

From individual questioning to collective exploration



[@francoistaddei](#)

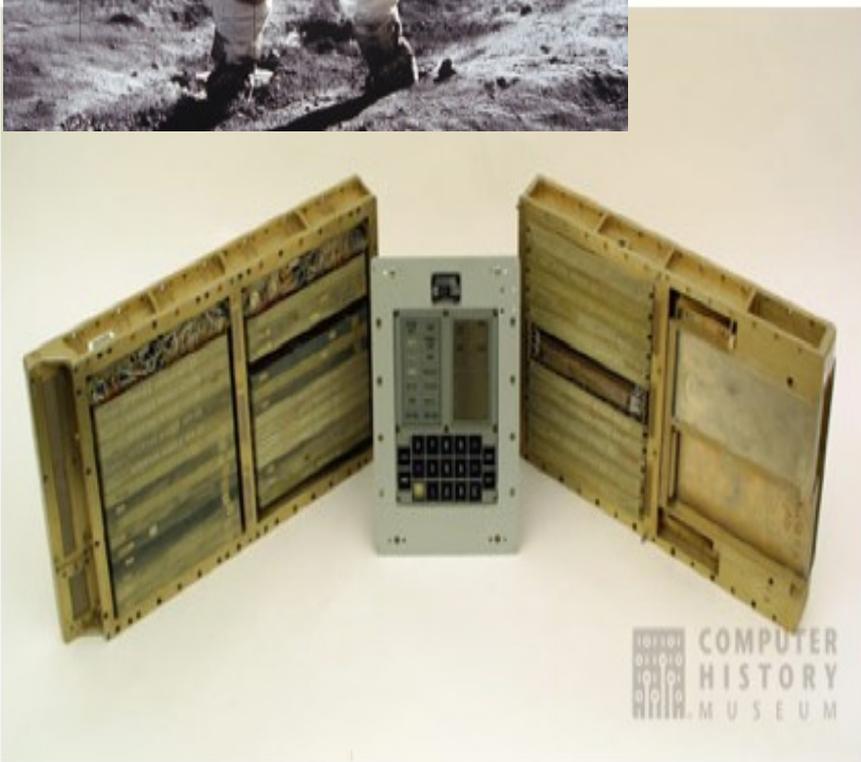
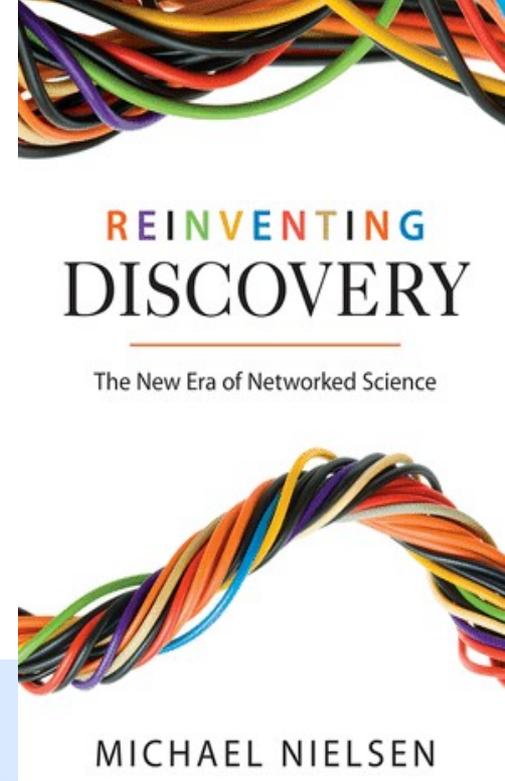
Chances & challenges for higher education

Increase quantity & quality simultaneously

- Motivating the new generation despite disinterest for science education
- Learning how to learn, update and co-construct relevant knowledge
- Cooperation
- Communication
- Creativity
- Critical Thinking (positive criticisms)
- New Technologies of Information & CCCC
- Allowing all learners to develop their potential
- Opening Higher-ed: >100 millions new students => **new university/day**

Towards a **paradigm shift ?**

Changing landscape of science education



The chances and challenges of *night science*

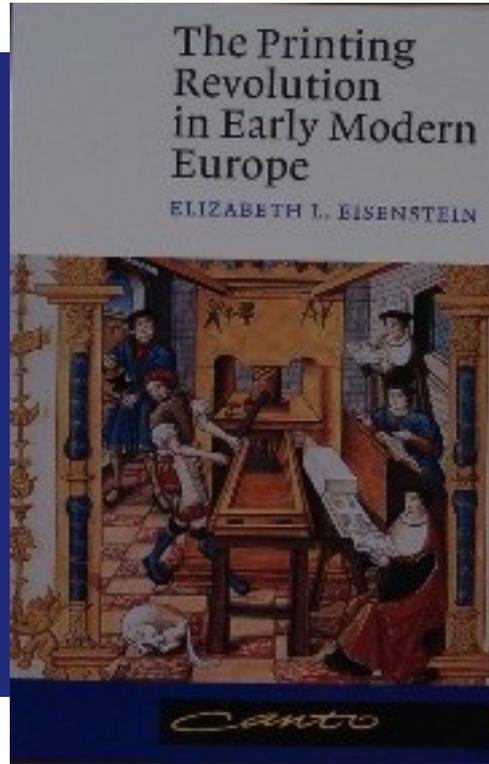


*Science has in fact two aspects. **Day science** involves reasoning as articulated as gears, results that have the strength of certainty. Aware of its style, proud of its past, sure of its future, the science of days advances in the light.*

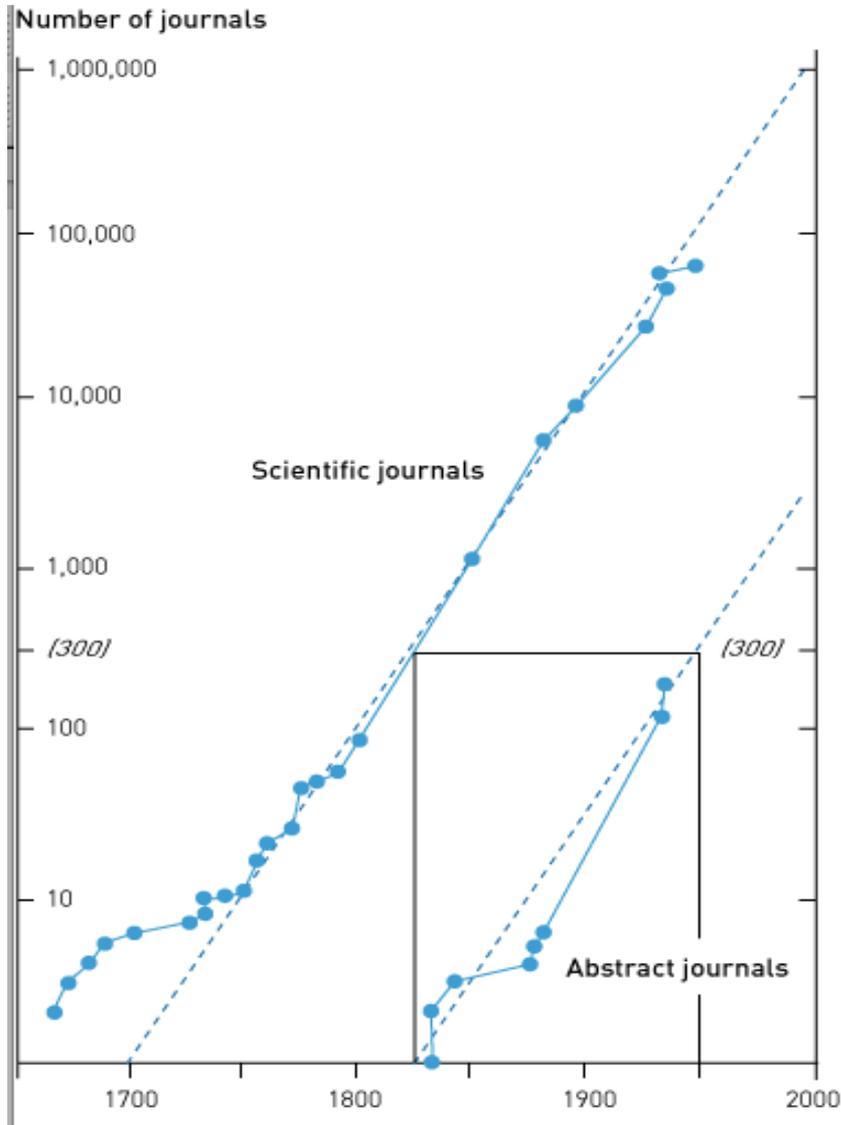
***Night Science**, on the contrary, wanders in the dark. It hesitates, stumbles, falls. Questioning everything, it is searching itself endlessly, combining, associating myriads of hypothesis, assumptions still in the form of vague hunches, projects barely taken shape. Nothing guarantees its successes, its ability to survive the tests of Logic and experiments, but sometimes thanks to intuition, instinct and the will to discover, as a lightning it illuminates more than a thousand suns....*

Adapted from
François Jacob
Nobel prize 1965

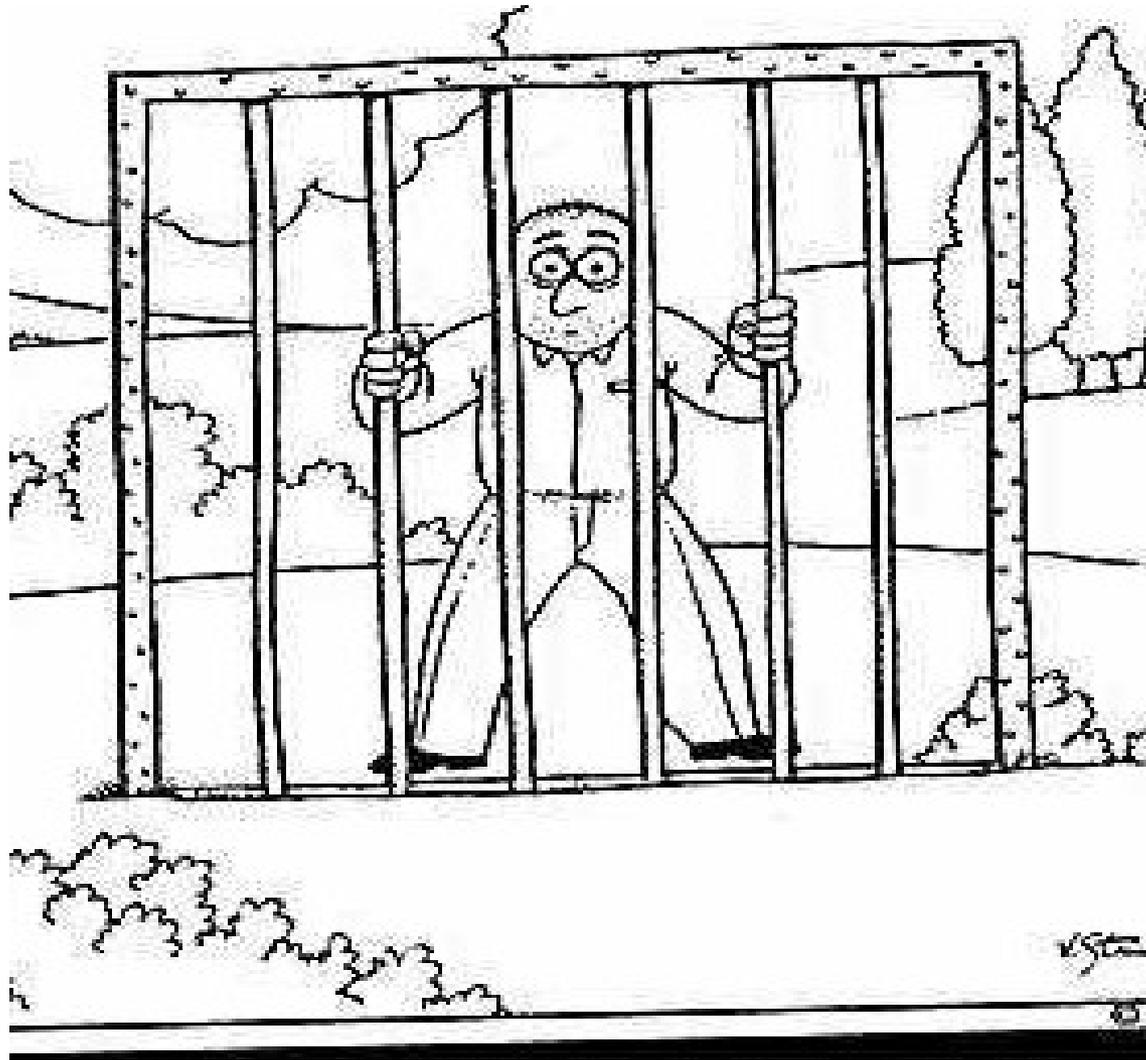




How to survive the exponential increase of scientific literature ?



Can we imagine innovative solutions ?



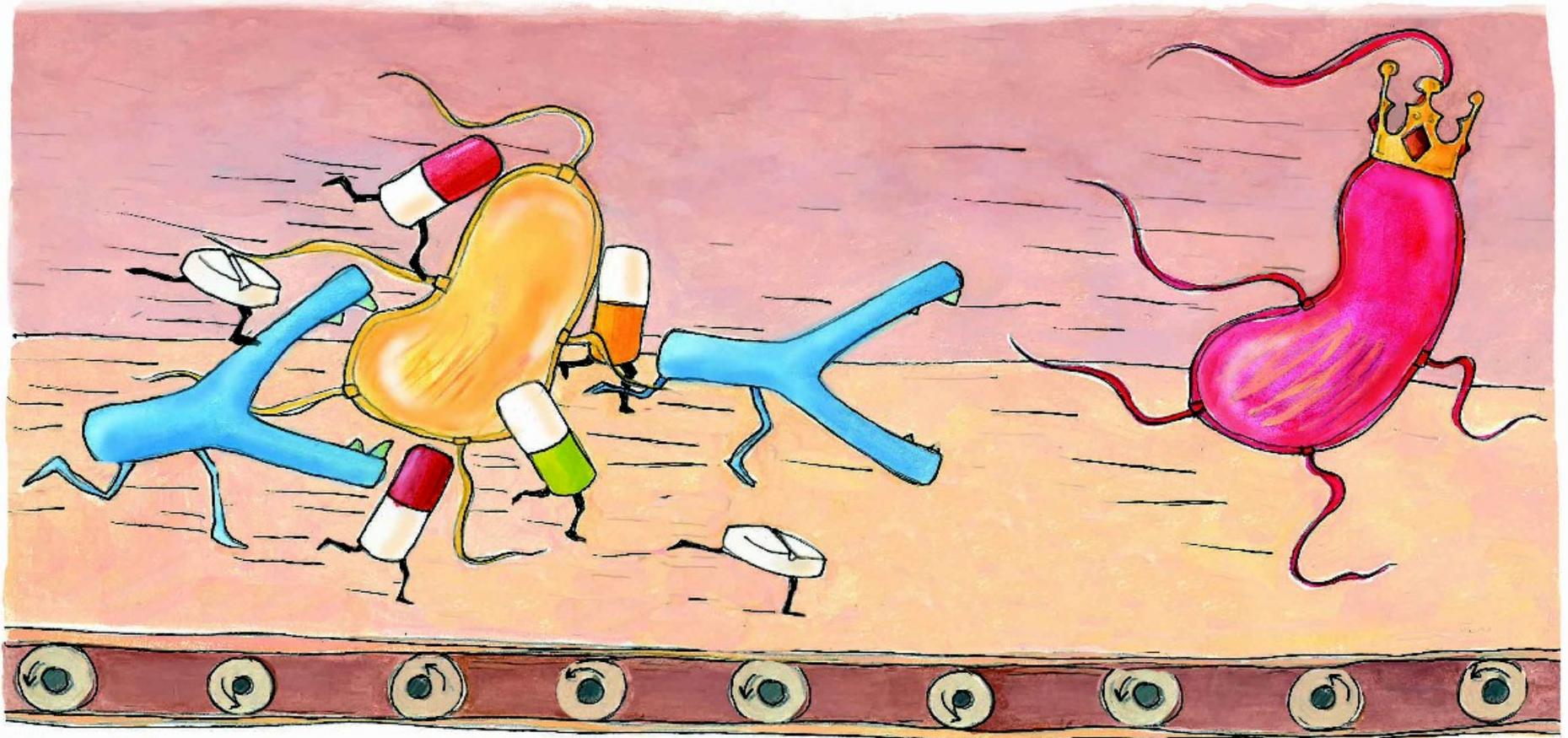
Prison for people who lack imagination.

It takes all the running you can do to keep in the same place



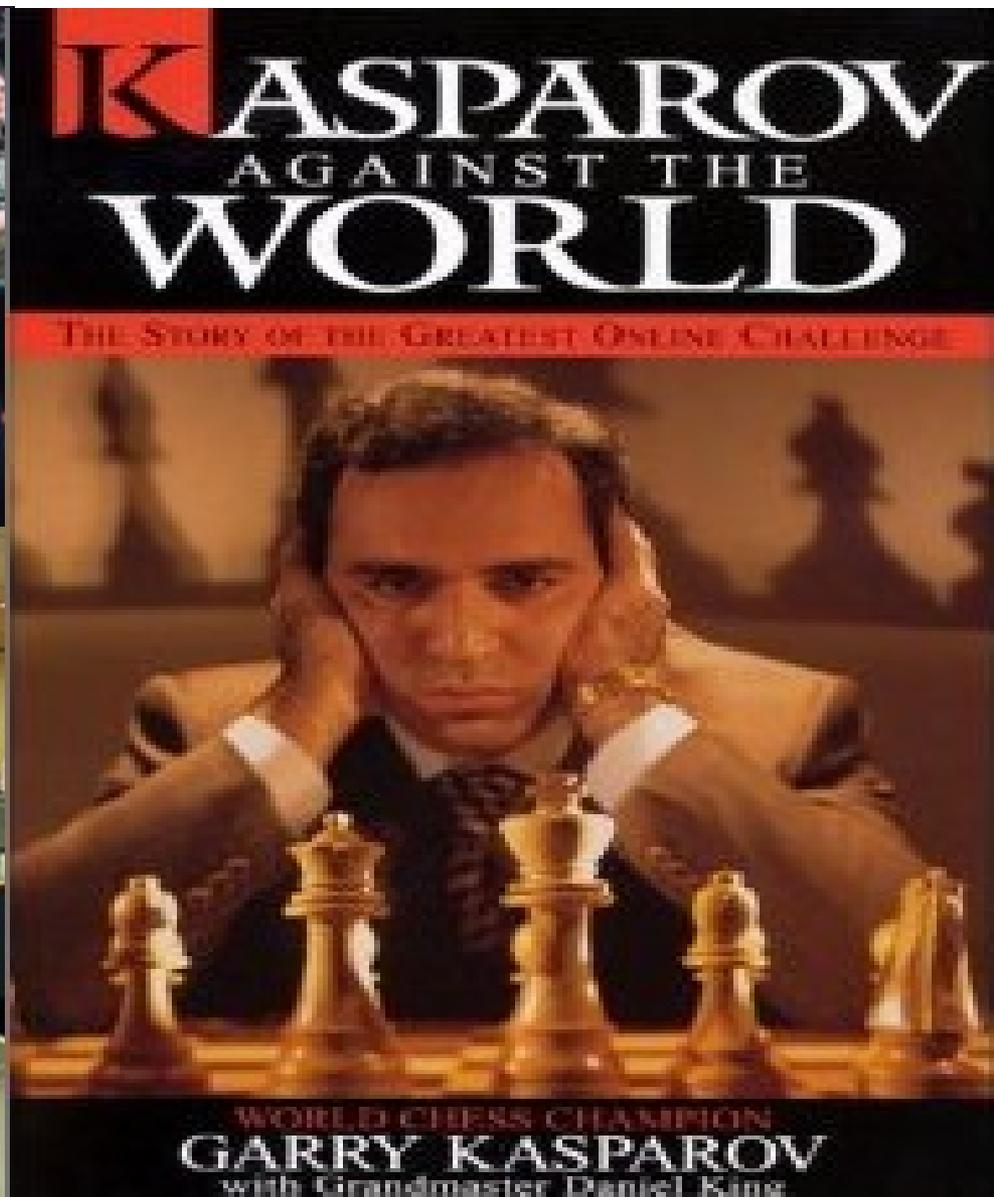
If you want to get somewhere else, you must run at least twice as fast

The bacterial Red Queen

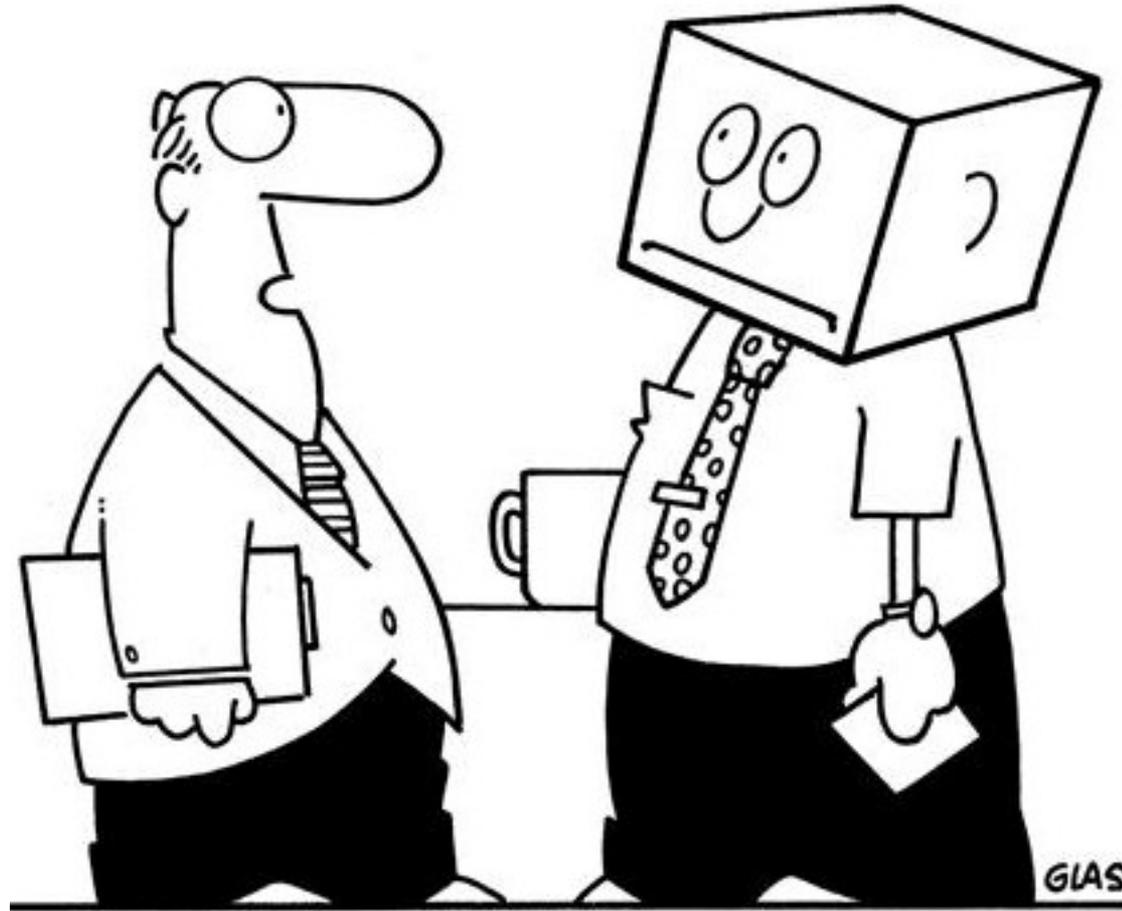


Lessons from bacteria:
Evolution of adaptability, co-operation &
niche construction via information exchange

Chess as a metaphor of the future ?



Creative education vs formatting



**“Thinking outside of the box is difficult
for some people. Keep trying.”**

How to inspire & empower students ?



Themes

Speakers

Talks

Translations

TED Conferences

TEDx Events **NEW**

TED Prize

TED Fellows

TALKS

Kiran Bir Sethi teaches kids to take charge

TEDIndia 2009, Filmed Nov 2009; Posted Jan 2010



The youngest authors of scientific publications

biology
letters

Biol. Lett.
doi:10.1098/rsbl.2010.1056
Published online

Animal behaviour

Blackawton bees

**P. S. Blackawton¹, S. Airzee¹, A. Allen¹, S. Baker¹,
A. Berrow¹, C. Blair¹, M. Churchill¹, J. Coles¹, R. F.-
J. Cumming¹, L. Fraquelli¹, C. Hackford¹, A. Hinton
Mellor¹, M. Hutchcroft¹, B. Ireland¹, D. Jewsbury¹,
A. Littlejohns¹, G. M. Littlejohns¹, M. Lotto¹,
J. McKeown¹, A. O'Toole¹, H. Richards¹,
L. Robbins-Davey¹, S. Roblyn¹, H. Rodwell-Lynn¹,
D. Schenck¹, J. Springer¹, A. Wishy¹,
T. Rodwell-Lynn¹, D. Strudwick¹ and R. B. Lotto^{2,*}**

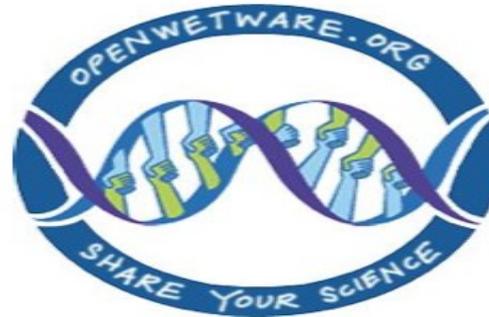
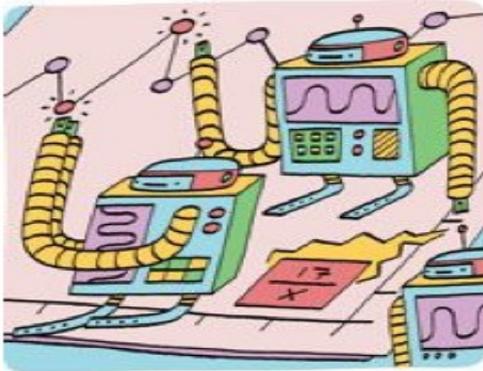
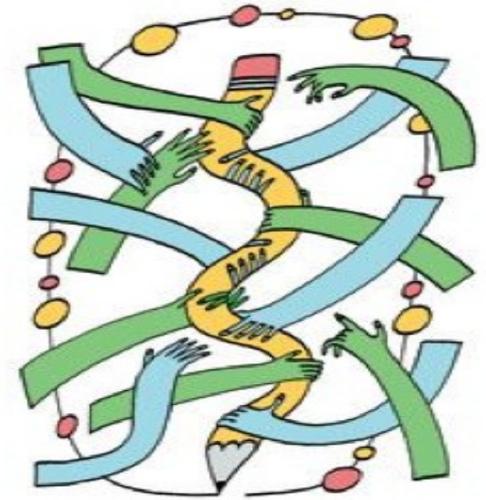
¹*Blackawton Primary School, Blackawton, Devon, UK*

²*Institute of Ophthalmology, University College London,
11-43 Bath Street, London EC1V 9EL, UK*

inaccessible to the literate ability of 8- to 10-year-old children, and second, the true motivation for any scientific study (at least one of integrity) is one's own curiosity, which for the children was not inspired by the scientific literature, but their own observations of the world. This lack of historical, scientific context does not diminish the resulting data, scientific methodology or merit of the discovery for the scientific and 'non-scientific' audience. On the contrary, it reveals science in its truest (most naive) form, and in this way makes explicit the commonality between science, art and indeed all creative activities.

***Principal finding:* 'We discovered that bumblebees can use a combination of colour and spatial relationships in deciding which colour of flower to forage from. We also discovered that science is cool and fun because you get to do stuff that no one has ever done before. (Children from Blackawton)'.**

Science 2.0



14 Year-Old Teen Builds Earthquake Detector

A Young Student in Chile Has Become the First Line of Defense for Earthquakes in the Country

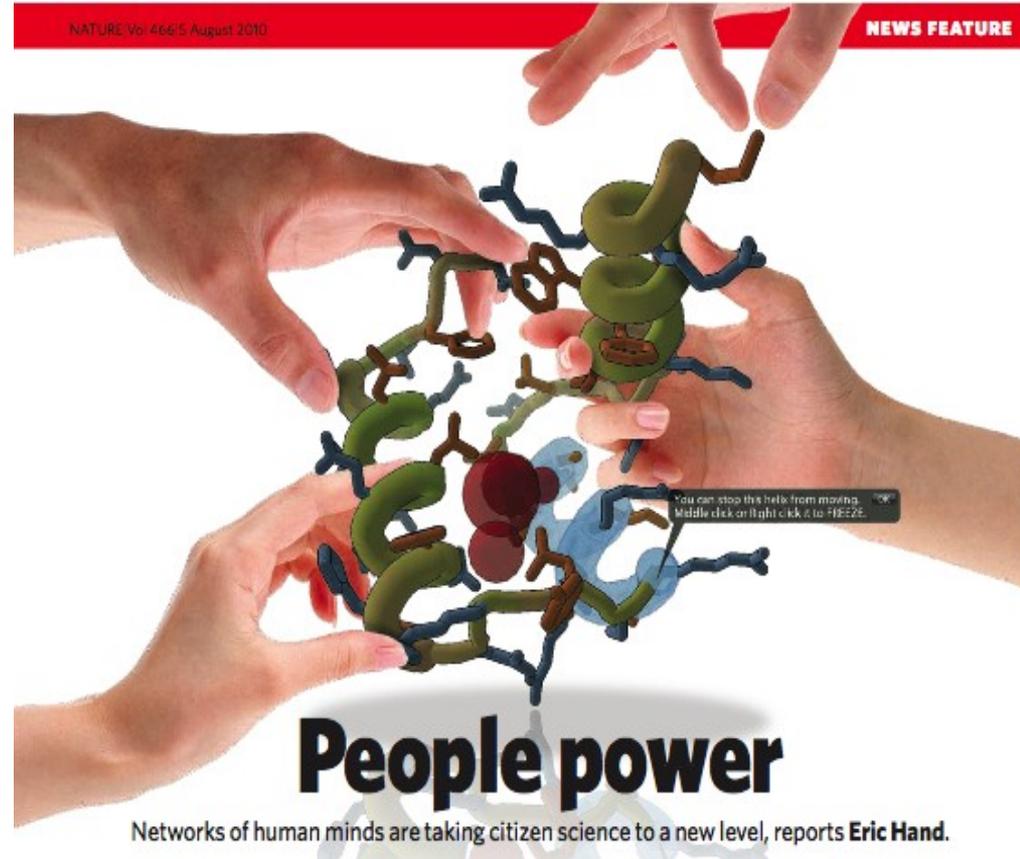
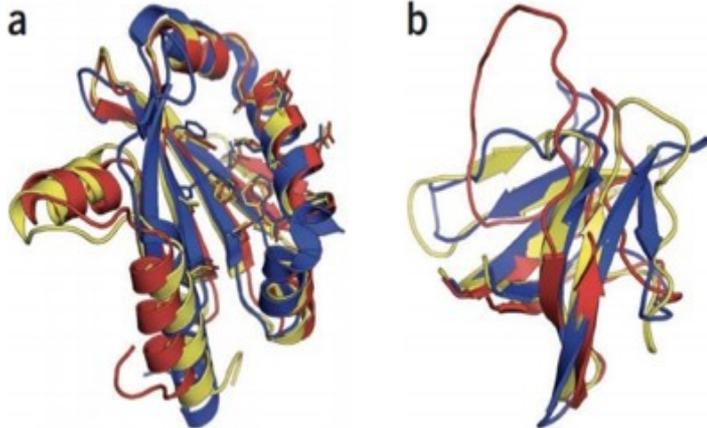


Scientific discovery games as Frames of freedom for collective intelligence

NEWS

Foldit Gamers Solve AIDS Puzzle That Baffled Scientists for a Decade

By [Matt Peckham](#) on September 19, 2011



Towards global student contest to open learning through research to all

To train the next generation of night scientists we are launching an international student co-opetition for the creation of new ways of

- learning by doing**
- learning by questioning**
- learning by playing**

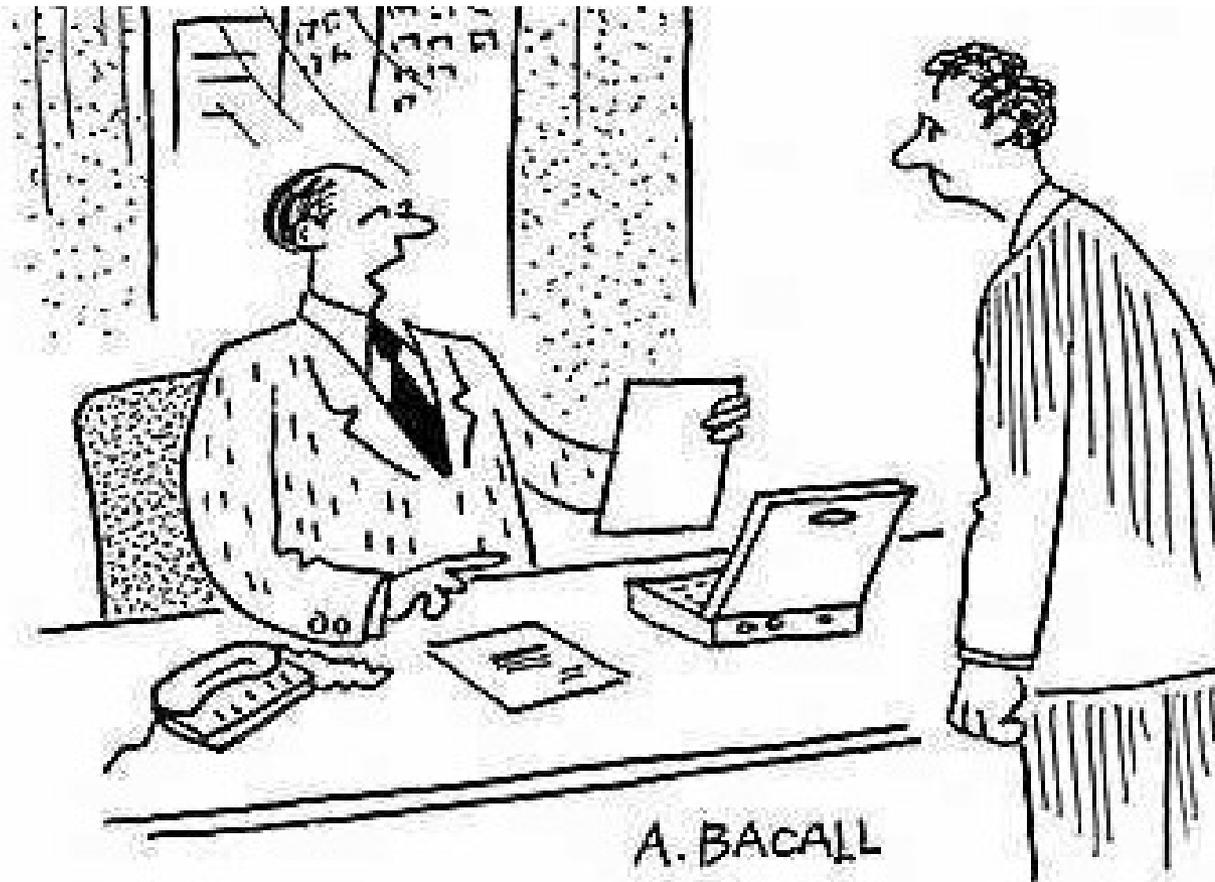
Open questions or targeted projects:

- Origaming**
- darwin@home: Evolution of digital & physical robots**
- Animal science for all**

www.nightscience.org



Encourage & protect creative minds



"Your proposal is innovative. Unfortunately, we won't be able to use it because we've never tried something like this before."

How to favour the birth & diffusion of innovations ?

Train innovators allowing them to learn through research

Create (pre)-incubator for innovations

Evaluate innovations (phase 1, 2, 3 as in biomedical research)

Identification and diffusion of best innovations

Create import/export framework for best innovations

Propagation of innovation in primates



New interdisciplinary training for 21st century students

- Create an interactive research culture that stimulates young scientists to combine skills from different disciplines to explore new frontiers.
- Transform scientific education through innovative bachelors, masters & PhD programs based on interdisciplinarity, individual & collective projects and early research experience in different fields.
- Promote international collaboration to strengthen novel approaches to education & research
- Optimize Web-based Interactions for Science Education & Research
- Create an international community to foster innovations and spread the best ways to learn through research (eg scientific discovery games, hands on activities, socratic technologies...)

Frames of freedom & creativity



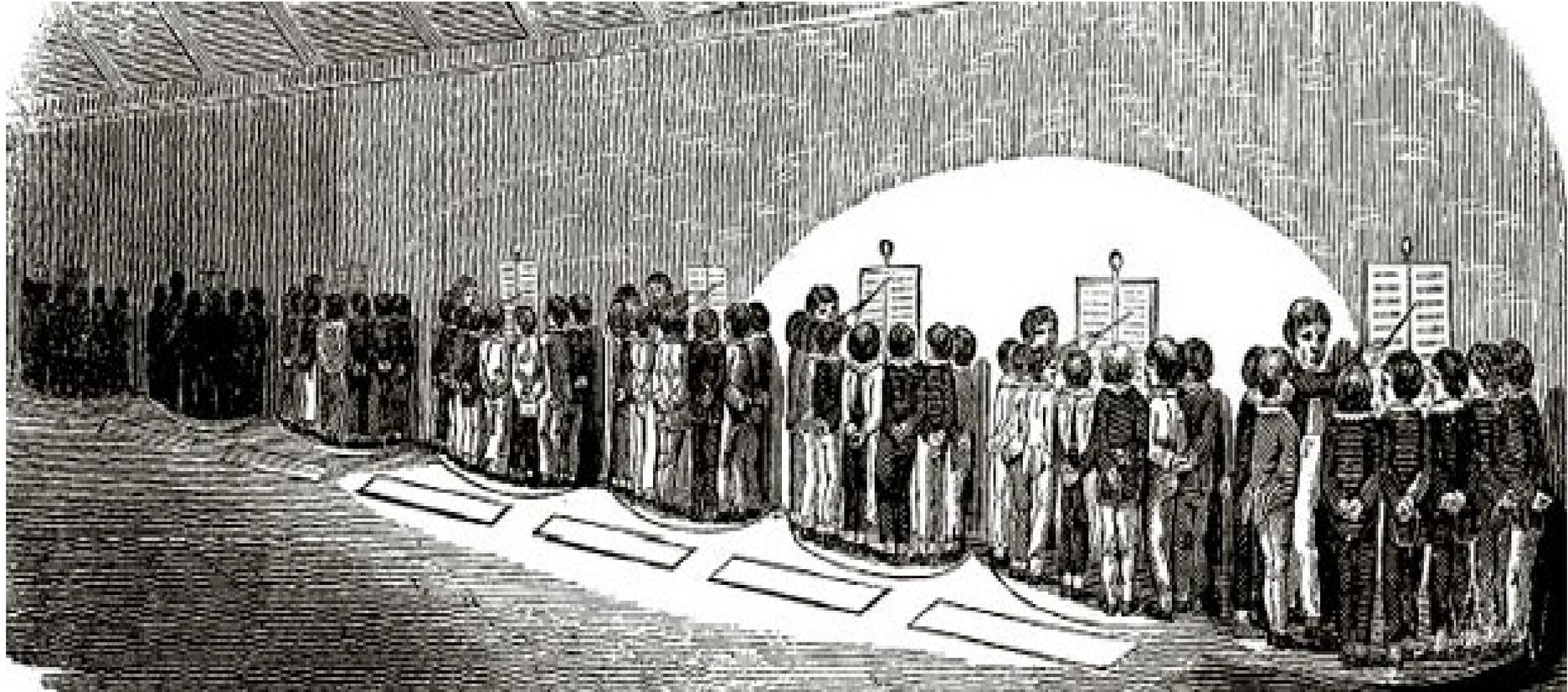
Questions for the future of learning

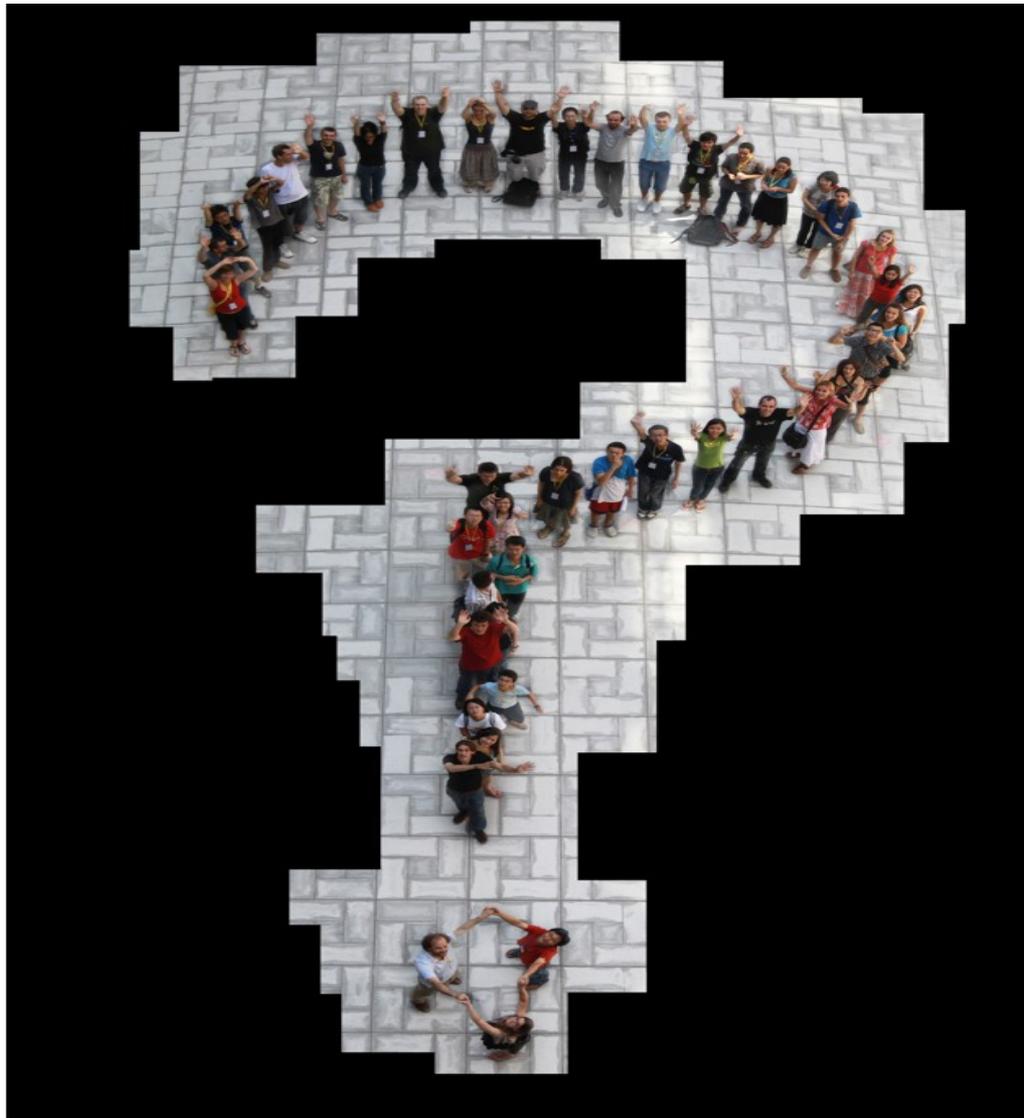
- What is found in good campus & not (yet) through the web ?
- How to navigate in oceans of uneven quality informations ?
- How to invent « socratic technologies » ?
- How to go from data to information to knowledge to wisdom ?
- How to find “ideas mate” ?
- How to create frames of freedom & creativity ?
- How to create TICCCC to train co-constructors of knowledge ?
- How to teach how to learn anywhere, anytime ?

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Towards 21st global innovative learning ecosystems





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