

# Trasferimento delle tecnologie e delle conoscenze: istruzioni per l'uso (con esempi dal CERN)

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*Innovatics*

# Di cosa parliamo?

## Trasferimento di conoscenze e/o tecnologie:

Attività tramite la quale conoscenze sviluppate in un'organizzazione e in uno specifico contesto applicativo vengono messe a disposizione (e adattate/completate se necessario) per l'uso in una istituzione e/o un contesto diverso.

## Problema

Il mercato della conoscenza è «frammentato»: il match fra domanda e l'offerta non è automatico.

## Sfide

- Identificare nella propria organizzazione le conoscenze trasferibili
- Identificare i soggetti che potrebbero usare le nostre conoscenze e raggiungerli
- Identificare i **propri** bisogni di conoscenza

# CERN



- The largest particle physics lab in the world
- Over 50 years of scientific excellence
- 13,000 people united in a common effort
- Hundreds of short-term visitors every year (including high-school teachers!).

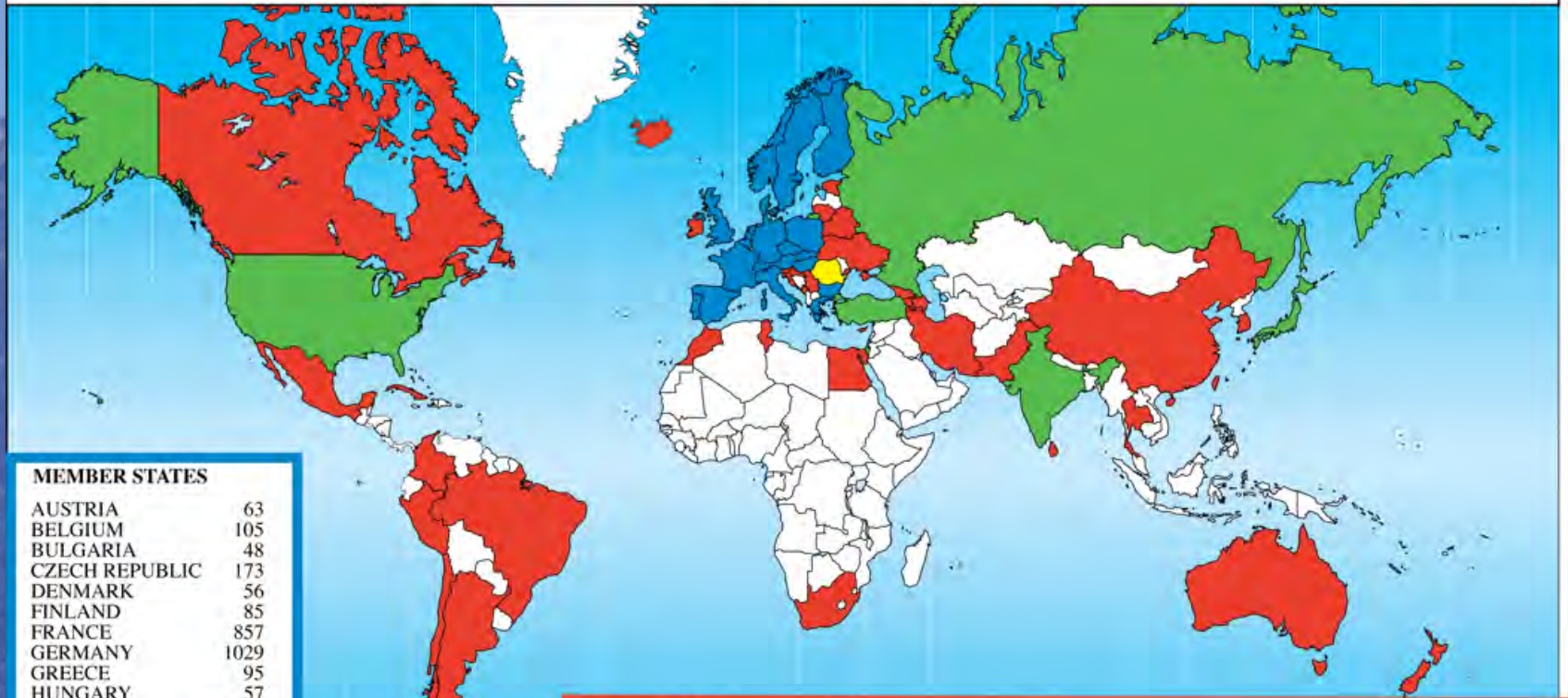
- 2256 staff
- ~700 other paid personnel
- ~ 10000 users
- Budget (2009) 1100 MCHF

- **20 Member States:** Austria, Belgium, Bulgaria, the Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Italy, Netherlands, Norway, Poland, Portugal, Slovakia, Spain, Sweden, Switzerland and the United Kingdom.
- **1 Candidate for Accession to Membership of CERN:** Romania
- **8 Observers to Council:** India, Israel, Japan, the Russian Federation, the United States of America, Turkey, the European Commission and Unesco

# CERN in Numbers



## Distribution of All CERN Users by Nation of Institute on 17 February 2009



### MEMBER STATES

AUSTRIA	63
BELGIUM	105
BULGARIA	48
CZECH REPUBLIC	173
DENMARK	56
FINLAND	85
FRANCE	857
GERMANY	1029
GREECE	95
HUNGARY	57
ITALY	1458
NETHERLANDS	175
NORWAY	72
POLAND	165
PORTUGAL	110
SLOVAKIA	48
SPAIN	291
SWEDEN	73
SWITZERLAND	332
UNITED KINGDOM	697

**5989**

### OBSERVER STATES

INDIA	97
ISRAEL	54
JAPAN	200
RUSSIA	886
TURKEY	51
USA	1499

**2787**

### OTHER STATES

ARGENTINA	10	CUBA	3	MONTENEGRO	1	SRI LANKA	1
ARMENIA	14	CYPRUS	6	MOROCCO	5	TAIWAN	44
AUSTRALIA	13	EGYPT	1	NEW ZEALAND	5	THAILAND	1
AZERBAIJAN	1	ESTONIA	11	PAKISTAN	22	TUNISIA	1
BELARUS	19	GEORGIA	10	PERU	1	UKRAINE	18
BRAZIL	70	ICELAND	1	ROMANIA	50		
CANADA	137	IRAN	12	SERBIA	17		
CHILE	5	IRELAND	12	SLOVENIA	16		
CHINA	69	KOREA	52	SOUTH AFRICA	8		
COLOMBIA	13	LITHUANIA	9				
CROATIA	20	MEXICO	29				

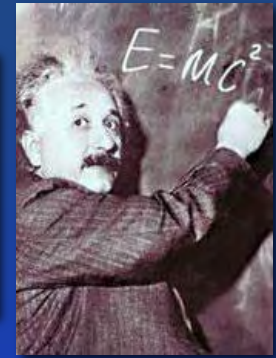
**707**



# The Mission of CERN

- **Push back** the frontiers of knowledge

E.g. the secrets of the Big Bang ...what was the matter like within the first moments of the Universe's existence?

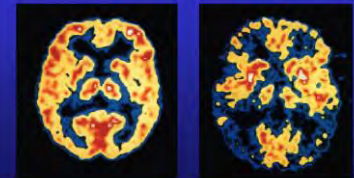


- **Develop** new technologies

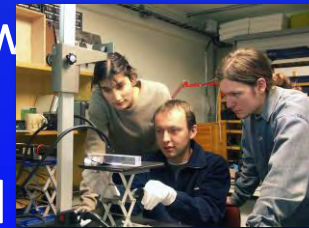
Information technology - the Web and the GRID  
Medicine - diagnosis and therapy



Brain Metabolism in Alzheimer's Disease: PET Scan



- **Train** scientists and engineers of tomorrow

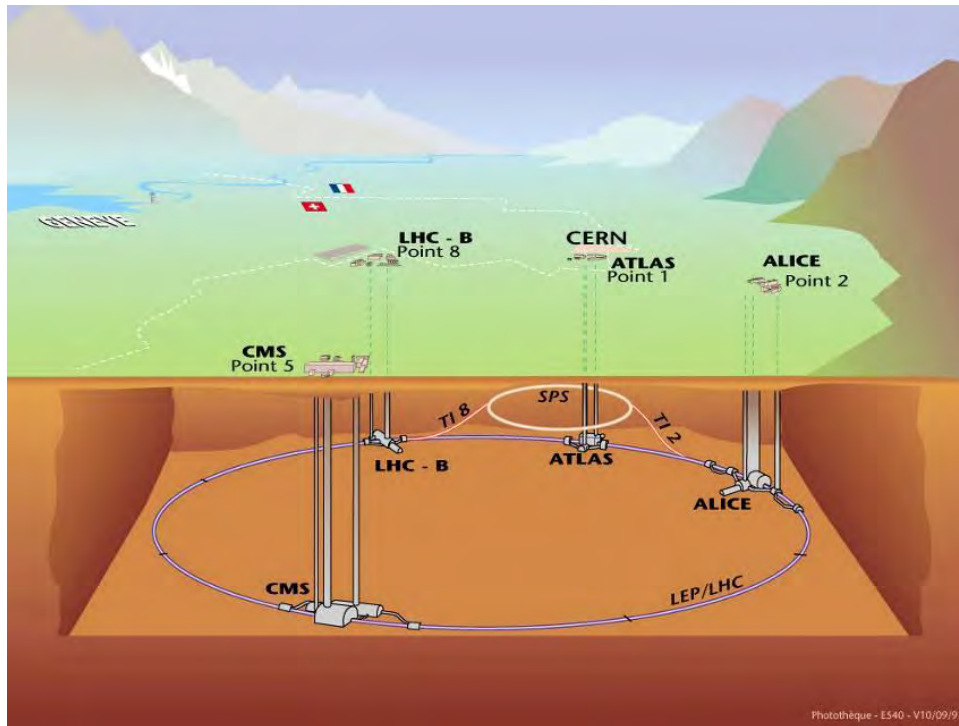


- **Unite** people from different countries and cultures



# LHC: Exploration of a new energy frontier

Proton-proton collisions at  $E_{\text{CM}} = 14 \text{ TeV}$



The LHC illuminates a new landscape of physics, possibly answering some of the most fundamental questions in modern physics, e.g.

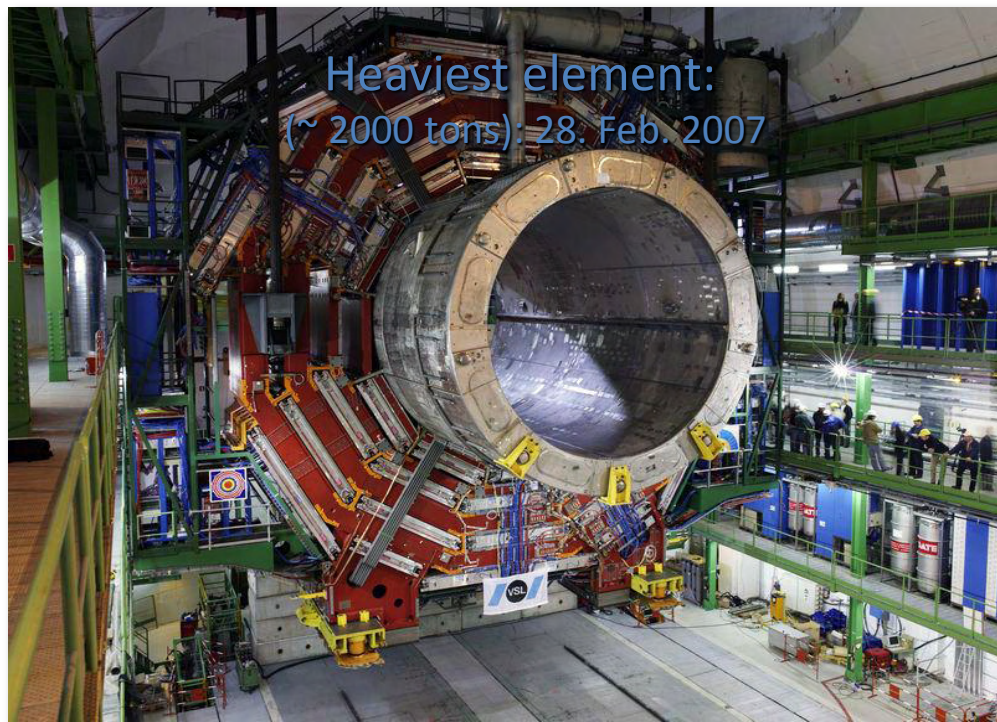
The origin of mass  
New forms of matter  
Extra dimensions of space-time

# CMS installation in experimental cavern

Installation in cavern started  
in Nov 2006



Heaviest element:  
(~ 2000 tons), 28. Feb. 2007



.... About the weight of 5 Jumbo jets ,  
or 3.5 Airbus380-planes....

# Mappa degli argomenti





Impatto  
sulla  
comunità

Competitività

Finanziari

Obiettivi

PERCHE'

# PERCHE' TRASFERIRE?

**Essenziale chiarire i propri obiettivi!**

**Determineranno:**

- **Strategia**
- **Canali**
- **Strumenti**

## Trasferire verso l'esterno

- Per dimostrare impatto sociale
- Per creare ricchezza e impiego
- Per acquisire visibilità e partners
- Per generare introiti

## Acquisire

- Per sviluppare nuovi prodotti
- Per diventare più competitivi
- Per acquisire visibilità e partners
- Per investire liquidità



# Obiettivo del CERN

“Dimostrare che le tecnologie e le conoscenze sviluppate per il programma di ricerca del CERN hanno applicazioni in aree di grande interesse per il pubblico e possono generare benefici tangibili all’umanità.”



Enfasi sulle applicazioni alla **medicina** e all'**ambiente**...

*Priorità all'**impatto**.*

*Gli aspetti finanziari non sono prioritari....*



# COSA TRASFERIRE?

**La conoscenze sono un «asset» strategico....**

**Vanno identificate, classificate e gestite**

**Identificare i propri «assets» trasferibili non è banale...**

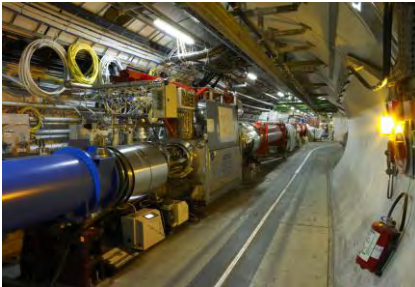
- Composite\_Materials
- ▶ ● Computing
- ▶ ● Cooling\_Refrigeration
- ▶ ● Electronics
- ▶ ● Energy\_Transport
- ▶ ● Sensors
- ▶ ● Telecommunications
- Thermal\_Insulation

1. Mappatura del “paesaggio” delle proprie conoscenze, identificando le aree cruciali/di eccellenza
2. In che misura le conoscenze sono **esplicite** (pubblicazioni, brevetti, documenti interni, ...)?
3. Identificazione delle comunità che potrebbero beneficiare di un accesso alle proprie conoscenze (industria, ricerca, pubblico, ...)

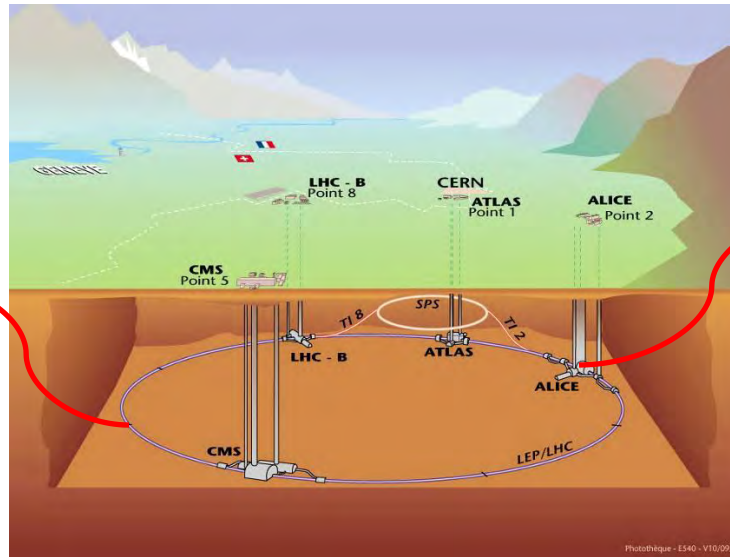
# CERN Technologies

## Three key technology areas at CERN:

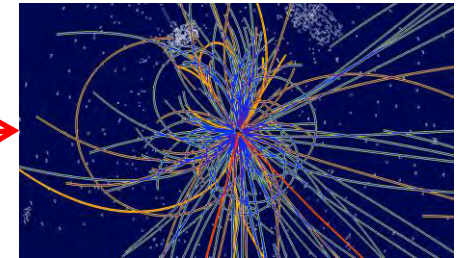
Accelerating  
particle beams



Vacuum  
Cryogenics  
Superconductivity



Detecting  
particles



Large-scale computing (Grid)

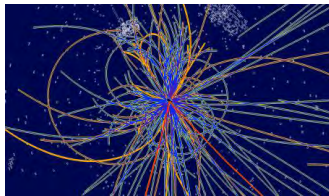


# Focus on Medical Applications

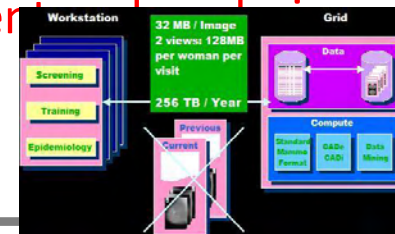
Particle beams for **cancer treatment**



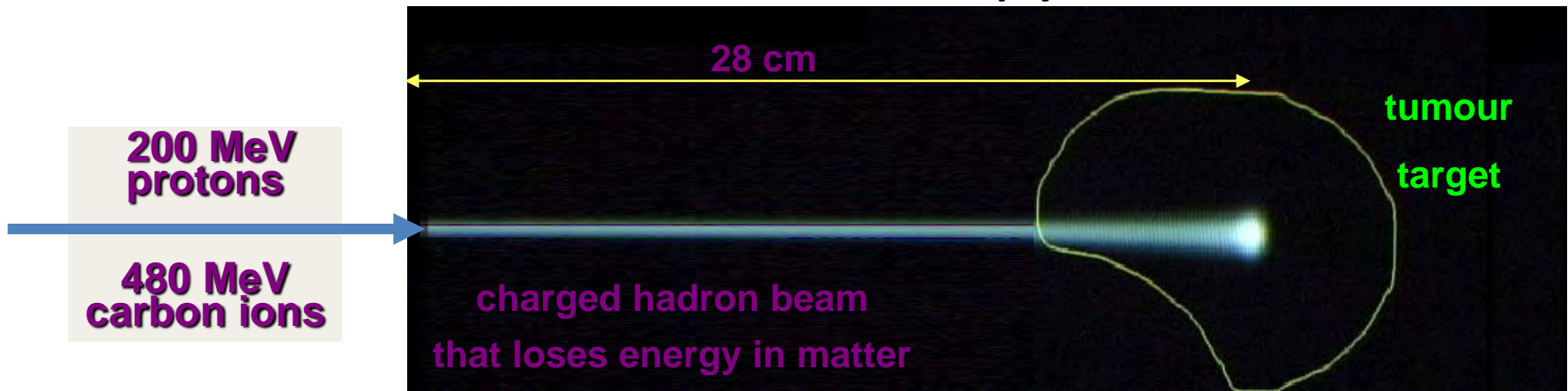
Particle detector technologies for **medical imaging**



Grid computing for **medical data management**

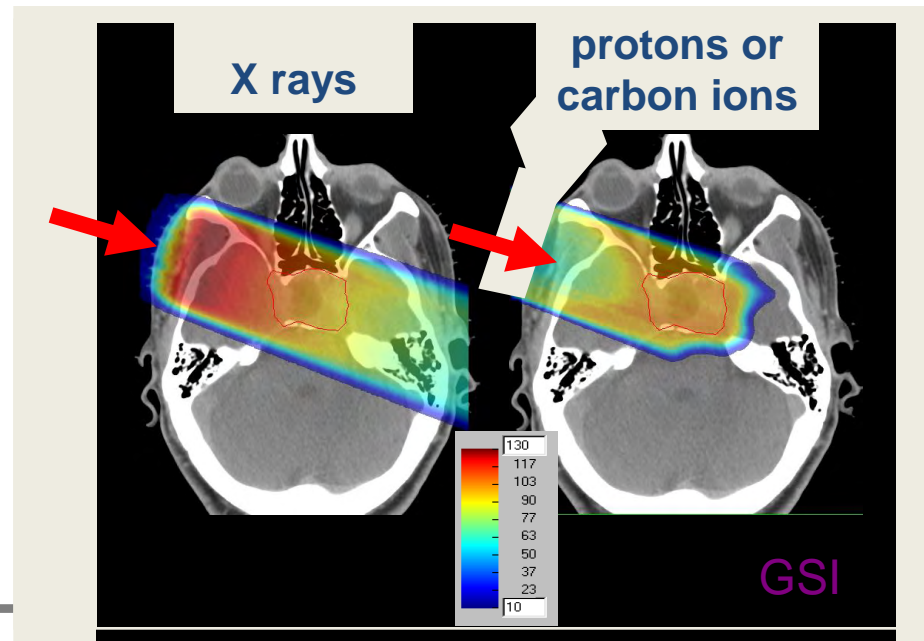


# Hadron Therapy



Hadron beams provide new treatment opportunities for deep-seated tumours.

Hadron beams are more effective than X-rays in **destroying tumours** while **sparing healthy tissues nearby**.



# COME?

## Strategia:

Definisce canali e strumenti in funzione degli obiettivi e delle caratteristiche del «COSA»





# STRATEGIA CERN

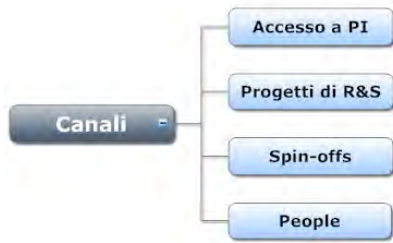
*Massimizzare la **disseminazione** delle tecnologie*

La gente deve poter VEDERE beni e servizi con tecnologia CERN...

Quindi:

- Sviluppo e gestione di un portafoglio di brevetti
- Software reso disponibile (di solito) in modalità OpenSource
- Accesso a tecnologie brevettate condizionato alla loro effettiva **utilizzo**.
- Supporto alle start-ups create per usare tecnologia CERN.



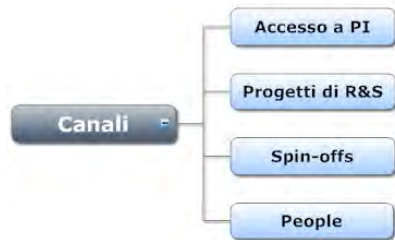


# Proprietà Intellettuale

## Cosa è la Proprietà Intellettuale (PI)?

PI = creazioni della mente protette da un diritto di proprietà (copyrights, marchi registrati e brevetti).

- **Copyright** protegge documenti tecnici (progetti, procedure, disegni,...) e software (codice sorgente, manuali, ...).
- **Brevetti** proteggono le **invenzioni**: prodotti o processi che forniscono soluzioni nuove a problemi tecnici.

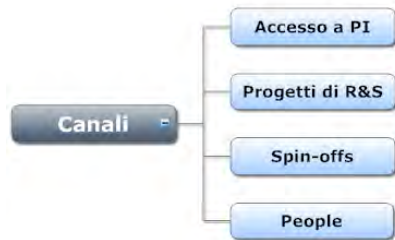


# Perchè usare la PI?

Le conoscenze (e le invenzioni in particolare) sono un “asset”, con un valore potenziale sia commerciale che di immagine.

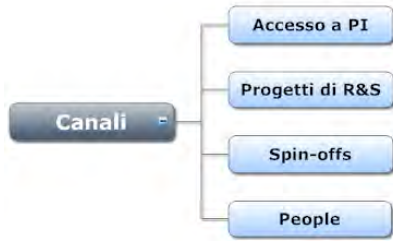
L’uso degli strumenti di gestione della PI (brevetti, ecc) permette di identificare chiaramente i propri assets intellettuali e di valorizzarli:

- Trasferendo conoscenze ad altre organizzazioni sotto condizioni chiaramente stipulate,
- Sfruttando le conoscenze per progetti interni senza il rischio che altri ne reclamino la paternità.



# Brevetti - vantaggi

- Identificano chiaramente il proprietario della tecnologia.
- Permettono di regolare l'accesso alla tecnologia.
- Rendono la tecnologia più “tangibile” e quindi più facile da trasferire.
- Creano un monopolio (temporaneo) per il proprietario.
- Accordando una licenza esclusiva, permettono di creare un vantaggio competitivo per il licenziatario.
- Forniscono visibilità e “tracciabilità”



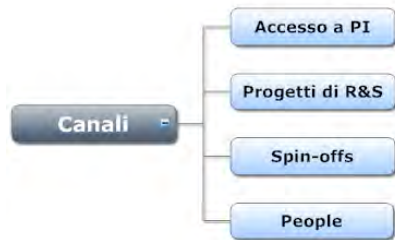
# PI – Campo di applicazione

➤ Trasferimento di conoscenze e tecnologie

➤ Qualunque collaborazione di R&S

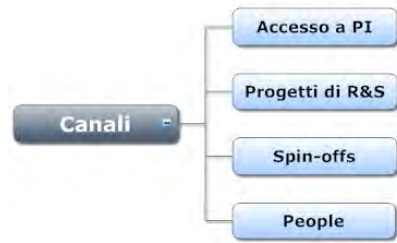
PI con valore commerciale puo' essere generata in una collaborazione iniziata con fini puramente accademici....

➤ **Acquisti**



# Canali usati dal CERN

- Licenze su brevetti  
Example: license to a Spanish company to use CERN's patent on non-evaporable getter thin films in order to manufacture evacuated flat solar panels.
- Progetti di R&S con partners esterni  
Example: collaboration with a German company active in the field of dosimetry.
- Programmi di formazione e mobilità del personale  
Example: the CERN Doctoral Student Program.
- **Acquisti**



# Trasferimenti e acquisti - CERN

Sondaggio effettuato dal CERN su aziende fornitrici di prodotti ad alta tecnologia (1997-2001). 178 risposte, per contratti di un valore di 503 MCHF.

## Risultati:

- 44% indicate technological learning
- 42% increased their international exposure
- 38% developed new products
- 36% indicated market learning
- 13% started new R&D teams
- 52% would have had poorer sales performance without CERN
- 41% would have had poorer technological performance



# Strumenti – Policy PI

## Perché vale la pena di pubblicare una policy sulla PI?

- ✓ Riduce il rischio di conflitti coi partners
- ✓ Riduce il “rischio politico” per gli organismi pubblici di ricerca
- ✓ Permette conformità con le raccomandazioni della Commissione Europea

**« ...Effectively exploiting publicly-funded research results depends on the proper management of intellectual property...Effective management of intellectual property requires the establishment of internal policies to ensure an adequate handling of the results of research. »**

**(C(2008)1329: Commission recommendation on the management of intellectual property in knowledge transfer activities and code of practices for universities and other public research organisations; Brussels, 10.04.2008.)**



# Strumenti – Partners

“Partners”: individui e organizzazioni che possono avere interesse a entrare/restare in contatto con voi.

- Ex dipendenti
- Fornitori
- Partners accademici e industriali in progetti di R&S

I rapporti con tutti i partners potenziali vanno coltivati e sviluppati nel tempo.



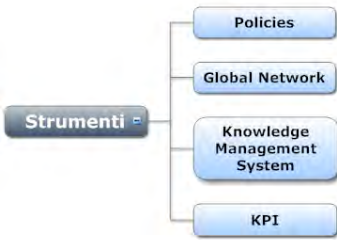


# Strumenti – Global Network

Una rete di persone ed organizzazioni con interessi comuni.

- Individuare i propri **“Alumni”** ed ottenere da loro informazioni sulla loro progressione di carriera, distribuzione geografica, ecc. → **KPI**
- Aumentare la visibilità delle proprie opportunità di partnership (trasferimento tecnologico, acquisti, reclutamento, ecc.)
- Creare nuovi canali per il trasferimento delle conoscenze, scambio best practices, ecc.





# Strumenti – CERN Networks

European Network for LIGHT ion Hadron Therapy

Home News Events Contact

>> home

- Related Links**
- News
  - Members
  - Projects
  - Documents
  - Events
  - Glossary

- Enlight++ Events**
- 2010: February 2-4, Physics for Health in Europe Workshop
  - 2009: Sept 26-27 ULICE Kick-off Meeting
  - 2009: June 18-19 ENLIGHT Meeting
  - 2007: 3-4 May - COST-ENLIGHT Workshop
  - 2006: 4th March - ENLIGHT++ Preparatory meeting

**Search**

Search this site

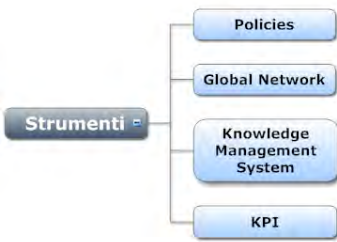


The European Network for LIGHT ion Hadron Therapy is a multidisciplinary platform that aims at a coordinated effort towards ion beam research in Europe.

The ENLIGHT network is formed by the European Hadron Therapy Community which consists of more than 150 researchers, belonging to more than fifty European Universities and research Institutes from sixteen European countries.

A major success of ENLIGHT has been uniting traditionally separate communities so that clinicians, physicists, biologists and engineers with experience and interest in particle therapy work together. ENLIGHT has demonstrated the advantages of regular and organised exchanges of data, information, best practices as well as information on treatment procedures, protocols and strategies.

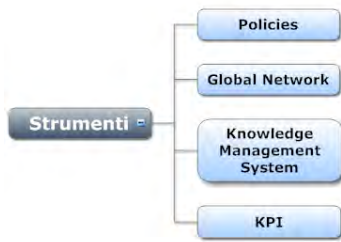
Coordinated by CERN



# Strumenti – CERN Networks

- **Enabling Grids for E-science (EGEE)** is Europe's leading grid computing project, providing a computing support infrastructure for over 13,000 researchers world-wide, from fields as diverse as high energy physics, earth and life sciences.
- The resources coordinated by EGEE are managed through the European Grid Infrastructure (EGI) from the end of April 2010. In EGI each country's grid infrastructure will be run by National Grid Initiatives.
- **Coordinated by CERN**





# Strumenti – CERN Networks

Il **CERN** contribuisce  
essenzialmente portando  
**leadership** e **visibilità...**

SCOAP<sup>3</sup> - Sponsoring Consortium for Open Access Publishing in Particle Physics

Towards Open Access publishing in High Energy Physics



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[Slides from SLA and ALA forums](#)

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[Slides and video from the SPARC & ACRL webcast, 10/06/2009](#)

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[Slides and video from the SCOAP<sup>3</sup> US focal meeting, Berkeley, CA,](#)

## SCOAP<sup>3</sup>

A consortium facilitates Open Access publishing in High Energy Physics by re-directing subscription money. This answers the request of the High Energy Physics community.

**Today:** (funding bodies through) libraries buy journal subscriptions to support the peer-review service and allow their patrons to read articles.

**Tomorrow:** funding bodies and libraries contribute to the consortium, which pays centrally for the peer-review service. Articles are free to read for everyone.

**Read now:**

- The Executive Summary of the Report of the SCOAP<sup>3</sup> Working Party
- The complete report

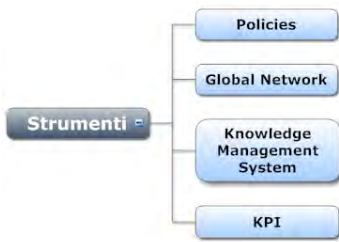
» To know more

## Latest news

**01/09/2009, SCOAP<sup>3</sup> support in the U.S. passes the 75% mark**  
Five more U.S. libraries have signed the SCOAP<sup>3</sup> Expression of Interest: Lawrence Livermore National Laboratory, SUNY Albany, SUNY Buffalo, the University of Michigan, and the Utah State University. With these new partners, SCOAP<sup>3</sup> has received pledges for a total of 2.7 Million dollars from leading U.S. libraries and library consortia. Worldwide, SCOAP<sup>3</sup> has received pledges for 6.5 Million Euros, 65% of its funding envelope, from partners in 22 countries. Before it can move forward, SCOAP<sup>3</sup> needs more support from U.S. libraries, of all sizes. The SPARC and ACRL FAQs and webcast give more details on how you can help.

**04/08/2009, More U.S. libraries support SCOAP<sup>3</sup>**  
Six more U.S. libraries have signed the SCOAP<sup>3</sup> Expression of Interest: East Carolina University, Savannah River National Laboratory, the University of Iowa, the University of Minnesota-Twin Cities, the University of Mississippi and Wake Forest University. These new SCOAP<sup>3</sup> partners join a long list of SCOAP<sup>3</sup> supporters in the U.S. who have collectively pledged about 3/4 of the projected U.S. contribution to SCOAP<sup>3</sup>. Before it can move forward, SCOAP<sup>3</sup> needs more support from U.S. libraries, of all sizes. The SPARC and ACRL FAQs and webcast give more details on how you can help.

» More news



# Cross-fertilizzazione

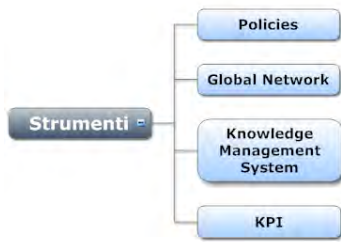
Challenge: bring together physicists and medical doctors!

Over 400 medical doctors and technology experts from the physics community together at CERN in February 2010.

Cross-cultural and multi-disciplinary event which would be hard to organize at the national level!



**The value of CERN both as a provider of technologies and as a catalyst for a cross-cultural community was widely acknowledged.**



# Semantica e gestione conoscenze

Semantics: define a suitable knowledge representation scheme (ontology) which can record in a structured framework all the key features of your knowledge, e.g.

## Knowledge domains

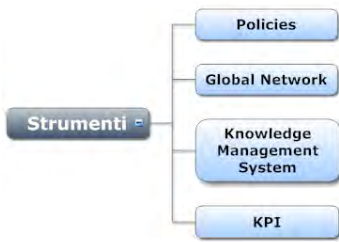
- Technology\_Areas
  - Composite\_Materials
  - ▼ Computing
    - ▶ Distributed\_Computing
    - ▶ Electronics
    - ▶ Hardware
    - ▶ High\_Speed\_Processing\_Communication
      - Real\_time\_video\_processing
    - ▶ Software
  - ▼ Cooling\_Refrigeration
    - ▶ CO2\_Cooling
      - Microchannel\_Cooling
  - ▼ Electronics
    - ▶ FE\_Electronics
    - ▶ Microchips
      - Readout\_System
  - ▶ Energy\_Transport
  - ▶ Sensors
  - ▶ Telecommunications
  - Thermal\_Insulation

## In-house applications

- ▼ ● Atlas\_detector
  - ALFA
  - Atlas\_Offline\_Computing
  - Atlas\_Upgrade
  - Data\_Preparation
  - ▶ ● Inner\_Detector
    - Larg\_Calorimeter
    - Luminosity\_Counters
    - Minimum\_Bias\_Scintillators
    - Muon\_Spectrometer
    - Radiation\_Monitors
    - Shielding
    - Solenoid\_Magnet
    - Support\_Structures
    - Tile\_Calorimeter
    - Toroid\_Magnets
    - Trigger\_DAQ\_DCS
  - ▶ ● Vacuum\_Beam
    - Zero\_Degree\_Calorimeters

## Industrial applications

- ▼ ● Aerospace
  - Augmented\_Reality
  - ▶ ● Dosimetry
  - ▶ ● Consumer\_Electronics
  - ▶ ● Cooling\_Refrigeration
  - ▶ ● Data\_Knowledge\_Management
  - ▼ ● Energy\_Environment
    - ▶ ● Earth\_Monitoring
    - ▶ ● Energy\_Transport
      - Thermal\_Insulation
  - ▶ ● Finance
  - ▼ ● Life\_Sciences
    - ▶ ● Cancer\_Therapy
    - ▶ ● E\_Health
    - ▶ ● Imaging
  - ▶ ● Maintenance\_Operations
  - ▶ ● Manufacturing
  - ▶ ● Materials\_Analysis
  - ▶ ● Safety\_Security
  - ▶ ● Telecom\_Services



# Classificazione conoscenze

(Automatically) classify documents into the ontology:

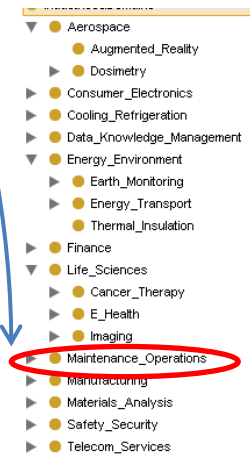
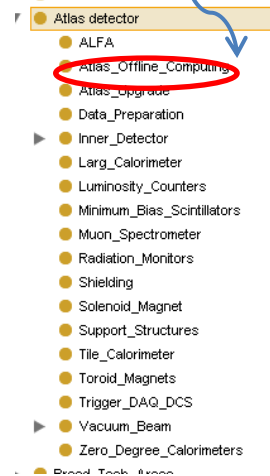
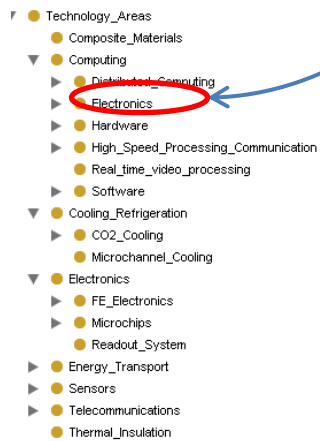
- What is the knowledge domain?
- What are the in-house applications?
- What are the potential industrial applications?

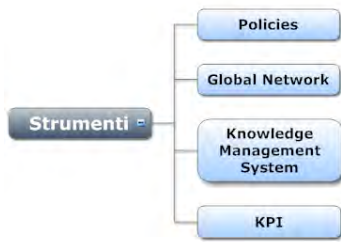


**Knowledge domains**

**In-house applications**

**Industrial applications**





# Catalogo delle conoscenze

Deliverable: a searchable **knowledge catalogue** which different communities can query and browse according to different criteria.....

## In-house view



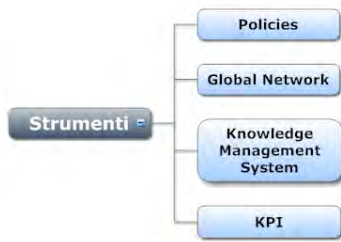
- 📁 [Zero Degree Calorimeters](#)
- 📁 [Triqger DAQ DCS](#)
- 📁 [Muon Spectrometer](#)
- 📁 [Data Preparation](#)
- 📁 [Support Structures](#)
- 📁 [ALFA](#)
- 📁 [Radiation Monitors](#)
- 📁 [Shielding](#)
- 📁 [Inner Detector](#)  
[Transition Radiation Trackers](#), [Trackers](#), [Pixel Detector](#)

## Industry view



- 📁 [Consumer Electronics](#)  
[Portable Devices](#), [Computing \(Consumer Electronics\)](#)
- 📁 [Aerospace](#)  
[Radiation tests](#), [Dosimetry \(Aerospace\)](#), [Augmented Reality \(Aerospace\)](#)
- 📁 [Life Sciences](#)  
[Imaging](#), [Cancer Therapy](#), [E Health](#)
- 📁 [Automotive\\*](#)
- 📁 [Finance](#)  
[Computing \(Finance\)](#)
- 📁 [Energy Environment](#)  
[Thermal Insulation](#), [Energy Transport](#), [Earth Monitoring](#)
- 📁 [Safety Security](#)  
[Homeland security](#), [Fire Detection](#), [Nuclear Safety Dosimetry](#), [Plant Monitoring](#)





# Catalogo per il CERN obiettivi

Progetto pilota verso un **Technology Applications Catalogue**.

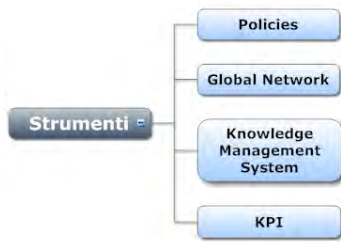
## Obiettivi:

### 1. Gestione interna delle conoscenze

Fornire ai ricercatori uno strumento rapido ed efficiente per condividere conoscenze grazie a un sistema di classificazione e ricerca semantica e **criteri di ricerca ottimizzati per i ricercatori (gerarchia di sistemi)**

### 2. Trasferimento delle conoscenze

Permettere a potenziali utenti esterni (industria in particolare) di consultare un catalogo di competenze e tecnologie **usando criteri di ricerca ottimizzati per l'industria**, per far emergere opportunità di trasferimento tecnologico .



# Catalogo per il CERN Creazione

Come viene inserita informazione nel catalogo?

**Step 1** Il ricercatore inserisce le informazioni chiave nel **Data Input Form**

Notare il bottone «Classify»...

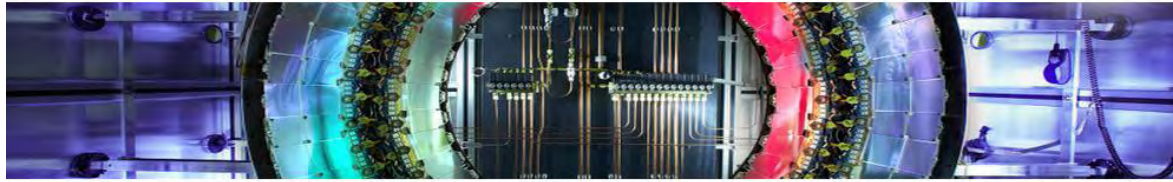




# Catalogo per il CERN Creazione (bis)



Home Account About Logout Instructions Contact



Title (max.140 char):

Abstract (max.512 char):

Key Technologies:

Innovative Features:

ATLAS Applications:

Applications Outside ATLAS:

Current Technology Stage (max.384 char):

Partners Currently Involved:

Planned Developments (max.384 char):

Potential Additional Dev. Partners:

**Key Technical Attributes**

Name	Units	Current Value	Target Value
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

[Add Key Technical Attribute](#)

Contact Person (Name):

Contact Person (Email):

Home Institution:

Country:

Image:

Automatic Classification | Manual Classification | Notes

**Atlas detector**

- Atlas detector
- Muon Spectrometer

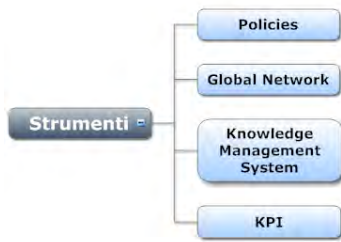
**Industries**

- Industries
- Safety Security
- Homeland security
- Container Inspection

- TAC Services
- [Ricerca TAC](#)
- [Data Input Form](#)
- [Tech Explorer](#)
- [Technology Applications Catalogue](#)
- [Manutenzione OBS](#)

**Step 2** Cliccando il bottone «Classify», il sistema interpreta e classifica automaticamente l'informazione fornita, identificando i sottosistemi per cui la tecnologia è rilevante e suggerendo applicazioni industriali....

Il ricercatore ha la possibilità di approvare/modificare/arricchire la classificazione automatica, indicando per esempio ulteriori applicazioni industriali...

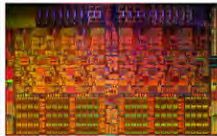


# Catalogo per il CERN Schede

L'informazione inserita e classificata genera una «scheda»

## Future computing technologies for ATLAS

### Abstract



Commodity CPU clock speeds are no longer increasing. The industry has moved from a single high speed core per device to multiple lower speed cores per chip, and "many core" devices are on most manufacturers' roadmaps. Also modern general purpose GPUs now surpass CPUs in executing stream computation over large volumes of data. We are adapting serial ATLAS codes to work more efficiently with these devices: introducing increasing levels of thread-level and instruction-level parallelism.

### Key Technologies

Many-cores, GPGPUs

### Innovative Features

Hundreds of processing cores; High memory bandwidth

### ATLAS applications

Examples include: particle tracking algorithms; Monte-Carlo integration, including matrix element methods; toy Monte Carlo methods in statistical analysis; and multivariate analysis techniques.

### Applications outside ATLAS

Accelerating algorithms using GPGPUs is of wide interest, especially where application performance is dominated by CPU time. There is also specific interest from companies that use Geant4 for medical applications, and considerable interest from other physical science communities such as astronomy.

### Current Technology Stage

CPUs: Intel Westmere (pictured): six cores per die, in widespread use. 32-core CPUs are available. GPUs: Nvidia's Sept 2010 roadmap anticipated factor 16 increase on GPU performance by 2013. Applications: Initial studies for particle tracking in ATLAS HLT. GPGPU z-finder vertexing algorithm achieved over 35x speed-up. Also observed speedup for GPGPU-based Kalman filter track finder.

### Partners Currently Involved

NVIDIA (Professor partnership programme) ; Lawrence Berkeley National Laboratory (LBNL);

### Planned Developments

Objectives include: Demonstration of specific high throughput data analysis applications using many-core and GPU technologies. Development and documentation of tools, exemplar codes and methodologies to benefit the wider scientific community. Integration of exemplar multicore applications with cluster batch systems and distributed storage systems.

### Potential Additional Development Partners

DELL

### Key Technical Attributes

Name	Units	Current Value	Target Value
Per event time of data analysis applications	Normalised to current applications	1	50

### Contact Person

Philip Clark

[P.J.Clark@ed.ac.uk](mailto:P.J.Clark@ed.ac.uk)

### Reference Institute

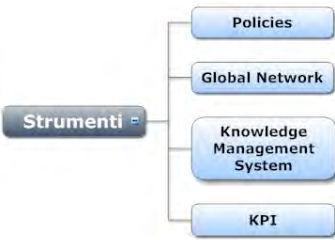
University of Edinburgh

### Country Institute

United Kingdom

ETOP

European Research



# Catalogo per il CERN Navigazione interna

**Navigazione ottimizzata per il personale interno.**

Menu basato sulla gerarchia dei sottosistemi dell'esperimento ATLAS

Home
Account
About
Logout
Instructions
Contact

**Browse the catalogue by :**

[Atlas detector] Industries

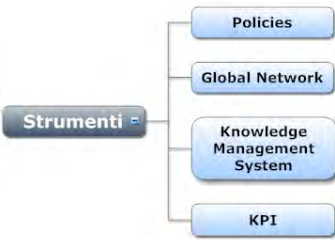
[Radice](#) > [Atlas detector](#)

<ul style="list-style-type: none"> <li><a href="#">Solenoid Magnet (0)</a></li> <li><a href="#">Trigger DAQ DCS (4)</a></li> <li><a href="#">Atlas Offline Computing (1)</a> <small>Software, Infrastructure</small></li> <li><a href="#">Data Preparation (0)</a></li> <li><a href="#">Vacuum Beam (0)</a></li> <li><a href="#">Toroid Magnets (1)</a></li> <li><a href="#">Tile Calorimeter (2)</a></li> <li><a href="#">Minimum Bias Scintillators (0)</a></li> <li><a href="#">Larg Calorimeter (2)</a></li> </ul>	<ul style="list-style-type: none"> <li><a href="#">ALFA (0)</a></li> <li><a href="#">Radiation Monitors (1)</a></li> <li><a href="#">Muon Spectrometer (3)</a></li> <li><a href="#">Luminosity Counters (0)</a></li> <li><a href="#">Shielding (0)</a></li> <li><a href="#">Zero Degree Calorimeters (1)</a></li> <li><a href="#">Inner Detector (9)</a> <small>Transition Radiation Trackers, Semiconductor Trackers, Pixel Detector</small></li> <li><a href="#">Support Structures (0)</a></li> </ul>
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Totale item: 17

TAC Services

- [Ricerca TAC](#)
- [Data Input Form](#)
- [Tech Explorer](#)
- [Technology Applications](#)
- [Catalogue](#)
- [Manutenzione OBS](#)



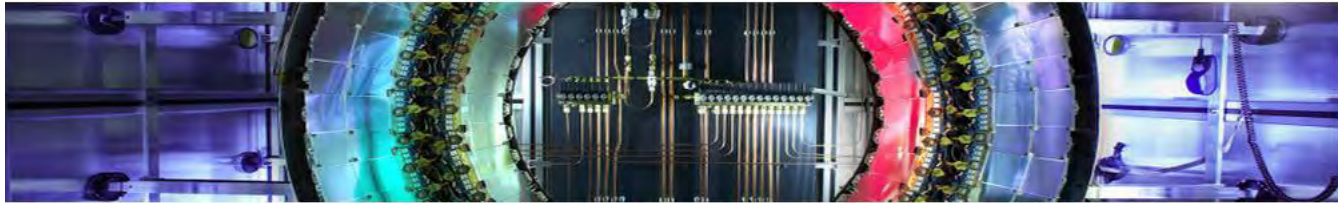
# Catalogo per il CERN Navigazione esterna

## Navigazione ottimizzata per l'industria

Menu basato su una gerarchia di industrie e processi



[Home](#) | 
 [Account](#) | 
 [About](#) | 
 [Logout](#) | 
 [Instructions](#) | 
 [Contact](#)



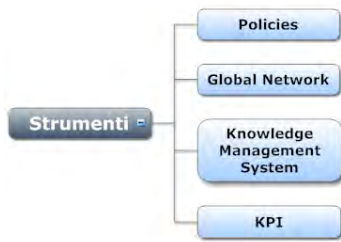
Browse the catalogue by:

[Radice](#) > **Industries**

- ▶ **Energy Environment (0)**  
[Thermal Insulation](#), [Energy Transport](#), [Earth Monitoring](#)
- ▶ **Automotive\* (1)**
- ▶ **Life Sciences (12)**  
[Imaging](#), [Cancer Therapy](#), [E Health](#)
- ▶ **Materials Analysis (3)**  
[Xray diffraction](#), [Neutron diffraction](#), [MRI System](#)
- ▶ **Data Knowledge Management (2)**  
[Data Mining](#), [Digital Libraries](#), [Distance Learning](#), [Computing \(Data Knowledge Management\)](#)
- ▶ **Cooling Refrigeration (0)**  
[Microchannel Cooling](#), [CO2 Cooling](#)
- ▶ **Nuclear Power Plants\* (5)**  
[Fusion experiments](#), [Dosimetry \(Nuclear\)](#), [Radiation tests \(Nuclear\)](#)
- ▶ **Safety Security (5)**  
[Homeland security](#), [Fire Detection](#), [Plant Monitoring](#), [Nuclear Safety](#), [Dosimetry](#)
- ▶ **Telecom Services (1)**  
[Videoconferencing](#), [Telecommunications \(Telecom Services\)](#)
- ▶ **Finance (0)**  
[Computing \(Finance\)](#)
- ▶ **Aerospace (4)**  
[Radiation tests](#), [Augmented Reality \(Aerospace\)](#), [Dosimetry \(Aerospace\)](#)
- ▶ **Manufacturing (0)**  
[Test Radiation Hardness](#), [Composite Materials](#)
- ▶ **Consumer Electronics (0)**  
[Portable Devices](#), [Computing \(Consumer Electronics\)](#)
- ▶ **Maintenance Operations (1)**  
[Automotive](#), [Nuclear Power Plants](#), [Aeronautics](#)

Totale item: 15

- TAC Services
- [Ricerca TAC](#)
- [Data Input Form](#)
- [Tech.Explorer](#)
- [Technology Applications](#)
- [Catalogue](#)
- [Manutenzione\\_OBS](#)



# Indicatori di performance (KPIs)

- Dipendono dalla **strategia**, dai canali e dagli strumenti
- Devono riflettere gli **obiettivi**, non semplicemente le attività svolte.
- Se possibile, facilmente misurabili e non ambigui
- Alcuni sono migliori degli altri.

Esempi per la strategia CERN (massimizzare impatto tramite disseminazione):

Number of patent applications



Number of patents awarded



Number of patents licensed



Number of devices with CERN technology sold



Number of people screened with devices using CERN technology



# Conclusioni

- ❑ Il trasferimento di tecnologie e conoscenze è un «dovere sociale» ma anche un'enorme opportunità di acquisire nuove risorse, finanziarie, intellettuali, ecc.
- ❑ E' un'attività che richiede risorse significative, essenziale quindi definire chiaramente gli obiettivi e sviluppare un piano d'azione coerente.
- ❑ E' un'attività i cui risultati vanno monitorati di continuo ma valutati in un'ottica di lungo termine.
- ❑ La gestione delle conoscenze tramite strumenti avanzati (classificazione semantica) facilita sia il trasferimento all'esterno che la trasmissione del know-how all'interno dell'organizzazione.

Grazie per la vostra attenzione!

Per approfondimenti: [claudio.parrinello@innovatics.ch](mailto:claudio.parrinello@innovatics.ch)