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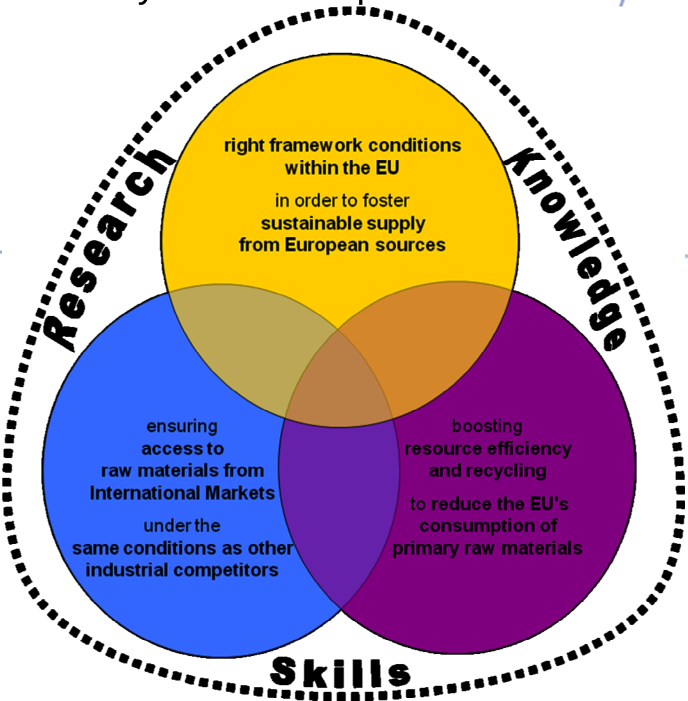
Improving framework conditions for extracting minerals for the EU

Abridged report of the *ad-hoc* Working Group on Exchanging Best Practice on Land Use Planning, Permitting and Geological Knowledge Sharing

The *ad-hoc* Working Group is a sub-group of the Raw Materials Supply Group and is chaired by the European Commission



Note: The full report will be available on the Enterprise and Industry Directorate General website http://ec.europa.eu/enterprise/policies/raw-materials/documents/index_en.htm

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Note: The text may be subject to final drafting adjustments.

This document reflects the view of the Commission services and is not of a binding nature.

European Commission, 01.07.2010

Based on questionnaires, the preparatory drafts of this guidance document were written by Jon Grantham, Catrin Owens and Elisabeth Davies, all Land Use Consultants, under contract to the European Commission (contract n° 30-CE-021568/00-41).

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1. INTRODUCTION

Raw materials are essential for the functioning of modern societies, and access to these raw materials is vital to the economy of the EU. Key sectors such as the construction, chemicals, information technology, telecommunications, automotive and aerospace industries, need a ready supply of non-energy raw materials at an affordable price. Interruptions to this supply can jeopardise the competitive position of companies within these industrial sectors, thereby threatening the functioning of the EU economy.

Further complexities are added by the fact that geological raw materials are a finite resource, and extraction is spatially constrained to the areas in which the materials naturally occur. Whilst some uses of raw materials may be reduced through improvements in technology, in many cases substitution of the raw materials is impossible, or would take many years to achieve.

The Commission Communication "*the Raw Materials Initiative – meeting our critical need for growth and jobs in Europe*"[1] of 2008, focussed on the various challenges regarding access to non-energy raw materials. It is an integrated strategy that ties together various EU policies, notably trade, external relations, development, competitiveness, environment and research. Ten lines of action were established, based on the three pillars of the strategy which aim to:

- 1st Pillar: Ensure **access to raw materials** from international markets under the same conditions as other industrial competitors;
- 2nd Pillar: Set the right **framework conditions** within the EU in order to foster sustainable supply of raw materials from European sources; and
- 3rd Pillar: Boost overall resource efficiency and promote recycling to **reduce consumption of primary raw materials** and decrease the relative import dependence.

[1] COM (2008) 699 – 4 November 2008

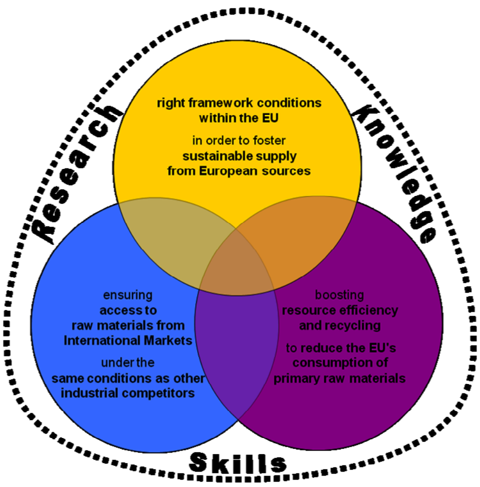

Figure 1: Model of the three pillar Raw Materials Imitative and its relation to Research, Knowledge and Skills.

The work detailed in this report has been undertaken with regards to actions 6 and 7 of the Raw Materials Initiative, linked to the second pillar of the Initiative. Action 6 involves identifying actions to promote the exchange of best practices in the area of land use planning and administrative conditions for exploration and extraction. Action 7 involves better networking between national Geological Surveys with the aim of increasing the EU's knowledge base, and looking into the need to develop a medium to long term strategy for integrating sub-surface components into land services of the GMES Land Monitoring Core Service.

Work has been undertaken in close cooperation with Member States and stakeholders. In order to facilitate this process, the *ad-hoc* Working Group on Exchanging Best Practice on Land Use Planning, Permitting and Geological Knowledge Sharing (hereafter called the Working Group) was created under the umbrella of the Raw Materials Supply Group[2] in April 2009. The Working Group consisted of a mix of experts from national and regional ministries, geological surveys, extractive and down-

[2] The Raw Materials Supply Group is an expert group with a long standing history. It is chaired by Enterprise and Industry DG, and comprises representatives from Member States, industry and other stakeholders.

stream industries, universities and non-governmental organisations (NGOs)[3].

The objectives of the Working Group were to:

- identify actions to promote the exchange of best practices in the area of land use planning and administrative conditions for exploration and extraction;

- develop the knowledge base of European resources by promotion of better networking between European Geological Surveys, competent authorities and academia; and

- consider the need to develop a medium to long term strategy for integrating sub-surface components into the land services element of the GMES Land Monitoring Core Service.

The Working Group's remit was to research and identify examples of best practice, and to disseminate these for consideration by interested parties within Member States. Accordingly, any recommendations made are not mandatory.

The study completed by the University of Leoben in 2004 (hereafter referred to as the Leoben Study[4]) has been a key reference in relation to action 6. It highlighted a number of elements of best practice in relation to raw materials, covering minerals policy, application and authorisation processes, land use planning, and codes and technical guidance notes. These elements have been considered again by the Working Group.

The Working Group met on six occasions during the study, providing an opportunity to exchange ideas and compare practices in different countries. A key part of the work was a comprehensive questionnaire survey conducted in late 2009 covering:

- Exchange of best practice in land use planning

- Geological knowledge base and better networking

- Integrating sub-surface information in to GMES

The questionnaire responses provided an important source of information for the Working Group.

The Report of the Working Group provides the basis for a Report that the Commission will deliver to the Council on the implementation of the Raw Materials Initiative by the end of 2010. This report summarises the content of the Report of the Working Group, and it follows a similar structure.

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[3] A parallel *ad-hoc* Working Group was created at the same time in order to prepare a report entitled "Defining critical raw materials for the EU".

[4] Mineral Planning Policies and Supply Practices in Europe. Department of Mining and Tunnelling, University of Leoben, Austria, November 2004. Commissioned by the European Commission Enterprise Directorate General under Contract no. ETD/FIF 2003 0781.

2. MINERALS POLICY

An agreed definition of what constitutes both national minerals policy and national minerals planning policy was considered fundamental to the exchange of best practice between Member States. No such definitions currently exist that are common to all Member States.

Suggested Definition of a National Minerals Policy

A statement or statements of agreed objectives for the management of mineral resources which aim to ensure their supply to meet the needs for those minerals. National mineral policy may also set out the spatially-orientated processes that will be used to achieve those objectives.

Suggested Definition of a National Minerals Planning Policy

Those statements, documents etc., which collectively contain the mechanisms which aim to achieve the objectives set out in national minerals policy through the planning system, together with any guidance which aims to provide clarity to decision making on the regulation of land use and stakeholder consultation processes.

One finding of the Working Group is that all the statements that constitute national policy are unlikely to be found in a single document. More usually, national policy is a combination of different legislation, codes and guidance which reflect the actual minerals resources present and legislative and institutional structures of individual member states.

Examples of National Minerals Policies

The Austrian Minerals Resources Plan, and the systems in place in Germany, the Netherlands and the Flemish region of Belgium all display elements of the definitions given above, best fitting to the legal framework, but there are no examples which display them all.

Not surprisingly minerals policy practices vary considerably throughout Member States. For example, the level at which minerals policy is formulated is largely dependent on the degree to which national government delegates decision making for minerals matters to other authorities. This in turn sets the shape of the legislative mechanisms that are put in place. Each Member State has evolved a system which best suits their own political and geological circumstances.

In all the cases considered it was apparent that the aim of the policy was to protect and promote the supply of minerals because of their economic significance, but mindful of other policy considerations such as environmental protection (see also the Report of the *ad-hoc* Working Group on "Defining critical raw materials for the EU").

However, there are currently no national minerals policies or national minerals planning policies in place within Member States that cover the full range of issues necessary to address the key issue of sustainability in the context of minerals planning.

The Working Group also considered the elements which could define a sustainable minerals policy and concluded that with respect to minerals, a sustainable policy (Shields and Solar, 2002 and 2004) needs to:

- facilitate the transformation of natural mineral capital into built physical, economic, environmental or social capital of equal or greater value;
- ensure that environmental and negative social impacts of mining are minimised and their costs incorporated into production functions;
- require transparency and information sharing;
- reconsider the allocation of rights and the availability of resources across generations;

- address benefit risk trade-offs from the perspective of multiple stakeholders and create contingency plans that will ameliorate the effects of mineral market booms and busts; and

- be correlated and consistent with other governmental policies.

Best Practice: Policy Elements

National Minerals Policy
A clear statement of national minerals policy, setting out objectives to ensure that the mineral resources are provided to society in an economically viable way, harmonised with other national policies and based on sustainable developments principles. This could include a commitment to provide a legal and information framework:

Legal framework

- Legal frameworks (minerals acts), covering all types of minerals to guarantee legal and planning certainty for all parties involved, and speedy and streamlined authorisation processes.
- A transparent non-distorting fiscal framework as a stimulus for exploration and acquisition.
- Effective safeguarding of actual and potential mineral resources through land use planning to avoid improper land use and/or sterilisation of mineral resources.

Information framework

- Reliable and comprehensive national and international statistics for trend analysis and as a decision base for authorities and the industry.
- A detailed geological knowledge base which is publicly available within the legal frameworks of Member States and includes comprehensive geological, geochemical, geophysical and general mineral data.

Minerals Planning Policy
Raw materials planning policy as a key component of the national minerals policy should describe in detail the ways that future minerals supply will be secured and demonstrate a strong link to broader land use planning policy and regulation.

Sustainable Minerals Policy
An ethics based Minerals Policy based on the principles of sustainable development and comprising the following three pillars:

The economic pillar

- Providing a proper long term economic environment for exploration and mining activities to ensure minerals supply.
- Safeguarding mineral deposits through land use planning to secure future minerals supply promoting research and development for resources and energy efficiency.

The environmental pillar

- Ensuring that the negative environmental impacts of the extractive industry are controlled to acceptable levels of risk.
- Promoting sound site reclamation and aftercare practices.
- Promoting research and development, e.g. environmentally sound mining methods (cradle to grave), materials efficiency, substitution, recycling and use of Best Available Techniques (BAT).

The social pillar

- Promoting the essential contribution of minerals in society, including mine heritage.
- Promoting a transparency for government, authorities, industry, NGOs and the general public (from local to national) to avoid conflicts and support sound and timely decision making.
- Promoting academic education and training, and health and safety.

Example of including Sustainability into a Minerals Policy in England

Minerals Policy Statement 1: Planning and Minerals, which was published for England in 2006 states that: “It is essential that there is an adequate and steady supply of material to provide the infrastructure, buildings and goods that society, industry and the economy needs, but that this provision is made in accordance with the principles of sustainable development”.

While there are numerous references to sustainability in relation to minerals, these tend to be focused on environmental issues such as environmental protection, transport or land reclamation, including positive effects such as employment, restoration and biodiversity contribution. Issues such as the social costs of development and production, equity, and transparency are generally not addressed. So while the overriding objective in the English Minerals Policy Statement 1 mentioned above is supported by a number of more detailed statements of policy, as a whole it amounts to a narrower definition of a sustainable policy than that described by Shields and Solar. This is because there is no explicit provision for capital transformation[5], social impact reduction, or fairness.

Consideration was also given as to whether there should be a minerals policy at the European level, and if so, what matters it should address, within the framework of the European Sustainable Industrial Policy. On the one hand it is felt that to have such a policy would exceed the authority of the Commission, whereas on the other, some Member States could see real value in establishing a Europe-wide policy position to bring mineral resources on to an equal footing with other resource issues.

RECOMMENDATIONS

Due to the diversity of political and geological circumstances within Member States it is not advisable to seek to impose prescriptive recommendations relating to mineral planning policy. However, analysis of practices that are in place indicate that each Member State should consider if it would be helpful to work towards adopting the following policy elements:

- A National Minerals Policy including the legal framework and the information framework;
- A Minerals Planning Policy; and
- A Sustainable Minerals Policy based on the economic, the environmental and the social pillar.

[5] Capital transformation refers to the inter-linkages between social, economic and environmental capital. A more detailed explanation can be found in the report "Towards a thematic strategy on the sustainable use of natural resources - Working Group 1 Supply of Resources", see http://ec.europa.eu/environment/natres/pdf/final_report_wg1.pdf

3. LAND USE PLANNING POLICY FOR MINERALS

The Working Group agreed that a comprehensive land use policy for minerals should be based on the following elements:

- a digital geological knowledge base;
- a transparent methodology for identification of mineral resources (quality, quantity, local importance);
- long term estimates for regional and local minimum demand (especially for construction materials), taking account of other sources of materials (eg. recycled), based on sustainable development principles as a monitoring tool; and
- identifying and safeguarding mineral resources to meet minimum demand, taking account of other land uses.

Generally all mineral types are covered by land use planning policies, but often with a distinction between those minerals deemed to be of national significance, usually for economic reasons, and of those of regional or local significance (principally construction materials). In the case of the former, there is usually a national mining law governing how the mineral can be worked, and rights to extraction are vested in the State. These tend to be high value minerals or energy minerals. Conversely, in some Member States lower value materials, notably construction materials, are dealt with through land use planning legislation.

Most countries do not have a national land use plan for minerals. Minerals are more commonly dealt with at the sub-national level. Most notably, countries with a strong regional or federal framework have regional plans.

A key component of a land use planning policy is that there should be an approach to long term estimates of minimum demand, especially for construction materials (sand and gravel and crushed rock). In fact there are many examples of long term planning mainly for construction materials with more local terms of use, but far fewer with respect to other minerals which are subject to regional, national or even global developments of the markets. Part of the explanation for this is that in many countries strategically important materials are protected by national legislation, thereby ensuring that they can be worked if required.

However, not all countries seek to quantify the need for minerals. In some cases the practice is to establish a flexible framework, such that supply can be adjusted at all times to meet demand, a market-led approach in effect, for example Germany.

The identification and safeguarding of actual and potential mineral resources is an important component of a land use policy for minerals. In practice, measures to identify and safeguard resources fall into two broad categories: safeguarding and allocation of land for future mineral extraction.

Once the presence of a potential minerals resource has been established through geological surveys (or any other kind of exploration process), the objective of safeguarding through the planning process is to protect mineral resources from sterilisation by non-mineral development (housing, roads, etc). Safeguarding does not necessarily mean that the resource identified will be extracted, but rather it puts in place a check to ensure that extraction is at least considered before any form of sterilising development can go ahead. It follows, therefore, that a safeguarding approach should also encourage the prior extraction of minerals where practicable. This is considered to be a prudent approach to the management of finite resources.

Best practice Examples of National Land Use Policies for Minerals in Austria and the UK (England)

Both the Austrian Minerals Plan and the English Model cover most aspects of land use planning policy for minerals (based on digital geological maps, transparent evaluation methods, long term demand estimates, identification of areas to be safeguarded).

Once safeguarded areas have been identified, proposals for development in the safeguarded areas that would result in sterilisation of mineral resources are referred to the mineral planning authority for consideration and comment prior to determination.

Ensuring a steady supply of raw materials requires the allocation of land in spatial plans. In the Leoben study there are three types of area allocated:

- areas where in principle no extraction will be allowed
- areas where extraction may be allowed subject to certain conditions
- areas where in principle extraction will be permitted

In effect, this classification of land amounts to a continuum of acceptability. At one end of the continuum are areas where extraction will generally be permitted, thereby increasing certainty that an application for extraction is likely to be approved. This implies that all the necessary considerations have been taken into account while the land use plan for minerals was being prepared, such that an area where extraction will be permitted would not result in unacceptable impacts on other land uses or the environment more generally.

At the other end of the continuum are areas where extraction will generally not be permitted. These tend to be areas where extraction would result in unacceptable environmental, social or economic impacts. In between are areas where proposals will be considered on their individual merits, taking into account environmental, social and economic impacts. Scenarios can change, because economic, environmental and social conditions also change. So an area where today extraction is not permitted can tomorrow be exploited, and thus should not be sterilised.

However, the Working Group noted that not all identified areas for mineral extraction have been available in practice. There are examples where despite the designation of areas for raw material extraction, mining companies still find that extraction activities lose out to other land uses because the planning authority is able, within the framework of national planning law, to alter the designation.

Lastly by contrast, some countries do not appear to operate a system of designation of the sort described, on the basis that general planning law is adequate to bring forward areas for mineral extraction. Examples include Slovenia, Czech Republic, and Netherlands.

RECOMMENDATIONS

Any land use policy for minerals must utilise a robust digital geological knowledge base, identifying using a transparent methodology. Alongside information on the resource, for certain minerals of local importance there should also be a method for estimating the long term demand for these materials, and a means by which this can be translated into a spatial plan. Recognising the contribution of recycled materials, ultimately, the aim should be to ensure fair and equal consideration of all potential uses of land including the eventual extraction of raw materials.

4. AUTHORISATION

Minerals exploration and extraction authorisation or licensing systems can be slow and expensive. The minerals industry is often required to obtain numerous permits.[6].

The Working Group considers that an important element of the minerals exploration and extraction licensing systems in Member States is the involvement of key stakeholders at an early stage, which often results in "smooth rides" with respect to the permitting process. Other ways of improving the authorisation process might include the use of standardised application forms, undertaking parallel assessments and providing for a 'one-stop-shop'.

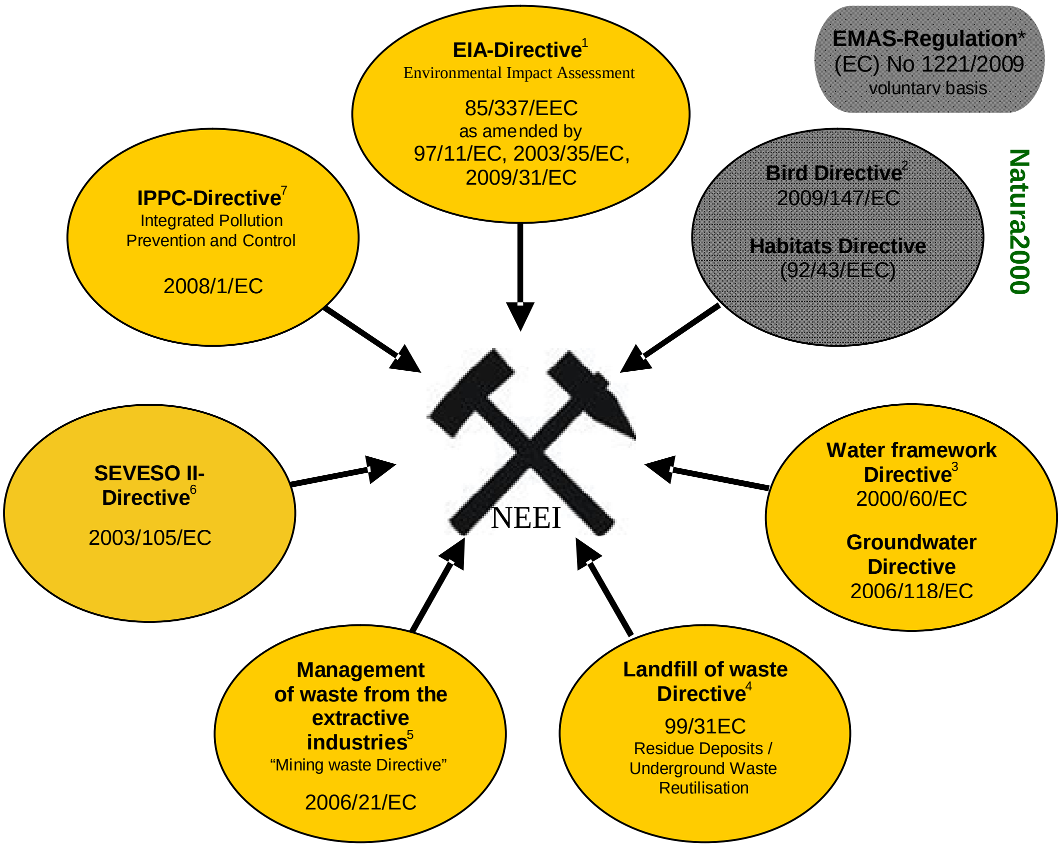

Figure 2: Simplified diagram to illustrate the various EU legal requirements related to the permitting process for land based extraction activities; adopted with changes from Kullmann 2002.

Note: Non Energy Extractive Industry (NEEI-) symbol indicated mining activities in central Europe since the early 16 century. All links to be found via http://ec.europa.eu/environment 1 [...]eia/eia-legalcontext.htm; 2 [...]/nature/legislation/habitatsdirective/index_en.htm; 3 [...]/water/water-framework/index_en.html; 4 [...]/waste/landfill_index.htm; 5 [...]/waste/mining/index.htm; 6 [...]/seveso/index.htm; 7 [...]/air/pollutants/stationary/ippc/index.htm; 8 -[...]/emas/index_en.htm

6 Additional EU-Directives may be in place when an extraction site starts production, or in case of extraction in a marine environment. Under specific circumstances other legal obligations based on EU Directives may be required in some cases (e.g. the Netherlands: 2004/18/EC Directive on the coordination of procedures for the award of public works contracts, public supply contracts and public service contracts).

The most important elements of the application process are clarity, understanding and certainty of what needs to be provided in order to get authorisation for minerals exploration or extraction. The use of a standard application form can assist, but such forms are not in universal use. Of more importance is the need to ensure that the procedure by which activities are authorised or licensed is understandable and accessible to potential applicants and the general public.

Best Practice: Publicising Information about Minerals Legislation in Sweden

Concise information on relevant legislation for minerals exploration and extraction is available on the websites of the Swedish Geological Survey and Mining Inspectorate[7]. This includes an unofficial translation of the Mineral Act and Ordinance as well as a brochure entitled "*Guide to Mineral legislation and Regulations in Sweden"*. The Act and the Guide are also available in a printed form.

The Mining Inspectorate, an independent body within the Swedish Geological Survey, is a small, highly computerised and service-orientated department with two offices, one in Luleå and one in Falun. Applicants may call the Mining Inspectors Office for advice on filling in the necessary application forms for authorisation, and the Mine Inspector sets up fixed time for handling applications received. Furthermore, the Inspectorate has an online map service showing all valid permits in Sweden, which is updated once a month. There is also free access to geological information, exploration reports and drill cores at the Survey´s Mineral Information Office (in Malå).

Often, the minerals exploration and extraction authorisation process is published in legal acts. However, although accessible through websites, such legal documents may not be easily understood. Publication of and easy access to transparent, coherent, multi-lingual information on websites is considered best practice.

Parallel assessment is defined as the process by which more than one assessment or investigation required by authorities to authorise the operation of a minerals extraction site is undertaken in parallel. For example, this could involve the authorisation process being undertaken at the same time as both the environmental permitting process and the health and safety assessment. Parallel assessment is not to be confused with a 'one-stop-shop' system that is dealt with below.

Parallel assessment can speed up the minerals exploration and extraction authorisation process, and should help ensure a sound decision as quickly as possible. This in turn will help reduce unnecessary expenditure by all parties concerned, including industry. A two phase parallel assessment such as that used in the Netherlands, where key decisions are made first and minor decisions at a later stage, based on proposals reflecting thorough stakeholder consultation, could go some way to addressing this issue.

A 'one-stop-shop' system is defined as a system where the authorities involved in an application for authorisation (e.g. the consenting authority, the environmental agency, the water authority) join together to meet the applicants all at once, thereby avoiding hierarchical applications. The aim of such a system is to achieve a coherent, simplified and accelerated application process.

Although some Member States already follow a one-stop-shop approach, this can be difficult to implement due to the number and variety of authorisations required for minerals exploration and extraction. This often results in various government or advisory institutions being involved in the authorisation process.

It is also the case that applicants have to undertake several environmental impact assessments, each including a stakeholder communication processes, in order to comply with different legislation (land use planning, permitting, Natura 2000, mining waste, etc.). This can result in extremely heavy, long and expensive administrative processes. It is the view of the Working Group therefore, that best practice is achieved when all environmental aspects are assessed in a single process, based on one study only.

[7] www.sgu.se and www.bergsstaten.se

Best Practice: Single administration process in Germany

The main feature of German mining legislation is its comprehensive structure, implementing integrated risk prevention through an approach with strict requirements on concessions, health and safety, environment and other issues as well as differentiated mechanisms for compliance and monitoring. These provisions set up a comprehensive legal system covering all aspects of mining, including health and safety and environment, supervised by one single administration (one-stop shop). This approach directly implements the challenges of the concept of sustainable development, taking into consideration the three pillars of environmental protection, social development and economic development, with each of these three policy areas being mutually supportive of the others.

Fixed time periods, within which all or part of applications for authorisation should be determined (ie approved or refused), are applied in some Member States. The Working Group noted that fixed time periods can help to restrict the length of time taken by planning authorities to make decisions, and thereby improve the authorisation process.

Transparent on-site discussions between the applicant for minerals exploration or extraction and key stakeholders (see Chapter 5) prior to the submission of an authorisation or licensing application help to achieve a smooth permitting process. Such discussions take place in the majority of Member States, although they are not always held on-site or mandatory. In some cases, community consultation is undertaken in order to build social acceptance of projects. Through these consultations, projects have been able to take into account those issues that matter for the local community. Implementing this approach to consultation has been a contributory factor in an increase in the number of authorisations granted, and as such is considered best practice by the Working Group.

RECOMMENDATIONS

The most important elements of the minerals exploration and extraction application process are clarity, understanding and certainty of what needs to be provided in order to get authorisation for minerals exploration or extraction. This does not necessarily need to take the shape of a standardised application form, but instead could be set out in legislation or guidance.

Speeding up the minerals exploration and extraction authorisation processes may be achieved through integrating the different permits required so that they are issued by one competent authority (a one-stop-shop) and with only one environmental impact assessment. However, a one-stop-shop system can be difficult to implement due to the number and variety of authorisations required for minerals exploration and extraction, which often involves a number of government or advisory institutions. Parallel assessment can also speed up the minerals exploration and extraction authorisation process, and should help ensure a sound decision as quickly as possible. This in turn will help reduce unnecessary expenditure by all parties concerned, including industry.

5. ACHIEVING TECHNICAL, ENVIRONMENTAL AND SOCIAL EXCELLENCE

The Working Group accords a high priority to the achievement of technical, environmental and social excellence in the area of land use planning and administrative conditions for exploration and extraction of raw materials. However the means by which excellence is achieved varies between Member States. It is possible to draw a distinction between the use of legal frameworks and voluntary commitments in this regard. While both are sometimes referred to as “Codes”, there is an important distinction between them. In some cases, the requirements are set out in legislation, whereas in others greater reliance is placed on voluntary codes of practice, either formulated by individual companies, or by industry representative organisations alone or in cooperation with authorities or NGOs.

This leads to an important distinction between “Code” as a legal framework and “Code” as a voluntary commitment.

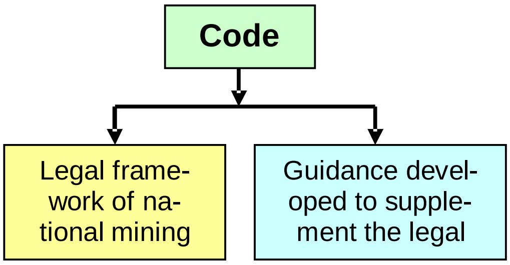

Figure 3: Relations of codes of best practice.

LEGAL FRAMEWORK

In general and as a result of European legislation implemented in Member States, all companies are obliged to undertake site remediation and restoration following extraction.

The Working Group considers that the exchange of best practice in the context of national legal provisions for certain issues of technical and environmental management might be useful. This is the case, for example, with the EU’s BAT document on the management of waste from the extractive industry[8]. This comprises a collection of best available techniques, linked to the Directive of the European Parliament and of the Council on the management of waste from extractive industries and amending Directive 2004/35/EC.

Best Practice: Examples of Legal Codes in Cyprus, Spain and UK

Cyprus: The environment is protected from adverse impacts of minerals extraction through the evaluation, approval and application of an ‘Environmental Management Study for Operating Mines and Quarries’, updated every five years and approved on site by a Multidisciplinary Committee.

Spain: Spain has robust regulations in place to deal with the restoration of sites since The Mining Act of 1973 and the Royal Decree of 1982 requiring the integration of a remediation/restoration plan into the extraction plan. The Royal Decree of 2009 “Management of Extractive Industry Waste and Protection and Rehabilitation of Spaces affected by Mining Activities” provides sufficient detail to ensure the protection of the environment from adverse impacts of mineral extraction.

United Kingdom (England): All planning consents in the UK require sound restoration and aftercare provisions that are legally enforceable. Regular reviews are undertaken to ensure aftercare provisions are up to date with best practice.

VOLUNTARY CODES

It is also relatively common within Member States for the legislation governing the management and restoration of extraction to be supplemented by voluntary codes of practice. This might be because the legal

[8] European Commission (January 2009) Reference Document on Best Available Techniques for the Management of Tailings and Waste-Rock in Mining Activities (BREF MTWR).

framework does not include the necessary technical provisions, or the required level of detail. Such codes are, therefore, complementary to legislation and regulations, and are voluntary. Some important examples are listed below:

General Business Conduct: Most industry associations and companies in the sector have codes of good business conduct.

Sustainable development: Many industry associations and companies in the sector have codes of sustainable development.

Safety (Dam Stability): The International Commission of Large Dams (ICOLD) provides guidance on the design, building and closure of modern long-term stable dams.

Environmental protection: Codes on best practice for environmental protection can take different forms and cover different areas, such as mine exploration, closure and rehabilitation, and biodiversity. One example is the guide to minerals and the historic environment published by the Confederation of British Industry: 'Mineral Extraction and Archaeology: A Practice Guide (2008)'.

Rehabilitation through integrated mine closure planning: Mine closure is a site specific exercise which is why it is very difficult to cover it appropriately through technical regulations. Environmental targets can be set by legislation, but the technical implementation is very varied. Often similar circumstances only occur outside Europe which is why in some subsectors codes of practice are more successfully developed at international level.

Management of Biodiversity: Biodiversity guidance has been provided at International and European level. Sub-sectors have committed themselves to targets. However, individual site characteristics and the specific biodiversity to be protected mean that technical expertise is left mostly to the company level.

Health and Safety: Legislation is supplemented by some International Codes as well as best practice guides from the Standing Working Party on the Extractive Industry (SWPEI) and the European cross-sectoral industry agreement, for example on the Handling of Respirable Crystalline Silica. Furthermore, numerous documents of binding character to the governments have been published by the International Labour Office (ILO) in Geneva.

Social Management Aspects: Social and community relations codes of practice have proven useful since this is an area which can only be partly regulated, for example, with regard to legally stipulated stakeholder consultations. However, successful human relations and social acceptance (the Social Licence concept) depend on trust which cannot be stipulated by law, but sustained by good and reliable practice on the ground. Codes of practice, therefore, need to embrace the management of historic and cultural conditions and can provide best practice in a managerial context.

Best Practice Examples of Voluntary Codes in Sweden, the Netherlands and Finland

Sweden: There are Ethical Rules which the members of the Swedish Association of Mines, Mineral and Metal Producers are committed to follow. The Rules include, amongst other things, sustainable development, occupational health and safety and environmental protection. In addition, a large amount of research has been undertaken on the management of minerals sites or management of tailings, for example, which is often supported by research organisations (including the Technical University of Luleå) and thus available to everyone.

The Netherlands: Two codes of practice have been developed in the Netherlands: The 'Gedragscode', the code of conduct of the extractive industry federation (FODI); and, a code of practice for members of Cascade, an Industry Association.

Finland: The 'Exploration and Mining in Finland's Protected Areas, the Sami Homeland, the 'Reindeer Herding Area Guide' and 'The Finnish Mine Closure Handbook' provide guidance on extraction site remediation and restoration.

RECOMMENDATIONS

Codes of practice are important instruments to achieve technical, social and environmental excellence. The use and acceptance of such codes of practice in many European countries is highly dependent on the degree to which the national legislation stipulates technical details already. Use of codes of practice, guidelines or equivalent by industry helps to ensure protection of the environment from adverse impacts of mineral extraction. Some are set out in legislation, and an important number are improved or complemented by codes of practice promoted by the industry.

6. GEOLOGICAL KNOWLEDGE BASE

The Raw Materials Initiative highlights the improvement of the EU knowledge base as a condition to enhance sustainable supply from within the EU. The identification and mining of deep-seated concealed deposits is one of the key components of an EU strategy to secure the reliable and undistorted access to raw materials. As noted in relation to land use planning policy, the availability of comprehensive information on geological resources should underpin the preparation of spatial plans. This will ensure allocation of sufficient areas of extraction to meet demand for minerals and help to avoid sterilisation of important raw materials.

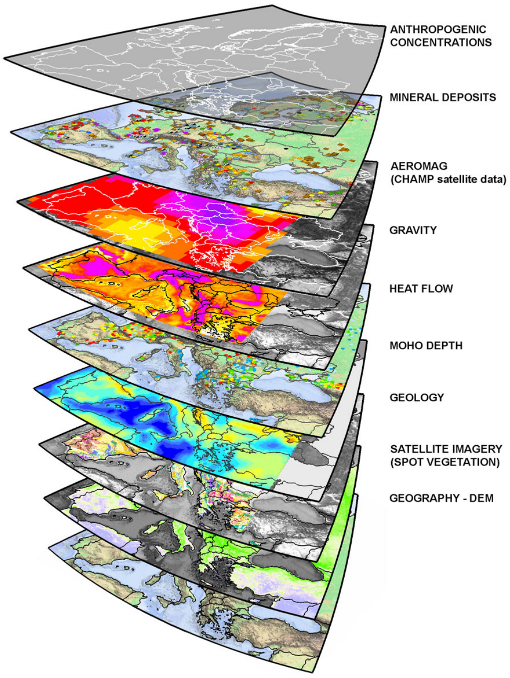

Figure 4**:** Assessments and homogenising multi-layer information system within the ProMine-Project building a basis for 3D and 4D modelling.

Major technological developments have made it possible to get detailed three dimensional pictures of the Earth crust. End-users of geological knowledge are no longer limited by the representation of geology as static two-dimensional (2D) printed maps but can benefit from three dimensional (3D) digital representations of its geology and of the related resources.

Moreover, the fourth dimension, time, should be added to these digital representations as past geological and climatic changes are not well understood. The resulting four dimension (4D) models[9] would be of great use to focus mineral exploration efforts. Such a knowledge base should be concentrated between the surface and 4 km below the surface, as this is likely to be where metallic minerals important to the future economical development of Europe are to be found and will increasingly become economically and technically accessible thanks to technological developments. Economic mining nowadays takes place up to a depth of about 1.5 km (e.g. in Finland and Sweden). The identification and mining of such deep-seated concealed deposits is one of the key components required to secure reliable access to these important raw materials.

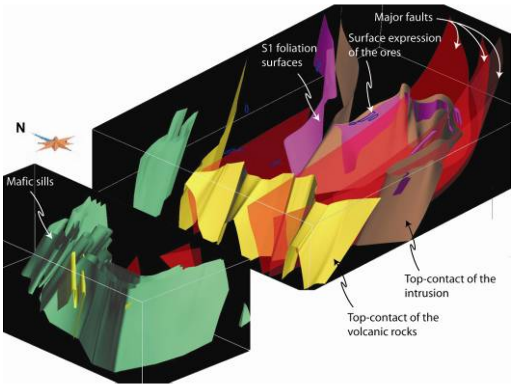

Figure 5: Geological 3D model of the main geological units structures in the Skellftefield, Northern Sweden, with courtesy of Boliden AB and Luleå Tekniskal Universitet.

Specialised knowledge is needed to turn the raw thematic geoscientific data into information that is meaningful to the broad range of end-users. These users include public authorities for land-use planning policy making, and to attract the investment to turn geological potential into social and economic wealth. Hence good integration of this specialised knowledge in policy-making is needed.

In every Member State it is the role of the national and regional Geological Surveys, often in collaboration with research insti-

[9] 4D models used here for geological maps modelling the three space dimensions plus time.

Best Practice on knowledge sharing: The Fennoscandian shield ore deposit database and metallogenic map[10]

The public-domain Fennoscandian Ore Deposit Database (FODD) contains data on more than 900 metal mines, unexploited deposits and significant occurrences within Fennoscandia (the Precambrian shield and the Caledonides in Norway, Sweden, Finland and northwest Russia). Information on the deposits includes the location, mining history, tonnage and commodity grades, together with a commentary on data quality, geological setting, age, ore mineralogy, style of mineralisation, genetic models, and the primary sources of data. Information on mineral resources is mostly based on in situ geological estimates, which should not be confused with the present industrial resource and reserve standards.

Databases covering extensive areas are important working tools for modern exploration; the associated metallogenic map is at a scale of 1:2,000,000. Public mineral deposit databases are used by governments to attract investment, helping investors to select larger areas as targets for more detailed work.

tutes, to develop the geological knowledge base needed to locate and assess mineral resources potential, groundwater, subsurface space for infrastructure development and storage purposes, and to plan the mitigation of natural hazards of geological origin. The Working Group considers that publicly available and accessible digital, interoperable data on the nature, location, extent and geometry of minerals, at sufficiently high resolutions, is essential for national authorities to assess their mineral potential. Promotion of mineral potential helps to attract the investment necessary for more detailed exploration and exploitation.

The knowledge base needs to reflect the requirements of the three main segments of the minerals industry: construction materials, industrial minerals and metallic minerals. While the knowledge base on construction minerals, and to a lesser extent, on industrial minerals is deemed satisfactory, more data is required to gain a good understanding of European resources of metallic, and to some extent, of industrial minerals occurring at depth (the sub-surface).

Data acquisition and processing activities rest with the national and regional Geological Surveys and some specialised public research institutes while, on the basis of the mineral potential outlined by the public data, the extractive industry will apply for exploration permits and intensify the data acquisition on much smaller areas, where mineral resources are known or anticipated. The Working Group considers that the EU could play an important role in supporting relevant professional training initiatives, the aim being to ensure sufficient, suitably qualified professionals to provide the required knowledge base in the future. Furthermore, development of the knowledge base must include the extractive industry, equipment manufacturing industry and other related industries in order to ensure the development of safe extraction technologies as future metal mining may take place at great depths and/or in remote areas.

The Working Group acknowledges the need for data and information at EU level on global minerals production, imports and exports, and outputs, and on shifts in the global minerals industry.

RECOMMENDATIONS

The lack of harmonised EU-level data sets is the principal need of a better geological knowledge base on EU level. The ProMine[11] project represents a significant attempt to address this issue.

There is need for standardised and accurate statistical data on world wide minerals production and imports and exports to be published on an annual basis.

Such data would serve to analyse trends and help decision makers to better under-

[10] http://en.gtk.fi/research2/program/mineralpotential/fodd.html

[11] ProMine is a Large-scale Integrating Project (LIP) with funding of €17million in the 7th research framework programme (FP7) of which €11million comes in a grant by the European Commission. http://promine.gtk.fi/about.html

Best practice on improving the geological knowledge base: The ProMine Project on new mineral resources in Europe

The non-energy extractive industry (NEEI) is a significant contributor to the economy of the EU providing metalliferous and non-metalliferous mineral resources to the society, as well as providing direct and indirect employment. The philosophy behind ProMine is to stimulate the extractive industry to deliver new products to manufacturing industry.

The project consortium includes 27 partners from 11 EU Member States led by the Geological Survey of Finland (GTK). Industry partners in the ProMine consortium produce more than 70% of metals in the EU, so implementation of results from the project will translate into direct and significant economic benefits. The project will:

- Develop the first ever pan-European GIS-based database containing the known and predicted metalliferous and non-metalliferous resources, which together define the strategic resources (including secondary resources) of the EU. Geological subsurface models will be demonstrated for four major active mining belts in Europe, i.e. the *Fennoscandian Shield*, the *Forsudetic belt* in Poland-Germany, the *Iberian belt* in Portugal-Spain and the *Hellenic belt* of Northern Greece.
- Give estimates of the volumes of potentially strategic metals (e.g. cobalt, niobium, vanadium, antimony, platinum group elements and REE) and minerals that are currently not extracted in Europe.
- Develop five new, high value mineral-based (nano) products.
- Enlarge the number of profitable potential targets in Europe.
- Establish a new, cross-platform information group between the European Technology Platform on Sustainable Mineral Resources (ETP-SMR) and other platforms.

stand and monitor the EU supply and demand situation and related risks.

7. BETTER NETWORKING BETWEEN THE NATIONAL GEOLOGICAL SURVEYS

Generally up to now the Geological Surveys in Member States have operated heterogeneously, according to a variety of national remits and economic models. Networking among Geological Surveys has been limited because raw materials were in abundant supply and countries beyond Europe with larger demand and well organised supply did not significantly impact the markets. As the global situation changes, it is necessary to promote better sharing of data, information, experience and knowledge, leading to greater harmonisation within the EU.

The current continuity issues with mineral resources-related statistics could be overcome by joint efforts with EUROSTAT. It is possible to network public national minerals intelligence activities among the EU Geological Surveys and other relevant authorities.

Better pan-European networking between the Geological Surveys of Member States will serve as a tool for collecting, storing, analysing, reporting and disseminating the EU minerals knowledge base, including mineral deposits. This can be achieved through cooperation between relevant institutions and the Geological Survey. In the future, networking should be driven by the need to:

- achieve synergies between the Geological Surveys;
- provide public data for policy making;
- facilitate investment in exploration and extraction; and
- provide minerals intelligence.

The implementation of the INSPIRE[12] Directive is a step towards improving networking amongst Geological Surveys. The obligations of the INSPIRE Directive relating to existing public digital mineral resources data include:

- the production of compliant metadata; and
- the development of an Implementing Rule laying down technical arrangements for the interoperability and, where practicable, harmonisation of spatial datasets and services.

Best practice on networking: OneGeology Europe

The aim of the OneGeology Europe[13] project as a network of Geological Surveys is to make geological spatial data held by surveys and national geological institutes discoverable and accessible through a uniform data model. The result is a web-accessible, interoperable, geological spatial dataset for the whole of Europe at 1:1 million scale. This will allow researchers, consultants, environmentalists, construction and water industries, planners and local, regional and central governments to make more informed decisions about the resources underlying Europe.

Moreover, while INSPIRE fosters schematic interoperability, a progressive shift towards semantic interoperability is necessary, to see all geoscientists in Europe working to an agreed common data model. The implementation of the INSPIRE Directive, supported by EuroGeoSurveys' lead, will facilitate the identification of and access to the digital data held by each Geological Survey.

There is a need for collaboration among EU Geological Surveys also in relation to the research on mineral deposits and mineral systems; interoperability techniques[14]; conceptual data models for mineral de-

[12] For further information http://inspire.jrc.ec.europa.eu/

[13] OneGeology Europe is a pan-European Best Practice Network programme with funding of €3.25million contracted in the framework eContentplus Programme of which €2.6million comes in a grant from the EC.

[14] Such as e.g. EarthResourcesML, a geoscience mark-up language dedicated to describe mineral resources data (ore deposits and mines).

posit information; interchange techniques; and, vocabularies, semantics and multilingual applications.

Consideration of modelling techniques has been identified as an additional field requiring collaboration between Geological Surveys, as has engagement of non-Member States. For example, the federal Geological Surveys of Canada (GSC) and the USA (USGS) are supporting the mineral resources industry in different ways, including supply vulnerabilities. The Japan Oil, Gas and Metals National Corporation (JOGMEC) fulfil a similar role.

Lessons from Elsewhere in the World

Lessons learnt from the role played by the Geological Surveys in Canada and the USA show the:

- significance of global mineral data and statistics (production, reserve, trade...) and of mineral deposit knowledge;
- need of recognising the significance of minerals;
- the benefit and methodology for undiscovered mineral resources[15];
- need for continuous improvement of geological networks to serve the needs of society;
- importance of application of internet based digital data;
- importance of including social and environmental considerations as data and information.

The networking among Geological Surveys should be organised at EU-level. While the actual work should be undertaken at national level (and funded from national level), it could then be aggregated at EU level. EU research projects and long-term coordination activities are needed to create an efficient and permanent network of Geological Surveys and other relevant institutions (academia, mining institutions, etc) also outside the EU (e.g. GSC, JOGMEC and USGS).

Implementation of global data models and the INSPIRE Directive will lead to the harmonising of the national minerals data sets for the pan-EU knowledge base. This data could then be used for securing continuous supplies of raw materials from European sources, and also for planning strategies for future extraction of mineral resources and land use. Harmonisation will create uniform terminology and standardise the terms and definitions used by Geological Surveys.

RECOMMENDATIONS

To asses how better networking should be organised the working group recommend the following:

The terminology used by Geological Surveys need to be standardised, so that for example, the technical terms reserve and resource are defined and used as such throughout Europe.

Common definitions for estimation of unknown resources and potential zones in 3D are needed. Currently ongoing activities in the area of international standardisation with regard to reporting of reserves and resources expected to be concluded in 2011/12 by UNECE will provide a basis for this and should be followed up on a EU-level.

Common European statistics sheet, as a uniform reporting system to underpin the concept of Minerals Intelligence, should be introduced.

The information obtained through the reporting system should be amalgamated in an EU-wide database of harmonised statistics.

The networking among Geological Surveys should be organised at EU-level, which would allow achieving the recommendations' above more coherent and straightforward. The core of networking activities could be the European Minerals Network (eMINEnt; Appendix full report) coordinated by the EuroGeoSurveys, in-

[15] This assessment is known as the 3-part assessments mythology of the USGS, which assesses 1) areas are delineated according to the types of deposits permitted by the geology, 2) the amount of metal and some ore characteristics are estimated using trade and tonnage models, and 3) the number of undiscovered deposits of each type, see Singer 1993 and Singer, Briskey & Menzie 2000 http://minerals.usgs.gov/

cluding capacity building in developing countries

European Geological Surveys should reinforce contacts with GSC, USGS and JOGMEG on priority actions.

8. NEED TO INTEGRATE TERRESTRIAL SUB-SURFACE INFORMATION INTO THE GMES LAND SERVICE

The integration of sub-surface components into the GMES Land service is part of a medium-long term strategy as underlined in the Raw Material Initiative, to be addressed in the 2nd step of the GMES programme implementation (2014 plus). However, this chapter investigates potential use of GMES land service for assessing areas of high potential and monitoring of the environmental impact of some raw material sites.

Over 20 national Geological Surveys and some Member States, industries and academic institutions responded to questions about the relationship between the RMI and Global Monitoring of Environment and Security (GMES). Only one respondent saw no benefits. In contrast, some 60% of respondents highlighted the benefits of relating the two, reflecting the acknowledged potential for minerals in these geographical areas. The need expressed by the majority was for comprehensive sub-surface information as a support to a range of mineral related issues from exploration, through land use planning to managing the mining legacy.

> ***Subsurface Information*** *is defined as Geographic Information that describes the nature, location, structure, 3D geometry, chemical and physical parameters, history and dynamics of Earth's subsurface and its individual components: its rocks; mineral deposits; energy sources and reservoirs; groundwater; and geohazard sources and mechanisms.*

While land-cover/land-use mapping using multi-spectral data (most available EO satellite data) has some limited use for RMI, the most useful EO technologies for the RMI are hyperspectral, for mineral mapping and waste management, and InSAR, for monitoring ground instability associated with mining. Neither of these forms part of the current set of GMES Services. However, ground instability monitoring has been demonstrated in GMES projects (TerraFirma[16]) and dedicated GMES satellites under development will provide needed data Opinion was divided as to whether the needed services could, in future, be provided by GMES. But, whether done through GMES or another mechanism, services providing tailored sub-surface information for RMI need to integrated *in-situ*, airborne and satellite data.

> ***Earth Observation*** *(EO) is defined as satellite, airborne and in-situ data acquisition by any type of sensor, or by direct human observations, from nanometric to macroscopic scales. Only such multi-method EO at various scales, combining remote sensing with in-situ geological observations, mapping, borehole data, geophysics and geochemistry can give a meaningful picture of the complex Earth system from 0 to - 4000m to discover deep seated resources as required by RMI.*

ACQUIRING TERRESTRIAL SUB-SURFACE INFORMATION

The most important observations for RMI are *in-situ*. They make possible sub-surface penetration from tens to a few thousands of metres. This is done by using ground-based geophysical survey tools[17]; geological and geochemical sampling. Based on the above and in combination with geological field observations, 3D models and maps can be extrapolated. *In-situ* observations can be targeted on locations and timing, provide high resolution and are the only way to measure some parameters.

Airborne methods are also important. They include airborne geophysical surveys by

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[16] TerraFirma is a pan-European ground motion hazard information service, www.terrafirma.eu.com.

[17] Such tools are e.g. gravity, seismic refraction reflection and tomography, magnetics, and electromagnetics together with borehole sampling and down-hole geophysical sensors.

using radiometrics, gravity, magnetics and electro-magnetics and airborne measurements by using remote sensing, multi- and hyper-spectral lithologic and mineral mapping at various wavelengths. Some resolution of airborne observations is traded for a more synoptic coverage of the region under study compared to *in-situ* methods, but some measurements are difficult from the air.

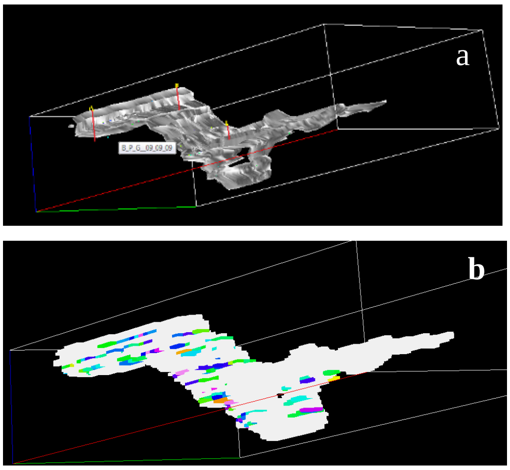

Figure 6: 3D model of the Stratoni ore body in northern Greece showing the orientation of the body in space (a, b) and in color (b) variations in Pb+Zn grades.

A similar range of remote sensing methods can be applied from space as can be applied from an aircraft. Whilst some measurements are not possible from as far as away as Earth orbit (e.g. radiometrics) others are possible (e.g. regional gravity anomalies and radar interferometry). There is a trade off between resolution and penetration, which are lower from satellites, and areal coverage, which is greater. The synoptic view afforded by satellites has led to advances in geological knowledge but fixed acquisition times complicate targeting specific conditions.

WHO ARE THE ACTORS ACQUIRING SUB-SURFACE INFORMATION?

In-situ methods are deployed by national Geological Surveys, either federated as EuroGeoSurveys[18] or cooperating in projects[19]. Geoscience research institutes university groups and Consultants also play a role. The mining, oil, water and construction industry collects significant *in-situ* datasets, particularly from boreholes, that are often deposited with national Geological Surveys. The degree to which these can be accessed by or for third parties varies from country to country.

Airborne methods are deployed by national Geological Surveys, plus commercial airborne survey companies. Satellite observations are acquired by national or international Space Agencies (incl. ESA[20]) and commercial space businesses; but, for geological purposes raw satellite data are usually processed to extract value-added information products like mineral maps or subsidence measurements by many of the organisations named above.

USING SUB-SURFACE INFORMATION FOR LAND USE PLANNING

The key to using sub-surface information from EO data and related value-added products is to integrate the many disparate datasets to generate a 3D model of the sub-surface. Such models are the modern equivalent of the geological map; at a minimum, they are built from digital geological map and borehole data plus terrain models. Integrating more sub-surface information, like geophysics, improves the resulting 3D model.

Only a few countries are ready to do this systematically, with all necessary digital data, 3D tools and know-how. Examples include France, the UK and the Netherlands. The FP7 granted project ProMine[21] is the first pan-EU effort to share 3D tools and know-how or harmonise the data and the models where Finland, France, Germany, Greece, Poland, Portugal, Spain and Sweden collaborate.

These models form a basis for bringing sub-surface information into the minerals and land-use planning process to support a range of decisions on mineral resources, from exploration through exploitation to

[18] E.g. in compiling Europe's geochemical atlas

[19] As for example OneGeology Europe, see page 22

[20] European Space Agency

[21] See best practice example page 21.

sterilisation and after-care[22]. They have potential to transform sub-surface decision making just as 2D GIS did for surface geographic information in the 1990s.

GMES DEVELOPMENTS

The European EO programme GMES aims at providing operational information services to users to support EU environmental and security policies from local to global level, and to manage natural resources and biodiversity.

The GMES services have been developed based on an extensive consultation with users and through a number of R&D and precursor activities. The precursor activities demonstrated the potential of spaceborne, airborne and *in-situ* EO data in EU-wide integrated environmental and human health risk assessment of past and recent mining regions.

GMES is now moving from research to operation with the Commission proposal for a Regulation on the European Earth observation programme (GMES) and its initial operations (2011 – 2013)[23] currently discussed in the European Council and Parliament. The objective is to have the regulation adopted by the end of 2010. This proposal establishes a new Community programme called GMES with provision on the contents of each component (Space, in situ and services), governance issues, data policy etc. It identifies a budget of EUR 107 M for GMES initial operations for the period 2011-2013. The objective is to have a fully-fledge GMES programme beyond 2014 with a larger budget from the next financial perspective. Therefore, the implementation of GMES operational services will be stepwise.

The development of the GMES dedicated Sentinel-1 will provide continuity of radar capacity. In addition to monitoring ground movements over time (detecting deformations down to the centimeter level), the data can also be used to generate elevation models; in combination with digital surface geology and digital borehole data, this is a fundamental building block for the construction of 3D geological models.

RECOMMENDATIONS

Currently, some project-based EO services provide information that can be of use for RMI. Operational land-use services will gradually be provided by GMES from 2011 onwards. However, there is potential for further optimised EO services for geological and especially RMI purposes. This includes services based on satellite data, airborne and *in-situ* surveys measuring surface topography and changes to it, geology, soils, chemistry, mineral and physical properties in 3D and 3D structure and changes to it, throughout the sub-surface zone of human interaction.

GMES will provide parts of the needed satellite data for such services, e.g. for ground stability monitoring. These satellite data could be processed into directly useful information for RMI by national institutes or value-adding industry in the Member States. Alternatively, GMES could also potentially directly provide such services while respecting the principle of subsidiarity, of costs, benefits, political priorities etc.

The experience gained by the ProMine project should serve to develop a long-term '3D-Europe' project, focussing at first on the areas with known mineral potential. The development of a pan-European programme of deep scientific boreholes data acquisition, processing and modelling should be considered as an important component of Europe's scientific infrastructure.

The development of Europe's 3D data acquisition and modelling capacity should be accelerated, to populate European, national, regional, local 3D models specific to RMI requirements, to integrate geological models and those of other disciplines. Three areas need to be addressed:

- integration of remote and *in-situ* data in 3D models for RMI applications;

[22] Currently, Associations of the extractive industry in Germany provide the nationwide information system to their member companies. Using the portal, the companies have the possibility to identify and assess potential conflicts with other land-uses', www.GisInfoService.de.

[23] COM(2009)223 (final), http:// eurlex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2009:0223:FIN:EN:PDF.

- development and dissemination across EU of 3D modelling methods, tools and know-how; and
- EU-wide subsurface data, information and 3D model harmonisation.

9. SUMMARY OF RECOMMENDATIONS OF THE WORKING GROUP

This section outlines a number of operational recommendations for follow-up and support which are based on the lessons learned during the work in relation to:

- minerals policy, land use planning and administrative conditions for exploration and extraction;
- developing the knowledge base of European resources by promotion of better networking between European Geological Surveys, competent authorities and academia with a clear EU remit; and
- developing a medium to long term strategy for integrating sub-surface components into the land services element of the GMES Land Monitoring Core Service.

Due to the diversity of political and geological circumstances within Member States it is not advisable to seek to impose prescriptive recommendations relating to mineral planning policy.

However, analysis of practices that are in place indicate that each Member State should consider if it would be helpful to work towards adopting the recommended policy elements.

The group recommends a **National Minerals Policy** to ensure that the mineral resources are provided to society in an economically viable way, harmonised with other national policies and based on sustainable development principles. This could include a commitment to provide a *legal* and *information framework*. Within this outline, the **Minerals Planning Policy** is seen as key component of the national minerals policy and should describe in detail the ways that future minerals supply will be secured and demonstrate a strong link to broader land use planning policy and regulation. Furthermore, a **Sustainable Minerals Policy** shall be based on the principles of sustainable development and incorporate economic, environmental and social requirements.

Any **land use policy** for minerals must utilise a robust digital geological knowledge base. Alongside information on the resource, for certain minerals of local importance there should also be a method for estimating the long term demand for these materials, and a means by which this can be translated into a spatial plan while recognising the contribution of recycled materials.

The **aim of a land use policy** for minerals should be, ultimately, to ensure:

- fair and equal consideration of all potential uses of land including the eventual extraction of raw materials.

A national planning framework can help to ensure that minerals are accorded due weight in the land use planning process, and therefore in appropriate national circumstances is recommended as best practice.

The most important elements of the minerals exploration and extraction application process are:

- **clarity**,
- **understanding** and
- **certainty** of what needs to be provided in order to get authorisation for minerals exploration or extraction.
- This does not necessarily need to take the shape of a standardised application form, but instead could be set out in legislation or guidance. Speeding up the authorisation processes may be achieved through integrating the different permits required so that they are issued by one competent authority (a one-stop-shop) and with only one environmental impact assessment or by parallel assessment. It is for individual Member States to decide which elements of best practice in authorisation to adopt, based on national circumstances.

Codes of practice are important instruments to achieve **technical, social and environmental excellence**. Use of codes of practice, guidelines or equivalent by industry helps to ensure protection of the environment from adverse impacts of mineral extraction.

There are important issues that need to be addressed to improve the **knowledge base** of mineral deposits in the EU. Principal among these is the lack of harmonised EU-level data sets.

Better networking between the national Geological Surveys of Member States is the basis for cooperation between relevant institutions and the Geological Survey driven by the need to:

- achieve synergies between the Geological Surveys;
- provide public data for policy making;
- facilitate investment in exploration and extraction; and
- provide minerals intelligence.

In order to achieve these goals the knowledge base and networking must be structured, organised, long-term oriented and consensus based.

- Standardised and accurate statistical data on world wide minerals production, imports and exports, and publication of this data on an annual basis. This would serve to analyse trends and help decision makers to better understand and monitor the EU's supply and demand situation and related risks.
- Implementation of global data models and INSPIRE Directive will lead to the harmonising of the national minerals data sets for the Pan EU knowledge base. This data could then used for securing continuous supplies of raw materials from European sources, and also for planning strategies for future extraction of mineral resources and land use. Harmonisation will create uniform terminology and standardise the terms and definitions used by Geological Surveys.

GMES will provide satellite data which are needed for providing RMI-targeted information services, and land-cover/land-use maps and monitoring which can benefit RMI. Services tailored for RMI and based on GMES data can be provided by competent national institutes or companies, or, alternatively, potentially by GMES if European funding is justified.

Medium to long term development projects should build upon experience gained by for example the ProMine project to develop future '3D-Europe' projects while focussing at first on the areas with known mineral potential. The development of a pan-European programme of deep scientific boreholes data acquisition, processing and modelling should be considered as an important component of Europe's scientific infrastructure.

The development of Europe's 3D data acquisition and modelling capacity should be accelerated, to populate European, national, regional, local 3D models that are specific to RMI requirements and to integrate geological models with those of other disciplines. Three areas need to be addressed:

- integration of remote and *in-situ* data in 3D models for RMI applications;
- development and dissemination across EC of 3D modelling methods, tools and know-how; and
- EC-wide subsurface data, information and 3D model harmonisation.

The **Working Group concluded** that the replies to the questionnaires and the discussions of both Working Groups (i.e. the one on *exchanging best practices* and the parallel one on *defining critical raw materials for the EU*) clearly indicated that the actions required in the sector have to respond to the very dynamic changes due to the global, European, national and local needs.

- The Working Group recommends to establish an **annual event** on mineral resources issues especially with regards to knowledge and research and exchange of best practices on minerals policies under the EU Council Presidency in cooperation with the Commission.