

Czech R&D Infrastructure and Successful FP7 and H2020 Projects

Petr Pracna, Technology Centre ASCR, Prague
national contact point (NCP) for NMBP

NMP in LEIT - Leadership in Enabling and Industrial Technologies

NMBP Micro- and Nano-electronics
Nanotechnologies
Advanced **M**aterials
Advanced Manufacturing and **P**rocessing
Biototechnology
Photonics



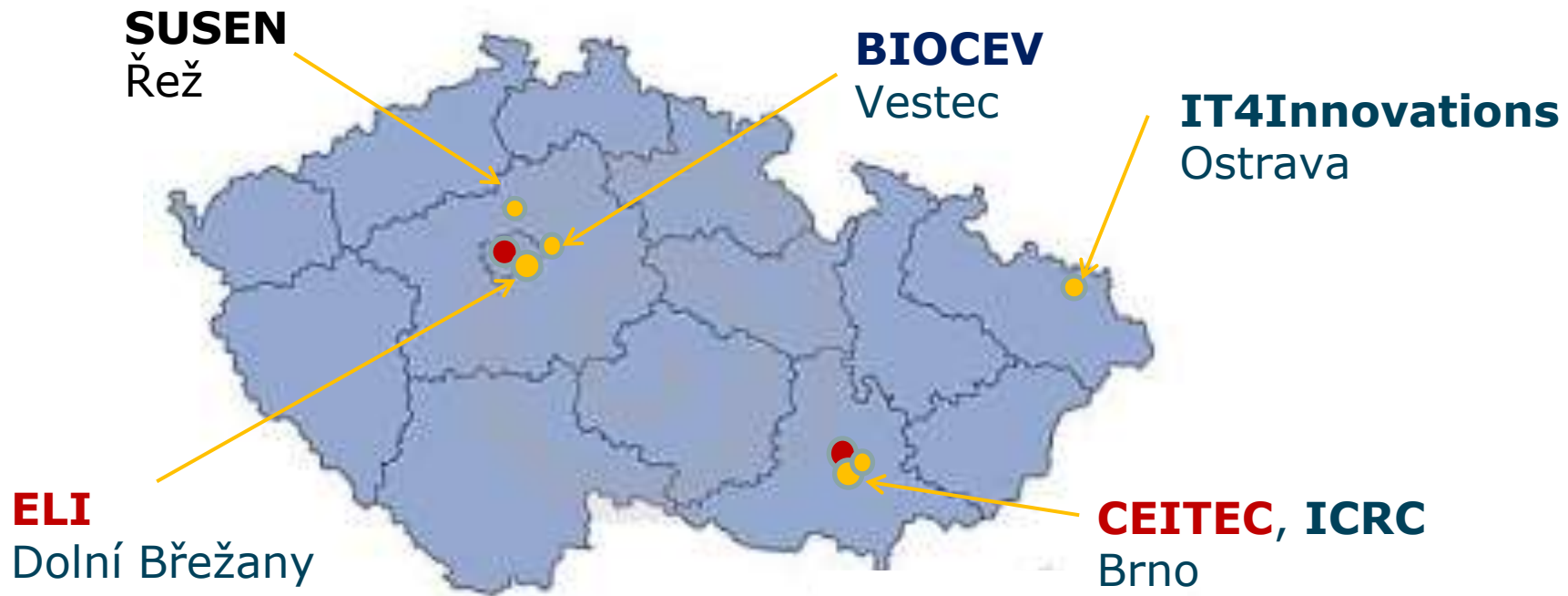
NMBP - 4 out of 6 Key Enabling Technologies (KETs)

NMBP - a cross-cutting topic – relevance also for other parts
of the framework programme Horizon 2020

Societal challenges – Health, Energy, Security

New CZ research infrastructures

Research institutes developed with significant contributions from EC Structural Funds





CEITEC / Brno



CEITEC – Central European Institute of Technology
Investment ~ 5 300 mil CZK (~ 290 mil €)

6 Partnering Institutions

Brno University of Technology (VUT)

Masaryk University

Mendel University in Brno

University of Veterinary and Pharmaceutical Sciences in Brno

Veterinary Research Institute

Institute of Physics of Materials ASCR





CEITEC / Brno

6 Partnering Institutions

7 Research Programs

61 Research Groups

557 researchers (2015)

25 000 m² of new laboratories

10 Core Facilities

Research programs

- **Advanced Nanotechnologies and Microtechnologies (VUT)**
 - **Advanced Materials (VUT)**
 - Structural Biology
 - Genomics and Proteomics of Plant Systems
 - Molecular Medicine
 - Brain and Mind Research
 - Molecular Veterinary Medicine
-

Collaboration

Various forms of partnerships

- **International** - MoU
- **National** – open access to core facilities
- **Regional**

South Moravian Centre of International Mobility (JCMM)

South Moravian Innovation Centre (JIC)

support of companies at various levels of business maturity





ELI Beamlines / Dolní Břežany

ELI - Extreme Light Infrastructure

European Research Infrastructure Consortium (ERIC)

ELI Beamlines Facility – main site of ELI

Developed and operated in close cooperation with
Institute of Physics ASCR (Prague)

Investment ~ 6800 mil CZK (~ 290 mil €)



Other partners in the ELI consortium

- **ELI-Nuclear Physics Facility** - “Horia Hulubei” National Institute of Research and Development for Physics and Nuclear Engineering, (Bucharest-Magurele, **Romania**, ~ 356 mil €)
 - **ELI-Attosecond facility** - ELI-Hu Research and Development Non-Profit Limited Liability Company (Szeged, **Hungary**, ~ 60 mil €)
 - 4th facility location (being negotiated)
-



ELI Beamlines

ELI Beamlines Facility – main site of ELI
Festive opening – **19 October 2015**



6 scientific programs

- Lasers
 - X-ray Sources Driven by Ultrashort Laser Pulses
 - Particle Acceleration by Lasers
 - **Applications in Molecular, Biomedical, Material Sciences** →
 - Plasma and High Energy Density Physics
 - Exotic Physics and Theory
-

Applications in Molecular, Biomedical, Material Sciences

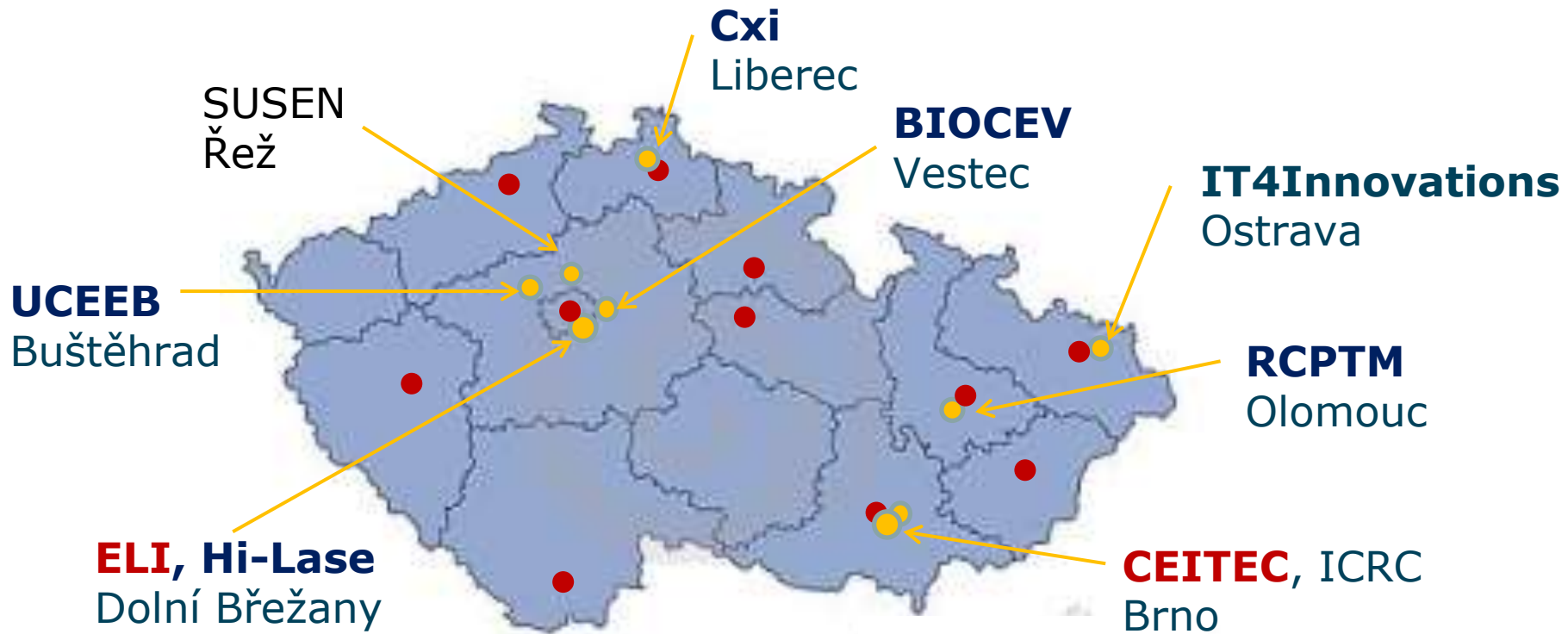
Based on unique opportunity of perfect spatial overlap and temporal synchronization of a fast optical laser beam with multiple beams of ionizing radiation at highest parameters achievable

Physical problems addressed

- Measuring the mechanisms of physical and chemical processes at the atomic scale.
 - Controlling electronic processes in matter. In addition to that, nuclear dynamics following the electronic events should represent a subject of control.
 - Understanding the complexity – efficient methods should be developed to control and investigate various processes in real, i.e., highly complex, systems in the state as they are present in nature.
 - **Nanometre scale imaging of arbitrary objects in their native state**, e.g., capturing a living cell at nanometre resolution, Nanometrically resolved dynamics of their responses to various stimuli.
-

New CZ research infrastructures

Research institutes developed with significant contributions from EC Structural Funds



HiLASE– New lasers for industry and research

neighbour to ELI - Dolní Břežany

Operating since October 2014

A national platform for development of high-repetitive laser systems for use in industry, research, and large scale facilities (ELI)



Research programs

- **RP1** – Development of diode pumped solid state laser systems for industrial and scientific applications (multi -J, kW-class)
 - **RP2** – Development of a 100 J / 10 Hz laser system scalable to 1 kJ level
 - **RP3** - Development of key technologies for repetition-rate amplifiers in partnership with industry
-



CxI – Institute for Nanomaterials, Advanced Technology and Innovation - research centre of the Technical University of Liberec (TUL)
...‘the place where Nanospider was born’

Research programs

- Material research
- Competitive engineering



Departments

- Preparation and analysis of nanomaterials
- Physical measurements
- Nanomaterials in natural sciences
- Nanotechnology and informatics



RCPTM / Olomouc



RCPTM – Regional Centre of Advanced Technologies and Materials

Developed and operated in close cooperation with Palacký University Olomouc and Academy of Sciences of CR

Research programs

- **Magnetic Nanostructures**
- **Carbon Nanostructures**, Biomolecules and Simulations
- Biologically Active Complexes and Molecular Magnets
- Optical and Photonic Technologies
- **Nanomaterials in Biomedicine**
- **Nanotechnology in Analytical Chemistry**
- **Environmental Nanotechnologies**





BIOCEV / Vestec

BIOCEV – Biotechnology and Biomedicine Center (Vestec)

3Q 2015 - Completion of the BIOCEV main construction site
Developed and operated in close cooperation with ASCR and
Charles University (Prague)

Research program

- Functional Genomics
- Cellular Biology and Virology
- Structural Biology and Protein Engineering
- **Biomaterials and Tissue Engineering**
- **Development of Diagnostic and Therapeutic Procedures**



New CZ research infrastructures



IT4I – IT4Innovations (Ostrava University)

National supercomputing centre

Research - Earth sciences, Engineering, **New Materials**,
Life Sciences, Embedded Systems, Audio/Video Processing

UCEEB – University Center of Energy-efficient Buildings (Buštěhrad)
Czech Technical University Prague

ICRC – International Clinical Research Center (Brno)

Clinical research – **cardiovascular** and **neurological** programs

SUSEN – SUSustainable ENergy (Řež u Prahy)

Nuclear research – integration into European cooperation

National funding

RDI Information System of the Czech Republic



- **26** state funding providers
- **269** programmes
- **543** tenders
- **42 511** projects
- **5 764** beneficiaries
- +
- **889** institutional research plans
- **887 214** results

- 😊 **User-friendly search**
 - 😊 **Easy export of data**
-

Nanotechnology conferences



Nanocon – International nanomaterial conference

Annual event since 2009 - **7th conference** 14-16 October 2015, Brno
2014 – 400 participants from 35 countries

- Nanomaterials for Electronic, Magnetic and Optic Applications. Carbon Nanostructures, Quantum Dots
 - Industrial and Environmental Applications of Nanomaterials
 - Bionanotechnology, Nanomaterials in Medicine
 - Monitoring and Toxicity of Nanomaterials
 - Advanced Methods of Preparation and Characterization of Nanomaterials
-



Technology Centre ASCR

TC founded in 1994 (FP5-FP6-FP7-H2020)

Scope of activities

- Supports participation of the Czech Republic in the European Research Area, hosts NCPs
- Prepares analytical and conceptual studies for research R&D
- Assists at international technology transfers, representation of Czech companies at conferences and brokerage events
- Represents the Czech research in the Brussels ambience (CZELO)





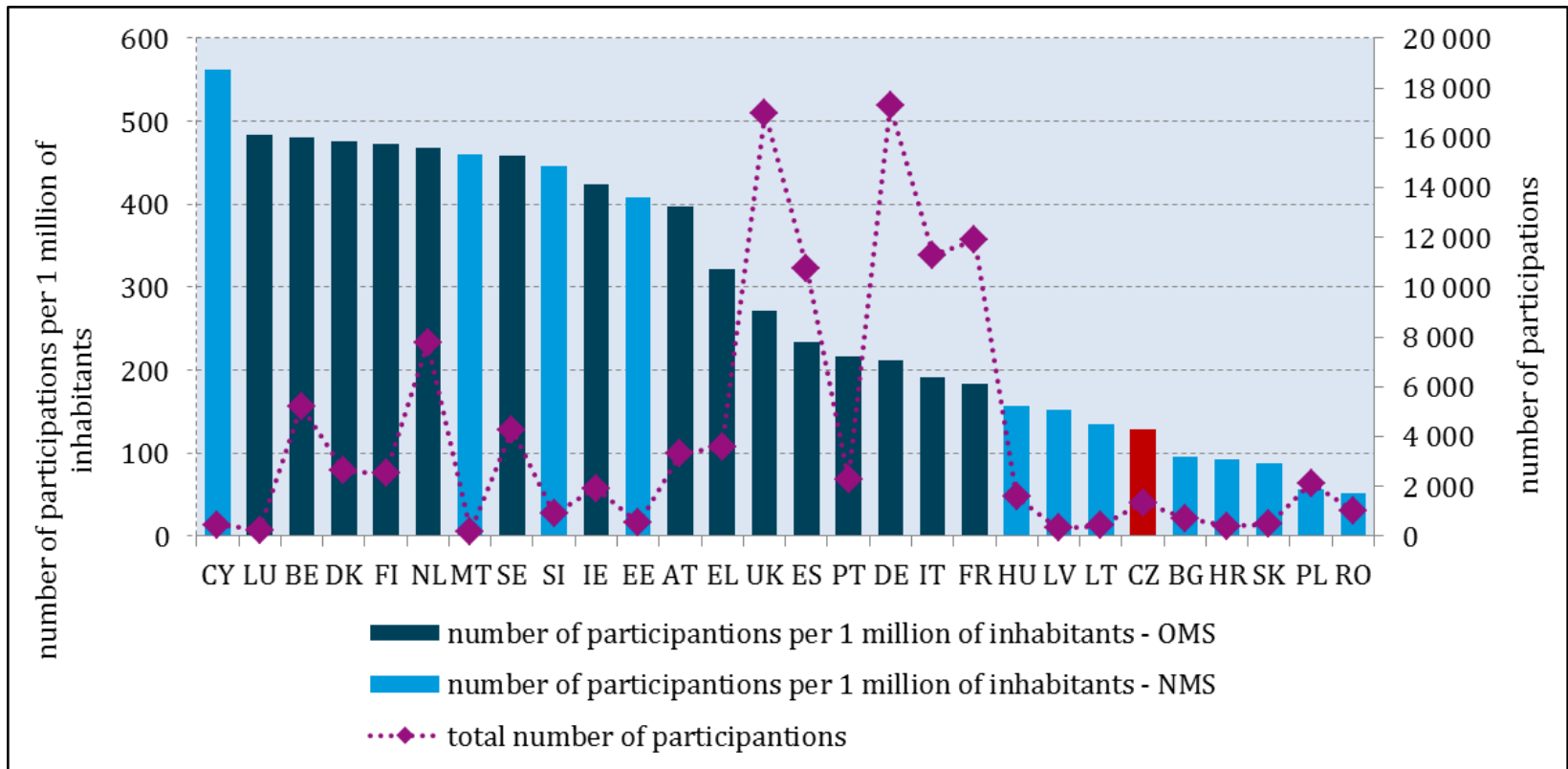
Technology Centre ASCR

NICER – National information centre for European research

- Team of NCPs – experts in programme committees of framework programmes (FP)
Follows the structure of FPs, cross-sector collaboration, specialists for financial issues, IPR
 - Information support for research institutions, universities and companies
 - Close collaboration with regional and professional contact agencies within the Czech Republic
-

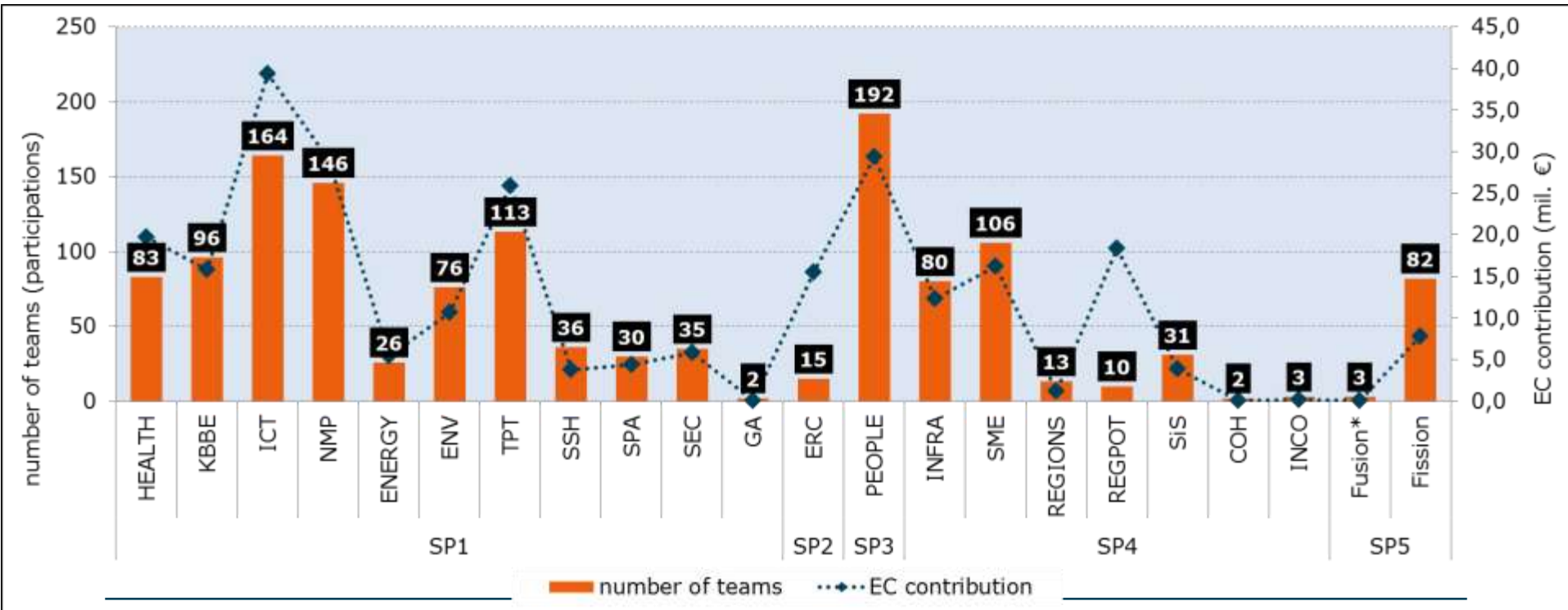
CZ participation in FP7 projects

Number of Czech teams: **1 344** (1.19% of EU28, EU28 – 112 527 teams)



CZ participation in FP7 projects

Breakdown of CZ participation (**1344 teams**) among FP7 themes
 Total CZ contribution **264.9 mil. €** (0.69% out of 38 489.7 mil. €)





CZ coordinators in FP7 NMP projects

Out of **146** Czech participations in FP7-NMP projects **4** had a **Czech coordinator**

UNIVSEM – Universal SEM as a multi-nano-analytical tool
Coordinator: TESCAN a.s.

CHIPCAT – Design of Thin-Film Nanocatalysts for On-Chip Fuel Cell Technology
Coordinator: Charles University, Faculty of Mathematics and Physics

INTEC – Smart INks as a standard TEsting tool for self Cleaning surfaces
Coordinator: Institute of Chemical Technology, Prague

ENF 2009 – Organization of EURONANOFORUM 2009
"Nanotechnology for Sustainable Economy"
Coordinator: Technology Centre ASCR

Related links

CEITEC <http://www.ceitec.cz/>

ELI <http://www.eli-beams.eu/>

HiLASE <http://www.hilase.cz/>

CxI <http://cxi.tul.cz/en/>

RCPTM <http://www.rcptm.com/>

BIOCEV <http://www.biocev.eu/>

IT4Innovations <http://www.it4i.cz/>

UCEEB <http://www.uceeb.cz/>

RDI-IS <http://www.isvav.cz/>



Questions / comments?

pracna@tc.cz

www.tc.cz

www.h2020.cz