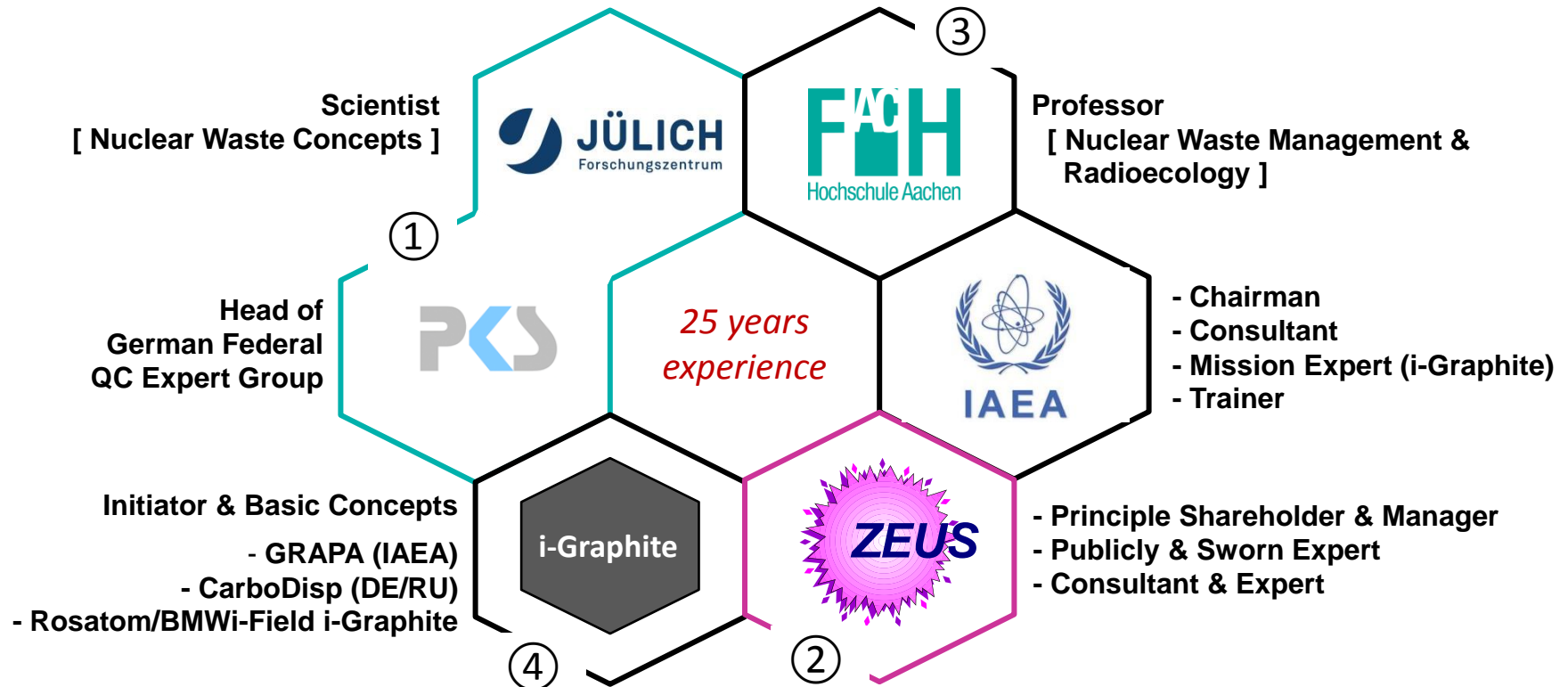


Ignalina Nuclear Power Plant, Workshop November 15th 2018

Expertise and Experience in Nuclear Waste Management and Decommissioning

Prof. Dr. Hans- Juergen Steinmetz
FH Aachen University of Applied Sciences
ZEUS GmbH & Co. KG
Germany

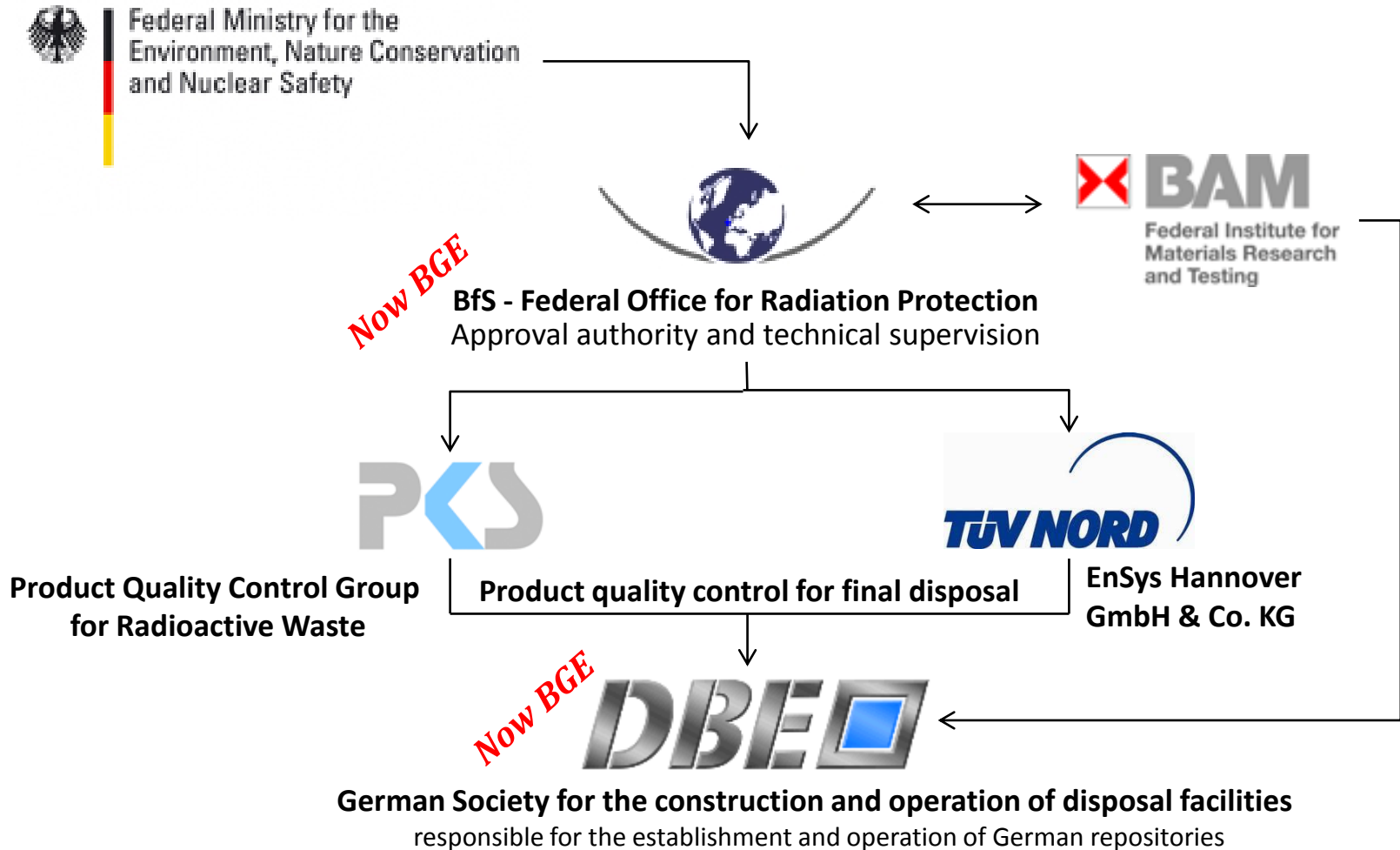
Professional fields



Important Networks & Advisory Bodies

- IAEA Predisposal Network (Chairman & Principle Representative)
- IAEA Decommissioning Network
- IAEA GRAPA-Project (Steering Group)
- Binational (German/Russian) Expert Group of the German Ministry of Economics and Rosatom
- International Programme Advisory Committee of the WM Conference in Phoenix/Az.
- ENTRAP - European Network of Testing Facilities for Quality Checking
- Peer-Review-Group for WM at EU-JRC ISPRA

Product Quality Control of LAW/MAW in Germany



German WM 'Landscape'

Final Disposal

Federal Republic of Germany

Federal Ministries

BMU	BMBF	BMWi	BMF
Environment Reactor Safety	Science Education	Economics International	Finances

Federal Offices

KONRAD

BfS

Radiation
Protection

IAEA

R & D

BfE

Disposal Safety

Industry

Decommissioning

Conditioning

Industrial
Interim Storage
Facilities

Federal Organisations

BGZ

Research
Centres

GRS

EWN

Most Public
Nuclear Facilities

Decommissioning

Individual Federal German States (16)

Individual Ministries

Collecting
Facilities

Individual Offices

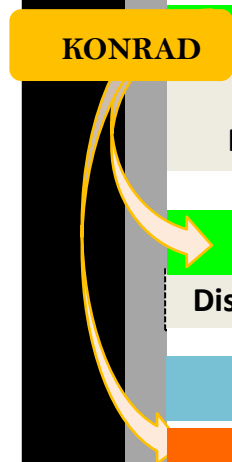
Nuclear
supervision

Regional Supervisory Authorities



Industry

4 Power Units
GNS



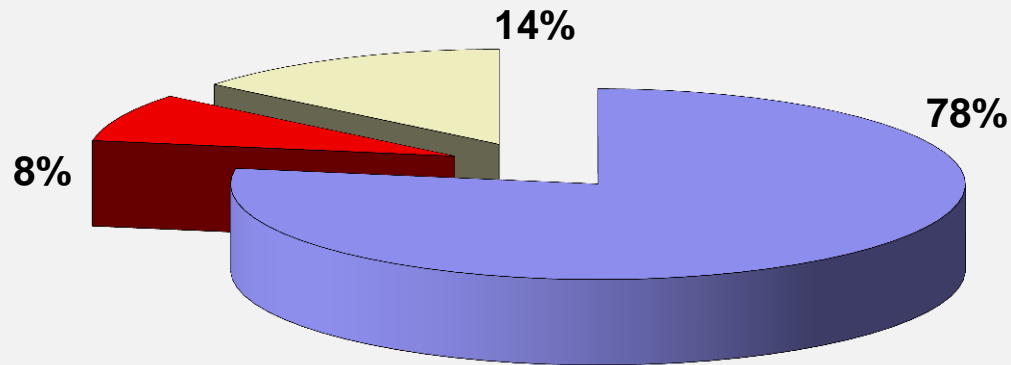


Main Business Fields

Typical: 20 Coworkers (interdisciplinary, multinational)
Annual projects ≤ 30 (≈ 20 man-years)
Individual project budgets 0,02 – 1.2 Mio. Euro
Inspections in: D, UK, F, USA

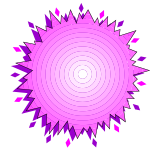
2010

- ▶ GNS/NPP – LAW/MAW
- ▶ Institutional Waste
- ▶ Decommissioning Waste



Grafenrheinfeld, Gundremmingen, Emsland, Lingen,
Isar, Mülheim-Kärlich + Interim Storage Facilities

+ All German HAW Waste Packages from La Hague & Sellafield

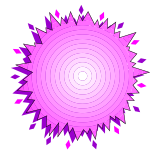


<u>Founded:</u>	Year 2000
<u>Legal Form:</u>	GmbH & Co. KG (ZEUS Holding GmbH + ZEUS Limited Partnership)
<u>Business Area:</u>	Evaluation/Assessment/Quality Control & Consulting
<u>Specialist Area:</u>	Holistic and/or detailed Concepts and Planning (interdisciplinary) <i>2000 - Winner of the SME campaign (MOVE) of the German Federal State NRW</i> <i>2001 - Environmental Award of the City of Aachen</i>

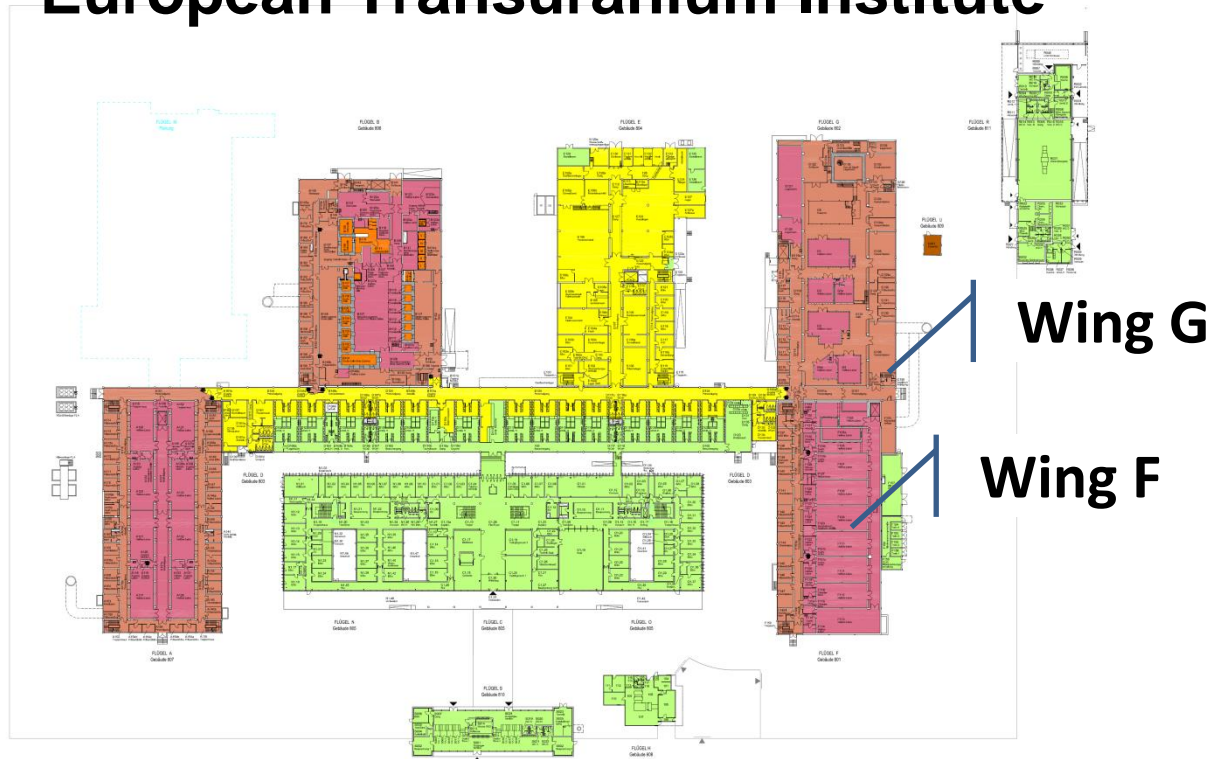


- **European Commission – JRC**
- **Westinghouse Electric Germany GmbH**
- **Atkins Energy Germany GmbH**
- **Eckert & Ziegler Nuclitec GmbH**
- **Gamma-Service Recycling GmbH**
- **German Air & Space Center (DLR)**
- **Helmholtz-Centre Berlin (HZB)**
- **Siempelkamp Industrie & Service GmbH**
- **Supervising Authorities**
- **IAEA** ← (China, „Wigner-Energy-Calculations „)

Clients



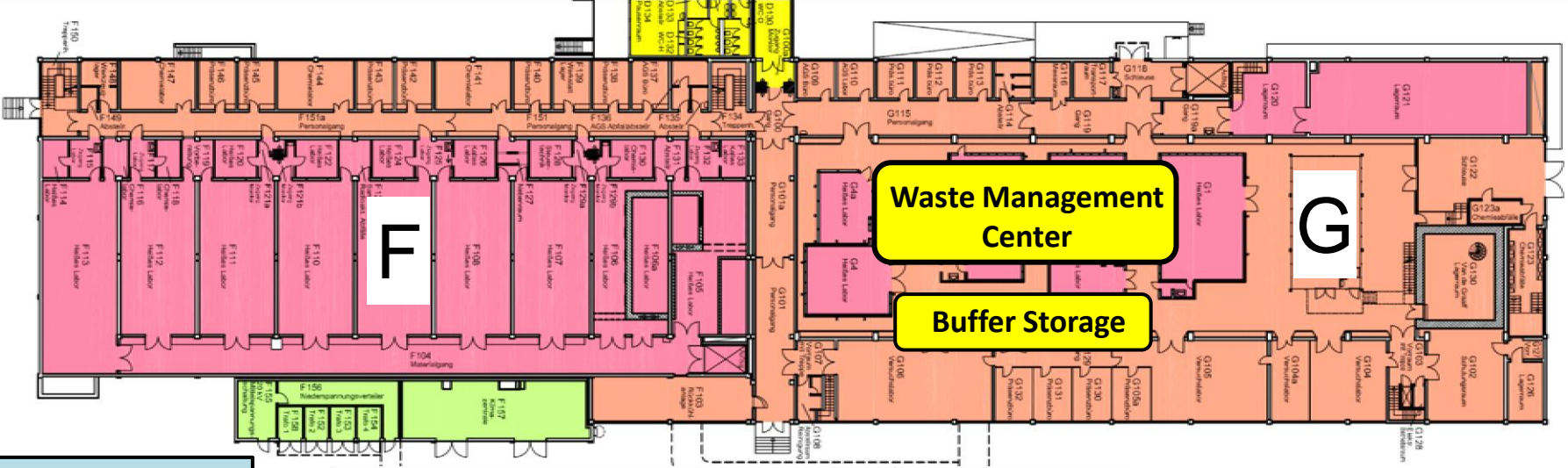
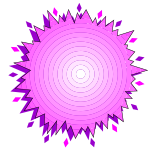
European Transuranium Institute



Decommissioning-Concepts for Wings G & F

Development of 5 Strategy Options
Individual Cost Estimations (ISDC)

Schedule: 2 Months!

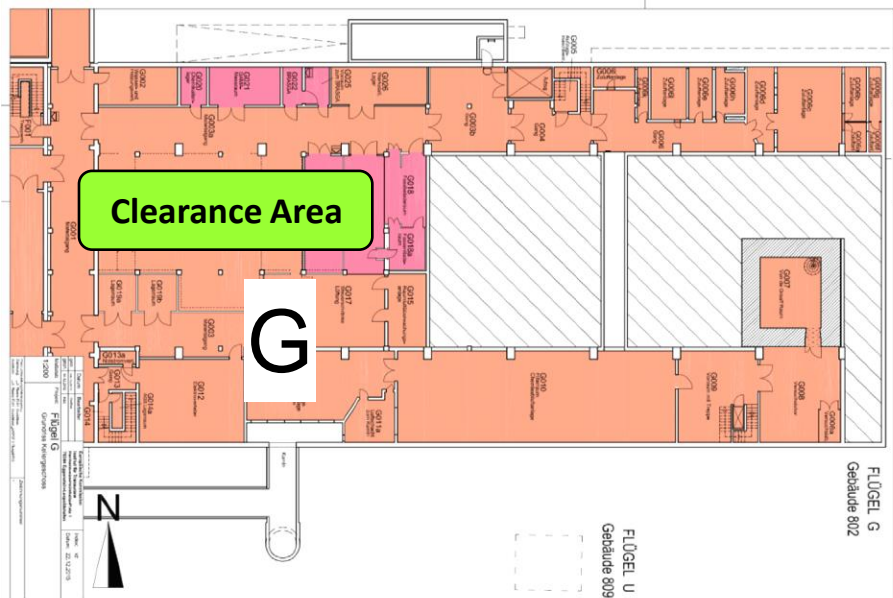


FLÜGEL F
Gebäude 801

FLÜGEL G
Gebäude 802

Dismantling

1



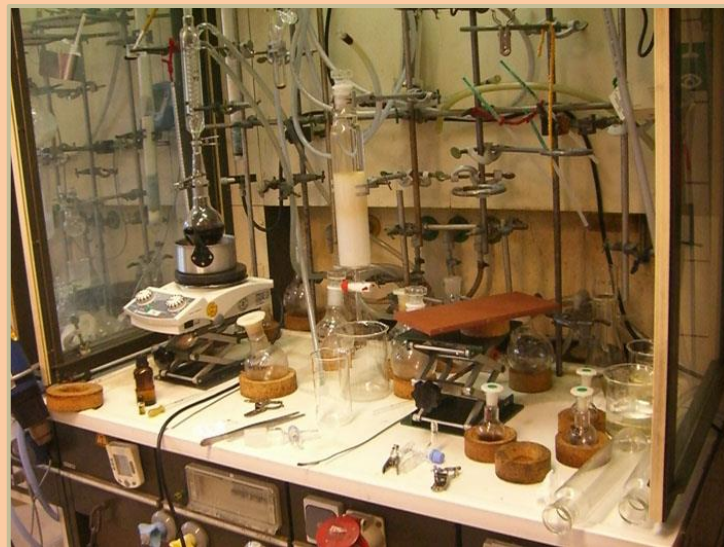
FLÜGEL G
Gebäude 802

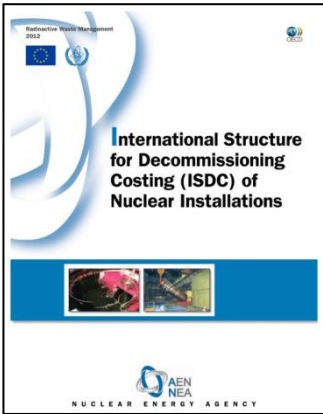
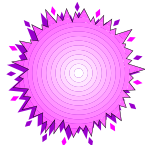
FLÜGEL U
Gebäude 809



- ② Dismantling
- ③ New Use
- ④ Conversion
- ⑤ New Building

Costs ?





General strategy options



Comparison

- Dismantling
- Reuse
- Waste Management



Multi-attribute utility analysis - Decision matrix



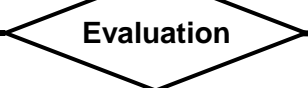
Preferred option

Analysis of available basic cost informations & data

Colletion of missing/additional information & data

LOP

List of Open Points



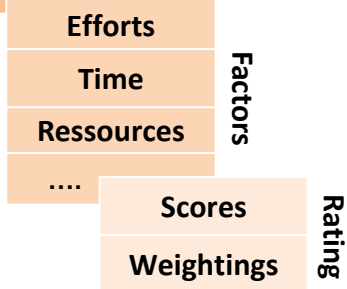
Order-of-magnitude estimate

1

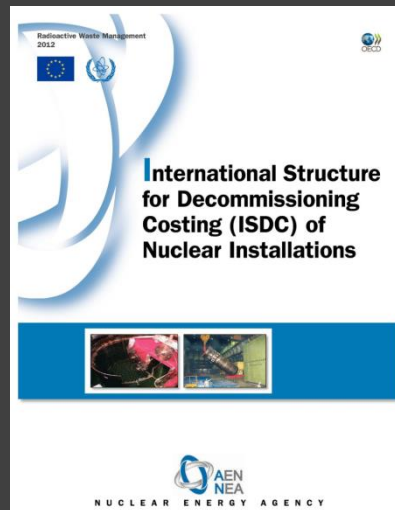
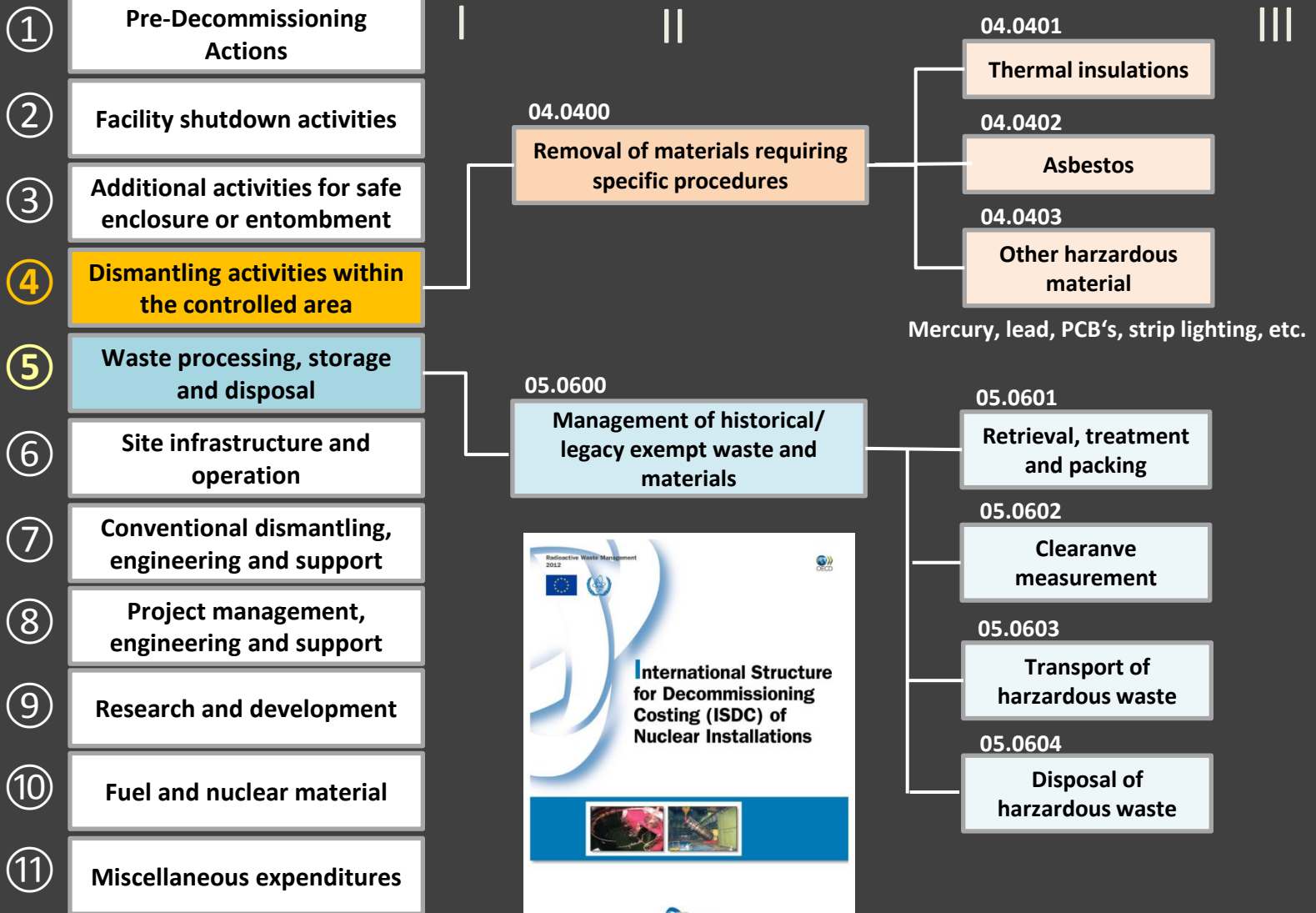
Stadler & Schaaf Study

Budgetary estimate

Definitive estimate




ISDC - levels related to hazardous waste



190 pages

Unique in Europe: EMINA

European Master in Nuclear Applications

1. Semester: Basics
2. Semester: Introduction into Focus Fields
3. Semester: Specialisation (Focus Fields)
 - A Nuclear Technology
 - B Medical Applications
 - C Nuclear Chemistry
 -  **D Nuclear Waste Management in Development**
4. Semester: Master Thesis and Final Examination

Awarded 2013 and 2014

By



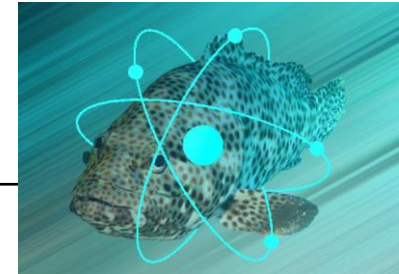
one of the 5 best
Study Programmes

Shortlisted

FH Aachen, EMINA
Training course of the year (1 year or more)



International Cooperations



Founding Member of the Network

CHERNE (18 European Universities)

→ Exchange of Students and Professors

International Training (2 weeks)

- In Prague, Mol, Brussels, Juelich, Lissabon, Sicily, Catania and Bologna (2005-2017)
- Various EU-Subsidies (SPERANSA, ICARO, SARA, MANTRA)

Radiochemical Summerschool (MARC)

since August 2007, promoted and supported by EU

GATE –Summerschool (Numerical Simulation)

since September 2016, openGATE-Collaboration

IAEA - in Development

Standardized Training and Workshops for IAEA Fellows

Important Partnerships

Forum Nuclear Technology West



Forschungszentrum Jülich
in der Helmholtz-Gemeinschaft

RWTHAACHEN

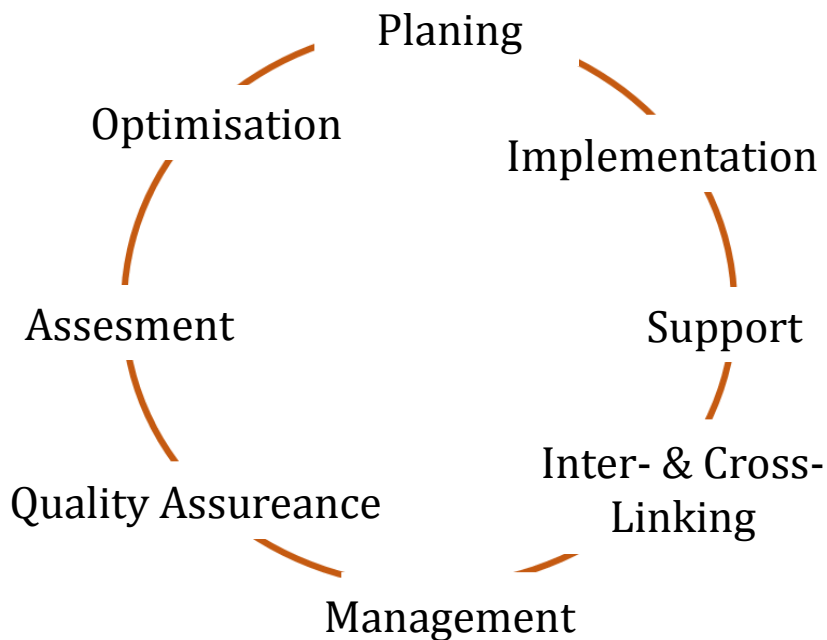
Industry



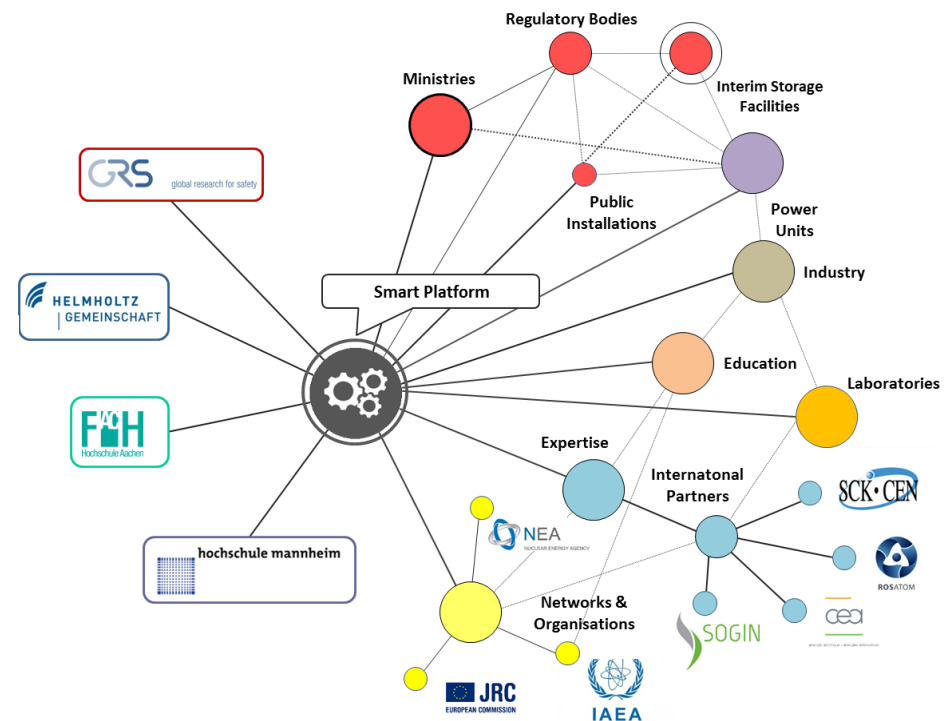
- **Excellent application-oriented Lecturers**
- State-of-the-Art R & D**
- Access to Large-Scale Equipment**

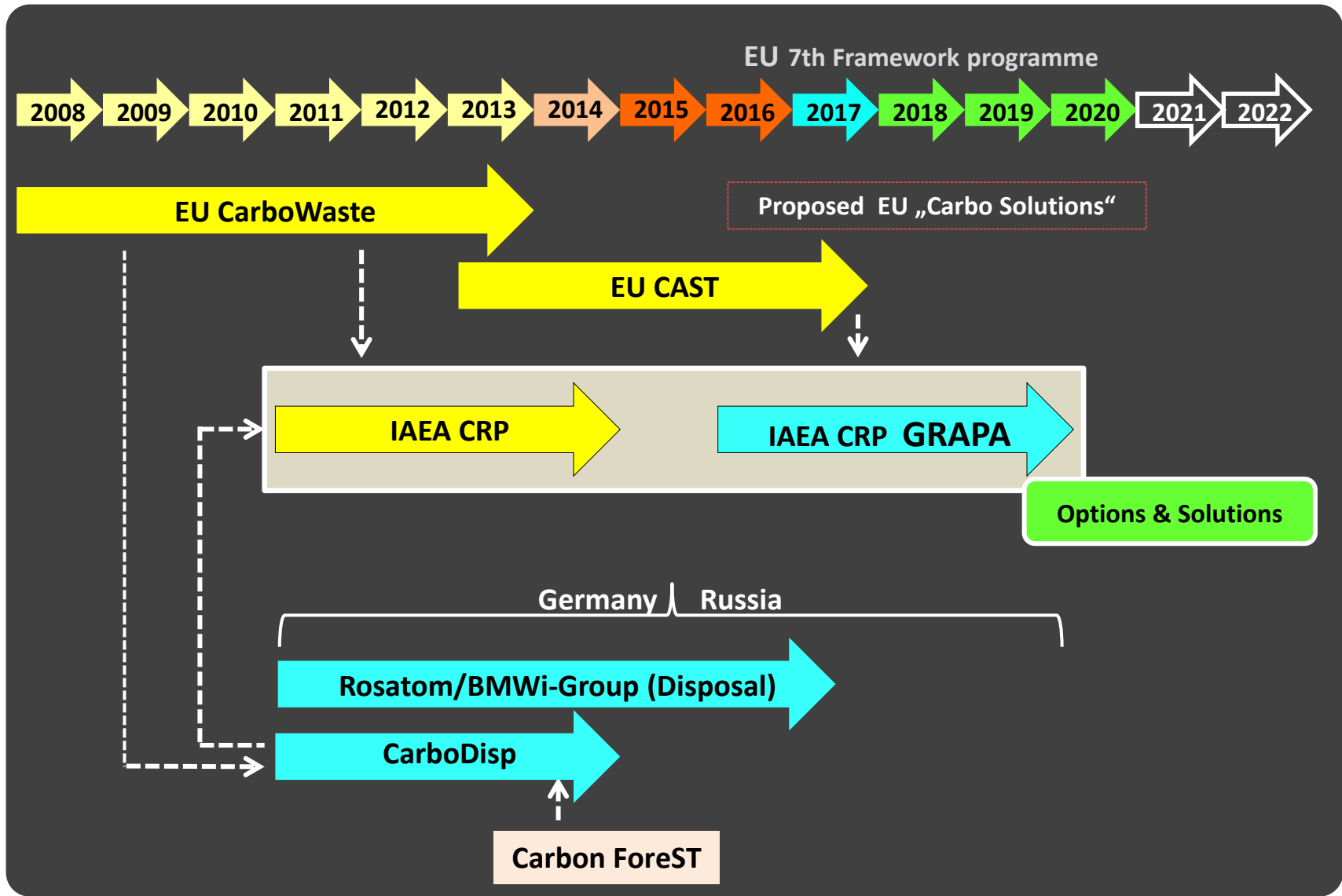
New Focus Field Nuclear Waste Management

Teaching both „Profound Knowledge“ and „Process-Oriented Skills“

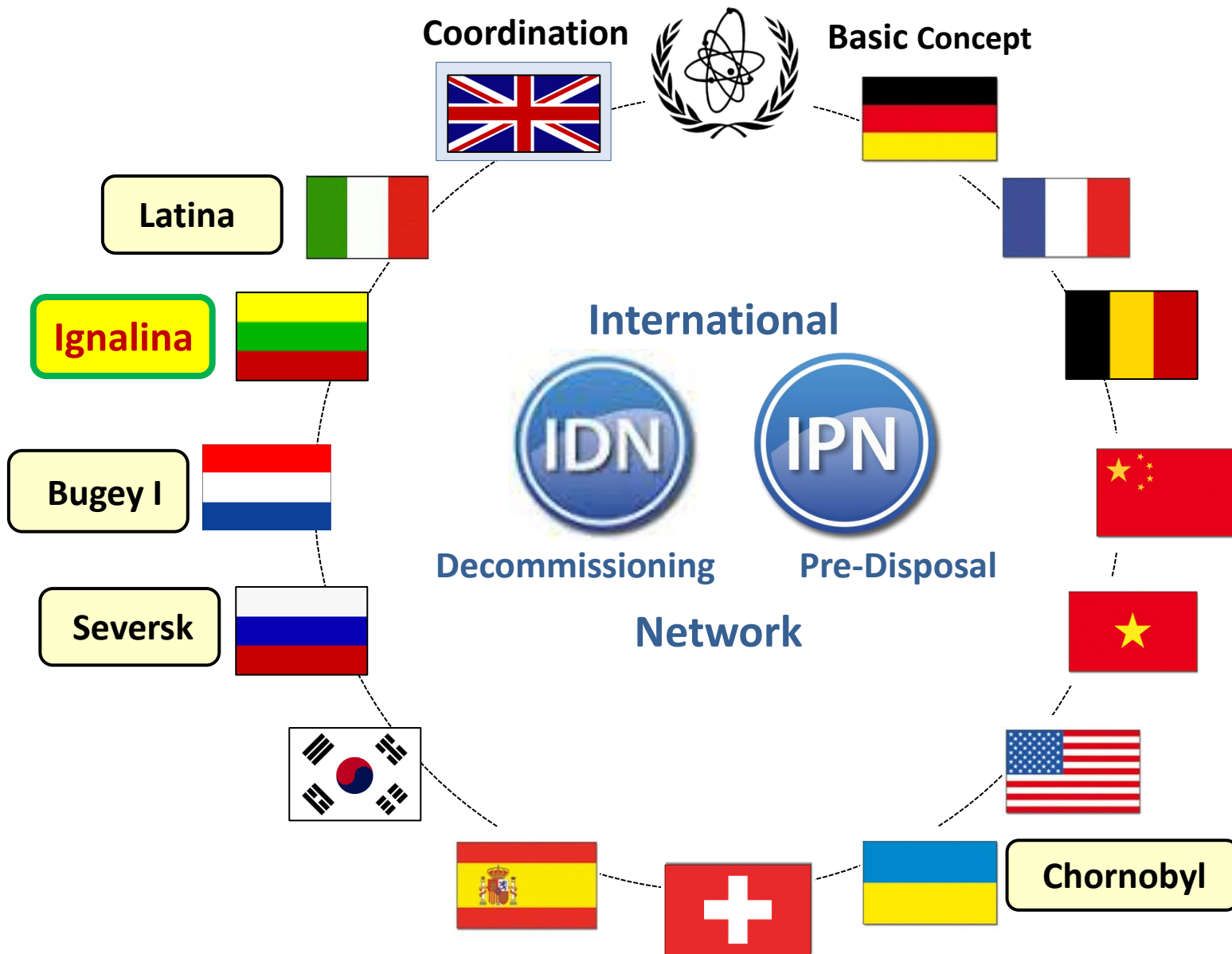


Using a unique Smart Platform





GRAPA Joint IDN-IPN-Coordinated Research Project



Thank You Very Much For Your Attention !

