



**EUROPEAN TECHNOLOGY PLATFORM
ON SUSTAINABLE MINERAL RESOURCES**

The contribution of RTD to address the sustainable use of natural resources and strategic raw materials.

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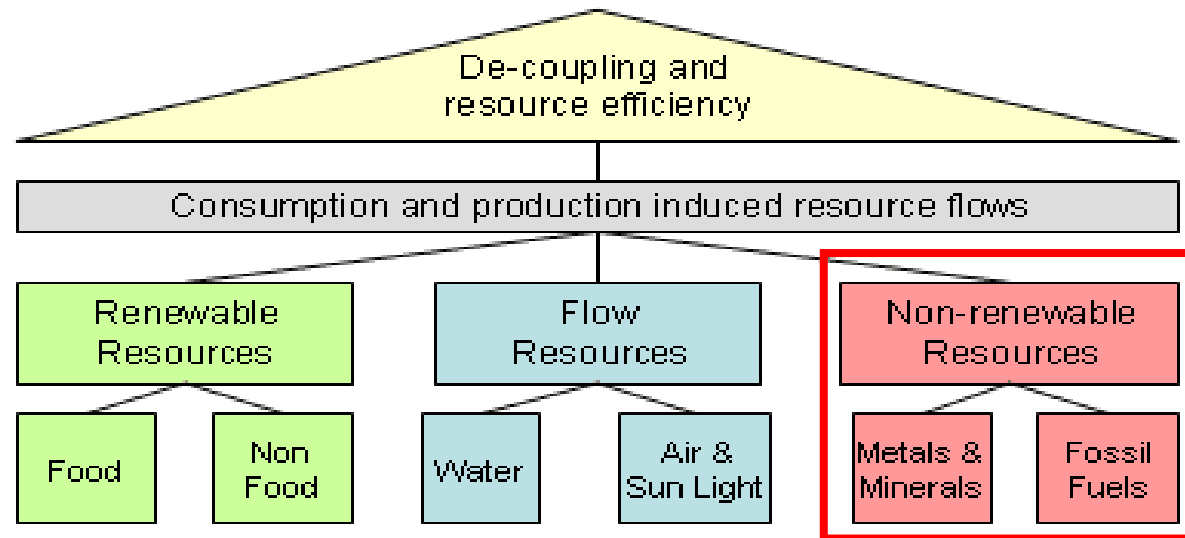


Agenda.

1. Issues of the sustainable use of natural resources in the EU policy;
2. Securing access to raw materials – important factor of the European economy ;
3. Is any contradiction between environmental issues and the new EU policy in minerals ?
4. Long term vision of the eco-effective management of production operations in extractive industry sector;
5. ETP SMR key issues to tackle the challenges of the sustainable use of natural resources in EU;
6. Potential cooperation between ETP SMR and other ETPs.

Natural Resources

1. Resources are the backbone of every economy.
2. Effective management of resources aims to find the best solutions which would satisfy environmental principles and economic aspects.



3. The management of resources such as metals and minerals, oil and gas, water and other renewable resources is a fundamental challenge of sustainable development.
4. In the last few years the consumption of resources has accelerated and was supported by high prices for raw commodities. This was accompanied by strong demand and fierce competition amongst importing and manufacturing countries for resources.

Greening Industrial Processes.(1)

In Europe, the society expects as far as the industrial processes are concerned:

1.Resource Efficient and Cleaner Production;

2.Eco-Efficiency by reducing ecological impacts and resource intensity throughout the life cycle;

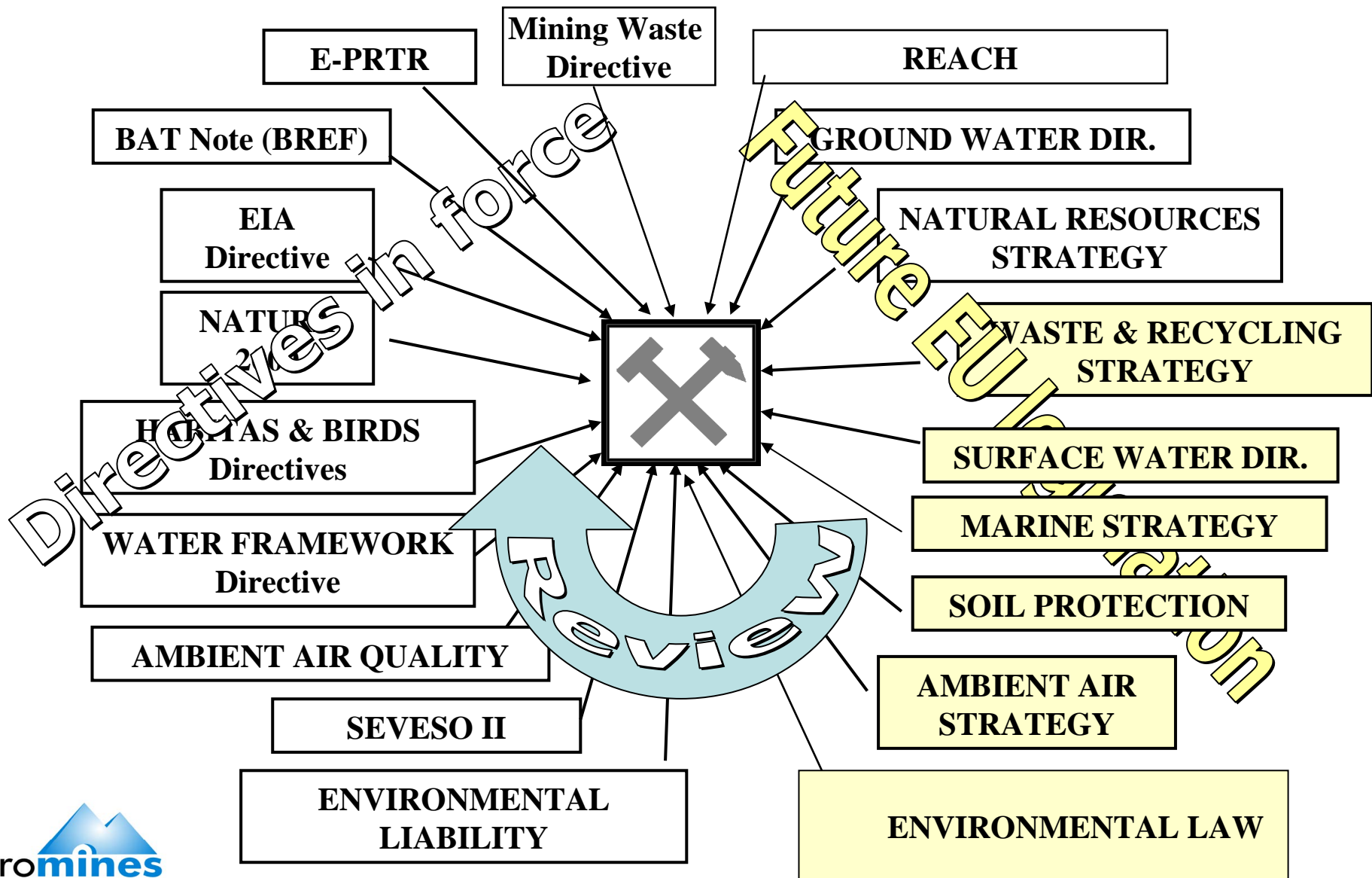
3. Pollution Prevention & Waste Minimisation;

4. Reuse or Recycling implementation.

Greening Industrial Processes.(2)

- On 21st December 2005 the European Commission proposed a **Strategy on the Sustainable Use of Natural Resources in Europe**.
- The objective of the strategy is to reduce the environmental impacts associated with the use of resources in a growing economy.
- Focusing on the **eco-efficiency** when using natural resources was to be a decisive factor in helping the EU achieve sustainable development.
- EU documents : [Communication COM 670 \(2005\)](#), [Annexes to the Communication SEC 1684 \(2005\)](#), [Impact Assessment SEC 1683 \(2005\)](#)

Directives of concern for the European industry ensuring Sustainable of Use of Resources and Cleaner Production.



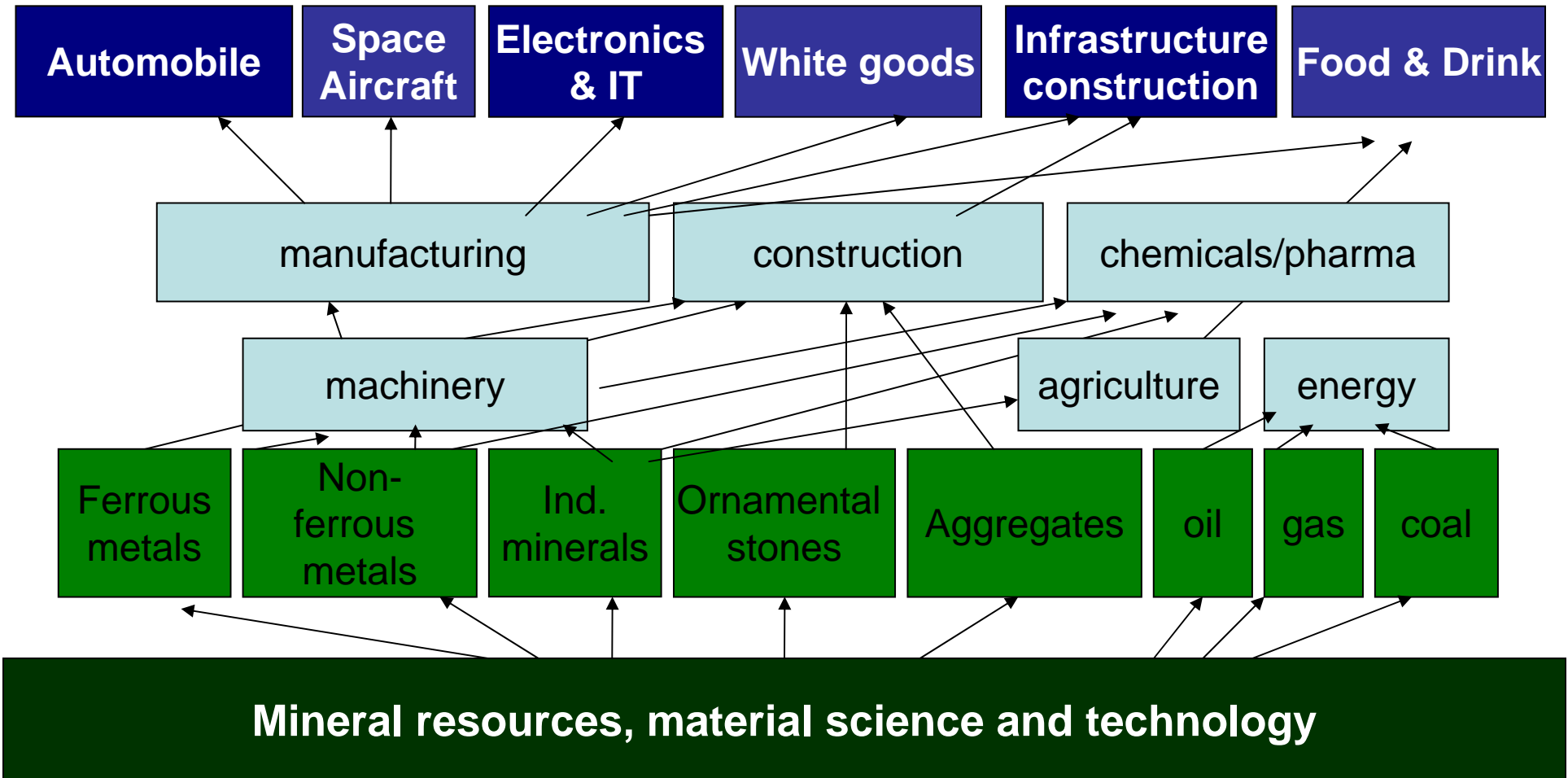


Most of the market products need metals & minerals.

- Within the general growing global need for resources of all kinds, metals and minerals are of particular importance today and in the future.
- Minerals and metals are needed for nearly every aspect of our daily life. They are an essential part of key economic sectors.
- Even renewable energy sources such as solar panels, windmills and hydro-power plants depend on metals and minerals.

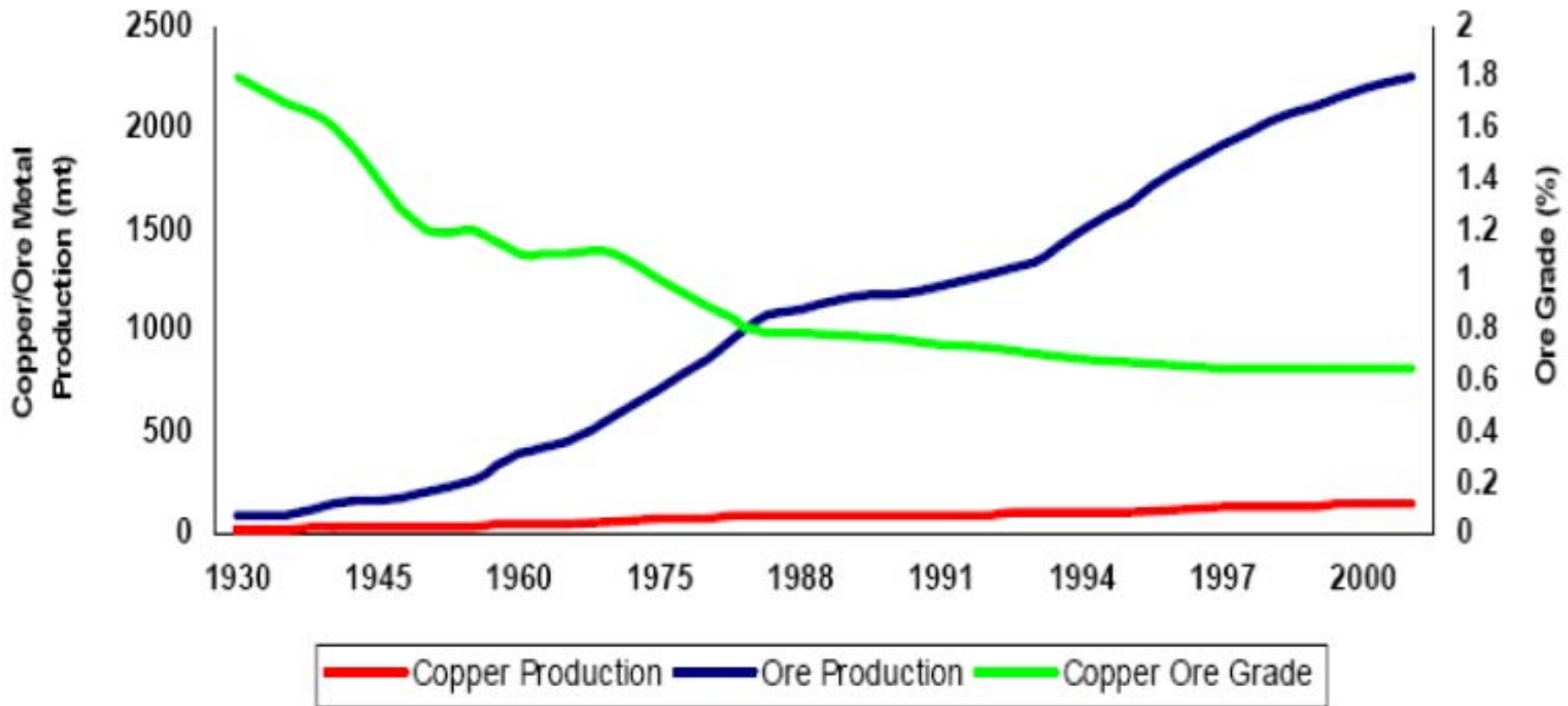


Extractive industry - a fundamental pillar of the economy.

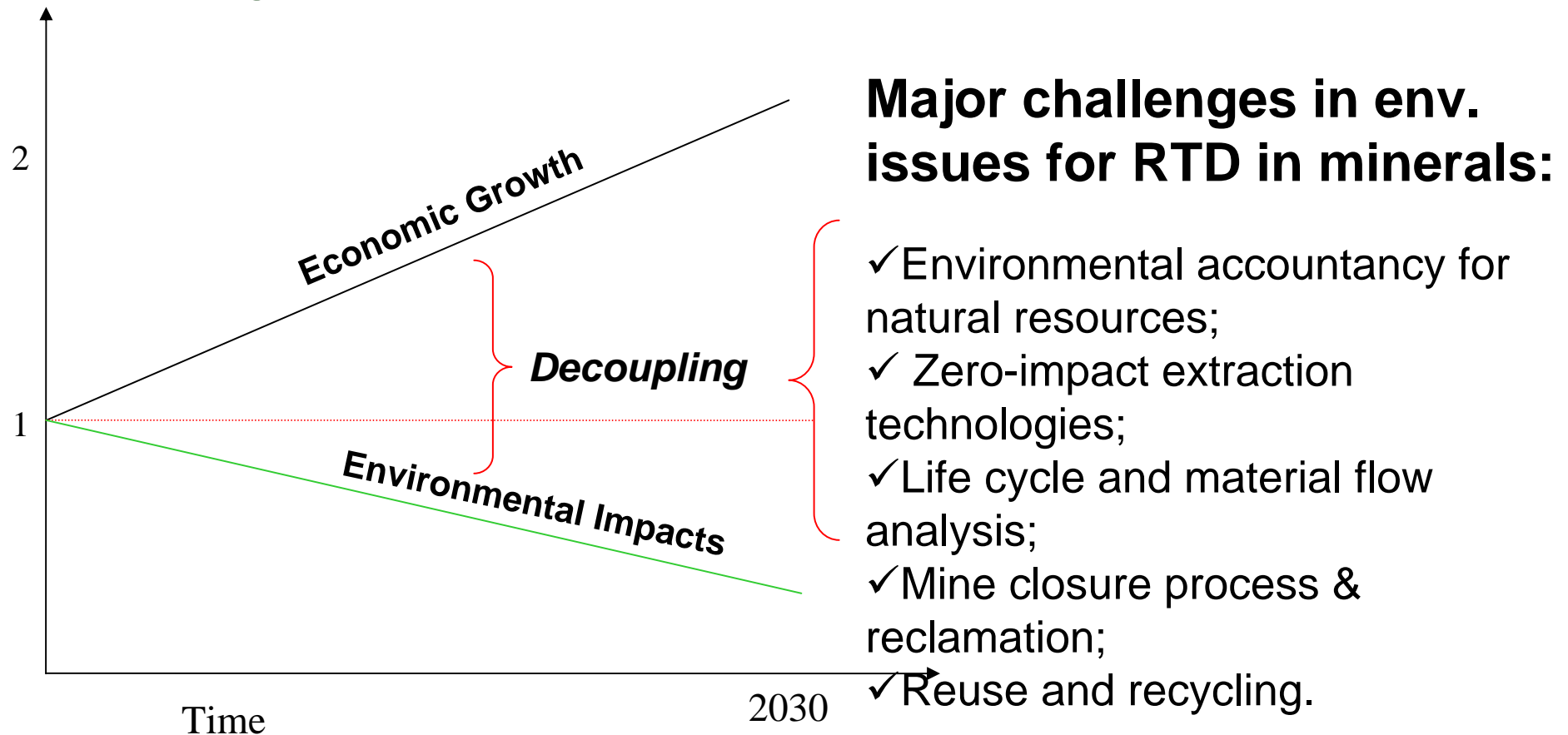


- Minerals and their resulting products are vital to a competitive European Economy
- Almost every economic sector needs products from the minerals industry

Lower content of many metals in extracted ore. The example of copper.



Idea of „decoupling” becomes an important issue and challenge for extractive industry in many EU countries.



The demand for more metals and other minerals is growing. How should we avoid the contradiction between needs of the market and environmental issues?

Main issues of the European Mining.

- 1.Exploration and mining – is getting increasingly difficult due to problems with access to land: conflict of interests (Natura 2000).
- 2.Permitting and appealing issues: very long processes, too many instances and possibilities to appeal,
- 3.Increasing trade distortion taken by third countries.
- 4.Bad image within the population: dangerous branch (safety & environment), *dirty* industry
5. Human resources: age pyramid
6. Education: low interest and status for the mining industry at all stages and levels in many EU countries
7. Technology and R&D: lack of support from EC between 2000-2006. More support from 2007.

New situation of extractive industry in the EU from the year 2007.

Public introduction of the EC Working Document *SEC (2007) 771* in June 2007 by DG Ent. & Industry which described the situation of non-energy raw materials branch in the EU.

Main topics of the document:

- 1.Importance of raw materials for the EU economy.
- 2.Trends on the international raw material markets.
- 3.Risks associated with the supply of raw materials for the future of EU economy.
- 4.Lack of the European policy in non-energy raw materials.

Top three producing mining regions for selected metallic minerals (2006).

Metal	First	%	Second	%	Third	%	Cum. %
Rare Earth concentrates	China	95	USA	2	India	2	99
Niobium-Columbium	Brazil	90	Canada	9	Australia	1	100
Antimony	China	87	Bolivia	3	South Africa	3	93
Tungsten	China	84	Canada	4	EU	4	92
Gallium	China	83	Japan	17	-		100
Germanium	China	79	USA	14	Russia	7	100
Rhodium	South Africa	79	Russia	11	USA	6	96
Platinum	South Africa	77	Russia	11	Canada	4	92
Lithium	Chile	60	China	15	Australia	10	85
Indium*	China	60	Korea	9	Japan	9	78
Tantalum **	Australia	60	Brazil	18	Mozambique	5	83
Mercury	China	57	Kyrgyzstan	29	Chile	4	90
Tellurium	Peru	52	Japan	31	Canada	17	100
Selenium*	Japan	48	Canada	20	EU	19	87
Palladium	Russia	45	South Africa	39	USA	7	91
Vanadium	South Africa	45	China	38	Russia	12	95
Titanium	Australia	42	South Africa	18	Canada	12	72
Rhenium**	Chile	42	USA	17	Kazakhstan	17	76
Chromium	South Africa	41	Kazakhstan	27	India	8	76
Bismuth	China	41	Mexico	21	Peru	18	80
Tin	China	40	Indonesia	28	Peru	14	82
Cobalt	Congo D.R.	36	Australia	11	Canada	11	58
Copper	Chile	36	USA	8	Peru	7	51
Lead	China	35	Australia	19	USA	13	67
Molybdenum	USA	34	China	23	Chile	22	79
Bauxite	Australia	34	Brazil	12	China	11	57
Zinc	China	28	Australia	13	Peru	11	52
Iron ore	Brazil	22	Australia	21	China	15	58
Cadmium	China	22	Korea	16	Japan	11	49
Manganese	China	21	Gabon	20	Australia	16	57
Nickel	Russia	19	Canada	16	Australia	13	48
Silver	Peru	17	Mexico	14	China	13	44
Gold	South Africa	12	China	11	Australia	11	34

Data source: World Mining Data (2008). * = World refinery Production (USGS, 2008) ** = USGS (2008)

Next important step - EC Raw Materials Initiative.

RMI was announced in November 2008 and gave a strong push towards RTD activities in minerals.

RMI - the integrated strategy of the EU which is based on 3 major pillars:

- 1. Access to raw materials on world markets at undistorted conditions;**
- 2. The right framework to foster sustainable supply of raw materials from EU sources;**
- 3. Increase resource efficiency and promoting recycling in the EU.**

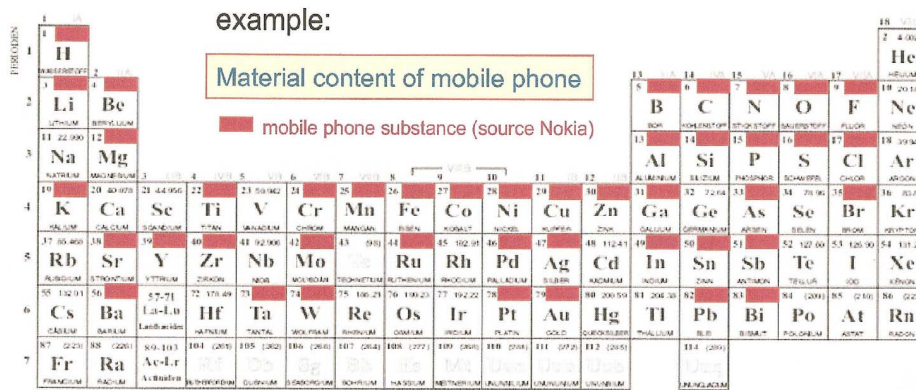
The Raw Materials Initiative activities

		Level of response		
		EC	Member States	Industry
1	Define critical raw materials	X	X	X
2	Launch of EU strategic raw materials diplomacy with major industrialised and resource rich countries	X	X	
3	Include provisions on access to and sustainable management of raw materials in all bilateral and multilateral trade agreements and regulatory dialogues as appropriate	X	X	
4	Identify and challenge trade distortion measures taken by third countries using all available mechanisms and instruments, including WTO negotiations, dispute settlement and the Market Access Partnerships, prioritising those which most undermine open international markets to the disadvantage of the EU. Monitor progress by issuing yearly progress reports on the implementation of the trade aspects, drawing, as appropriate, on inputs from stakeholders.	X	X	X
5	Promote the sustainable access to raw materials in the field of development policy through the use of budget support, cooperation strategies and other instruments	X	X	

Provisional list of non-energy critical minerals.

Commission Communicate of the EC (Brussels, 4.11.2008, COM(2008) 699 final)

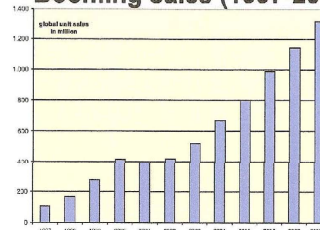
Precious & special metals – key for smart materials and increasing functionality



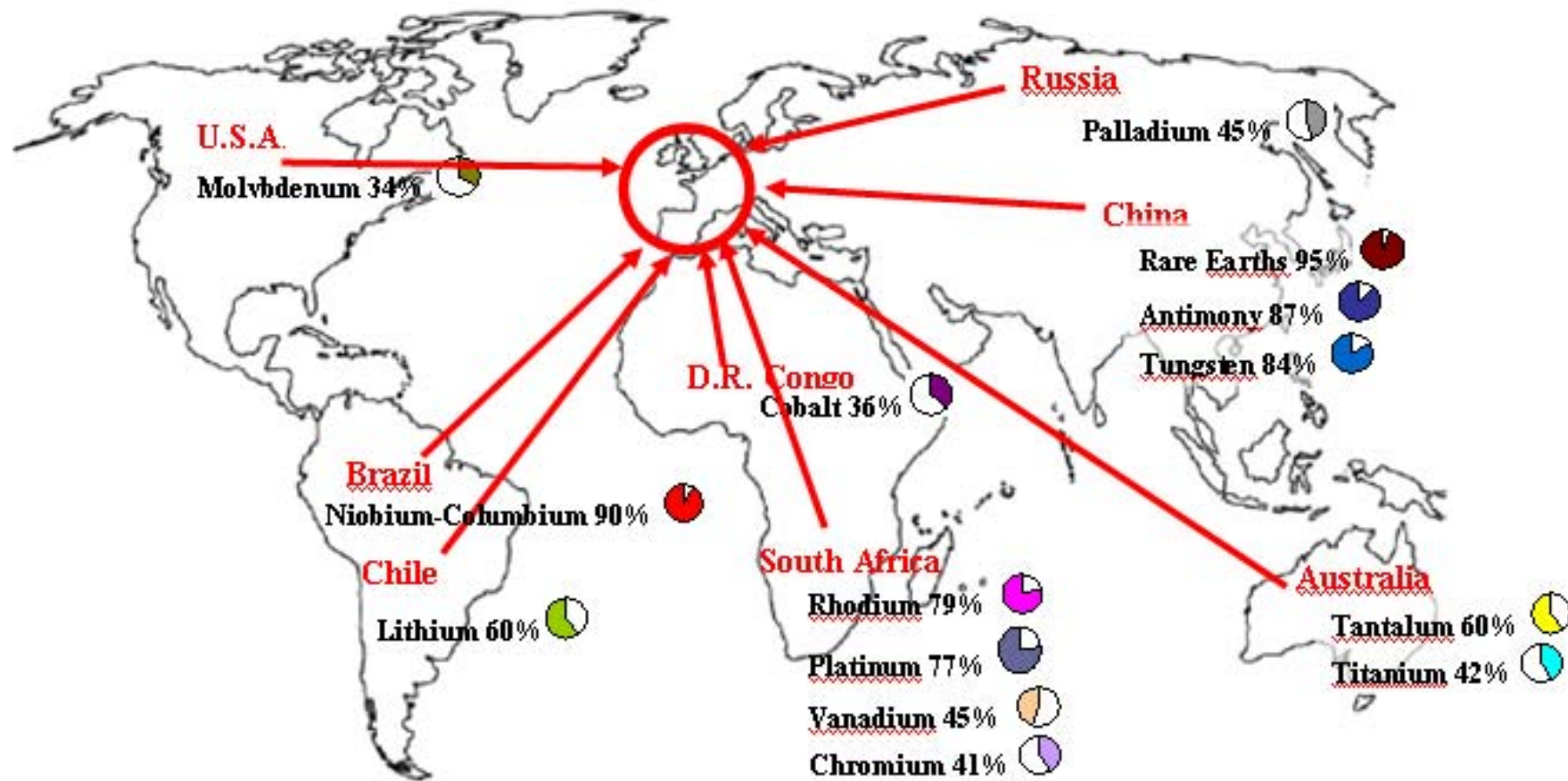
- Antimony
- Platinum
- Palladium
- Rare earths
- Rhenium
- Rhodium
- Tantalum
- Titanium
- Tungsten
- Manganese
- Niobium
- Chromites
- Cobalt
- Gallium
- Germanium
- Indium
- Lithium
- Magnesium
- Vanadium
- Molybdenum

- special & precious metals = “technology metals”:
 - ⇒ Significant increase of demand (& prices)
- Primary production from low grade ores:
 - ⇒ high energy & resource requirements

Booming sales (1997-2008)



Major global producers of selected high-tech metals (2008).



Data source : World Mining Data (2008) **=USGS (2008)
The figures and pie graphs indicate the proportion of world production

The Raw Materials Initiative activities

		Level of response		
		EC	Member States	Industry
6	Improve the regulatory framework related to access to land by:			
	- promoting the exchange of best practices in the area of land use planning and administrative conditions for exploration and extraction and		X	
	- developing guidelines that provide clarity on how to reconcile extraction activities in or near Natura 2000 areas with environmental protection	X		
7	Encourage better networking between national geological surveys with the aim of increasing the EU's knowledge base		X	
8	Promote skills and focussed research on innovative exploration and extraction technologies, recycling, materials substitution and resource efficiency	X	X	X
9	Increase resource efficiency and foster substitution of raw materials	X	X	X
10	Promote recycling and facilitate the use of secondary raw materials in the EU	X	X	X



ETP SMR - key objectives when implementing the EU RMI.

- **Securing** the future supply of/access to European raw materials;
- **Supporting** the revival of exploration of Europe's mineral potential;
- **Developing** innovative and sustainable production technologies;
- **Implementing** best practices;
- Reuse, recovery and recycling as well as **new product applications**;



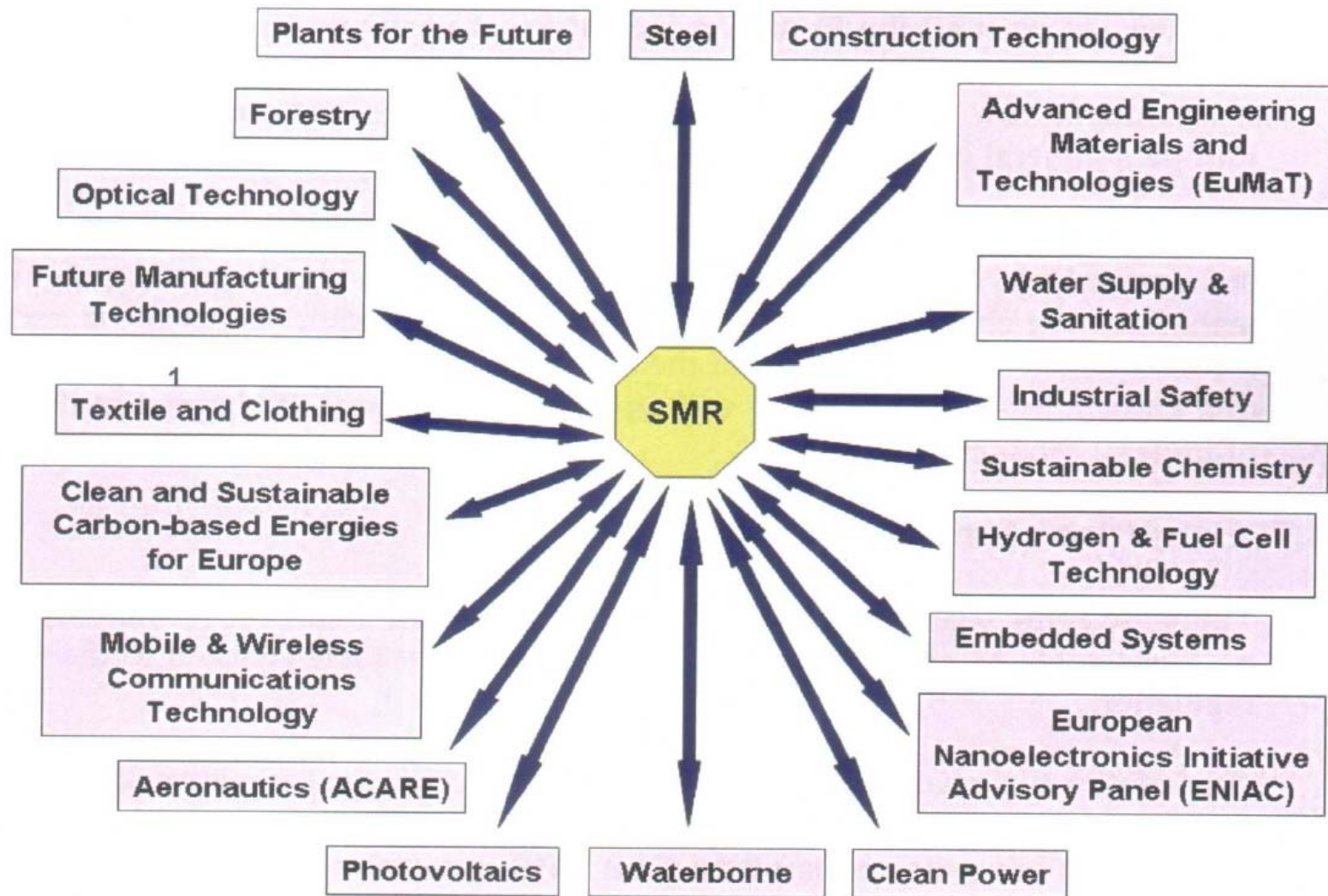
RTD in resource efficiency by promoting skills and research in new extraction and resource processing technologies.

- New routes for mineral processing, metallurgy and reuse/recycling;
- New advanced machinery and installations, and process control.
- **Alliances with the other ETPs when implementing new advanced technologies.**





Potential relations with other European Platforms



- Mining industry is one of the largest users of water, and is also one of the largest contributors to the degradation of aquifers and river systems.
- Water and energy management impacts directly on the economic viability, environmental footprint, social acceptability and long-term sustainability of many mining projects.
- The priority is the development an NMP FP7 research and demonstration project of best practices for integrated water management systems in industry incl. mining (close-loop recovery, treatment and purification technologies).



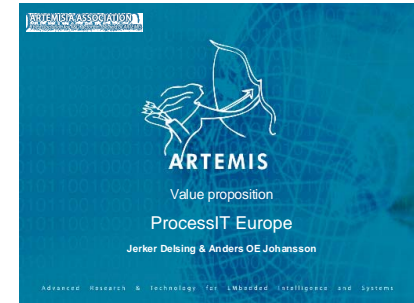
Mining and construction industry operate in a very competitive international environment. They face the same problems and challenges: (access to land, underground operations during construction, supply of suitable materials, need for ICT and automation).

Both ETPs could be interested in cooperation in the scope of:

- achieving increased effectiveness of the equipment and processes for underground operations at low and very deep level.
- extensive use of the ICT and robotics in order to highly automate the processes and continuous mining operations.
- better knowledge about the about behavior of surrounding rock/extracted deposit (look-ahead technologies) and underground infrastructures (ground support)
- ensuring healthy and safe work conditions during underground operations.

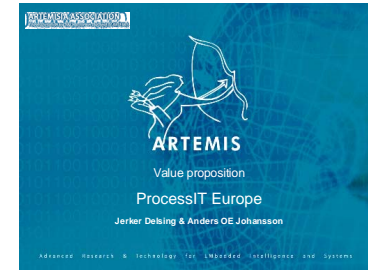


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ARTEMIS proposal - ProcessIT Europe.

- The scope of ProcessIT Europe was defined as “**manufacturing automation within industries like mining and minerals, pulp & paper, metals, oil & gas, energy, chemical, pharmaceutical, wastewater etc**”. The overall target is to increase the industry competitiveness for those industries and its automation (IT and ES).
- ProcessIT Europe should **develop and maintain a roadmap** to be able to impact on FP7/8 program/calls. ProcessIT Europe should also act as a **project incubator**.
- It is assumed that ProcessIT Europe will consist of **the four stakeholders**:
 - End Users (industry),
 - Product owners (industry),
 - University/institute-research
 - Society (eg. financing agencies)

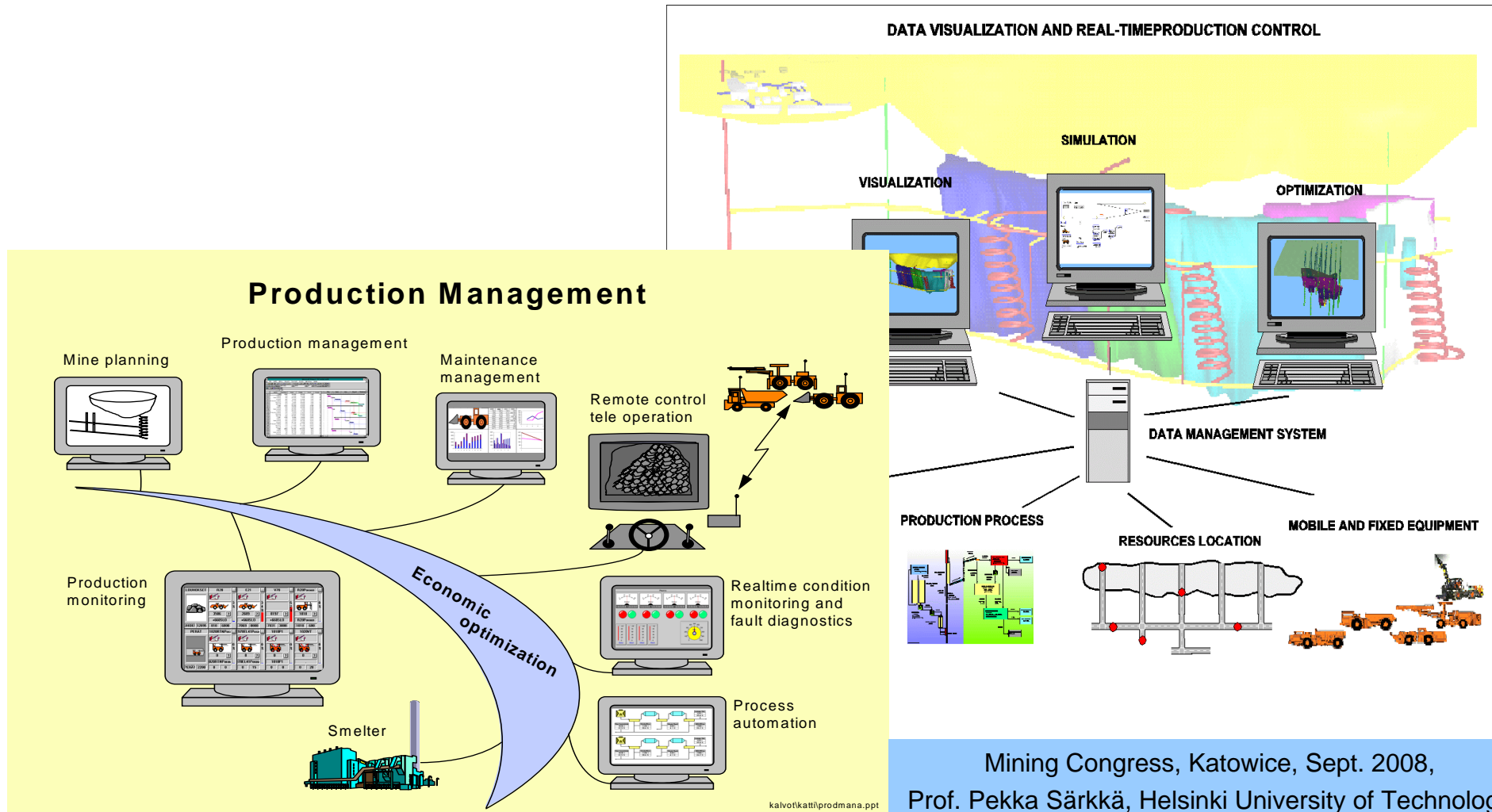


IT ProcessEurope a valuable proposition for mining industry – one of the end users.

Finding and coordinating robotics and automation needs that strongly influence the future technology development in deep mining operations that lead to the **Intelligent Deep Mine** implementation with increased safety and efficiency in underground operations.

What is an Intelligent Mine ?

A mine that monitors its entire operation in real time, with each process feeding relevant data to the successor process for action, as well as to the predecessor process for feedback.



Examples of automation and remote steering in underground iron ore mine (1 000 m deep), LKAB, Sweden





Lean Manufacturing – Action Plan.

- The LEAN MANUFACTURING principles for production processes are well established in some industrial sectors in Europe (automotive, steel, electric/electronic, transport industry). There is a need to give further impetus to implement efficient production processes in other European sectors for example **in the mining sector** to encourage optimal use of all resources in production process.
- In this Action Plan a set of integrated actions in some European sectors should be proposed in LM under the umbrella of the **Manufuture Technology Platform**.



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**PPP or JTI « Mine of the Future »
with ETP Manufacture
including:**

- new, high- added-value products and services;
- new manufacturing engineering;
- emerging manufacturing science and technologies;

Conclusions

- Global market in mining sector has become a challenge for Europe.
- Extractive industry is going to be one of main pillars of European economy (security of supply an important issue in Europe)
- We should intensify the exploration and RTD activity in mining sector.
- Recycling and reuse can be strong alternative for increasing demand for strategic raw materials.
- Expanded RTD in FP7 **and FP8** – the heart of the matter in the EU RMI implementation.
- The security in supply of raw materials should be tackled with by the EU and all EU members.



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Thank you for your attention !