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Roma | 27 luglio 2011

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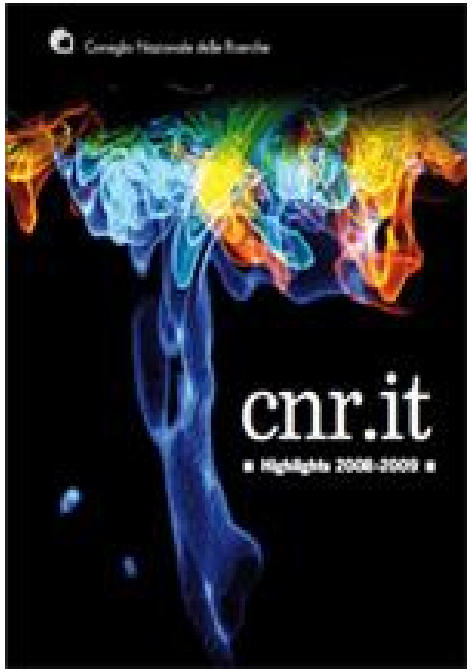

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FIRST EDITION

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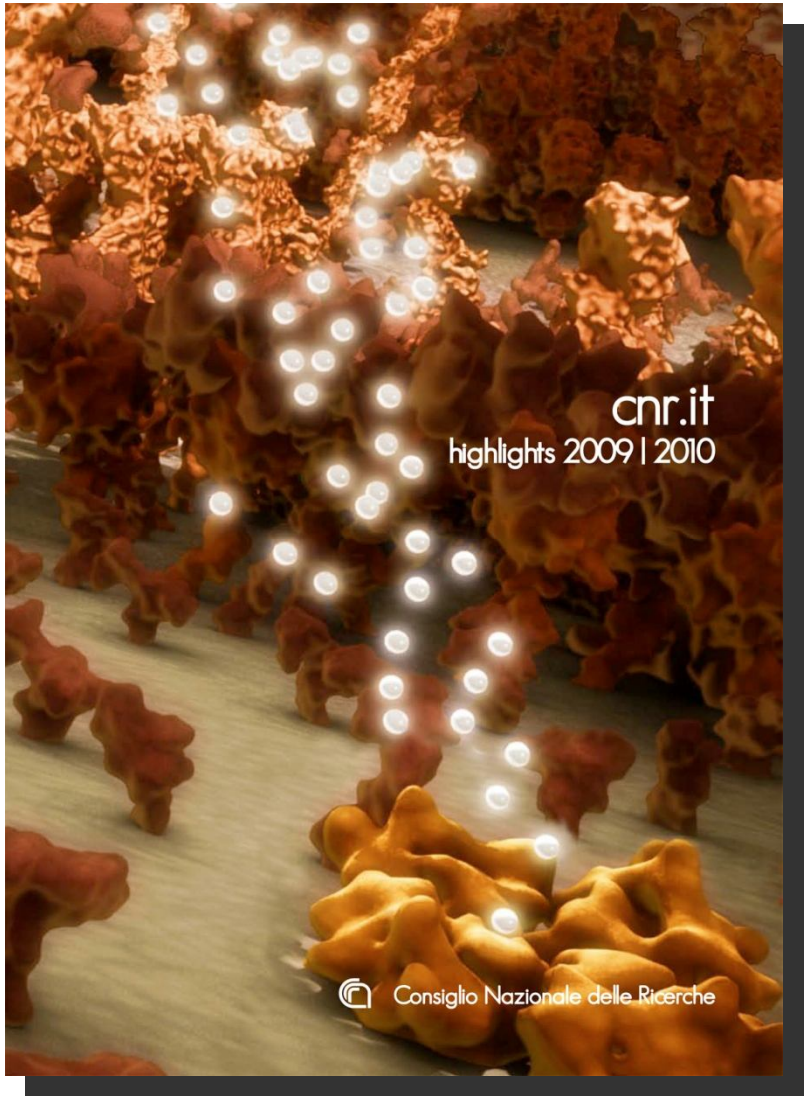
SECOND EDITION



CNR.IT

- CNR is the largest public research institution in Italy, performing multidisciplinary activities
- In 2010 it produced **6,898 publications and 6,986 in 2009**, indexed in the Web of Science (WoS)
- Highlights: a selection of about **220 articles** published in CNR.IT second edition
- **EDITORIAL BOARD:** selection of articles, general supervision
- **SELECTION CRITERIA**: High IF Journals, relevance for CNR research

Inside CNR.IT ...

URBANIZATION

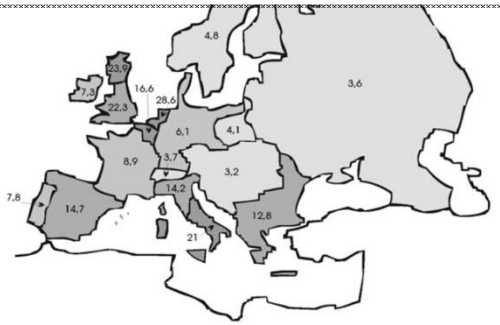
Towards a modern view of city: processes of urbanization in Europe 1700-1870

The 19th century marks the passage of Europe from a civilization based on agriculture and the countryside to a civilization based on industry, services and cities. Urbanisation is one of the main changes taking

and product and the rising share of industry and services, implied the relative decline of agriculture and countryside within both the economy and society.
The period analysed in the chapter

From stability to growth and from inequality towards convergence: thus we could succinctly recall the main changes in 18th and 19th century European urbanisation. In 1800, the geography and the levels of European urbanisation were still similar to those of the late Middle Ages, the main changes being the rise of England and Scotland and the spread from Flanders towards the Netherlands in the early modern age. Inequality between North and South had diminished for this very reason. In 1870, by contrast, both the level and geography of urbanisation were significantly different. Rise in urbanisation had occurred within the great transformations of the European econ-

220 scientific articles published in 2009-2010 on major journals



European Urbanisation in 1800.

DEMOGRAPHY

Size, characteristics and prospects of EU minors in Italy

C. Bonifazi, "Dimensioni, caratteristiche e prospettive dei minori comunitari in Italia", *Minorigiustizia*, 2 (2010), pp. 28-32.

Scientific "GLAMs" from CNR Press Office

The increase in foreign mi
one of the most important
opments of foreign immi
in Italy. This increase is the
of the stabilisation of ma
migrant communities and
elled by family reunions
births by foreign couples. F
minors were 126,000 in 1997 and had become 862,000 by the beginning of 2009. The increase of foreigners born, or who have grown

statistical data offers a scant picture of the situation. As a matter of fact, the enlargement of the EU has brought about a huge and

students enrolled in Italian schools. In the school year 2002-2003, only 6,000 students came from one of the countries of the EU-15 (2.5% of the total). After only five years, the number of EU-27 students arrived at 124,000, one fifth of all Italian students. A growth of 21 times in a very short time period. The growth in EU immigration is another important change in the Italian immigration scenario. It has been driven by the enlargement of the EU and has completely modified the legal status of a large part of the foreign population. In light of these changes, it should be a requirement to update our statistical tools, analysis, interpretations and policies towards foreign immigration.

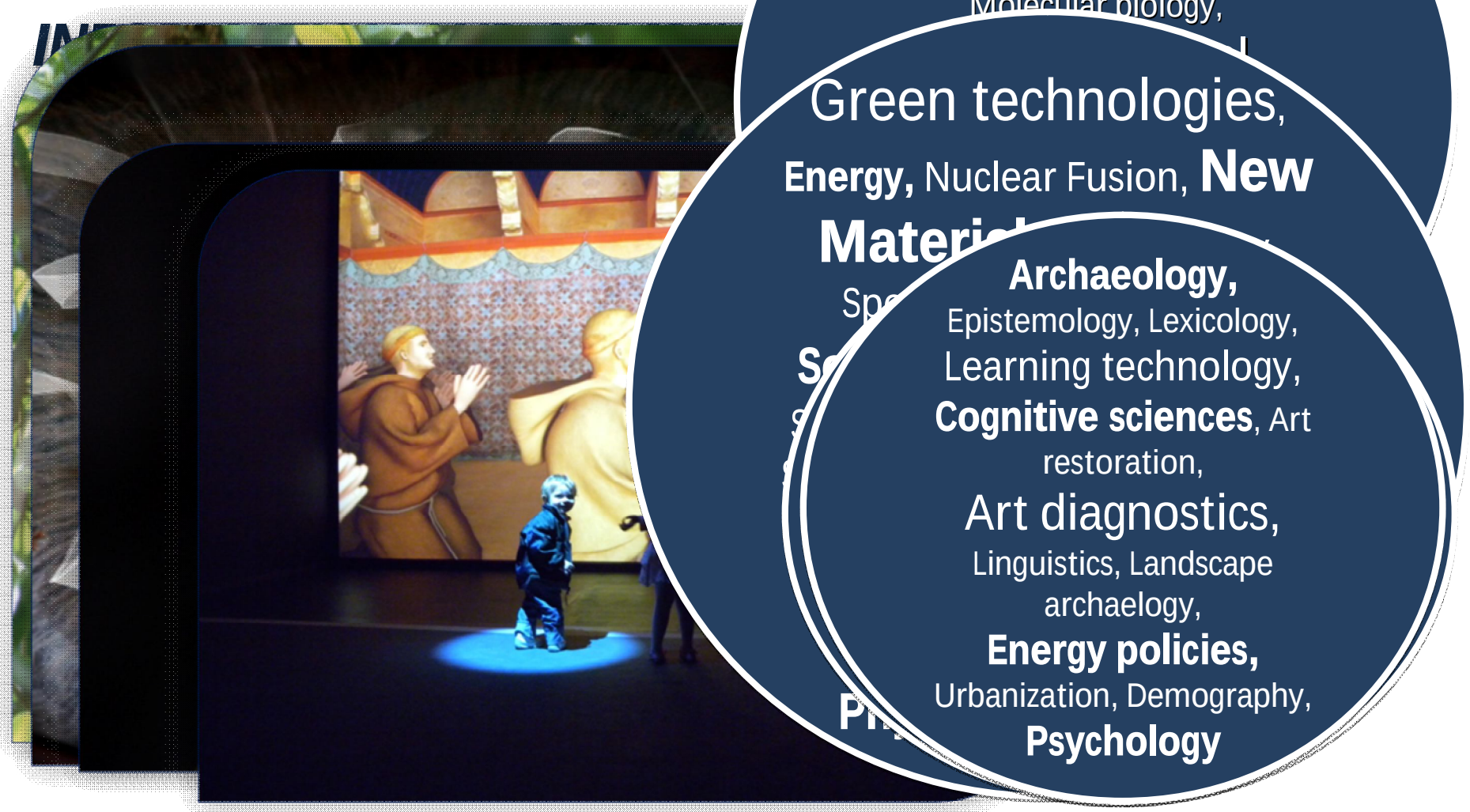
ETRUSCAN STUDIES

Uncovering the secrets of the etruscan language

The new edition of the Etruscan Language Thesaurus, edited by Enrico Benelli, researcher at the Institute for the Study of Ancient Mediterranean Civilisations (Iscima) of CNR, is enhanced with five thousand new entries in addition to the original eight thousand entries of the first edition from 1978, published by Massimo Pallottino, the father of Italian Etruscan Studies. The new acquisitions are owed to the intensification but, since the 1970's, the increase of the territorial extension of the studies as well, mostly concentrated in Southern Etruria, full of accounts from the VII through the IV centuries B.C.: especially personal names and terms drawn from the funerary and sacred lexicon. It was also possible to loosen several crucial points in the identification of verbs, adjectives, and other grammatical elements and defining the pronunciation.

4 TEMATIC SECTIONS

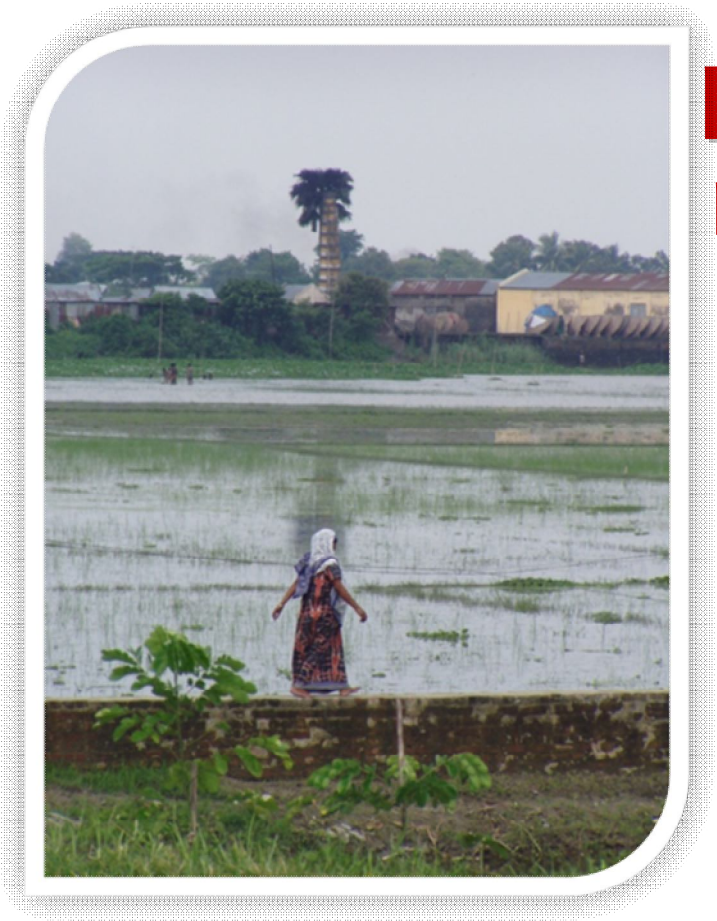
- ***LIFE AND ENVIRONMENT***
- ***ENERGY AND MATTER***
- ***IN***
-



Alberto Figoli

ITM - CNR

Roma | 27 luglio 2011



Influence of operating parameters on the Arsenic removal by Nanofiltration

Figoli et al., Water Research 44 (2010) 97-104

Alberto Figoli*, Alfredo Cassano, Alessandra Criscuoli, Enrico Drioli

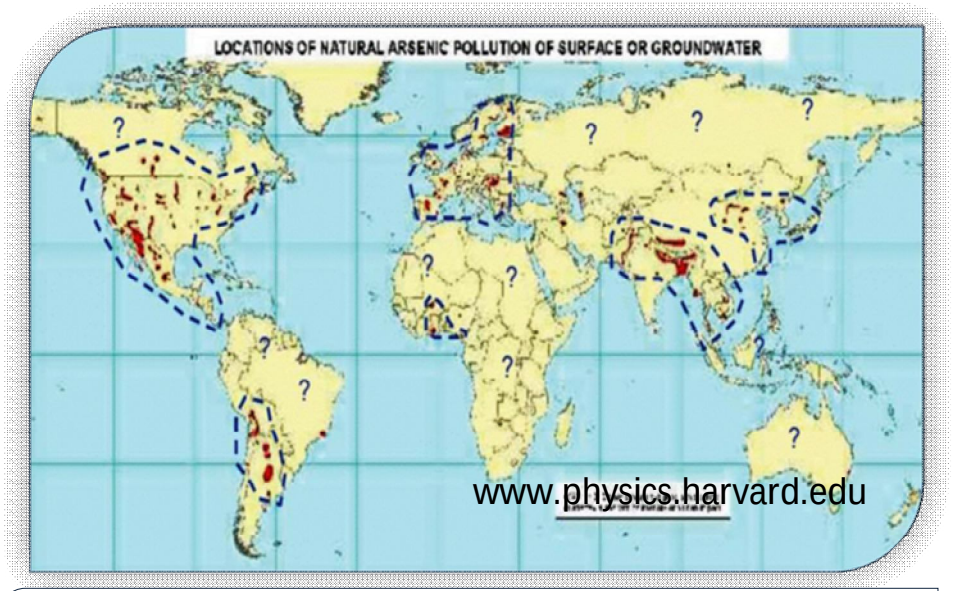
*Institute on Membrane Technology (ITM-CNR), Rende (CS), *a.figoli@itm.cnr.it*

This work was carried out within the Asia Pro Eco Program ‘‘Technology partnership for innovative treatment of drinking and industrial water’’ (INNOWA) (BD Asia Pro Eco/07/96638) supported by the European Commission in the 6th Framework Programme. (*websites: www.innowa.org ; www.itm.cnr.it*)

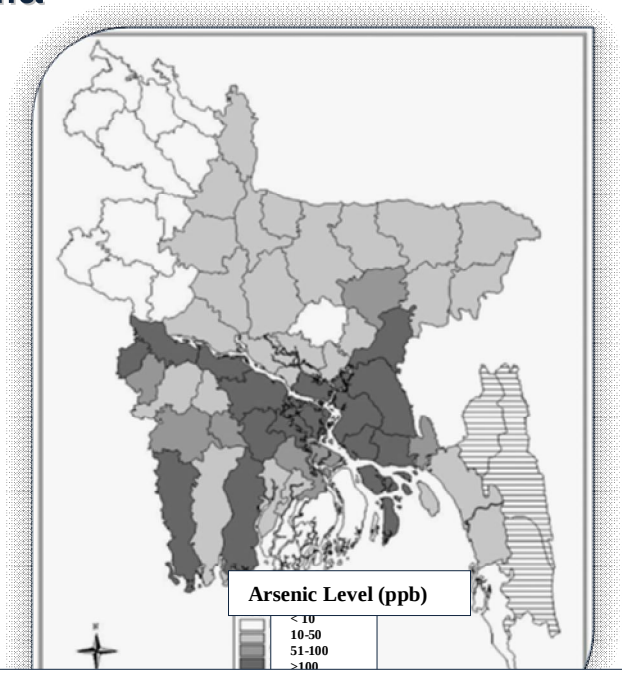
Arsenic contamination in the water

- Dangerous arsenic concentrations in natural waters is a worldwide problem and often referred to as a 20th–21st century calamity.

- High Arsenic contaminations of surface and groundwater is reported in a large number of Countries (Bangladesh, Chile, Argentina, USA, New Zealand, Canada, Poland, Hungary and also Italy). However, the largest population at risk is in Bangladesh followed by West Bengal in India

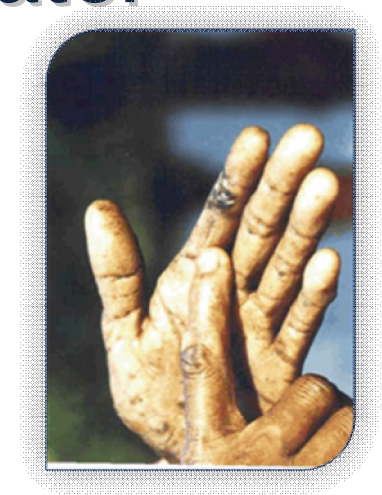


Worldwide map of As contamination of surface and groundwater



Bangladesh map of As contamination of groundwater

Arsenic contamination in the water



- **Health Effects**

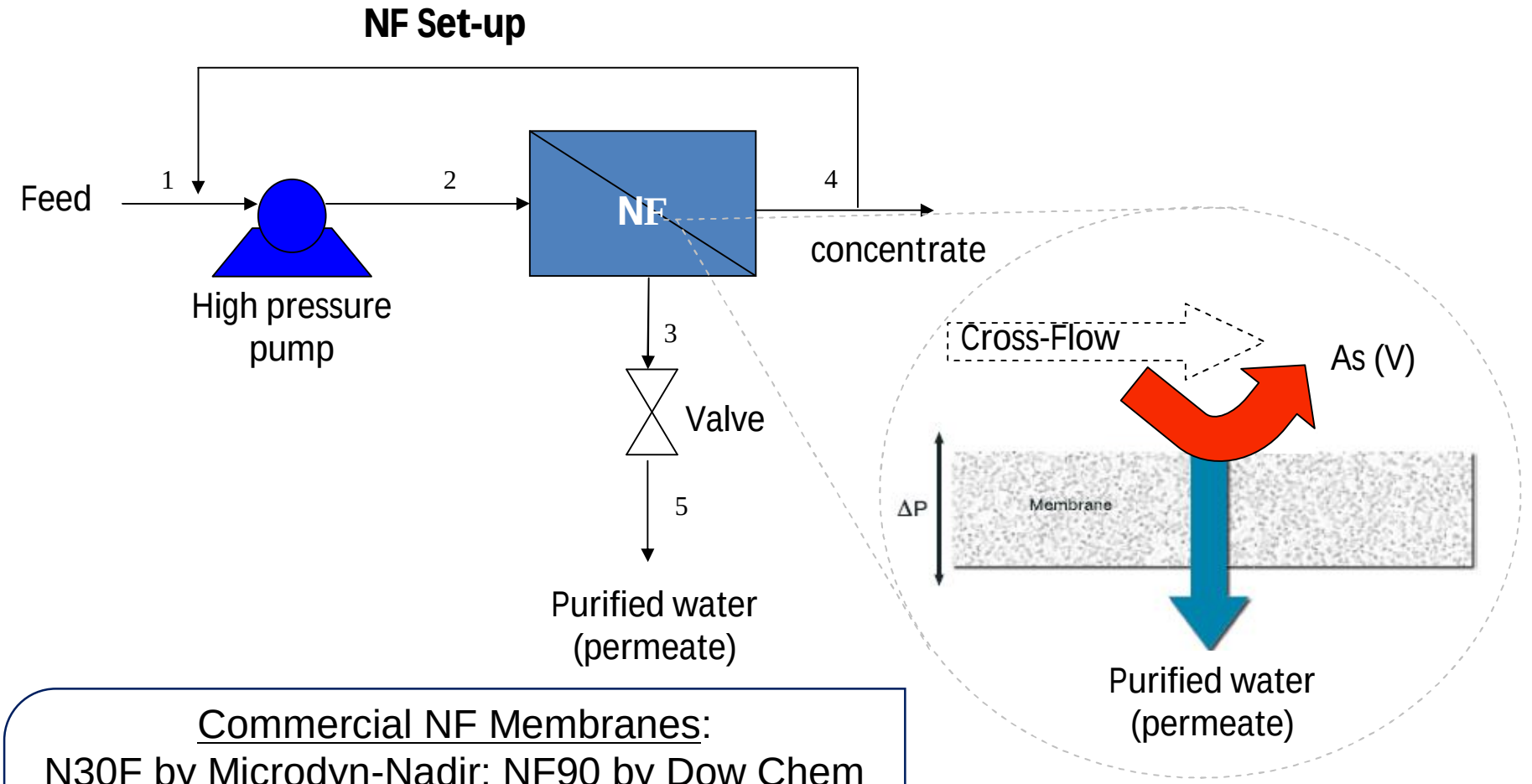
Long term exposition to inorganic arsenic may cause a wide range of health effects including: skin lesions such as pigmentation changes, form of gangrene, circulatory disorders and diabetes. It is carcinogen increasing the risk of skin cancer and tumors of the bladder, kidney, liver and lungs.

Consequently, authorities have taken a more stringent attitude to arsenic (As) in the environment. World Health Organization (WHO) and US Environmental Protection Agency (USEPA) guidelines fixed the new standard limit for arsenic in drinking water to **10 ppb.**

- **Chemistry of Arsenic**

In nature arsenic occurs in several chemical forms and oxidation states. The two states prevalent in water environment are **trivalent (As (III)) and pentav** $HAsO_4^{2-}$ **(As(V)).** At neutral pH, the predominant species for As(V) are H_2AsO_4 and which means that As(V) exists as an anion at a typical pH in natural water (pH 5–8), whereas in this range of pH As(III) is mainly present as uncharged species (H3AsO3) and, therefore, is less efficiently rejected.

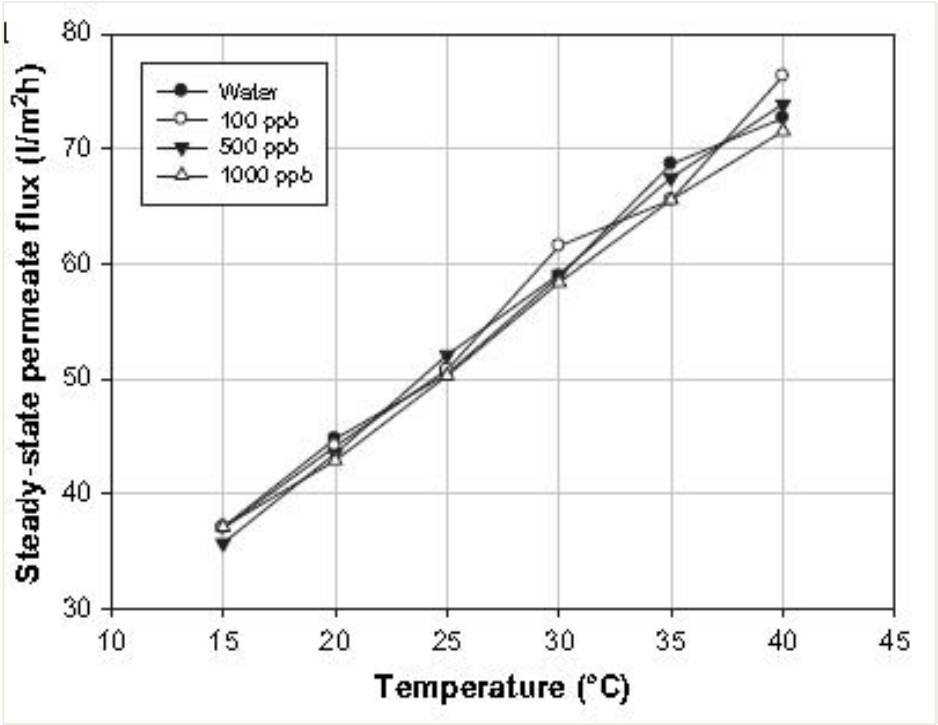
Experimental Section

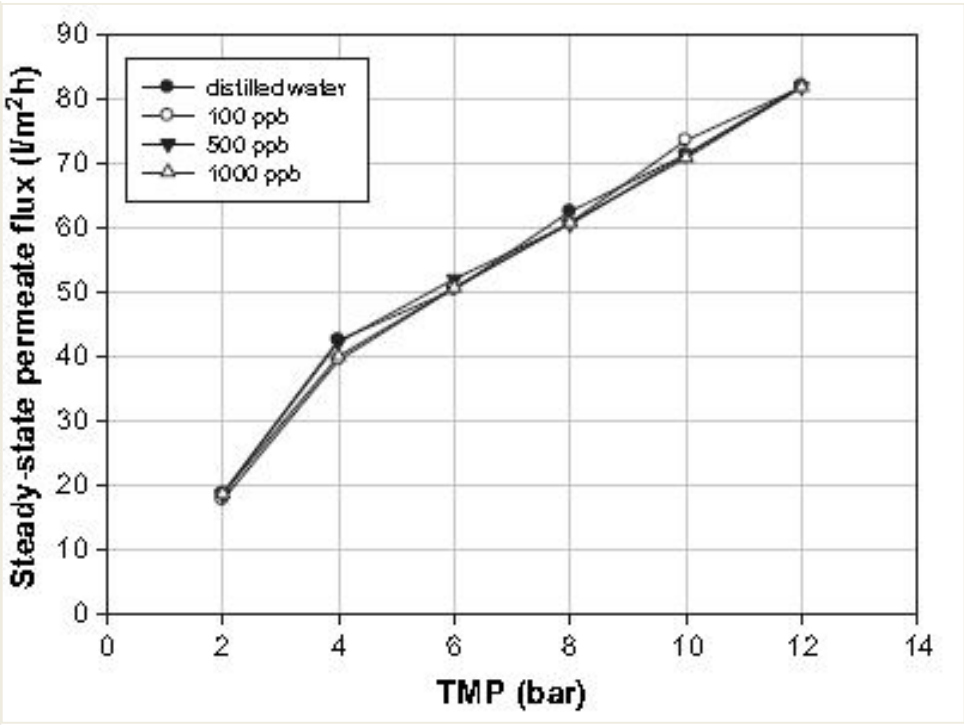


Commercial NF Membranes:
N30F by Microdyn-Nadir; NF90 by Dow Chem
Operating Conditions:
pH= 3, 6, 8, 10
Δ Pressure (TMP)=2-12 bar
As (V) in feed=100, 500, 1000 ppb

$R(\%) = [1- (c_p/c_f)] \times 100$

Water Permeate Flux

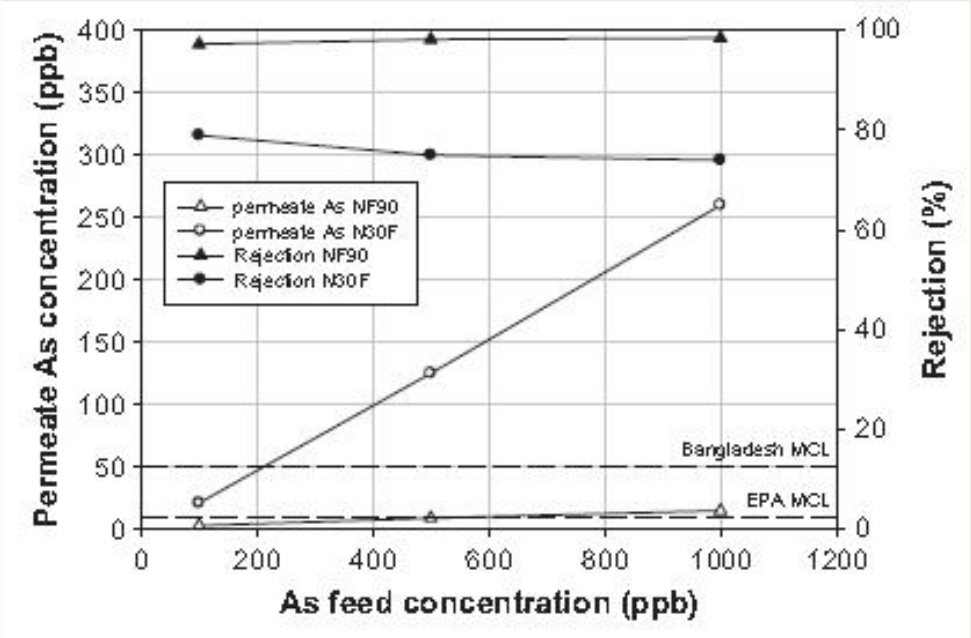




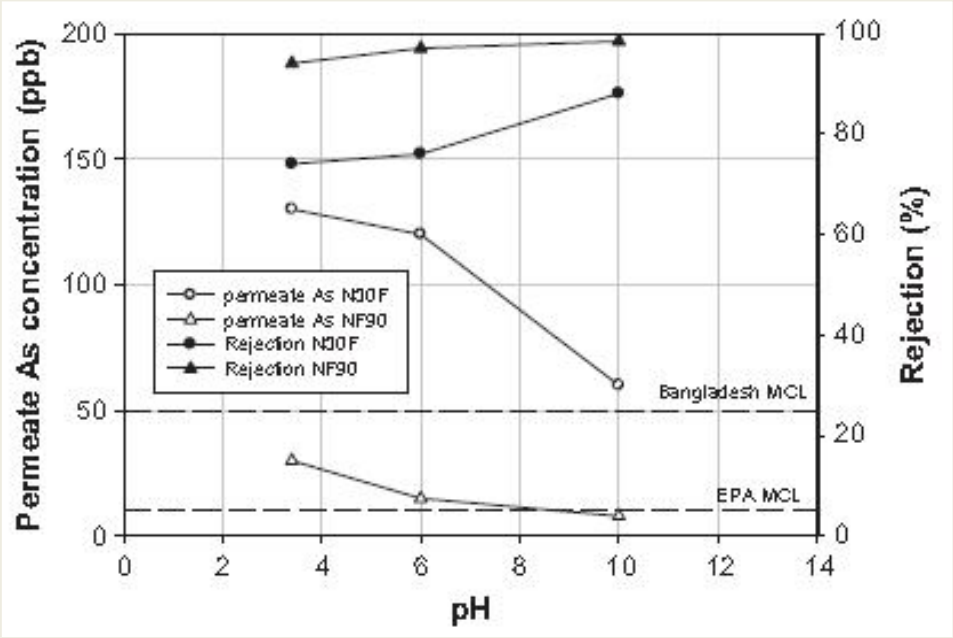
Effect of operating T on permeate flux at different As concentrations (TMP=6 bar, pH=8).

Effect of TMP on permeate flux at different As concentrations (T=25^{o}C, pH=8).

As Rejection(%) *vs* As concentration and pH feed



Effect of **As feed concentration** on the removal of As(V)
(T=25ºC, pH=8, TMP=6 bar)



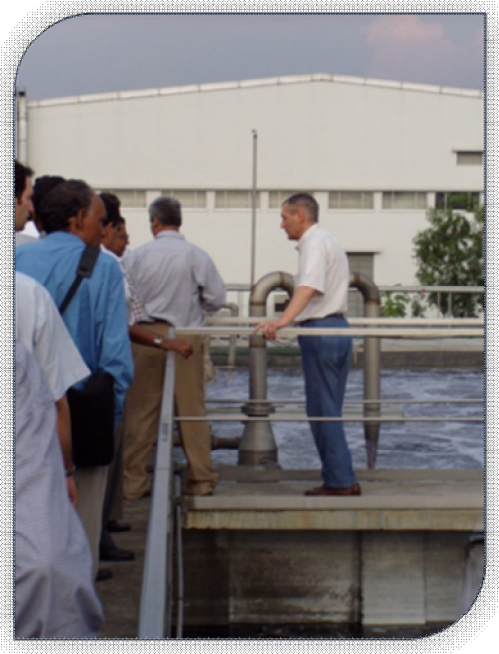
Effect of the **pH** on the removal of As(V)
(feed Conc. = 500 ppb, T= 25C,TMP=6 bar.

Conclusions

- As a common trend, an increase of pH and a decrease of operating temperature and As feed concentration determined a higher efficiency of As removal for both membranes, whereas the TMP slightly affected the As rejection of the N30F membrane (it reduced at higher TMP). In both cases, the permeate flux increased with temperature and pressure and it had a maximum value at a pH of about 8.

Conclusions

- Nanofiltration can be considered a viable approach to remove As(V) from contaminated water. However, the As feed concentration has to be strongly considered in order to produce a permeate stream containing an As concentration within the allowed limits.



Mario Pagliaro
ISMN - CNR

Roma | 27 luglio 2011

Solar hydrogen: Fuel of the near future

Energy Environ. Sci., *2010*, ***3***, *279-287*

- Solar H_2 is the fuel of the future because it solves the intermittency of supply of free solar energy, meeting the key requirement of today's global society
- **the continuous flows of energy.**

- **Solar H_2** is the fuel of the future because it does so meeting two requirements of tomorrow's society:
- It will stop **greenhouse emissions**
- Solar energy is abundant (it exceeds 5,000 times current world's energy demand) and is free and evenly distributed (yearly sun radiation is 900 in the UK and 1500 in Sicily)

The first hydrogen 1 km pipeline in the world located in Arezzo delivers pure H_2 at 3.5 bar to the fuel cells installed in 4 goldsmith companies

Mario Pagliaro
Istituto per lo Studio dei Materiali Nanostrutturati (Palermo)
www.i-sem.net

Solar H_2: Sun radiation is employed to split water using two main technologies

1. Water electrolysis using a photovoltaic current over a Pt catalyst:

$$H_2O + 2F \rightarrow H_2 + \tfrac{1}{2}O_2$$

2. Thermochemical water splitting over a metal oxide catalyst:

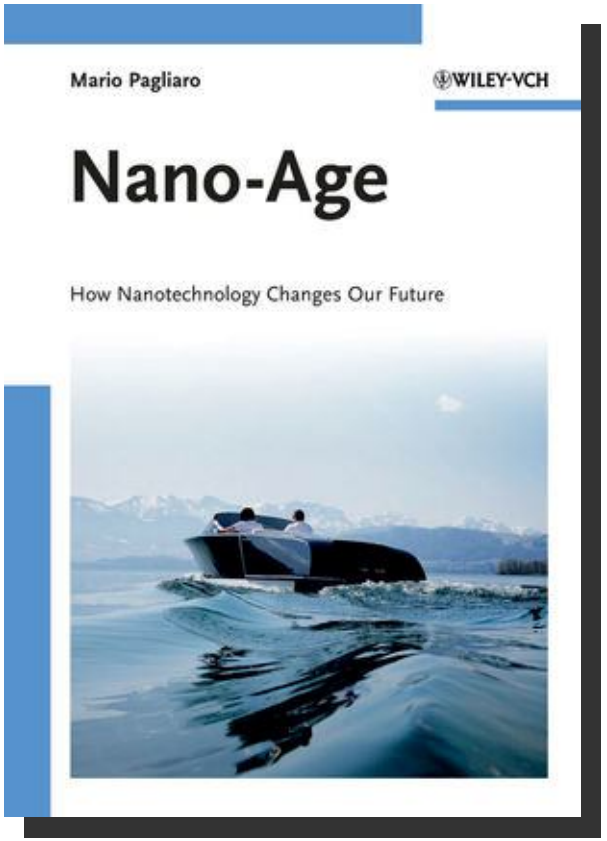
$$MO_{x-1} + H_2O \rightarrow MO_x + H_2$$ exothermic

$$MO_{ox} \rightarrow \tfrac{1}{2}O_2$$ endothermic

Both technologies are becoming feasible on massive scale thanks to advances in nanochemistry

- Nanochemistry, namely chemistry-enabled nanotechnology.

- An approach that is finally delivering after two decades of unfulfilled nano-promises



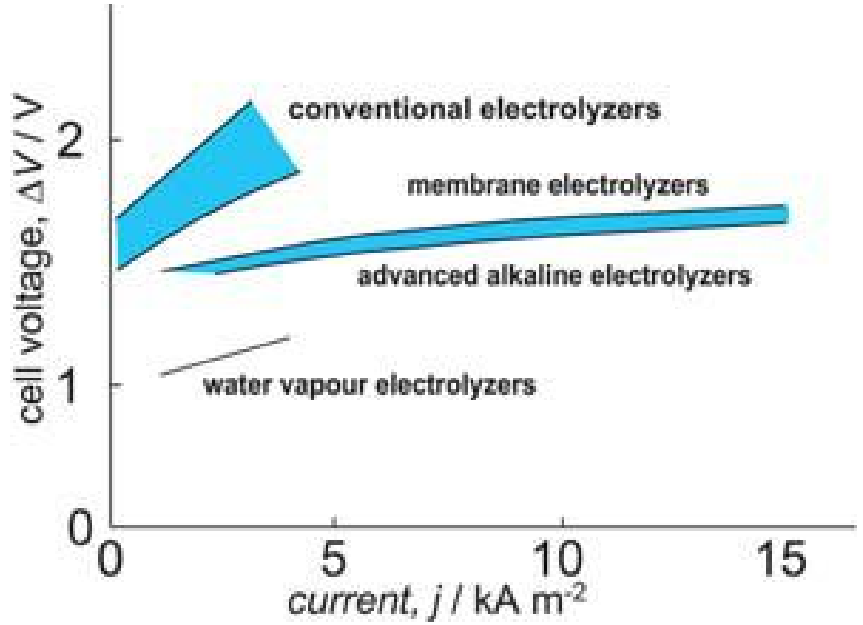
What do we do with the massive amounts of solar hydrogen?

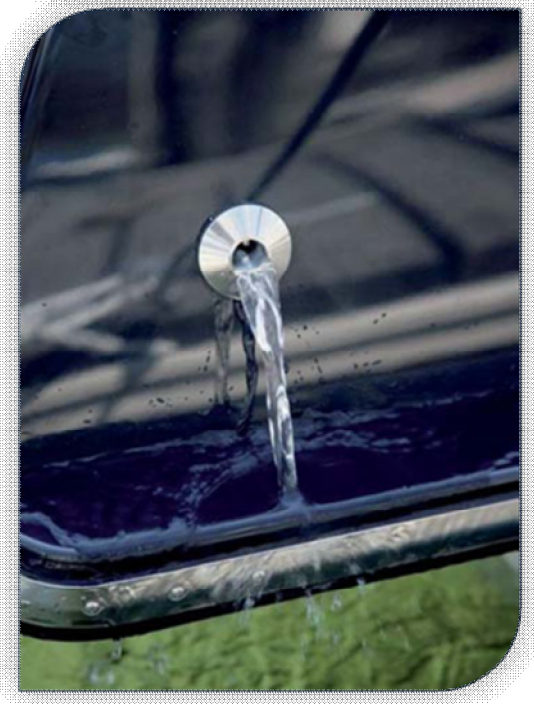
First in the world to operate on such a scale, the 12 MW combined cycle plant in Venice's industrial zone of Porto Marghera fuelled by hydrogen by-products from local petrochemical industries.

PV-induced electrolysis over low amounts of nanostructured Pt catalyst

Table 1 Experimental parameters in alkaline electrolysis. (Reproduced from ref. 7).

$H_2O \rightarrow H_2 + \frac{1}{2}O_2$
Electrolyte: 25–30% KOH
$\Delta V = 1.65$–2.00 V, $j = 1$–10 kA m^{-2}
Energy consumption: 4–4.9 kW h m^{-3}
Current yield: 98–99.9%
H_2 purity: >99.8%





Multifunctional Silia*Cat*Pt catalysts, *for instance*

The CNR has 108 Institutes in Italy. *Why no Solar Energy Institute@CNR?*

- Italy ranks #3 in the world for installed PV power
- Italy ranks #2 in the European solar thermal market
- Germany -- – solar energy world's leading country -- operates its Solar Energy Institute at Fraunhofer Society since 1981

- Despite remarkbale advances research on solar energy in Italy is fragmented and education -- with the le remarkable exception of Lazio's PV and Sicily's PV Pole -- is simply non existent

- *Clearly, time has come to establish a Solar Energy Institute at Italy's CNR*

Team

Giovanni Palmisano

Rosaria Ciriminna

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IFN - CNR

Roma | 27 luglio 2011

Rosetta spacecraft encountered Asteroid (2867) Steins

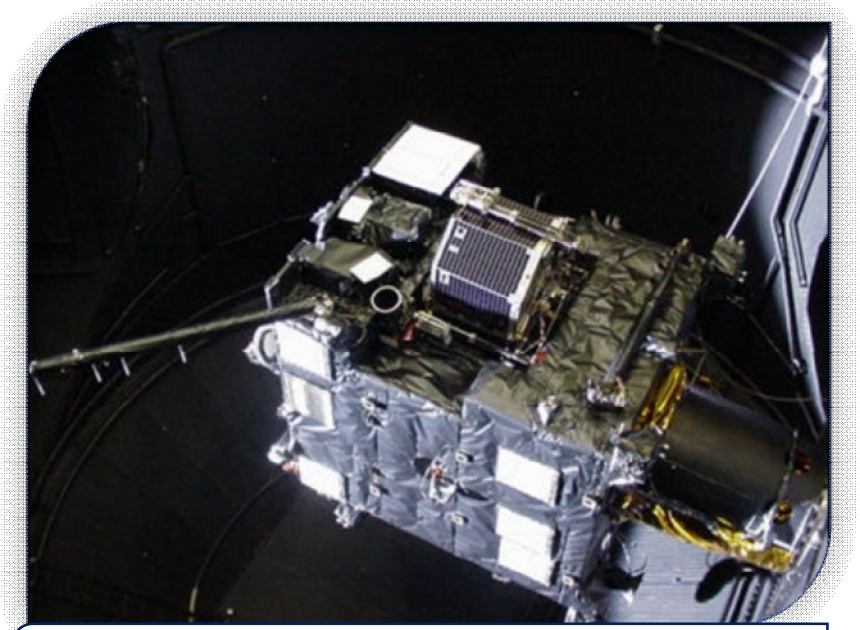
Science 8 January 2010:
Vol. 327 no. 5962 pp. 190-193

V. Da Deppo, G. Naletto
CNR-IFN Institute for Photonics and Nanotechnologies – UOS Padova
LUXOR

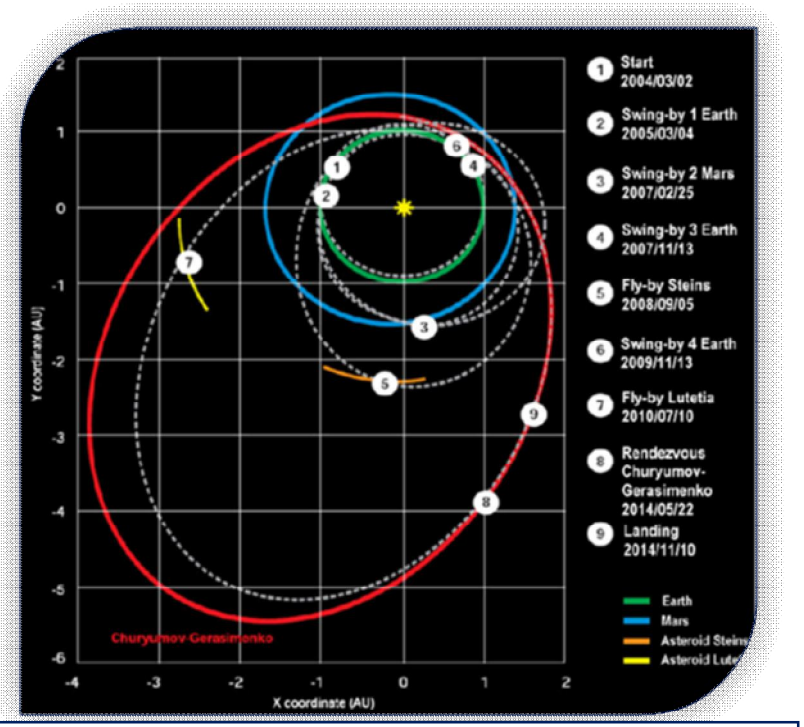
MPS Max Planck Institute for Solar System Research, Katlenburg-Lindau
H. U. Keller, et al.
IDA Institute fur Datentechnik und communikationsnetze GERMANY
LAM Laboratoire d'Astrophysique de Marseille, Marseille, FRANCE P. Lamy, et al.
RSSD Research and Scientific Support Department
European Space Agency
CISAS Centro Interdipartimentale per gli Studi e le Attività Spaziali - Università di Padova
C. Barbieri, et al.
IAA Instituto de Astrofísica de Andalucía
INTA Instituto Nacional de Técnica Aérospacial
UPM Universidad Politecnica de Madrid SPAIN R. Rodrigo, et al.

The ESA Rosetta Mission

- The main aim of the Rosetta mission is to study in detail a comet: the 67P/Churymov-Gerasimenko.
- The rendez-vous with the comet will be in 2014.



Rosetta in the thermal vacuum chamber at ESA/ESTEC (Noordwijk – NL)



Rosetta spacecraft interplanetary orbit

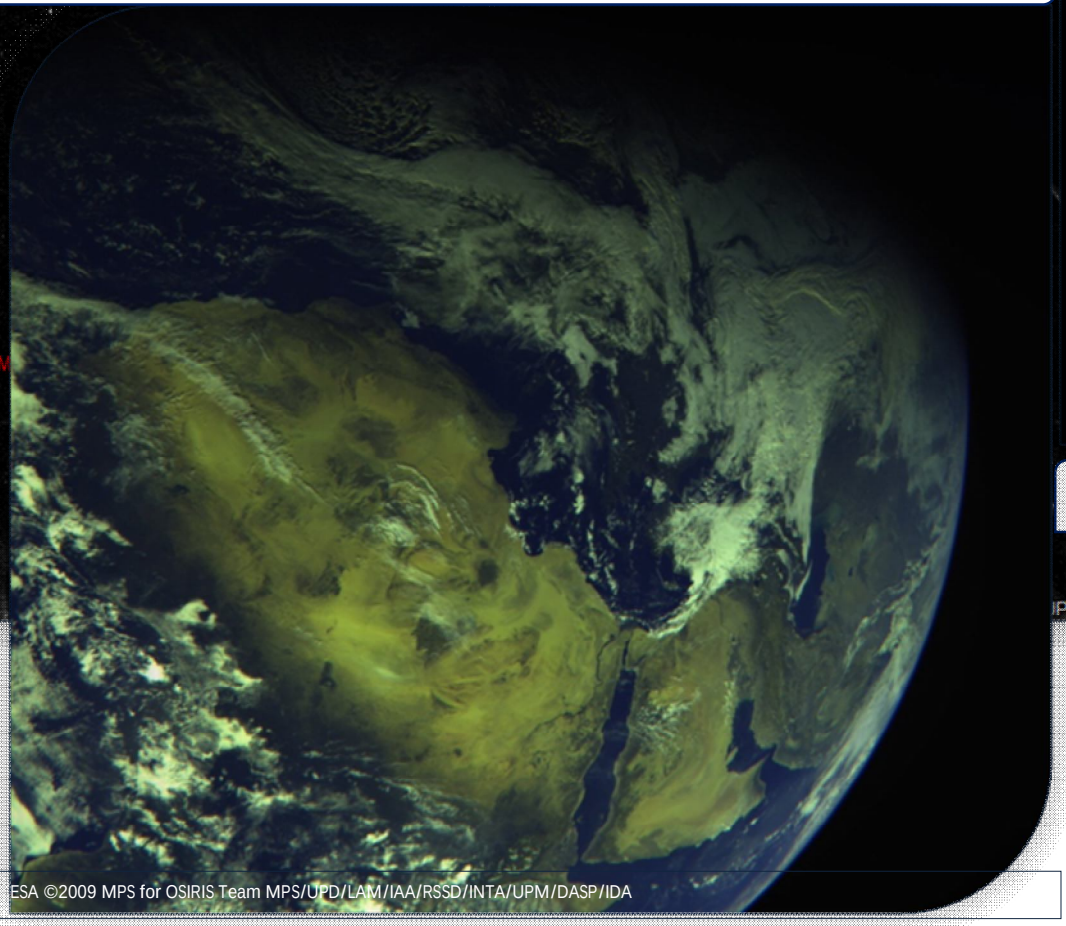
- Rosetta was launched in 2004.
- The spacecraft experienced many swing-bys in order to gain enough energy to reach the comet orbit.

Rosetta fly-bys

- Rosetta passed three times near Earth (2005-2007-2009) and once near Mars (2007).

Earth fly-by 2005: image of the cities of the northern he

Earth fly-by 2009: Europe, North Africa and Saudi Arabia



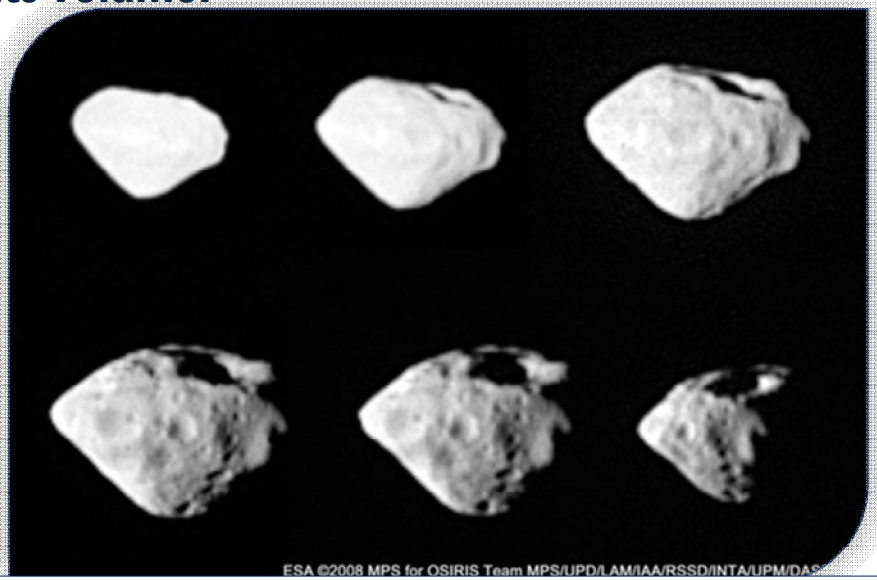
Mars fly-by 2007

During its long interplanetary journey, Rosetta had also the chance to fly-by two main belt asteroids:
- Steins in 2008
- Lutetia in 2010

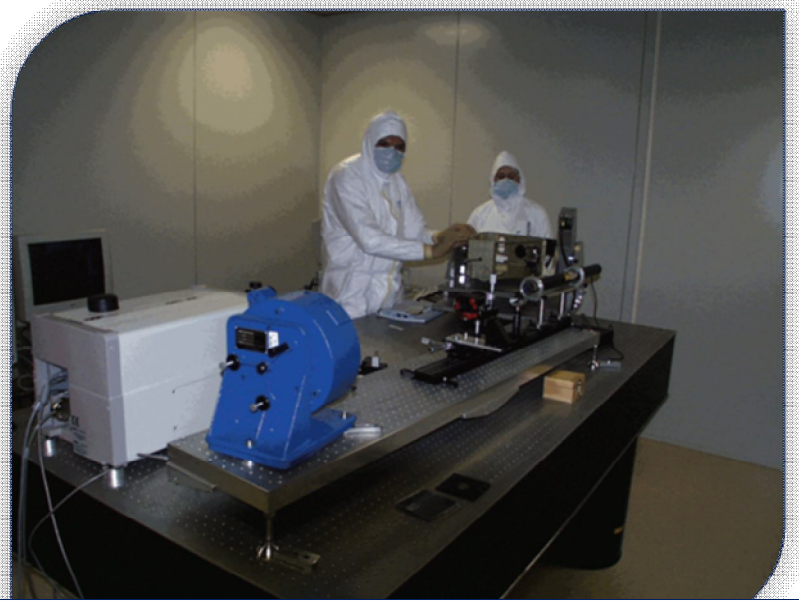
Steins encounter

On September 5th 2008 the spacecraft passed by Steins with a relative velocity of 8.6 km/s and a minimum distance of 803 km.

During the fly-by the OSIRIS (*Optical, Spectroscopic, and Infrared Remote Imaging System*) cameras on board Rosetta acquired hundreds of images which allowed studies of the asteroid morphology and determination of its volume.



Asteroid Steins WAC images taken before, during and just after closest approach.
A large crater is visible near the asteroid south pole, which is oriented upward in the images



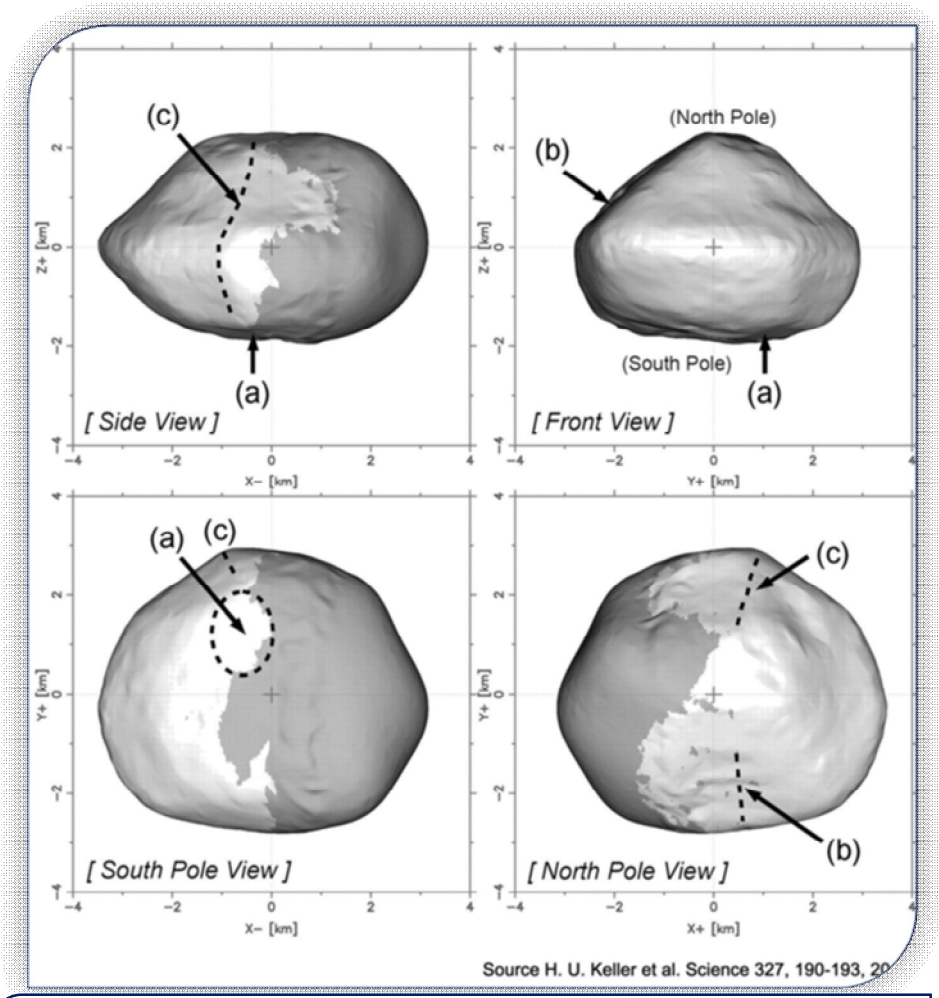
WAC during the integration in CNR-IFN LUXOR laboratory

OSIRIS consists of a *Narrow-Angle Camera* (NAC) and a *Wide-Angle Camera* (WAC), which were realized through the joint work of a European consortium led by the MPS Institute (Lindau-Germany).

Most of the mechanical and optical components of the WAC were designed and built in Italy. The researchers of the CNR-IFN LUXOR Laboratory in Padova have been responsible for its optical design, alignment and calibration.

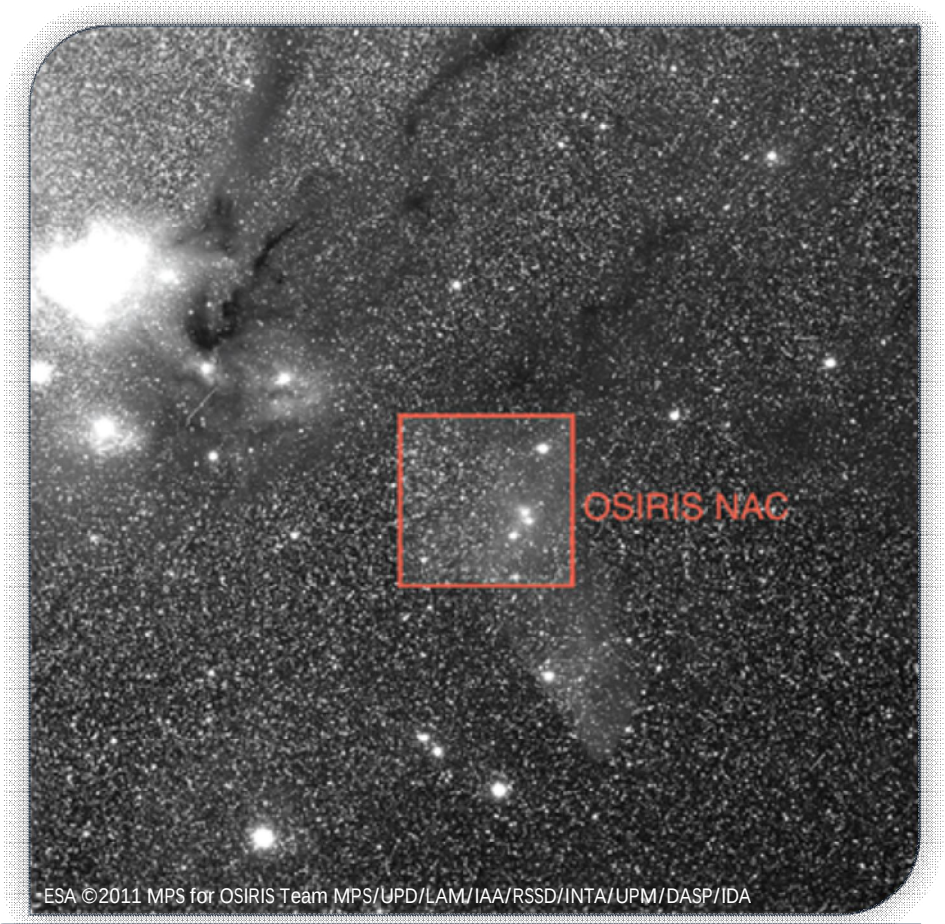
Research Results

OSIRIS images allowed to resolve approximately 60% of Steins's surface. The acquired images yielded important information on the asteroid.
It has been discovered that Steins's morphology is dominated by a large 2.1-km-diameter crater, whose presence provides information about the physical properties of the interior.
The asteroid shape was modeled based on limb positions from 1 NAC and 61 WAC images and the simultaneous inversion of a set of 28 light curves taken from Earth and during approach.
Steins's overall dimensions are $6.67 \times 5.81 \times 4.47$ km^3 and its volume is equivalent to a 2.65-km-radius sphere.



The reconstructed shape of Asteroid Steins is illustrated by two equatorial views (top panels) and two polar views (bottom panels)

Rosetta continues its journey towards the comet



67P/Churymov-Gerasimenko comet seen by OSIRIS just before hibernation

- On June 8th Rosetta was sent into deep-space hibernation.
- The hibernation is a phase during which all instruments and almost all control systems are silent. The deep sleep is made necessary by the spacecraft enormous distance from the Sun and the weakness of the sunlight falling on its solar panels, which cannot produce enough electricity to power the probe fully.
- On January 20th 2014, after 31 months of coasting, the Rosetta spacecraft will be waked up to observe the comet.

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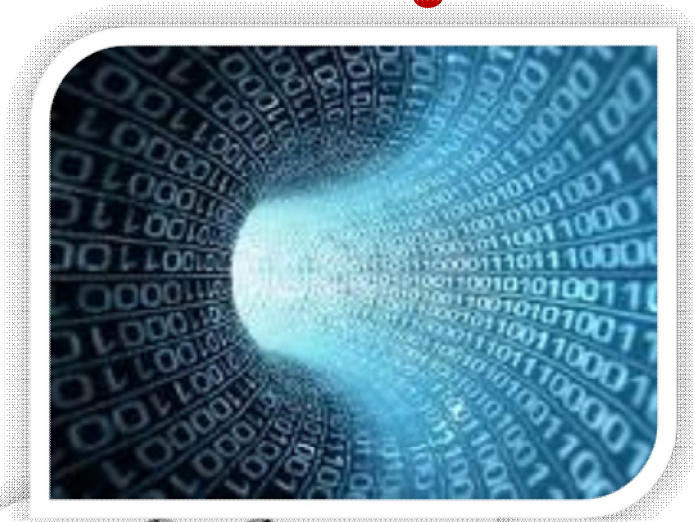
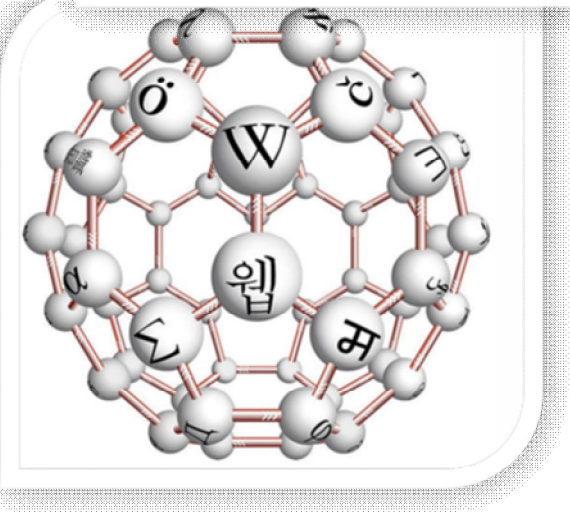
Roma | 27 luglio 2011

An ontology to model e-portfolio and social relationship in Web 2.0 informal learning environments

International Journal of Computers, Communications & Control, ISSN 1841-9836, E-ISSN 1841-9844
Vol. V (2010), No. 4, pp. 578-585





- Web 2.0 environments create new opportunities for informal learning activities
- Semantic Web technologies provide standards and models to promote the evolution from a Web of document to a Web of data
- In "Social Semantic Information Spaces" information is socially created and managed, as well as interconnected and described in a machine understandable format

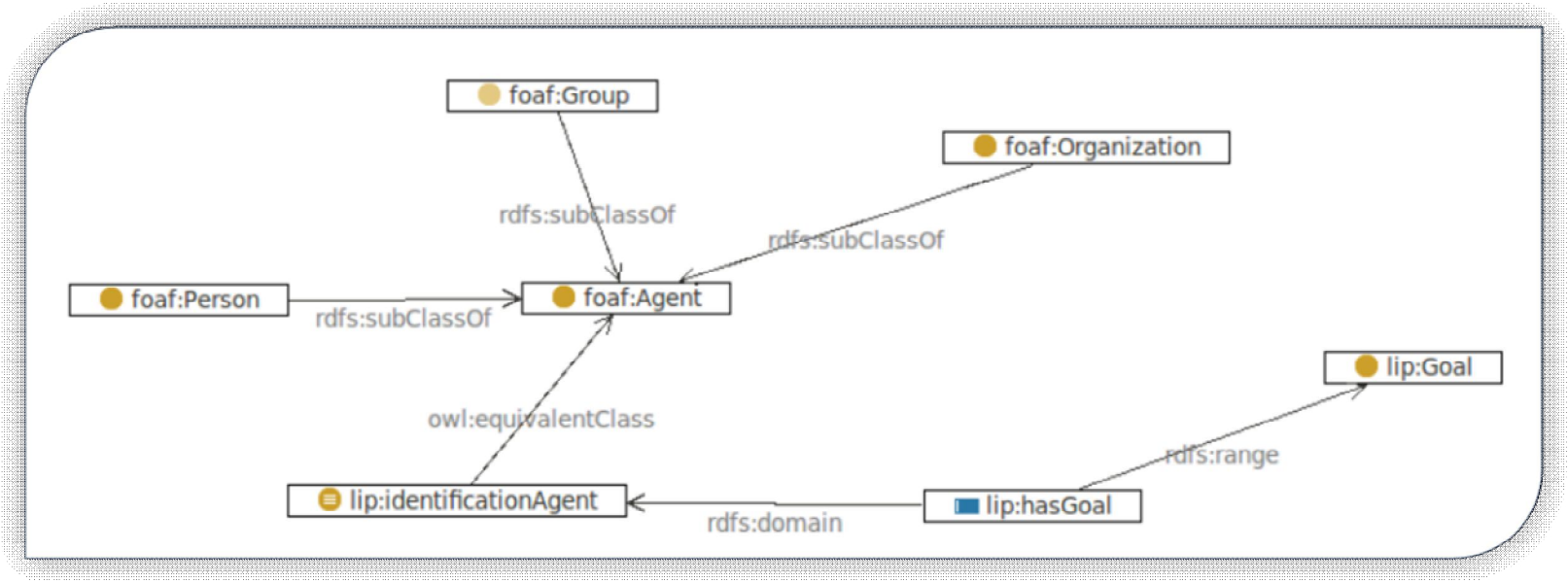
Davide Taibi, Manuel Gentile, Giovanni Fulantelli, Mario Allegra
Istituto per le Tecnologie Didattiche

An ontology to model e-portfolio and social relationship in Web 2.0 informal learning environments

We propose an ontological approach to model:

•Social Network relationships: the results of learning activities are highly influenced by the group in which students participate, as demonstrated by the studies on the impact of positive interdependence on the effectiveness of cooperation.

•Students' e-portfolio: activities in which the student has participated, is participating, or plans to participate; competences and skills of the student; students achievements, whether or not certificated; student's preferences and interests; results of any test or examination.

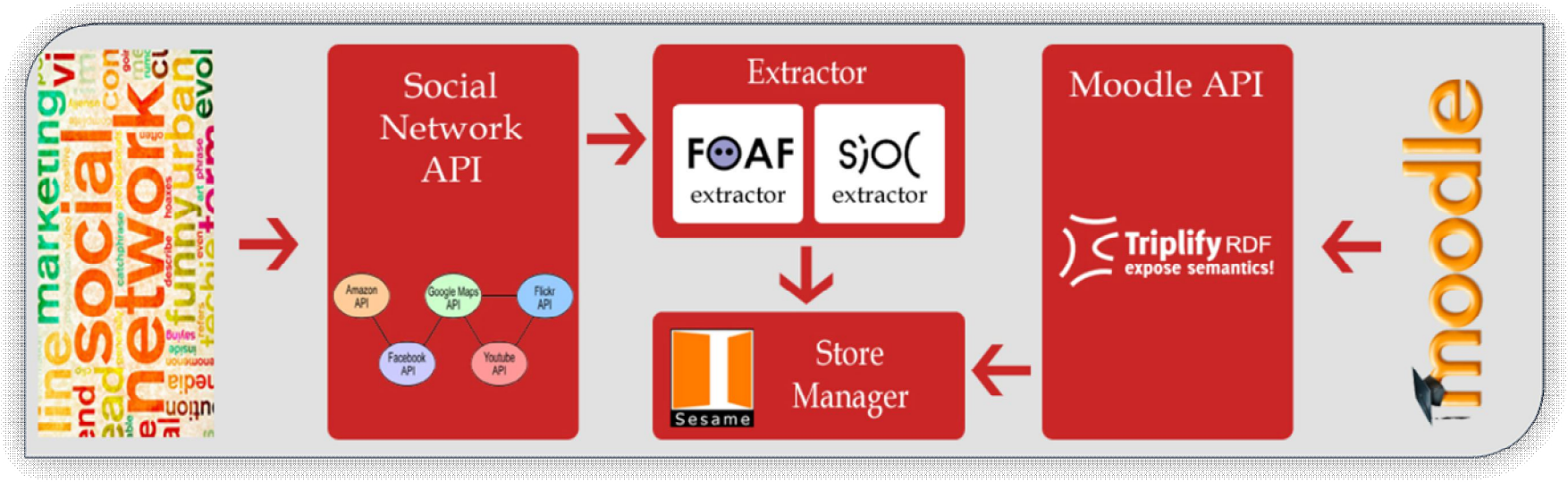


Applications :

•Starting from a student's friendship group, the ontology can be used to extract the friends that have common learning interests and objectives

•Suggesting new friends by selecting the people of the social network with specific competences in their portfolios that can help the student to achieve his learning objectives

•Help students in finding the more suitable courses to attend considering their own competences



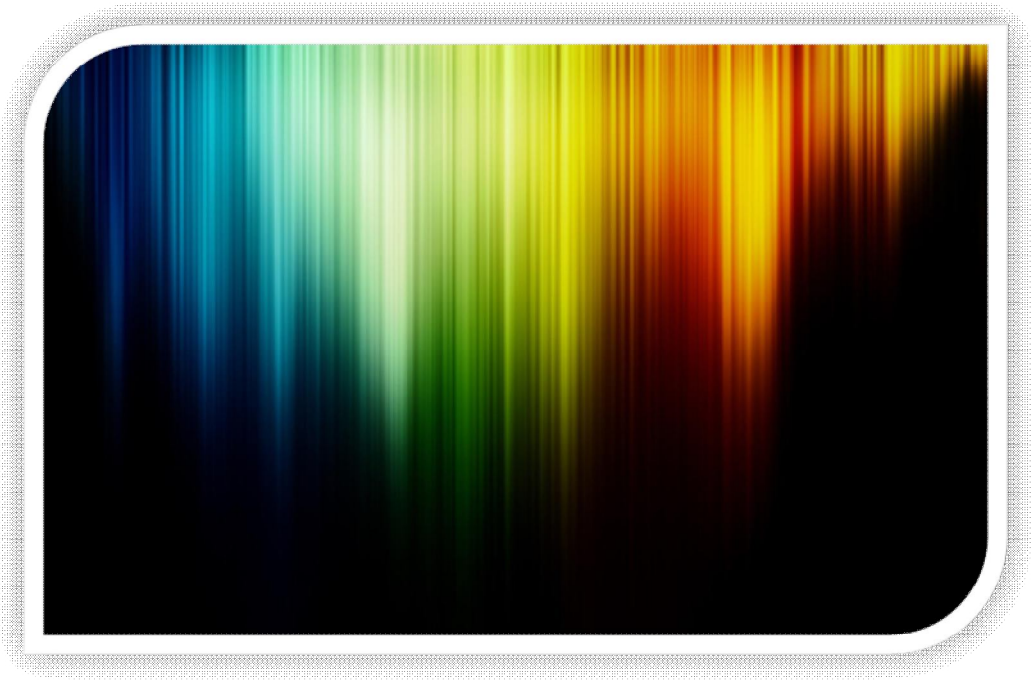
Andrea Puglisi
ISC - CNR

Roma | 27 luglio 2011

Modeling the emergence of universality in color naming patterns

Proc. Natl. Acad. Sci. USA 107, 2403 (2010)

- Complex systems: many interacting simple elements → rich phenomena
- Borrowed from physics to other disciplines: biology, economy, social sciences
- Language dynamics: an emerging approach for modelling communicating systems (cybernetics, human)



A Puglisi, A Baronchelli, T Gong and V Loreto
CNR - Istituto dei Sistemi Complessi
(in collaboration with: Universitat Politecnica de Catalunya Barcelona, Max Planck Institute for Evolutionary Anthropology Leipzig, Dipartimento di Fisica Sapienza Roma, Institute for Scientific Interchange Torino)

Color naming

Problem: linguistic categories without strong natural constraints

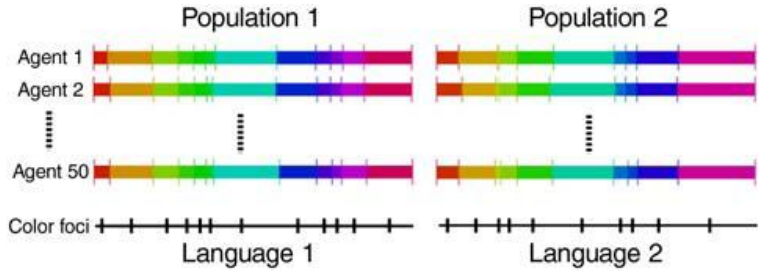
- Example: color names in a language
- Experiments show that color dictionaries across languages are
  - different (number and position of boundaries)
  - similar (weak correlations in position of boundaries)
- A challenge for models: huge resolution ($10^5 \div 10^6$ different hues) vs. tiny number of names ($5 \div 10$)

Solution: language evolves through its use

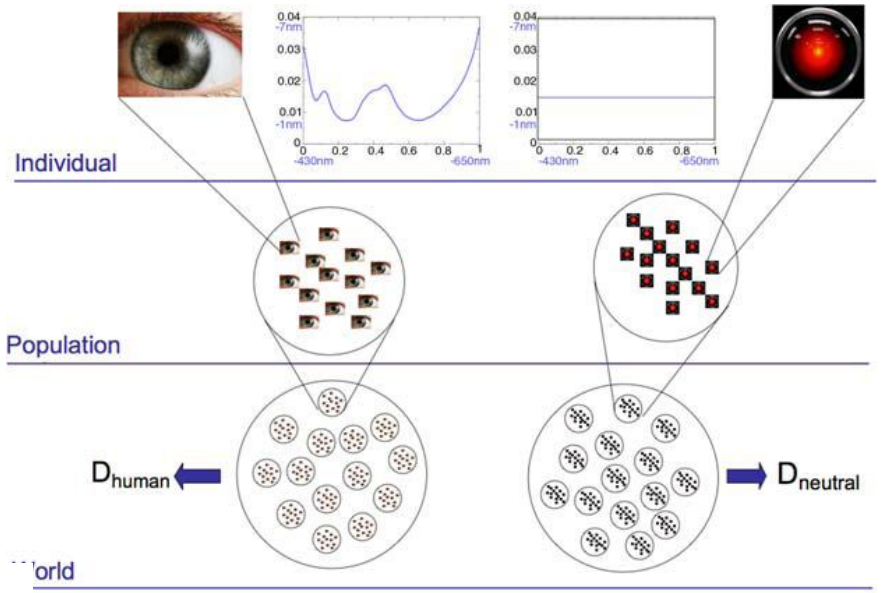
- A model with many interacting agents playing a category game with simple rules
- Computer simulations: start a population from scratch, play many games, reach an asymptotic state with few shared color names

Applications: technology and knowledge

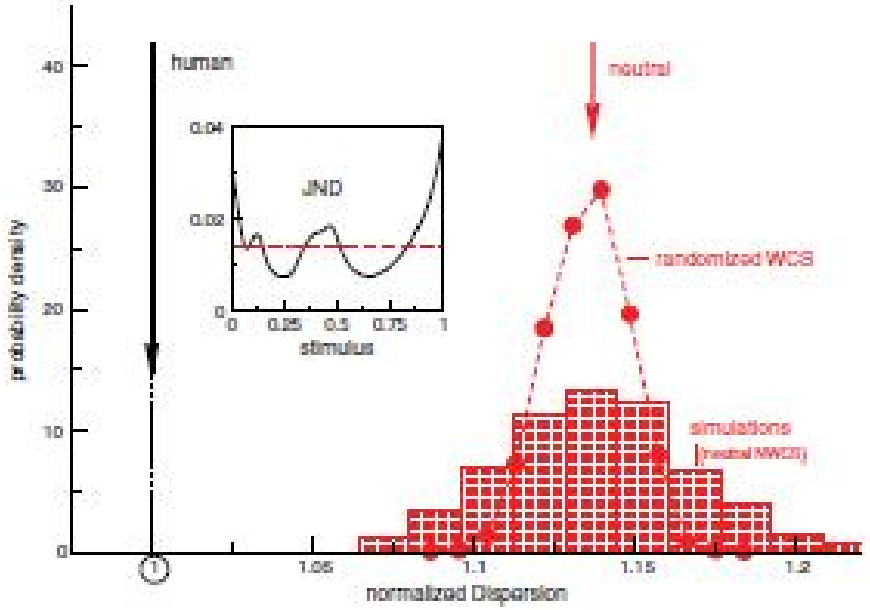
- Systems of robots exploring a new environment
- Offering a possible interpretation of our language evolution
- Comparison with experiments: not only robots, also humans: the World Color Survey (1969 – today)



Simulations outcomes for two populations



The «in-silico» World Color Survey



Comparison of simulation and real experiments: a key ingredient is the Just Noticeable Difference (JND curve)

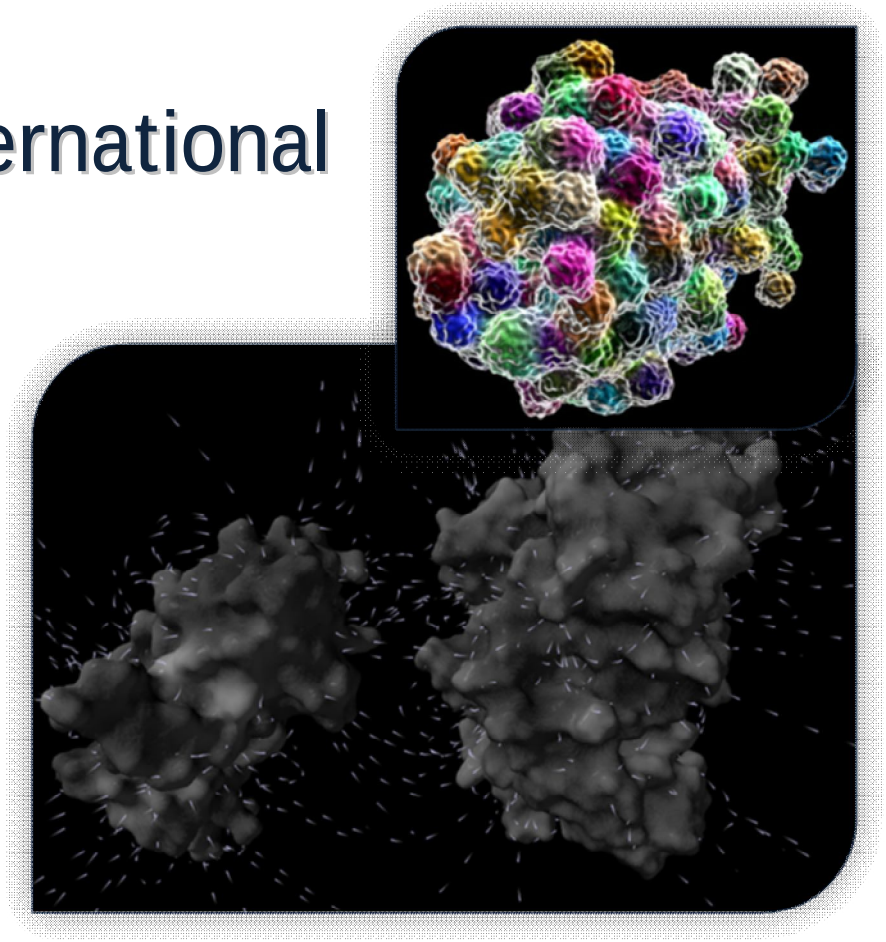
Luciano Maiani

President CNR

Roma | 27 luglio 2011

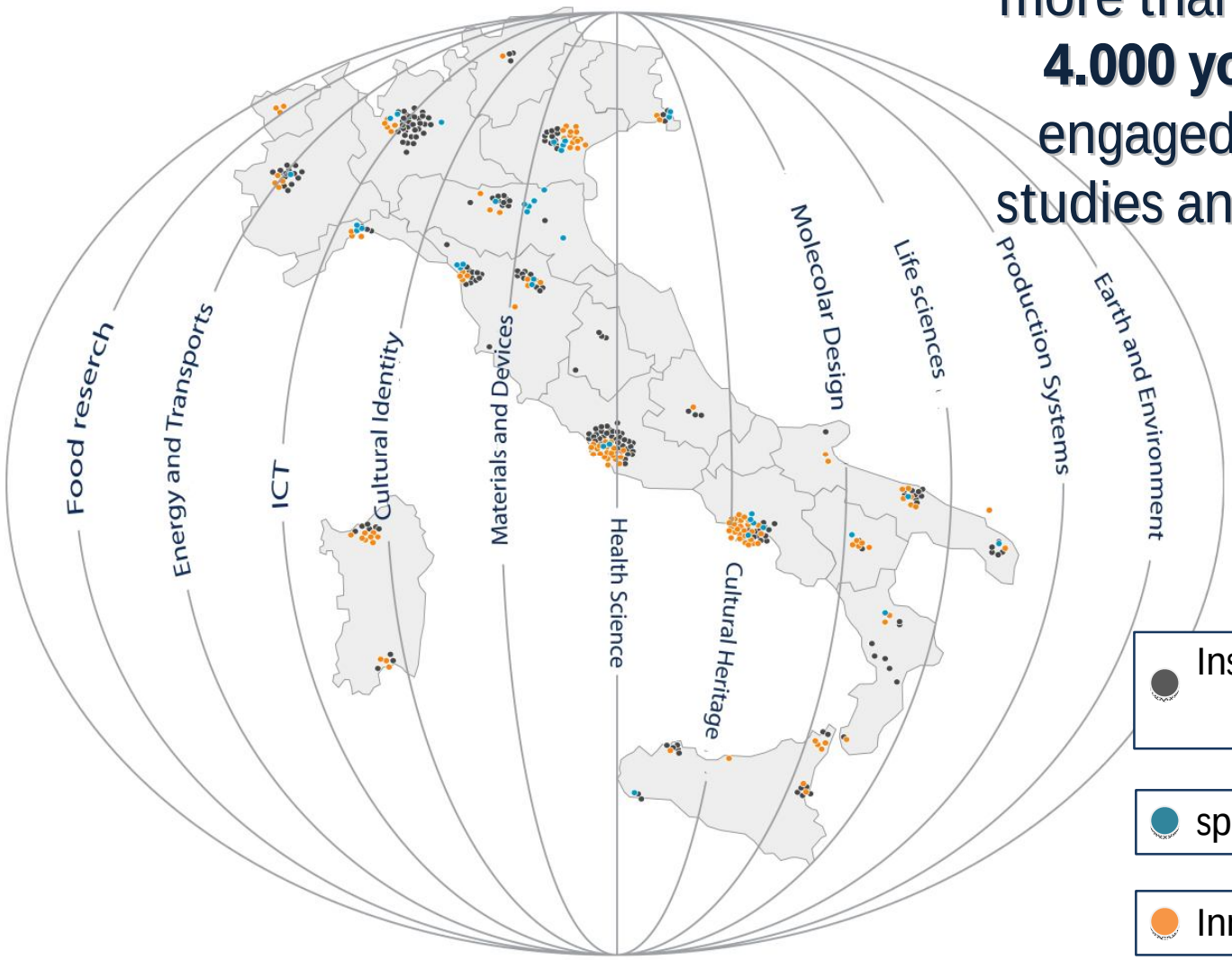
Inside CNR.IT ...

- WHAT IS CNR
- CNR PEOPLE AND FUNDING
- CNR IMPACT ON THE ADVANCEMENT OF SCIENCE
- CNR IN THE WORLD – International activities
- CNR FACILITIES
- CNR STRUCTURE:
  - DEPARTMENTS
  - INSTITUTES



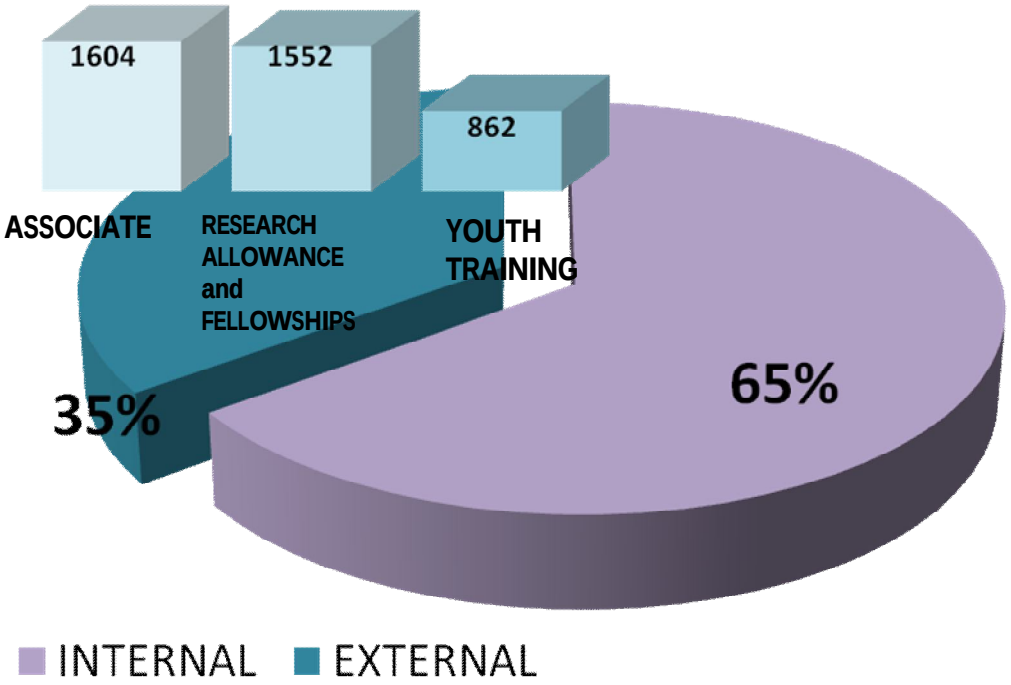
What is CNR?

more than **8.000 employees**
more than half are **researchers**
and **technologists**
more than **1.500 technicians**
4.000 young researchers
engaged in postgraduate
studies and research training

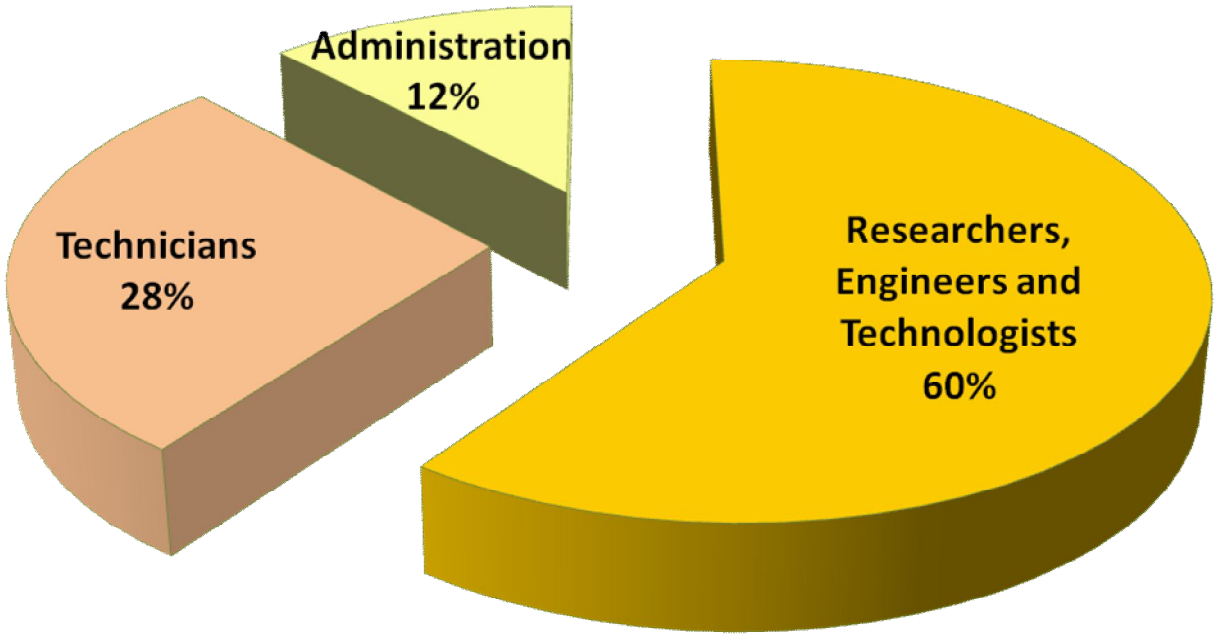


- Institutes and premises
- spin-off companies
- Innovation centers

CNR People



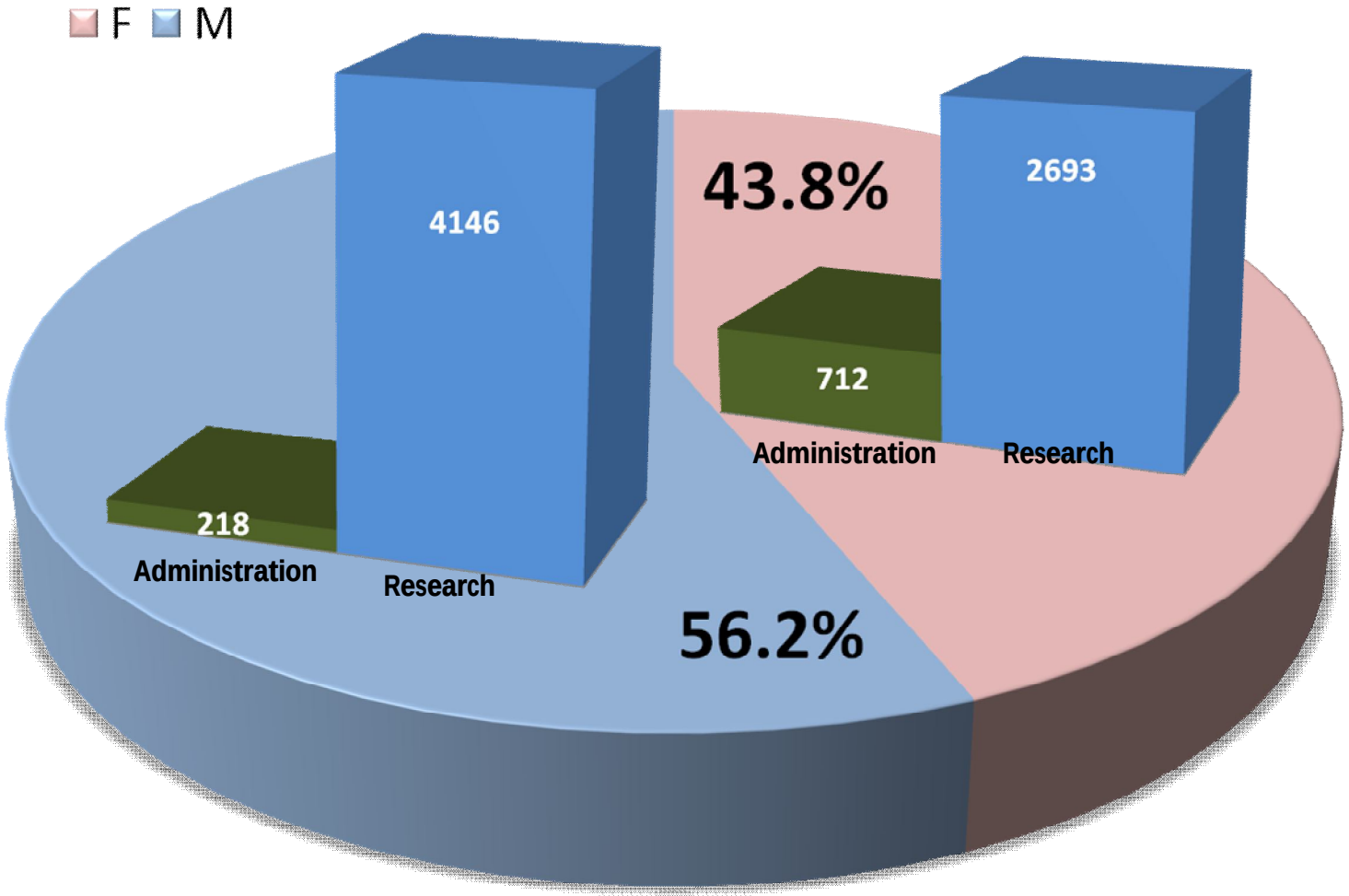
PROFESSIONAL PROFILES



CNR People

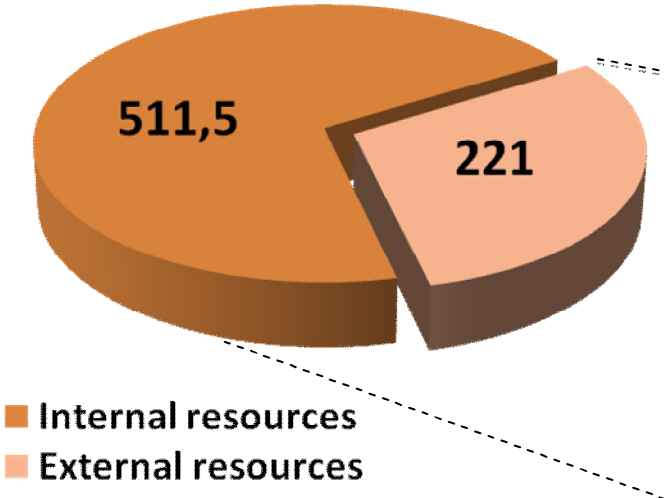
PROFESSIONAL PROFILES AND GENDER

(March 2011)

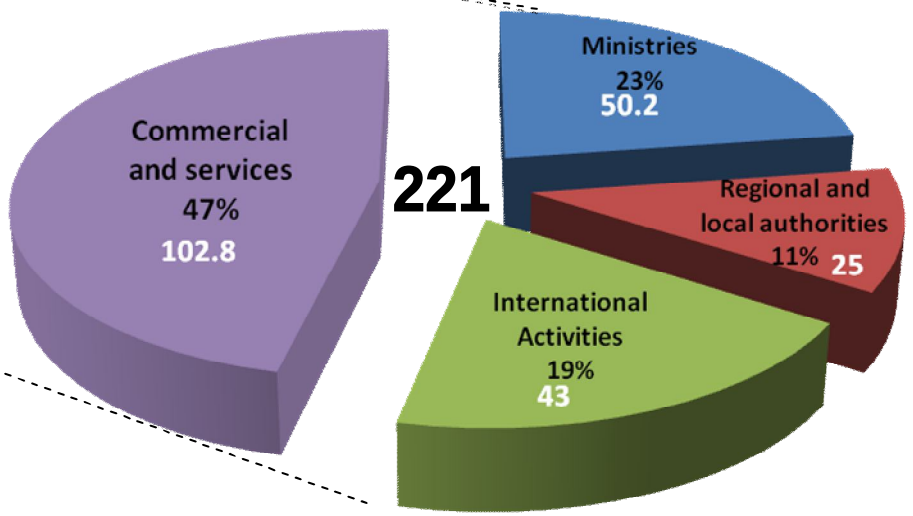


CNR Funding

TOTAL FUNDING 2010



EXTERNAL RESOURCES



Absolute values in ME

Fund Raising Index

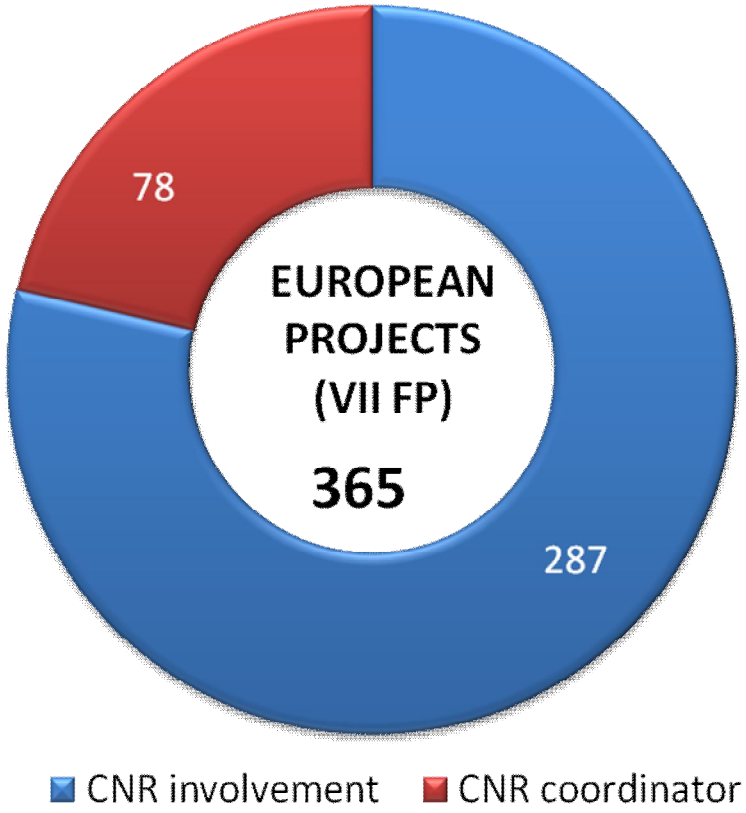
1.43

CNR in the World

7th Framework Programme for RTD (2007-2013)

31 bilateral agreements for the promotion of Scientific and Technological Cooperation with Research Institutions throughout the world

In UE, CNR is now 5th among European Research Institutes for grants.



CNR Facilities

Oceanographic Infrastructures

Urania

Dallaporta

Maria Grazia

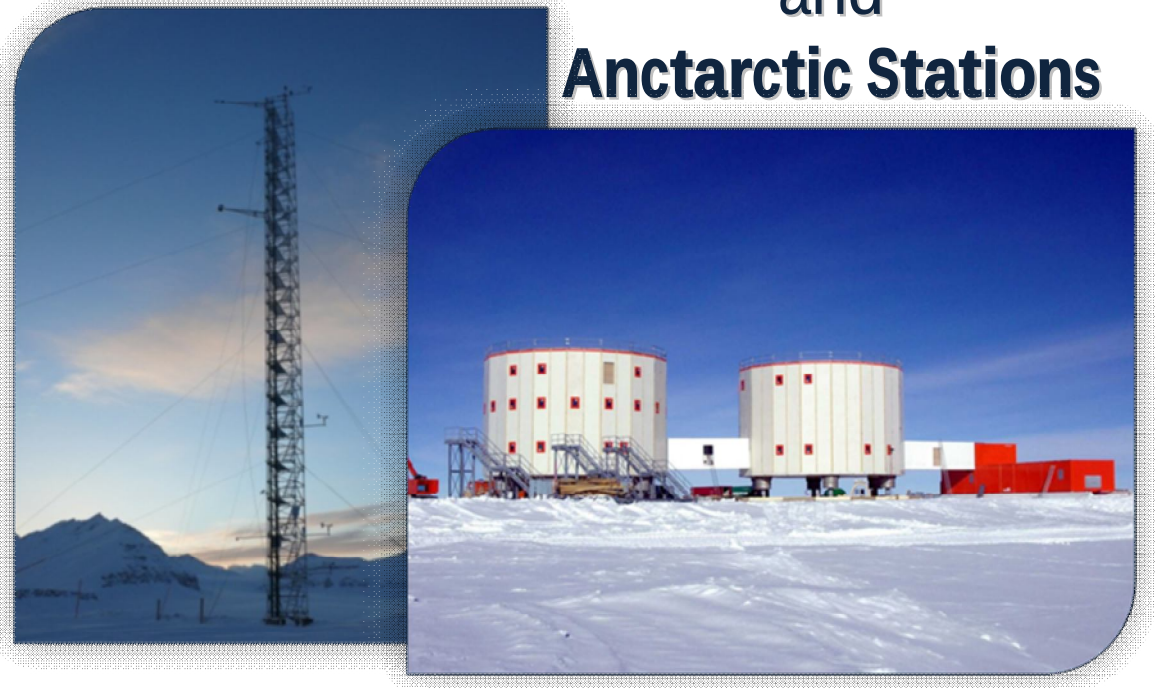
Registro.it

Everest K2 - CNR

Arctic

and

Anctarctic Stations



Manuela Arata
TT Officer CNR

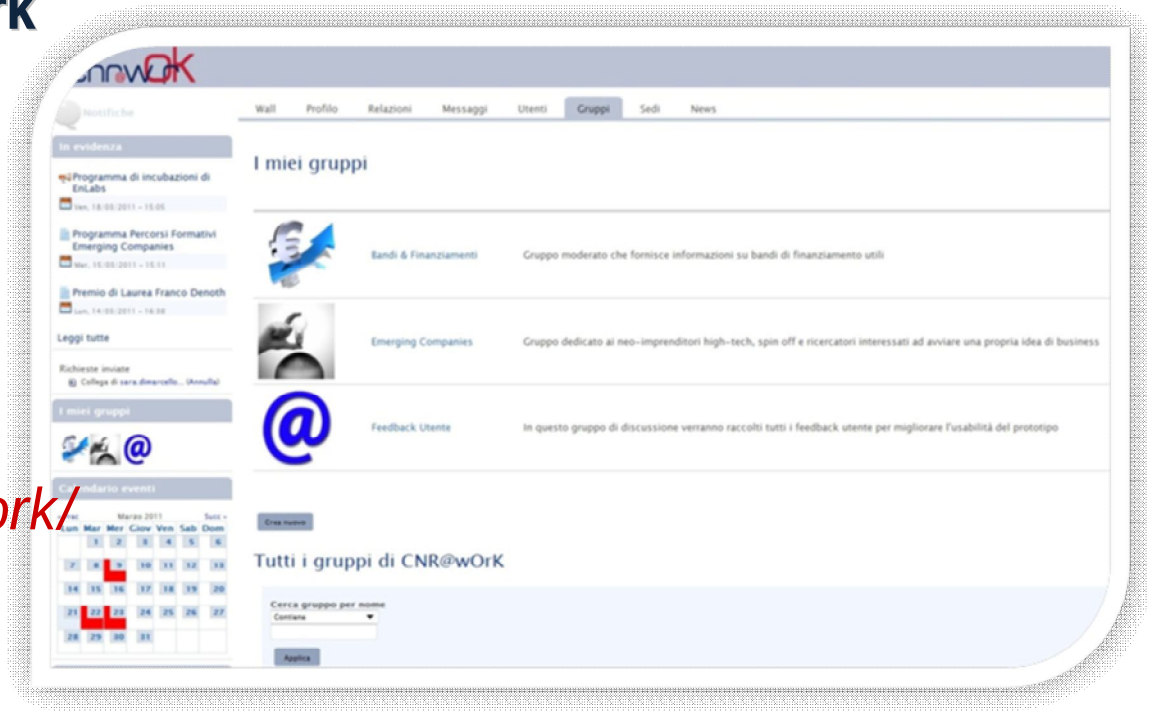
Roma | 27 luglio 2011

CNR - KTT Knowledge and Technology Transfer...

KTT instruments

NetwOrK R2R

- Over 200 experts and researchers operating inside CNR: TT to industries, start-up and promoting communication and outreach activities
- Microblogging - User Content Generated
- Intranet tool called **cnr@work**



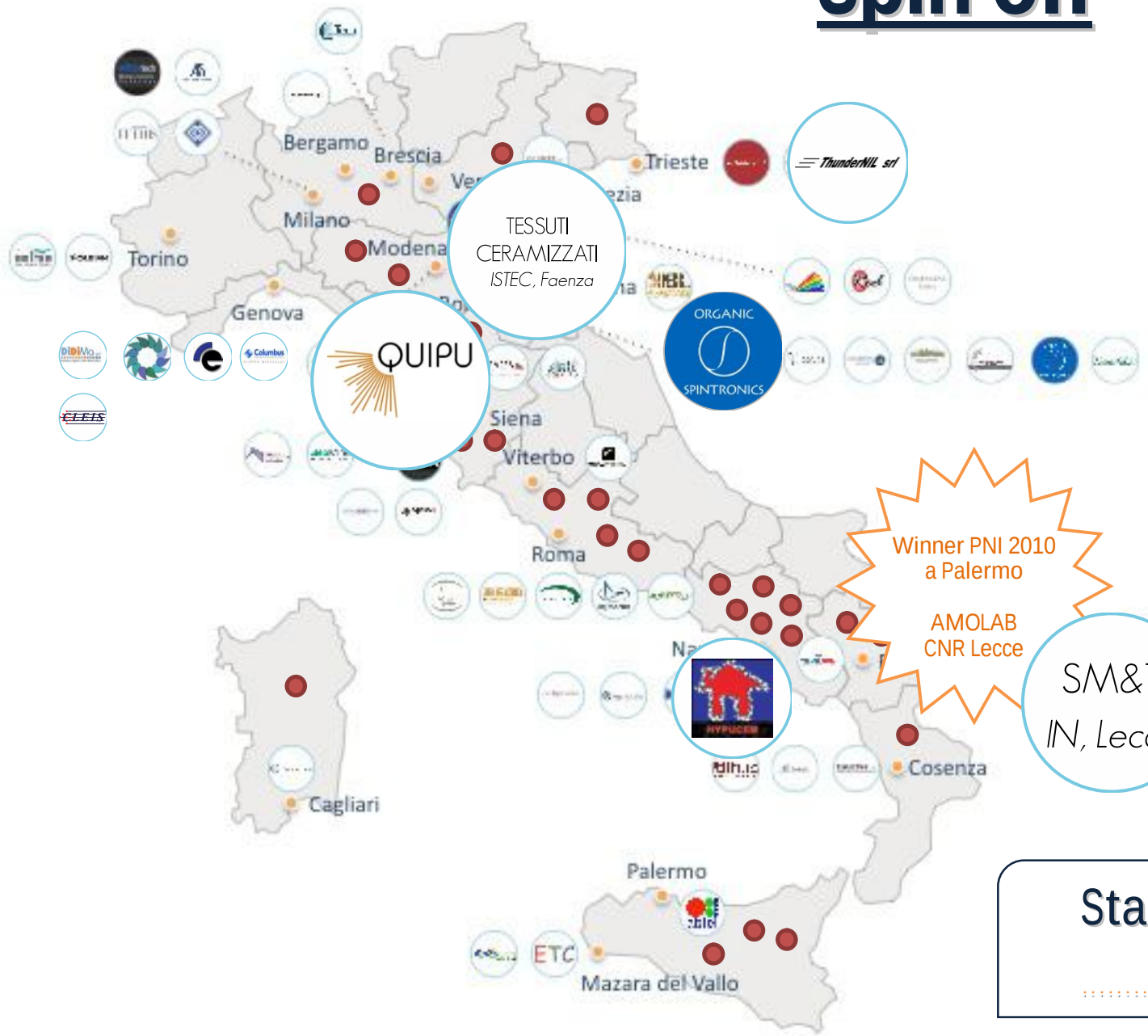
Per iscriversi:
http://weblab.iit.cnr.it/cnratwork/

- CNR Portfolio ~ 444 (including patents, trade marks, copyrights, novel varieties, etc...) **IPR**

  CNR has the largest number of patents amongst ROs

- "**Catalogo Brevetti**" → New IPR Catalogue with a user-friendly interface

Spin off



startCUP 2010

Il Sole 24 ORE

Start Cup 2010: +32 new proposals

Start Cup | 2011

Looking for new 1000 Italian innovators...

Partecipano:

Goal: valorization of national research excellences

Start cup 2011

In cooperation with

Start Cup 2011: + 70 business ideas!

Training

→‘**Come va... la ricerca?’** a summer school to integrate scientific competences with managerial skills

→ **‘Research Design’** with Politecnico di Milano with the aim of enhancing prototypes design skills as a distinctive mark of the ‘Made in Italy’ also in new high-tech products.

→PhDs with Universities

→Workshops

CoMe Va ...la Ricerca ?
Corso di Management e Valorizzazione della Ricerca

Creating a new industrial system

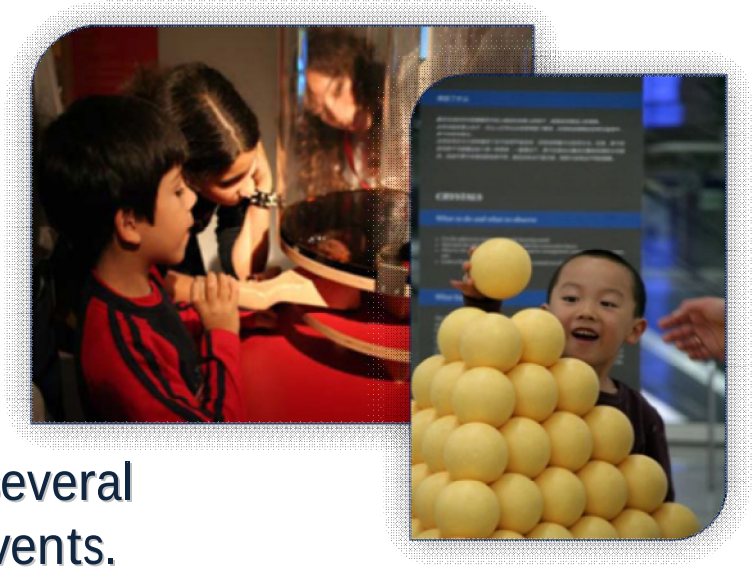
Science and Research to promote a new "Made In Italy"

...and Outreach

CNR pays a particular attention to dissemination and outreach, starting from the worldwide known **Genova Science Festival** (www.festivalscienza.it , the largest European event dedicated to science dissemination and public engagement

Genoa 21° October – 2° November

9°edition: 150 anni... di Scienza®



1861 > 2011 > >
150° anniversario Unità d'Italia

MateFitness®
LA PALESTRA DELLA MATEMATICA

the math arena (www.matefitness.it) and several travelling exhibitions and events.

Agorà
Science and mathematics at the time of Archimedes

Semplice e Complesso
Mostra interattiva su complessità, disordine e caos

Dissemination is also supported by **CNR as a Publisher** of books, technical reports, research monographs and e-editions

CNR.IT