SAFER NANOMATERIALS
bioHealth Computing School

eit RawMaterials

Accelerating nanotech innovations through a safer-by-design approach

Putting citizens at the center of the innovation process

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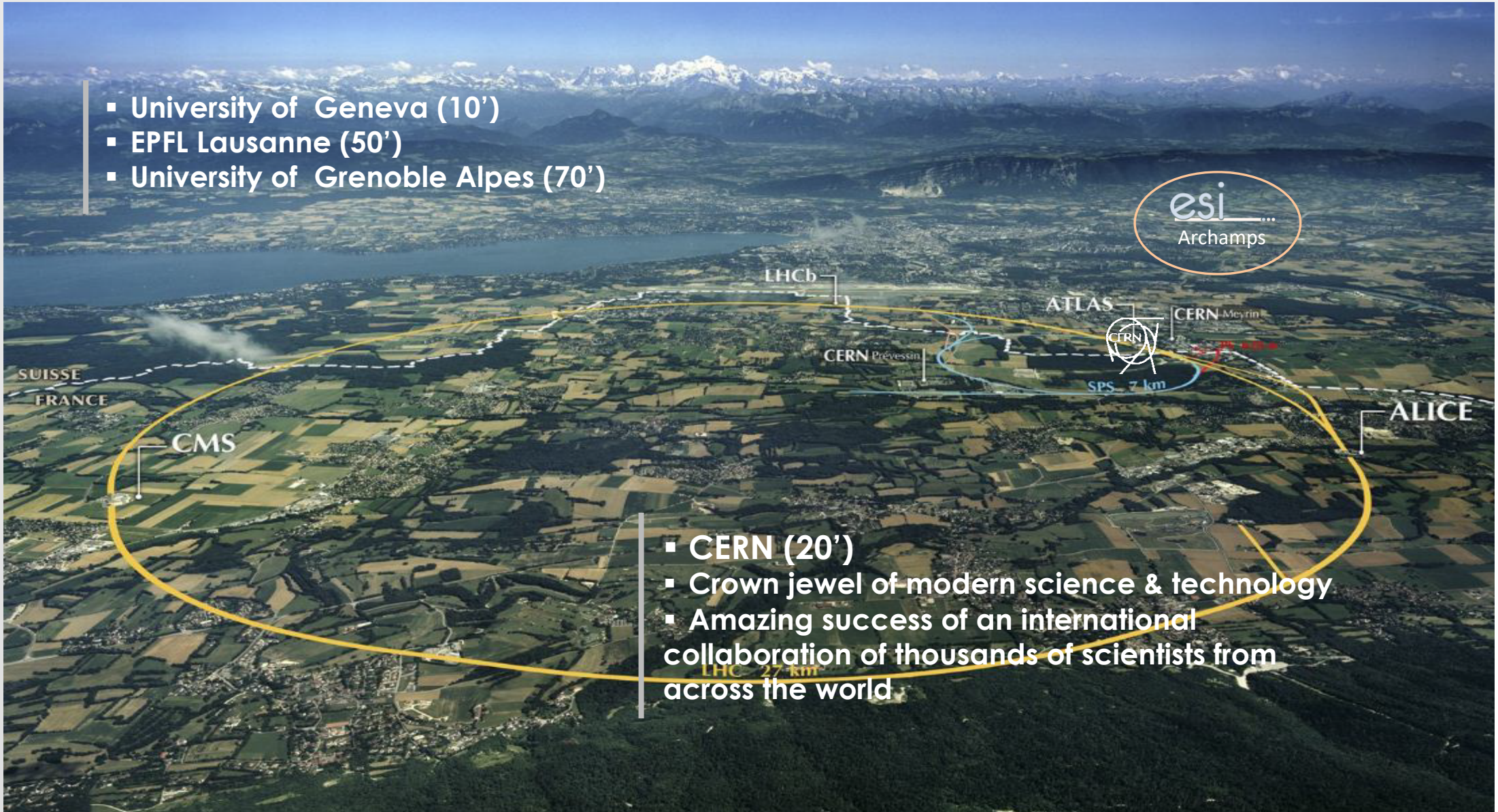
European Scientific Institute (ESI), Archamps, France (Greater Geneva)

A rich ecosystem

European Scientific Institute



ESI in a few words …

Mission
25 years as a non-profit developing postgraduate schools around the science, technologies and achievements of CERN: particle accelerators, instrumentation for particle detection and scientific computing and their applications to medicine, industry ...

Students
MSc and PhD students, mostly from European universities, and early-career professionals

Faculty
Drawn from CERN and an international network of universities, research facilities, university hospitals and industry

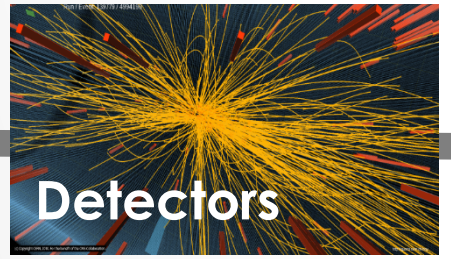
What's different ?
ESI applies CERN's approach to fundamental research (state of the art, collaborative, open, innovative, international) to knowledge sharing and transmission ; specialised, modular, intensive, state of the art courses ; students and faculty working together in a "campus" environment

ESI in a few words …

esi European Scientific Institute

CERN

Research



CERN | Knowledge Transfer

esi

Knowledge sharing

juas Joint Universities Accelerator School

esipap European School of Instrumentation in Particle & Astroparticle Physics

bioHealth Computing Schools

Innovation &
Entrepreneurship

The nano revolution

- **“Nanotechnology is the sixth truly revolutionary technology introduced in the modern world** following the Industrial Revolution of the mid-1700s, the Nuclear Energy Revolution of the 1940’s, The Green Revolution of the 1960’s, The Information Revolution of the 1980’s, and the Bio Technology Revolution of the 1990’s.“

D. Allan Bromley Formerly Assistant to The President of the United States for Science and Technology (1989-1993)

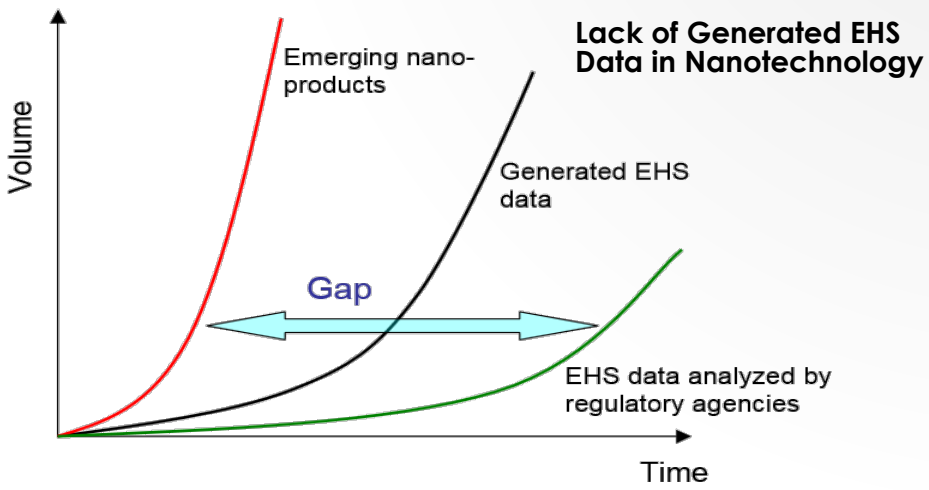
- **Engineered nanomaterials are today found in more than 1800 commercially available products**

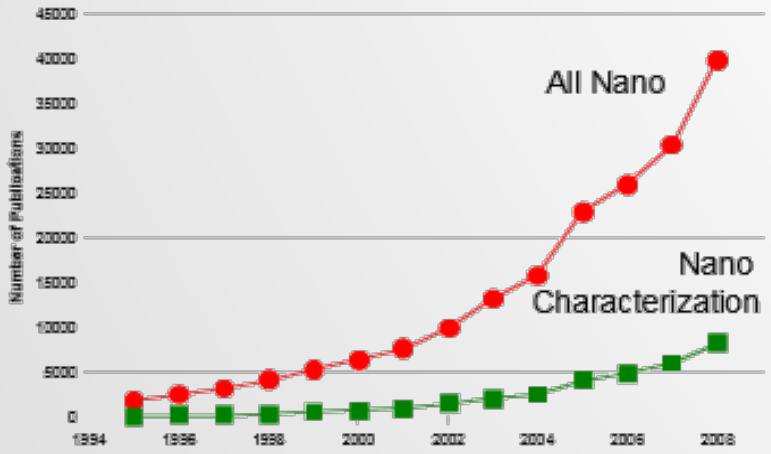
- **With their unique properties and potential to significantly reduce dependence on extractable raw materials, nanomaterials can potentially bring enormous benefits both to industry and society as a whole.**

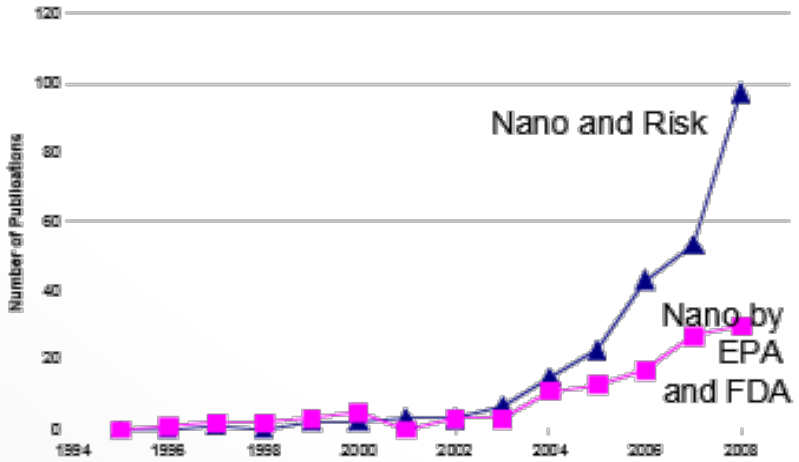
- **Nanotechnology is a multi-billion $ enterprise worldwide** that may **exceed the impact of the Industrial Revolution** and is projected to become **a $1 trillion market by few years.**

The problem? Environmental Health and Safety

- Increasing time lag between the emergence of nano-products and the generation and data analysis of Environmental Health and Safety (EHS) by regulatory agencies.
- Too many chemicals to test with standard animal-based methods:
  - Cost, time, animal welfare constraint
  - Exposure is as important as hazard







Journal Articles on Nanotechnology Topics by year in Science Citation Index

The solution? You!

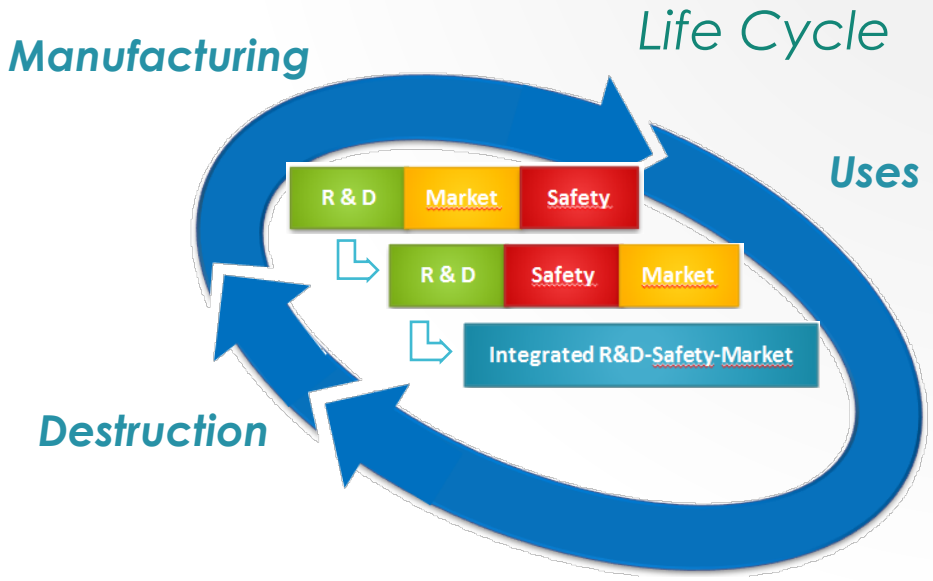
- The upcoming generation of highly trained material scientists, life scientists, entrepreneurs, industrialists and regulators, accustomed to
  - working in a pluridisciplinary and international environment
  - using a “safer-by-design” approach to nanomaterial life-cycle assessment
- **Safer Nanomaterials, the school, offers a unique and transformational opportunity to broaden skills-sets in a range of fields including advanced research strategies, innovation & sustainable business planning, ethics and regulatory affairs**

2018 Safer Nanomaterials School has been an intensive experience where I’ve learned both theoretically and practically from great professionals, with an awesome international atmosphere and an incredible team of people!

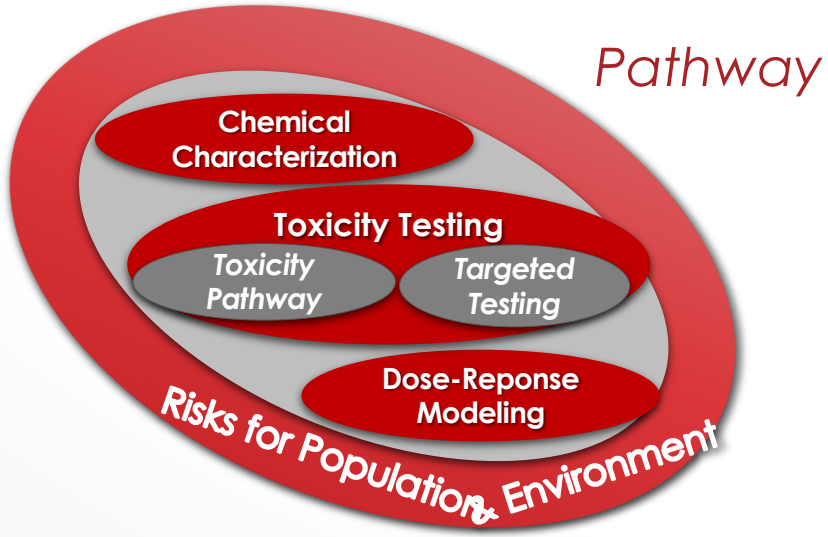
Alejandra Fernandez Alvarez, MSc
Universidad Politècnica de Madrid

The school: an accelerator

- Safer Nanomaterials School promotes Life Cycle Approach (LCA), a chain-oriented methodology
- to evaluate the **safety of nanoproducts** from manufacturing and use to end of life processing.

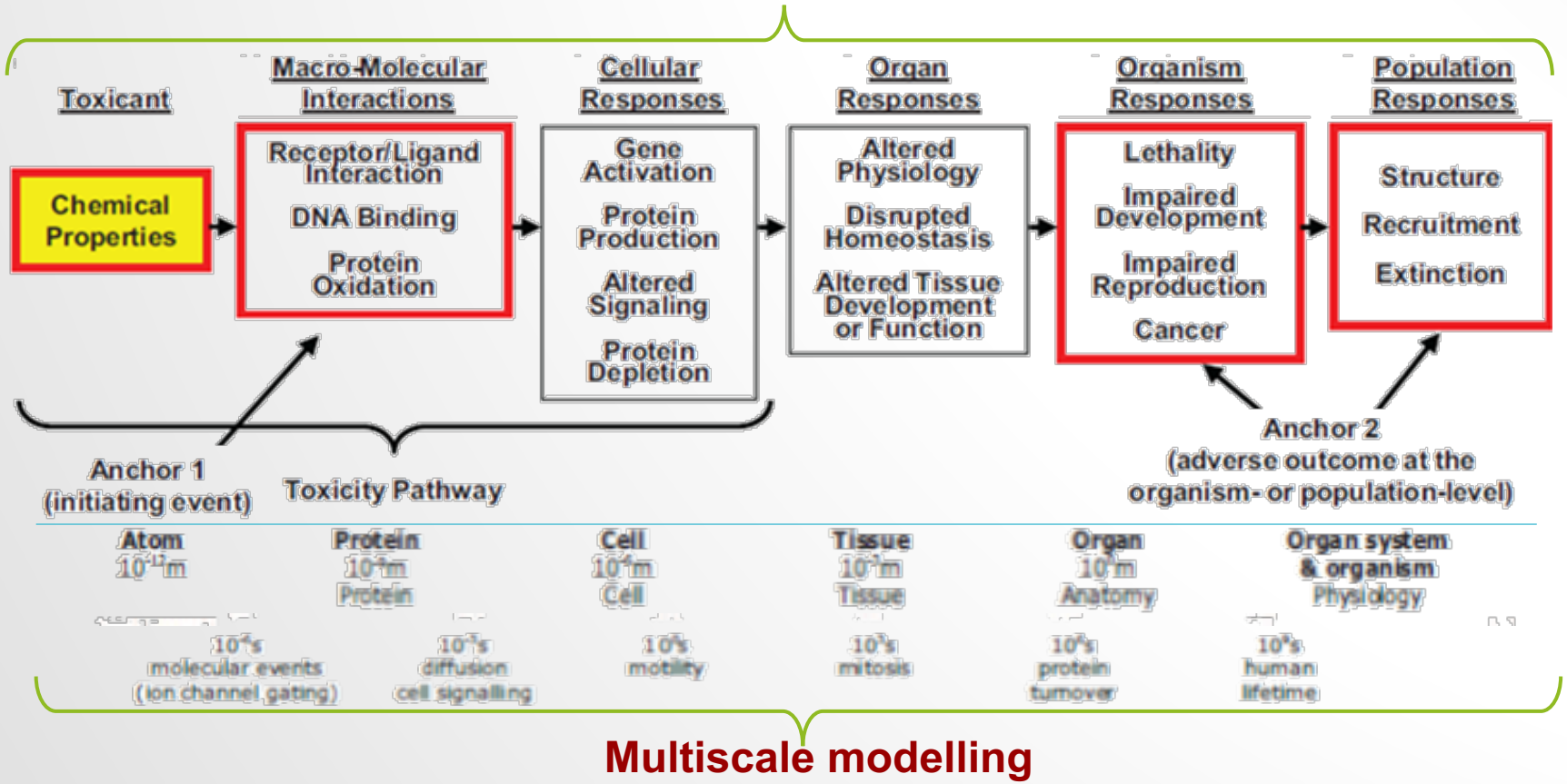


- The School envisions a future in which all routine toxicity testing would be conducted by:
- evaluating perturbations of biological responses in a suite of **toxicity pathway assays**
- using high throughput **computer assisted methodologies**, in silico, in vitro and in vivo at different scales.



Frameworks & models

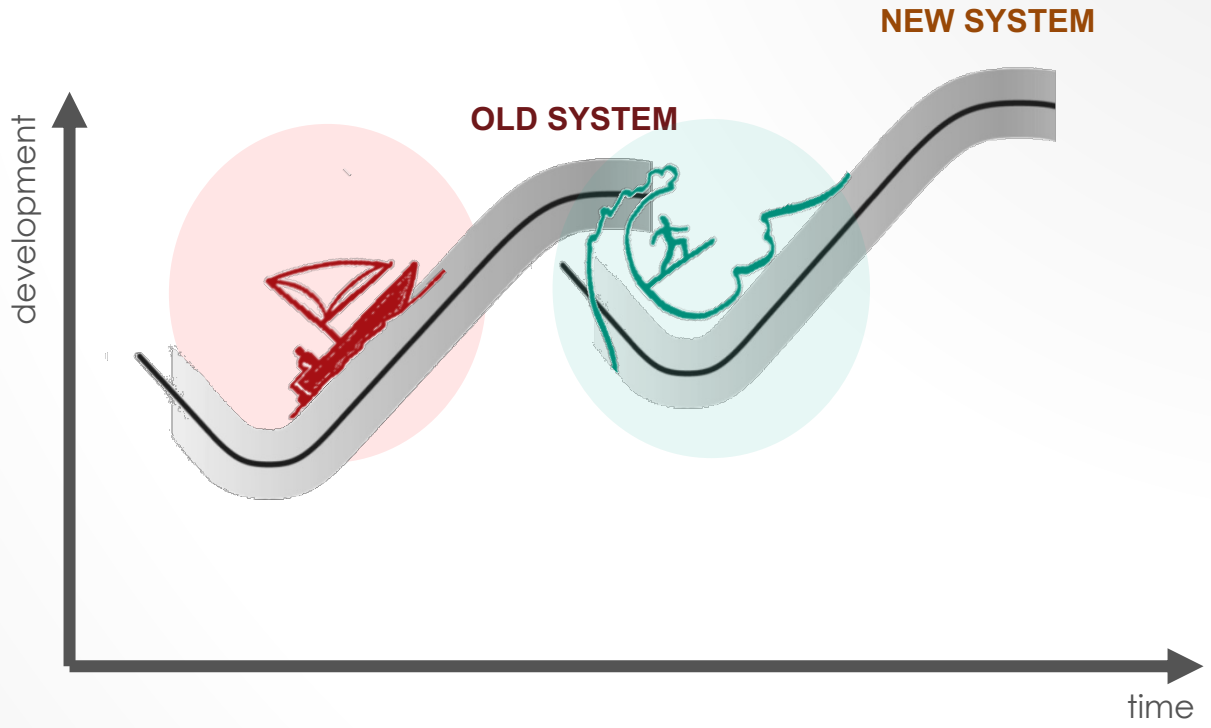
- We consider there is a need for better mechanistic approach to determine human relevance of Mode of Action (MOA) or Adverse Outcome Pathway (AOP) recommended by EU, US and International Agencies [OECD(AOP) / WHO (MOA), etc.].



The global challenge

- **Sustained innovation**
  - Improving performances, lower cost, incremental changes
  - Existing & predictable market
  - Believable customer
  - Successful traditional business methods

- **Disruptive innovation**
  - Problem not well understood
  - Emerging & unpredictable market
  - Unknown & unknowing customer
  - Game changing dramatically
  - Failing traditional business methods



Startups: are not smaller versions of Large Companies,

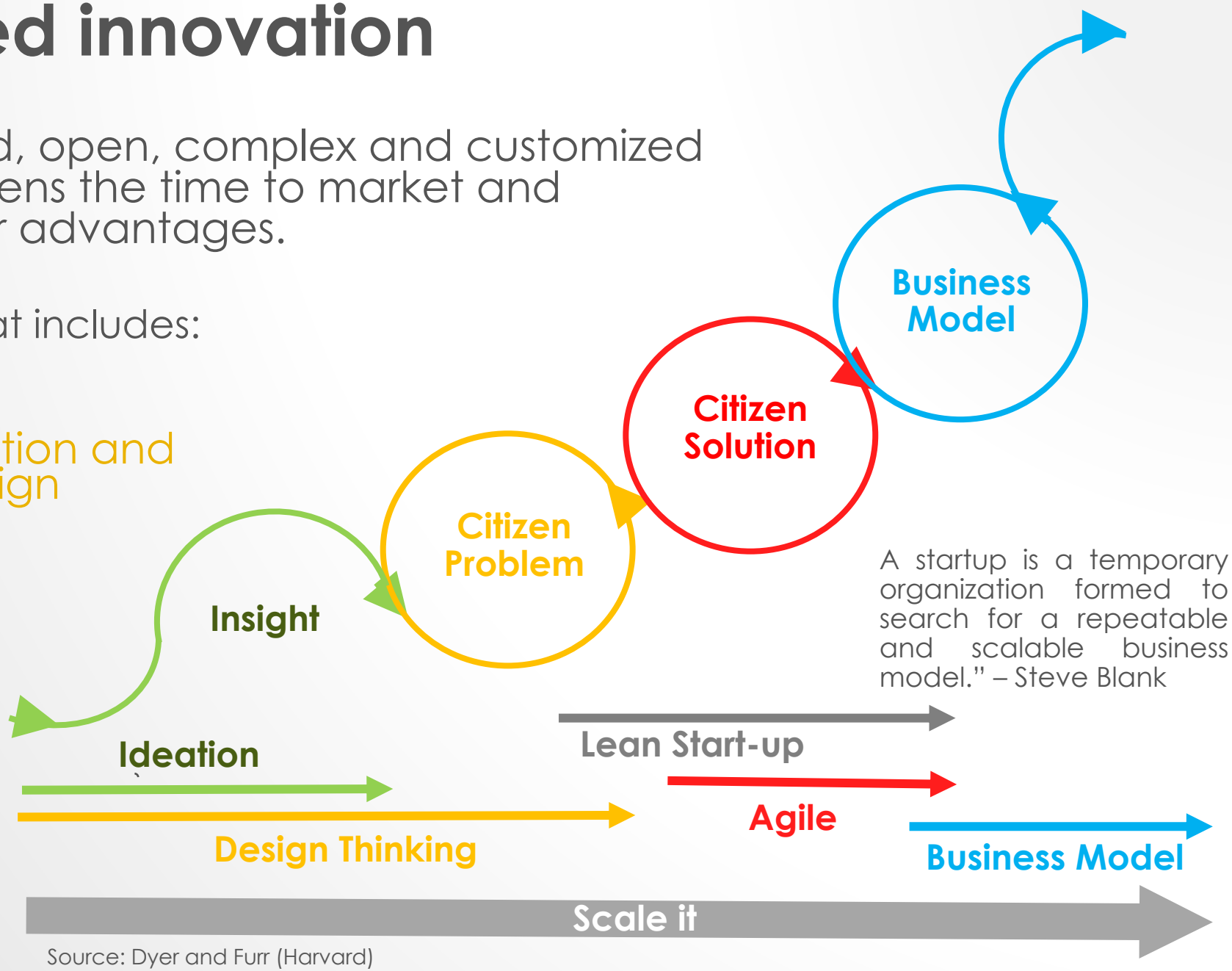
BUT **a temporary organization designed to search for a repeatable and scalable business model**

Citizen-based innovation

- A knowledge-based, open, complex and customized process which shortens the time to market and increases first mover advantages.

- An iterative cycle that includes:

- design thinking, ideation and patient problem design
- lean thinking, agile and patient solution design
- business model and the scale-up

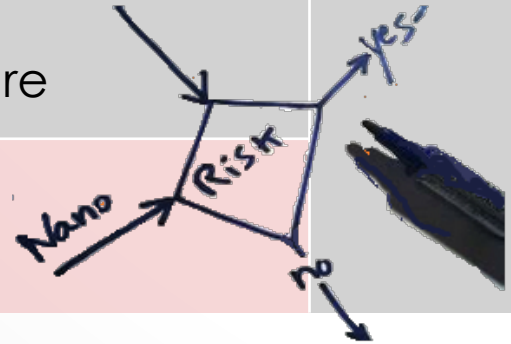


A startup is a temporary organization formed to search for a repeatable and scalable business model." – Steve Blank

Source: Dyer and Furr (Harvard)

The Programme

		Component 3
Opening day	Keynote talk, Round table, Team building	Technology transfer and business development
Component 1	NM structures, behaviour & environmental transformation, exposure and ecotoxicity	
Component 2	Human toxicity, risk assessment, predictive (eco)toxicology, big data : present and future	
Closing day	Pitching of innovation projects	



The Team

A group of expert speakers and tutors drawn from a rich international ecosystem of academia, research and industry

Aristedes Senra
(UPM, Madrid)

Laurent Charlet
(Université Grenoble-Alpes)

Benjamin Gilbert
(LBNL, Berkeley)

Mark Hoover
(NIOSH)

Celina Vaquero Moralejo
(Tecnalia)

Ilise Feitshans
(ESI)

Hristo Aladjov
(OECD)

David Munos Rojas
(INP, Grenoble)

Shuji Tsuruoka
(Shinsu University)

Fabienne Bornard
(Université Grenoble-Alpes)

Ana Elena Pradas de Real
(INIA, Madrid)

Egon Willighagen
(BIGCAT, Maastricht)

Olivier Loget
(Capeval Pharma)

Nikolai Kochev
(Plovdiv University)

Lawrence Berkeley National Laboratory

University of Plovdiv

Maastricht University

SHINSHU UNIVERSITY

SAFER NANOMATERIALS

2 – 10 May 2019

European Scientific Institute, Archamps, France (Greater Geneva)

Max. 30 participants (including 5-8 project leaders)

Website: *www.safernanodesign.eu*

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