

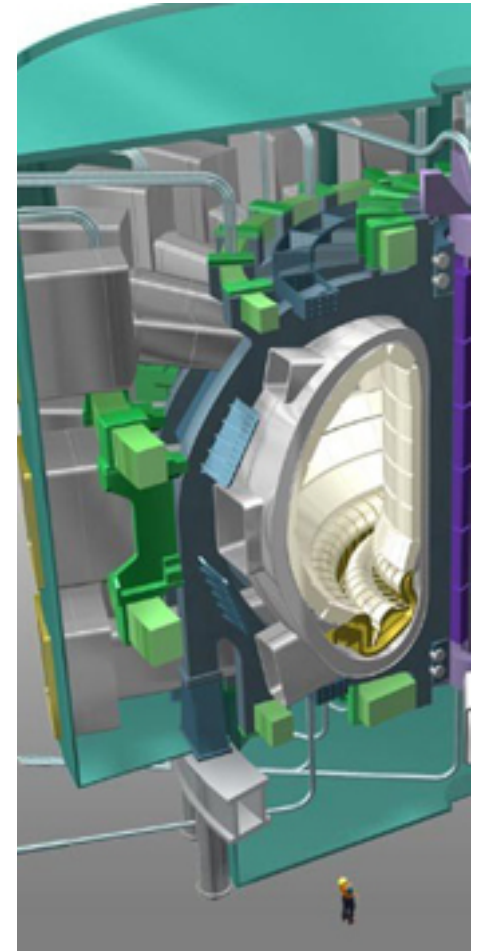
# ITER-NL

DUTCH-FRENCH COOPERATION ON ITER PROJECT  
French delegation's mission in The Netherlands

# Goals of ITER-NL



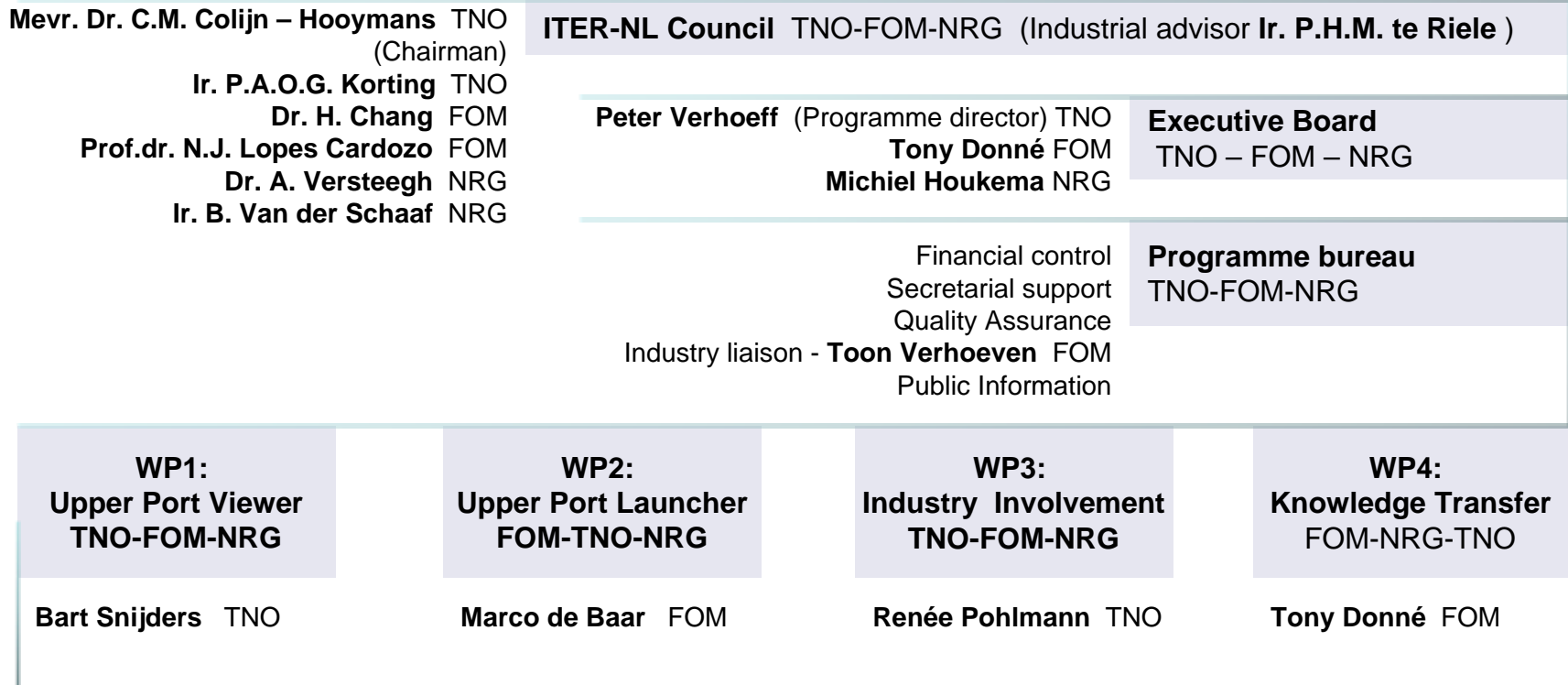
- A strong participation of Dutch industry in the ITER project
  - Involve Dutch (niche) technology in ITER via international partnerships
- Front line participation of Dutch scientists in the scientific programme of ITER
  - Involve Dutch competences in Burning Plasma Control, Optical detection and Material



# ITER-NL – Dutch Programme for Industry and Science (Founded 2007)



## Organization



# Opportunities and candidates



## ITER Focus Areas

ITER Focus Area	Companies involved in the ITER-NL programme
Blanket & Divertor	VDL Enabling Technologies Group, Urenco Nederland, Schelde, Xycarb Ceramics
Vacuum Vessel	Exploform, Schelde Exotech, Geodelta, VDL Enabling Technologies Group
Remote Handling	Dutch Space, Heemskerk Innovative Technology, Atkins Nedtech, TreeC Technology, Geodelta, Philips Applied Technologies, Oxford Technologies
Vacuum Pump, Fuelling & Cryoplant	DeMaCo Holland, Dutch Space, NEM
Control and Data Acquisition	Science & Technology, INCAA Computers, Philips Applied Technologies, Draka Comteq Telecom, Hitec Power Protection, Imtech Vonk
Diagnostics	Heemskerk Innovative Technology, Draka Comteq Telecom, Dutch Space, NEDINSCO, VDL-ETG, Urenco Nederland, Heeze Mechanics, Atkins Nedtech, Oostendorp Apparatenbouw
Heating Systems	Heeze Mechanics, Atkins Nedtech, Dutch Space, Element Six, Heemskerk Innovative Technology, INCAA Computers, TreeC Technology,
Buildings	Royal BAM Group, DHV, Royal Haskoning, Fugro, Heras Nederland,
Logistics & Assembly	Mammoet, Schelde Exotech,

# ITER-NL partners



Knowledge development- and transfer, liaison to industry and SME's, programme management and QA



Science on fusion, interface to international fusion community



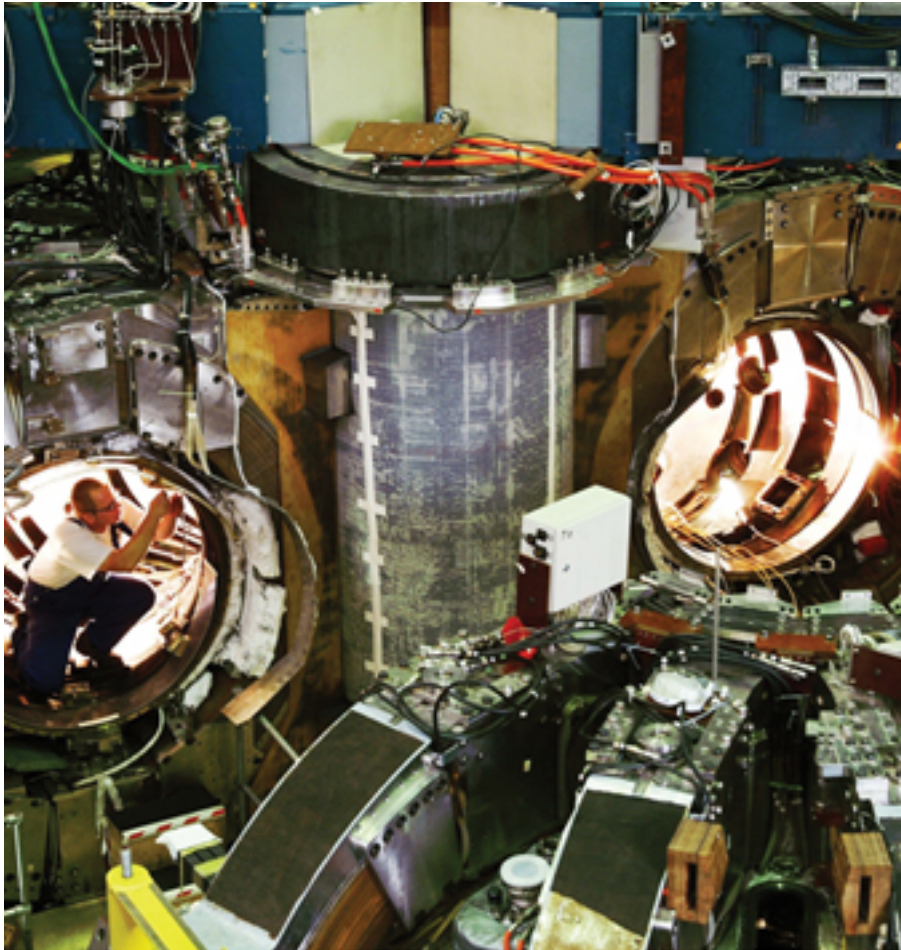
Nuclear expertise: material, test and qualification, interface to fusion nuclear technology community, rules and regulations and QA

**All partners contribute their core competences**

**ITER-NL is an open programme**



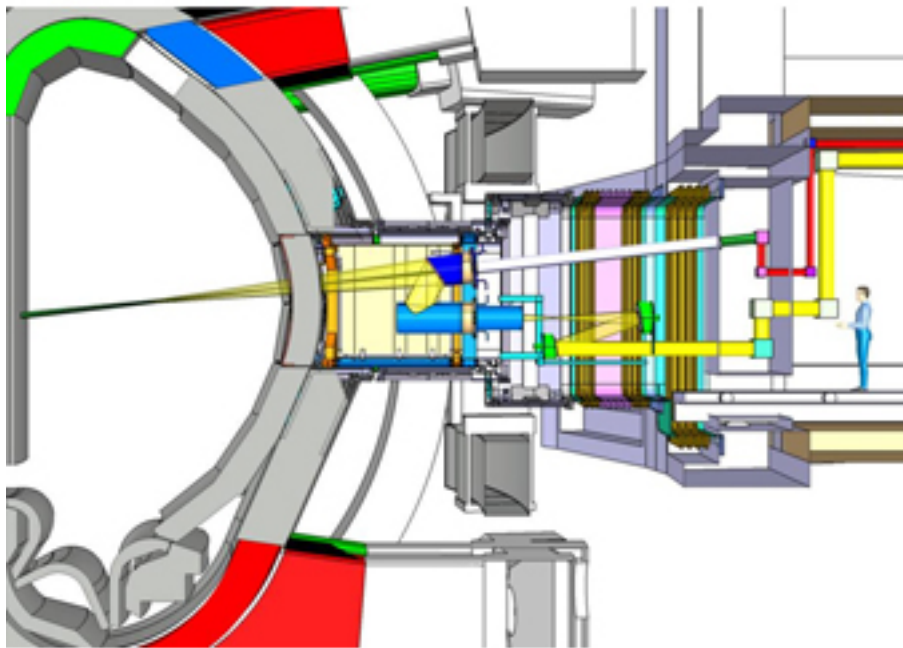
- **NRG**  
NRG is the nuclear expertise centre in the Netherlands, and exploits a first-rate nuclear R&D infrastructure with High Flux Reactor, Hot Cell Laboratories and associated laboratories. NRG products and internationally renowned expertise are frequently called on by both government and industry.



- FOM

The institute has specialized in major fields of tokamak research:

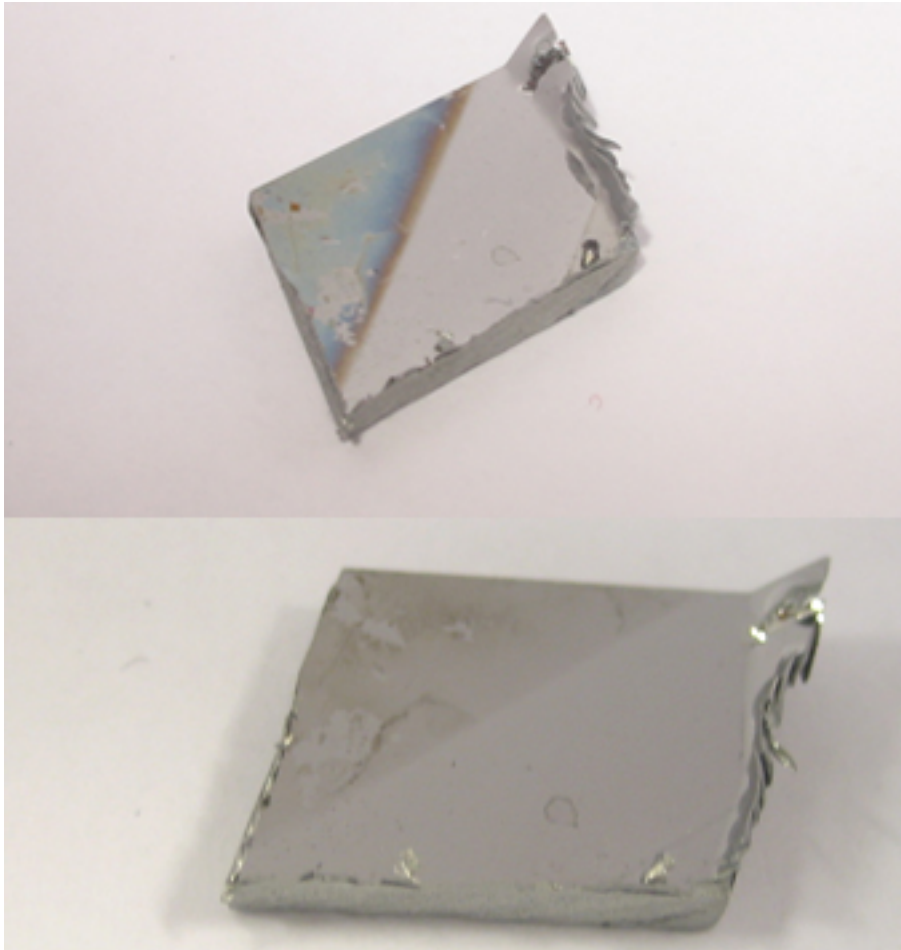
- Diagnostics development, in particular high resolution electron diagnostics
- Microwave plasma heating (ECRH) and current drive (ECCD)
- Plasma-Surface Interaction (Magnum PSI)



- TNO

Highlights of some fields of expertise for ITER:

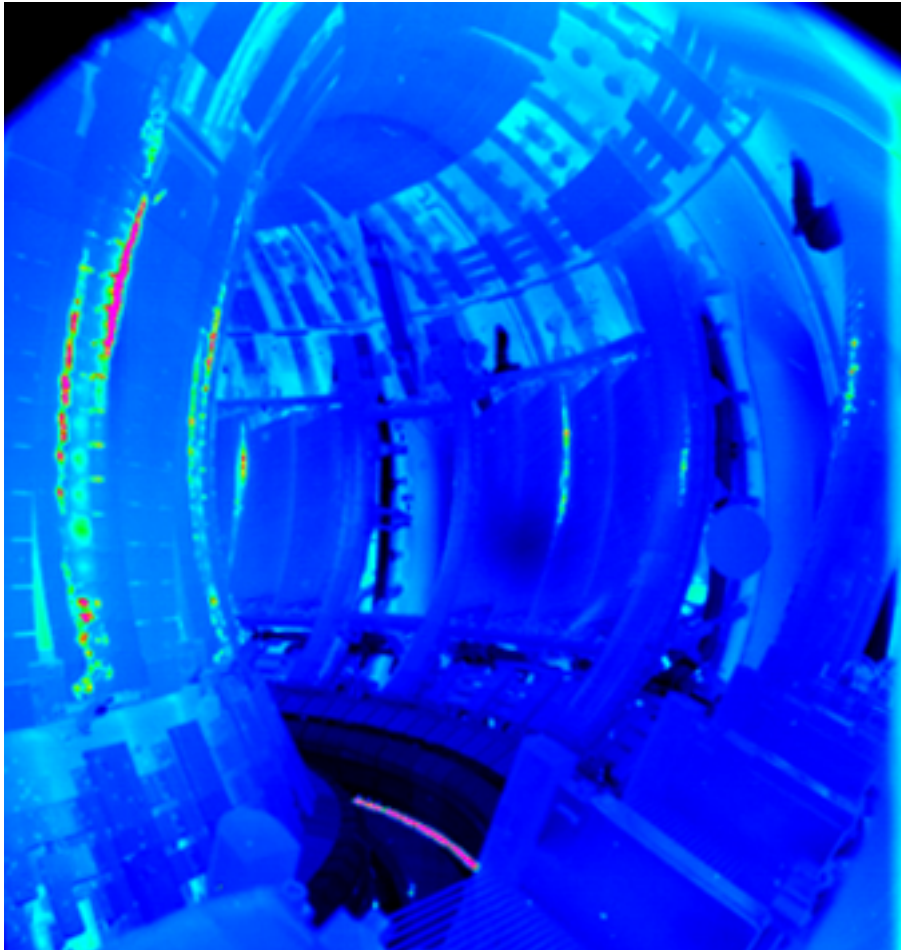
- Opto-mechanical instruments Diagnostics development:
  - Infrared viewing system (Endoscope for JET)
  - Spectrometers
  - Lidar systems
  - Including Port plug design



- TNO

Highlights of some fields of expertise for ITER:

- Materials development Plasma facing optical components:
  - Materials
  - Manufacturing of optical surfaces (e.g. Tungsten, Mb, world's first Single Crystal concave mirror)
  - Contamination Control and Cleaning of surfaces



- TNO

Highlights of some fields of expertise for ITER:

- Plasma control
  - CODAC
  - Real-time Control
  - Studies & Experiments at JET



- TNO

Highlights of some fields of expertise for ITER:

- Explosive bonding, -forming, and -hardening of metals
  - Tungsten clad on side-parts of divertor mock-up (with NRG and EFDA support)



- TNO

Highlights of some fields of expertise for ITER:

- High power microwave and IR technology
  - Microwave diagnostics
  - Design of innovative microwave components (antennas, filters, transmission lines)



- TNO

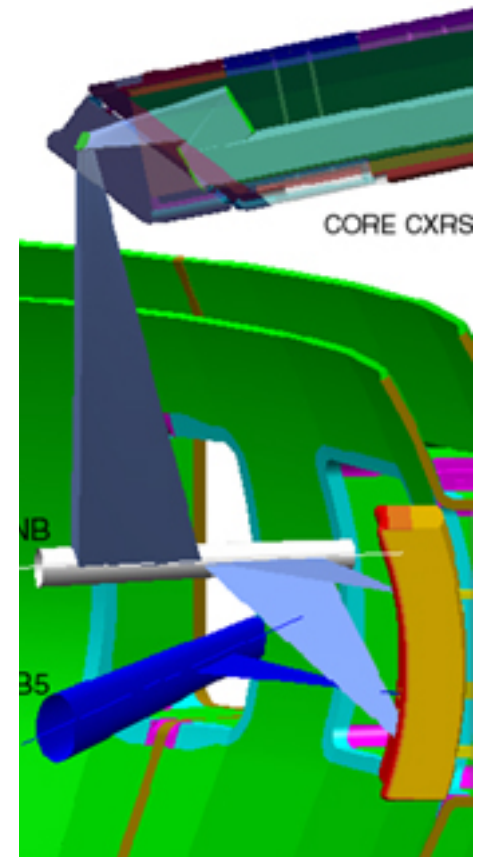
Highlights of some fields of expertise for ITER:

- Electric power technology
  - Pulsed power
  - Plasma (nano-)coatings

# Workpackage1 CXRS diagnostic system

As leading party in a European consortium  
ITER-NL develops (with the support of Dutch  
industry)

- A diagnostic portplug for Charge Exchange  
Recombination Spectroscopy (CXRS)
- A spectrometer system
- A glassfiber link between portplug and  
spectrometer.

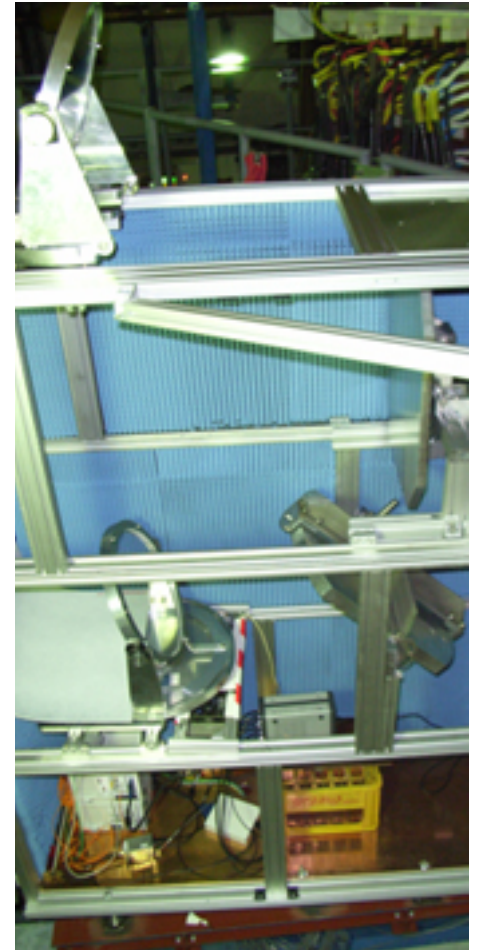


# Workpackage2 ECRH Heating System



As important partner in a European consortium ITER-NL develops (with the support of Dutch Industry)

- Remote handling technology
- Plasma burn-control strategies and – hardware
- Facilities for the verification and testing of (upper) port plugs



# Workpackage3 Industry Involvement



- Make Dutch Industry and SME's aware of the ITER project
- Assist in the assessment of the companies business cases
- Disseminate information about upcoming calls for tender, applicable procedures, nuclear regulations and necessary qualifications
- Give support to companies to improve their technology position
- Stimulate participation in international consortia
- Interfacing with ITER, F4E and international fusion community



# Workpackage3 Industry Involvement



Ongoing technology developments with  
ITER-NL support (1)

## Exploform

- Explosive forming of large, thick steel plates into precise double-curved panels, and metallic claddings

## DeMaCo

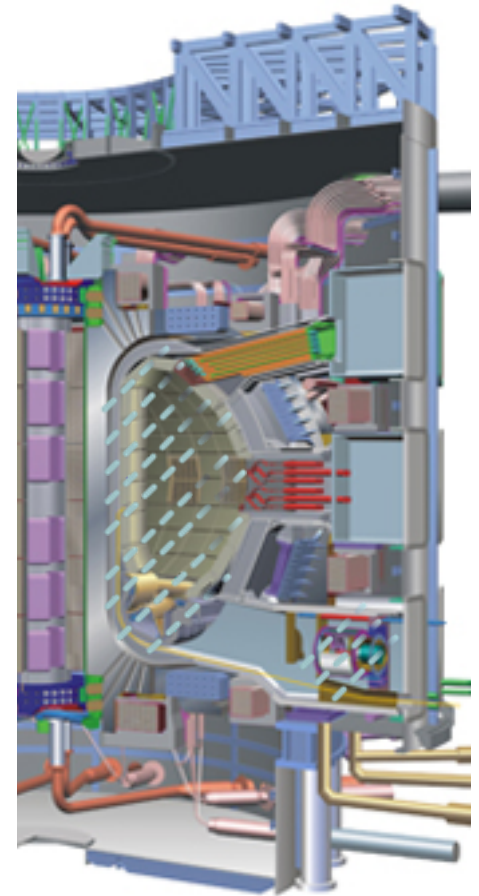
- Prototyping of Cryopump

## Dutch Space

- Positioning for 23P6 Hotcell  
Repair/Maintenance Equipment

## Science and technology

- Prognostic health management for ITER



# Workpackage3 Industry Involvement



Ongoing technology developments with  
ITER-NL support (2)

## **Philips Advanced Metal Solutions**

- MIM tungsten for in-vessel components – alternative production technology for high precision elements

## **Atkins Nedtech**

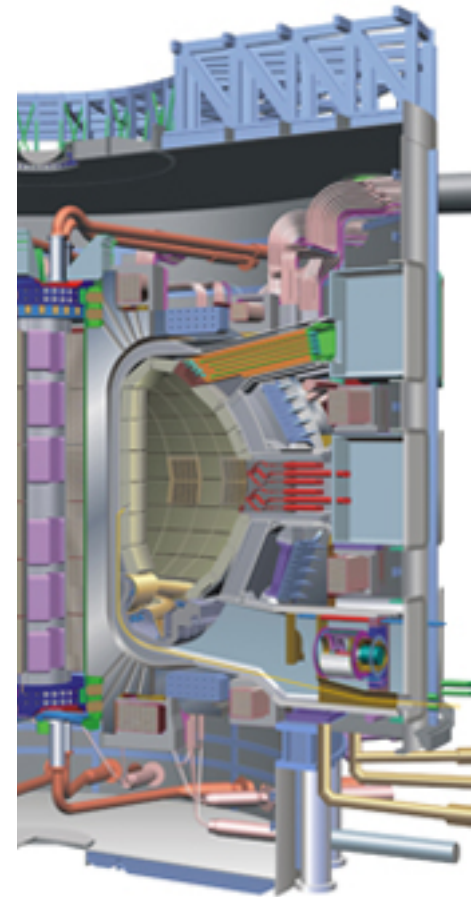
- Maturing the design of ITER Hot Cell Remote Handling tools for portplugs

## **Urenco Stable Isotopes**

- Enriching materials for ITER – improving materials by adapting the isotopical composition

## **HIT, TreeC, Dutch Space**

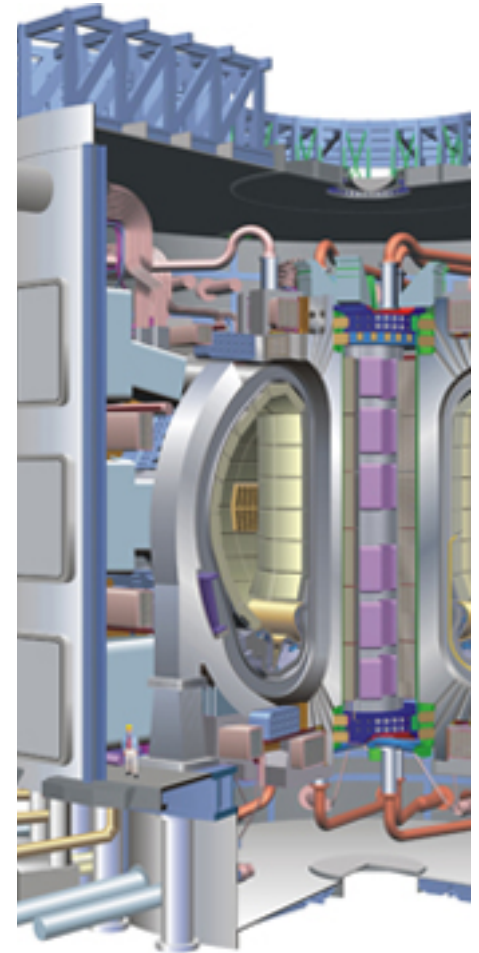
- Virtual Slave – prototype operational- and trainingssimulator



# Workpackage4 Knowledge Transfer



- Provide information about the ITER project to Dutch industry
- Promotion of companies involved in ITER-NL
- Training and courses – Nuclear technology and regulations, CATIA, QA
- Public Relation – societal promotion of fusion energy
- Outreach – interesting scholars and involving students and postdocs



For further information or requests for support you are kindly invited to contact ITER-NL.

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