

Guzzella: Wir reden immer von der Digitalisierung. Das ist in meinen Augen ein fragwürdiger Begriff. Die Digitalisierung hat vor 50 Jahren begonnen, als wir die analogen Steuerungsgeräte in digitale umgewandelt haben. Was jetzt passiert, ist die Vernetzung. Ende der 1960er Jahre hat man die Computer miteinander vernetzt. Dann hat man immer mehr Geräte miteinander vernetzt. Das Zentrale ist also die sehr billige, sehr schnelle, sehr effiziente Vernetzung. Auf diesem Planeten Erde wächst im Moment ein Nervensystem. Wir werden zu einem multizellulären Organismus.

**Lino Guzella: «Auf diesem Planeten Erde wächst im Moment ein Nervensystem. Wir werden zu einem multizellulären Organismus.»**

Hengartner: Aber das Nervensystem wird immer schneller, anders als in der Biologie.

# Data for All!

# Data production

tion



The graphic features a stylized city skyline where the buildings are represented by vertical columns of varying heights, each composed of strings of white binary code (0s and 1s). The skyline is set against a dark blue background with a faint, light blue grid pattern. The perspective is angled, giving the impression of looking up at the city from a low angle. The binary code is arranged in a way that creates a sense of depth and architectural structure.



# Data analytics



## Applications and Services

# Empowering People

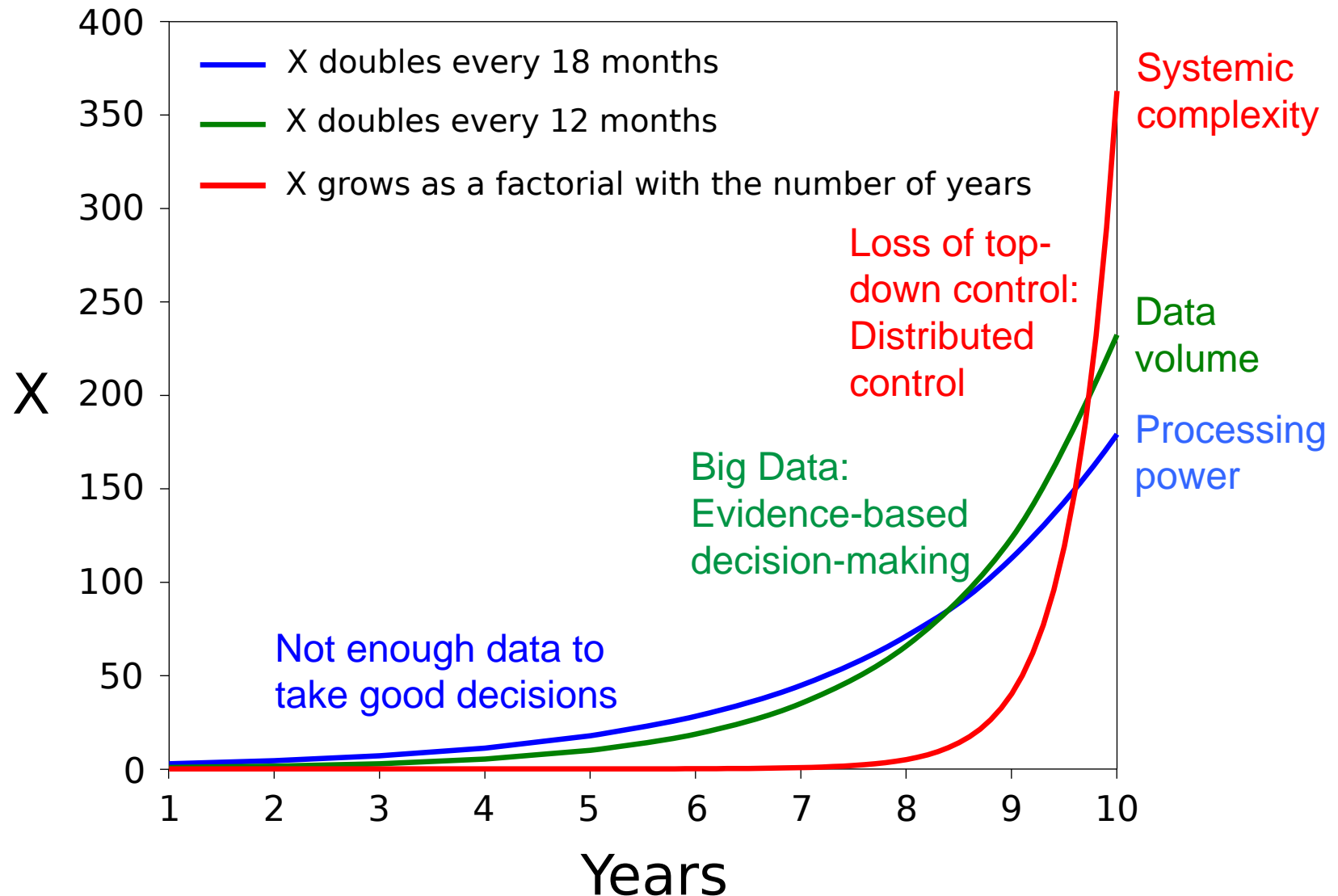


[www.enableeurope.eu](http://www.enableeurope.eu)

If set up well, enabling users, customers, citizens will lead to better services, better products, better businesses, better neighborhoods, smarter cities, smarter societies ...

# Complex Systems

# Exponential vs. Factorial Growth – Implications for the Governance of Complex Systems



New paradigm:  
From top-down  
control to a culture  
of empowerment





← Bahnhof  
Dammthor

← Colonnaden

50

auf dem  
Seitenstreifen

Mo-Fr 8-18h  
Sa 8-12h

PRESENTED BY  
HAMBURG  
WASSER

(Image: dmd/ADAC)

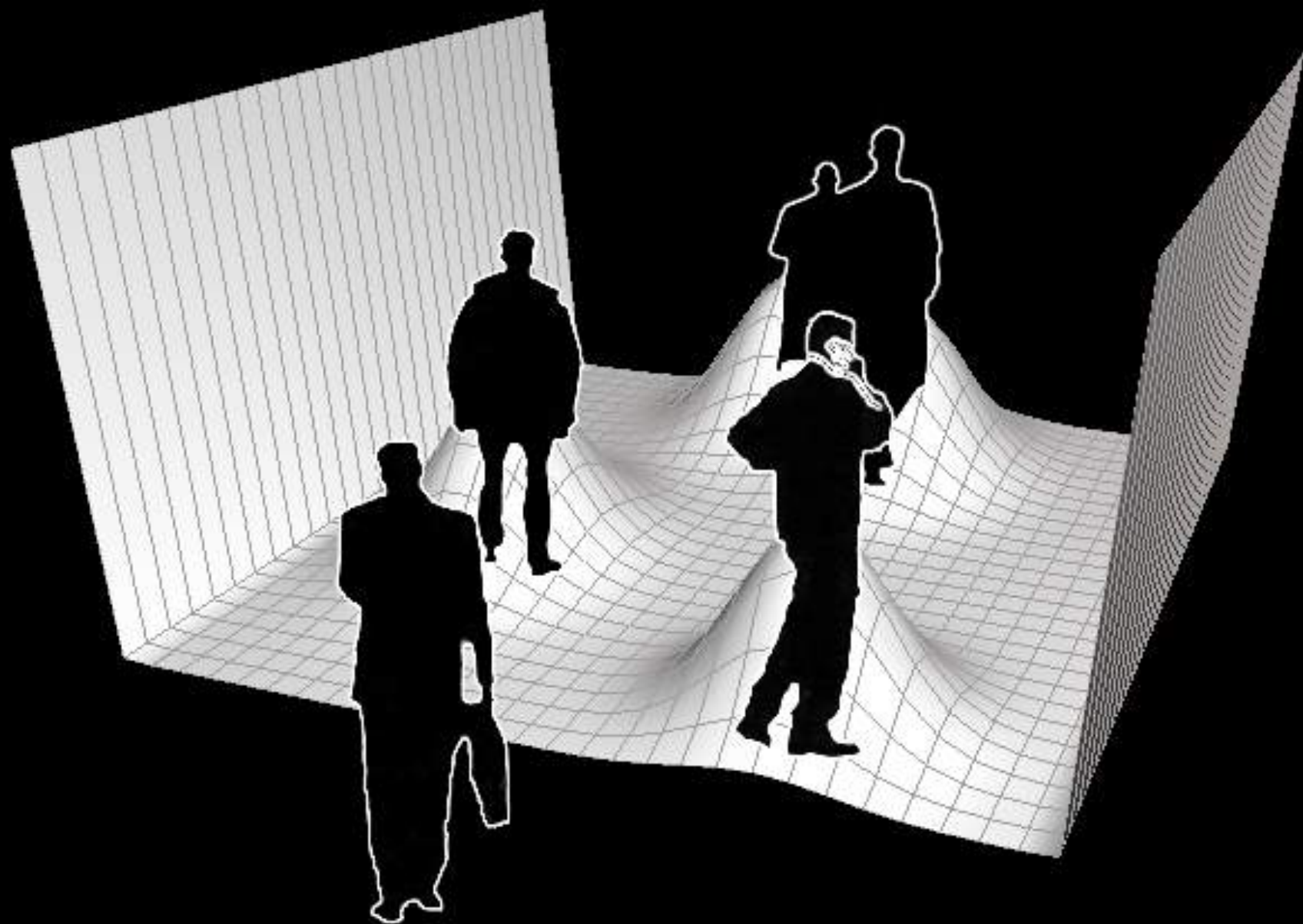














# Internet of Things



With the Internet of Things,  
we can now make self-  
organization work, 300  
years after Adam Smith's  
“invisible hand” concept!

# Self-organization in complex systems



# Overcoming Congestion by Real-Time Feedback Based on „Mechanism Design“

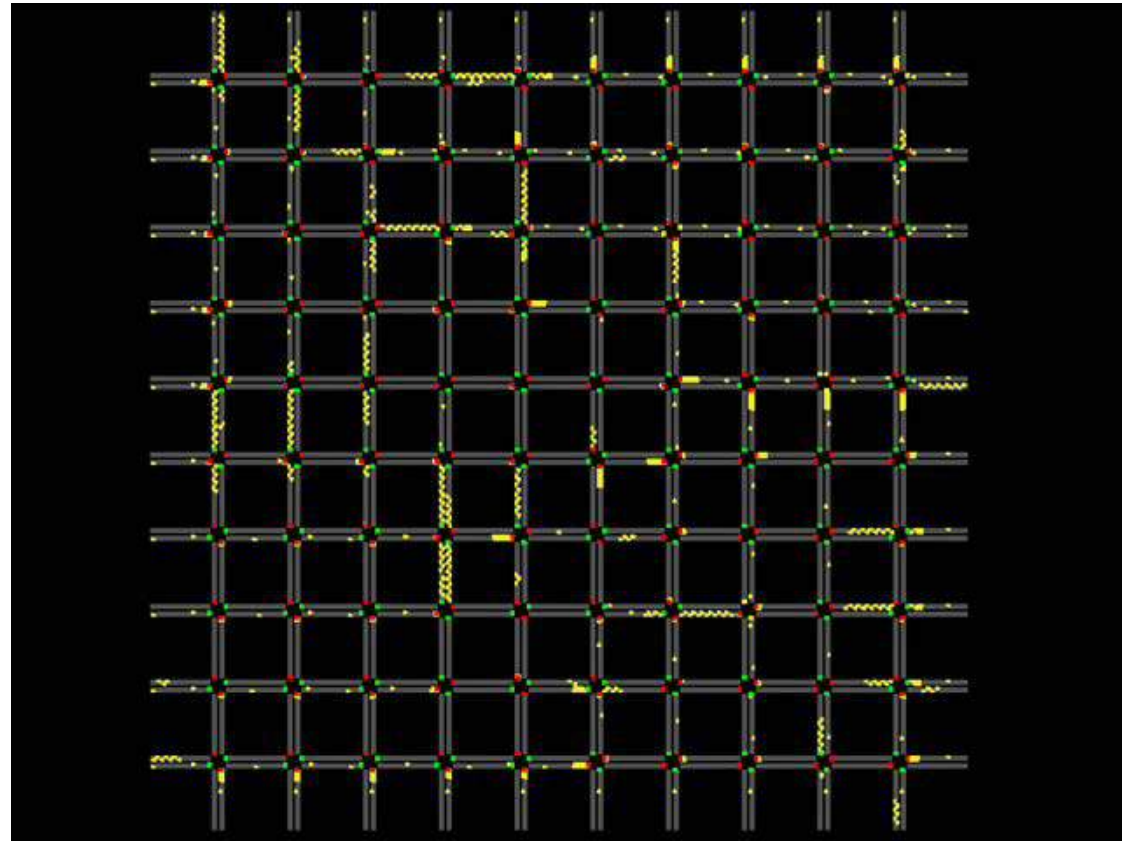
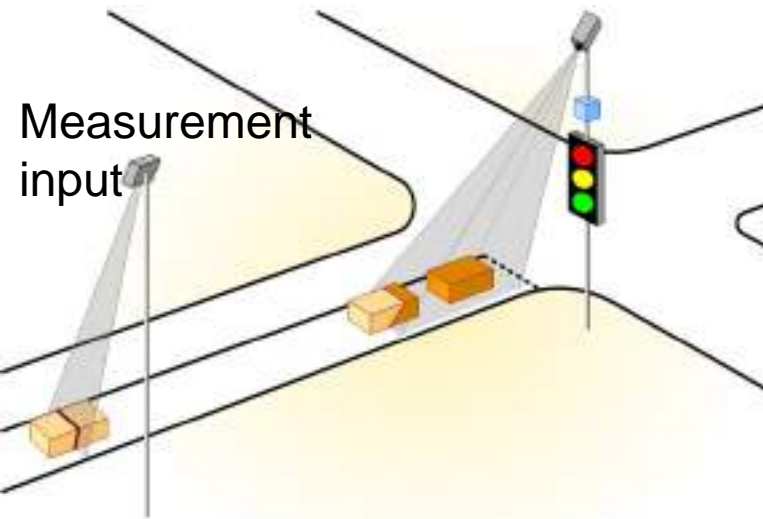
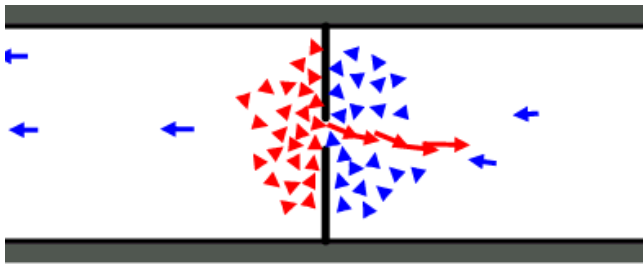
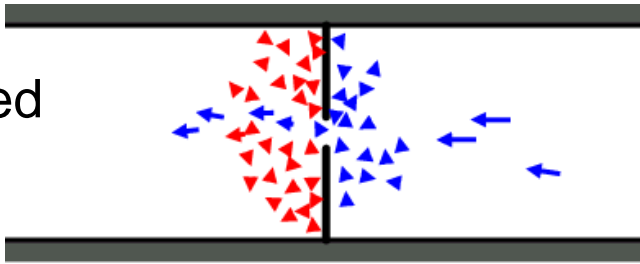


Measure Externalities and Create Suitable  
Feedback Loops to Enable Self-Organization



# Harnessing Complexity by Decentralization

Self-organized oscillations



Self-regulating green waves.  
Patent available.



# Decentralized Can Outsmart Centralized Control



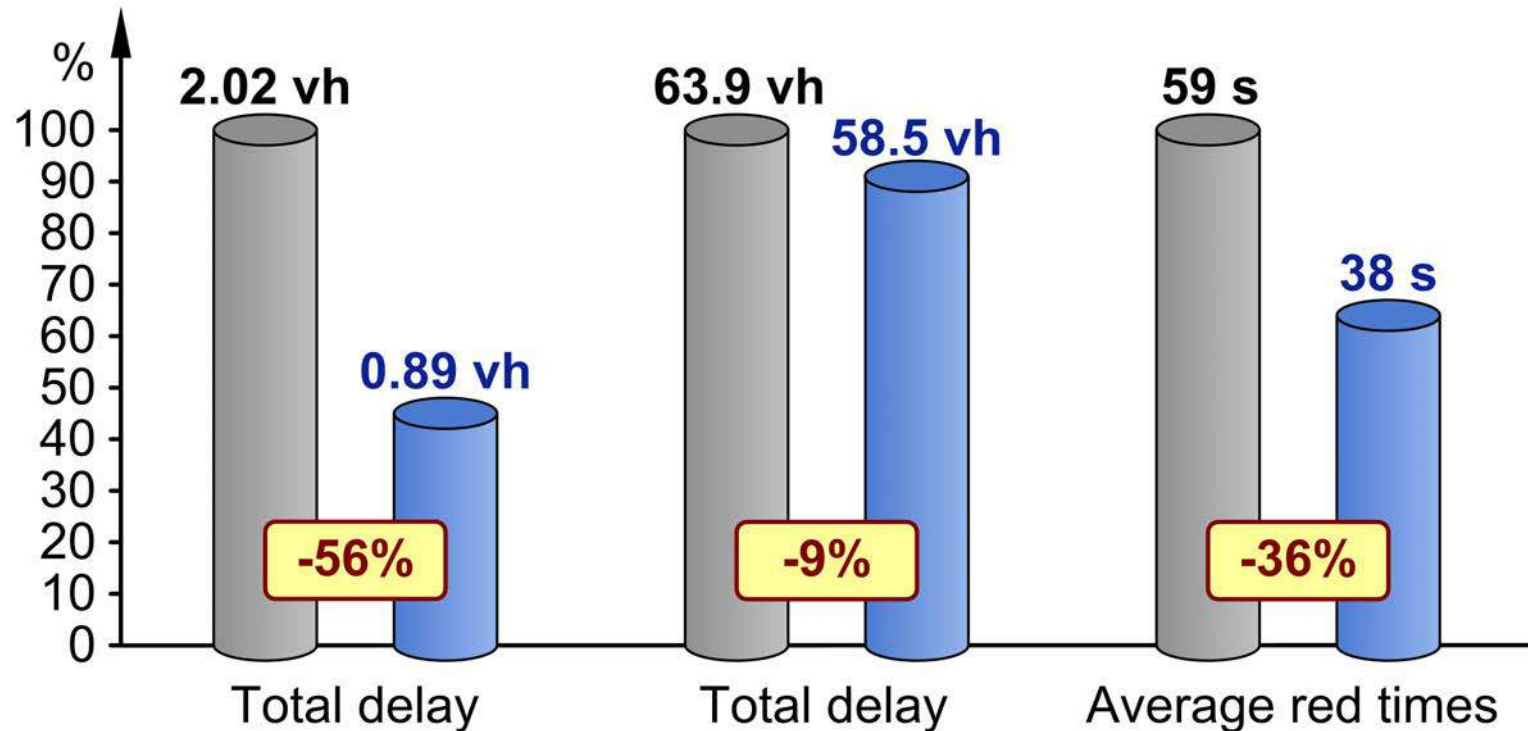
**Public  
transport**



**Motorized  
traffic**



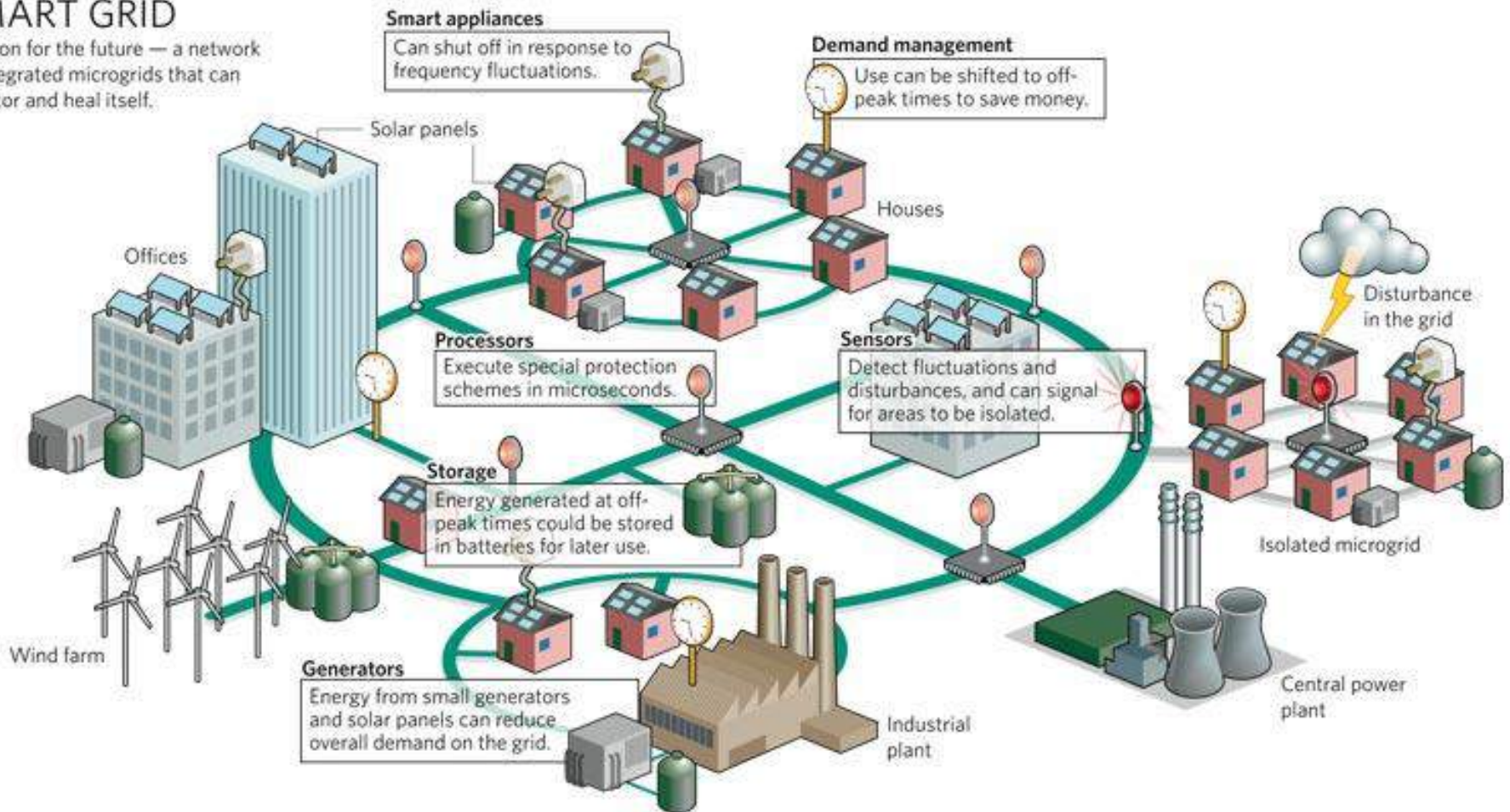
**Pedestrians  
and Cyclists**



# Smart Grids: Decentralized Energy Production, Intelligent Consumption

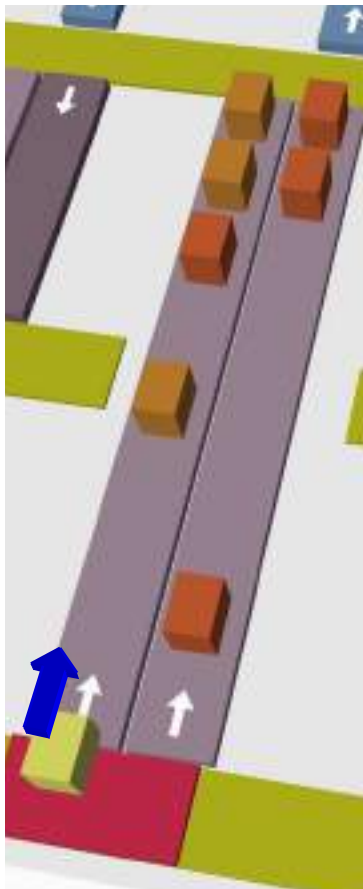
## SMART GRID

A vision for the future — a network of integrated microgrids that can monitor and heal itself.

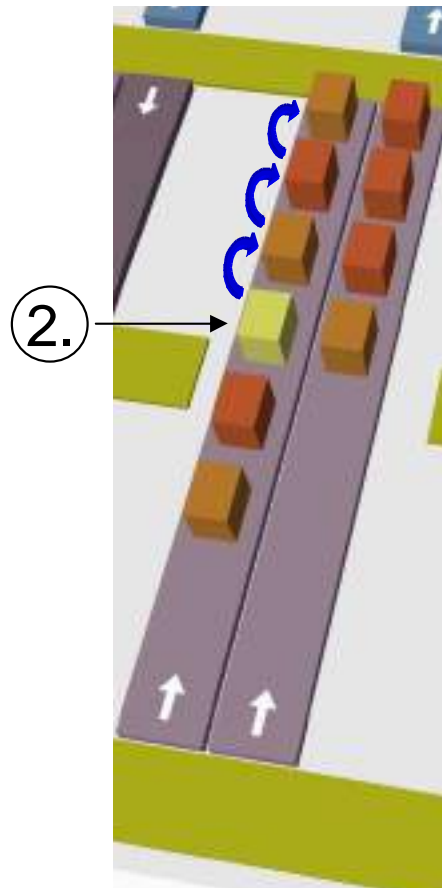


# Industry 4.0: Specification of Information Flows and Interaction Rules

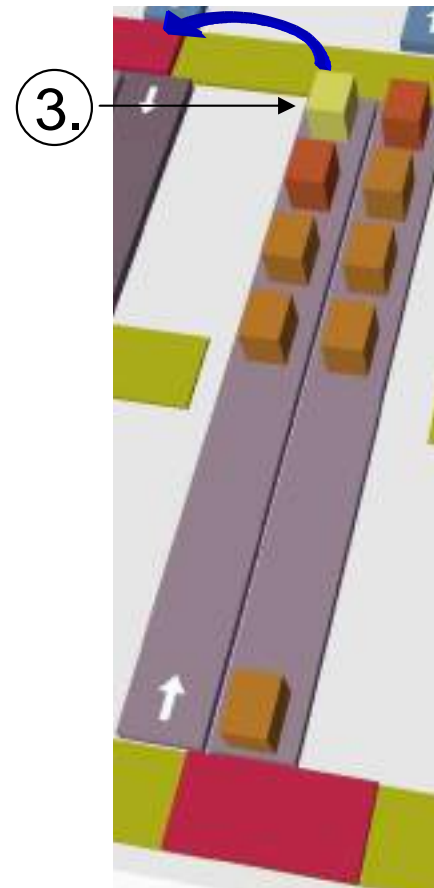
A unit enters the lane



It decides to exit the lane



It sends a request for a transfer car



The unit exits the lane





# Digital Assistants:

## Boosting self- organization

# Empirical Studies of Self-Governance Confirm Efficiency, Given Proper Design Principles



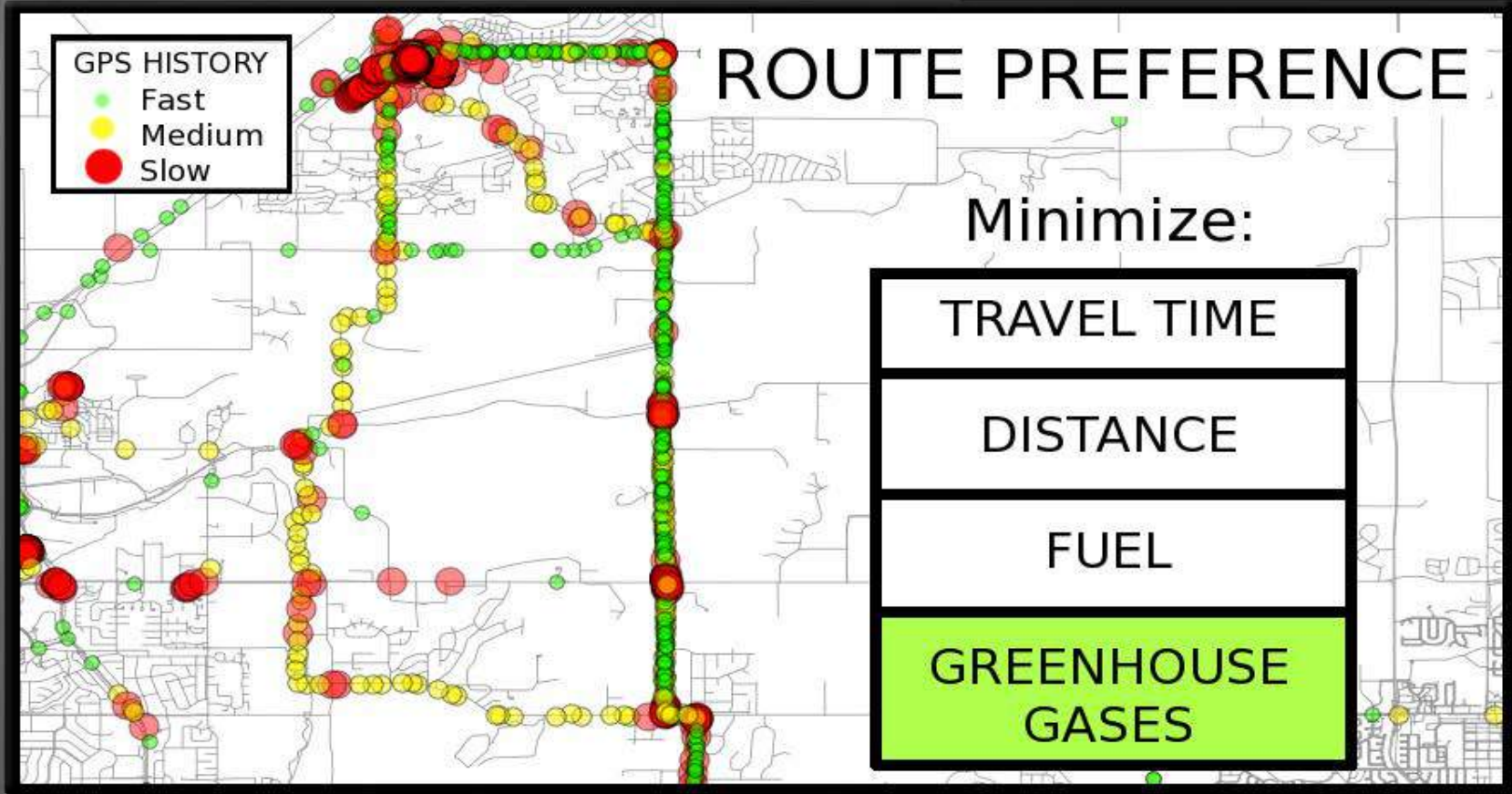
**ELINOR OSTROM**

2009 Nobel Laureate  
in Economic Sciences

Nobel medal © © The Nobel Foundation

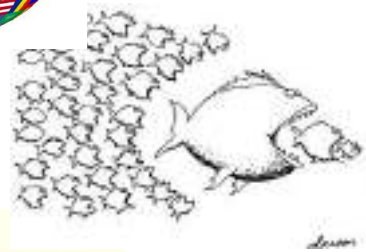


# Digital Assistants to Support Decisions



# Support Favorable Interactions with Personal Digital Assistants

Task	Technology
Support situational / context awareness	Social Mirror
Facilitate profitable interactions	Social Adapter
Avoid lossful interactions	Social Protector
Incentivize favorable interactions / support value transfer	Social Money





# In A Diverse World We Need to Create Interoperability



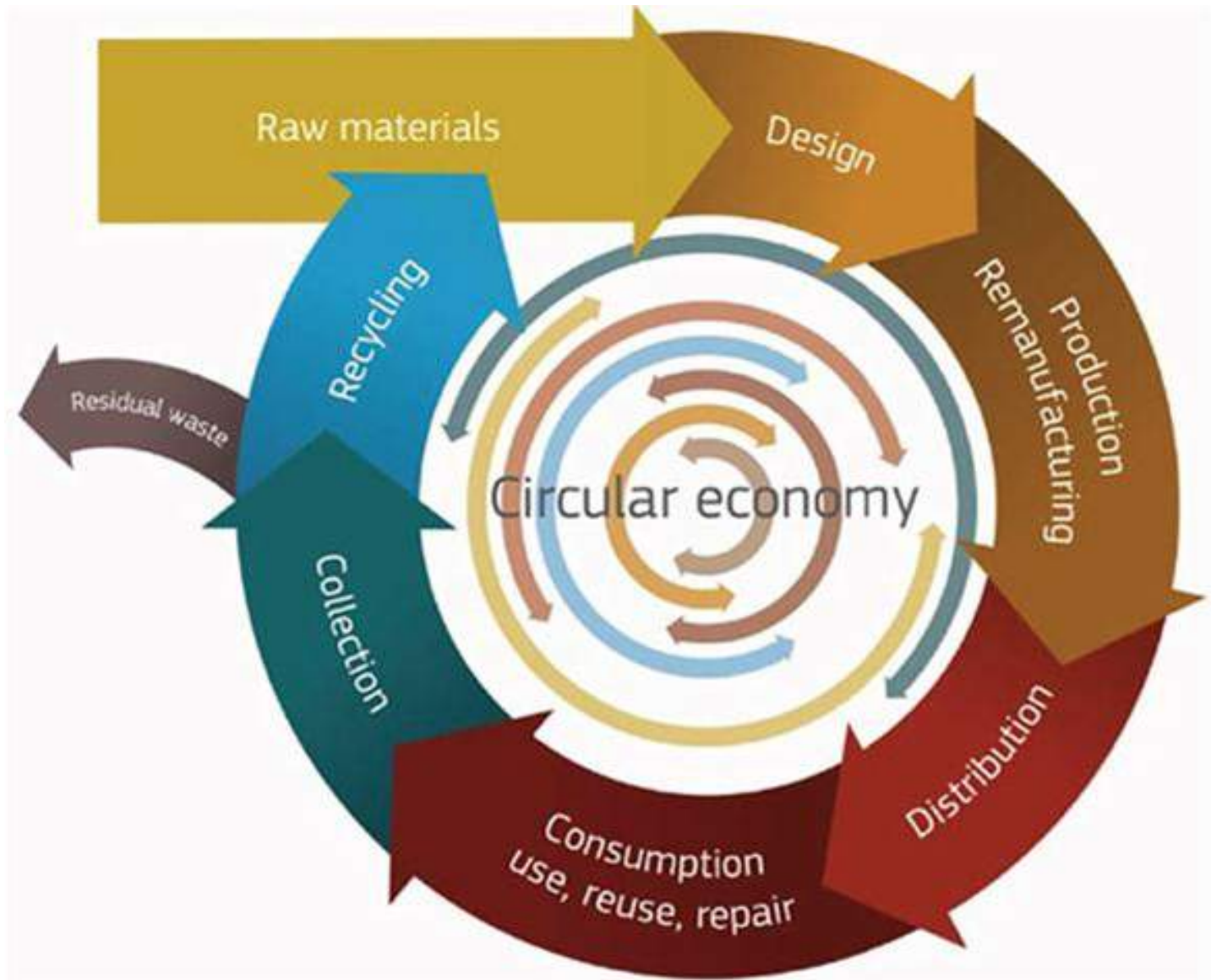
Socio-ecological  
coordination system:  
Boosting sustainability





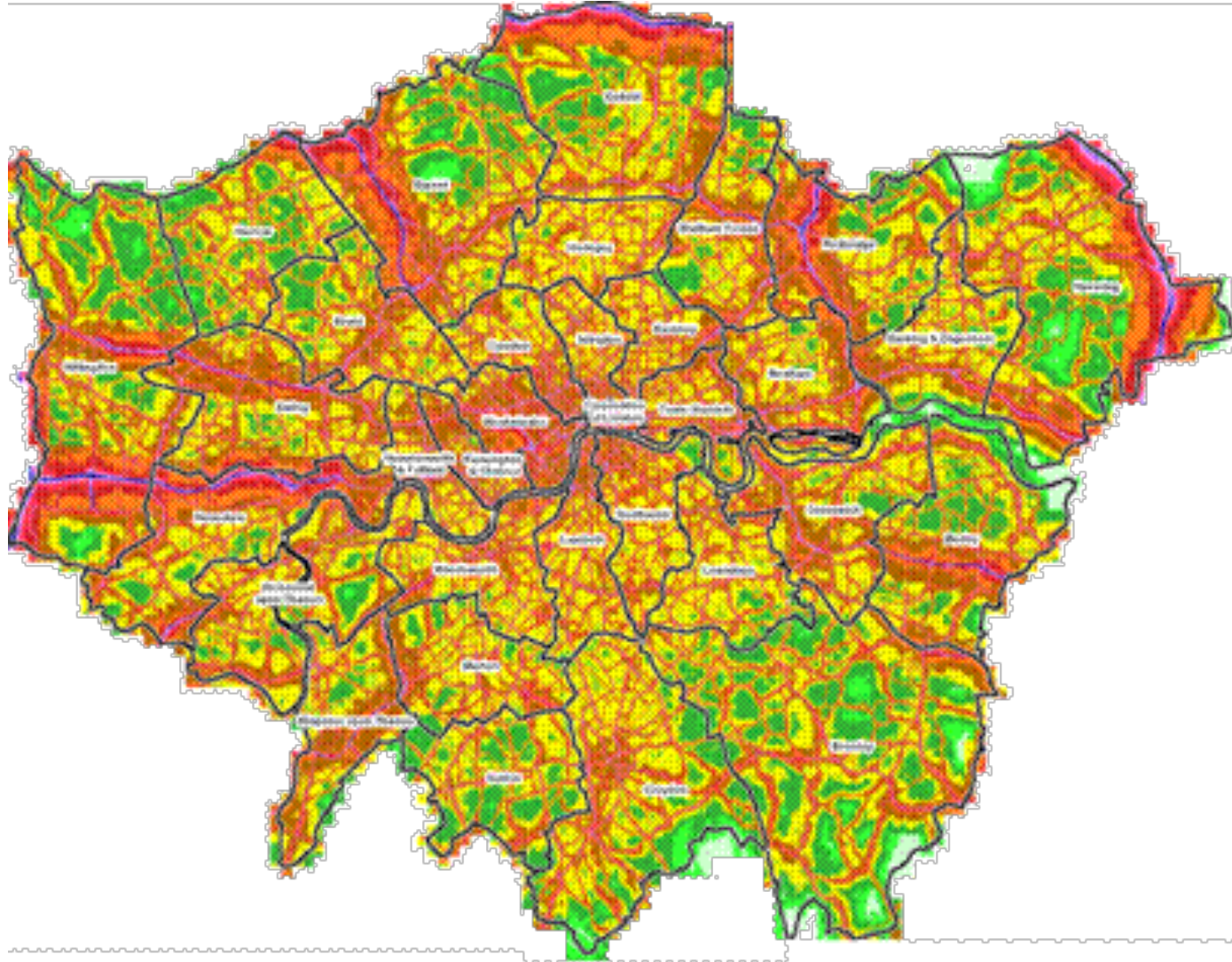


# Circular Economy





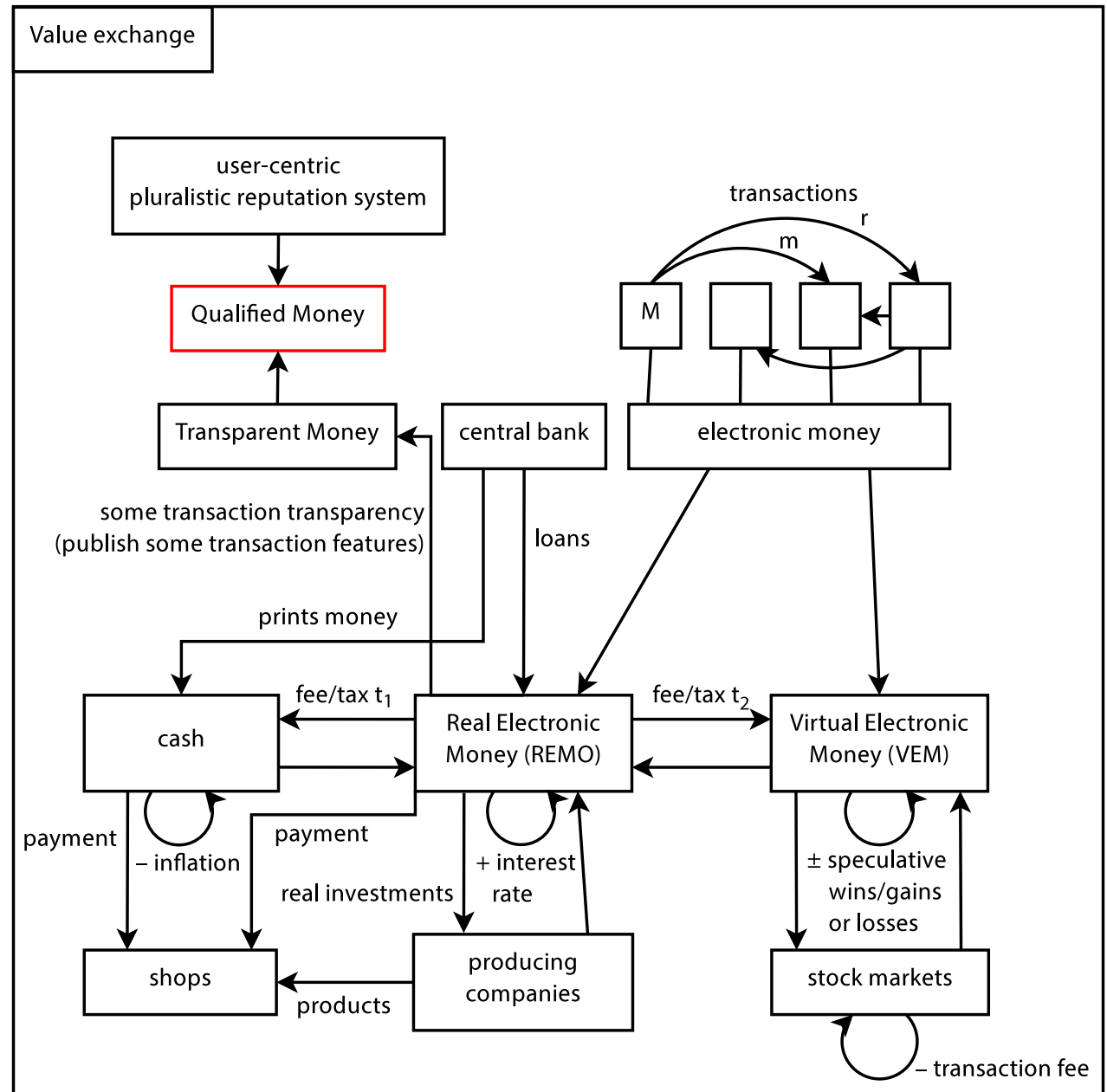
# Mapping Noise and other Externalities



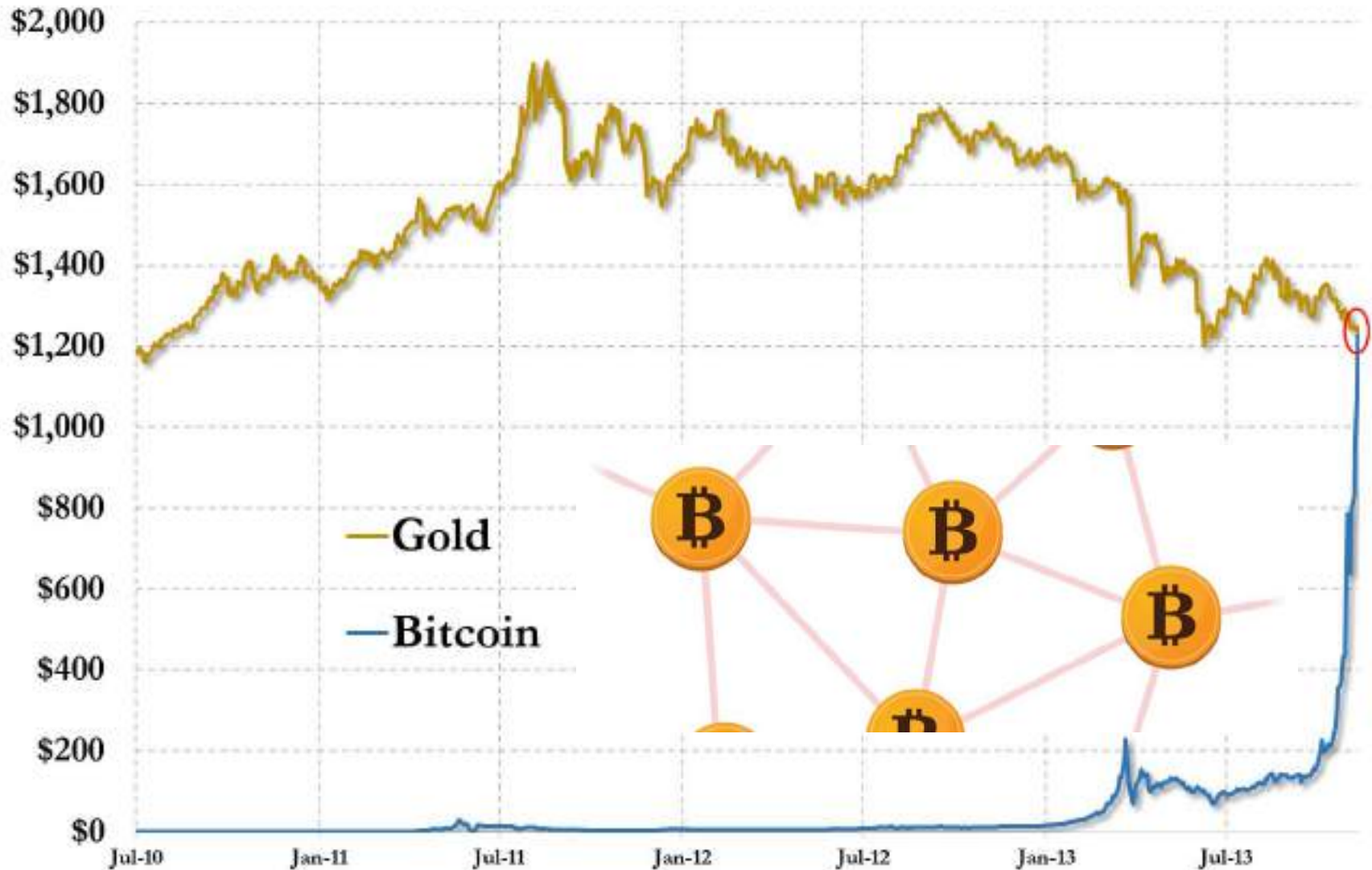
# The No. 1 Principle

Increase positive  
externalities, reduce  
negative ones, and  
ensure fair  
compensation

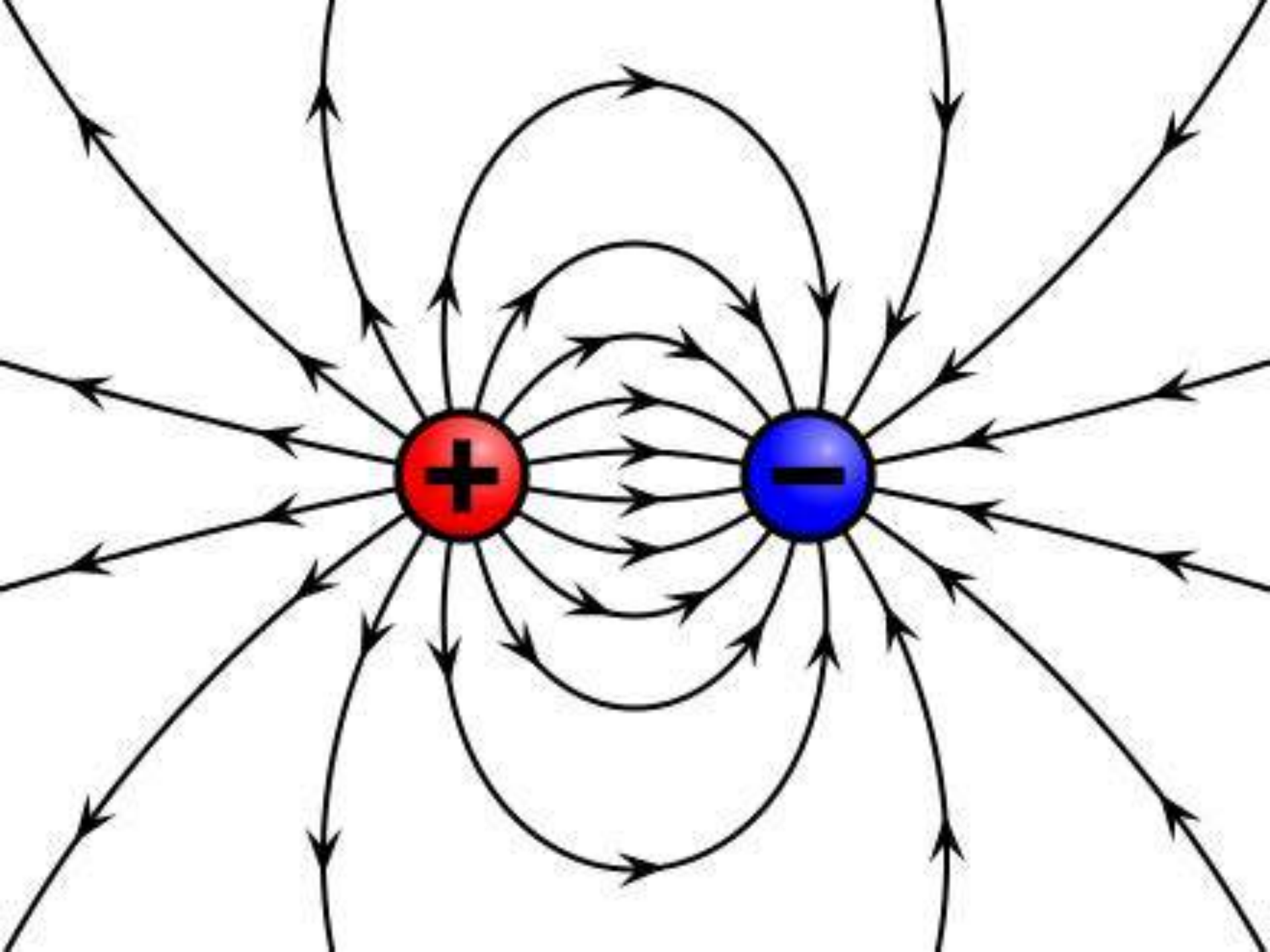
# We Need a Multi- Dimensional Incentive System



It is now possible to create such new money(s), as BitCoin has shown







Democratic  
Capitalism:  
Boosting  
innovation

ONLY 1%  
OF ALL THINGS  
HAVE BEEN INVENTED



# Revealed: how the wealth gap holds back economic growth

OECD report rejects trickle-down economics, noting 'sizeable and statistically negative impact' of income inequality



📷 OECD secretary-general Angel Gurría said that 'addressing high and growing inequality is critical to promote strong and sustained growth'. Photograph: Eric Piermont/AFP/Getty Images



10.000 Euro-Ökonom zieht Bilanz

# Quantitative Easing der Fed hat versagt!



Foto: Daniel Stelter - Beyond the obvious

Autor: Redaktion w:o 01.11.2014, 10:06 | 4210 | 1 | 0



**Kaum zu glauben, aber wahr. Die Zeiten der geldpolitischen Lockerung (Quantitative Easing) sollen in den USA erst einmal vorbei sein. Das hat die amerikanische Notenbank Federal Reserve (Fed) beschlossen.**

Seit dem Ausbruch der Finanzkrise hatte sie insgesamt drei QE-Programme aufgelegt, zuletzt hatte sie im Herbst 2012 damit begonnen, Papiere im Wert von 85 Milliarden US-Dollar zu kaufen. Doch mit dem [Gelddrucken](#) soll nun Schluss sein. Zeit, Bilanz zu ziehen: War die Politik mit der Notenpresse erfolgreich?



# Digital Democracy :

## Boosting collective intelligence

**Dirk Helbing, Contributor**

Professor of Computational Social Science, complex systems expert, member of the German Academy of Sciences "Leopoldina"

# How to make democracy work in the digital age

08/04/2016 06:44 am ET

By Prof. Dirk Helbing and Stefan Klauser, ETH Zurich

Recently, we have heard many complaints about how democracy works these days – or maybe rather why it doesn't work. In a recent Huffington post article, Dhruva Jaishankar, a Fellow at the Brookings Institution in India, claimed that digital democracy is the evil that makes our world ungovernable.<sup>[1]</sup> We argue that Jaishankar defines digital democracy in a flawed and misleading way. This could cause serious misunderstandings of what the problems are and what are the possible solutions. In the following we will show that digital democracy – if properly understood<sup>[2]</sup> – is the most promising way to build prosperous societies in the digital age.

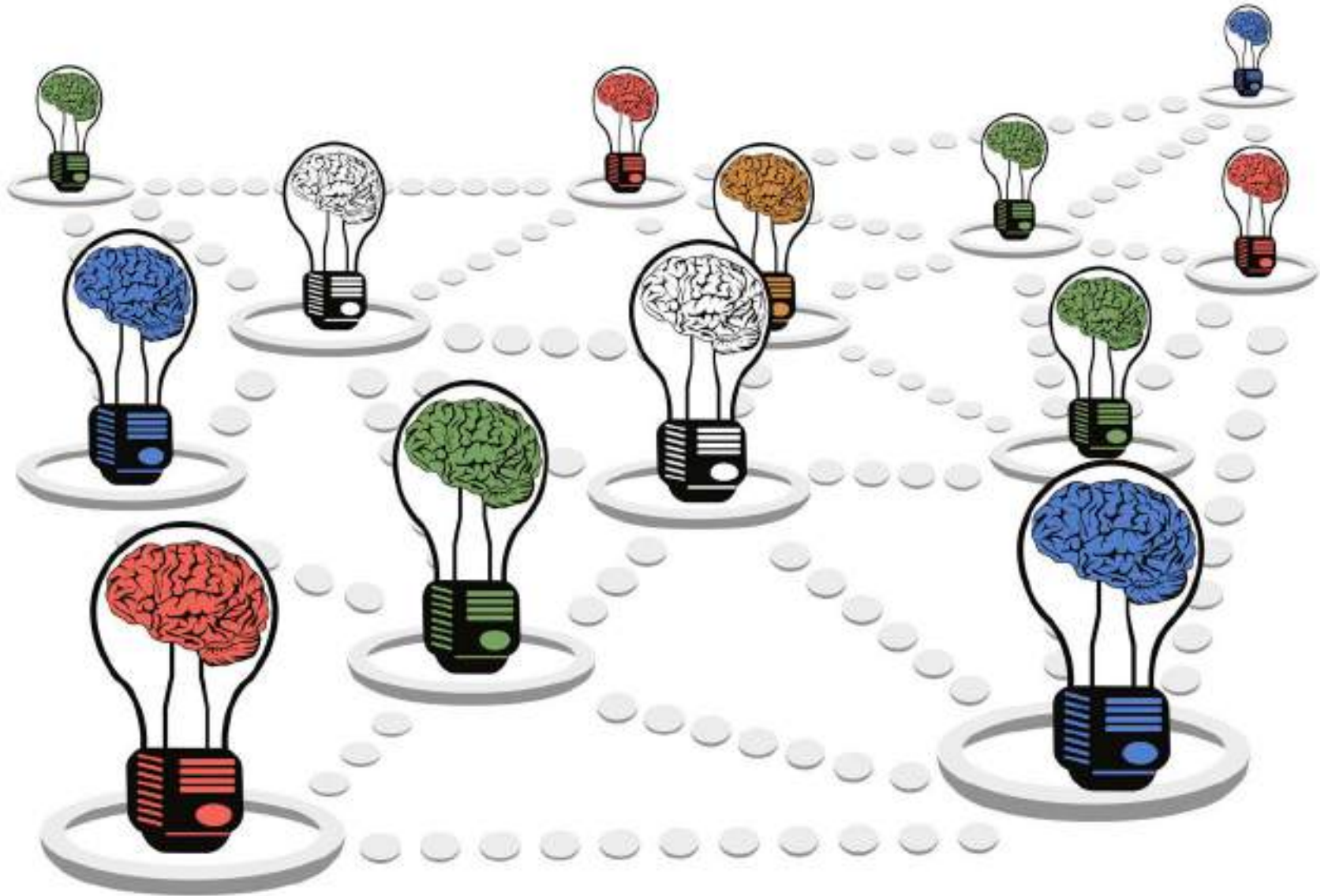
AdChoices 

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**Brexit, Trump, AfD - is the Internet creating protest voters?**



# Bring the Best Ideas of Many Minds Together



# Diversity Wins, Not the Best



## Leaderboard

Display top  leaders.

Rank	Team Name	Best Score	% Improvement	Last Submit Time
1	<a href="#">BellKor's Pragmatic Chaos</a>	0.8558	10.05	2009-06-26 18:42:37
<b>Grand Prize - RMSE <math>\leq</math> 0.8563</b>				
2	<a href="#">PragmaticTheory</a>	0.8582	9.80	2009-06-25 22:15:51
3	<a href="#">BellKor in BigChaos</a>	0.8590	9.71	2009-05-13 08:14:09
4	<a href="#">Grand Prize Team</a>	0.8593	9.68	2009-06-12 08:20:24
5	<a href="#">Dace</a>	0.8604	9.56	2009-04-22 05:57:03
6	<a href="#">BigChaos</a>	0.8613	9.47	2009-06-23 23:06:52
<b>Progress Prize 2008 - RMSE = 0.8616 - Winning Team: BellKor in BigChaos</b>				
7	<a href="#">BellKor</a>	0.8620	9.40	2009-06-24 07:16:02
8	<a href="#">Gravity</a>	0.8634	9.25	2009-04-22 18:31:32
9	<a href="#">Opera Solutions</a>	0.8638	9.21	2009-06-22 05:53:30
10	<a href="#">xlvectur</a>	0.8639	9.20	2009-06-26 13:49:04
11	xiangliang	0.8639	9.20	2009-06-26 07:47:34
12	<a href="#">BruceDengDaoCiYiYou</a>	0.8641	9.18	2009-06-02 17:08:31
13	<a href="#">Ces</a>	0.8642	9.17	2009-06-24 14:34:14
14	majia2	0.8642	9.17	2009-06-23 08:07:50

Top-down  
and majority  
decisions  
obstruct  
collective  
intelligence

Wisdom of  
crowds  
requires  
independent  
exploration  
and then  
integration



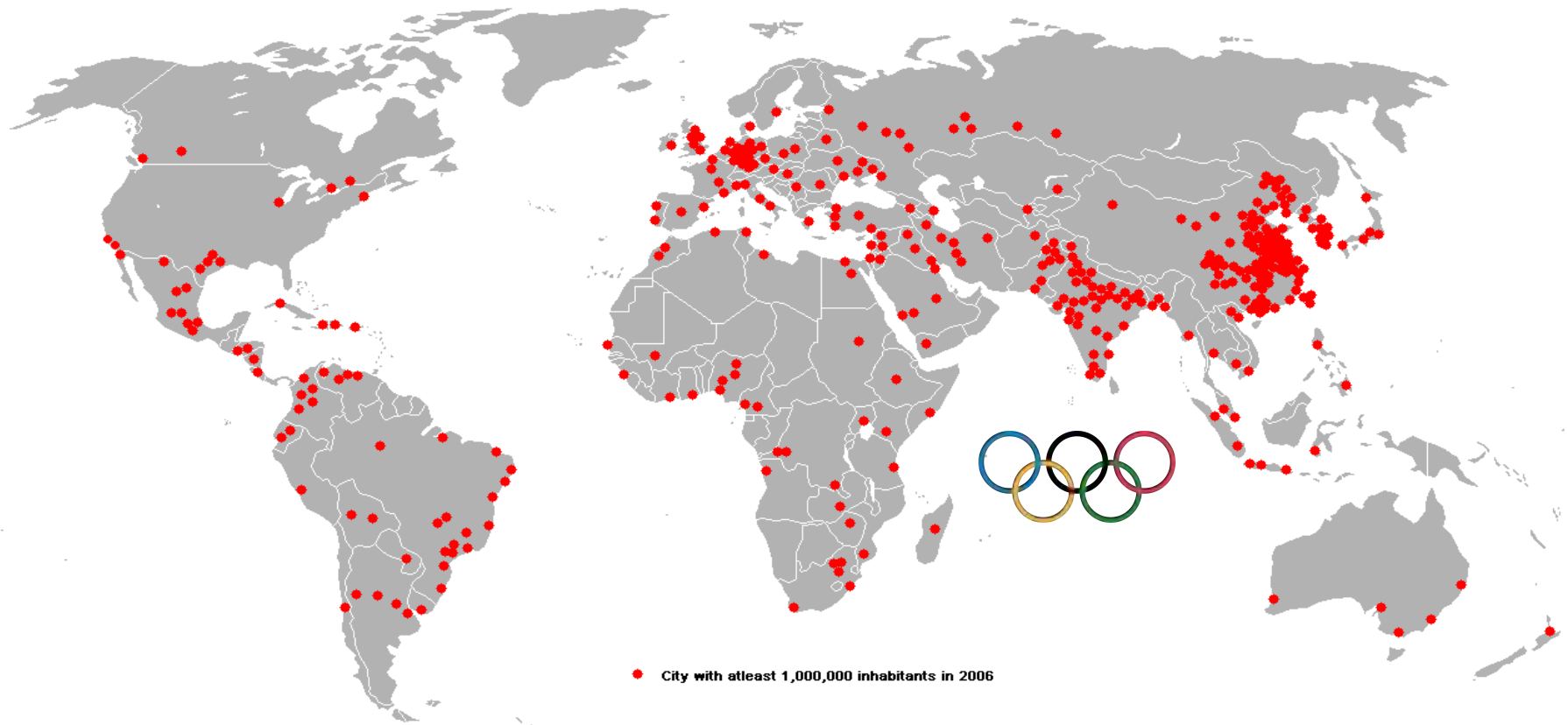
Many choices that people consider their own are already determined by algorithms.

# Build digital democracy

Open sharing of data that are collected with smart devices would empower citizens and create jobs, say **Dirk Helbing** and **Evangelos Pournaras**.



# Countering Global Problems Bottom-Up: **City Olympics** for Better Energy, Environmental and Climate Solutions





We are at the beginning of a new age



Universe – C. Flammarion, Woodcut, Paris 1888, Colorit : Heikenwaelder Hugo, Vienna 1998, CC BY-SA 2.5



# We All Deserve A Better Future

- Circular economy
- Pull economy, open innovation
- Participatory sharing economy
- Democratic capitalism to let the best ideas become real
- Socio-ecological finance system
- Region-based world council
- Digital democracy to activate collective intelligence
- City olympics to achieve global goals

Read "To the Elites" in "The Globalist" by Dirk Helbing

# Let's Do This Together!



Image Source: <http://demosite.in/applicationdevelopment.php>

Dirk Helbing

# THE AUTOMATION OF SOCIETY IS NEXT

How to survive the digital revolution

The explosion in data volumes, processing power, and Artificial Intelligence, known as the **"digital revolution"**, has driven our world to a dangerous point. One thing is increasingly clear: We are at a crossroads. We need to make decisions. We must re-invent our future.

After the automation of factories and the creation of self-driving cars, the automation of society is next. But there are two kinds of automation: a centralized top-down control of the world, and a distributed control approach supporting local self-organization. Using the power of today's information systems, governments and companies like Google seem to engage in the first approach. Will they even try to build a **"digital God"** who knows everything and controls what we do? In fact, governments would spend billions to predict the future of our world and control its path.

Given that, every year, we produce as much data as in the entire history of humankind, can we now create a better world? The abundance of data certainly makes it possible to establish an entirely new paradigm for running our societies. Could we even build a data-driven **"crystal ball"** to predict the future and, given that knowledge implies power, also something like a **"magic wand"** to optimally rule the world? Will the digital revolution empower a **"wise king"** or **"benevolent dictator"**, maybe by means of Artificial Intelligence? In fact, we are much closer to this than you might think. But do we really need large-scale surveillance to understand and manage the increasingly complex systems we have created? Or are we running into a totalitarian nightmare?

What alternatives to master our complex world do we have? What about the principles of the **"invisible hand"** and the **"wisdom of the crowd"**, which posit that independent decisions made by many people will produce optimal societal outcomes? In the past, these principles have often failed. So, can bottom-up self-organization really work and if so, what does it take? Could technology make it work? Relying on the **"Internet of Things"** and complexity science, can self-organization now enable a more efficient, more innovative, more successful, more resilient, smarter and happier society?

Let us explore this now, because this would open the door to a brighter version of the digital society, based on informational self-determination, human dignity, freedom of decision-making, democratic principles, participation, and collective intelligence.

**It's time to take the future in our hands!**

Bar Code







Economy 4.0:  
How to create  
jobs and earn  
money in future?

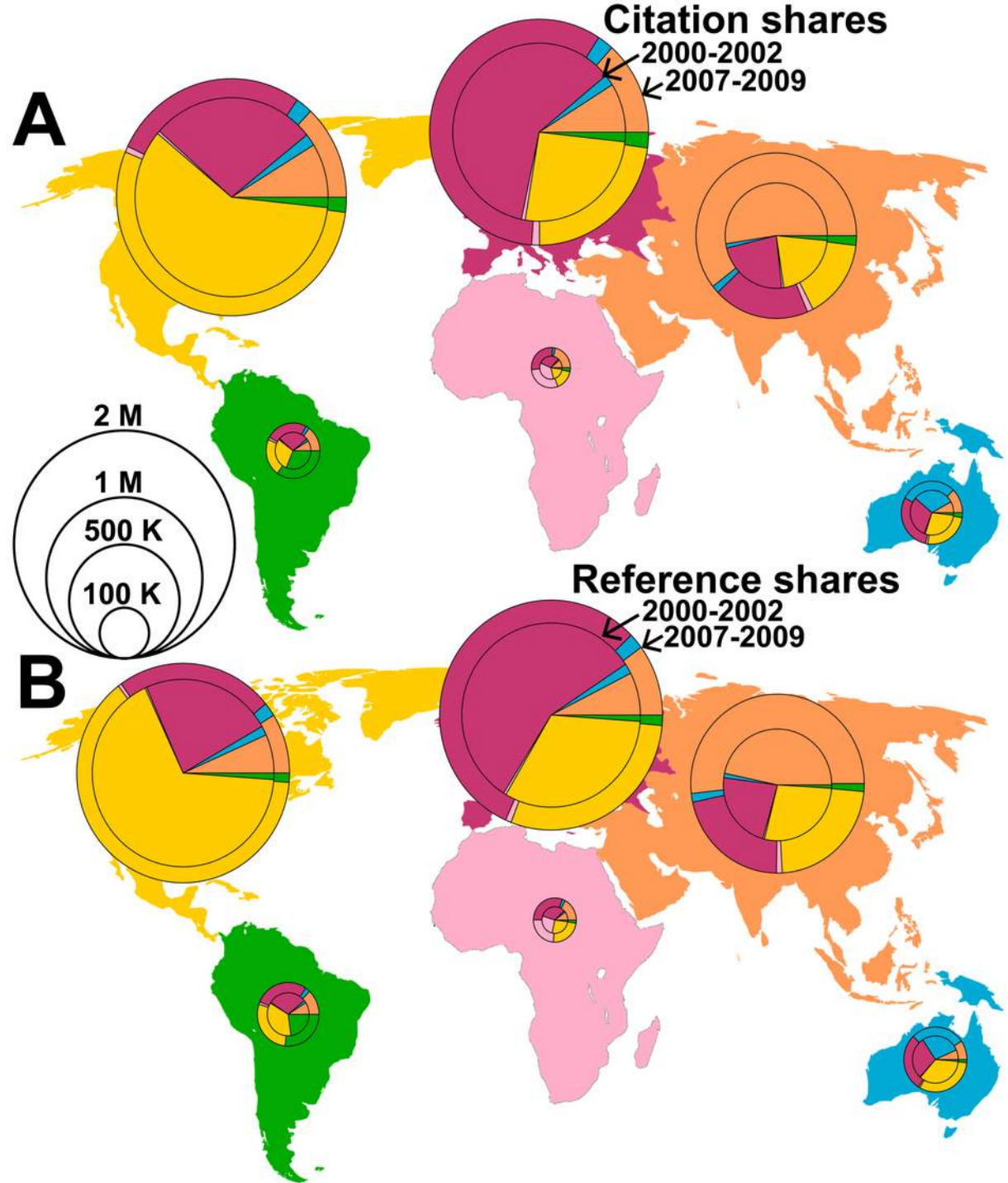
# Low-Carbon Economy



**REDUCE**  
**REUSE**  
**RECYCLE**



# Information and Knowledge Production





Creative Work



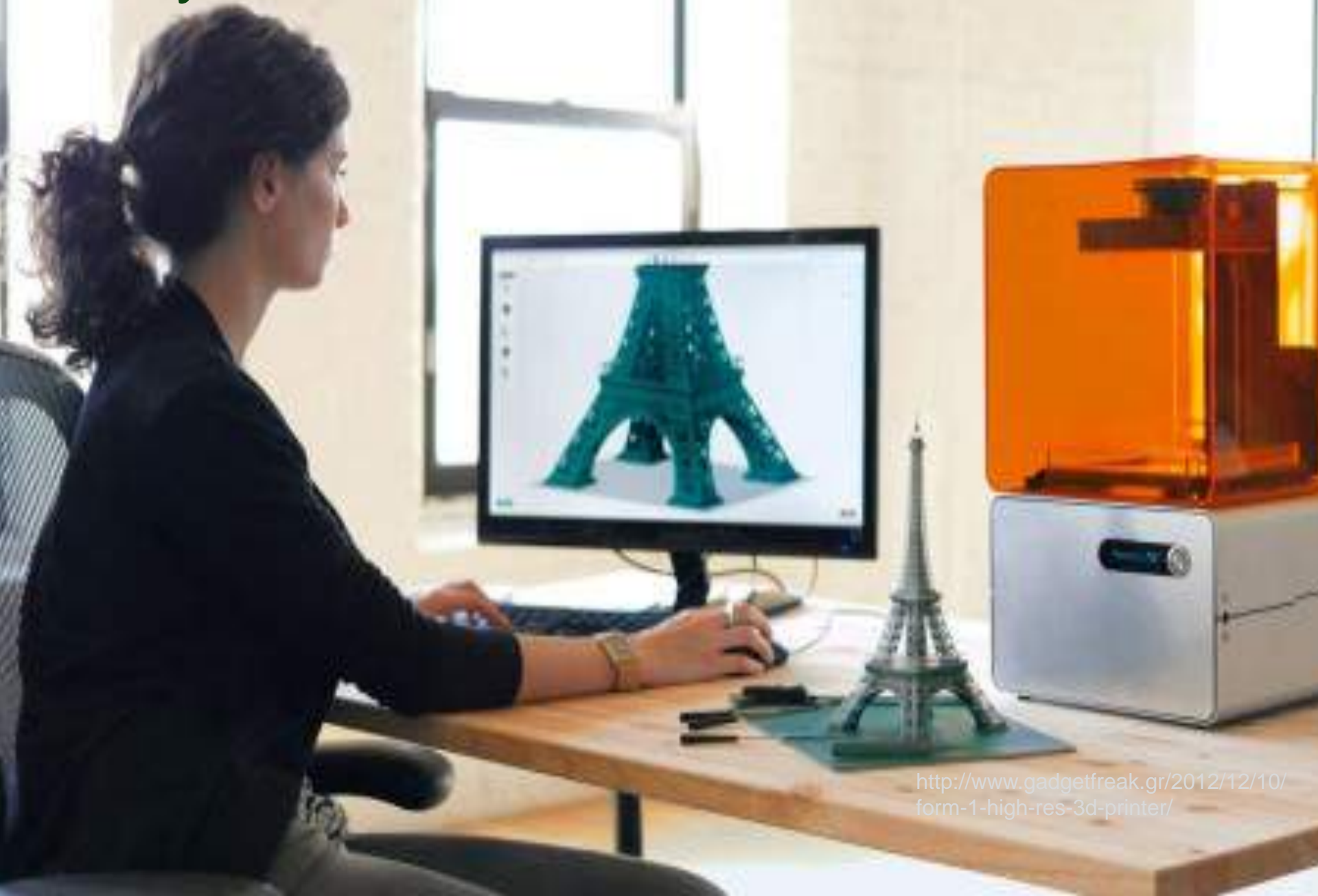
# Personalized Products



## Do it yourself case design

Design your photo, art or logo  
and we'll turn it into a custom  
card insert to iphone 4/iphone  
4 CDMA case

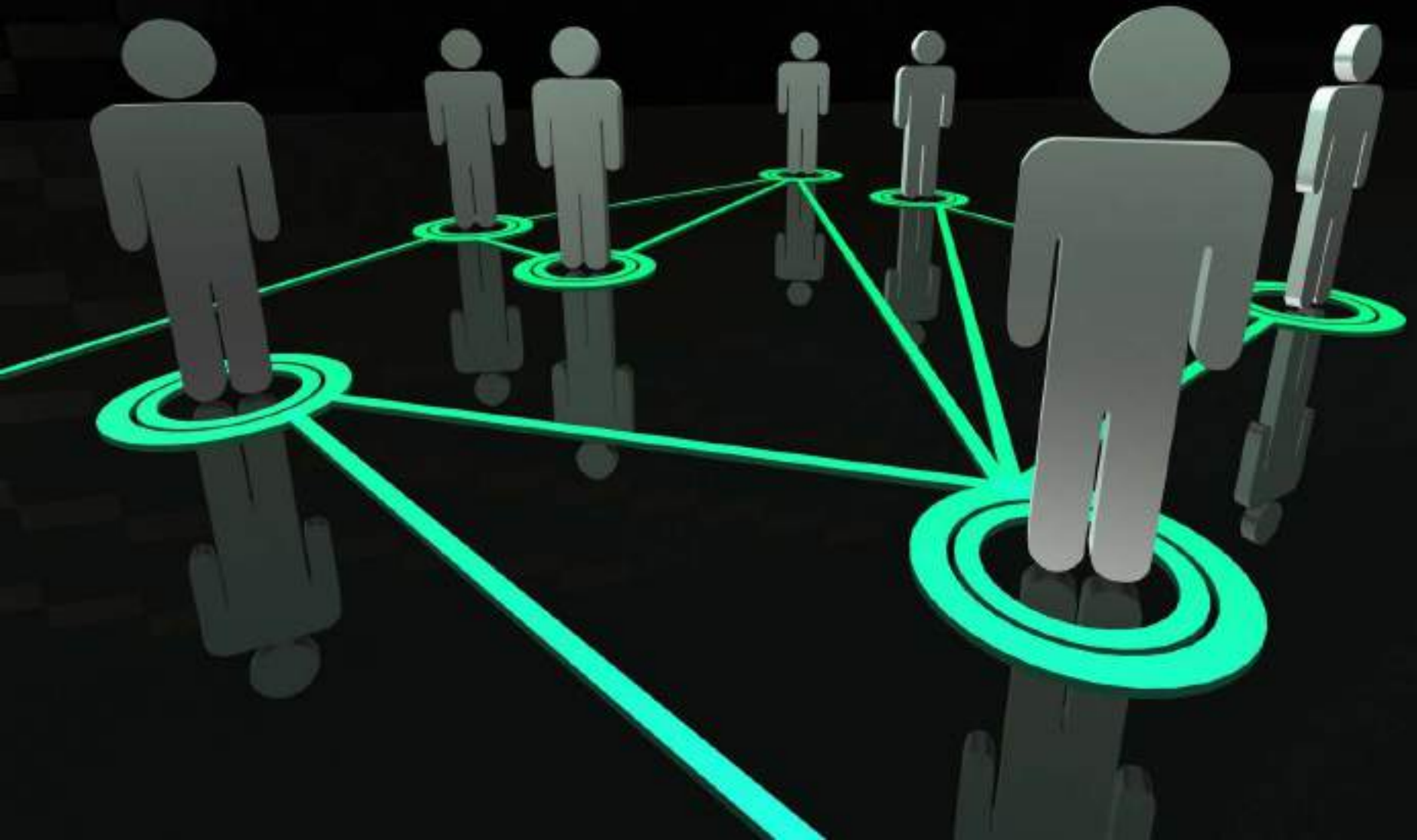
# Everyone Can Establish An Own Business



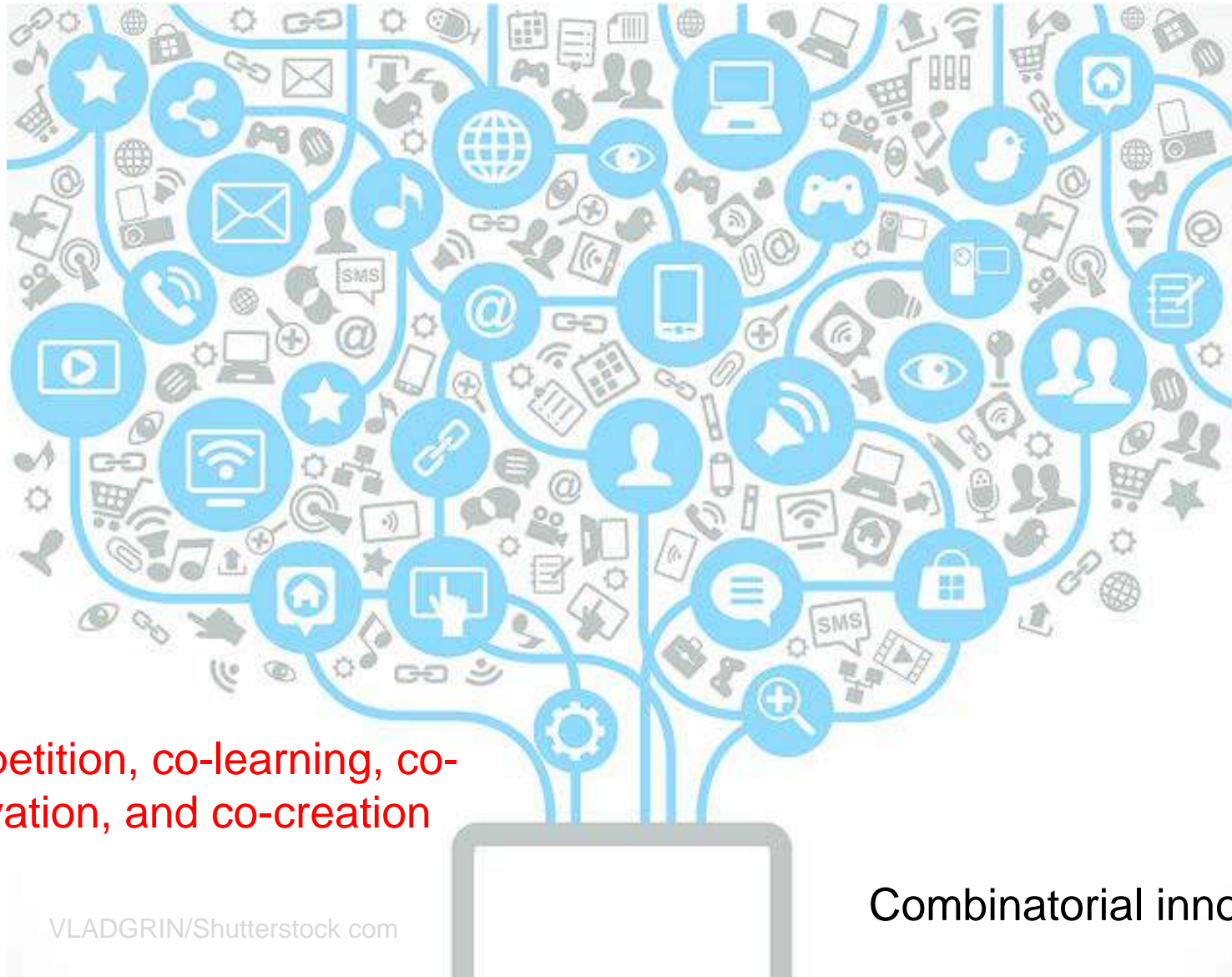
<http://www.gadgetfreak.gr/2012/12/10/form-1-high-res-3d-printer/>



# Networked Thinking



# Information, Innovation, Production and Service Ecosystem



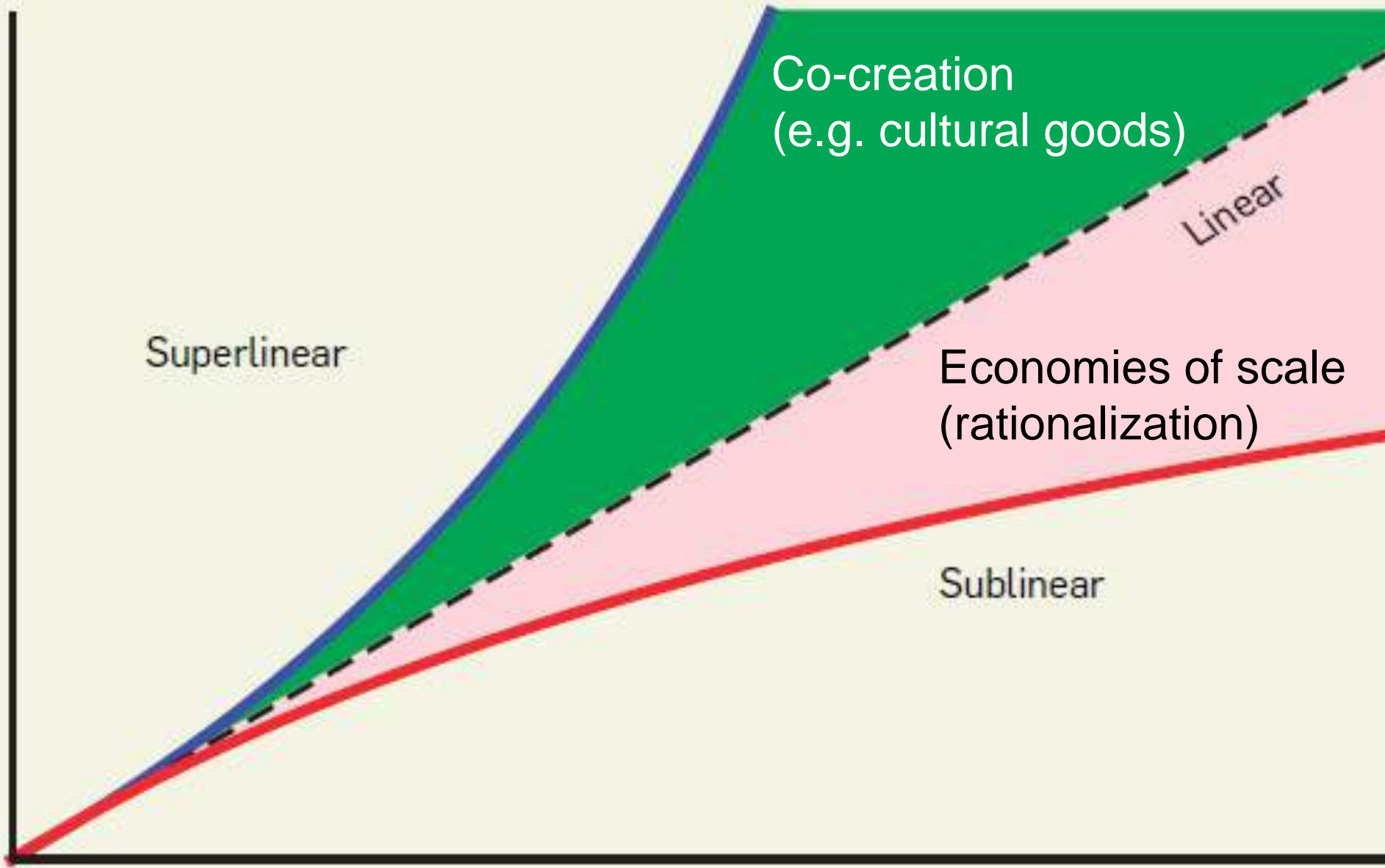
Superlinear

Co-creation  
(e.g. cultural goods)

Linear

Economies of scale  
(rationalization)

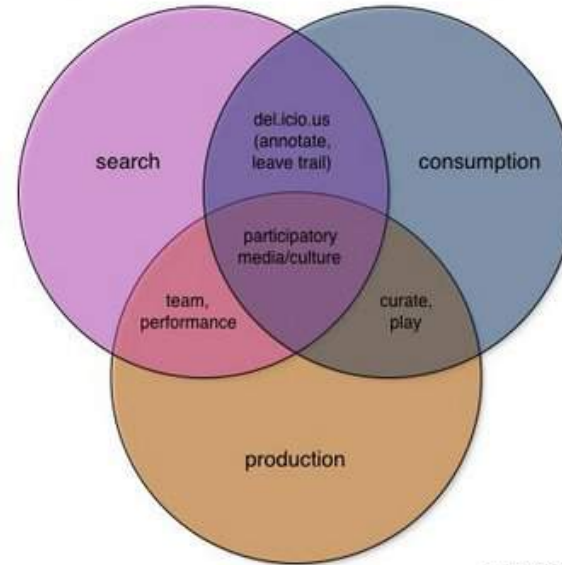
Sublinear



# Co-Creation

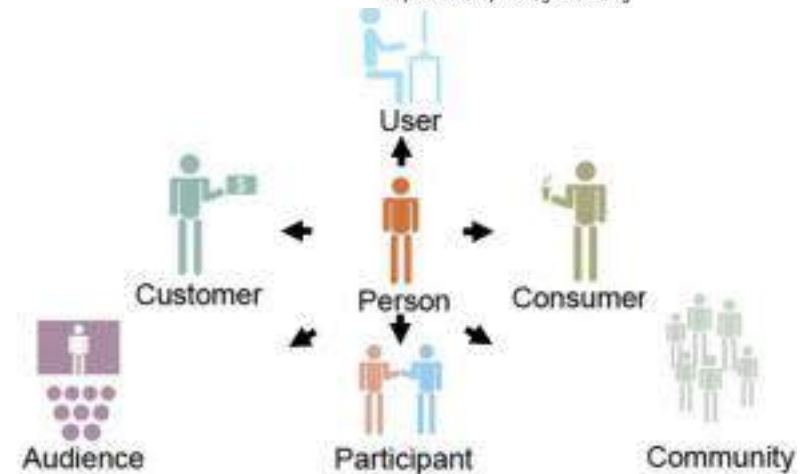
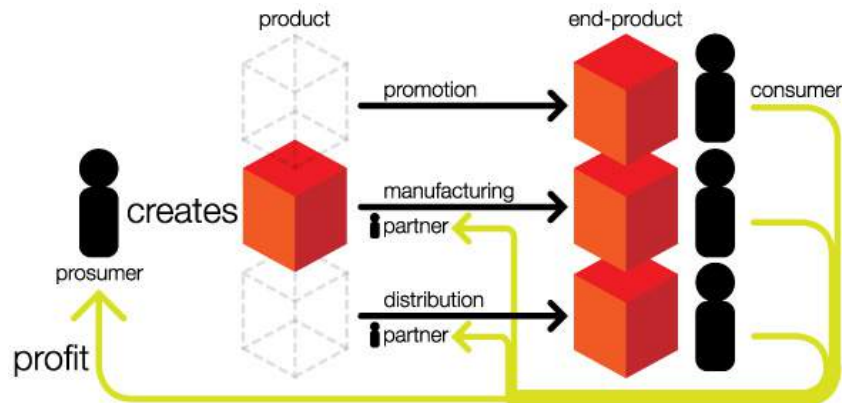


participatory culture and the empowered media prosumer



by Eli Chapman  
3/10/05

<http://www.chapmanlogic.com/blog>





# New Opportunities Everywhere!

- Smart cities
- Smart grids
- Industry 4.0
- Finance 4.0
- Economy 4.0
- Governance 4.0
- Ethical IT
- Retail business
- Search engines
- Financial Industry
- FinTech
- Insurances
- Re-Insurances
- Medicine
- Pharma Industry
- Internet of Things
- Digital Assistants
- Watch Making
- Tourism
- Furniture

Ethical, Value-Sensitive,  
Culturally Fitting IT

**Sarah Spiekermann**



# **Ethical IT Innovation**

**A Value-Based System Design Approach**

 **CRC Press**  
Taylor & Francis Group  
AN AUERBACH BOOK

## Personal Data: The Emergence of a New Asset Class



1. Achieve a balance between the interests of business, public, and private individuals
2. Give individuals control over their personal data (“informational self-determination”)
3. Pay individuals a fair share of the value of their personal data



## PRIVACY

While controlling  
how it is used



## PERSONAL DATA

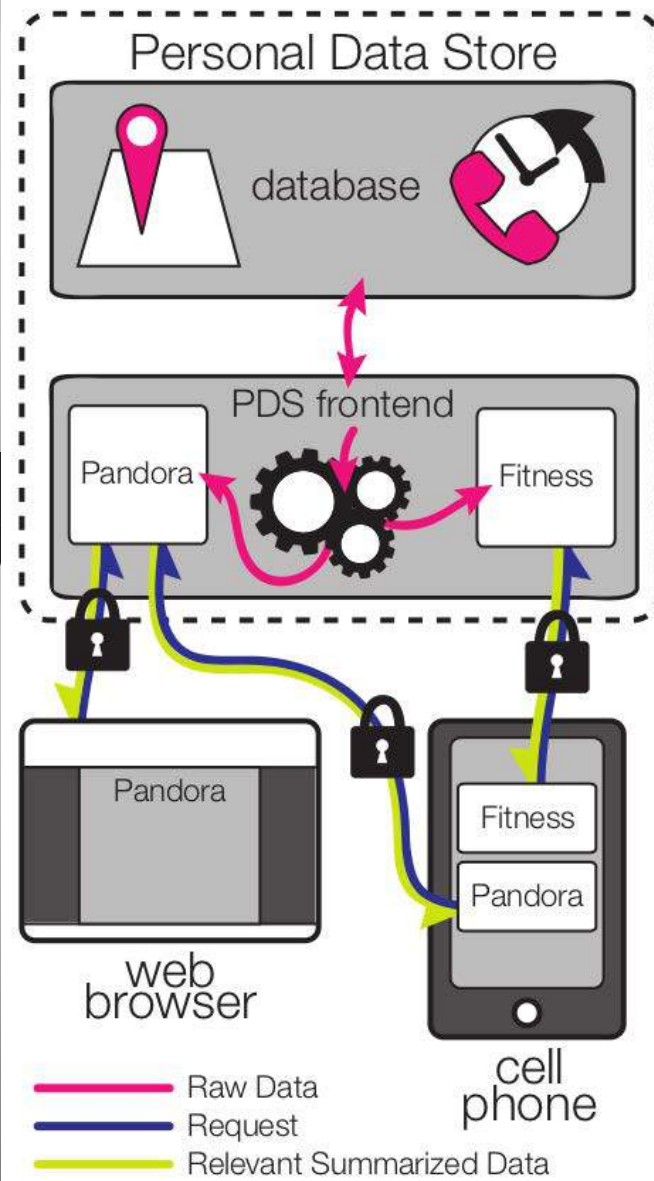
Collect it, Own it  
Share it

## PRIVACY

openPDS helps  
you protect your data



# Personal Data Store



# Matching Supply and Demand Via Third Parties/Devices



Personal Data

Personalized Product

Retail business

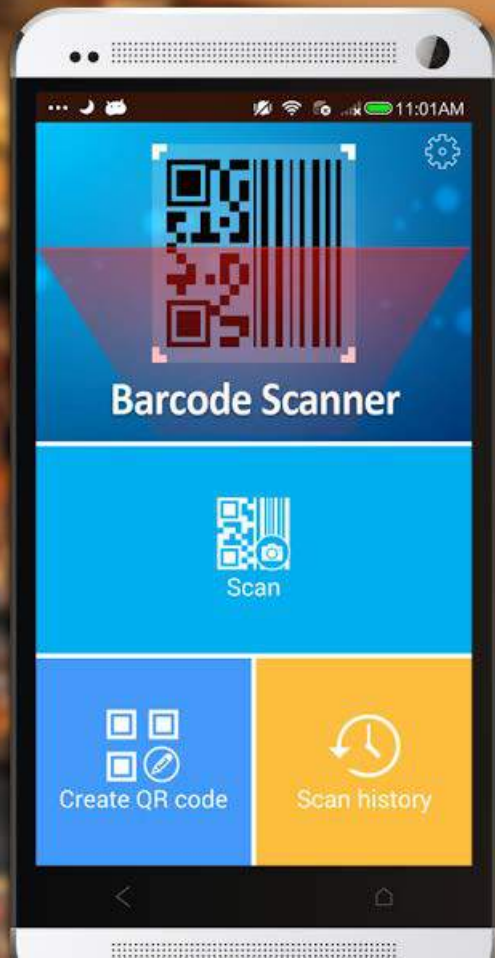






# Barcode Scanner

Fast & Powerful



# Search Engines



### Yoga für Anfänger

[www.laurasyoga.de](http://www.laurasyoga.de)

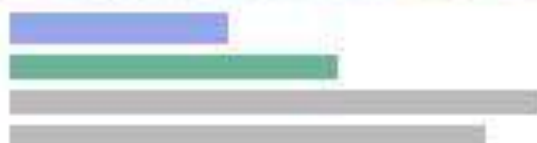
Yoga für Anfänger. Starten Sie mit einem Gratis-Probetraining.



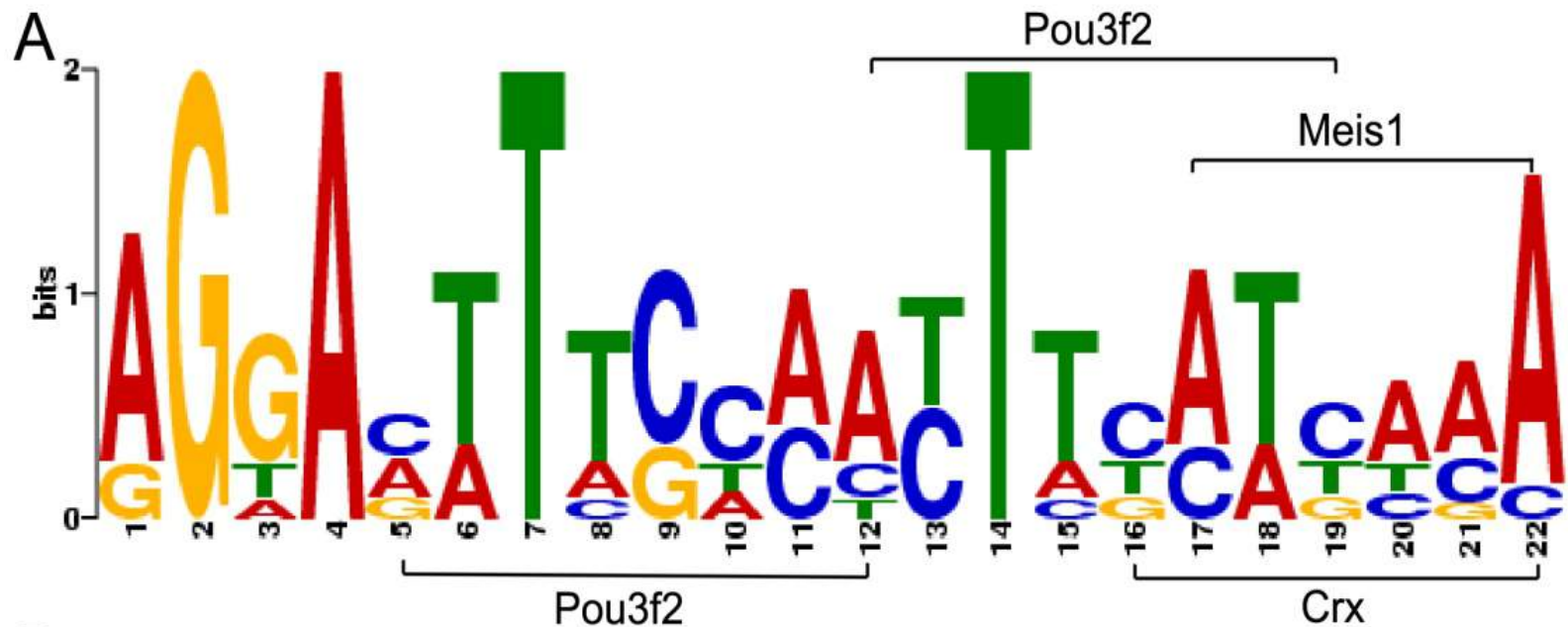
### Starten Sie heute

[www.deinyogakurs.de](http://www.deinyogakurs.de)

Starten Sie heute. 10 Klassen für 40€. Probetraining gratis.



# Measuring Innovation: Determining the Genes of a Product



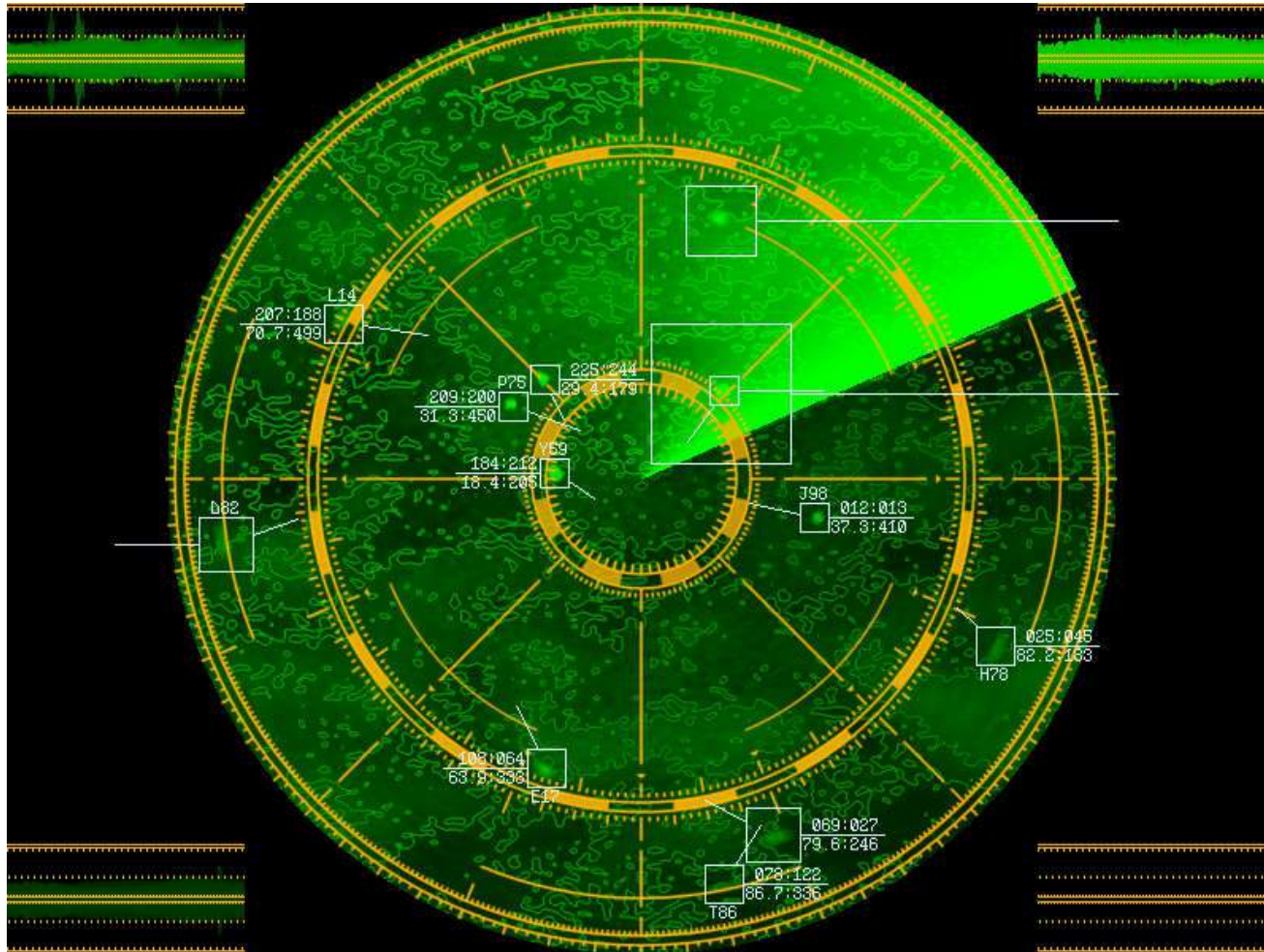
**B**

Name	Strand	Start	p-value	Sites
cis-element_of_r_CyclinD1	+	0	3.76e-11	AGGACTTTGCAACTTCAACAAA
cis-element_of_m_CyclinD1	+	0	3.76e-11	AGGACTTTGCAACTTCAACAAA
cis-element_of_h_CyclinD1	+	0	3.76e-11	AGGACTTTGCAACTTCAACAAA
cis-element_of_h_Chx10	+	0	5.41e-09	AGGAGATTCCCCCTTTTATCCAA
cis-element_of_m_Chx10	+	0	2.13e-08	AGGAGATTCCCTTTTATCCAA
hs258.chr3:33,781,318-33,782,778	+	517	1.09e-07	GAGAGATAGG AGGACTTTCTAATTTGCTTTCC CTCTATTTTA
cis-element_of_h_Pax6	+	0	1.24e-07	AGTAATTACAAATTACATTACA
cis-element_of_q_Pax6	+	0	1.24e-07	AGTAATTACAAATTACATTACA
hs27.chr8:94,973,252-94,974,310.all	+	456	2.82e-07	AAGTCCGTGC GGGAAATTCCTTCGCTGTAA ATACCTAGCG
hs1170.chr13:78,817,206-78,818,434	+	424	5.05e-07	TGGATGCGTA GGAAAATTCCTACTTTCTGAGA GAAATTCCTT

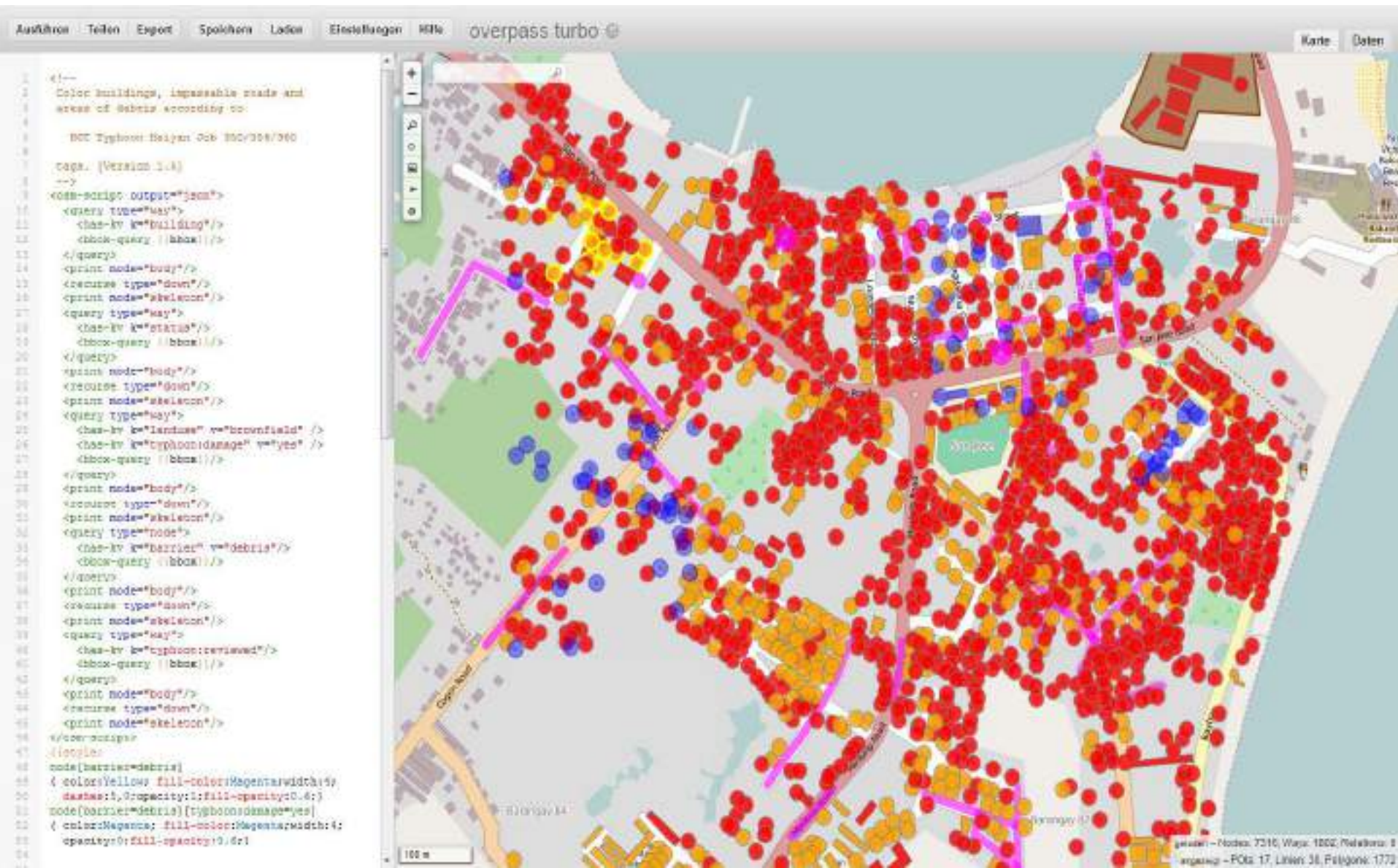


Re-Insurance

# A Crowd-Sourced “Radar” System



# Crises Mapping



Insurance



# Black Box verspricht Rabatte für brave Autofahrer



Kfz-Versicherer wollen mit Telematik-Boxen den Versicherungsbeitrag an die Fahrweise knüpfen.

Bild: dpa

von Maximilian Nowroth >

**Junge Autofahrer verursachen hohe Schäden, deshalb zahlen sie hohe Versicherungsprämien. Autoversicherer wollen sie nun per Black Box am Steuer überwachen - und locken mit günstigeren Prämien. Ein Manöver mit Risiko.**

ANZEIGE



1

Kommentare

Artikel teilen



Versenden

Drucken

Merken

Startseite





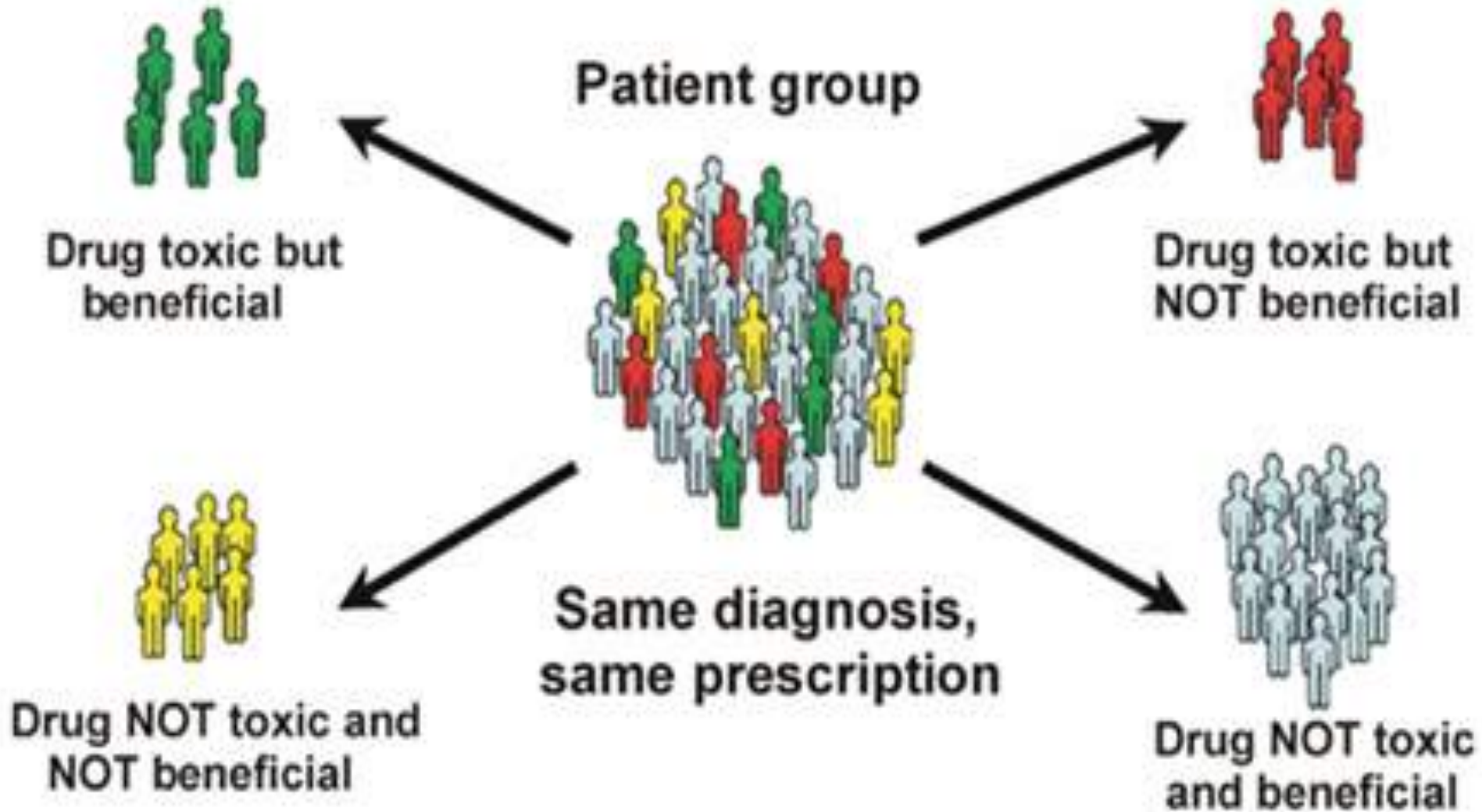
# Competition Naturally Raises Everybody's Effort



# Medicine and Pharma Industry



# Personalized Health





# Health Data Cooperatives – Citizen Empowerment

E. Hafen<sup>1</sup>; D. Kossmann<sup>2</sup>; A. Brand<sup>3</sup>

<sup>1</sup>Institute of Molecular Systems Biology, ETH Zurich, Zurich, Switzerland;

<sup>2</sup>Institute for Information Systems, ETH Zurich, Zurich, Switzerland;

<sup>3</sup>Institute for Public Health Genomics, University of Maastricht, Maastricht, The Netherlands







# **CITIZEN** **SCIENCE**

**GO AHEAD, TRY THIS AT HOME**



# Cognitive Computing: IBM Watson's Health Services





# Internet of Things



# Internet of Things







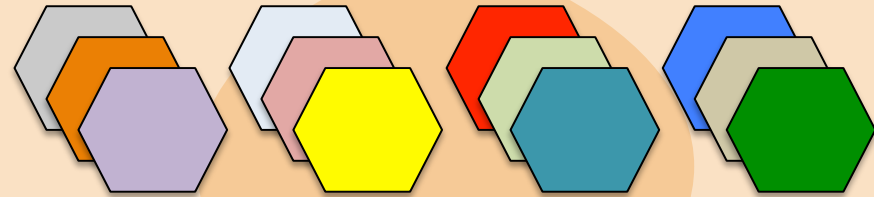
# Device democracy

*Saving the future of the Internet of Things*

IBM Institute for Business Value



# Application Ecosystem



## Physical & Virtual Sensors

Informational Self-Determination

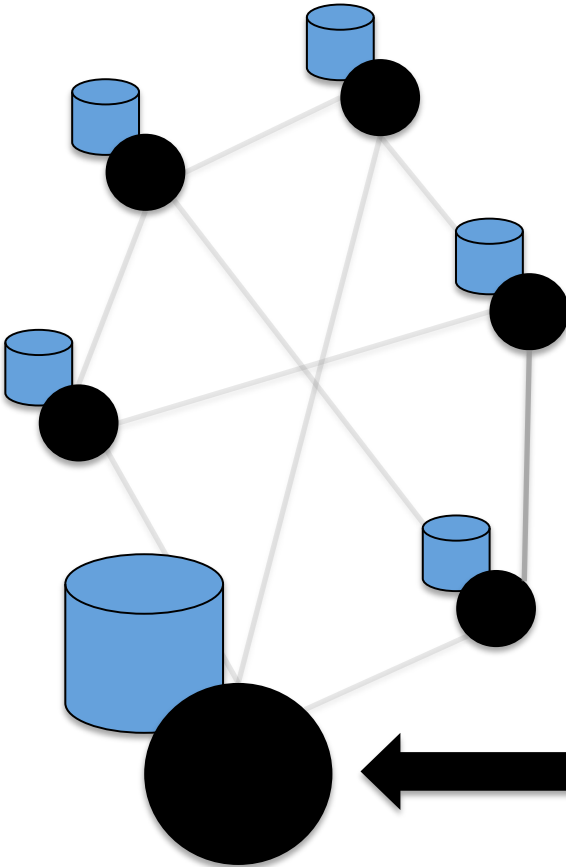
Application Programming Interface (API)

Storage

Data Analytics

## Mobile Phone Environment

## Networked Environment



## Nervousnet Proxy

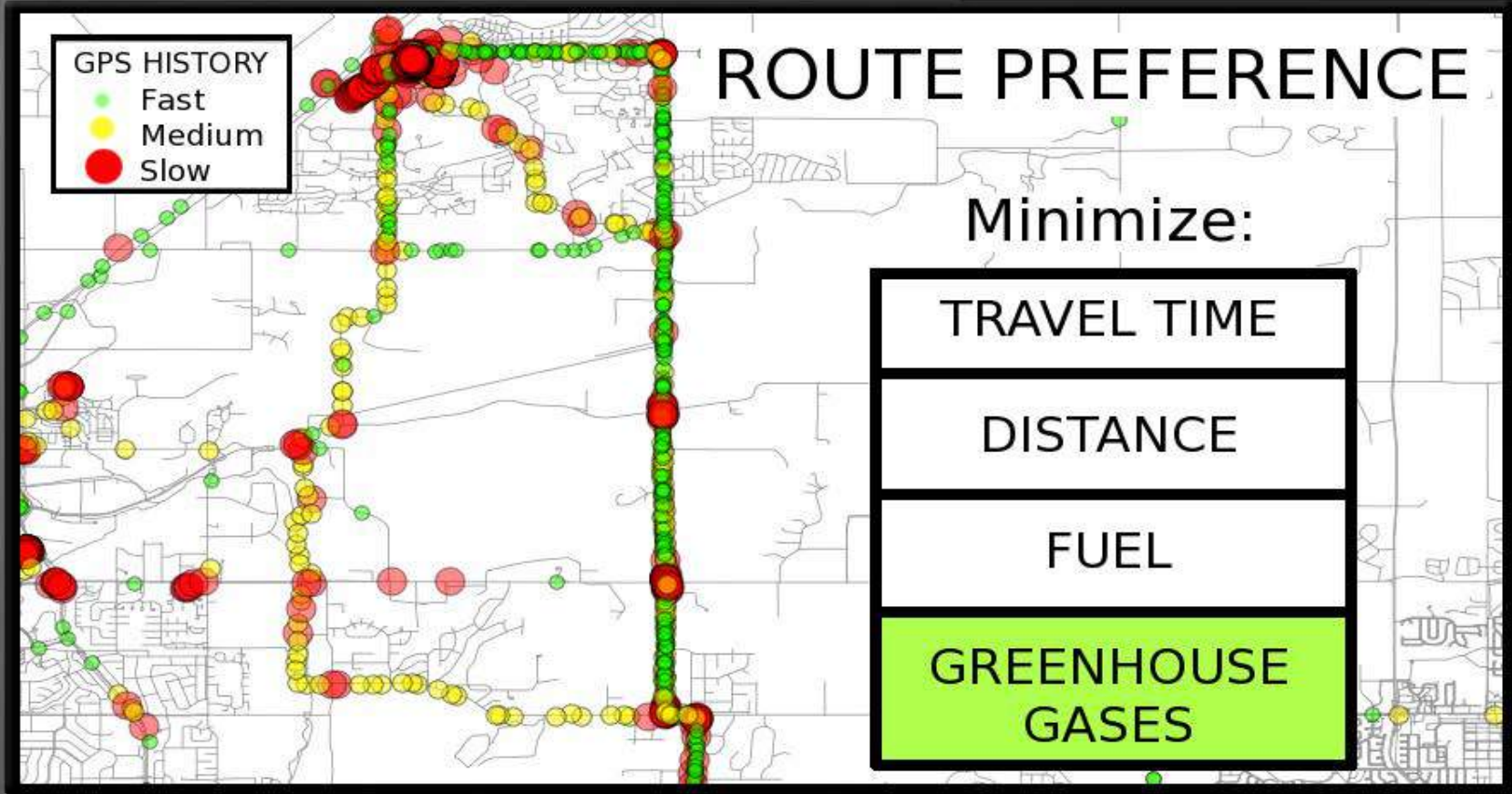
# Watch Making





# Digital Assistants

# Digital Assistants to Support Decisions

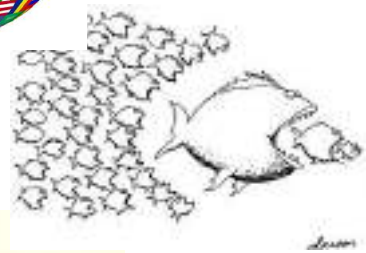


# Reputation Systems to Increase Quality



# Support Favorable Interactions with Personal Digital Assistants

Task	Technology
Support situational / context awareness	Social Mirror
Facilitate profitable interactions	Social Adapter
Avoid lossful interactions	Social Protector
Incentivize favorable interactions / support value transfer	Social Money

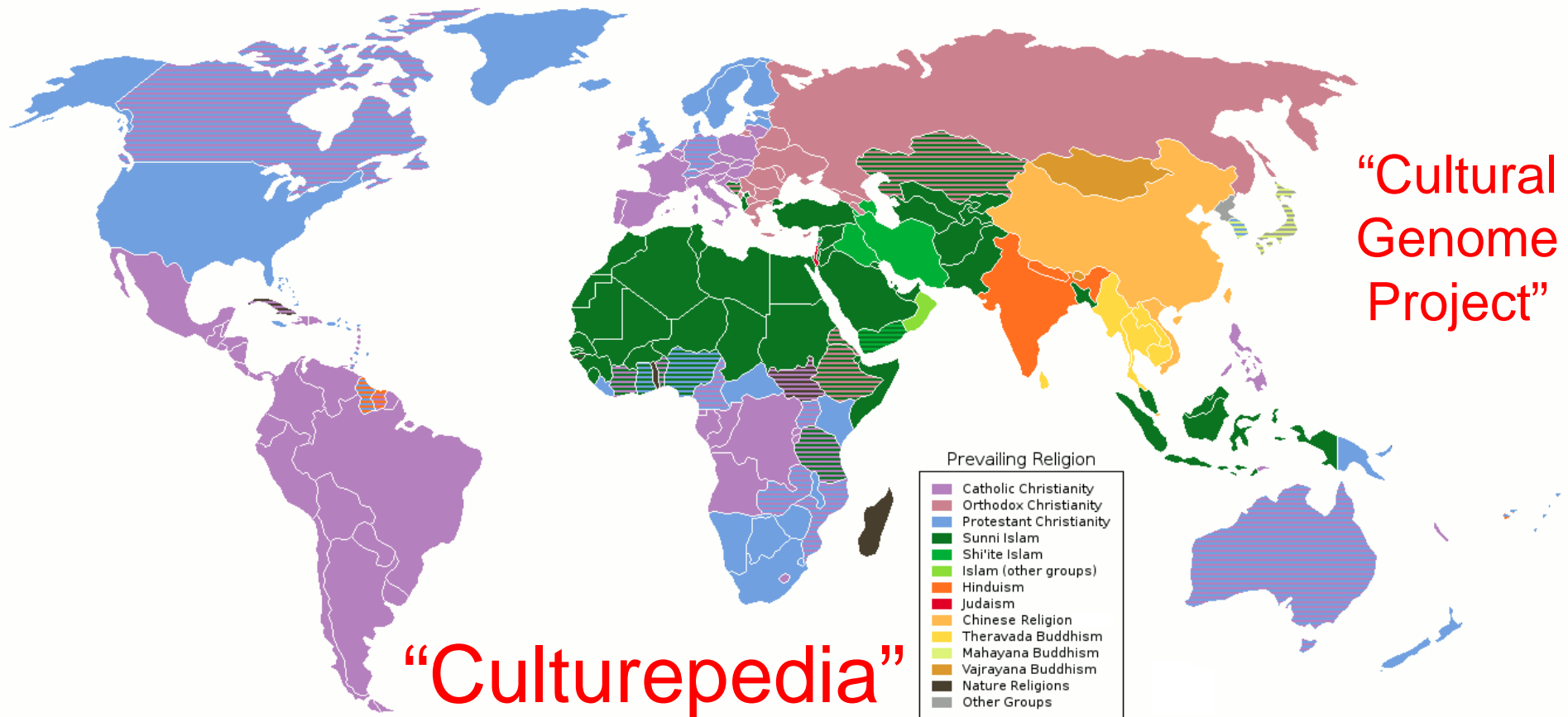




# In A Diverse World We Need to Create Interoperability



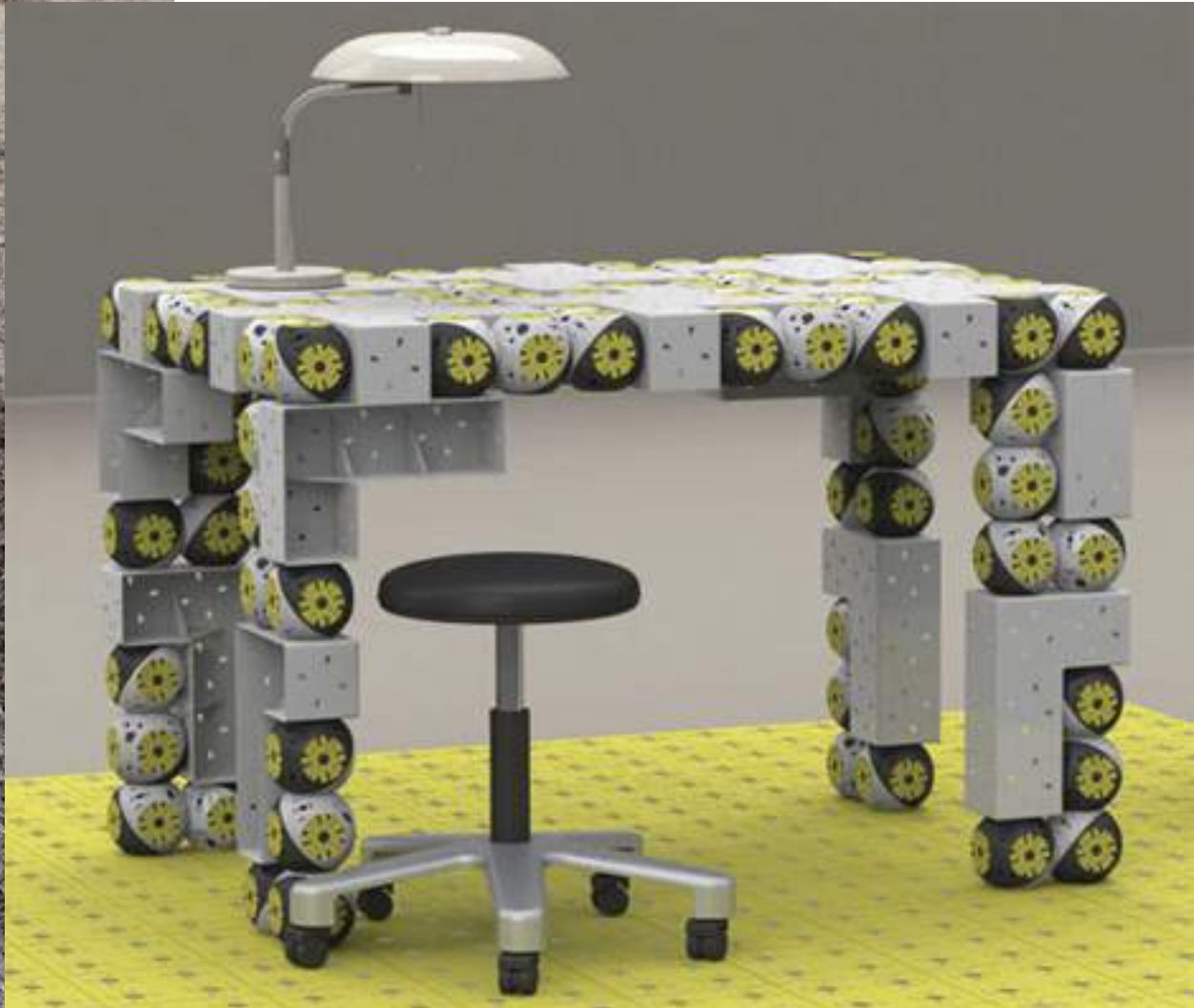
# Discover, Use and Combine the Success Principles Underlying Different Cultures



Overcome the large degree of “cultural alphabetism”

Furniture

# Robotic Furniture





# Reconfigurable Space: Living and Working



# Tourism Industry



**Low-Carbon Economy:**  
More efficient production,  
transport, logistics,  
coordination and use



**REDUCE**  
**REUSE**  
**RECYCLE**



# SHARING



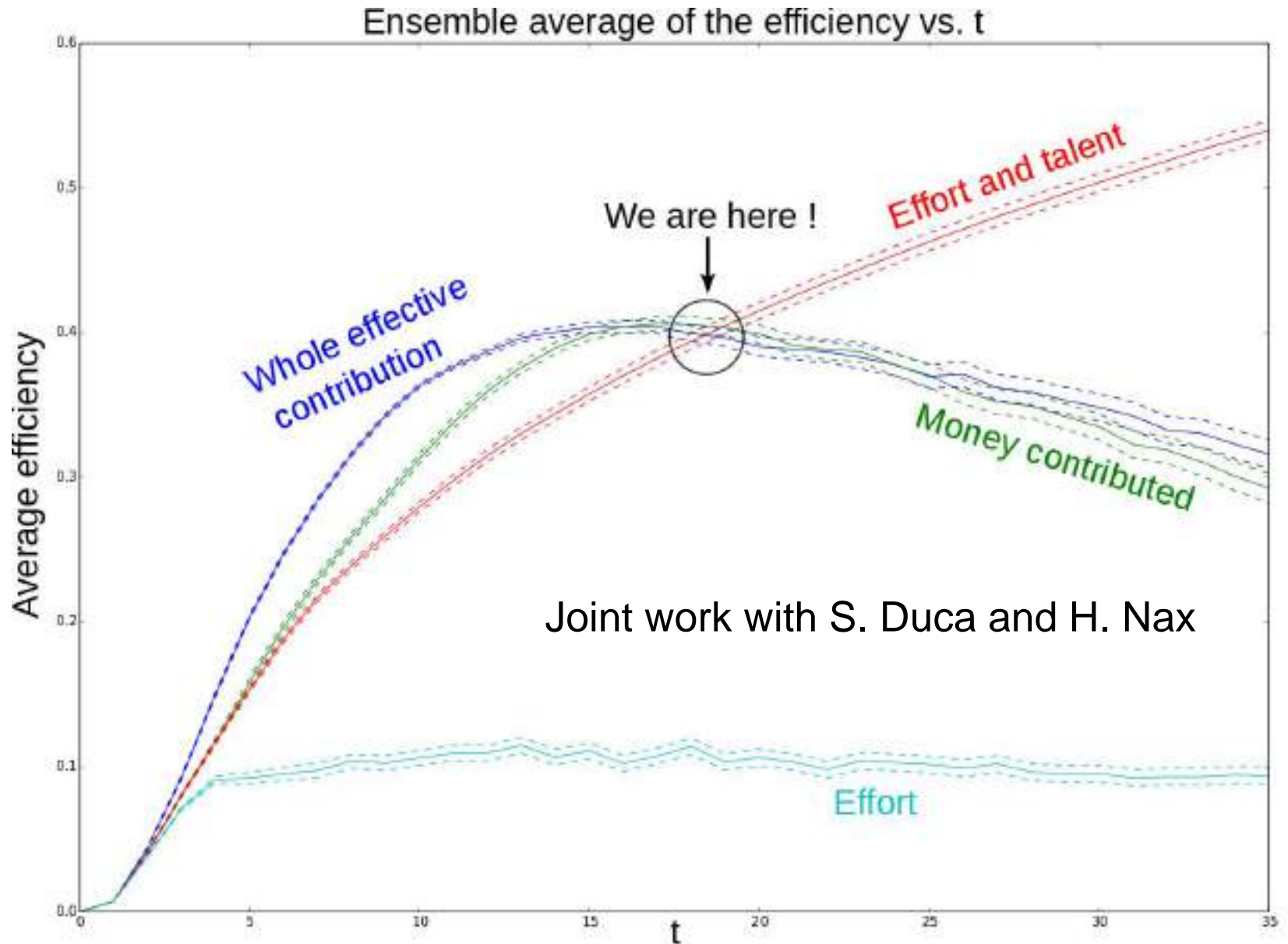
# Summary

If we go on as before, we may end in disaster, characterized by

- loss of democracy, freedom
- mass unemployment
- financial and economic collapse
- resource shortages
- serious climate change
- global war

Superintelligence will not prevent this, but a digitally upgraded socio-economic system may.

# A New Paradigm Is Needed





# Capitalism 2.0 + Democracy 2.0

- Is a **decentralized** information, innovation, production and service **ecosystem**; network interactions and **coopetition** dominate
- **Opens up** unused resources for use
- Engages in transparency and **interoperability**
- Offers pluralistic **participatory opportunities**
- Supports **co-creation and collective intelligence**
- Gives scientists and young entrepreneurs more freedom (stipends, prizes)
- Promotes a **circular and sharing economy**
- Measures **externalities**, prices and trades them
- Enables the local **self-organization**, coordination and **co-evolution** of systems