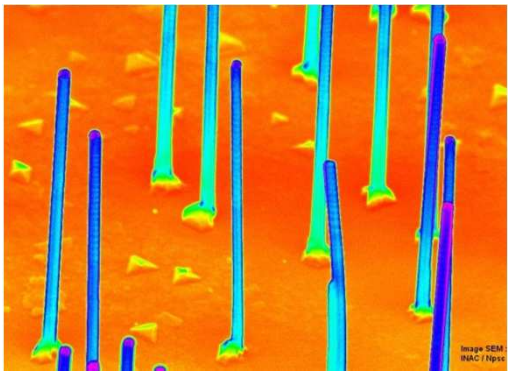
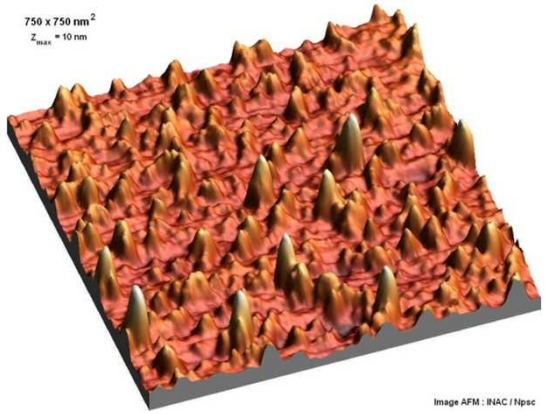
# Nanosmile website on Nanosafety
# Training, Education and Public dialogue issues

1. **Why such a specific attention to nano 'emerging risk'?**
2. **What can we expect from risk communication experts for a Public dialogue?**
3. Nanosmile origin, concept, collaborations, historic, uses, examples : animations, cartoons,…




**Yves SICARD**
*Scientific consultant*
*Chemistry and NanoSafety Laboratory*
*CEA LITEN DTNM*
**Joseph Fourier University POLYTECH**
**Industrial Risk Prevention Dpt, Professor**

# Science & Teaching: 2 main occupations


## Scientific consultant

*Nano professional training, best practices*
*Nanosafety information dissemination*
*Public dialogue resource design*

## Safety Engineering Dpt

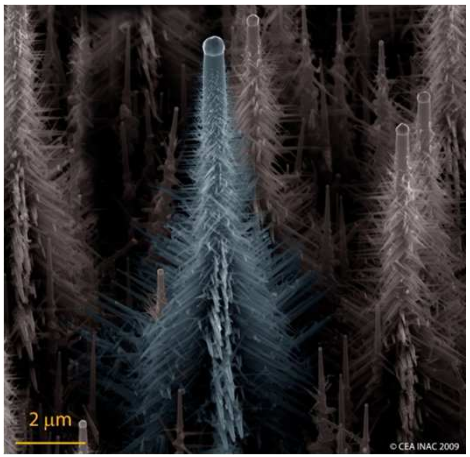
*Risk assessment & management*
*Human Factors, ergonomics*
*Emerging risk governance*

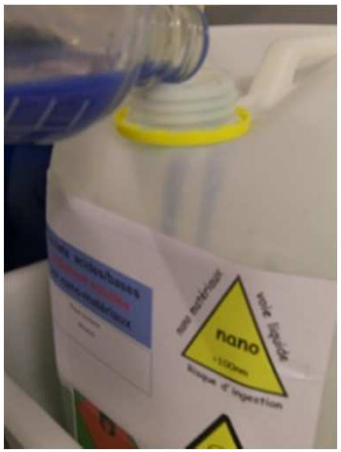
# CEA : a big structure, 4 main R&D themes

**Atomic Energy & Alternative Energies Commissary,** ***9 Research Centers***
***NUCLEAR, INFO & HEALTH Techno, NEW ENERGIES → 15,000 in France***
***→ 3,500 in Grenoble***

**LITEN: Innovation for New Energy and Nanomaterials → 700**
**DTNM: Technology of NanoMaterials Department → 150**
**LCSN : NanoChemical & Nanosafety Laboratory → 25**

***Grenoble → ~ 450 nanoscientists/technologs potentially exposed to…***



# CEA LITEN DTNM **LCSN** Grenoble

nanoSAFE'12

13-15 NOVEMBER / MINATEC - FRANCE

http://www.nanosafe.org

**FP7 coordinator**

**NanoHOUSE: nanorelease, LCA 2010→13**

**FP7 participation**

**NanEX : exposure Kw & scenarios 2010**

**NanoCode : CoC implementation → 2011**

**iNTegRisk : Emerging risk frameW → 2013**

# 1.Nanosmile risk context

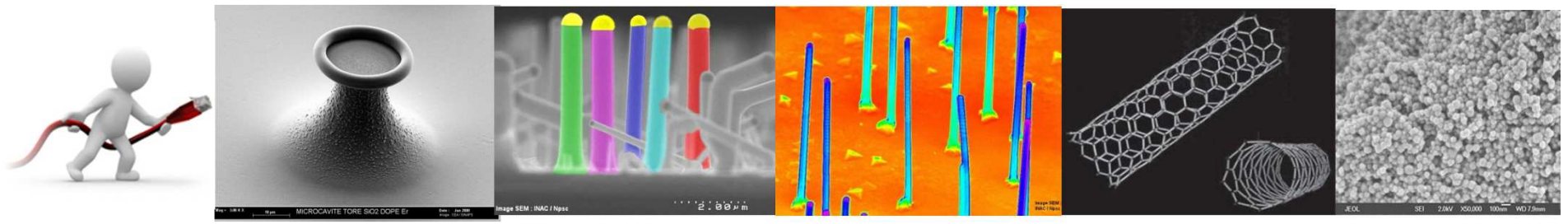
## Why such a specific attention to nano 'emerging risk'?

A. **Economic & Societal impacts**

B. **Risk uncertainties: hazard & exposure**

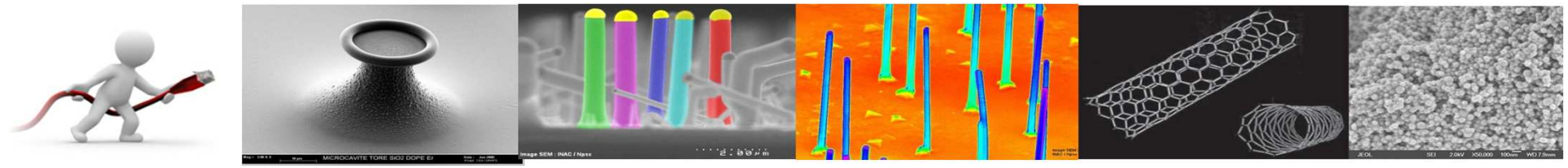
C. **Risk management context**

D. **Societal & Ethics issues**



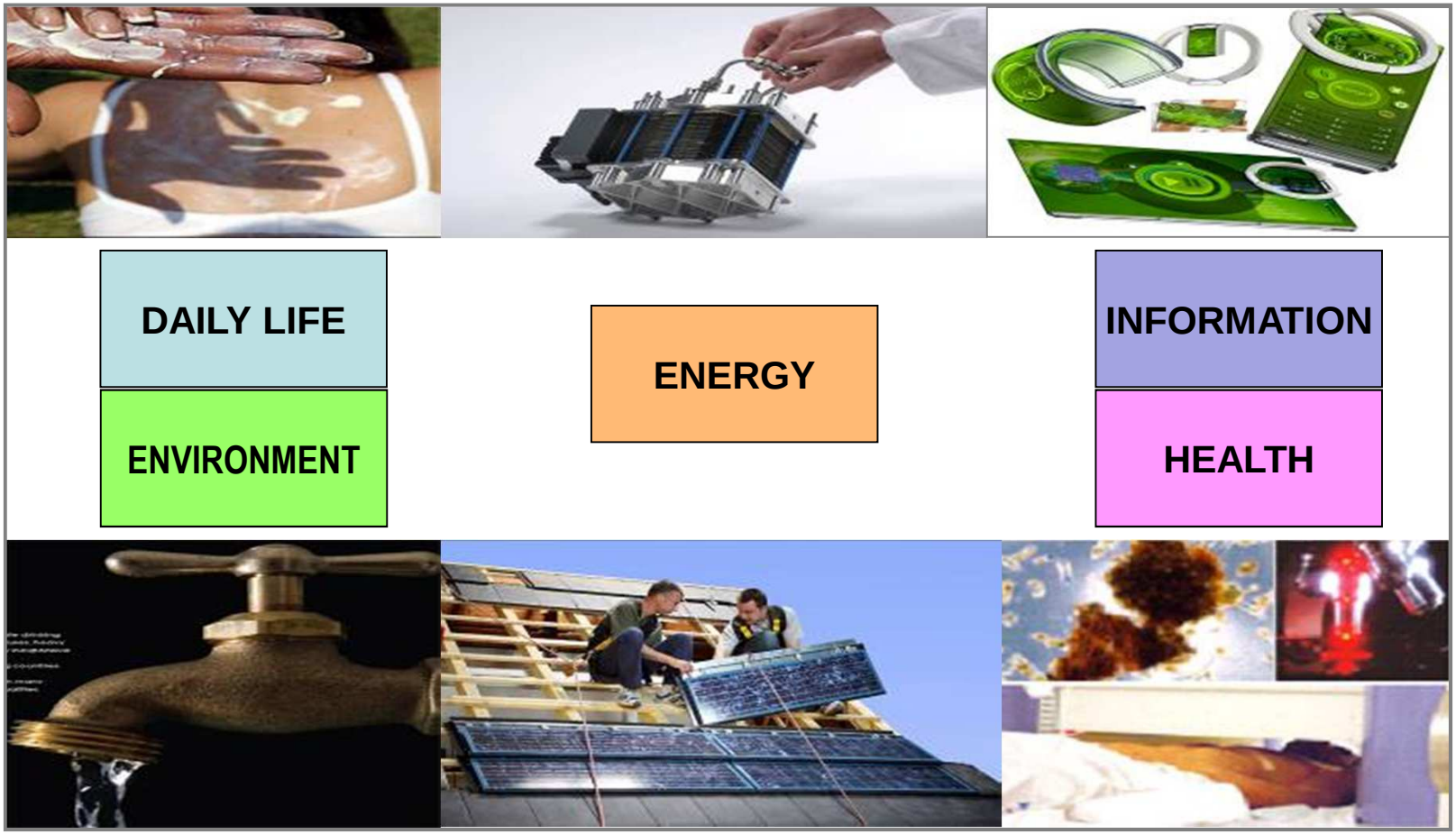
# 1A. Eco & Societal impacts

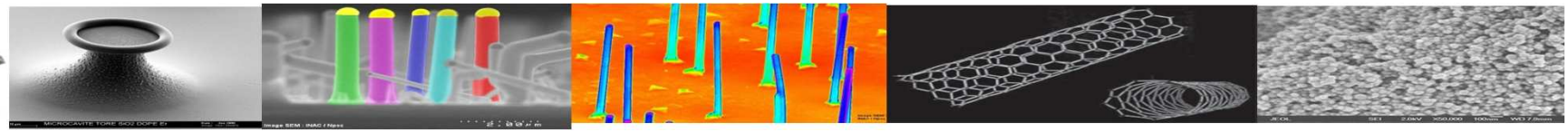
## A lot of hope of economic development!
## → Low public tolerance facing techno-risk

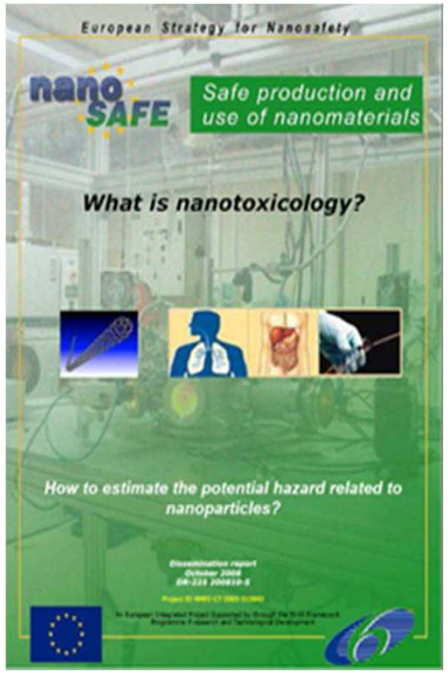
# 1A. Eco & Societal impacts

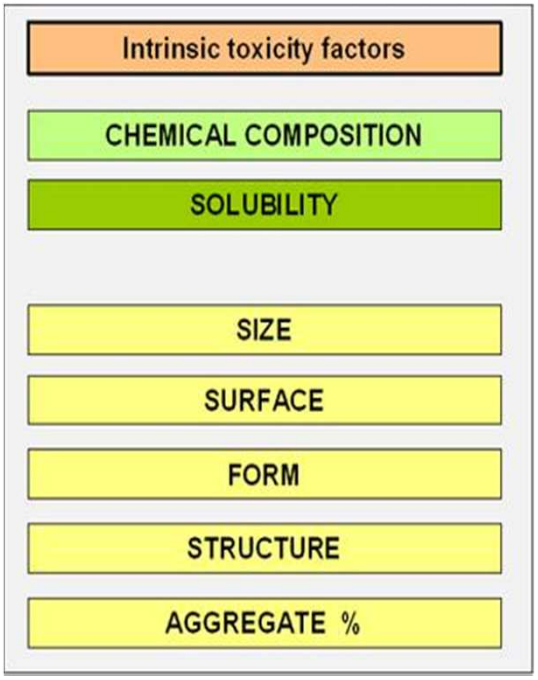
## A very large variety of activity sectors and… applications already on the market

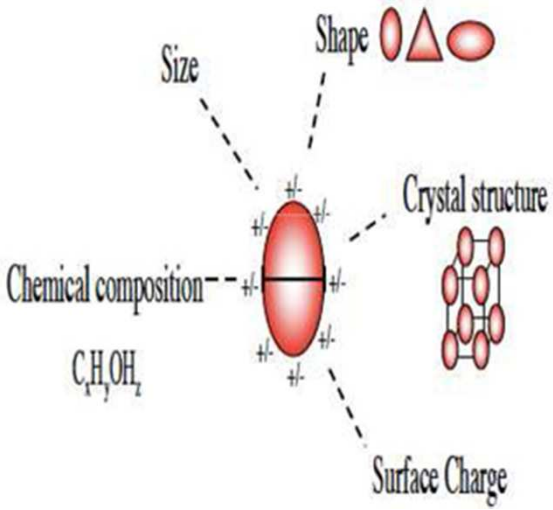


# 1B. Risk uncertainties: Hazard→ nature & delay




**'Some engineered nanoparticles, in certain circumstances, may be toxic'**

May 15, 2009 / ENVIRONMENTAL SCIENCE & TECHNOLOGY

***« If manufacturers spent 10% of their R&D budgets on extensive testing of all nanomaterials, they could finish the task in 3-5 years, but with a mere 1% spending such tests would take 34-53 years to complete ».***

# 1B. Risk uncertainties: Exposure → metrology

***Natural nanoparticle***

***....from combustion***

***Engineered nanoparticle →*** **A needle in a haystack!**

***Important and variable « background noise »***

***We know how to limit nano exposure BUT Exposure 'assessment' remains a problem to solve!***

# 1C. Risk management context

## Which precaution for which level of risk?

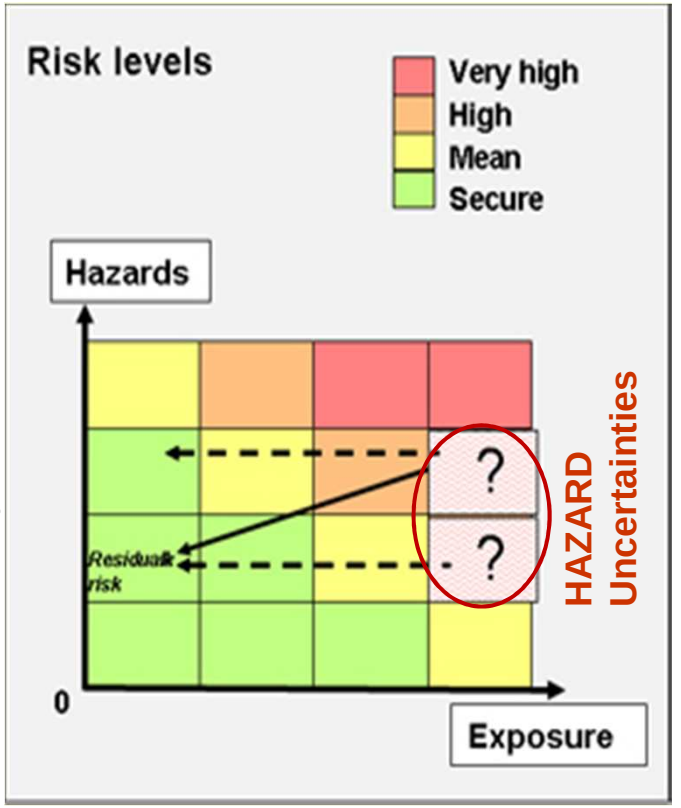
RISK = f(HAZARD * EXPOSURE)

**ALARA** = ? * ~ 0

**ALARA = As Low As Reasonable**

*How to '**reasonably' (?) apply** the Precautionary framework ?*

*Are we able to limit exposure **during all Life Cycle** of nanoproducts?*



# 1D. Societal & Ethical issues

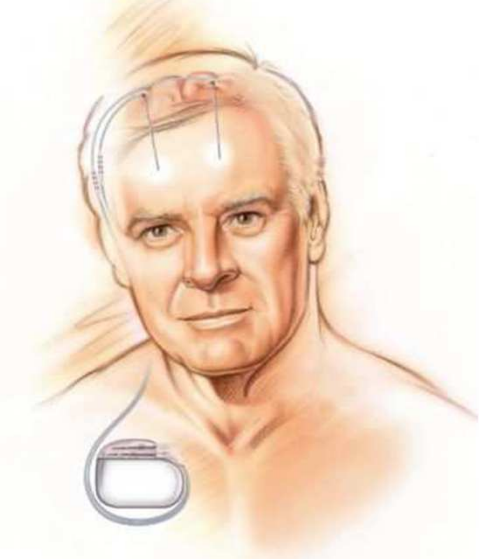
**Risk →** *Imposed? ~ Chosen ? Undergone or Voluntary assume?*

**Exposed →** *Workers / Consumers / Citizens*

*All long nanoproducts life cycle*

Stakeholders
RESEARCH
BUSINESS
INSTITUTIONS
CIVIL SOCIETY

## *RISKS BENEFICES balance + ETHICAL Issues*

***RISK perception is particularly sensitive***

***So, public dialogue is required…***

# 2. Nanodialogue: Risk communication? Public dialogue?

# 2.Nanodialogue, marketing vs. education?

*Economics*

**Marketing techniques assume you want to sell something**

***Convince***
***Seduce***

**Innovation acceptance**

?

**Education supposes you want to give people the means to choose by themselves**

***Make things***
***Understandable***
***& attractive***

**Public dialogue**

***Social***

# 2.Nanodialogue, acceptance vs dialogue process?

All risk communication experts insist on **TRUST** as a necessary condition for any process of integrating an innovation. (feeling ++ vs. rational demonstration)

Do not try to **CONVINCE** people by marketing or education
Efficiency = no **a priori** acceptance oriented process

Differentiate clearly applications you are talking about.
Considering nanotechnology in general is confusing


References
[3] Chris.Tourney, Nature Nanotechnology, Vol 4, (March 2009)
[4] Dan Kahan & David Rejeski, Project emerging on nanotechnologies (March 2009)
[5] R. Sandler, Nantechnology, social & Ethical issues, Woodroiw Wilson Center, (Jan 2009)
[6] M. Siegrist & al, Correspondence Nature Nanotechnology (Feb 2007)
[7] N. Piedgeon & al, Letters Nature Nanotechnology (Feb 2007)
[8] Dan Kahan & al, Woodwrow Center, Nanotechnology Risks Perception, (March 07)

# 2.Nanodialogue, a voluntary code of conducts?

*Information has to be above all an **Ethical duty** for the risk producers, And NOT a tool for marketing…*

*Example of EU Code of Conducts principles*

*N&N research activities should be:*

*- comprehensible to the public (1st principle ).*

*- guided by the principles of openness to all stakeholders, transparency and respect for the legitimate right of access to information. (3rd principle ).*

**Respect the voluntary Code in order to get public and institutions confidence**

NANO CODE

www.nanocode.eu


**References**

**[9] Commission Recommendation, Code of Conducts, (Feb 2008)**

[10] Mateo Bonazzi, European Commission, Communicating nanotechnology, (March 2010)

[11] David Berube, White paper, communicating risk in the 21st century, NNCO, (Feb 2010)

# 2. Nanodialogue: Debate or Dialogue?

## *Lessons learnt → conditions to succeed*



# 2. NanoDialogue, French Public Debate feed back

## →Necessary conditions to succeed

Let people discuss any subjects, anywhere and at the moment they decide to

Let people speak more or least so much than the 'experts'

Make things understandable & attractive enough to involve the general public

Announce clearly dialogue objectives and what can bring public opinion

openness

listening

meaning

inclusiveness

transparency

# 3. Nanosmile example: The origin?


***Requirement: RISK Governance SUPPORT***

***→ Define & Update training best practices***

**Exposed persons, safety engineer, medical, managers**

***→ Design public dialogue information process***

**General public, Environ[t] ONG, Consumer groups**

# 3. Nanosmile example: The origin?

**Updated training best practices supposes:**

- Collect updated Nanosafety results
- Define reasonable level of precaution
- Propose understandable and operational safety rules

**Responsible Societal Dialogue supposes:**

- Make Science understandable by public at large
- Be transparent on risk/benefit balance issues
- Include all stakeholders in decision making discussion
- Respect ethical issues during all the innovation process

***How to satisfy all these requirements?***

# 3.Nanosmile concept, a 3 level of knowledge

nanosmile SAFETY OF NANOMATERIALS

***because** students and scientists are also consumers and citizens*


**An Information Resource Support as "a Nanosafety one-stop-shop"**

**From training needs to general public information**

# 3.Nanosmile, a collaborative framework Thanks to…

**Experts Nanosmile**

- J.Y.BOTTERO, J.ROSE (CEREGE)
- F.BOIS, J.BOUILLARD, C.MANDIN (INERIS)
- H.JEANSON, C.TARDIF (INSTN)
- C.VERCHERE (LITUS, CEA)
- D.GRAND (DIR,CEA)
- L.GOLANSKI, S.LAUNOIS, E.ROUVIERE, O.RENARD, F.TARDIF (LITEN,DRT,CEA),
- T.FAROUZ (SMR, DRT, CEA)
- S.CHEVILLARD, R.MAXIMILIEN (DSV,CEA)
- D.BLOCH (SST, CEA)
- M. CARRIERE (DSM/IRAMIS/SIS2M)

nanoSAFE'10 15-19 November / Minatec - France

EU-VRi Early Recognition, Monitoring and Integrated Management of Emerging, New Technology Related, Risks — iNTeg-Risk

Nano-INNOV

MINATEC®

GIANT INNOVATION CAMPUS

instn

GT nano CEA

**E-information needs a collaborative framework!**

## Cartoons Credits

Website renovation: Olivier Parent

**Authors** Nayla Farouki (Philosopher - GIANT) | Marie Carriere (Toxicologist – DSM CEA Saclay) | Roland Pasternak (Science / Society interaction - MINATEC) | Yves Sicard (Nanosafety scientific advisor UJF LITEN) **Steering Comittee** Jean Philippe Bourgoin (Nanosciences Transversal Program Responsible CEA) | François Tardif (Director LCSN, DTNM, LITEN) **Conception** Graphics : Jonathan Courat | Scenograpy : Jacques Bocquet et Yves Sicard **Realisation** Actors : Catherine Jeanneret, Kathleen Lewis, Christian Séruzier | Sound recording : Olivier Garde | Sound and image editing : François Garde | Music : « Passepied » de Claude Debussy | Piano : Marie-Bénédicte Cohu **Project direction** Yves Sicard (Nanosafety scientific advisor UJF LITEN) **Production** DECALOG, Manhattan Studio Productions | CEA – NanoInnov – Safety of nanoparticles.

# 3.Nanosmile implementation Historic



*Survey → updating ……*

*New ressources*

*Conception → implementation*

Expression of needs

*Juil. Dec 07*

Training Tests

Intranet version

*MarchAv.*

Internet version

*Jun08*

Audits

*Jun09*

New Web version

*Jun2010*

*→ 20.000 to 110.00 consultations/month*

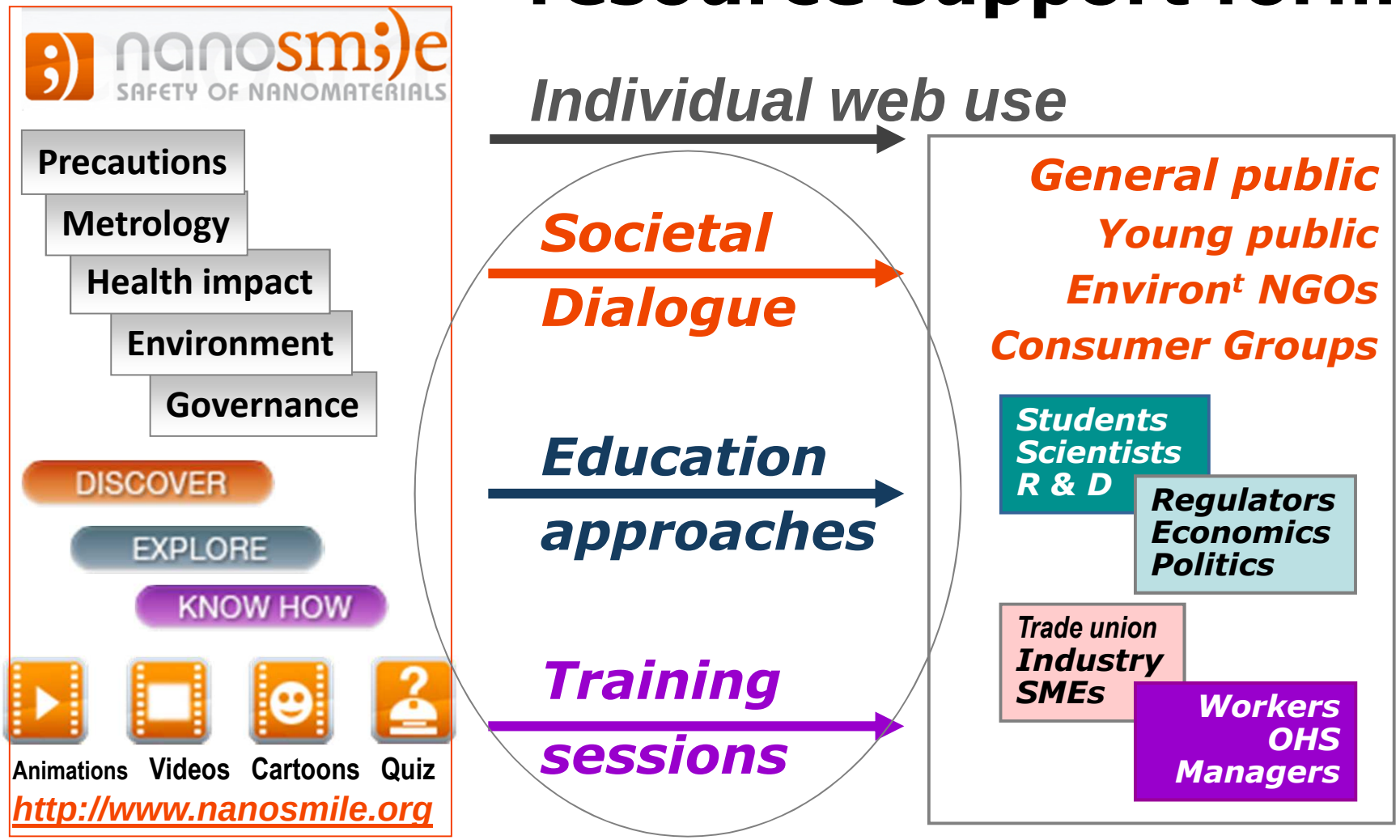
***NANOSAFETY TRAINING SESSIONS***

KNOW HOW

EXPLORE

DISCOVER

# 3.Nanosmile uses, an information resource support for…




***You can design and implement the best website in the world, your success will depend on how you use it.***

# 3. Nanosmile web page examples

Thursday, 22 July 2010

nanosmile
SAFETY OF NANOMATERIALS

animations | videos | cartoons | quiz

HOME | PRECAUTIONS | METROLOGY | HEALTH | ENVIRONMENT | GUIDELINE

**Metrology**

- Aerology
  - Composition of air
  - Nanoparticles in air
  - Behaviours
  - Stability
  - Deposit
  - Synthesis
- Measurement
- Protection
- Training session

**Search...**

search...

**RSS feed**

## Behaviours

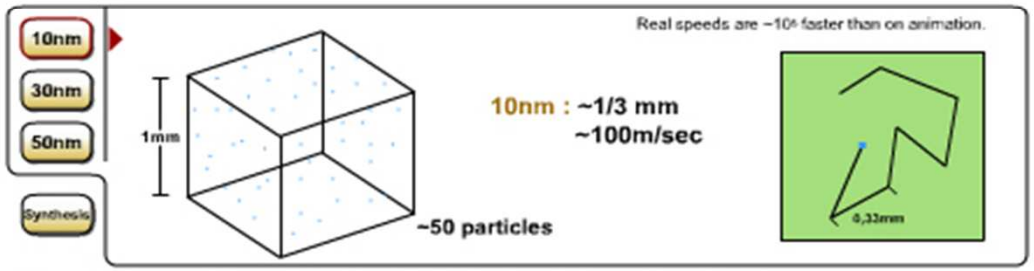
DISCOVER

*Do nanoparticles have a specific behaviour?*

Hanging in the air, all the particles are theoretically subject to 3 types of independent actions: Sedimentation characteristic of inertia, the Thermal diffusion and the disturbances of the air or Convection.

### The thermal diffusion affects only a few fractions of millimetres

**Mean displacement and diffusion speed of a particle**




Speed and mean displacement of nanoparticles (10, 30 and 50 nm) under the influence of thermal diffusion

The diffusion is characterized by a diffusion coefficient (expressed in m²/s) inversely proportional to the square of the particle diameter. **The smaller the particle is, the higher its mean displacement and speed will be.** But this diffusion method can not move the particles over distances up to a fraction of a millimeter

GIANT INNOVATION CAMPUS

DISCOVER
For the general public

EXPLORE
To perfect, to study...

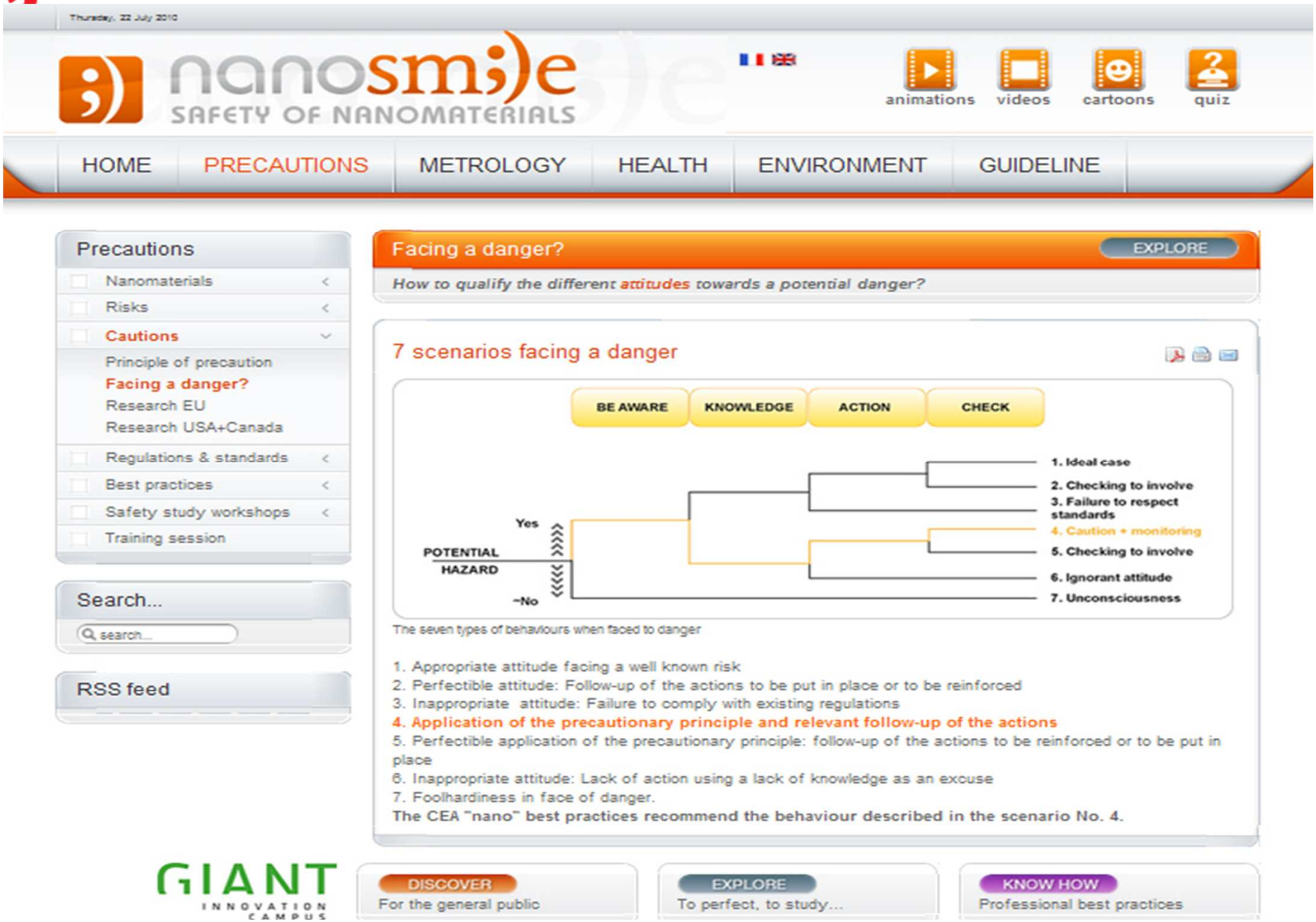
KNOW HOW
Professional best practices

# 4. Nanosmile animation examples

# 4. Nanosmile animation examples

# 4. Nanosmile web page examples



# 4. Nanosmile web page examples

nanosmile
SAFETY OF NANOMATERIALS

animations videos cartoons quiz

HOME | PRECAUTIONS | METROLOGY | HEALTH | ENVIRONMENT | GUIDELINE

**Precautions**

- Nanomaterials
- Risks
- Cautions
- Regulations & standards
- **Best practices**
  - General actions
  - Exposure limitation
  - Personal confinement
  - Environment confinement
  - Safety pictograms
  - **Waste management**
  - Transportation
  - Monitoring & archiving
- Safety study workshops
- Training session

**Search...**

search...

**RSS feed**

## Waste management

KNOW HOW

*Waste management principles?*
Liquid and solid "nano" waste are managed following two prevention principles at CEA.

### Liquid waste management implementation

Temporary storage of liquid waste

Liquid waste transfert

When liquids (aqueous solution, buffer, etc.) have been soiled by nanos (nanotubes, nanocrystals, nanopowder), the latter will be collected in **identified containers** and stored in a suitable place (under a hood, in a glove box, in a chemical cabinet, etc.).
These wastes should not be mixed with other chemical waste liquids of the premises and containers will be placed in **specific retention bins**. Waste contaminated with heavy metals will be distinguished from those that are not.

GIANT INNOVATION CAMPUS

DISCOVER
For the general public

EXPLORE
To perfect, to study...

KNOW HOW
Professional best practices

# 4. Nanosmile cartoons example

## Cartoons - how to use it?

**9 episodes of Nanosmile Show** are designed in order to be understandable by public at large. Most important information relative to 9 basic nanotechnology issues are proposed within 4minutes:

- What are nanoparticles & nanomaterials?
- Applications & products?
- Nanos & freedoms?
- Is it toxic?
- Are you exposed?
- Nanotoxicology: research in progress?
- Nanoworkplaces precautions?
- Consumers precautions?
- Ethics issues?

**Each of 9 episodes ends with most important information to remain followed by one or two opened questions in order to initiate thinking and engage dialogue with audience.**

# Nanosmile website on Nanosafety

## Conclusions

TNT conf Trends in NanoTechnology

nanosmile SAFETY OF NANOMATERIALS

Dialogue → public
Education → student
Training → professional
www.nanosmile.org

DISCOVER
EXPLORE

**Public dialogue is a complex process…**

***Efficient and attractive general public information is a condition to succeed!***

**Academic education, a long term process…**

**In particular to develop a reasonable 'Precaution attitude'**

**Best practices diffusion**
**Research in progress**

***Efficient and effective sharing at the international level***

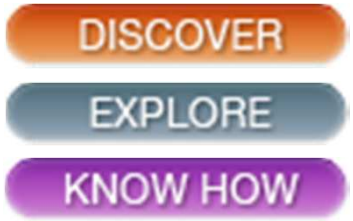
# Nanosmile website on nanosafety

nanosmile
SAFETY OF NANOMATERIALS

Dialogue → public
Education → student
Training → professional
www.nanosmile.org

DISCOVER
EXPLORE
KNOW HOW

# Nanosmile, Audience & feed back

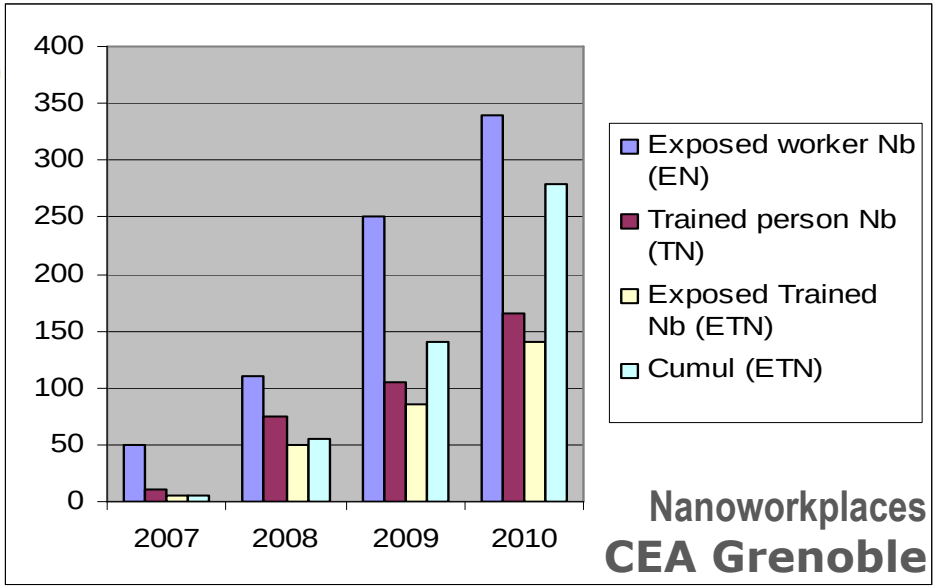

**Web using:**
**From 20,000 to 110,000 requests/month**
**Only 5 to 50 feed back messages/month**

**Public dialogue using:**
**nano@school, Timefornano, La Recherche fait école, Croq'Science, Polytech Master, Conferences**

**International collaborations:**
**Nanosafety support: Korea, South Africa,...**
**FP7 project collaboration/ NanEX, NanoHOUSE, NanoCode**

# 1.Nanosmile C. Risk management & training

## *Professional training needs*




**BILANS**
**2007 → implement + tests**
**2008 → 5 sessions → 75j**
**2009 → 10 (3 indus) → 195j**
**2010 → 15 (4 indus) → 345j**
**+ Engineer schools**

**→ Knowledge management process**

**Best practices workplace**
**e-information**
nanosmile SAFETY OF NANOMATERIALS
**Consultation preparation**

→

**Formal Training session**
nanosmile SAFETY OF NANOMATERIALS
**Training support**

→

**Assistance & updating**
**e-information**
nanosmile SAFETY OF NANOMATERIALS
**Updating Questions**

# Nanosmile, emerging risk context


SCIENCE

ETHIC, LEGAL
SOCIO ECONOMIC

SAFETY RULES

DIALOGUE PROCESS