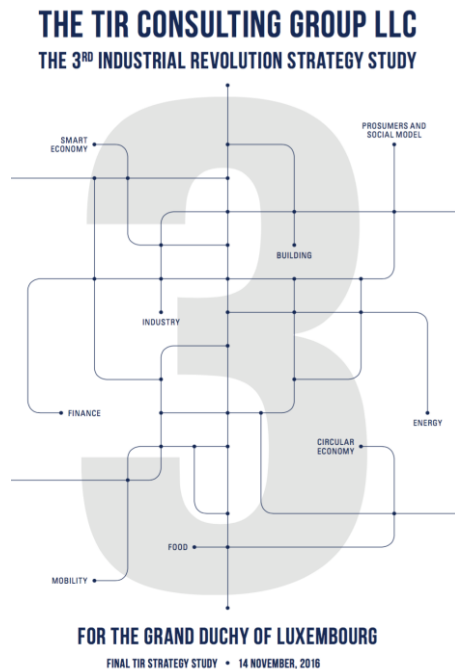


# The Challenge

*Drive and embrace change*: change is the only constant. We must learn not to fear change, but to embrace it and even encourage and drive it and have the courage to give up what cannot be sustained. Companies come and go, and have to be resilient and embrace continuous improvement.

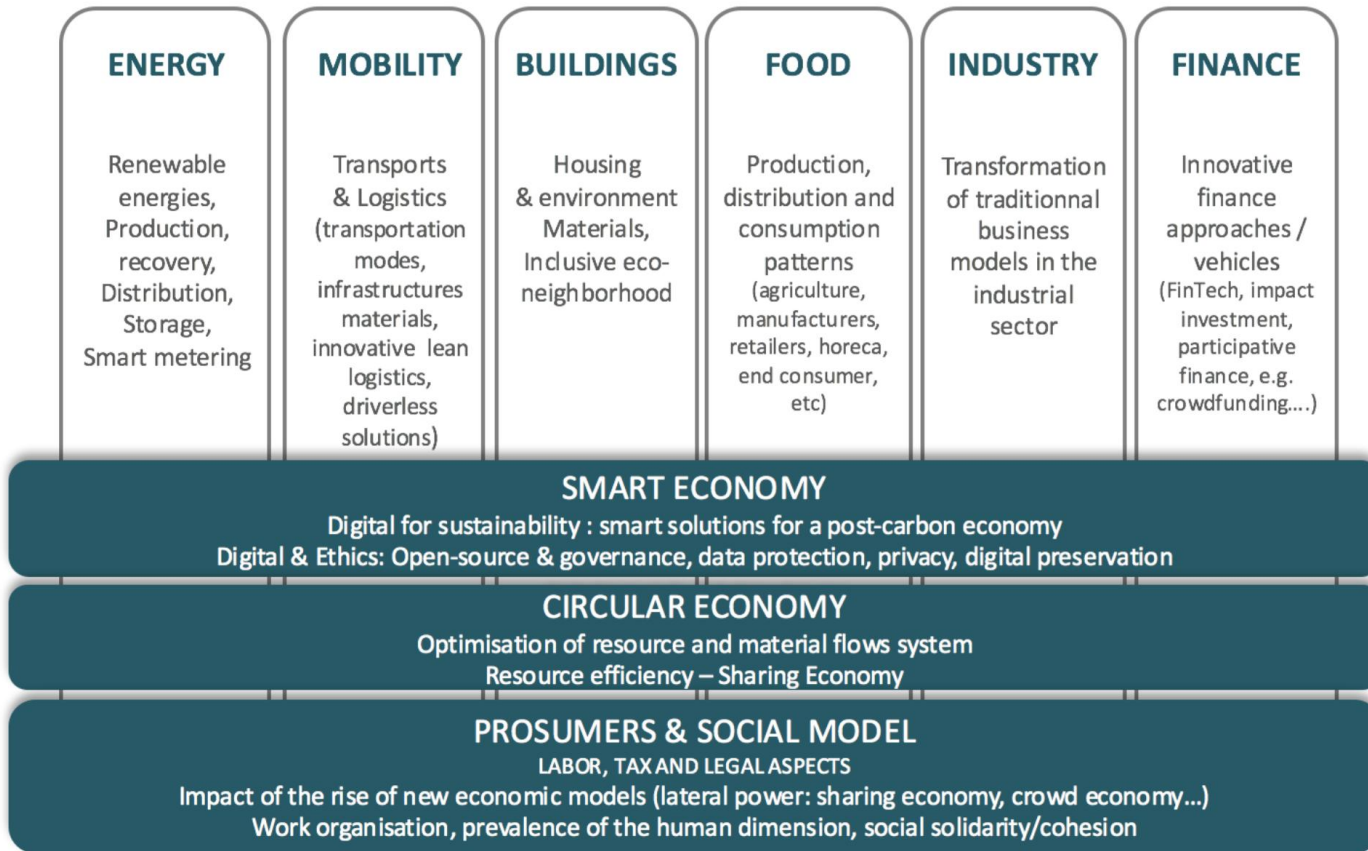


# How to create sustainable innovation?

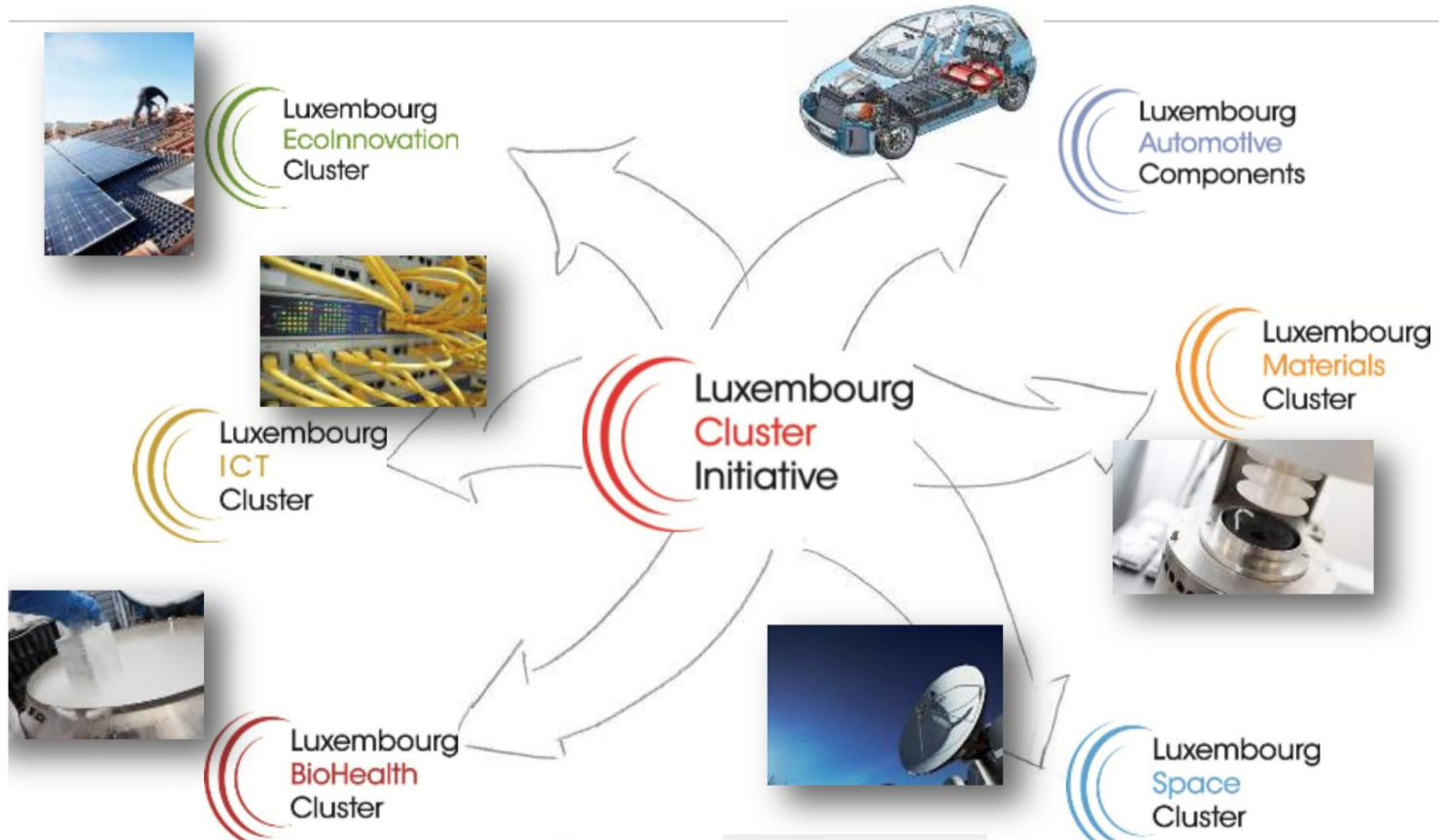
## Resiliency



# The Rifkin-Report: Priorities or Necessities?



# Where is Healthcare in the Rifkin-Report?



**ICT**

**Health**

**Education**

# An avalanche is coming

IPPR

## AN AVALANCHE IS COMING

HIGHER EDUCATION AND  
THE REVOLUTION AHEAD

### ESSAY

Michael Barber  
Katelyn Donnelly  
Saad Rizvi

Foreword by  
Lawrence Summers,  
President Emeritus, Harvard University

March 2013  
© IPPR 2013

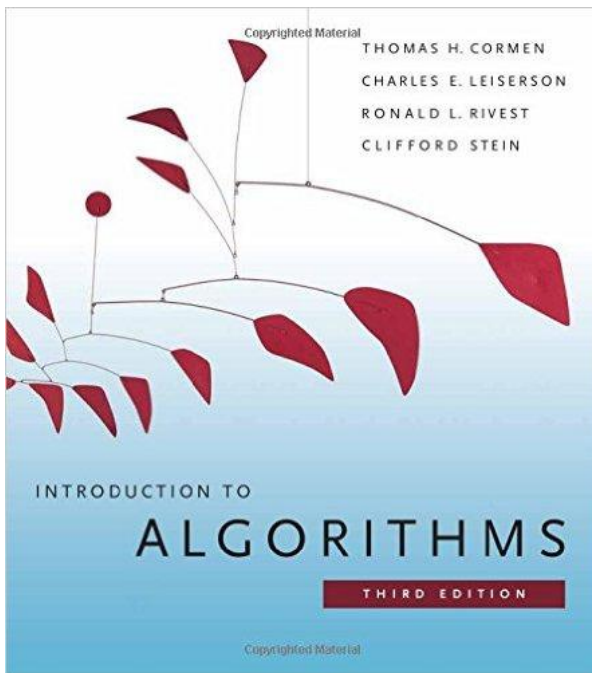
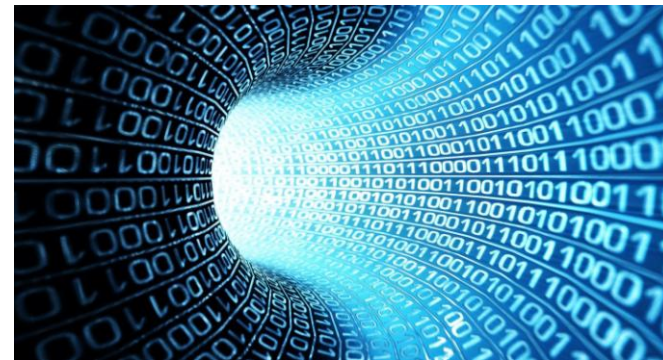
Institute for Public Policy Research



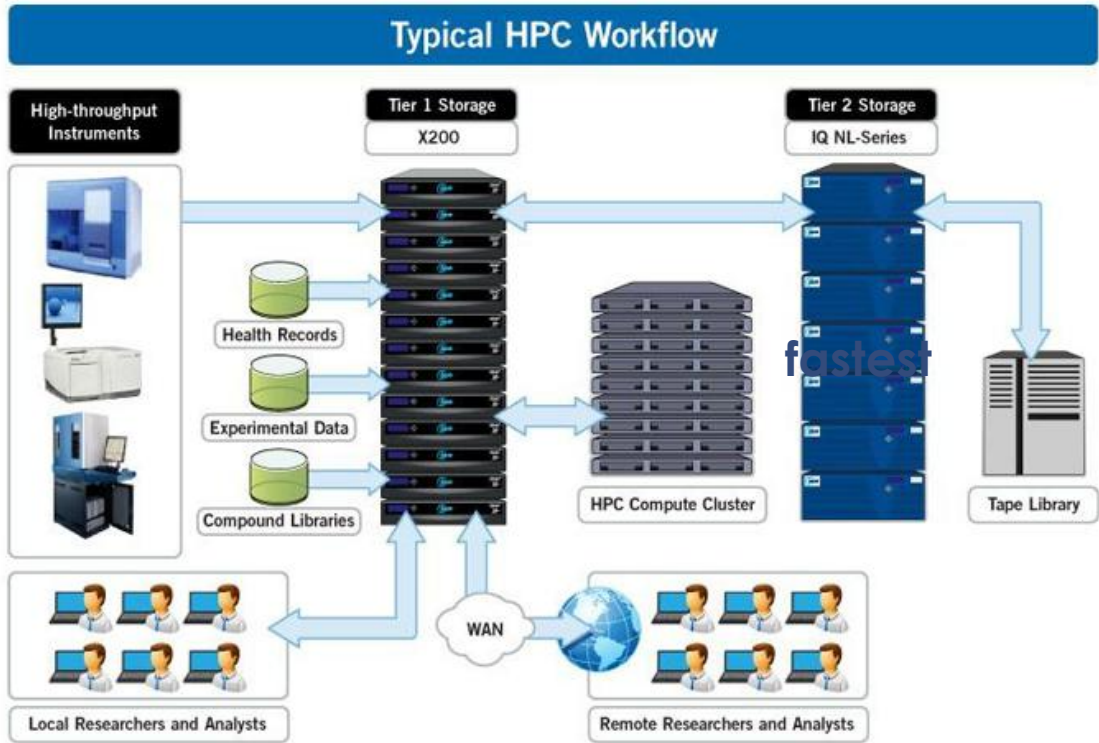
LCSB



# “Out-compute or get out-competed”



# Be the fastest with computing rather than have the fastest computer



**FPGA's**  
(Field programmable Gate arrays)





# An opportunity: The concept of a data embassy

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Digitalisation

## Estonian 'data embassy' to open in Luxembourg



The first 'data embassy', for Estonia, will be opening in Luxembourg by the end of 2017.

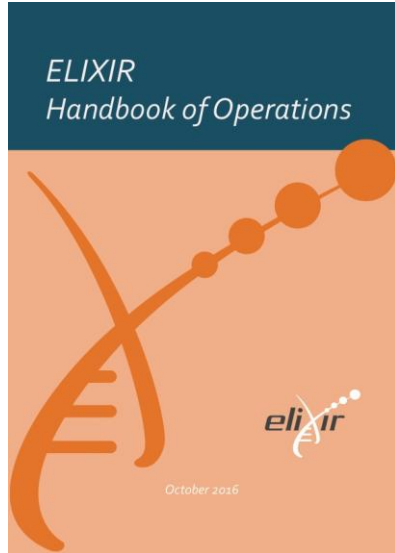
Photo: Shutterstock

Published on Wednesday, 3 May, 2017 at 14:36

(sth) – Luxembourg is to host the first 'data embassy' on its territory, planning to store sensitive data for the Estonian government on servers in the Grand Duchy.

According to the 'Data Embassy Initiative' published by the Baltic state's Economy Ministry, Estonia, which is "highly dependent" on information technology, is transforming "into a country without borders".

# Bioinformatics meets Medical Informatics



## Dedicated IT infrastructure

- A high performing database cluster
- A secure computing environment

## Repository for high quality translational medicine data

- Integration of well-curated clinical and molecular data from cohorts and large consortia
- Access management for researchers and publishers in line with security requirements of ELIXIR Europe and the community
- Comprehensive tools registry for scientists in both academia and industry

## User training

- Workshops and courses on data management, curation, analytics and visualisation
- Continuous education of software developers, data managers and researchers

# NIH-Big Data to Knowledge Initiative

## (BD2K)



Be prepared for the data flood:

- omics
- health records
- imaging data
- data from mobile devices and wearable sensors

→ Creation of 13 Centers  
2M\$ per center / year

# Genomics England



## The 100,000 Genomes Project in numbers



**100,000** genomes



**70,000** patients and family members



**21** Petabytes of data.  
1 Petabyte of music would take 2,000 years to play on an MP3 player.



**13** Genomic Medicine Centres, and  
**85** NHS Trusts within them are involved in recruiting participants



**1,500** NHS staff  
(doctors, nurses, pathologists, laboratory staff, genetic counsellors)



**2,500** researchers and trainees from around the world

# Genomics England announces interpretation partners and expands industry engagement

Posted on September 30, 2015 at 9:25 am

Genomics England has today (30<sup>th</sup> September 2015) announced that it has contracted with [Congenica](#) and [Omicia](#) to work with them on the interpretation of the genomes from 8,000 patients participating in the 100,000 Genomes Project. Work with LockheedMartin-Cypher, [Nanthealth](#) and [WuxiNextcode](#) continues as part of a test phase. This is in addition to ongoing work with sequencing partner [Illumina](#) who are also exploring a variety of bioinformatic challenges around sequencing and clinical interpretation.

Genomics England is also announcing that two new companies, [Berg Health](#) and [NGM Biopharmaceuticals](#) have joined Genomics England's industry collaboration, known as the [GENE Consortium](#). BERG is a Boston based biopharmaceutical company and NGM Biopharmaceuticals is based in South San Francisco. Both will join the other members of the GENE Consortium who are already working on a year long industry trial assessing how best to engage with Genomics England to accelerate the development of new diagnostics and treatments for patients.

Sir John Chisholm, Executive Chairman of Genomics England said;

"We are delighted to welcome two new partners to the GENE Consortium. Exploring how industry will work with this unique dataset along with driving up the quality of the interpretation of genomic data are crucial to us in finding out how to understand and treat disease better in the future. It's this that will ensure genomic medicine benefits patients for years to come."



GENE Consortium discussion

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# The 100.000 UK Genome Project



**Next-Generation Sequencing**

**Automated Interpretation**

**Clinical Interpretation**

**Illumina**

**Illumina  
Congenica  
Omica/Fabric  
Phevor  
Nanthealth  
WuXi NextCODE  
Cypher Genomics**

**NHS**

**Building an economy**  
Analyses done by external companies

# ITTM - IT for Translational Medicine

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## ITTM S.A. - Information Technology for Translational Medicine

Data Curation and Integration  
transSMART Hosting  
Software Development  
Data Archiving & Backup

### ITTM SOLUTIONS

ITTM provides solutions and services to improve the value and lifespan of your data.

ITTM provides data integration and knowledge management solutions and services to all bio-medical research areas. It focuses especially on translational medicine studies and clinical trials, in which heterogeneous data need to be curated, linked and integrated.

ITTM teams up data scientists and IT experts who build up their expertise through their contributions to multiple large EU-wide industrial and public projects on data integration and translational medicine research.

#### OUR SOLUTIONS

#### Contact us:

ITTM S.A.  
9, avenue des Hauts-Fourneaux  
L-4362 Esch-sur-Alzette  
Luxembourg



ITTM is a member of the transSMART Foundation

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DON'T MISS SES choisit System Solutions pour son plus grand projet IT Posted 3 days ago

Home > News > Actualité > POST Luxembourg prend une participation dans une spin-off de Biomedicine

## POST Luxembourg prend une participation dans une spin-off de Biomedicine

By Jessica Concetti on October 23, 2015

Posts by Jessica Concetti

POST Luxembourg a pris une participation dans une société récemment créée par des chercheurs du Luxembourg Centre for Systems Biomedicine (LCSB) de l'Université du Luxembourg.

La nouvelle entreprise, Information Technology for Translational Medicine (ITTM S.A.), est spécialisée dans la préparation et l'analyse de données provenant d'essais cliniques. Par l'intermédiaire de sa filiale POST Capital, POST Luxembourg a acquis environ 35 % des actions d'ITTM. Le directeur général d'ITTM, le Dr Andreas Kremer, et le directeur général adjoint de POST Luxembourg, Joseph Glod, viennent de signer les contrats en

Information Technology  
for Translational Medicine

le gouvernement du GRAND-DUCHÉ DE LUXEMBOURG

luxembourg.lu guichet.lu gouvernement.lu Other sites

innovation public.lu

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21-10-2015

## "Biomedical research is an important driver for IT"

ITTM: POST Luxembourg takes a share in an LCSB spin-off

f t e

Information Technology  
for Translational Medicine

POST Luxembourg has taken a share in a company recently founded by scientists of the Luxembourg Centre for Systems Biomedicine (LCSB) of the University of Luxembourg. The new enterprise, Information Technology for Translational Medicine (ITTM S.A.), specialises in the preparation and analysis of data from clinical trials. Through its subsidiary POST Capital, POST Luxembourg has acquired about 35 percent of the shares in ITTM. ITTM Managing Director Dr Andreas Kremer and POST Luxembourg Deputy Managing Director Joseph Glod have recently signed the contracts to this effect.

UNIVERSITÉ DU  
LUXEMBOURG



# Partner or threat?





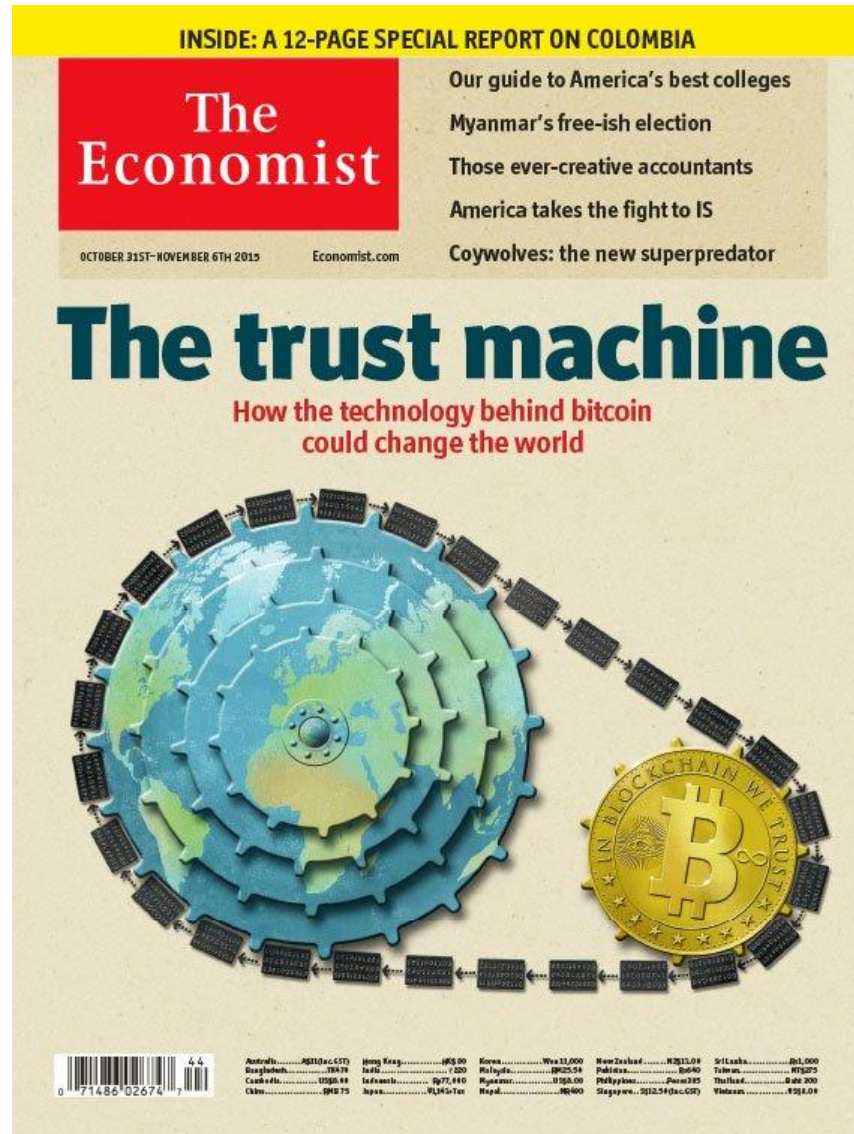
## *ITTMM and AbbVie to collaborate on Disease Map for Alzheimer's*

 *Monday, 03 April 2017 in News*

*ITTMM S.A. and AbbVie Germany, today announced that they signed a two-year agreement to build a comprehensive up-to-date knowledge map for Alzheimer's Disease. ...*

*[Read more...](#)*

# Privacy AND Transparency: Can we have it all?





# The European General Data Protection Regulation

## A red flag !!!!

Regulation can be both the killer and the enabler of innovation in this field. With that in mind, Luxembourg's government should approach it as it has other such opportunities, seizing on regulatory innovation and reform opportunities to encourage new technologies and markets.



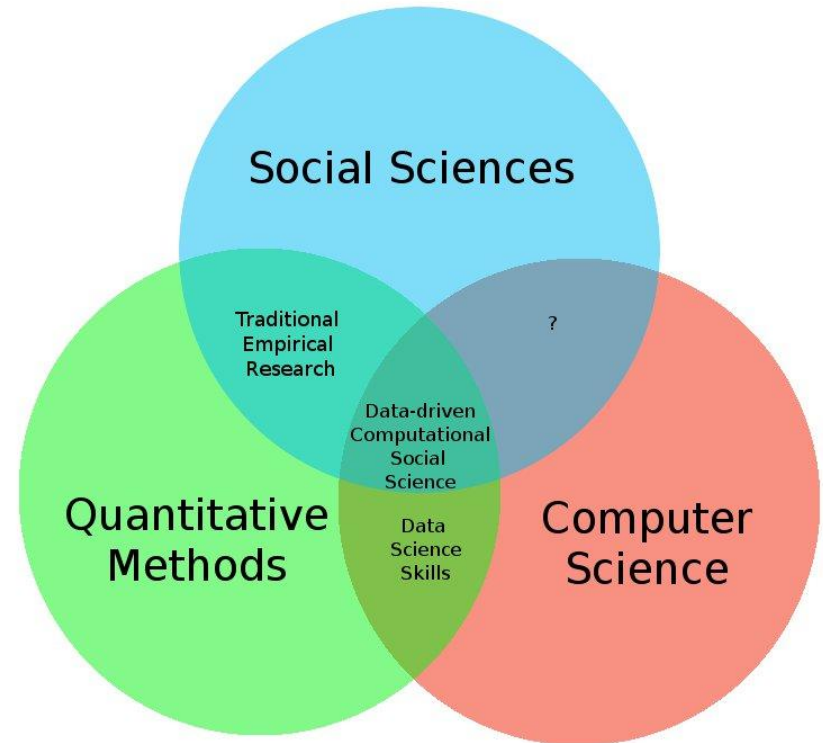
## EU GDPR TIMELINE



How to deal with non-consented socio-economic data?  
We need a national implementation for research.  
How long will it take?

# Luxembourg as a „Testbed“ for eHealth

- Alzheimer
- **Parkinson**
- Huntington
- ALS
- Multiple Sclerosis



# New markets: Consumer Health

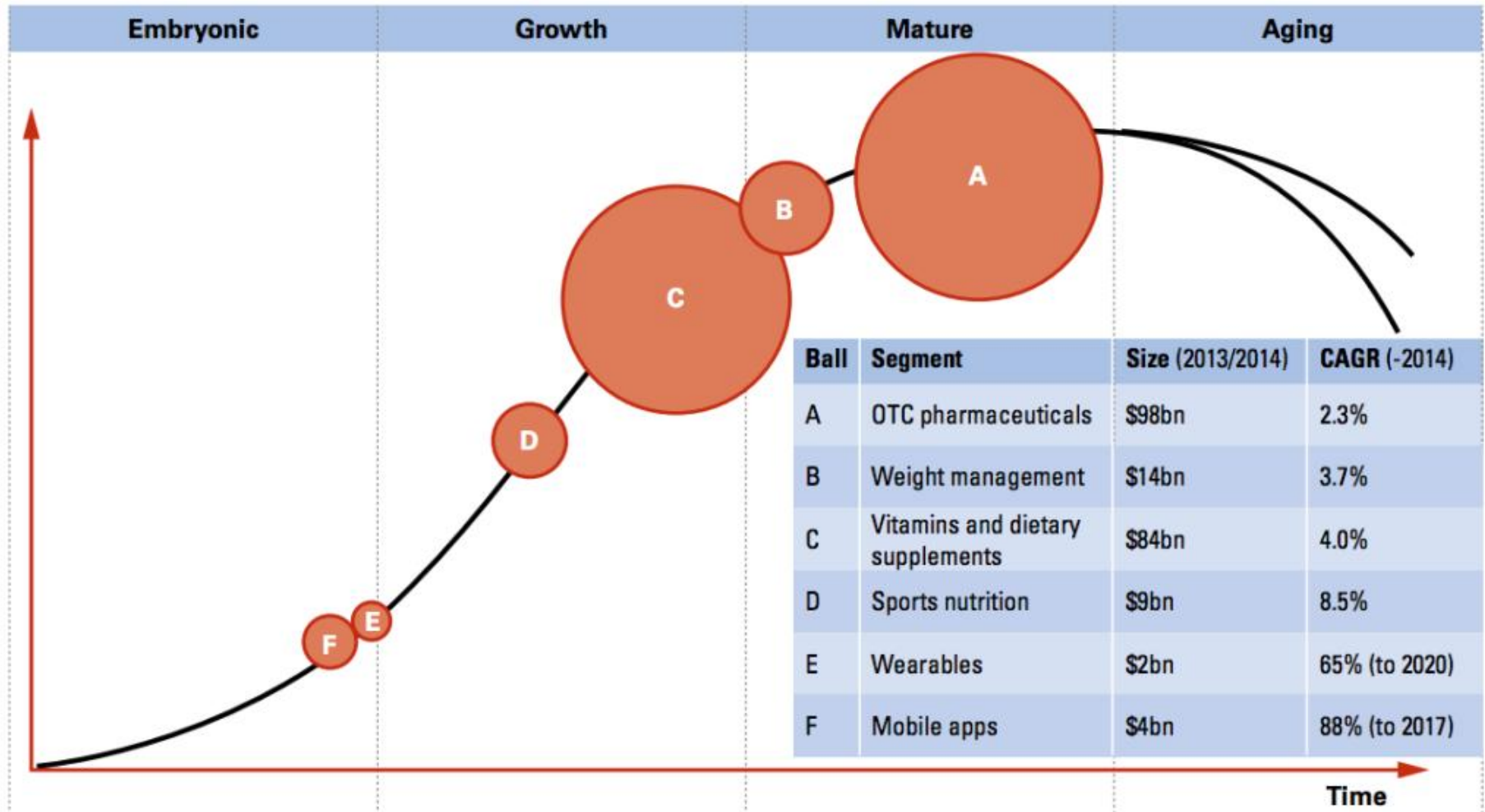


Table 2 Selected consumer health segments by size and maturity

Source: Euromonitor International, Reseach2guidance, Soreon Research, Arthur D. Little analysis

# Is there a common vision for integrative biomedicine?



# The challenges in interdisciplinary teams

commentary

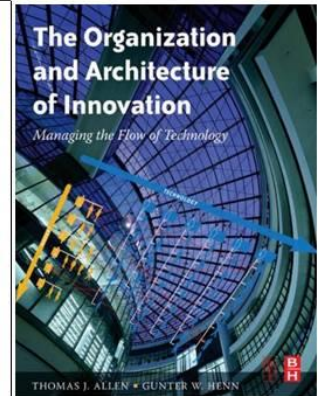
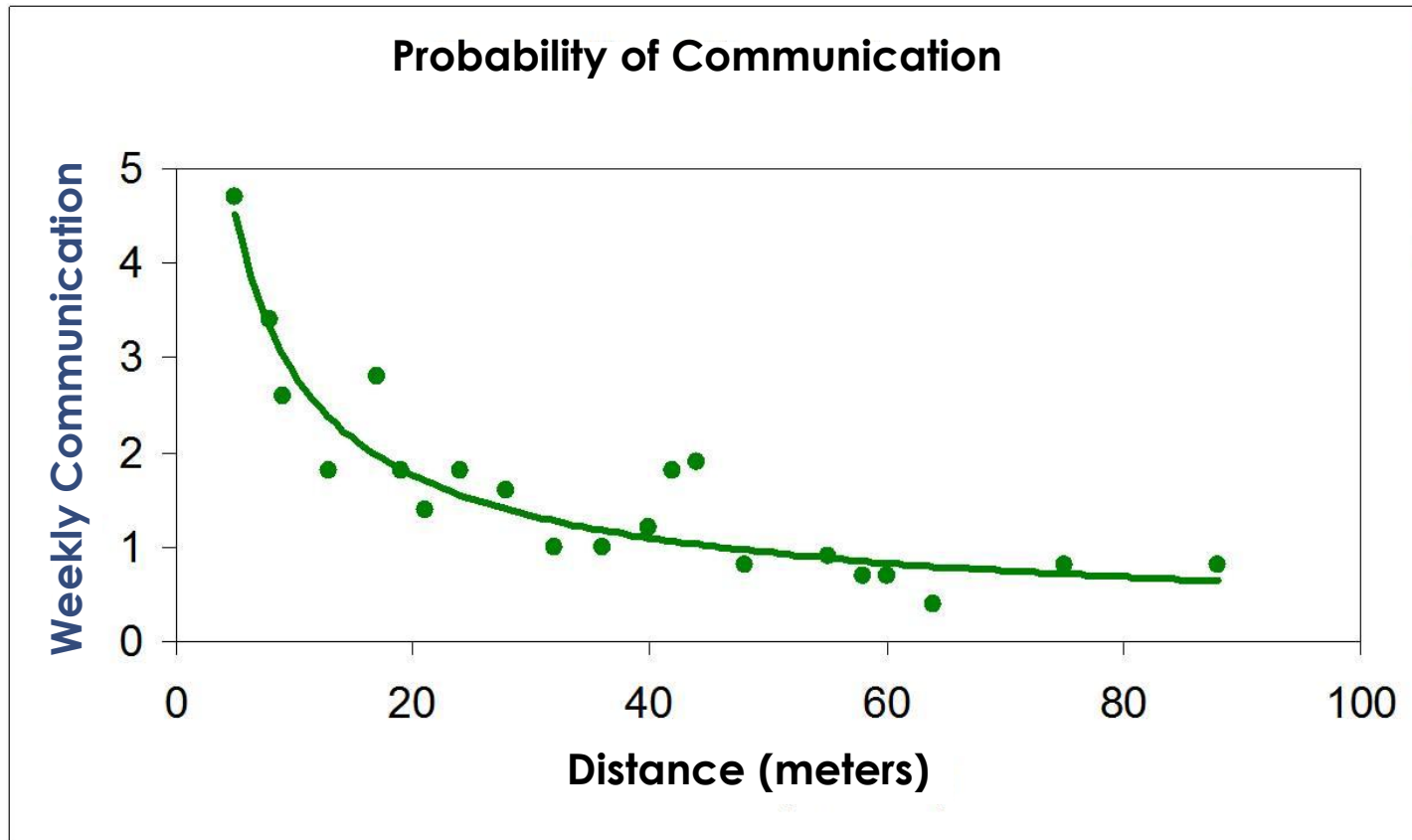
## Social engineering for virtual 'big science' in systems biology

Hiroaki Kitano, Samik Ghosh & Yukiko Matsuoka

A new type of big science is emerging that involves knowledge integration and collaboration among small sciences. Because open collaboration involves participants with diverse motivations and interests, social dynamics have a critical role in making the project successful. Thus, proper 'social engineering' will have greater role in scientific project planning and management in the future.

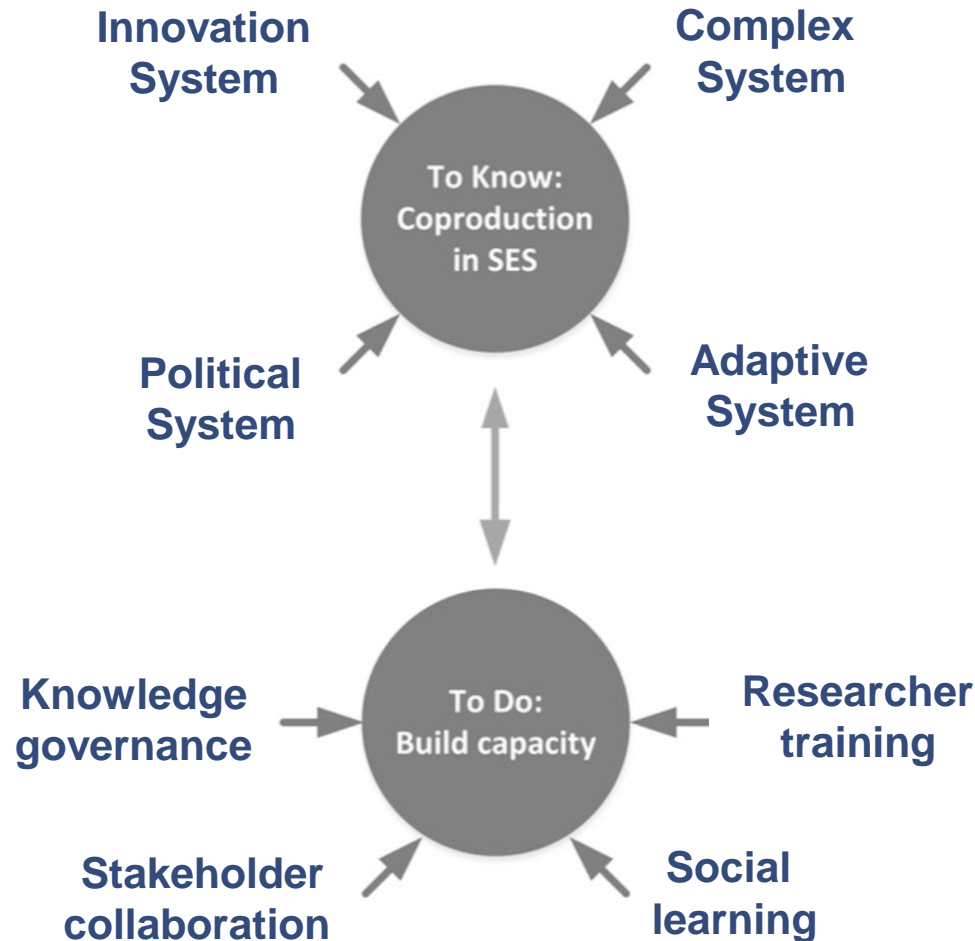


# Distance matters...



# Complex: To say the least....

.....the dynamics of coupled socio-economic systems



# International visibility is key



## Guest speaker: Prof. Hiroaki Kitano

President of the Systems Biology Institute in Tokyo, Japan  
President and CEO of Sony Computer Science Laboratories

Best known as the initiator of AIBO, Sony's robotic pet, and the founder of RoboCup (robotics world cup), Prof. Kitano is coming to Luxembourg to give a talk about his new challenge: artificial intelligence systems that could make major scientific discoveries with minimal or zero human interventions and win a Nobel Prize!

The lecture will tackle how systems biology approaches combined with big data and recent breakthroughs in AI could be key to understand complex systems, from medicine to financial markets.

# Tonight

7:30 pm

MSA 3.500 Campus Belval







What should be the role of Universities and of interdisciplinary centres in public R&D?

How can the interdisciplinary centers support Luxembourg's economic strategy?

- How can we achieve critical mass, excellence and relevance?
- How can we attract and educate new talents?
- How can one Improve public governance steering and coordinating international cooperation

How should one foster research and innovation in the business sector?

What are good priority areas for Luxembourg?

Are there new emerging areas?

Are there other countries comparable to Luxembourg with respect to specificities and strategy?