

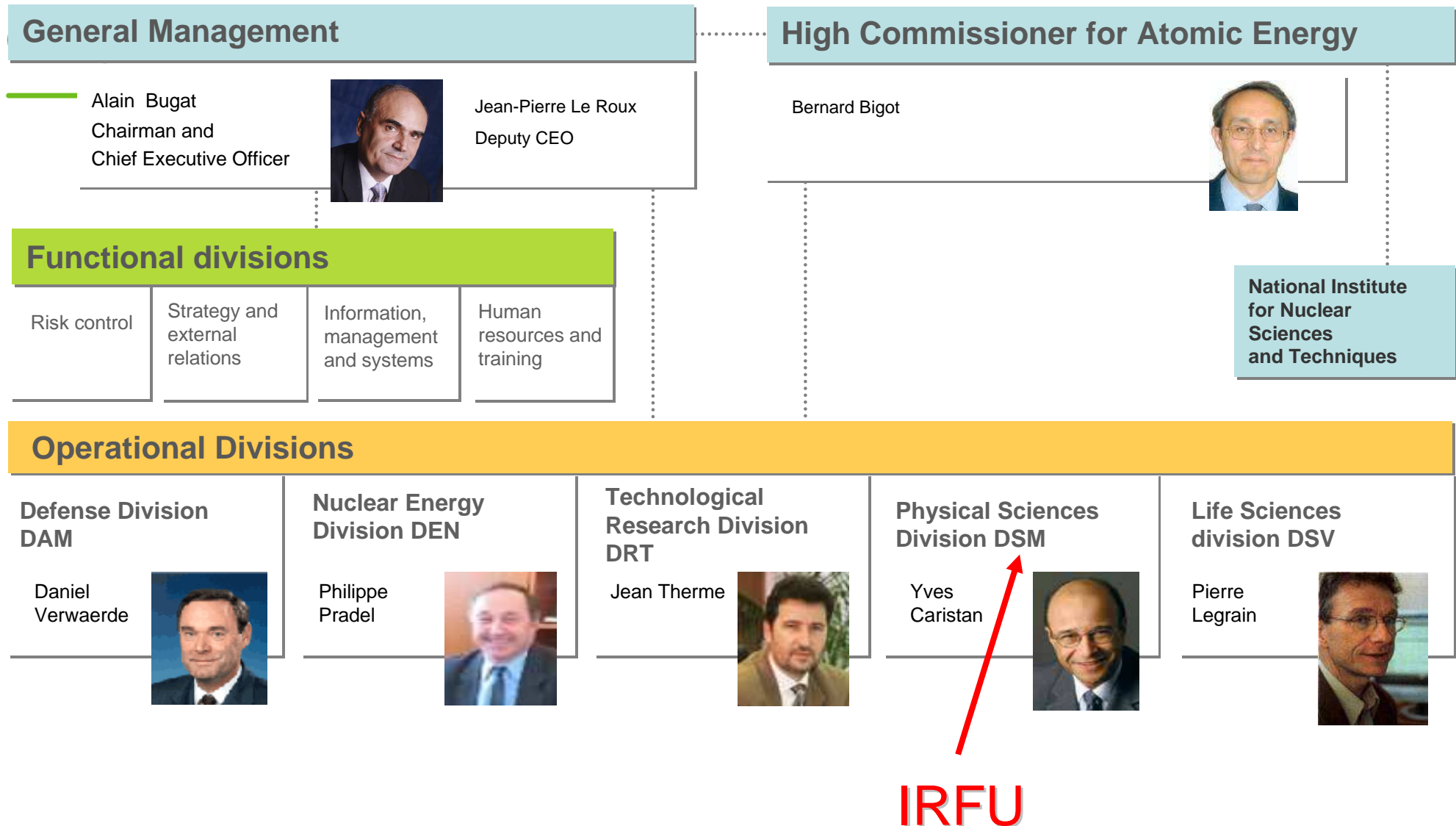
150 anniversary of Japanese-French relations



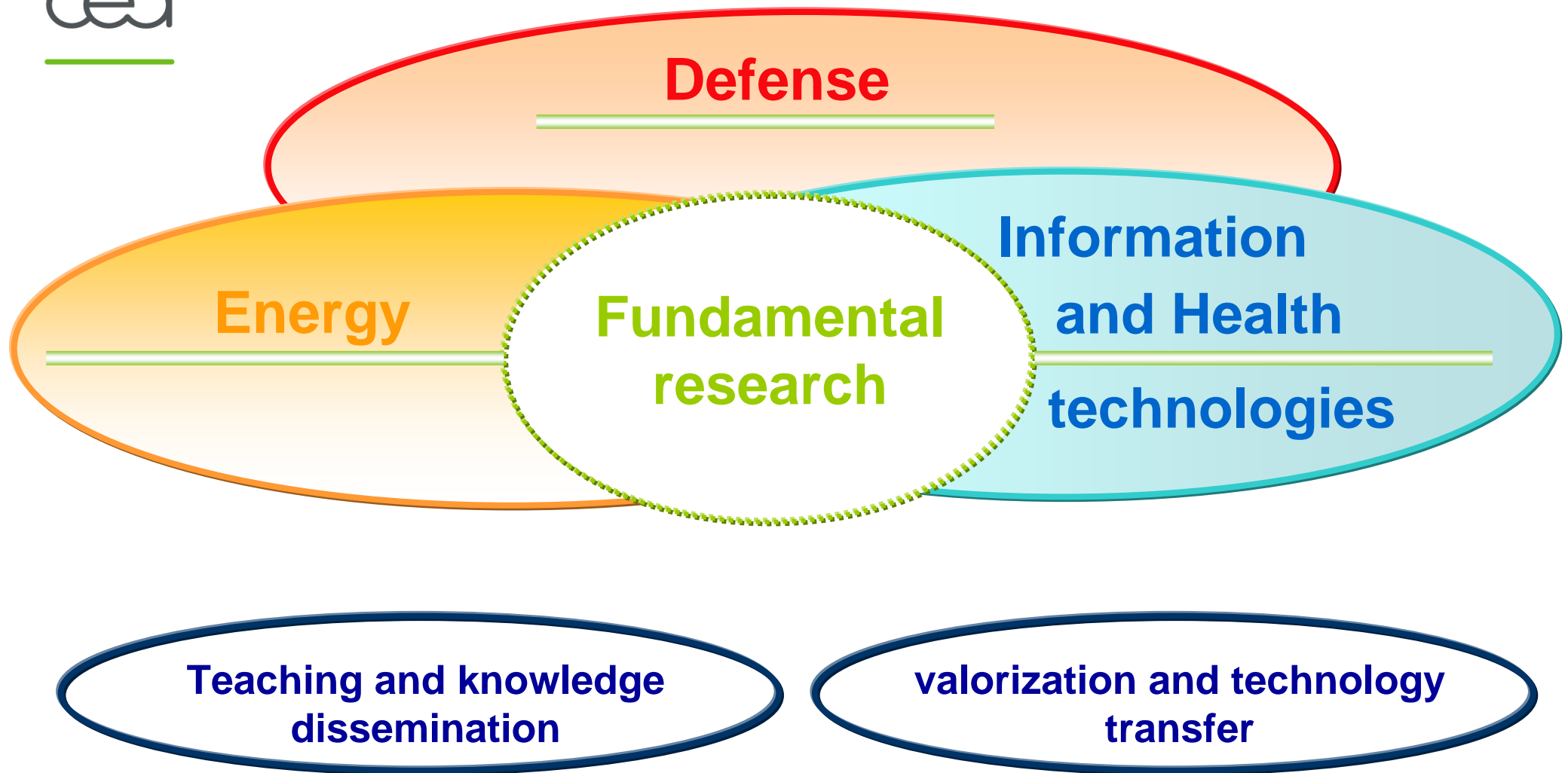
The ongoing relationship between Japan and France started with the treaty of peace, friendship and commerce signed on October 9th 1858 (September 3rd for the old Japanese Moon calendar)

To see events: http://www.fr.emb-japan.go.jp/150/medias/pdf/150_2008_5.pdf

CEA : Organization



CEA programs : diversity and coherence



Civilian CEA key figures



✓ **10,500 employees**

✓ **Budget: €1.9BN, including €840M in subsidies**



✓ **3,293 scientific publications in 2005 (ISI base)**

✓ **Over 1000 PhD students**

✓ **305 priority patents filed**

✓ **1250 delivered priority patents in portfolio**

✓ **667 active partnership agreements with industries**

✓ **364 current licence agreements**

✓ **100 spin-off start-ups created from the CEA since 1984**

✓ **Main shareholder of AREVA group**

61,000 employees and €10.9BN in turnover

Local player with the French Regions



Materials
Centre, Bourgogne

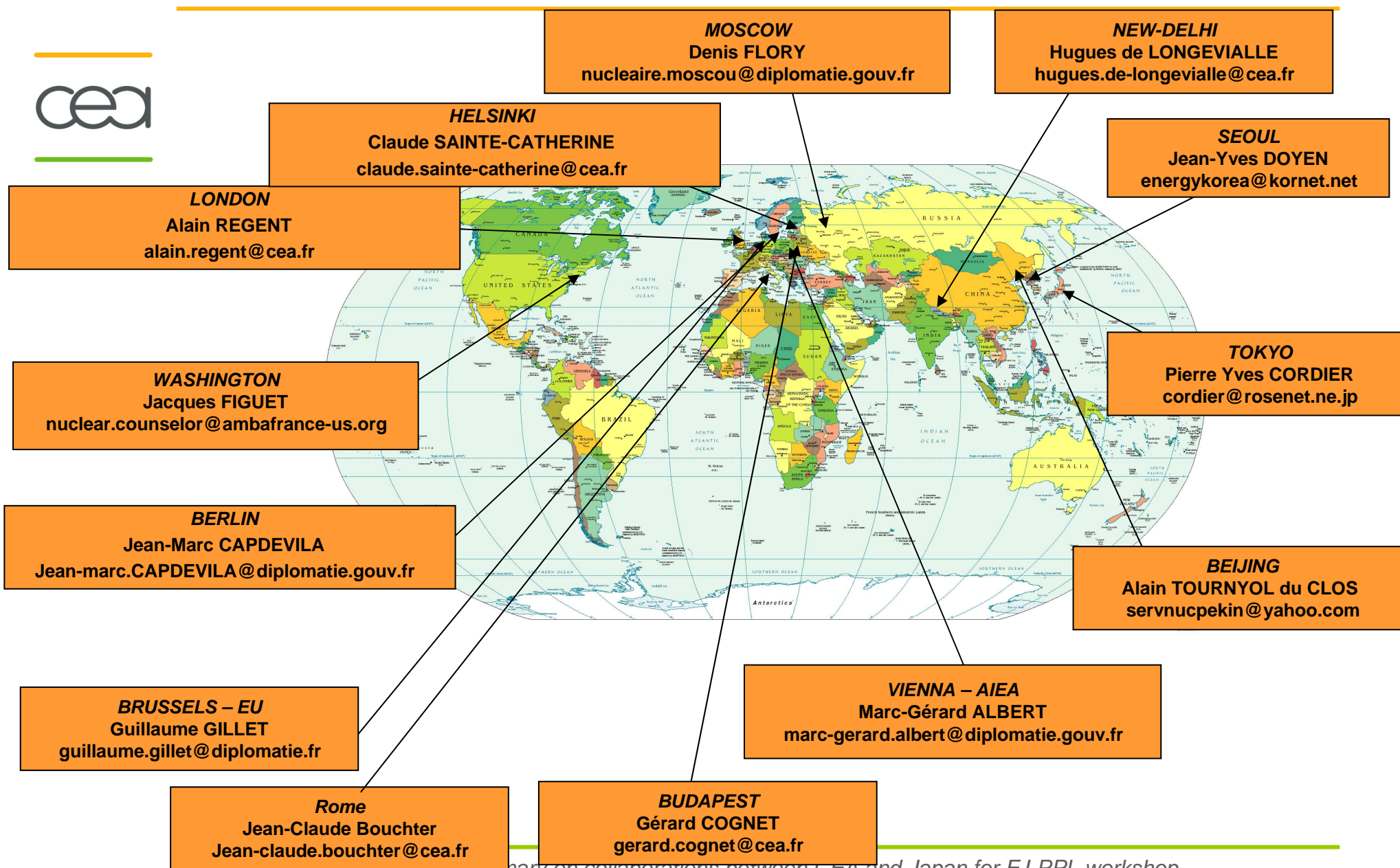
Lasers and plasmas
Aquitaine

Nuclear sciences, fundamental research,
software technologies, high performance
computing, biomedecine
Ile de France

Micro/Nanotechnologies
Nanobiotechnologies
Rhône-Alpes

Nuclear :
● Fusion, fission
Provence Alpes Côte d'Azur
● Nuclear fuel cycle and
waste management
Vallée du Rhône

CEA counselors network in French Embassies



Formalized Research Collaborations with Japan:



- **Particle Physics**
- **Nuclear Physics**
- **Nuclear Energy**
- **Fusion (ITER and Broader Approach)**
- **Life Sciences**

Additionally many lab-to-lab collaborations without signed agreement

Particle Physics



- **FJ-PPL (reason why we are here) with CNRS**



- **K2K: KeK E 362 baseline neutrino oscillations (agreement applicable up to 2023)**
- **Agreement on applied superconductivity and cryogenics (only bilateral agreement between KeK and CEA)**

Nuclear Physics : Nuclear Structure Problems FJ-NSP



Together with CNRS and GANIL at Caen



RIKEN: Nishina Center for Accelerator-Based Science (based in Wako Institute). RIBF Radio Active Beam Factory

GANIL



▲RIKEN Wako Institute



▲RIKEN Harima Institute



▲Terahertz-wave Research Program



▲RIKEN Tsukuba Institute



▲RIKEN Yokohama Institute

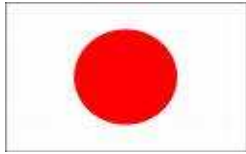


▲RIKEN Kobe Institute



▲Bio-Mimetic Control Research Center

Nuclear Energy : more than 30 years of partnership



- **Agreement between Japanese and French governments on pacific use of nuclear energy (Feb 1972)**
- **Technical cooperation : a 15+ year old framework agreement**
 - CEA / JNC Agreement in the field of Advanced technology R&D for nuclear energy (june 91 to june 06)
 - CEA / JAEA Framework agreement for cooperation in the field of nuclear R&D (dec 05 for 5 years)

Fields covered : mainly R&D on future systems

Implementation : exchange of informations, services, staff ; training

Japan and France committed to the industrial implementation of nuclear power for many decades and developing an “historic” technological partnership



- 34 900 MWe units
- 20 1300 MWe units
- 4 1500 MWe units

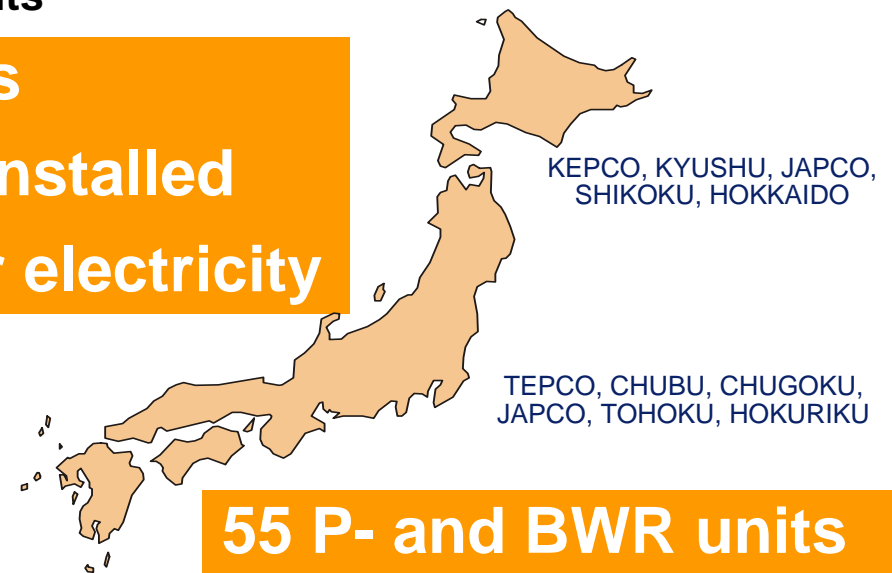
58 PWR units

63184 MWe installed

~80% nuclear electricity

Connection to the grid :

- Unit 1 (Fessenheim 1) : April 1977
- Unit 58 (Civaux 2) : Décembre 1999
(EPR under construction)



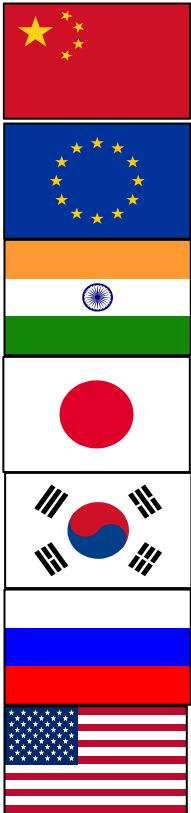
- Unit 1 (Tsuruga 1) : March 1970
- Unit 55 (Shika 2) : March 2006
(1 PWR and 1 ABWR under construction)

55 P- and BWR units
47577 MWe installed
~30% nuclear electricity

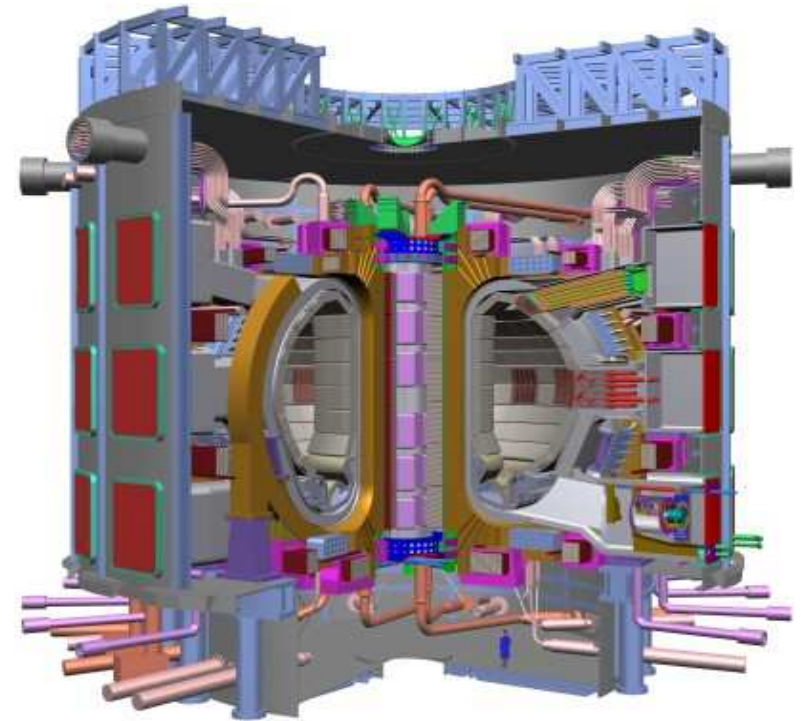
Fusion: ITER



- ITER (“the way” in Latin) is the essential next step in the development of fusion.
- Objective - to demonstrate the scientific and technological feasibility of fusion power.
- The world’s biggest fusion energy research project **€5bn.**
- An international collaboration.



Cadarache
France (on
CEA
premises)

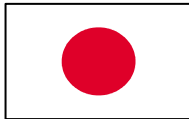


... and Broader Approach (BA) - between EU and Japan



Signature of agreement on BA in Feb. 2007 - Mr. Taro Aso, Minister for Foreign Affairs of Japan and Mr. Hugh Richardson from the European Commission

BA is the result of the ITER negotiations between the EU and Japan



The cooperation aims to complement the ITER Project and to accelerate the realisation of fusion energy by carrying out R&D and developing some advanced technologies for future demonstration fusion power reactors (DEMO).



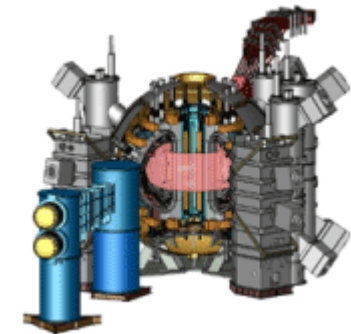
BA: 3 different projects



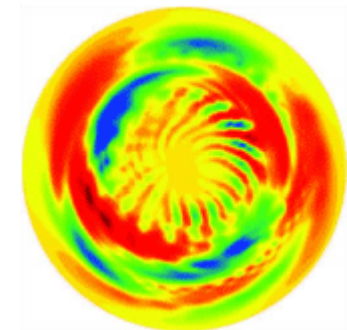
- **International Fusion Materials Irradiation Facility (IFMIF).** (high neutron fluxes, challenges for materials) Group for design studies installed at Rokkasho; large implication from CEA/IRFU



- **Japan-EU “Satellite” Tokamak Programme**
JT-60U -> JT-60SU (tokamak will be superconducting); implication of CEA institutes: low temperatures group and fusion institute



- **International Fusion Energy Research Centre (IFERC):** simulation, coordination of DEMO design and R&D activities



Life Sciences



- 2 Agreements:

- With University of Tokyo on nanopores and nanochannels



THE UNIVERSITY OF TOKYO

- With National Institute of Radiological Sciences (NIRS) on Radiobiology, medical imaging and radiotoxicology (workshop every 2 years)



National Institute of Radiological Sciences
独立行政法人 放射線医学総合研究所

... Agreements In discussion University of Tokyo, University of Kyoto concerning Neurospin (Magnetic resonance imaging Facility) and participation to workshop in Kyoto this year



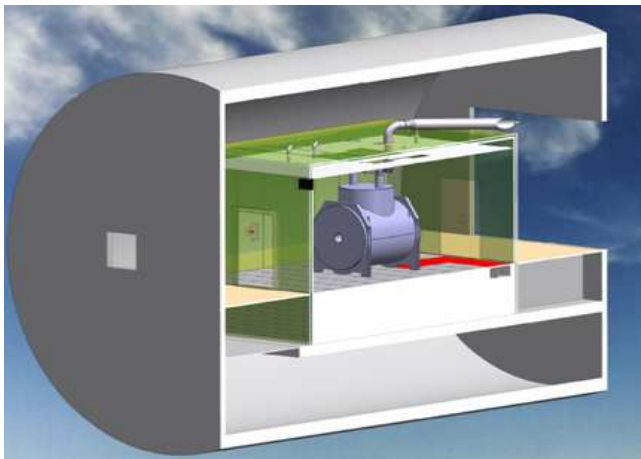
NeuroSpin

Neuro-imaging tools @ Neurospin at CEA/Saclay



3T Magnet (Tim Trio Siemens)

« Hospital » MRI scanner (60 000 x earth field)



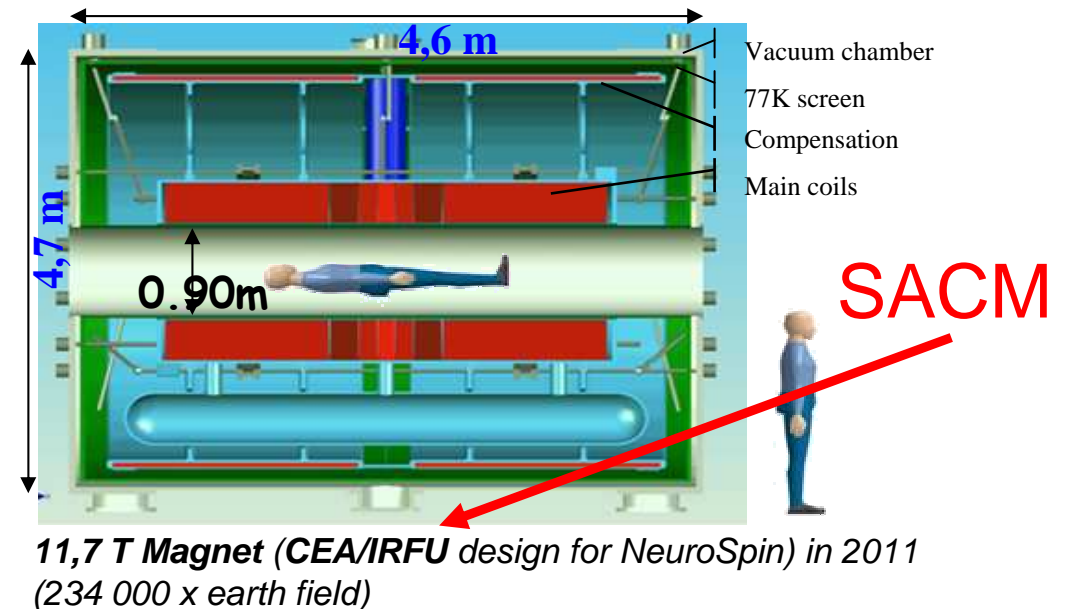
17,65T Magnet (Bruker) (353 000 x earth field)

with room shielding installation



7T Magnet (Siemens/Magnex) (140 000 x earth field)

The magnet (25 tons) is surrounded by 450 tons iron shield.



11,7 T Magnet (CEA/IRFU design for NeuroSpin) in 2011
(234 000 x earth field)

High Energy Physics as a driver for emerging research topics



High energy physics is exciting by itself ...and is also extremely useful for:

- **IFMIF/EVEDA for fusion as energy source (Broader Approach) for DEMO**
- **Strong and homogenous magnets used for medical imaging (Neurospin): break through in neurological sciences (cognition and diseases like Alzheimer)**
- **Synchrotrons; 4th generation light sources -> important for nanosciences**
- **High Energy Physics has long tradition in very large international collaborations; this experience is very useful to other research topics going global, like for example.....**

Collaboration Agreement between CERN and ITER



Cooperation agreement signed on March 12th 2008:
long experience of CERN available to ITER in areas of
technology and administration.

Robert
Aymar



Kaname
Ikeda

Thank you for your attention
Arigato gozaimas!