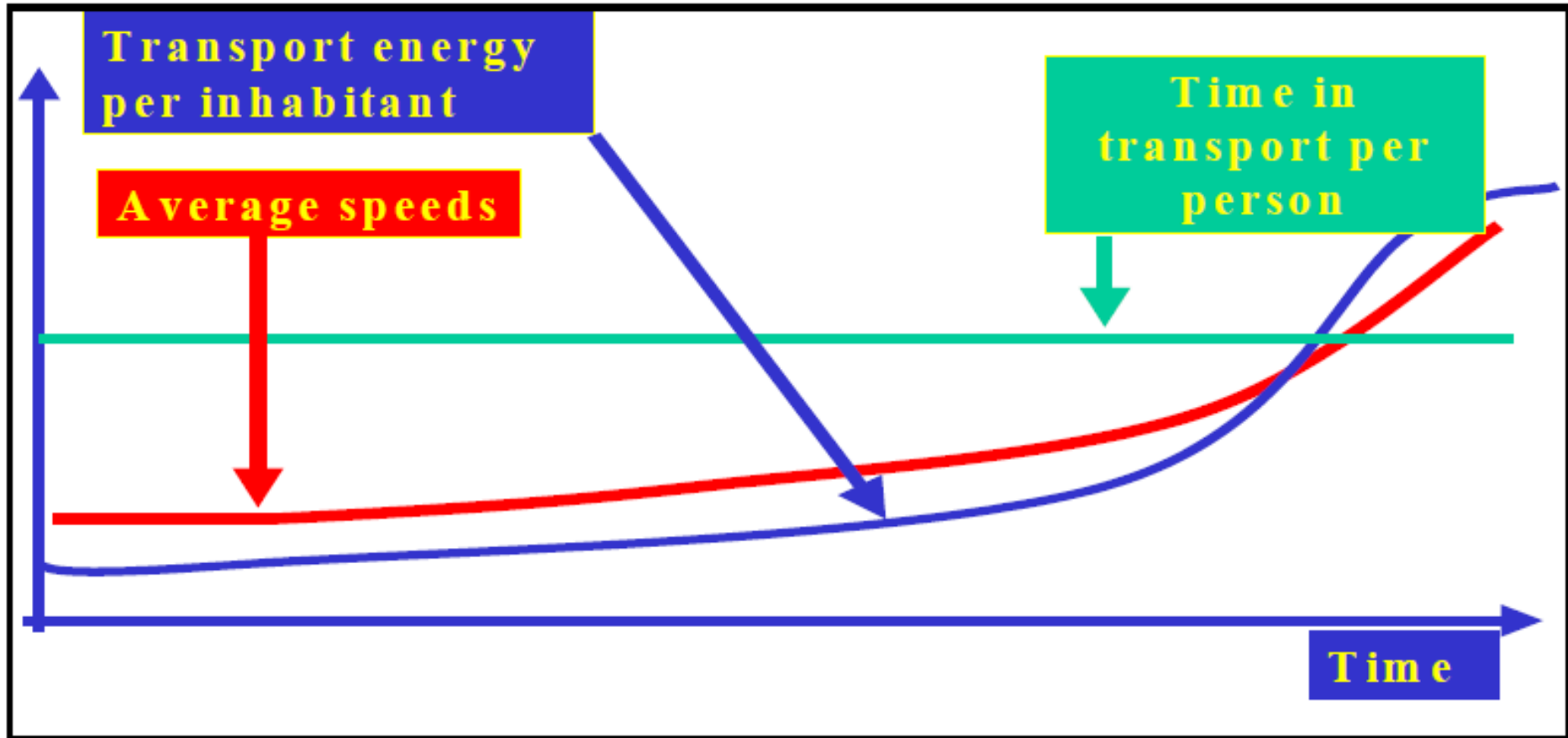
Source: European Commission, DG RTD, VLEEM (B. Chateau)

# The obesity epidemic

**Source: OECD, 2016**

# Food loss and wastage

**Source: UN, FAO**

# EU organic sales



billion euros

10.2   22.2

2004   2013

**Source: EP, Research Service**
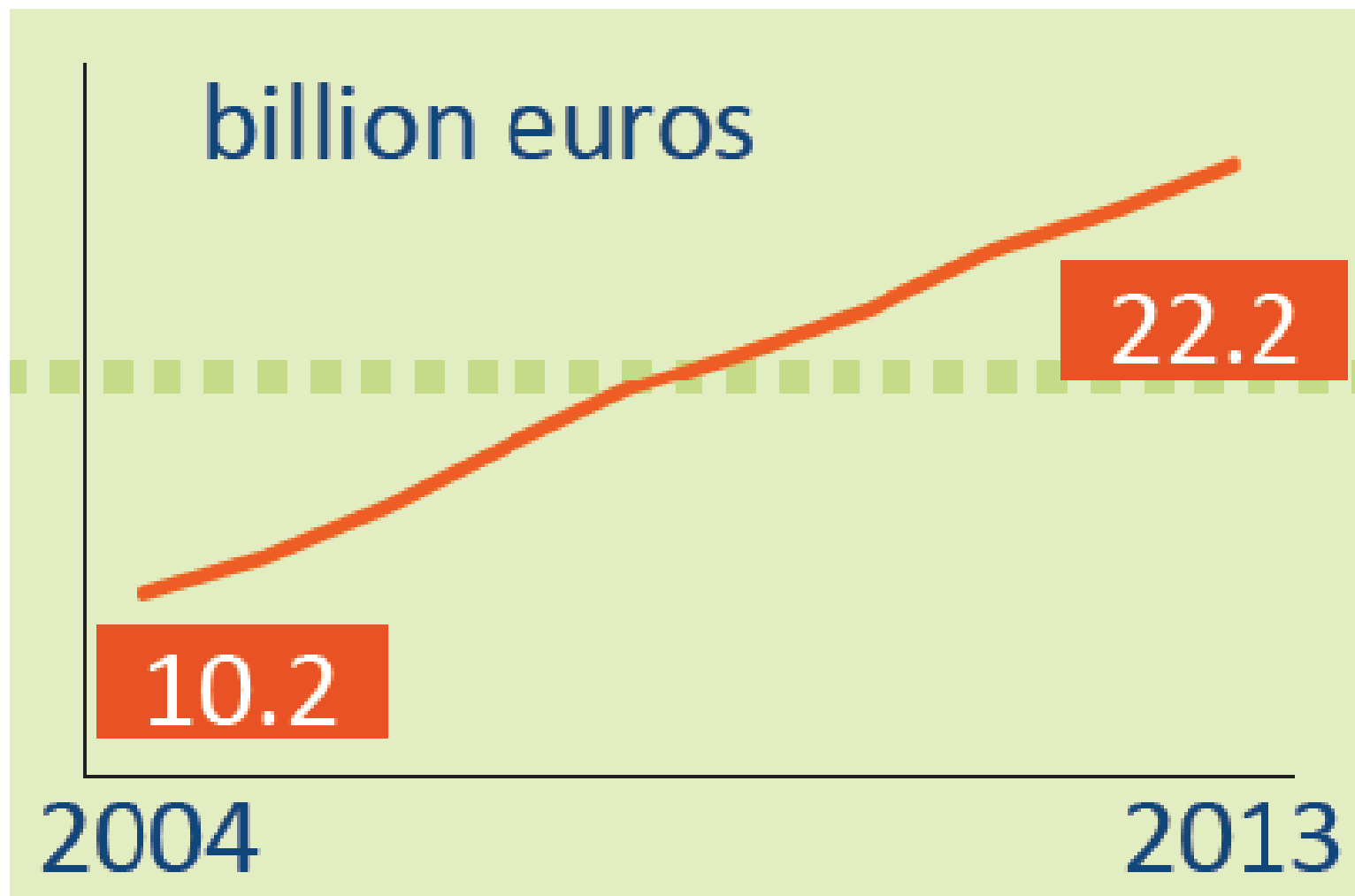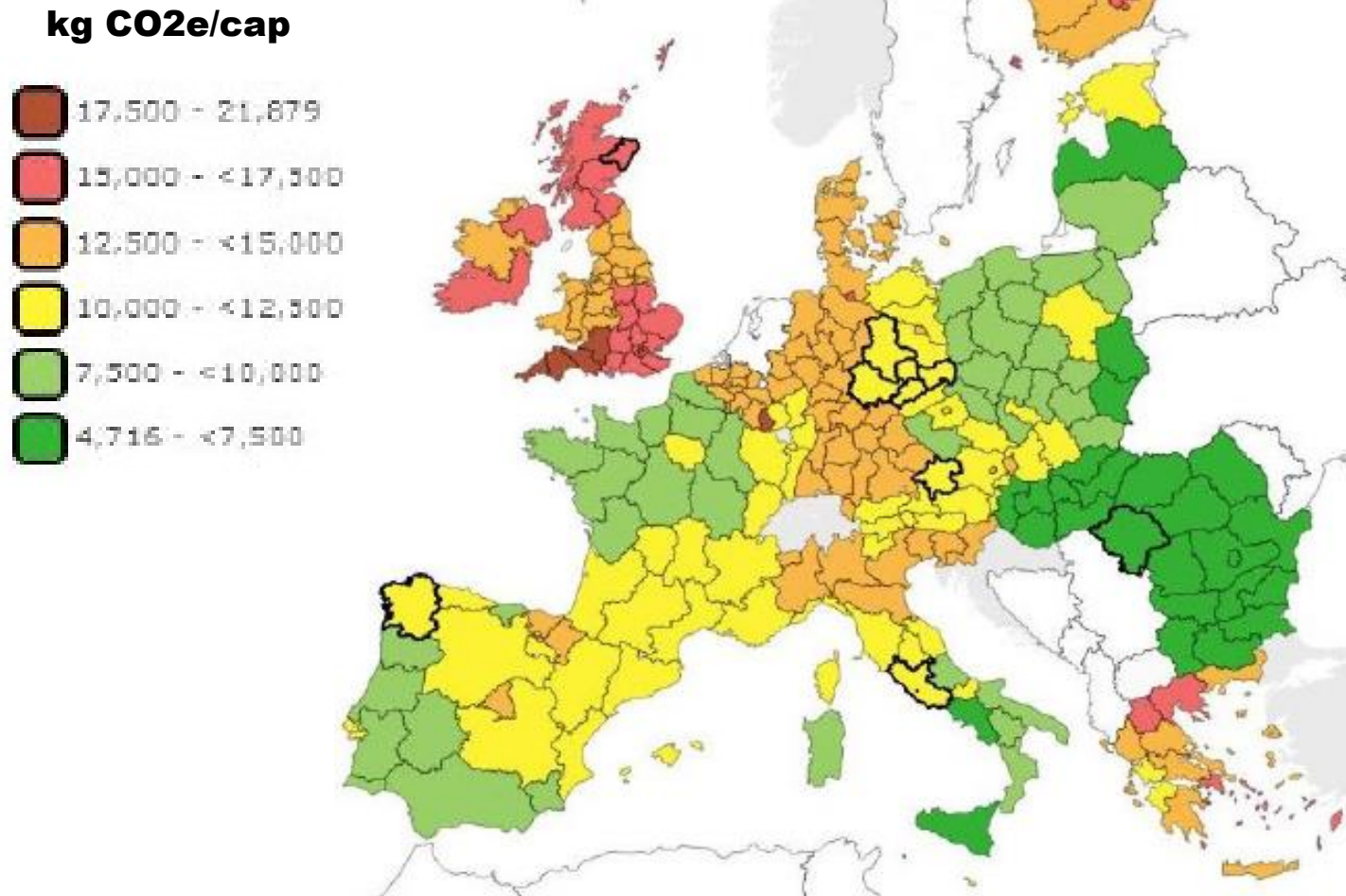
# Sustainable lifestyles in practice

➢ **Efficiency (in the production and use of products)**

➢ **Making sustainable lifestyles easy (eg. thanks to ICT)**

➢ **Access vs. Ownership (shared/collaborative economy)**

➢ **Long-term well-being vs. Immediate gratification**

**Source: EC, DG RTD, SPREAD**

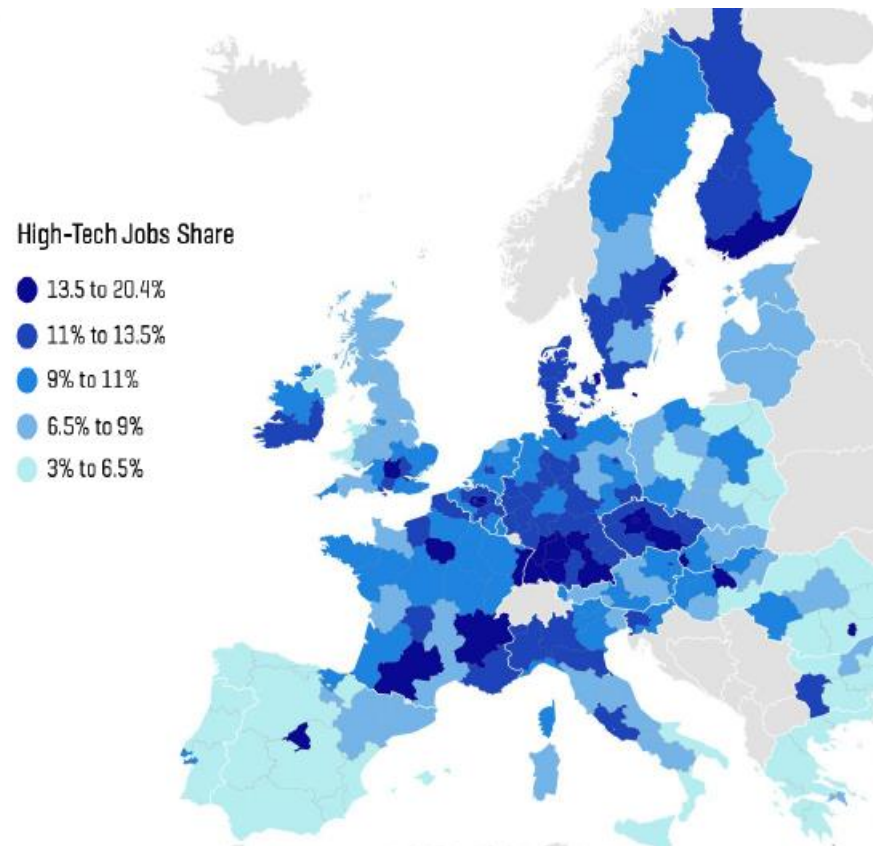# Regional household carbon footprint



kg CO2e/cap

- 17,500 - 21,879
- 15,000 - <17,500
- 12,500 - <15,000
- 10,000 - <12,500
- 7,500 - <10,000
- 4,716 - <7,500

**Source: EC, DG RTD, GLAMURS (D. Ivanova, G. Vita)**

# New paths for growth

- ➢ **Innovation**
- ➢ **Structural reforms**
- ➢ **New industrial revolution**
- ➢ **Digital economy**

**Source: G20, China, 2016**

# Creating and innovating

**Not only R&D expenditures, number of scientists, patents and co-publications but also:**

- ➢ **Co-creation**
- ➢ **'Ecosystem'**
- ➢ **Synergies**
- ➢ **User-driven**
- ➢ **Social innovation**
- ➢ **Co-production**

**High-Tech Jobs Share**

- 13.5 to 20.4%
- 11% to 13.5%
- 9% to 11%
- 6.5% to 9%
- 3% to 6.5%

**Source: D. Rossetti**

**Source: M. Goos, Eurostat & EULFS**

# H2020 Calls of SC6 (2016/17)

- ➢ **Co-creation for growth and inclusion**

- ➢ **Reversing inequalities and promoting fairness**

- ➢ **Engaging together globally**

- ➢ **Understanding Europe**

**Source: EC, DG RTD, H2020, SC6**

# CONCLUSIONS

# Corelations?

➢ **Between ecosystem damages and social inequalities?**

➢ **Between *autonomisation* (empowerment) et automation (robotic)?**

➢ **Between individualistic reactions and need for EU collective response (cf. migration crisis)?**

➢ **Between start-up and scale-up?**

➢ **Between economies of scope (cf. platforms) and economies of network (finance, media, politics, philanthropy)**

**Source: D. Rossetti**

# Real value



## $ 179 M

€ 10-100        € 200,000-300,000

# EU assets and governance

- **Competitiveness and attractiveness**: industry and services but also health, education, research, arts, culture and tourism

- **Materialistic and acquisitive values ('extract-produce-consume-dump') but also happiness and quality of life** (welfare, socio-ecological development, circular economy)

- Governance structures: Top-down (centralizing, exclusive, elitist, hierarchical) but also **Bottom-up** (decentralizing, democratic, participative)

# Wellbeing as a common denominator

# Individual vs. Co-creation

- *NIMBY* - Not in my backyard

- *BANANA* - Build absolutely nothing, anywhere, near anybody


- *KEFA* - Knowledge Everywhere For Anybody

- *B-GOT* - Beyond GDP, Beyond Oil, Beyond Tangibles

**Source: D. Rossetti**

# EU *Rinascimento*

- EU as a 'Hub' of technological and social innovation with a fruitful marriage between STEM and SSH

- Theoretical knowledge reconciled with practical experience

- Social and ecological problems as sources of entrepreneurial opportunities

- Exploiting EU colors (green, blue, silver, white, pink)

- *Re-shoring* in Europe (logistics, stability, management, IPR)

- Positive union between individual empowerment and the collaborative economy

- Man as gardener of the planet (neither absolute precaution neither earth/ethical innovation evil)

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Source: D. Rossetti

*Nella battaglia per l'unità europea
ci vuole una concentrazione
di pensiero e di volontà
per cogliere le occasioni,
per affrontare le disfatte,
per decidere di continuare*

**Altiero Spinelli**

# The Power of Science

Economic research and European decision-making:
The case of energy and environment policies

Domenico Rossetti di Valdalbero