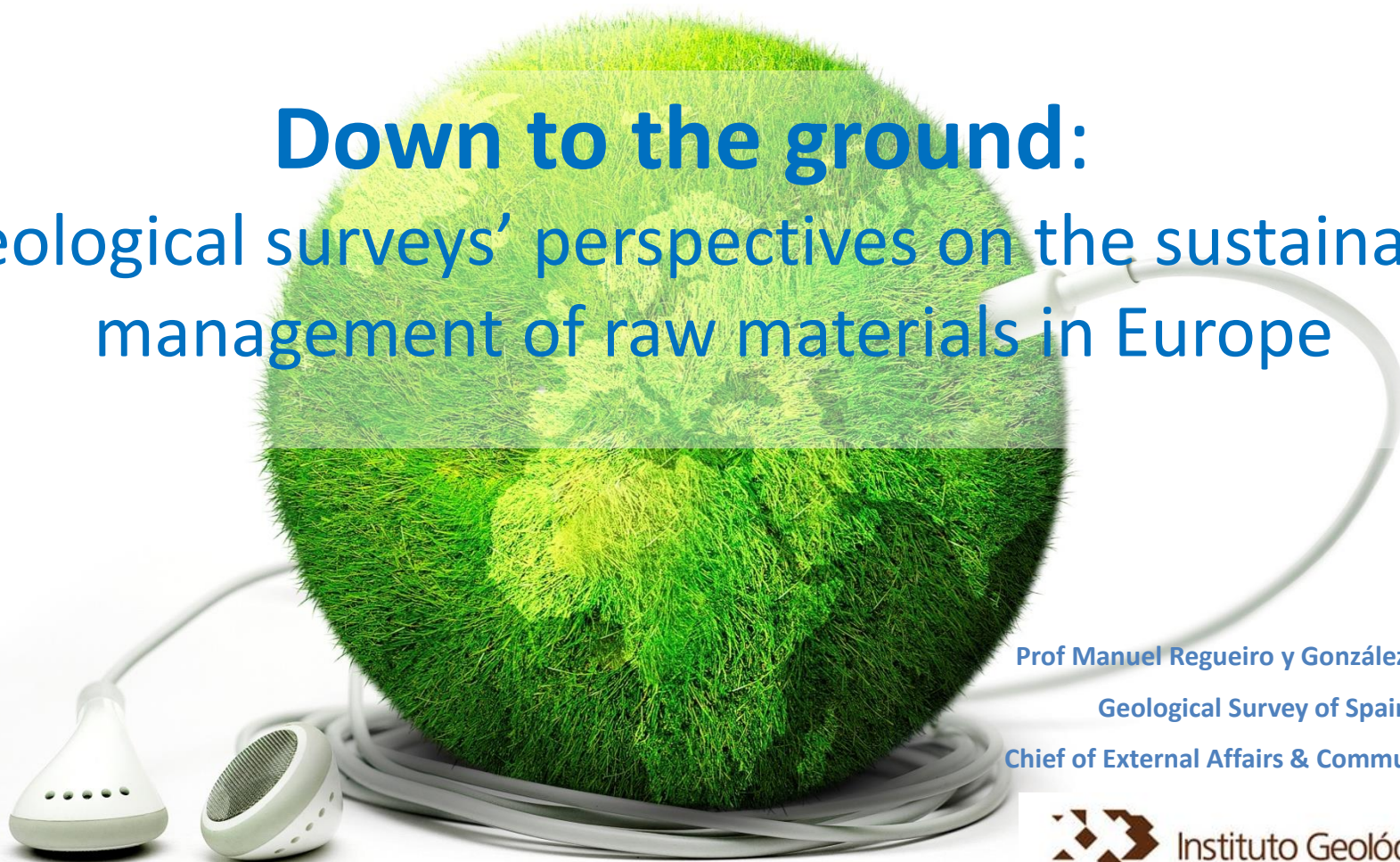


Down to the ground:

Geological surveys' perspectives on the sustainable management of raw materials in Europe



Prof Manuel Regueiro y González-Barros

Geological Survey of Spain

Chief of External Affairs & Communication



Instituto Geológico
y Minero de España

40 Years Listening to the Beat of the Earth

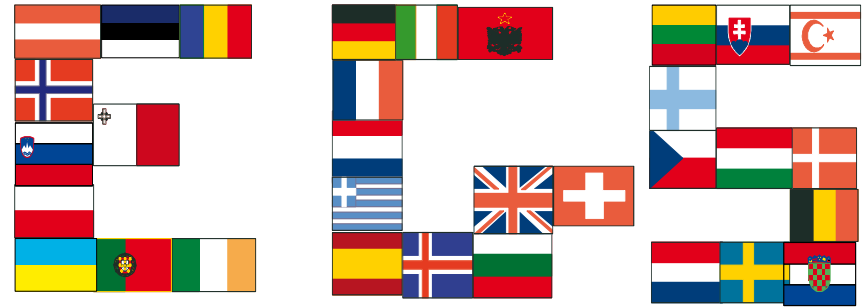
MENU

- EGS
- IGME
- Production trends
- Mineral raw materials in Europe
- Sustainability
- Mineral Policy in the EU: past present & future
- Raw Materials Initiative
- EGS Mineral Resources Expert Group: role, projects and future
- SIP for EIP on RM, ETPSMR
- Outreach



EUROGEOSURVEYS

31 NGSO
from across Europe



Work force of
SEVERAL THOUSANDS

Over **1** billion euro annual budget



EuroGeoSurveys - The Geological Surveys of Europe



MEMBERS

Albania

Luxembourg

Austria

Malta

Belgium

The Netherlands

Croatia

Norway

Cyprus

Poland

Czech Republic

Portugal

Denmark

Romania

Estonia

Russian Federation

Finland

Slovakia

France

Slovenia

Germany

Spain

Greece

Sweden

Hungary

Switzerland

Ireland

Ukraine

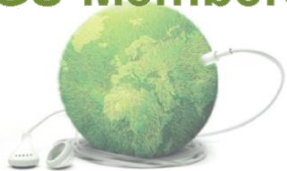
Italy

United Kingdom

Lithuania



EGS Membership



EuroGeoSurveys - The Geological Surveys of Europe





The Instituto Geológico y Minero de España (Geological Survey of Spain)

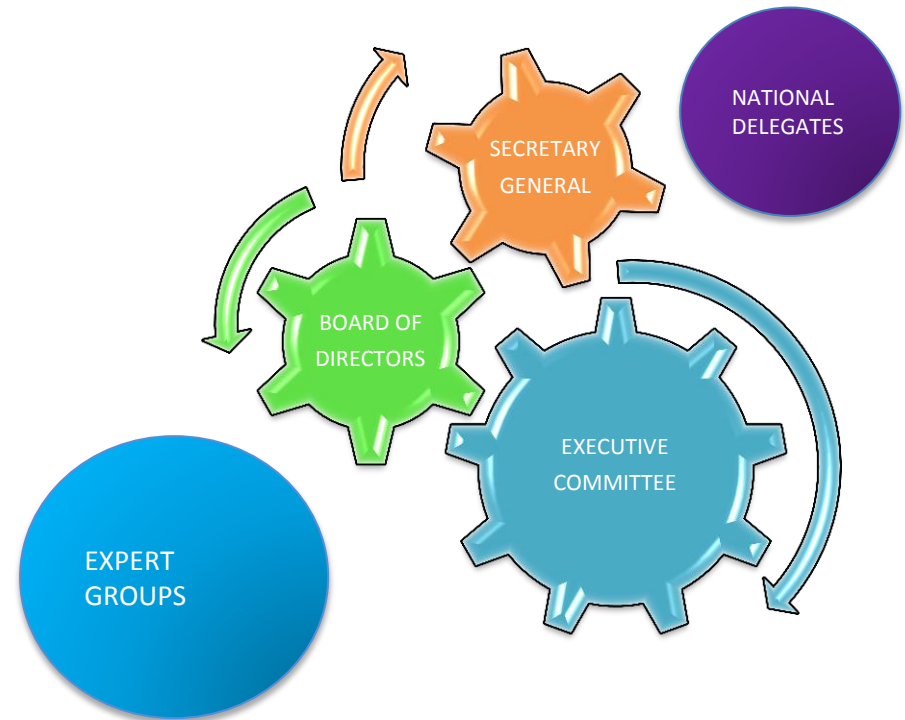
- Senior (founded 1849) public research autonomous institution attached to the Ministry of Science and Innovation
- Main Earth Sciences Research Centre of Spain. Total 447 employees, 341 graduated
- Specialized in various fields of activity such as geology, environment, hydrogeology, mineral resources, natural hazards and land use planning
- IGME facilities, including its headquarters, project offices in several places around the country, laboratories, warehouses, drill core repository, library and museum, are equipped with advanced technology and technical resources
- IGME is the national centre for the creation of knowledge infrastructure, information and R&D in Earth Sciences



EGS TEAM

Expert Groups

- Earth Observation and Geohazards
- GeoEnergy (including CCS)
- Marine Geology
- Mineral Resources
- Water Resources
- Spatial Information (INSPIRE)
- Geochemistry
- International Cooperation and Development
- Superficial Deposits (Soil Resources)





**SPATIAL INFORMATION
(INSPIRE)**



GEOCHEMISTRY



**SUPERFICIAL DEPOSITS
(SOIL RESOURCES)**



**INTERNATIONAL COOPERATION
AND DEVELOPMENT**



MINERALS RESOURCES



**EXPERT GROUPS
& TASK FORCES
CHAIRMANSHIP**



**Instituto Geológico
y Minero de España**

**EARTH OBSERVATION
AND GEOHAZARDS**



GTK

MARINE GEOLOGY



WATER RESOURCES



STRATEGY



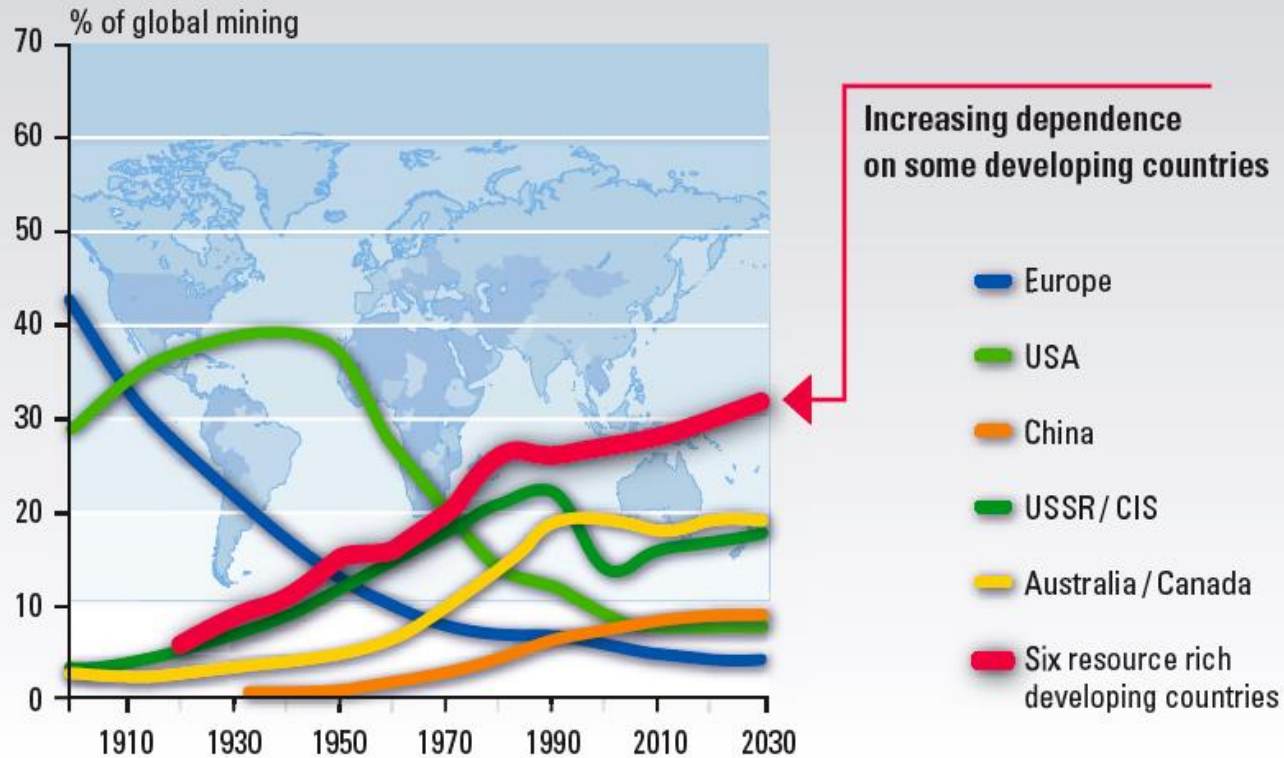
**GEUS
GEOENERGY**



EuroGeoSurveys - The Geological Surveys of Europe



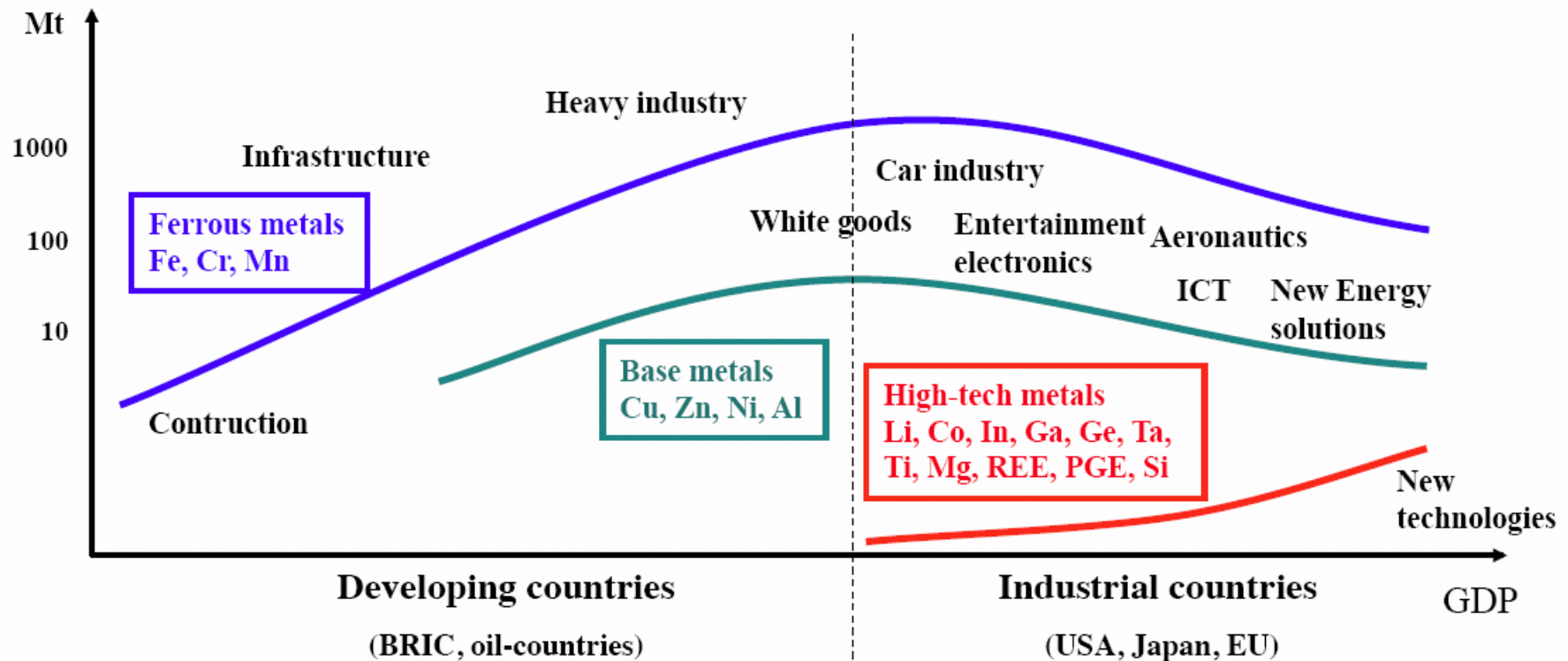
World Mining 1900 - 2030



Sources: Ericsson, Raw Materials Data 2005; Sames, 1975



Growing Demand for Earth Resources

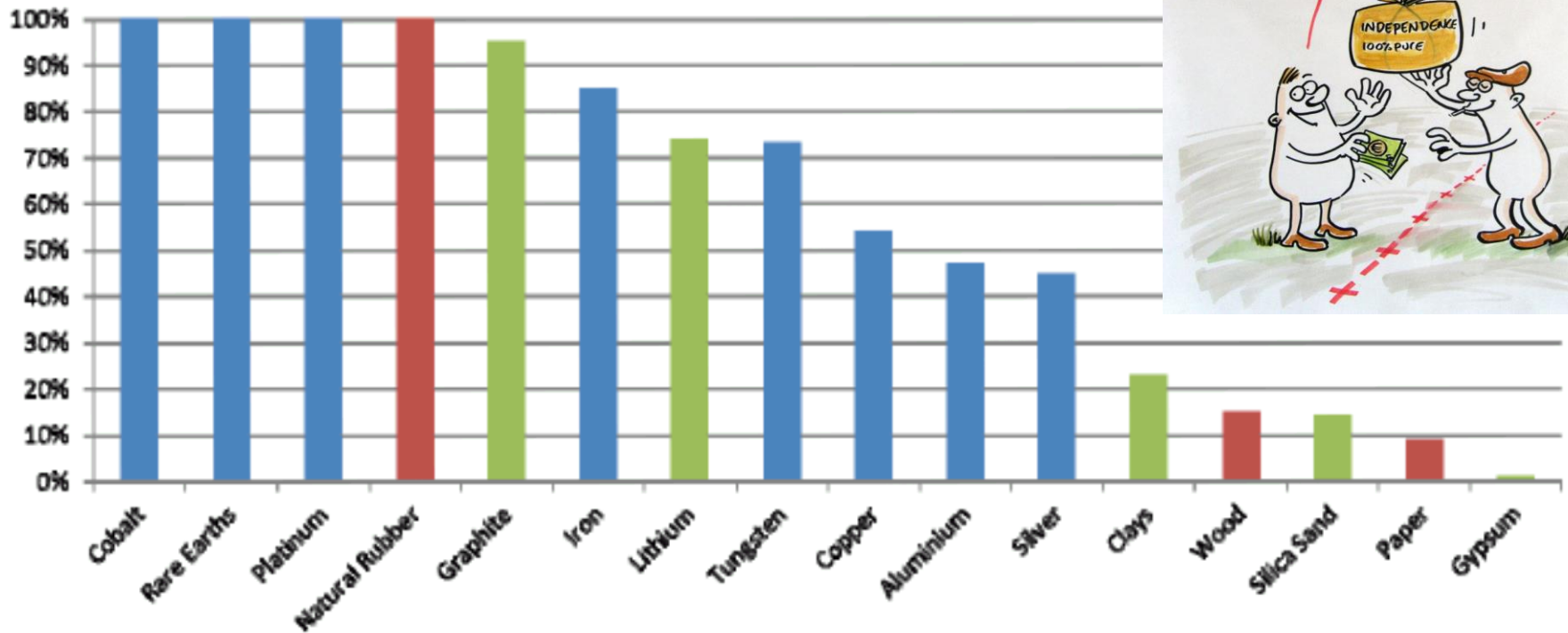


Economic signification of raw materials

- The contribution of raw materials to the overall EU-economy amounts to more than €1.300 billion of value added along the value chain with employment for some 30 million people.
- The production value of EU domestic mining of raw materials (mainly construction minerals) amounts to €45 billion.
- Raw materials such as metals and industrial minerals largely need to be imported. Annually 232 million tones of raw materials are imported into the EU, worth a total of €23 billion.



EUROPE IMPORTS DEPENDENCE

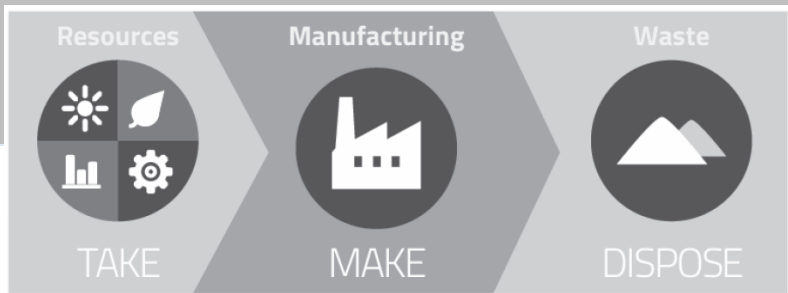


Principles of Sustainability for Minerals

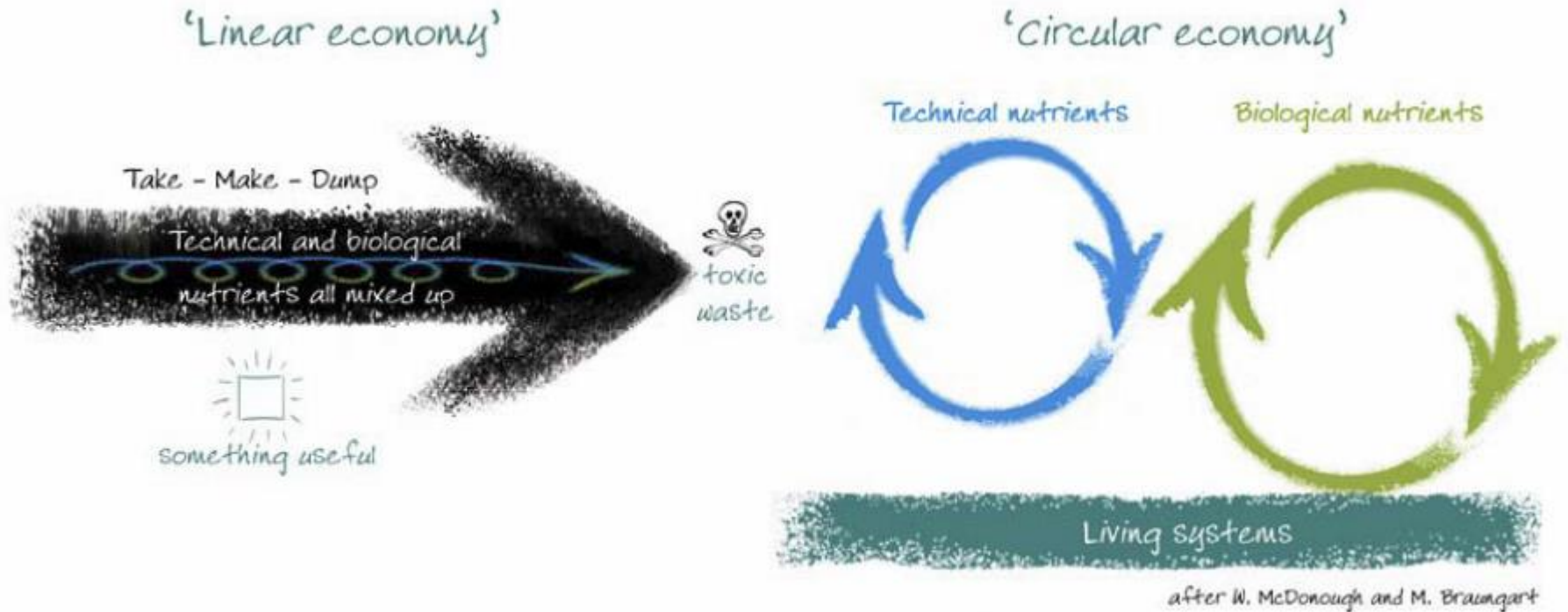
- Ensure **efficient use** of resources.
- Ensure a **fair distribution of risks, costs, and benefits**.
- Replace depleted natural resources with other forms of capital to so as to **ensure that future generations** are not deprived of the benefits of current extraction.
- Promote **responsible stewardship** of natural resources and the environment, including remediation of past damage.
- **Minimize waste and environmental damage** along the whole supply chain.
- Price commodities, products and services at levels that reflect the **full cost** of their provision.
- **Maintain and enhance conditions** for a viable enterprise.



FROM LINEAR TO CIRCULAR ECONOMY



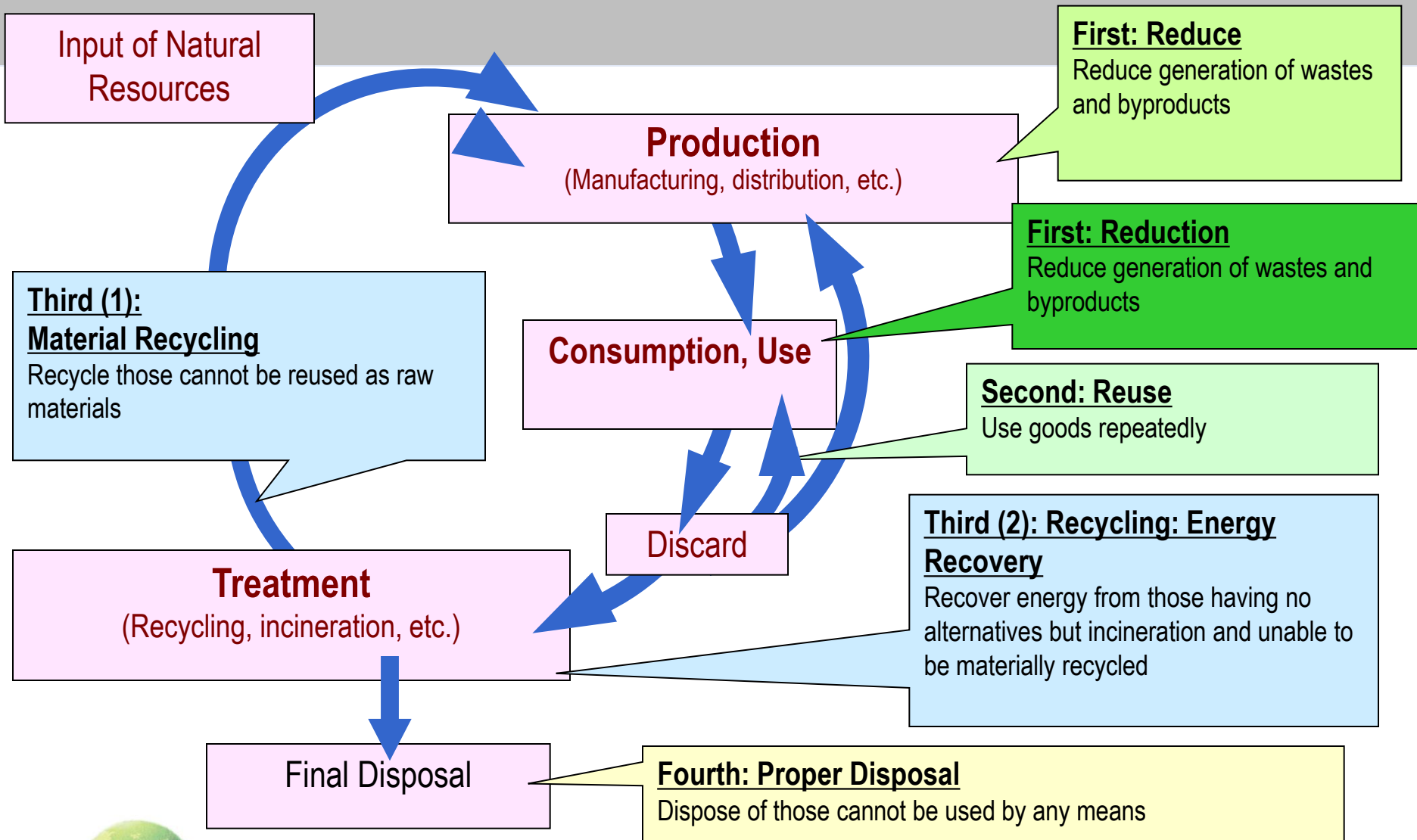
Source: Ellen MacArthur website



Source: 'Sense and Sustainability - Educating for a low carbon world',
Ken Webster and Craig Johnson. TerraPreta, 2008



SCHEME OF A SOUND MATERIAL-CYCLE SOCIETY



European Union

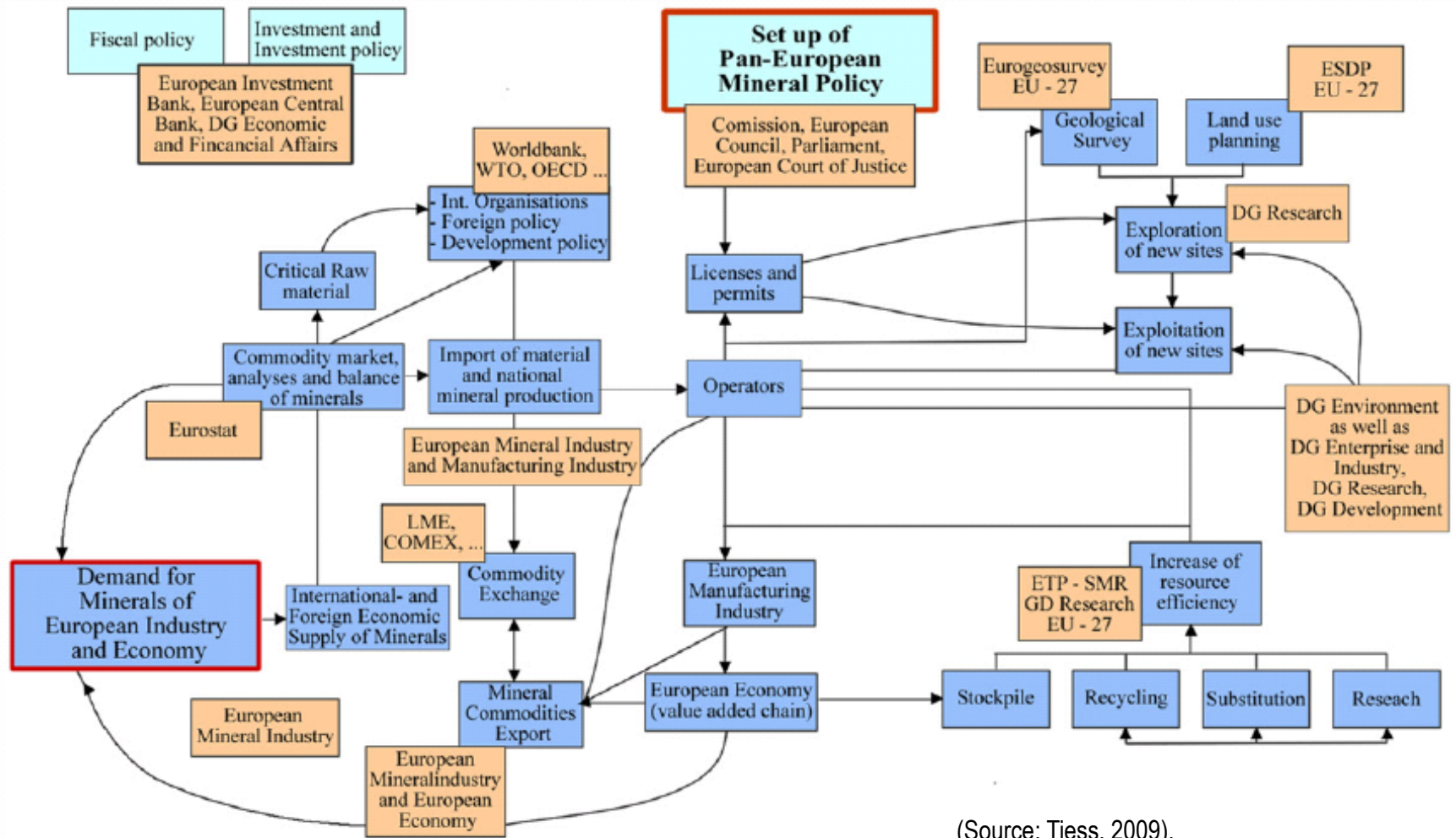
- 2001. EU Sustainable Development Strategy (SDS) (renewed in 2006)
- 2005. Thematic Strategy for the Sustainable Use of Natural Resources
- 2008. The Raw Materials Initiative – Meeting our Critical Needs for Growth and Jobs in Europe” (COM699)
- 2011. EU Strategy: “Tackling the challenges in commodity markets and on raw materials”

International

- ICMM Sustainable Development Framework
- SDIMI, an international forum for the Sustainable Development Indicators in the Mineral Industry
- African Mining Vision 2050
- African Mining Partnership (AMP)



INTERRELATIONS OF AN EU MINERALS POLICY



(Source: Tiess, 2009).



EU Raw Materials Initiative –2008/2011

- Pillar 1: Ensuring supplies from outside the EU(global raw material markets)
- Pillar 2: Ensuring supplies from within the EU(domestic extraction)
- Pillar 3: Enhancing recycling of raw materials and resource-efficiency

Pillar 2 and Pillar 3 will have significant repercussions for the European industry

Pillar 3: Recycling & Resource Efficiency

Challenges:

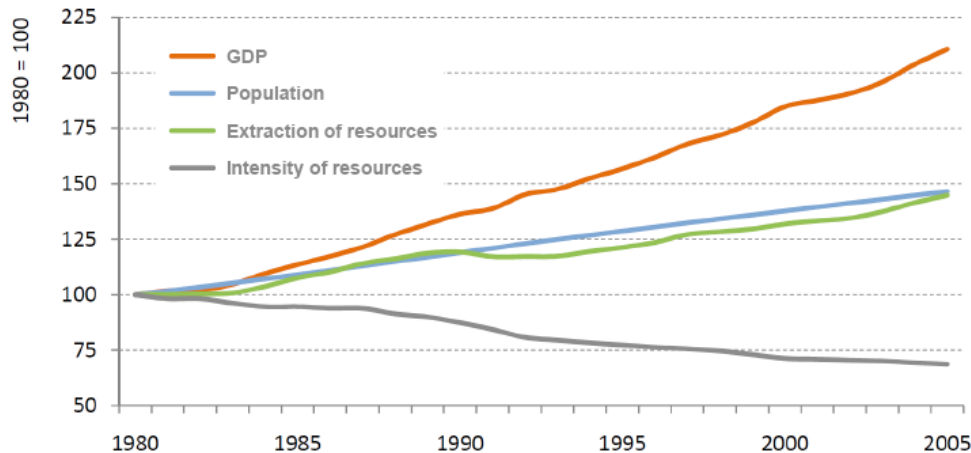
- Strict Regulatory framework at EU & national level expected
- Potentials
 - Reducing import dependence by the industry
 - Opening up new recycling markets
 - Fostering new technology development

Becoming more resource efficient is in the economic interests.



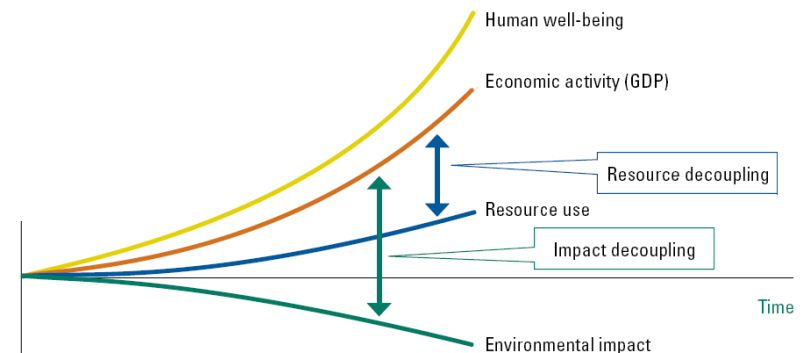
Pillar 3: Recycling & Resource Efficiency

- Decoupling of economic growth and consumption of resources
 - Using less resources per unit of economic output and reducing the environmental impact



© Friends of Earth/Global2000/SERI (2011)

Material intensity: materials used to produce one Euro

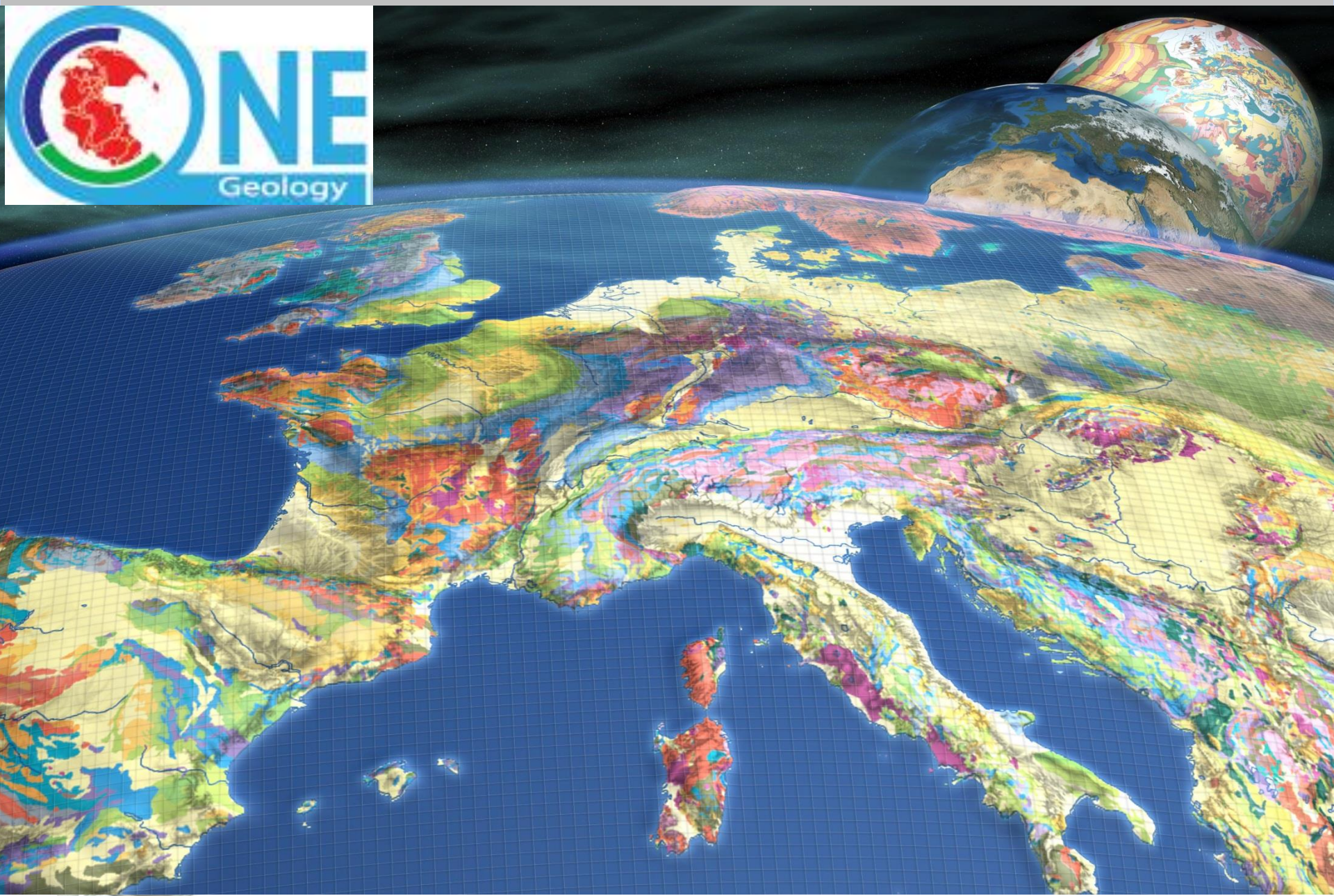


Source: United Nations Environment Programme. UNEP 2011



- **EO-MINERS.** Earth Observation for Monitoring and Observing Environmental and Societal Impacts of Mineral Resources Exploration and Exploitation (<http://www.eo-miners.eu/>)
- **The ProMine project.** Nano-particle products from new mineral resources in Europe. 2009-20 (<http://promine.gtk.fi/>)
- **EuroGeoSource.** Aggregated geographical information on geo-energy (oil, gas, coal etc.) and mineral resources (metallic and non-metallic minerals, industrial minerals and construction materials: gravel, sand, ornamental stone etc.) (<http://www.eurogeosource.eu>)
- **Aegos.** African-European Georesources Observation System (<http://www.aegos-project.org/index.php>)
- **SARMa.** Sustainable Aggregates Resource Management (<http://www.sarmaproject.eu/>)
- **MIN-NOVATION.** Mining and Mineral Processing Waste Management Innovation Network (www.min-novation.eu/)
- **CRM_InnoNet (Critical Raw Materials Innovation Network)** will drive innovation and influence policy in the field of substitution of critical raw materials for the benefit of EU industry.





Responding to EU needs

A 3D cube is shown against a blue sky with white clouds. The cube is divided into smaller sections. Labels with arrows point to different dimensions: "Resolution" points to the vertical axis, "Coverage" points to the horizontal axis, and "Themes" points to the depth axis.

European Geological Data Infrastructure

- Pan-European, interoperable, thematic data
- Mineral & energy resources, Groundwater, Soils, Hazards, marine geology, etc)
- Act on questions from society
- Implementing INSPIRE
- Building on past EU projects
- Growing with on-going and future projects

Connecting thematic data from all Geological surveys across Europe

A map of Europe is shown at the bottom of the panel. Numerous vertical white lines connect the map to the "European Geological Data Infrastructure" text above, symbolizing the integration of data from various European geological surveys.

MINERAL RESOURCES EXPERT GROUP (MREG) MAIN AREAS OF ACTIVITY

All main areas of activity stay well within the scope lines of the EGS
MREG, addressing and considering,

- EU agenda priorities (RMI, EIP,ETP SMR, KICs..)
- Work related focus
 - Mineral Intelligence Network for Europe-Mineral4EU proposal submission and selection for funding
 - Promotion and coordination of EU projects and calls related to minerals among all members of EGS
 - Member of Advisory Boards – AEGOS, EuroGeoSource, EURARE
- EGS Strategy issues e.g. ART 185/ERA-NET+ ,EGDI
- International co-operation and representation e.g. EU-Greenland days, EU-US, EU-Africa, EU-Russia ...

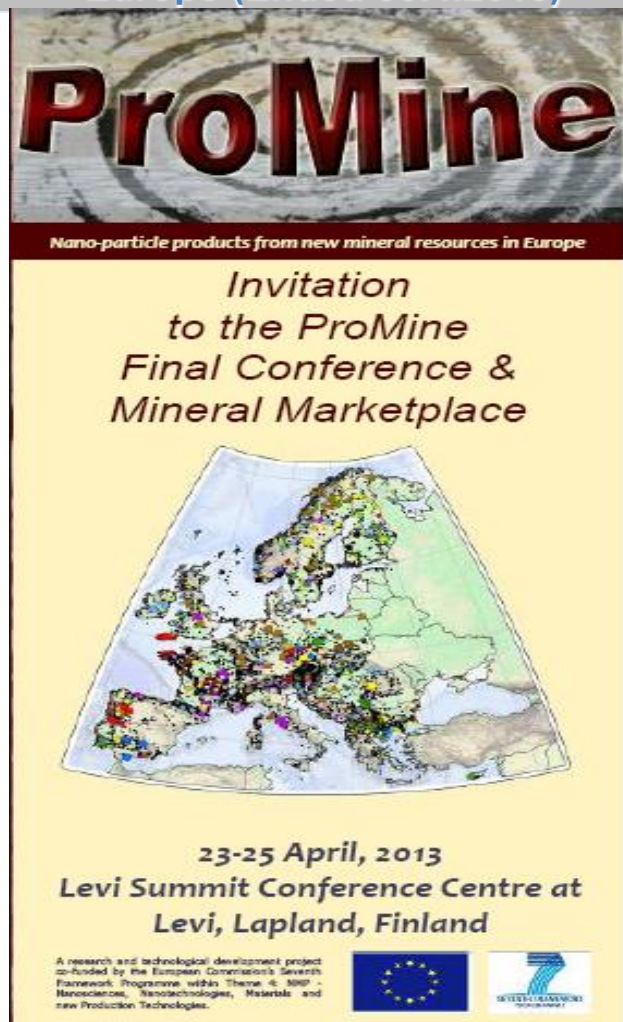


EU FUNDED MR RELATED PROJECTS/STUDIES

- EU Flagship projects with thorough NGSOs' participation in partnership and leading roles.
 - Ended; AEGOS, SARMa, Promine, EuroGeoSource
 - Ongoing; EO-MINERS, Polinares, ERA-MIN, EURARE
- DG Enterprise tenders
 - Study on 10 EIP pilot plants selected to demonstrate innovative technologies applied at various stages of minerals value chain
 - Study, on Structured Statistical Information on the Quality and Quantity of the EU Raw Materials Deposits
- Projects of strategic importance for NGSOs
 - European Geological Data Infrastructure (EGDI) proposal preparation is in full progress.
 - Minerals Intelligence Network for Europe- Minerals4EU-project



ProMine – Nano-particle products
from new mineral resources from
Europe (Ended 30.4.2013)



- **EURARE – eu Rare** 57-71 sustainable exploitation
 - Development of a sustainable exploitation scheme for Europe's REE ore deposits (1st 6 monthly meeting held last June)
- **Minerals4EU –**
 - Minerals Intelligence Network for Europe (Kick-off 16-17.9.2013 at GTK in Espoo)

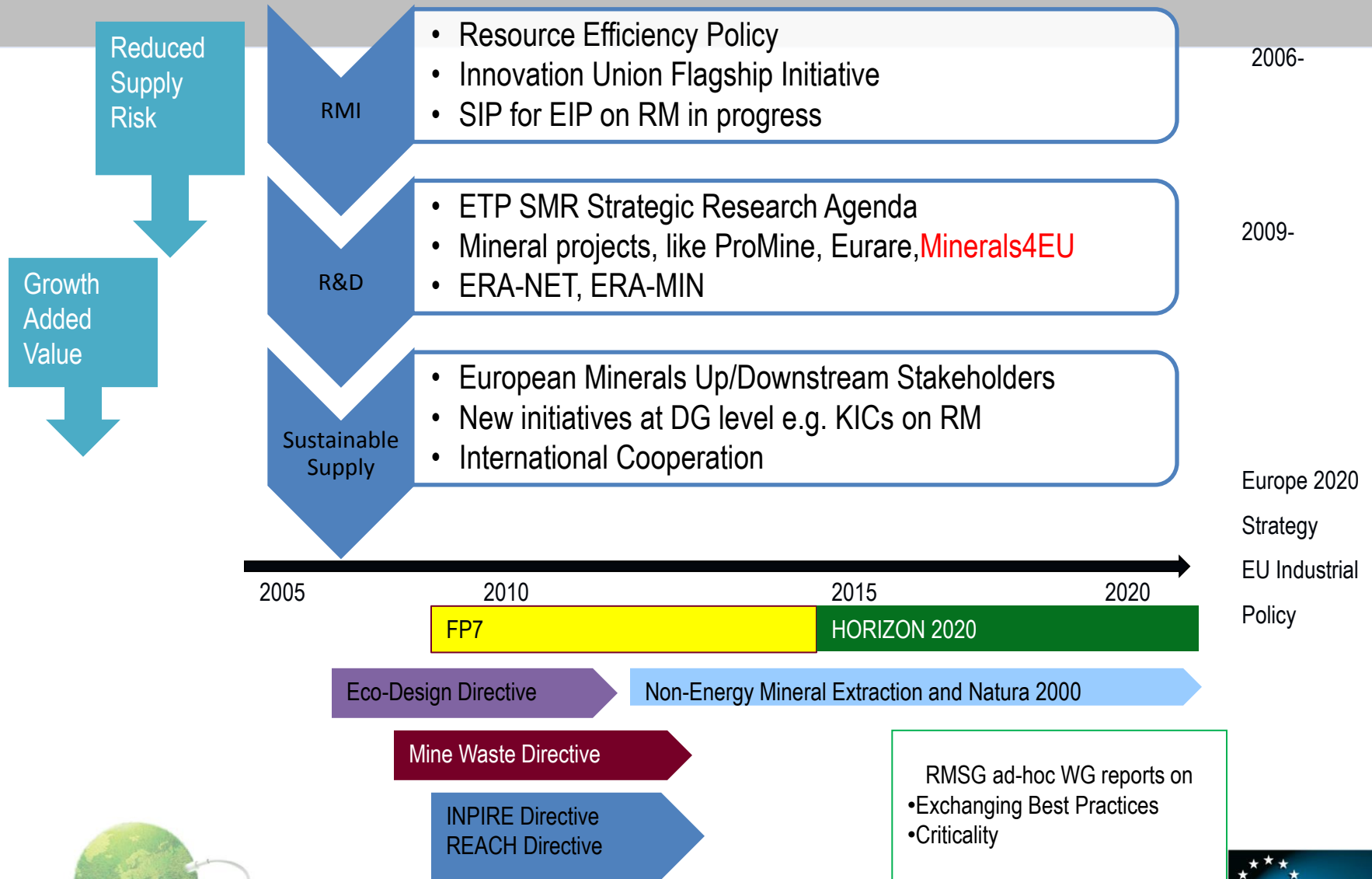


A WEALTHY TIME FOR MINERALS?

- **Restart towards sustainable use of European mineral resources is in progress**
 - New industrial targets, added value products, driving economy, more and better jobs expected
- **Challenging opportunities for EGS**
 - Further implementing RMI & EIP
 - New mineral calls- New projects (e.g. H2020)
 - Need for EGS to reshape (minerals) strategy
- **Changing activity profile for MREG**
 - Potential to network and exploit project results
 - Data provision is good but applied research performance and technology development (e.g. exploration, waste re-use, mineral processing) are probably better!



A WEALTHY TIME FOR MINERALS?

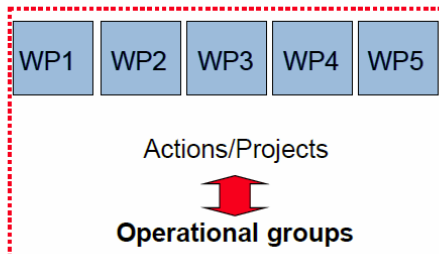


Need for innovation along the entire value chain of raw materials

- Commission adopted in 2012 a proposal for an Innovation Partnership on raw materials within the Europe 2020 Innovation Union Flagship
- This Partnership will target all non-energy, non-agricultural raw materials (metallic ones, industrial and construction minerals as well as natural rubber and wood).

High Level Steering Group (24 members)

+ Sherpa group



Orientation level

Planning / Monitoring

Advice / Implementation

STAGES

- Preparatory stage - 2012
- Planning stage – 2013

SIP adopted on 25/09/2013

- Implementation stage - 2014+



KEY COMPONENTS

- WP1 – Developing new innovative technologies and solutions for sustainable raw materials supply:
 - **Efficient resource processing.**
 - Economic, safe and environmentally friendly extraction and processing of primary raw materials
 - **Safe and environmental friendly extraction of mining waste heaps and recycling of secondary raw materials.**
 - Demonstration on **10 new pilot plants** along the value chain reflecting extraction of different types of raw materials, and processing and collection and recycling processes, in different regions and 3 demonstration biorefinery plants.
- WP2 – Developing new innovative technologies and solutions for the substitution of critical materials.
- WP3 - Improving Europe's raw materials knowledge and infrastructure base
- WP4 – Improving the regulatory framework via promotion of excellence and promoting recycling through public procurement and private initiatives
- WP5 –International cooperation



EUROPEAN INNOVATION PARTNERSHIP ON RAW MATERIALS

	Target	Indicators
WP1	10 innovative pilot actions	10 actions
WP2	Substitutes for 3 applications	3 substitutes
WP3	Improving mining regulatory framework	Revisions of regulatory acts
	Raw materials knowledge base with raw materials flows and trends	Service providing information and knowledge
	Network of Research, Education and Training Centres	Knowledge and Innovation Community on Raw materials
WP4	Enhanced efficiency in material use	Revisions of regulatory acts
WP5	Pro-active international cooperation strategy of EU	Strategy



OBJECTIVES OF SIP FOR EIP ON RM

- Reduction of **import dependency** and promotion of production and exports (*“Reducing Europe's import dependency on the raw materials that are critical to Europe's industries”*) by **improving supply conditions from EU and other sources** and providing **resource efficiency, including recycling, and alternatives in supply** through substitution (*“Providing Europe with enough flexibility and alternatives in the supply of important raw materials”*).
- Putting Europe **to the forefront** in raw materials sectors (*“Making Europe a leader in the capabilities related to exploration, extraction, processing, recycling and substitution by 2020”*) and mitigating the related negative **environmental and social impacts** (*“taking into account the importance of mitigating the negative environmental and social impacts of some materials during their life cycle”*)

Rapidly changing landscape demands to be pro-active and ready to re-shape



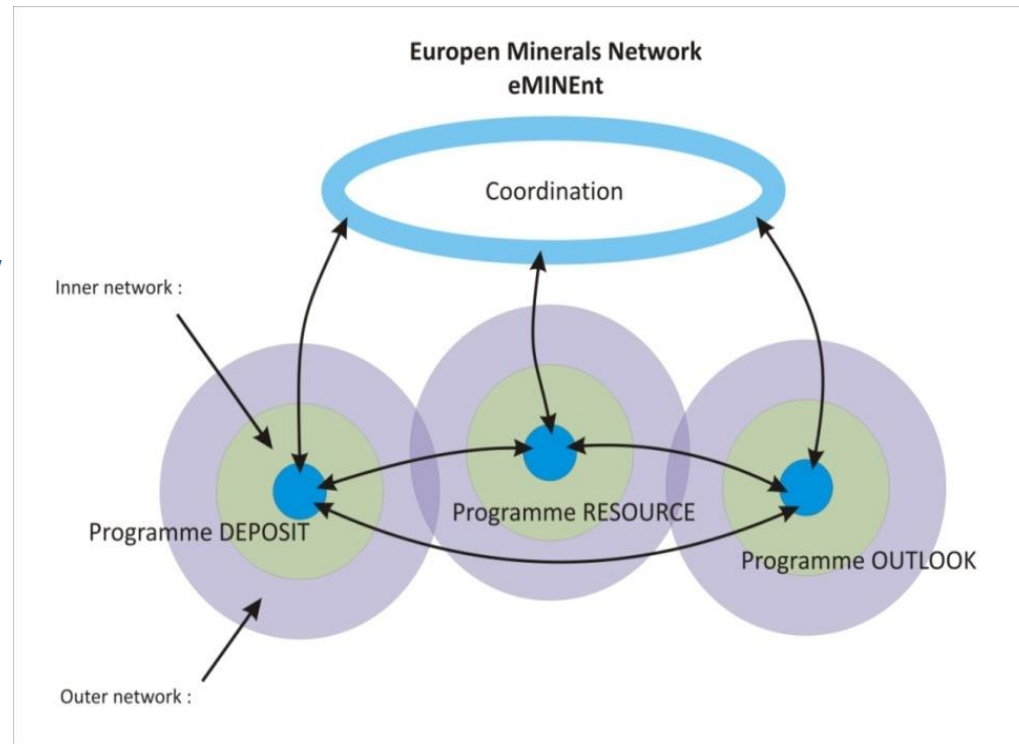
SIP: Strategic Implementation Plan. EIP: European Innovation Partnership

EuroGeoSurveys - The Geological Surveys of Europe



MREG- TURNING IDEAS IN PROJECTS

- 2009: European Minerals Intelligence Network (eMINEnt)
- 2011: Pilot Action -Improving Europe's raw materials regulatory framework, knowledge and infrastructure base-
- 2013: Minventory – EU Raw Materials Statistics
- 2013: Minerals4EU ↔ EGDI



RESULTS AND ACHIEVEMENTS

- The results to be paid particular attention are about achievements and outcomes having a more practical approach, as well as more applied research and development value for the sustainable supply and growth of mineral resources in Europe, such as:
 - The kick-off of the Minerals Intelligence Network for Europe- Minerals4EU- project
 - The approval of the project “*Geoscientific Knowledge and Skills of African Geological Surveys*” commissioned by DG-Entreprise and DG Dev
 - The study on Structured Statistical Information on the Quality and Quantity of the EU Raw Materials Deposits (*Minventory*) commissioned by DG-Entreprise.
 - The Sustainable Aggregates Planning in South East Europe (SNAP-SEE) project focuses on developing and disseminating tools for aggregates management planning in Southeast Europe (SEE).








- Set up in 2005
- Recognised by the EC in 2008
- Becomes a non-profit association in 2013





EUROPEAN TECHNOLOGY PLATFORM
ON SUSTAINABLE MINERAL RESOURCES

The ETP "Sustainable Mineral Resources" will:

-  reshape a 'traditional' industry from a resource-driven to a knowledge-driven industry;
-  foster new and better jobs, including SMEs and New Member States;
-  supply and secure the mineral resources needed by the EU economy, while minimising the related environmental footprint (decoupling);
-  strengthen world leadership and competitiveness in minerals sector technology;
-  add value for customers and society.



ETP SMR Members

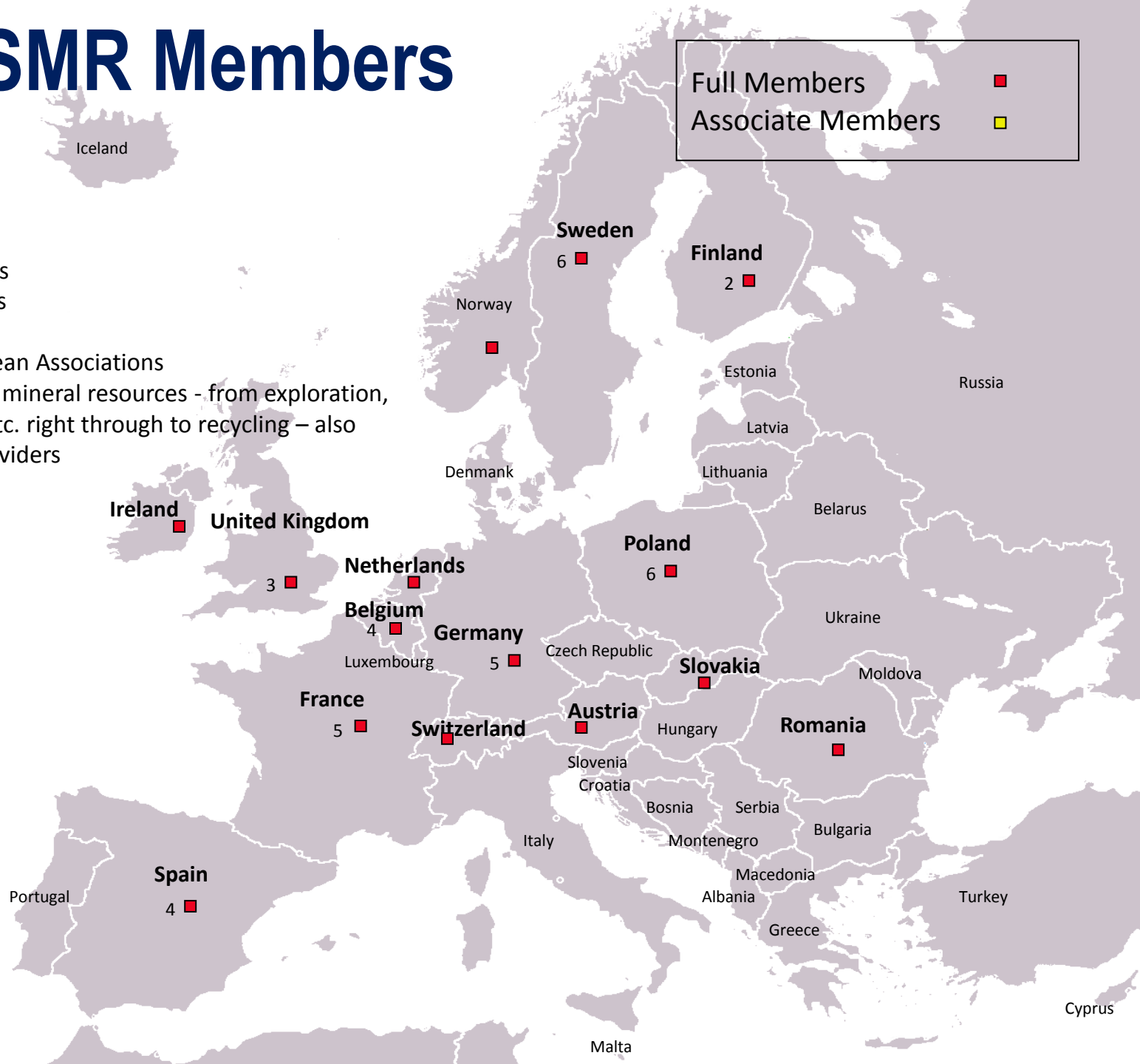
Full Members 
Associate Members 

43 members from

Industry
Research Institutes
Geological Surveys
Academia
National & European Associations

Covering most sectors in mineral resources - from exploration, extraction, processing, etc. right through to recycling – also including technology providers

Mintek
Republic of South Africa



STRATEGY/ACTIVITIES

STRATEGY

- By 2020, the EU will have secured a sustainable minerals and metals supply base to ensure competitiveness and growth of the EU industry as a whole. Scientific breakthroughs and sustained innovation efforts will have significantly improved access to, production, use and recycling of resources.
- By 2050, the EU will have achieved a sustainable basis for the entire life-cycle of minerals and metals in the EU.

ACTIVITIES

- Strategic Research Agenda to highlight research needs
- European Innovation Partnership on Raw Materials
- ERA-MIN collaboration
- SPIRE. Sustainable Process Industry through Resource & Energy Efficiency
- EC-funded projects, tenders and other EU initiatives (e.g. ProMine, I²Mine, RAMINTECH)



Minerals4EU



Designing a permanent structure



EuroGeoSurveys - The Geological Surveys of Europe



Minerals4EU

- Knowledge Base Platform that goes along and in line with the SIP* for EIP on RM.
- Dynamic value chain, delivering and exploiting adding value intelligence and foresight studies, and challenging the development of a permanent structure to achieve and provide sustainable services

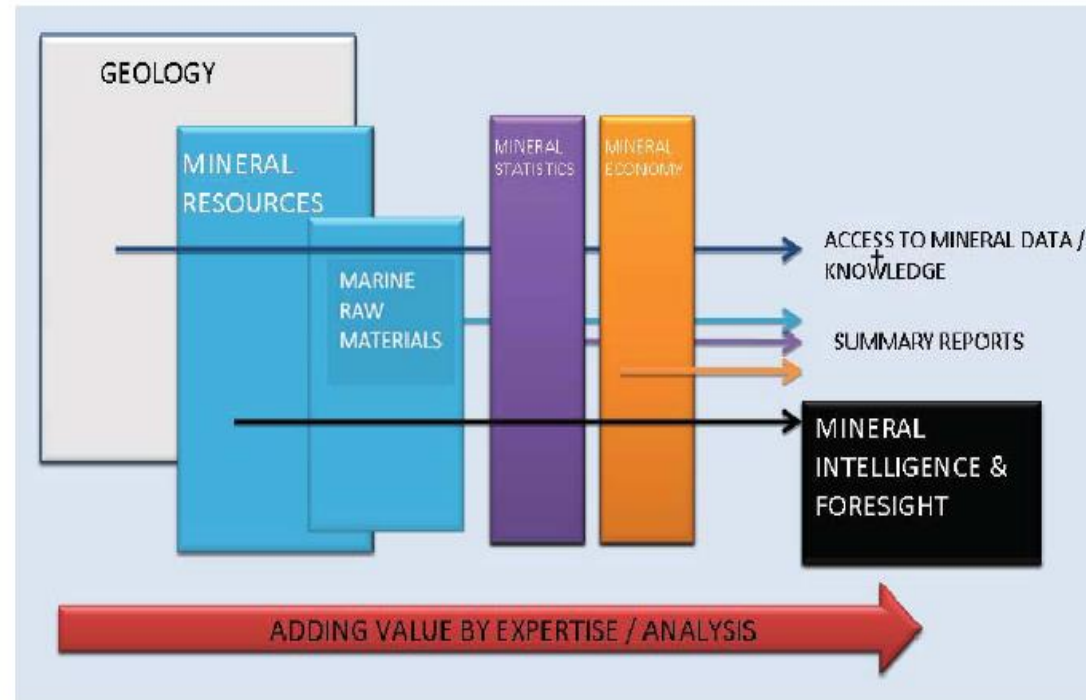


Figure 9: Value chain from minerals data to minerals data processing to minerals intelligence and foresight

**Priority Area: Knowledge and skills on raw materials /EU Knowledge Base*



- Creation of Minerals intelligence network to facilitate access for the EU to the raw materials information sources and to promote collaboration among experts.
- Developed EU Mineral intelligence network structure can deliver:
 - data, information and knowledge on mineral resources around Europe on a regular, and “on demand” basis, upon a ‘sustainable’ business model, based mainly on the most directly involved public regional, national and European minerals data providers and stakeholders,
- Before the end of the project this network should be transformed in a sustainable permanent operational service



- Create a sustainable network gathering a critical mass of institutions with the relevant authority and competencies at world, EU and national levels, resulting in the creation of a permanent structure before the end of the project.
- INSPIRE compatible infrastructure (Integrated Knowledge Management System) that enables partners to share mineral knowledge, and the public and private stakeholders to find, view and acquire standardized and harmonized information from:
 - National and regional data sources (e.g. mining authorities, surveys)
 - Past and ongoing national and EU projects (e.g. ProMine, EuroGeoResource, EURARE)
 - Web portals at partner and stakeholder sites (e.g. EUROMINES, IMA, UEPG)
 - National and European statistics (e.g. EUROSTAT)

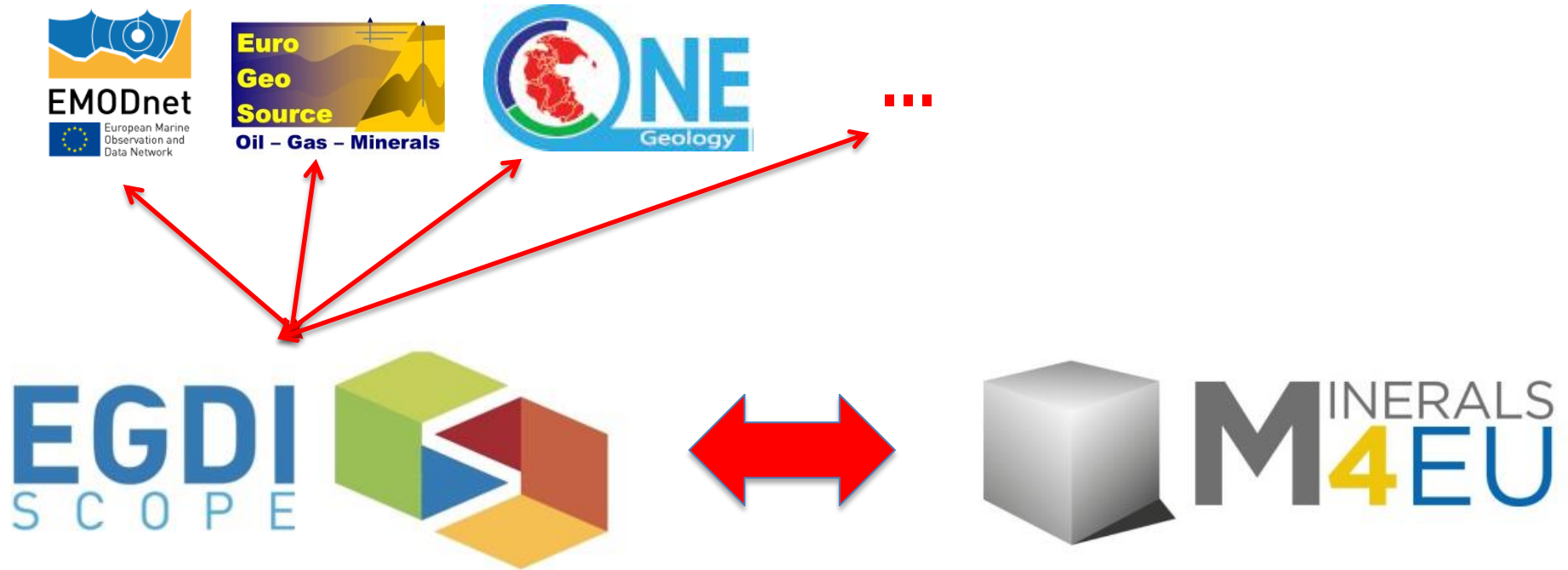


INTELLIGENCE AND FORESIGHT

- Establishment of a permanent structure to guarantee the sustainability of the network in the long term, for the on-going and routine provision of Minerals4EU services for all potential stakeholders.
- Identification of existing data sources and assessment of data availability and quality for primary and secondary raw materials to achieve harmonization and standardization of EU mineral statistics.
- Development of the a 'European Mineral Raw Materials Yearbook' and a roadmap for future implementation, updating and maintenance after project.
- Development of an operational EU Knowledge data platform compliant to INSPIRE.
- Production of a foresight study (demo) on mineral raw materials future supply and demand in the EU with special attention given to critical minerals, but not excluding Fe, Al, Cu, Ni.



EGDI-Scope ↔ Minerals4EU



**One pillar of the
pillars!**



- Create a sustainable coordination structure or forum gathering and mobilizing the critical mass of European mineral resources key players (R&D groups, EU and national projects, EC initiatives, European Mining Industry bodies, International cooperation).
- Enhanced position in minerals development using main tools, components and actions supporting, facilitating and monitoring work progress, achievements and results with respect to the strategic areas emphasized above



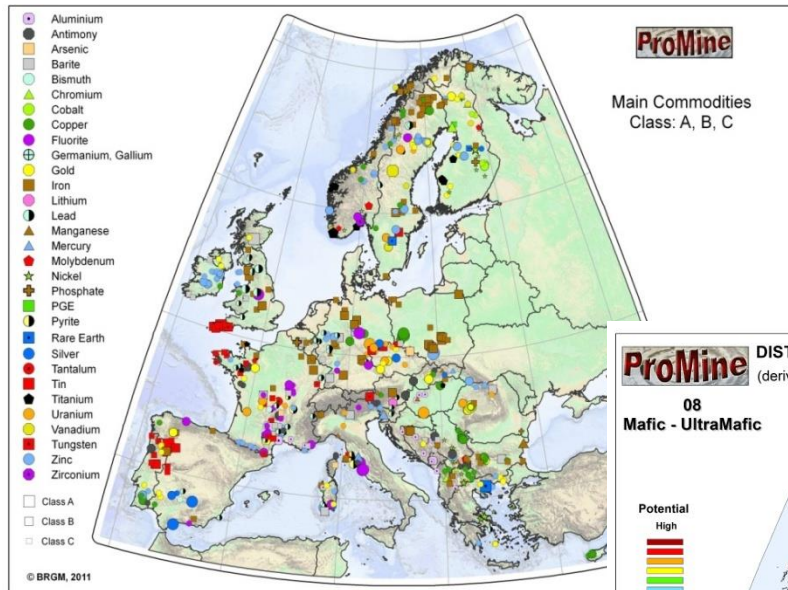
- The emphasis of EuroGeoSurveys will go beyond its present state and institutional role to become an active component (using the expertise and involvement of all EGS member surveys) in emerging projects addressing minerals related topics and focusing on,
 - further implementing the RMI
 - Following up the SIP EIP thematic priorities
 - raising the position of minerals in Europe 2020 Strategy
 - incorporation of MR topics in HORIZON 2020
 - avoiding fragmentation of the European Research Area in the field of mineral resources
 - enhancing an EU geopolitical role in RM
 - Improving resource efficiency e.g. re-use

Turn from being only data and knowledge providers, to even become and act as RTD performers and technology developers

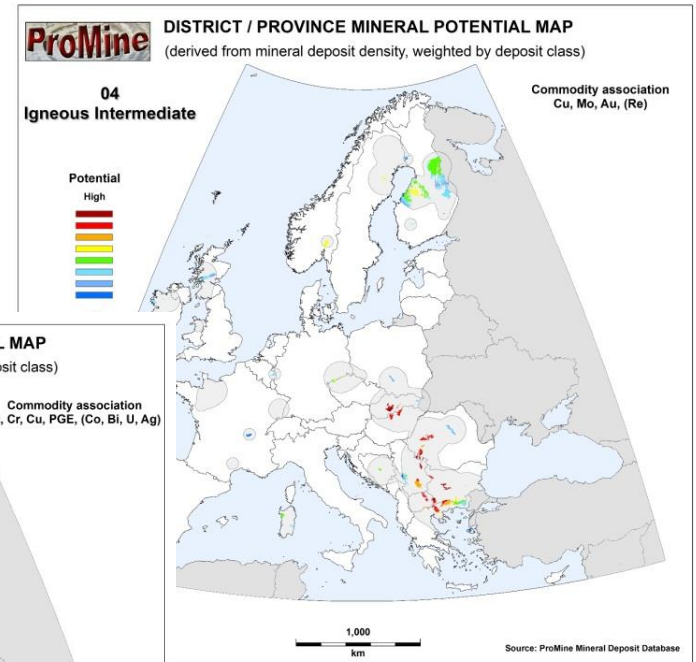
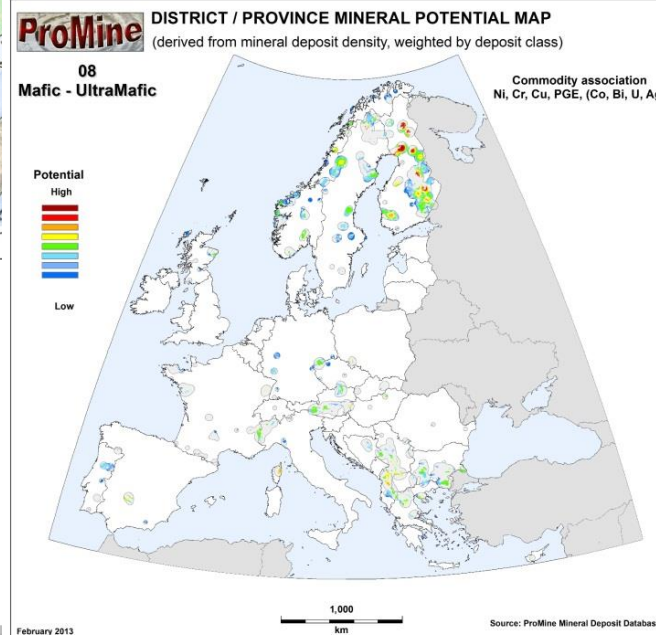


METALLOGENETIC / PREDICTIVE MAPPING

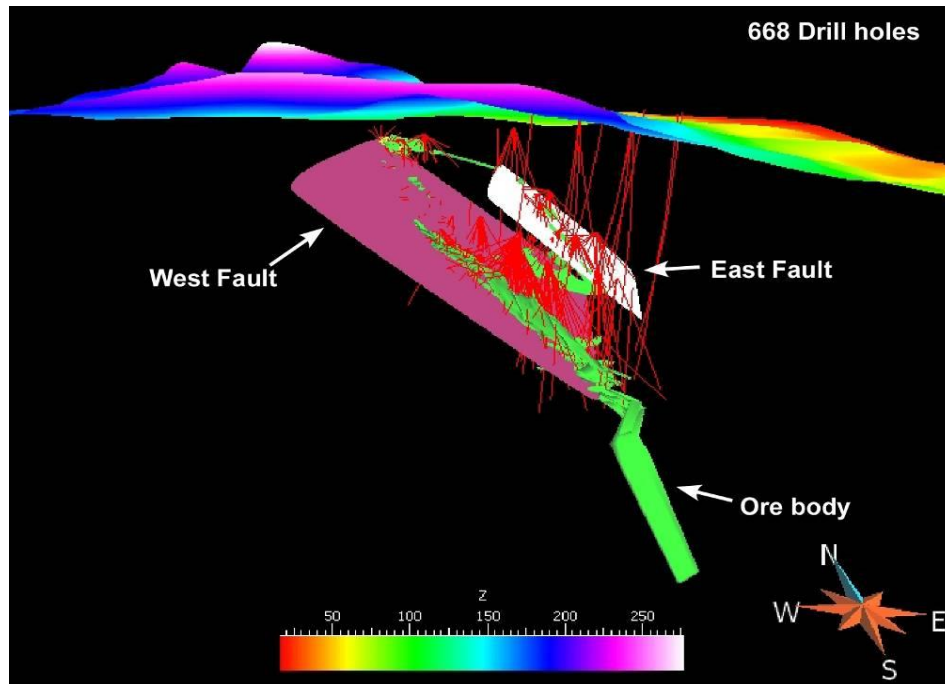
Mineral /metal commodities



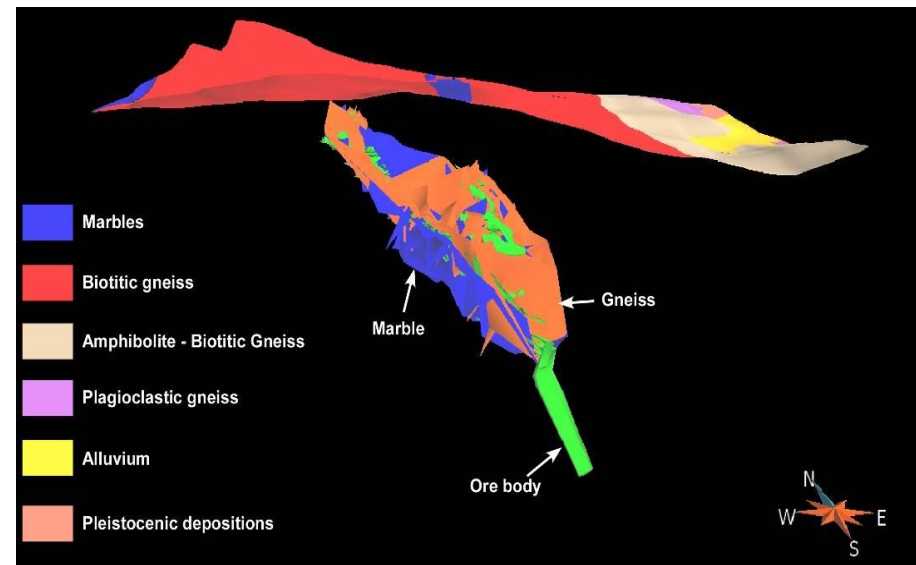
Potential exploration targets



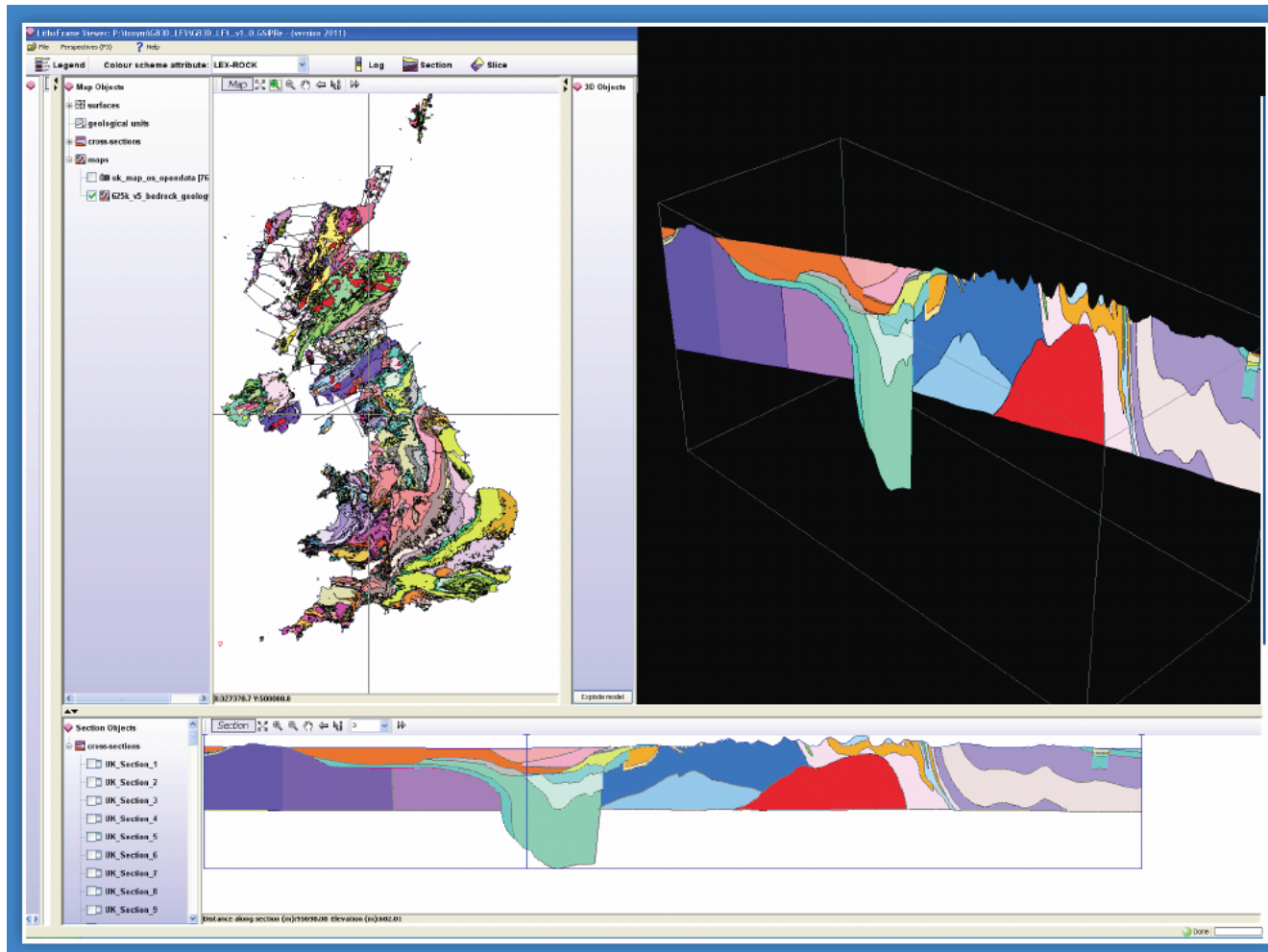
Structural control



Host- lithology setting



FROM DATABASE TO 3D MODELLING



- Short term work tasks and project targets of main concern, to be undertaken and progressed, include,
 - following up the work program of the Minerals4EU- proposal
 - progress of the EGS-African cooperation issues on mineral resources
 - proper position of minerals into the context of Art 185/ERA-NET⁺ and the related Vision Paper edition
 - active involvement to the UNECE Expert Group on Resources Classification
 - further participation to the EIP SIP governance structure
 - support to the Exploration Pilot Plant, also backed up by ETP-SMR, the mining industry, ProMine consortium and academia
 - setting up an action plan taking into account current and future European and global minerals exploration and exploitation trends, the SIP EIP progress, which seems from now on to control and govern any developments in minerals R&D (e.g. H2020), and any foresight and outlook studies dedicated to extractive industry.
 - involvement to Knowledge Innovation Community (KIC) on Raw Materials (sustainable exploration, extraction, processing, recycling and substitution of raw materials) introduced by European Institute of Innovation and Technology (EIT) expected to be launched in 2014 with a recently allocated budget of €2.8 billion under Horizon 2020



IS THERE A NEED FOR AN EGS KIC?

- Processing, some NGSOs have facilities and expertise
- Metallurgy to beneficiate low grade ores ???
- Waste management issues e.g. safety of disposal sites
- Recycling/re-use e.g. secondary resources may become potential raw materials for critical minerals extraction e.g. REE, PGE, Sb, Ga
- Restoration, taking also into account geotouristic and mining heritage aspects
- Public awareness requires interactive communication
- Co-location issues
 - Overall RM KIC center
 - Sub-themes centres e.g. exploration, processing etc.



THE IMPORTANCE OF OUTREACH

Minerals in our life



The Geological Surveys of Europe



Minerals in our life

Shaping the Earth of Tomorrow

32 Geological Survey organisations from across Europe

EuroGeoSurveys is a non-profit organisation of the Geological Surveys of Europe, the national institutions responsible for geological inventory, monitoring, knowledge and research.

For 40 years the main objective of EuroGeoSurveys has been to contribute to society's welfare. We turn geoscientific information into European-wide knowledge, technologies and services easily accessible and beneficial to society and economic growth.

Our principal purpose is to provide public Earth science knowledge to support the EU's competitiveness, societal well-being, environmental management and international commitments.

In our day-to-day activities, we promote the contribution of geosciences to European Union affairs and action programmes; provide a permanent network between the Geological Surveys of Europe and a common, but not unique, gateway to each of the Members and their national networks; jointly address European issues of common interest in the field of geosciences; and publish technical advice for the European Union Institutions.

EGS only pursue activities that lie exclusively in the public interest or in the interest of public administration that will benefit from our ability to quickly respond to specific demands from the European Union, addressing geological problems of a political, economic and social nature.

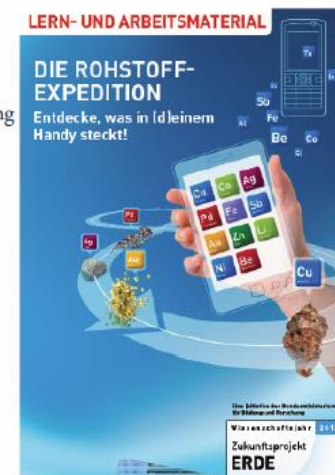
EuroGeoSurveys - The Geological Surveys of Europe



THE IMPORTANCE OF OUTREACH

Education campaign “The raw material expedition”

- Nationwide education campaign by the German Federal Ministry of Education and Research (2012/13): „The raw material expedition – discover what is hidden inside your cell phone“
- Target: raise awareness for sustainable consumption and resources contained in a mobile phone among young people (14 – 19 years)
- Over 1.600 schools ordered the learning and teaching papers
Over 350 schools ordered the „Mobile phone raw material box“
- Content: 9 raw materials (e.g. gold, tantalum) contained in a mobile phones
- Very positive feedback of teachers and pupils.



T ■ ■ ■ **ERLEBEN, WAS VERBINDET.**



EuroGeoSurveys - The Geological Surveys of Europe

THANK YOU FOR YOUR ATTENTION

