ITER (International Thermonuclear Experimental Reactor) and the Finnish Industry

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Presentation

- General about large scale science projects or centres
- ITER –project
- How to participate the ITER-project
- Finnish industry in ITER
- Examples of products

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Large Scale Science Projects

- Part of national innovation systems of their Member States
  - Science & innovation & education platforms
    - Training & intersectoral knowledge transfer
  - Learning for organizations
    - Leverage for other markets and international R&D collaborations
- Business opportunity
  - Total volume of procurement in multi billion euro yearly volume
  - Two-way technology transfer
    - Platforms for innovations that potentially may turn out having ground braking applications

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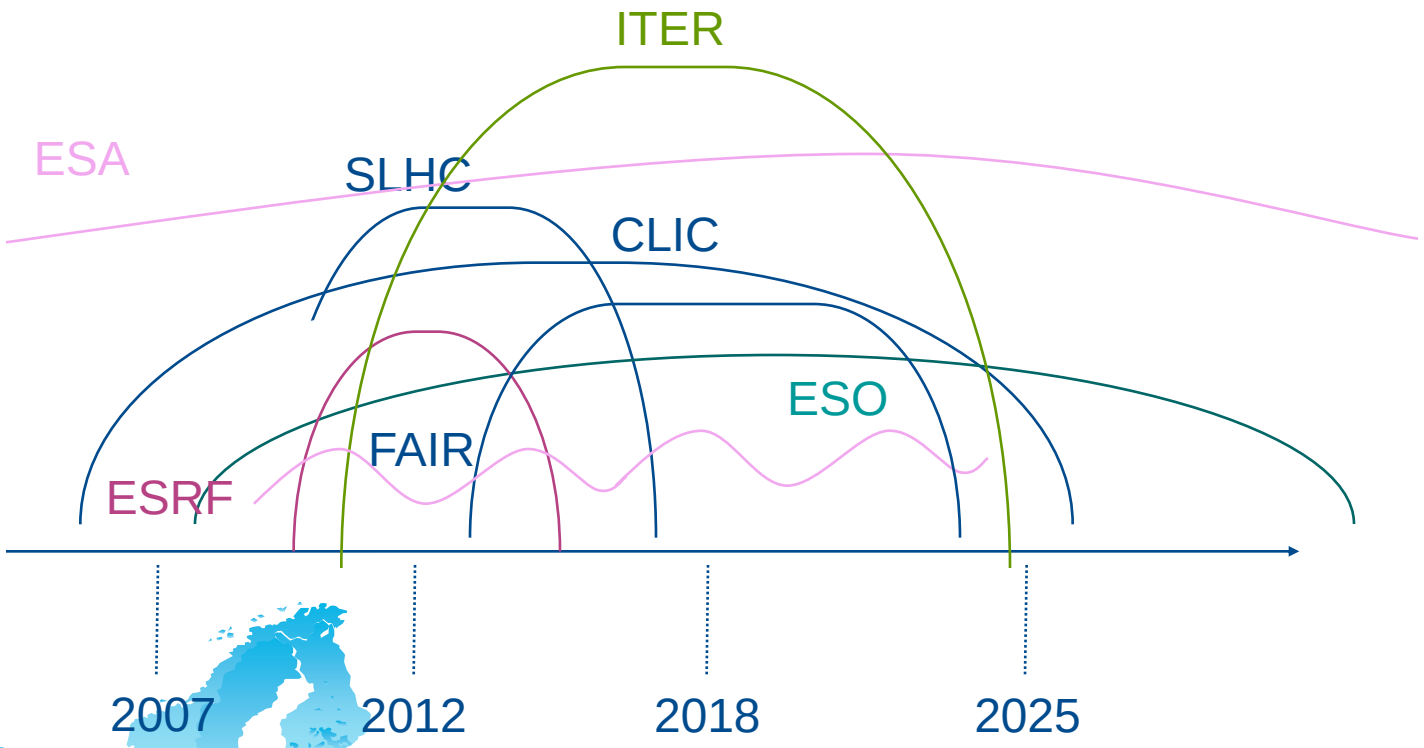
Project cycles



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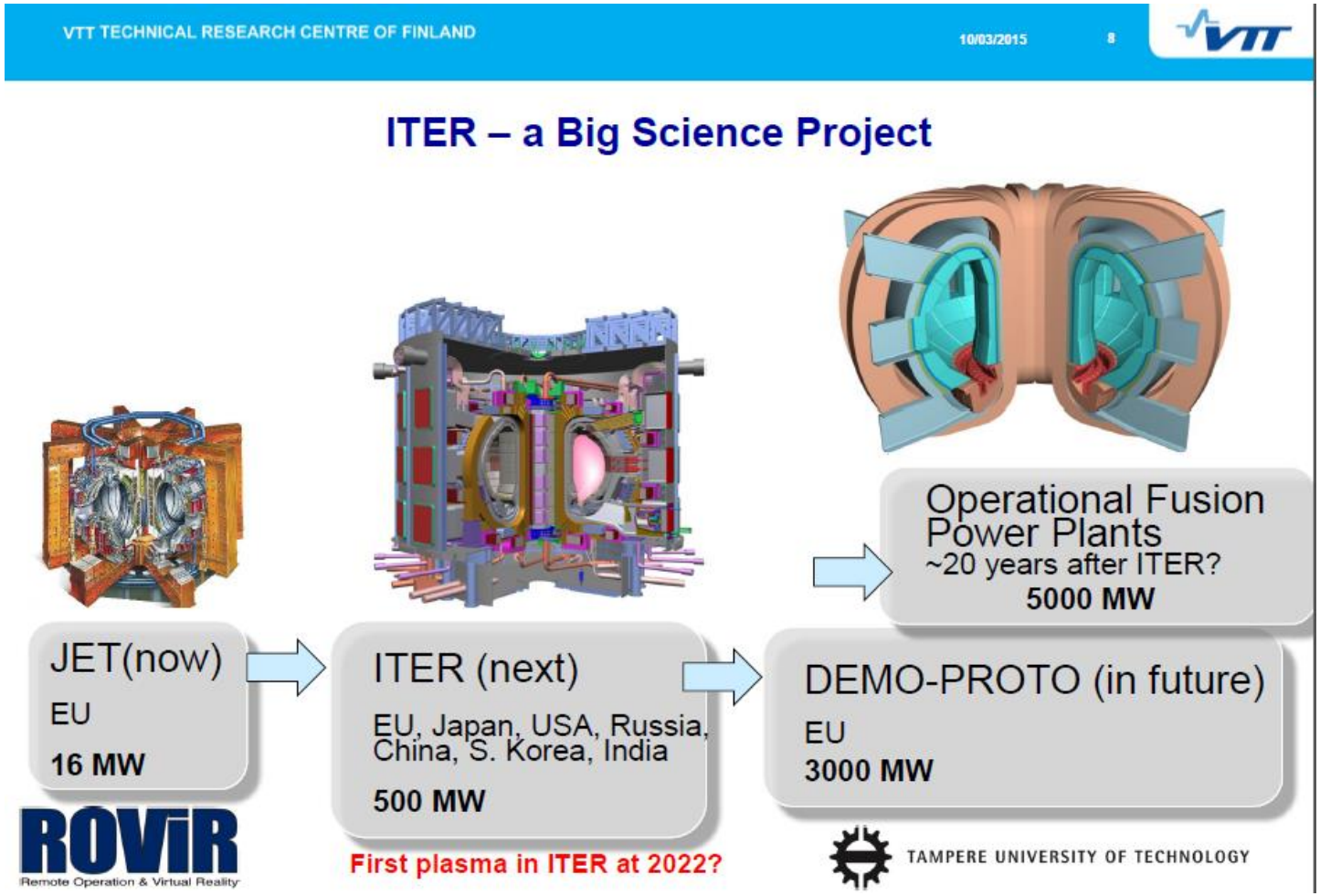
Fusion milestones JET – ITER - DEMO



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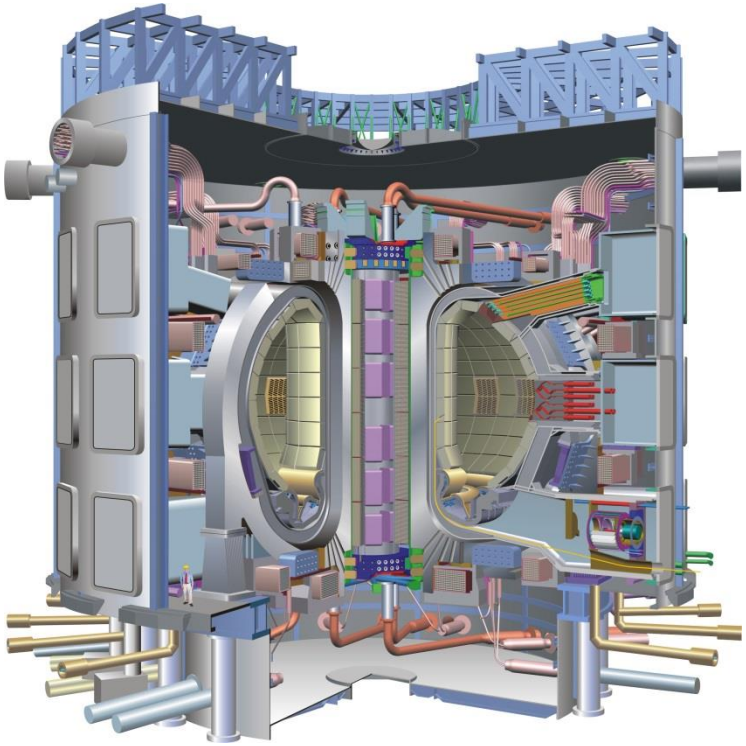
ITER in 5 minutes

- https://www.youtube.com/watch?v=cCkp2SEsfao



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How to co-operate with ITER

- ITER Organisation (IO) is representing the non-EU countries and managing the in-kind procurement from member states
  - 10 % of the budget reserved for procurements from other suppliers

http://www.iter.org/

- F4E is responsible for Europe's contribution (45% of total costs)
  - Call for tenders published in the F4E Industry portal and also in The EU's Official Journal
    - Grants for research activities (national funding needed)
    - Procurements for the construction of ITER

https://industryportal.f4e.europa.eu/IP_PAGES/ehome.aspx

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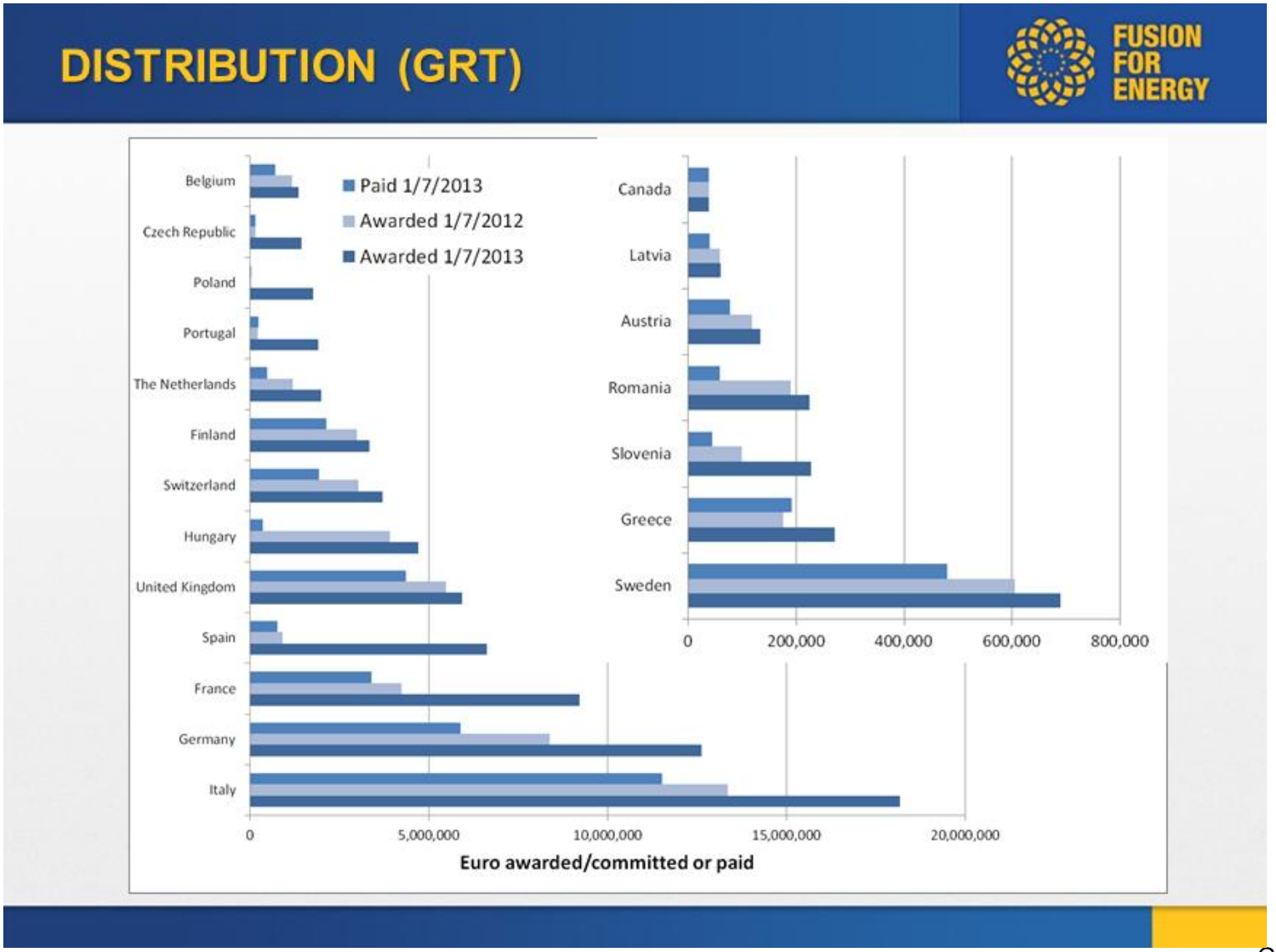
Distribution of grants (€)



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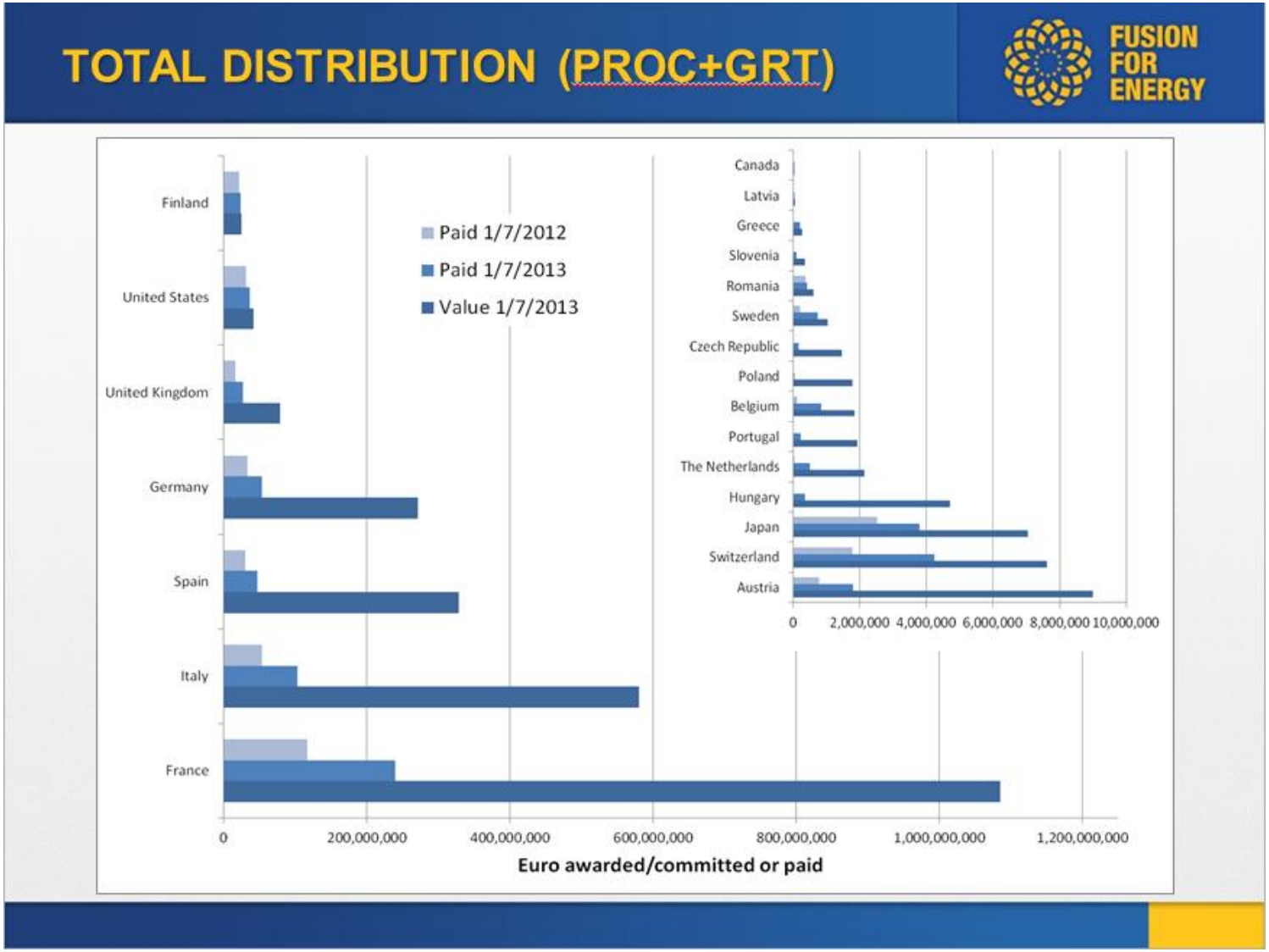
Geographical distribution of contracts



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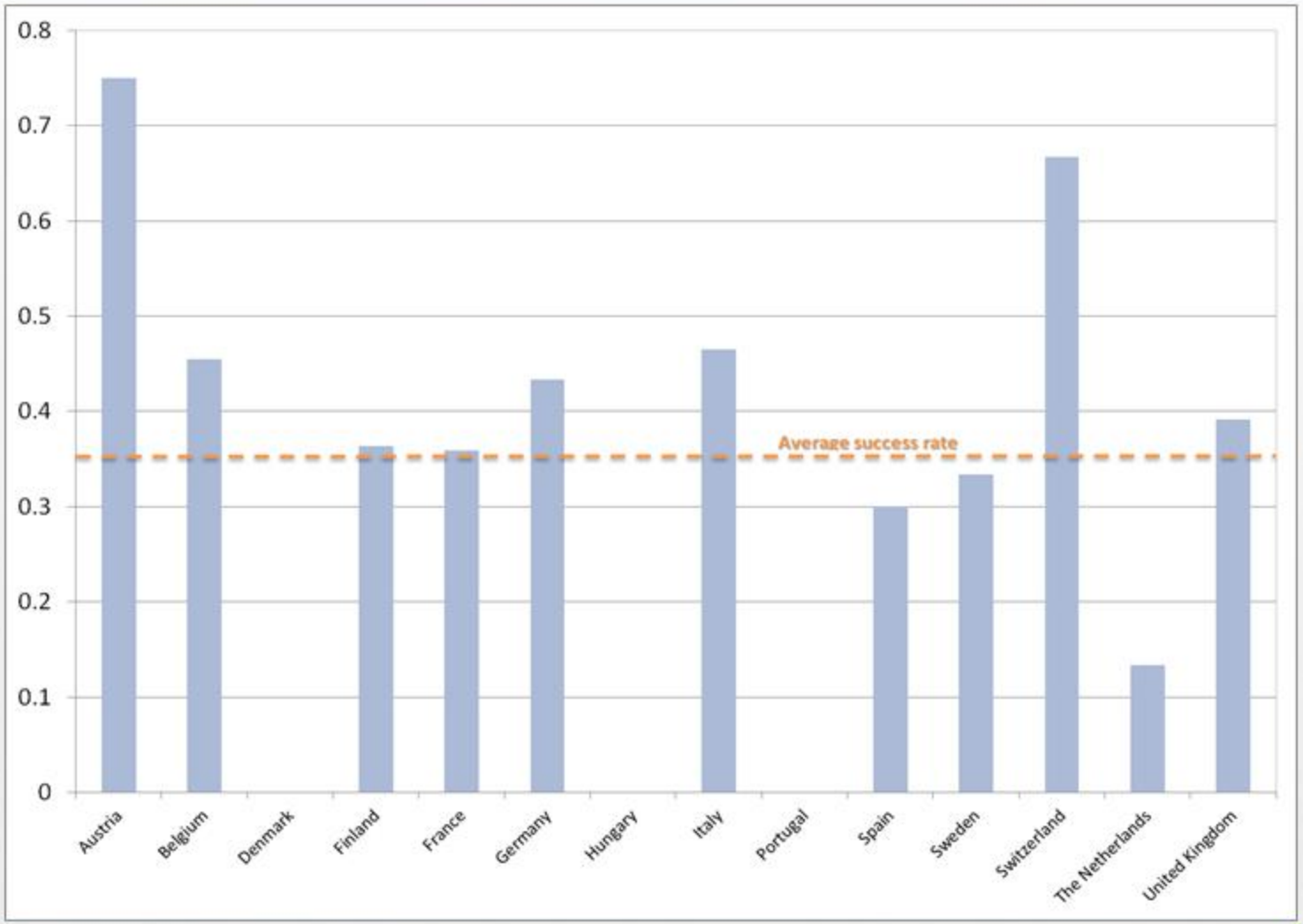
SUCCESS RATE (PROC)



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Finnish business in ITER – total 32 M€

Company – product, (buyer), year

- Luvata – copper cables , F4E, 2009
- Diarc Tech – surface coating, VTT/JET, 2009-2013
- Metso - PM HIP –blocks, 2010
- VTT - Lip Seal development, IO, 2010-2013
- Luvata – super conductor, F4E, 2011
- Metso - PM HIP, F4E, 2012
- Outokumpu – steel plates, 2012
- Space Systems Finland, IT services, F4E, 2013-2017
- Hollming Works - Divertor proto, F4E, 2014
- VTT - Divertor tests, IO, 2014

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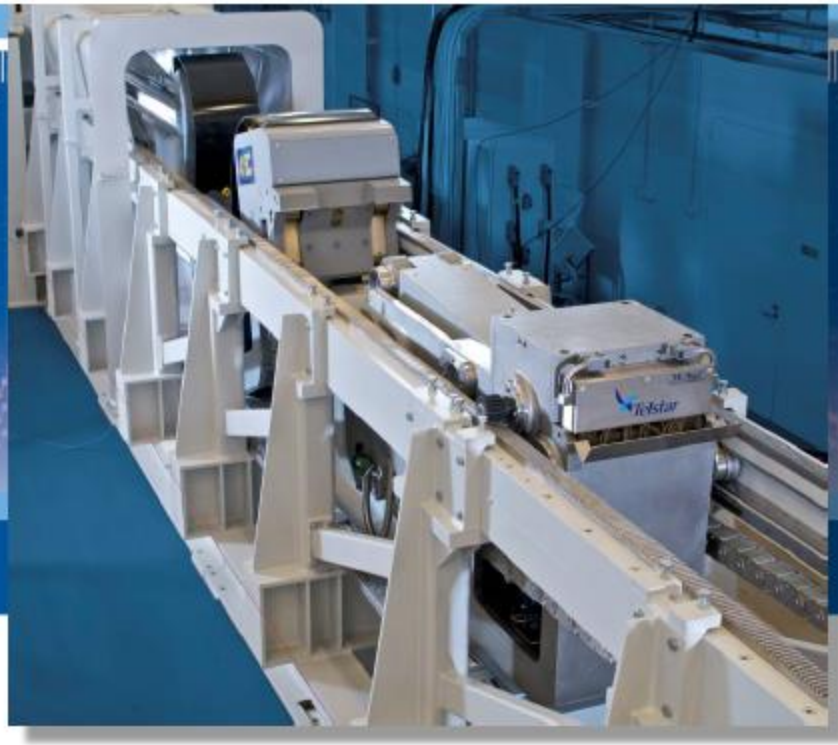
ROViR - Remote Operations and Virtual Reality Center



- Established to conduct research for ITER fusion program in collaboration with VTT and Tampere University of Technology (TUT)
- Hosts (VTT) a full-scale model of the fusion reactor divertor maintenance system, Divertor Test Platform (DTP2)
- Specialises in developing remote handling and virtual reality applications for industrial needs

ROViR
Remote Operation & Virtual Reality

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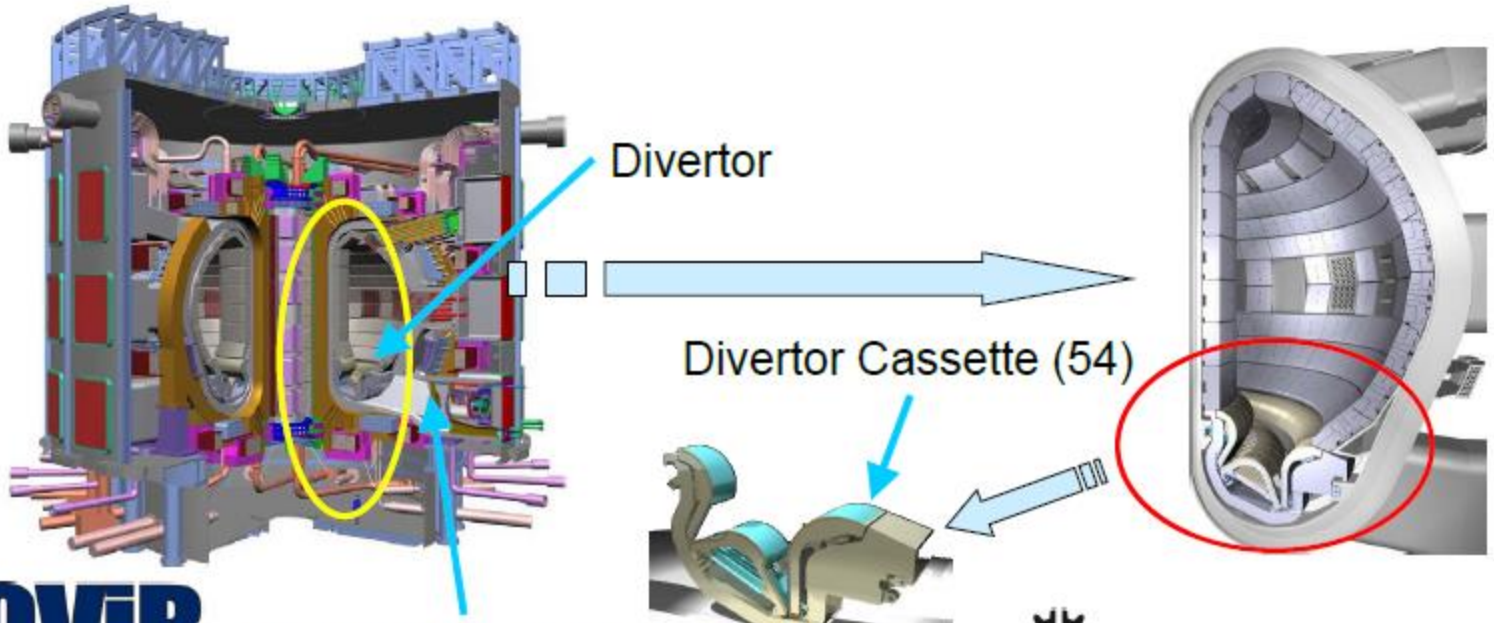
Divertor Test Platform – DTP2

- The planned divertor maintenance operations to be verified (Cassette locking, cleaning, transportation)
- DTP2 is necessary for developing and testing devices, sequences and operational procedures for ITER maintenance



ROVIR Remote Operation & Virtual Reality

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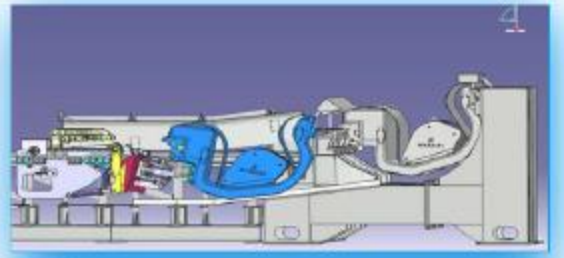
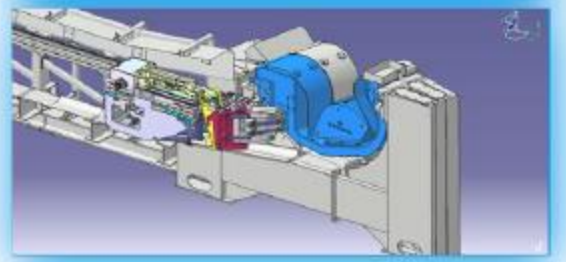
The implementation of Virtual technology at ROViR





Virtual models in DTP2 are used for:

- Virtual prototyping and analysis
- Task specification and planning
- Device and tool specification
- Control system development
- Manufacturability analysis
- Maintenance planning
- Condition monitoring
- Operator training

ROViR Remote Operation & Virtual Reality

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Technology transfer from Industry Example: CERN

Metso was selected in 2006 by CERN as the best supplier. Metso produced 2800 pipe ends for LHC with pulver metallurgical technology (HIP –technology). The solution had clearly the lowest cost and also the best quality Same technology is also applicable to ITER Vacuum Vessel...

- **Finland's share of the annual budget about 14 milj. € (2015)**
- **Industrial rate of return in 2003-2007 avg. 1,5 (2010-2014 avg. 0,7)**
- **Largest industrial deliveries to Cern:**
  - Luvata – superconductor cable
  - Metso Powdermet - LHC pipe end domes
  - Kempower – more than 200 power supplies
- **High tech products for special purpose**

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Cern - RADOS

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Cern - Rocla Robotruck

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ITER and Finnish industry in the future

F4E

- Active procurement activities will continue over 2015-20
- The contract values will be smaller (than during 2007-13)
- The F4E Procurement organisation will improve, the rules will be simpler and more practical (than so far)
- F4E will try to attract also SME companies

Procurement areas 2015-20 (with Finnish possibilities):

- Engineering support, delivery control support
- Remote Handling, robotics, water hydraulics
- Demanding steel and pipe structures
- Buildings, special competences
- IT, software, program systems
- Diagnostics

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Thank you for your attention & let’s stay in touch!

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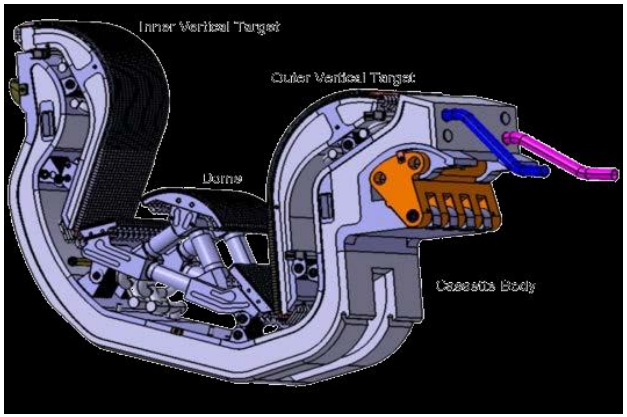

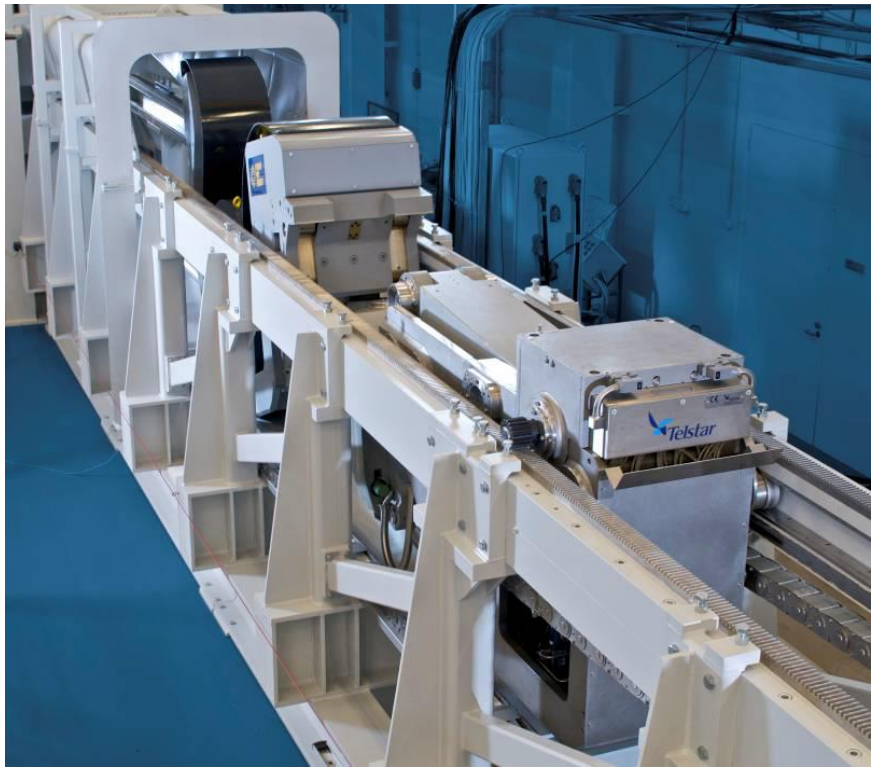

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