REPORT OF THE NICOLE WORKSHOP

Management of Contaminated Land towards a Sustainable Future: Opportunities, Challenges and Barriers for the Sustainable Management of Contaminated Land in Europe

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Barcelona

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NICOLE (*Network for Contaminated Land in Europe*) was set up in 1995 as a result of the CEFIC "SUSTECH" programme which promotes co-operation between industry and academia on the development of sustainable technologies. NICOLE is the principal forum that European business uses to develop and influence the state of the art in contaminated land management in Europe. NICOLE was created to bring together problem holders and researchers throughout Europe who are interested in all aspects of contaminated land. It is open to public and private sector organisations. NICOLE was initiated as a Concerted Action within the European Commission's Environment and Climate RTD Programme in 1996. It has been self-funding since February 1999.

NICOLE's overall objectives are to:

- Provide a European forum for the dissemination and exchange of knowledge and ideas about contaminated land arising from industrial and commercial activities;
- Identify research needs and promote collaborative research that will enable European industry to identify, assess and manage contaminated sites more efficiently and cost-effectively; and
- Collaborate with other international networks inside and outside Europe and encompass the views of a wide a range of interest groups and stakeholders (for example, land developers, local/regional authorities and the insurance/financial investment community).

NICOLE currently has 156 members. Membership fees are used to support and further the aims of the network, including: technical exchanges, network conferences, special interest meetings, brokerage of research and research contacts and information dissemination via a web site, newsletter and journal publications. NICOLE includes an Industry Subgroup (ISG) – with 29 members; a Service Providers Subgroup (SPG) with 36 members; 77 individual members from the academic sector/research community; and 14 members from other organisations, including research planners, non-profit making organisations, other networks, funding organisations. Some members are involved in both the ISG and the SPG. For further general information, further meeting reports, network information and links to contaminated land related web sites, please visit NICOLE's web site: *www.nicole.org*.

Membership fees are currently 3,500 EURO per year for companies (1,750 EURO for smes), and 150 EURO per year for academic institutions. For membership requests please contact:

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- the speakers and rapporteurs at the meeting and the session chairmen for their presentations and comments on this report,
- and last but not least Stefan Ouboter for his "organised chaos" which led to much fun and good ideas for the Friday discussion sessions, and all those who played a role in these activities.

Executive Summary

Management of contaminated land is an important issue throughout Europe, and one that involves many stakeholders: governments, regulatory bodies, the community, industry and the wide range of researchers and service providers who support the process. Over the last decade good progress has been made in developing and enhancing contaminated land management tools for site investigation, risk assessment, modelling and remedial techniques. The challenge for the future is to ensure that management of contaminated land, like that for any of the other complex issues which our societies face, sits within a framework of sustainability. NICOLE, the Network for Industrially Contaminated Land in Europe, held an interactive workshop in Barcelona in Spring 2003, to explore the opportunities, challenges and barriers posed by sustainable land management.

The workshop included a broad range of papers on how sustainable development and the remediation of contaminated land are linked, including some detailed case studies. The papers set a platform for a debate within NICOLE to set priorities for its activities over the next few years.

The meeting began with an overview of sustainable development, followed by a series of perspectives on what that meant in terms of "sustainable land management" from industry, regulators and nongovernmental organisations (NGOs). The meeting then considered what the barriers, challenges, opportunities related to sustainable land management might be, in particular regarding waste issues and brownfields. The first day of the meeting concluded with discussions to identify the most pressing issues affecting the implementation of sustainable development principles to contaminated land management across Europe. The second (half) day used syndicate groups to further explore these issues, prioritise them and provide suggestions for activities that NICOLE could engage in to facilitate sustainable land management across Europe.

Discussion

The fundamental point is, of course, that land is a limited resource.

The meanings ascribed to terms such as "sustainable" or "sustainable development" vary widely. There is clearly not (yet) a common language for discussing contaminated land management in the context of sustainable development. It would be both a major challenge, and also a major achievement, for NICOLE to catalyse the development of a common framework, widely used across Europe in the same way that risk based decision making has become used.

Distinguishing land that is still being actively used for processes from land that has moved to a post-industrial phase may be useful because the funding, stakeholders, beneficiaries will all to some extent be different. Discriminating between the phases also eliminates confusion about who will/should provide funding for managing the land, what sustainable management means and who should be the problems holders and problem solvers.

Without clear definitions are pinned everybody can claim that they are acting sustainably when sometimes perhaps they are not. There were some differences in point of view between NGOs and businesses, with NGO delegates tending to equate sustainable development less strongly with sustainable business management.

The most important single outcome was the acceptance that NICOLE needs both to take a broader view in its discussions and to engage with a wider audience. In particular a strong synergy was seen between NICOLE's interests and spatial planning. This broader view, in conjunction with some degree of clarity on the phases of land under consideration, should move the agenda forward for sustainable land management both for land which is still in commercial use or is to be returned to

commercial use, and post-industrial land such as that in the former mining region of Nord pas de Calais.

NICOLE's next steps are to establish the concrete needs of stakeholders for sustainable contaminated land management, perhaps using case studies to facilitate this process.

The full report provides summaries of the papers given, along with a discussion based on points raised during the meeting, and comments from a number of delegates after the meeting.

Contents

1 Introduction

NICOLE supports two workshops a year and produces a meeting report for each. Past events and future workshops are listed in Table 1. Further information, for example reports or registration forms, are available on the NICOLE web site: www.nicole.org.

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During the evening prior to the workshop a number of Spanish stakeholders presented their activities and the role of sustainable land management in their work. Slides from these presentations are available via www.nicole.org Information Gateway: NICOLE News Service – Announcement 245.

Table 1: Recent and Forthcoming NICOLE Events and Publications

Date	Event / Report
30-31 October 2003	**Next NICOLE Workshop**: *Sharing experiences in the management of mega sites: towards a sustainable approach in land management of industrially contaminated areas*, Palais de Congres, Lille, France see www.nicole.org Information Gateway: NICOLE News Service – Announcement 245 for further information
6 - 7 November 2002	**Report of the NICOLE Workshop**: *Financial Aspects of Site Restoration with an Emphasis on Central and Eastern Europe*, 6 - 7 November 2002, Budapest. Web link: www.nicole.org Information Gateway: NICOLE News Service – Announcement 239 and *Land Contamination and Reclamation* in press
September 2002	*NICOLE News* 2002 issue, Web link: www.nicole.org Information Gateway: NICOLE News Service – Announcement 223
18 – 19 April 2002	**Report of the NICOLE Workshop**: *Cost-effective Site Characterisation - Dealing with uncertainties, innovation, legislation constraints*, 18-19 April 2002 Web link: www.nicole.org Information Gateway: NICOLE News Service – Announcement 212, and *Land Contamination & Reclamation* **10** (3) 189-219
14-15 November 2001	**Report of the NICOLE workshop:** *ICT/Computing applied to contaminated land characterisation /remediation and MNA*, Rotterdam, the Netherlands (Port of Rotterdam) in conjunction with the Network on Natural Attenuation in Groundwater and Soil (NNAGS). Web link: www.nicole.org Information Gateway: NICOLE News Service – Announcement 187, and *Land Contamination & Reclamation* **10** (1) 33-59
October 2001	*NICOLE News* 2001 issue, Web link: www.nicole.org Information Gateway: NICOLE News Service – Announcement 171
17-18 May 2001	**Report of the NICOLE workshop**: *Cost-effective clean-up technology; quality assurance and acceptance* , Paris, France. Web link: www.nicole.org Information Gateway: NICOLE New Service – Announcement 167 and *Land Contamination and Reclamation* **9** (4) 377-395
January 2001	Special Issue of *Land Contamination and Reclamation*, outlining NICOLE and CLARINET work, www.nicole.org and www.btInternet.com/~epppublications/ *Land Contamination and Reclamation* **9** (1)
9 and 10 November 2000	**Report of the NICOLE workshop:** ***Brownfields: How to Change a Potential Threat into an Asset,*** IJmuiden**,** The Netherlands. Web link: www.nicole.org Information gateway: NICOLE News Service – Announcement 131 and *Land Contamination and Reclamation* **9** (2) 252 – 256
October 2000	*NICOLE News* 2000 issue, Web link: www.nicole.org Information gateway: NICOLE News Service – Announcement 120
September 2000	Joint Statement of NICOLE, CLARINET, ETCA and SENSPOL: Sustainable Management of Contaminated Land for the Protection of Water Resources, Web link: www.nicole.org Information gateway: NICOLE News Service – Announcement 112
21-23 June 2000	EU Workshop on The Protection of European Water, Resources, Contaminated Sites, Landfills and Sediments, Venice. Web link: www.etcanet.org/
22-23 May 2000	**Report of the NICOLE Workshop:** ***Source Management,*** Helsinki, Web link: www.nicole.org Information gateway: NICOLE News Service – Announcement 121 *Land Contamination and Reclamation* 8 (4) 67 – 68.

2 Offered Papers

Overview on Sustainable Development, Phillip Roberts and Martin Bell, ICI, UK.

A definition of "sustainable development" in a business context was suggested to be a "Triple Bottom Line for Business", consisting of:

- economic prosperity
  - financial health, as if there is no profitable business there is no industry
  - wealth creation/quality of life
  - distribution of wealth
- environmental protection
  - preventing further degradation
  - reversing past damage
- social responsibility
  - positive contribution to society
  - engaging skills, power and influence.

Hence business activities need to be economically viable, socially responsible (which encompasses health and safety of employees) and environmentally sound, as illustrated in Figure 1.

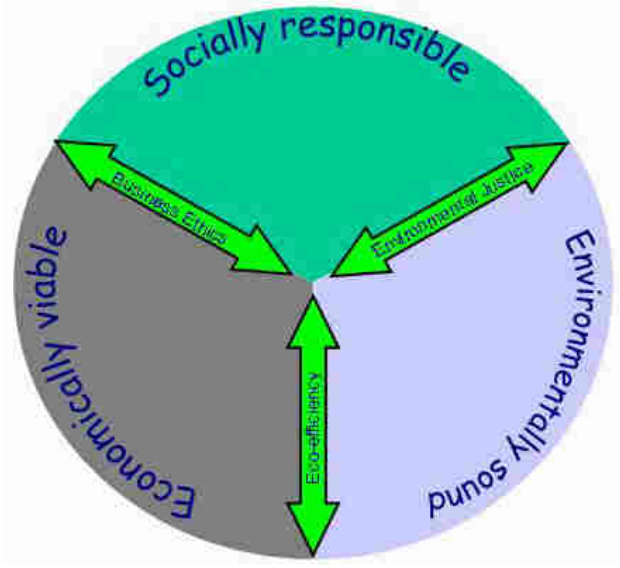

Figure 1 Business sustainable development model

This business view of sustainable development identifies the principles of business ethics, eco-efficiency and environmental justice. An emerging environmental justice concern is that the most deprived people tend to live in the most environmentally degraded areas. ICI believes that the view that "sustainable development may be the right thing to do but is not good for business" is fundamentally flawed. ICI regards challenges for sustainable products and services as a major opportunity for profitable growth. It does not accept the conventional wisdom that renewable or sustainable approaches are either more expensive and/or result in a lower quality of product.

ICI's views are widely shared by industry, for example:

- "Growing the value we bring to society and reducing our environmental imprint are business strategies to grow shareholder value" Gary M. Pfeiffer - Chief Financial Officer, DuPont

- Operational efficiency: "We've found a new way to win in the marketplace…one that doesn't come at the expense of our grandchildren or the earth, but at the expense of the inefficient competitor" Ray Anderson - Chief Executive Officer, Interface Inc.

- Access to Capital: "Corporate management cannot expect to get a top credit rating if it demonstrates poor environmental performance" Dr Eberhard Rauch - Director, HypoVereinsbank

- Customer attraction: "Ethics contribute value to the company by deepening … connections with customers" John Dalla Costa -The Ethical Imperative

- Brand value and reputation: "It takes 20 years to build a reputation and 5 minutes to ruin it" Warren Buffet - Head of Berkshire Hathaway Group

- Human and intellectual capital: The single most reliable predictor of overall excellence in a company is its ability to attract and retain talented employees" Fortune Magazine

- Risk profile: For many of the larger firms, social responsibility is not a 'nice to have' — it's a life-saver" Mallen Baker - Business in the Community.

- Innovation: "Overall, innovators and entrepreneurs will view sustainable development as one of the biggest business opportunities in the history of commerce" Stuart Hart & Mark Millstein - Sloan Management Review.

Questioning business ethics, eco-efficiency and environmental justice is a real risk faced by all companies, including the majors.

NICOLE's role in achieving sustainable development is concerned with contaminated land management and sustainability. One perspective to examine this role is to view the remedial goal/outcome as a product and remediation as the manufacturing process; and then apply conventional industrial tools and improvement plans to achieving product and process enhancement. Broad areas of improvement could be then categorised as:

- making better use of renewable resources
- eco-efficiency
- product stewardship (managing the land)
- social aspects.

A range of conventional management tools exist to test new ideas:

- the "needs test",
- eco-efficiency – the "eco-innovation compass" and
- environmental cost accounting.

The "needs test" has the following steps[1]:

1. identify the primary function of the product or service envisaged
2. identify any benefits it offers
3. test whether there is likely to be a long term need or demand for the product or service
4. consider the social and economic value of introducing the product versus its impact (including its production, use and disposal)
5. identify whether the product or service is sustainable
6. consider whether there are more sustainable ways of providing the function or meeting needs
7. assess threats and opportunities and decide whether it is attractive and feasible to proceed.

[1] adapted from *Cannibals with Forks*, J Elkington 1999

The "Eco-compass" is a comparative tool[2] which provides a rapid visual means of assessing the relative merits of a current product with new development options (see Figure 2). The six dimensions of the assessment are largely related to environmental issues but the tool would be amenable to extension to embrace the social dimension of sustainable development. It is important when using the "eco-compass" to compare services, processes and products that the boundaries of comparison are the same, i.e. that "like is compared with like".

The are two main applications for environmental cost accounting:

- External cost accounting – add in costs of restoring effect of current activities on environment (restoration or avoidance – not repair)
- Internal cost accounting – allocate environmental costs to specific activities rather than averaging over all activities. This brings a focus on unsustainable activities

This is a transformation tool, which stops environmental interests being seen as a special interest only and centres sustainability in business.

Technical excellence is not enough to succeed in business. Social and environmental considerations need to be an integral part of business. Furthermore, it can be helpful to regard remediation as a (sustainable) business process like any other.

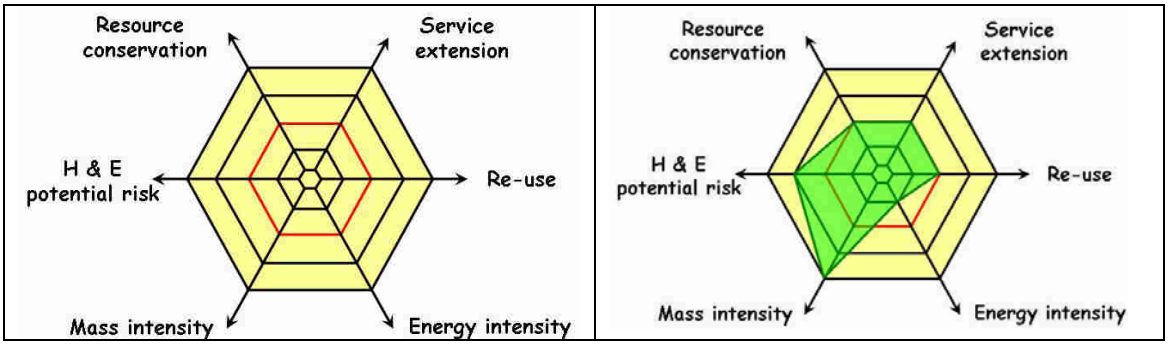

Figure 2: The "Eco-Innovation" Compass

Industry views on Sustainable Land Management, Cees Buijs, Public Works Rotterdam, the Netherlands

The Netherlands has had a National Initiative for Sustainable Development (NIDO) since 1999. This is a virtual organisation that includes academic and industrial groups, which seeks to stimulate a transition to more sustainable economic activity in the Netherlands, using tools such as learning networks. NICOLE could offer its leading expertise on sustainable soil and groundwater management to this activity. NICOLE could benefit from new ideas being developed more generally in business for sustainable development.

NIDO's vision is to facilitate "a step change in behaviour (culture) to achieve innovative business to business (B2B) relations in a value creating supply chain." This is to be achieved by supporting process and system innovation and by making targeted interventions to stimulate a step change in behaviour and culture required for sustainable outsourcing. NIDO's specific goals are to:

- analyse the cultural characteristics in transactions to optimise intervention strategies
- find best practices in the sector identify the key success factors.

[2] as originally devised by Fussler, C. and James, P. (1996), *Driving Eco-Innovation: a breakthrough discipline for innovation and sustainability* .Pitman Publishing, London, UK

- demonstrate the feasibility of a step change in culture[3] and show the benefits resulting from it
- stimulate a wide acceptance of change in business.

NIDO describes the elements of sustainable development (economic, environmental and social) as:

- **People**, talents, participation, passion, quality and life
- **Profit**, return on investment, growth, continuity
- **Planet**, ecology, natural resources, biodiversity.

Business should seek to add value for each of these components.

One idea being discussed in NIDO is "sustainable out-sourcing", to create maximum value for each of the partners in a business supply chain (*People*, *Profit*) while minimising ecological impacts (*Planet*). At its simplest an example of a supply chain for land remediation might be that: a site holder or developer needs remediation work for example to increase the value of his asset. A model for linking this supply chain to different stakeholders is illustrated in Figure 3, which identifies three financial components:

- the value of the remediation benefit (V)
- the price charged for that remediation benefit by the remediation service provider (P) and
- the cost of providing the remediation to the service provider (C).

It is interesting to note the factors driving up value are related to innovation in how land is used and what it is used for, and that technological advances drive down costs. Using this type of analysis one can see the developer's interest is in maximising V-P, the service providers interest is in maximising P-C, and perhaps society's interest in maximising V-C. For a sustainable approach a balance needs to be achieved between both public and private interests to create the highest added value in each relationship in a supply chain or network.

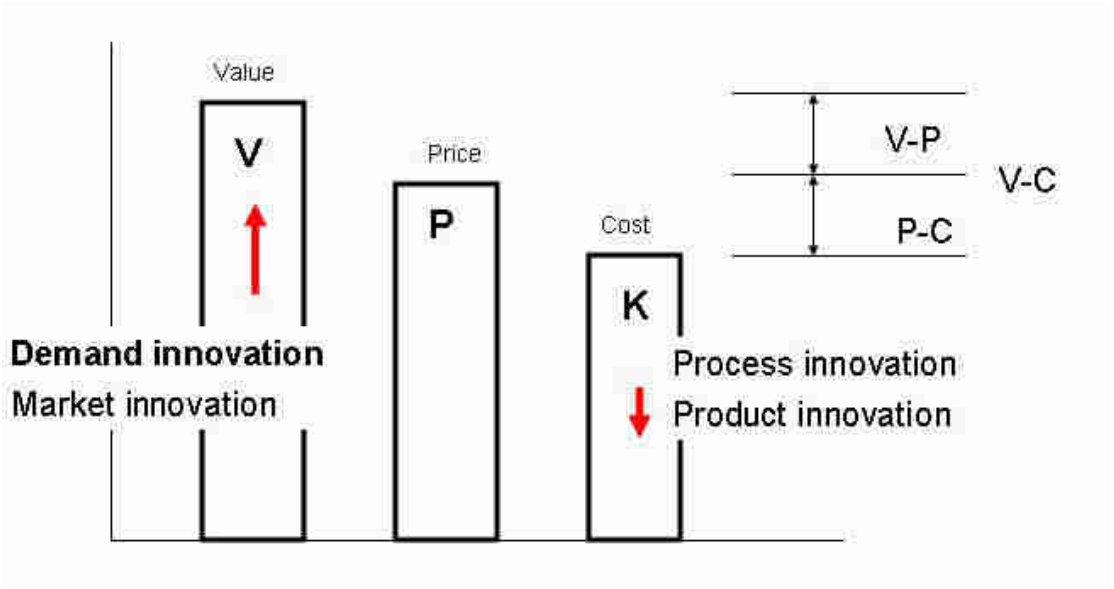

Figure 3 Supply chain analysis of value, price and cost

In the Netherlands the "REC" model is increasingly being used as a tool to examine the wider costs of remediation.

The REC methodology identifies three factors: risk reduction, environmental merit and cost: R, E and C. These indicate the main consequences of remedial operations in a simple, direct manner. They

[3] The word "culture" is used by NIDO to describe the values, beliefs and principles that underlie decision making.

introduce a structure to the decision-making process and clarify the situation for the decision-makers and therefore make it easier for them to arrive at their decision.

The final quality of the remedial alternative in a certain decision context is a function of the R, E and C indices as well as other factors not associated with the REC methodology. This function can either be determined explicitly or will implicitly play a role in the consultations held between different participants in the decision making process.

NOBIS - Netherland Onderzoeksprogramma Biotechnologische In situ Sanering (1995). "Risk Reduction, Environmental Merit and Costs." REC-Method, Phase 1. Document 95-1-03, CUR/NOBIS, Gouda, The Netherlands, tel. +31 182 540680.

NOBIS - Netherland Onderzoeksprogramma Biotechnologische In situ Sanering (1995). "Risk Reduction, Environmental Merit and Costs. REC-Method, Phase 2: A methodology based on Risk reduction, Environmental merit and Costs." Document 95-1-03, CUR/NOBIS, Gouda, The Netherlands, tel. +31 182 540680.

Remediation is a market driven by regulations. Initially it was characterised by a demand being *applied* by an authority to a company (or other responsible party), which would then *reply* to the authority by negotiating. When negotiations were concluded, typically, the company would then hire in another company to *supply* remediation work which allowed it to *comply* with the regulatory requirement. This basis system was described by Buijs as: "competence induced control" or a "licensing based approach". Over time the management of this interaction has become more sophisticated with the development of quality management both for the *replying* to regulations and *compliance* with them. Service providers *supplying* remediation are favoured where they have been active for sometime and an element of trust exists in their client base. However Buijs suggests that at present there is no overarching system to manage the quality of the *application* of regulations and that their application is often prescriptive and overly demanding. He suggests that this limits the flexibility with which service providers can respond to environmental problems they have to solve, and so overall limits the use of more sustainable responses.

Another bottleneck in delivering sustainable land management is, in Buij's view, the nature of relationships between service providers and their clients. Where one or the other party is in an overly dominant position the economic interests of the other are threatened, which limits both the flexibility and quality of the remediation delivered to society as a whole. A simple model to illustrate this is presented in Figure 4. Buijs suggests that a progression from simple "ordering" / "buying" relationships to an overall "value-chain management" approach will serve all parties in the supply chain better and achieve a greater value for society overall. Buijs suggests that the remediation market is still in a process of transition to more mature supply chain relationships, a process which he sees as taking another 10 to 15 years to complete and needs a shared "culture" amongst the supply chain parties. Transparency to all stakeholders is vital to the development of a common culture and more mature supply chain relationships, it should also be noted that EU regulations may also demand more transparency in supply chain interactions, particularly where public money is involved.

Buijs suggested that in general land in urban areas had the highest economic value, for example where it is used for housing, whereas land in rural areas had a lower economic value. Industrial land typically has an intermediate value. He further suggested that the "emotional value" attached to land is the inverse of this, with rural landscapes having the highest emotional value and urban landscapes a lesser emotional value. From this analysis he suggests that rapid higher cost remediation is justified in urban areas because of its higher inherent economic value and lower "emotional value", whereas lower cost, longer term treatments are more appropriate in rural areas.

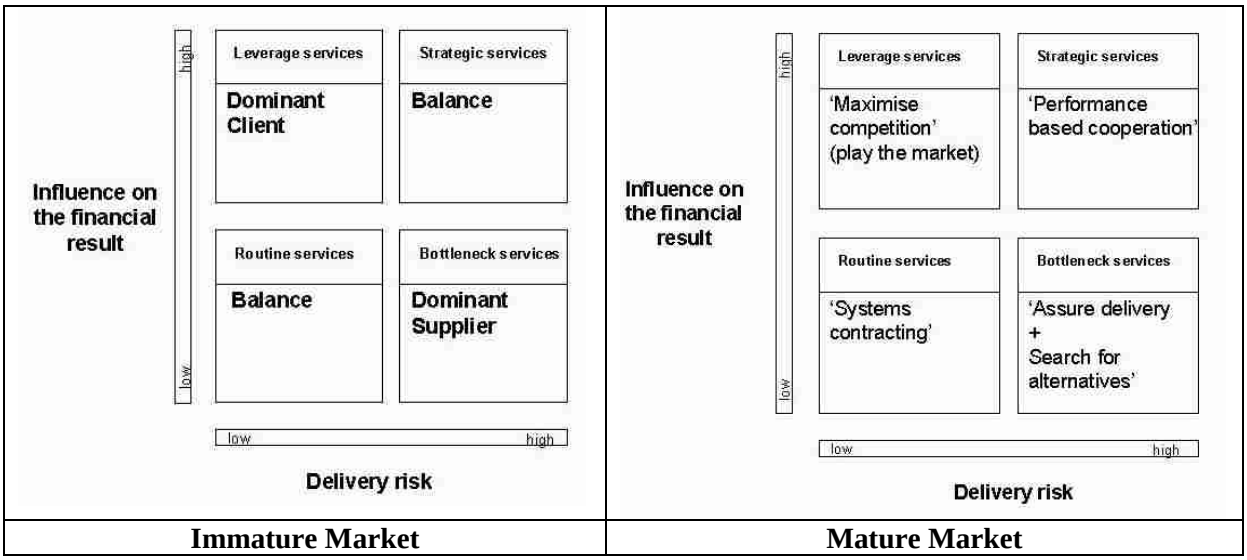

Figure 4 Dominance Relationships in Supplier Chains

Regulatory views on Sustainable Land Management , Victor Dries, OVAM, Belgium

OVAM is the Public Waste Agency of the Flemish Region. Dries took a broad perspective in considering the sustainable management of land. He saw these as encompassing not just land remediation and risk management, but also impacts from the use of land and impacts such desiccation caused by both water use and covering of urban areas and roads with impermeable surfaces. Such capping of the land surface has further knock-on effects, for example increasing the probability and severity of flooding.

Dries suggested the use of ecological "foot-printing" as a tool that can be used to quantify these different impacts.

The "ecological footprint" is an environmental accounting tool for ecological resources. Categories of human consumption (activity) are translated into areas of productive land required to provide resources and assimilate waste products. The ecological footprint is a measure of how sustainable our life-styles are.

Wackernagel, M., Rees, William (1997) Our Ecological Footprint, Reducing Human Impact on the Earth, New Society Publishers, Gabriola Island, BC. Canada and Philadelphia, PA USA, Canada Paperback ISBN 1-55092-251-3.ISBN 1-55092-250-3.

In densely populated areas open space is a valuable resource. Once a greenfield development has taken place that open space has gone *forever* as a built development. Hence the best preservation for green space is the *prevention* of greenfield development. There are two facets to this. Clearly, stimulating brownfield development relieves the need for use of green fields. However, it is also important to make optimal use of land, for example in terms of spatial planning, or making use of vacant land that is being "banked" by owners rather than being used.

Where development is taking place, contamination is avoidable. While historic contamination needs to be managed, future contamination should be avoided. Approaches to preventing contamination might encompass:

- minimising the use of hazardous substances as far as possible, or substituting for them: products that are not used, cannot pollute

- optimising production to minimise wastes: wastes which are not produced cannot pollute
- integrating prevention in site and facility design, and perhaps more innovatively
- integrating geological considerations in site design and even site selection, for example would it not be better to locate potentially polluting industries on less sensitive geologies to protect groundwater.

BATNEEC[4] is often used as a benchmark for pollution prevention approaches, but understanding what BATNEEC truly is, is limited by our state of knowledge today. This can be seen as an inevitable situation, i.e. how can we protect against things that are not yet known about. On the other hand often there is information about possible "future risks". A recent example of potentially avoidable future risks has perhaps been the use of MTBE, where while there is a risk driver, its impacts are related to its solubility and low taste and odour thresholds. Perhaps this should have been a predictable consequence given the known properties of MTBE. Risks discovered in the future can turn out to be a good deal more costly to manage than risks controlled in the present. Dries also suggested that a contemporary question related to preventing future risks is in studying the adequacy of current approaches to monitoring emissions to air and water from storage tanks.

As well as "gradual" risks such as those of contamination over time there are also sudden or catastrophic risks. These can be also controlled, examples include:

- Ensuring that bunded area in tank farms not only are able to contain contaminated liquids on a day to day basis, but can also offer protection during flood events,
- Preventing the ingress of into the ground of water used to deal with fires before it has been treated.

Dries suggests that there should be a focus on prevention, rather than on "simple" regulatory compliance. Dries also questions the weight of regulation being applied to secondary materials, such as recycled aggregates, where regulations are often stricter than for primary or virgin materials.

Where contamination has occurred and remediation is necessary, a full restoration – particularly of groundwater - can be a long term process. In many cases a "fit for purpose" end point is used for remediation. While this may be economically expedient, it can leave open the need for further remediation work should a site use change to a more sensitive scenario in the future. This may affect the value of the site in transactions. In addition, it is important that there are institutional measures in place to ensure that any restrictions on land use are not lost as a result of successive property transactions rather than additional risk assessment / risk management. This is particularly important for sites where contamination has been dealt with by isolation and containment.

When options are being considered where contamination remains *in situ*, whether contained, stabilised or as a residual, it is important that contaminants' long term behaviour is considered, and what the potential cost implications are of such long term behaviour. This needs to form part of the assessment of which remedial solutions are most suitable.

As an overall philosophy it can be very helpful to link remediation with site management overall, including wider spatial planning that recognises space as a resource and soil protection in the longer term, and encompasses issues such as eco-design and waste minimisation. Projects need to be considered in a longer time-frame than simply their next built development, perhaps this is an important role for policy and regulation in helping society achieve a longer term vision for land use

[4] Best available technology not entailing excessive cost

NGO view on Sustainable Land Management, Jirina Jacksonova, CEC Projects co-ordinator, Institute for Transportation and Development Policy, Czech Republic

The Institute for Transportation and Development Policy (ITDP[5]) is a nongovernmental organisation based in the Czech Republic. Its work related to brownfields is strongly focused on city centre revitalization and the containment of urban sprawl in Hungary, Poland, Slovakia and the Czech Republic. The ITDP fosters broad coalitions that enhance the competitiveness of accessible city centre development and redevelopment (retail, residential, and other) relative to out-of-town "greenfield" developments, which tend to be sprawling, car-based, and wasteful of resources, and undermine city centre vitality.

The countries of central and eastern Europe (CEE), which were formerly communist, have plentiful data on air or water pollution, but only limited data on pollution of soil and real estate, and little idea about the amount of under-utilised previously urbanised land. Furthermore, if work was undertaken to try and assess this amount of under-utilised previously urbanised land, there is no generally agreed methodology or system of categorisation.

Indicators of sustainable development in the Czech Republic include measures of the quality of water, air and agricultural land or biodiversity. However, the amount of vacant or brownfield land is not yet considered as a sustainability indicator. Both the amount and the fiscal performance of specific land areas is *could be* used as indicators of sustainable development, for example:

- % of vacant or brownfield land/ to build up area
- % of vacant or brownfield land/ to a particular land use
- % of vacant or brownfield land/ to land designated for greenfield development
- Fiscal performance of vacant or brownfield land / unit area of land

In general urban coverage is increasing. For example, in the Czech republic over the last 70 years, the amount of urbanized land has doubled despite a decrease in population.

Brownfield sites are a massive legacy in CEE countries, a consequences of the previous economic regime where land had next to no market value and costs of capital were not factored into decision making. Centrally planned economies were inflexible and demanded over-scaled (uneconomic) real estate provisions for their industrialisation efforts. As a result CEE cities have been left with an abnormal proportion (25-35%) of industrial land compared to cities in western countries. Industrial sites are often in city-central locations where factories were built on edge of existing settlements, which then grew. The return of a market economy to CEE countries has now rendered many of these factories uncompetitive. Other major contributions to brownfield land are former military sites; former railways land, as rail use has decreased, and even agricultural sites where there are remnants of industrial agricultural collectivisation.

CEE country expectations for what will happen in the future to such brownfield land can be rather unrealistic at a local authority level.

"Frogs into princes. . ." a brownfields fairytale (Local beliefs about brownfields)

One day (hopefully soon), an investor in a big white Mercedes will come and . . .

- Prepare a project that cost him a lots of time and money and carries exceptional risks
- If necessary, initiate zoning changes
- Prepare and pay for all necessary technical surveys and investigations of potential

[5] www.itdp.org

environmental damages

- Investigate complicated land ownership and land charges and place a securing contract on the land despite the unstable context for securing land titles
- Not hesitate to pay unrealistic prices for dilapidated properties and land from large numbers of owners
- Eagerly invest money in the necessary environmental clearance, and demolition
- Brings lots of money for the project itself, which will . . .
- Brings jobs and an increased tax base for the community

Then kiss the frog and change it into a prince. . . .

In practice there are significant barriers to brownfields re-use in CEE countries, relating to: know-how; co-ordination; motivation; administrative, fiscal and legal tools; strategies; policies and data. All this also prevents the CEE countries from effectively joining the brownfields and vacant land sustainability discussion in a wider European context.

Know-how, coordination and motivation problems

- Inadequate understanding of the scope of the brownfield problem, and of its financial and social implications at all levels
- Low levels of political commitment to brownfield reuse in all levels
- Absence of an overall brownfield strategy mainly at the national level, but also at lower levels
- Inadequate cooperation and knowledge-transfer among disciplines, institutions, and departments within institutions
- Inadequate know-how across the full range of potential brownfield stakeholders, including private investors, local authorities, regions, NGOs and ministries

Tools, policies and strategies issues

- Lack of national policy, strategy, analytic tools and principles for prioritising brown sites investments
- Lack of a unified registry of sites and their critical parameters
- Lack of benchmarking of the technical and other costs and procedures against international best practices
- Insufficient transparency and enforcement in the legal system in several areas that impinge on brownfields planning, purchase, and use
- Inadequate tools for land assembly
- Inflexible planning tools
- Insufficient fiscal instruments and incentives
- Lack of means to insure or cap environmental liabilities
- Overly uniform and insufficiently discriminating cleanup standards

Even with adequate knowledge, coordination, technical tools and policies, brownfield rehabilitation on a sufficient scale is unlikely unless the following prevails:

- a vibrant expanding economy
- local public sector “priming” finance (for the less well located and heavily damaged sites, and to match private sector or EU funding even for the best sites)
- greater restrictions on the ready availability of greenfield sites. (i.e.the removal of visble and invisible greenfield subsidies).

Sustainable development encompasses three key elements: environmental sustainability, economic sustainability and social sustainability, as illustrated in Table 1. These allow us to distinguish key advantages to the re-use of brownfields, for example this:

- removes unproductive "holes" in the local urban fabric (economic sustainability)
- catalyses revitalisation of localities (social sustainability)
- increases local employment, local economic activity and local tax base in the area (economic sustainability)
- promotes public health and protection of local environment (environmental sustainability)
- reduces development pressure on greenfields (environmental, economic and social sustainability)

Local government has a key leadership role. Jackson suggests that local authorities are in the best position to promote reuse of their brownfields in CEE countries, but their role is not easy. Amendments to legal framework are in hands of State. The main influences on the reuse of "their" brownfield may be in the hands of state agencies and programmes. The finances needed may be controlled by private finance institutions. Land and property decisions are in hands of private owners. However local government is in a position to

- integrate brownfield redevelopment into other local priorities
- engage citizens in preparation of brownfield redevelopment plans
- carry out promotion, marketing and advocacy for redevelopment
- co-ordinate environmental regulators and agencies
- identify the need for and enabling restoration
- prevent the creation of new brownfields

Table 1: Components of the Three Key Elements of Sustainable Development

Environmental sustainability	Economic sustainability	Social sustainability
• Energy efficiency • Material sustainability • Land sustainability • Productivity • Biodiversity • Landscape value • Long term recourse • Transport availability • Proximity use • Recycling principles	• Economic sustainability criteria • Maintenance of high and stable economic growth • Stable employment growth • Accessibility to goods • Unrestricted movements of goods • Expansion of selected economic sectors • Improvements to the locality • Building on local strength	• Social progress • Social cohesion • Social equity • Social inclusion • Social empowerment • Serving the needs of the area • Serving the needs of the community

Jackson distinguishes four kinds of site where rehabilitation is likely, in terms of the role of different stakeholders:

Market will solve it independently	• Only in best locations • Takes place when the market is up • Private sector pays all costs
Market will solve it once environmental damage is identified or removed	• In good locations • Takes place when the market is up • Ratio of public matching to private finance is: 1:5 to 1:10 and more
A site has compelling social and/or environmental values beyond its real estate market value	• Ratio of public matching of private finance is: 1:1-1:4
Site an active health/environmental hazard with no development value	• Public pays all

Waste issues, Steve Wallace, Secondsite Property, UK

Secondsite Property see waste minimisation from the remediation process as a key component in delivering a more sustainable approach to land remediation. In particular, they see advantages to treatment based approaches compared with containment or excavation and removal to landfill. They see a hierarchy of operations: firstly recovering the material (destroying or removing contamination from soil) or directly recycling materials where testing indicates that they are not contaminated (for example concrete after crushing), followed by re-use, for example using treated materials as fill. Minimising wastes from remediation not only has environmental advantages, but can make projects more economically viable.

Common barriers to treatment based approaches are:

- Technological
    - Availability of technology
    - Verification data (confidence)
    - Timescale (when can I have it?)
- Legislative
    - Waste legislation (hazard driven) versus
    - Contaminated land legislation (risk driven)
    - Water regulation (moving towards absolute)
- Financial
    - Developer wants least cost option
    - Project must have net positive value

Duration can be a significant impediment to the use of treatment based approaches in remediation. Figure 5 indicates typical project time scales in the UK for remediation work on former gasworks sites. Treatment based remediation can take almost twice as long to implement as excavation and removal. If the site is unavailable for development during the remediation works, this can add a significant indirect cost to the remediation work.

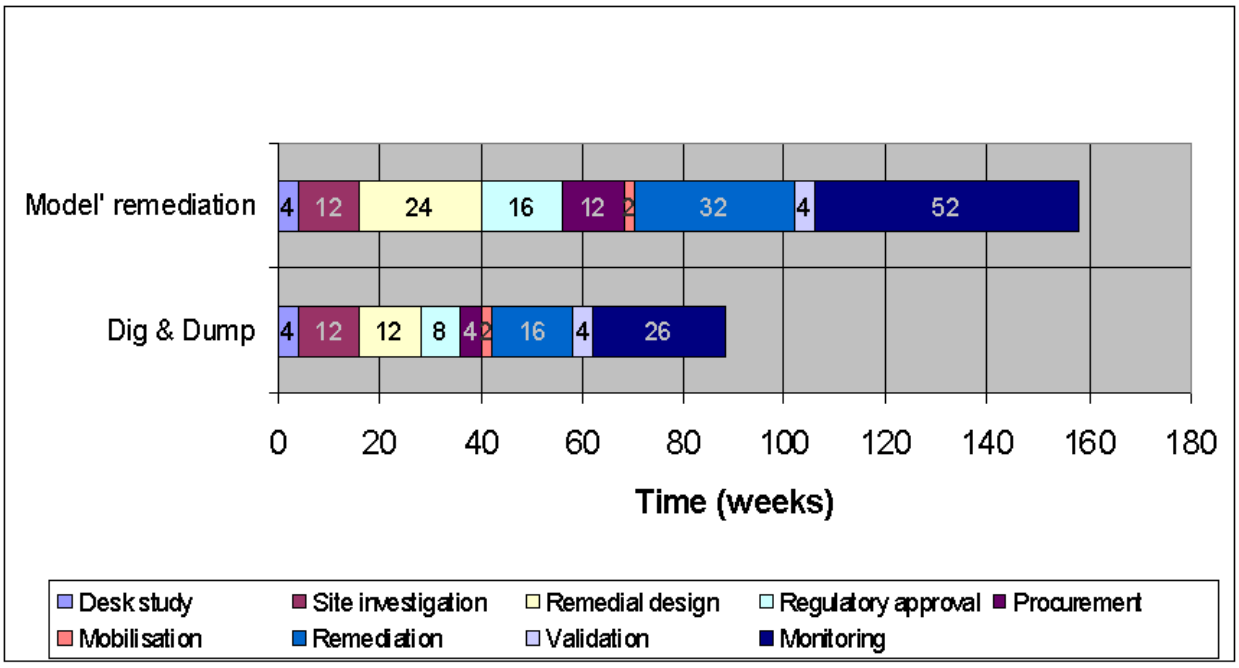

Figure 5 Indicative Remediation Programme Times (excludes time for planning approvals)

In the UK, and perhaps elsewhere, the implementation of the EC Wastes Directive is proving to be one of the largest barriers to treatment based remediation where materials are excavated and re-used. Wallace described an example of remediation of site using a combination of bioremediation and off-site disposal. On this occasion bioremediation (biopile method) was carried out under the UK waste licensing regime, using a "mobile plant license" (MPL). MPLs were originally designed for mobile waste treatment facilities as part of the enactment in the UK of the EC Directive.

Some heavily contaminated material was not amenable to biological treatment so disposed off-site. This was replaced by imported "clean fill" (virgin ground) sourced from a nearby development site. Quarried material of same specification was available from a commercial supplier but from further away and at extra cost. Secondsite took the view that using the virgin ground from the adjacent development site was a more sustainable approach because it (a) used a material which would otherwise have had to be disposed of, and (b) reduced use of transportation. And in this case the more sustainable option was also the cheapest!

However, this project ran into regulatory problems. When the Environment Agency visited the site to inspect the biopiles as part of the MPL procedures (no bioremediation compliance problems were noted) they queried the source of stock pile of imported fill. Since this had come from another construction project, the Agency officer decided that the material was a "waste" and therefore the site being remediated required waste disposal licensing – despite the material being demonstrably fit for purpose as clean fill. Secondsite disputed this and were issued with a letter issued threatening enforcement action, which put project delivery and costs at risk. Eventually the Agency agreed to an exemption for the clean fill material. However, this still implied that the clean fill used was a waste, i.e. that a waste had been disposed of on the site.

The ultimate cause of this Agency position is the EU definition of waste, where waste is something that the holder discards or intends or is regarded to discard[6]. Case law is adding weight to strict interpretation of this definition. In practice in the UK, if a site is remediated, for example by an *in situ* process, then the goal is remediation that is fit-for-purpose for the specified use of the site. However,

[6] NB the UK regulatory view is that land contamination is also captured in this definition of waste

if the soil is excavated and re-used on the site *and* this soil is regarded as a waste, then site licensing for waste disposal licence is required for the site. Such licences can only be surrendered if the Agency agree that the site will not cause harm, which can be interpreted far more stringently (in the UK) than endpoints for land contamination. This is having a severe impact on the UK's ability to re-use treated soils. Manufacturing something with the treated material does not necessarily remove the "waste label", and off-site treatment exacerbates the regulatory problem.

Furthermore, the UK MPL regime does not cater well for remediation of materials at a location remote from their origin such as an off site treatment plant or at treatment at another site being remediated. A site waste management licence needs to be applied for, which takes a lot of time and is generally not worth the trouble for a single remediation project, or to create economies of scale by centralising remediation at one of a portfolio of sites being remediated.

Perhaps, in due course, centralised soil treatment facilities will be established in the UK, however the current regulatory system is likely to impede or prevent the recycling of treated soil factions from such facilities, as they will still be considered a "waste". Wallace suggests that it should make no difference whether soil is treated on site or off site. In practice though in the UK, local regulators tend to find it easier to take "helpful" enforcement positions if transport of such 'waste' in and out of a site is avoided.

Even with on site treatment, and a licensing exemption, treated material is still regarded by the regulator as a waste which causes a problem with stigma for the treated site. Furthermore, the enforcement position adopted by local regulators is not nationally consistent. Often positions are agreed 'off-line' so they are susceptible to changes in regulator staff. This translates into budget/programme uncertainty.

Often treatment based waste minimisation approaches are avoided because of this regulatory uncertainty. Use of treatment based solutions becomes ever more limited to those 'in the know' who are able to predict and deal with regulatory circumstances.

Across the EU the regulatory position varies from state to state, for example:

- Sweden: not common to re-use excavated soils
- Italy: excavated materials are only a waste when they leave a site
- France: excavated materials are only a waste when they leave a site
- Germany: remains a waste if treated *ex situ*, but certain uses allowed
- Ireland: no on site treatment – soil is exported for treatment
- The Netherlands: excavated materials cease to be waste when re-used
- Belgium, Flanders: on-site soil specifically excluded from waste regulations. Soil treated off-site is not a waste when re-used
- Belgium, Flanders: Excavated soil is a waste as there is an intention to discard.

The recent Landfill Directive includes a total ban on certain types of waste (liquids, flammable, corrosive, explosive etc). It requires a classification of landfill sites (inert, non-hazardous, and hazardous). It requires that all waste disposed of must be pre-treated (from July 2004 in UK), and that materials disposed of must comply with Waste Acceptance Criteria (WAC). These WAC are based on leach tests <u>not</u> total concentrations. No WAC for organic contaminants are available yet, but are vital for treatment targets, for example WAC for PAH for treating former gasworks soils. Secondsite expect that many contaminated land soils will fail WAC and will need significant treatment even if disposed of off-site. This emphasises the importance of on site treatment and re-use, yet in many countries this is impeded by the interpretations of definitions of waste. The combined effect of not being able to dispose of untreated soils, and not being able to easily re-use treated soils, if appropriate, will be to make brownfields remediation more costly and more time consuming and so reduce reuse of brownfield sites

The requirement for waste classification at source and by type is may cause further problems for brownfields re-use because of the great variability of materials encountered on site. The regime also requires a shift from testing for total contaminants to leachate testing. Furthermore, there are contaminants for which no WAC are listed.

Wallace also argued that in some cases treatment may be inherently a higher risk approach than excavation and disposal to landfill. He suggested that reactive (bioreactor) landfills are remedial treatments but under better environmental control, and because of their scale and the fact that materials are encapsulated may also offer health and safety advantages. While waste minimisation is seen by Secondsite as the pre-eminent approach, they believe that disposal to landfill should remain an option in the remedial "tool-box".

In Wallace's view sustainability in relation to contaminated land waste management needs to be a balance between environment, social and economic needs. In effect, the development of waste management practice needs to be a cost/benefit decision process which balances these three demands. National implementation of the Landfill Directive and Waste Framework Directive should consider this balance, but such a holistic outlook is not immediately apparent in all Member States.

Many contaminated land remediation projects are commercially driven, where remediation is for a change of end use, rather than to protect the environment from the site in its existing condition. This means that the project has to be economically viable for it to happen. If regulation changes the cost base of remediation too much, it will simply drive development away from brownfield sites and onto greenfield sites, thus resulting in negative social and environmental impacts (which is presumably the opposite effect to that intended). Too many people in regulation, perhaps, seem to think that businesses have to remediate brownfield sites or face enforcement and therefore that the cost base does not matter. In fact business may simply abandon many brownfield relocations in favour of greenfield projects.

Wallace argued that NICOLE should seek clarity on when treated material ceases to be a waste, and whether clear enforcement positions can be agreed at an EU rather than a national level, given that the basic framework for Directives operates across the EU. A body of case law is building which does not favour the re-use of treated soils, which seems counter to the philosophy of sustainable development. Waste regulations not designed to handle the "historic waste" that contaminated land is seen to be by regulators. Perhaps NICOLE could develop draft exemptions at an EU level to exempt a range of remediation techniques from the Waste Framework Directive. Overall there is a conflict between waste and contaminated land regulations. Whatever the intent of the original regulations, the impact will be to reduce brownfield site re-use, and this problem needs to be resolved at EU level for the benefit of our crowded continent.

CABERNET Network – Tackling Urban Brownfields and Economic Regeneration Issues, Kate Millar, CABERNET Project Manager, University of Nottingham, UK

CABERNET is a three year networking project funded as a Concerted Action under the Framework 5 City of Tomorrow and Cultural Heritage Programme. It has 55 members from 21 countries, and its first plenum meeting takes place in Athens during 2003. The aim of CABERNET is to facilitate new practical solutions for urban brownfields. The Network will focus on four key developments:

- Better awareness and shared understanding of brownfield issue
- A conceptual model for brownfield issues
- Co-ordinated research activities across different sectors and countries
- Identification of best practice approaches and other tools.

CABERNET is organised into a number of Working Groups (WGs), summarised in Table 2. CABERNET is an expert network aiming for an intellectual framework, practical relevance and sustainable solutions.

Table 2: CABERNET Working Groups

Working Group Name	Activities / Areas of Interest
WG 1 : Citizen Participation and Decision-Making	• communication and stakeholder engagement tools • identifying stakeholders and encouraging participation • consensus building • long term stewardship and social cohesion
WG2: Policy approaches and regulatory practices	• indicators for brownfield redevelopment • best practice in policymaking at national and local level • influence of European policy • brownfield prevention policies
WG 3 : Professional skills	• translation of science to brownfields practice • training to fit the skills matrix; stimulation of professional development
WG 4: Social and Cultural Issues	• social equity • intergenerational justice, characterising regional social needs and opportunities • mobilising local skills and employment opportunities • role of industrial heritage • enhancing small scale and interim uses
WG 5 : Environmental Issues	• measuring effects of brownfield regeneration on overall urban development • urban health (people and environment) • managing environmental impact of regeneration • interface between environment and other issues
WG 6 : Economic issues	• understanding of how to attract money to a brownfield site • managing the rate of creation and regeneration of brownfield • financial risk management • tools for valuing brownfields and their regeneration

CABERNET has taken on the risk based land management concept developed by CLARINET (see Vegter *ibid.*) and developed it for brownfield redevelopment scenarios. Of particular concern to CABERNET is dealing with the brownfield sites which are the most intransigent. Figure 6 summarises CABERNET's view of the stakeholders involved in sustainable brownfields regeneration. Brownfield sites can be categorised on the basis of these drivers for and pressures against brownfields remediation, summarised in Table 3, the "A-B-C Model" illustrated in Figure 7.

These drivers and pressures can be grouped into seven broad classes:

- Financial viability

- Spatial Planning process
- Risks and liability
- Technical knowledge
- Professional skills
- Community Needs
- Cultural heritage

CABERNET have used these to suggest a "Framework for sustainable Urban redevelopment" actions. The key steps of this framework, which is now being developed by CABERNET are:

- Prioritisation of brownfield regeneration
- Coordinated planning systems
- Greenfield protection (financial tools)
- Incentives for brownfield redevelopment
- Coordinated and simplified approval systems
- Community involvement

To get involved with CABERNET e-mail: Kate.Millar@nottingham.ac.uk or view the web site at www.cabernet.org.uk.

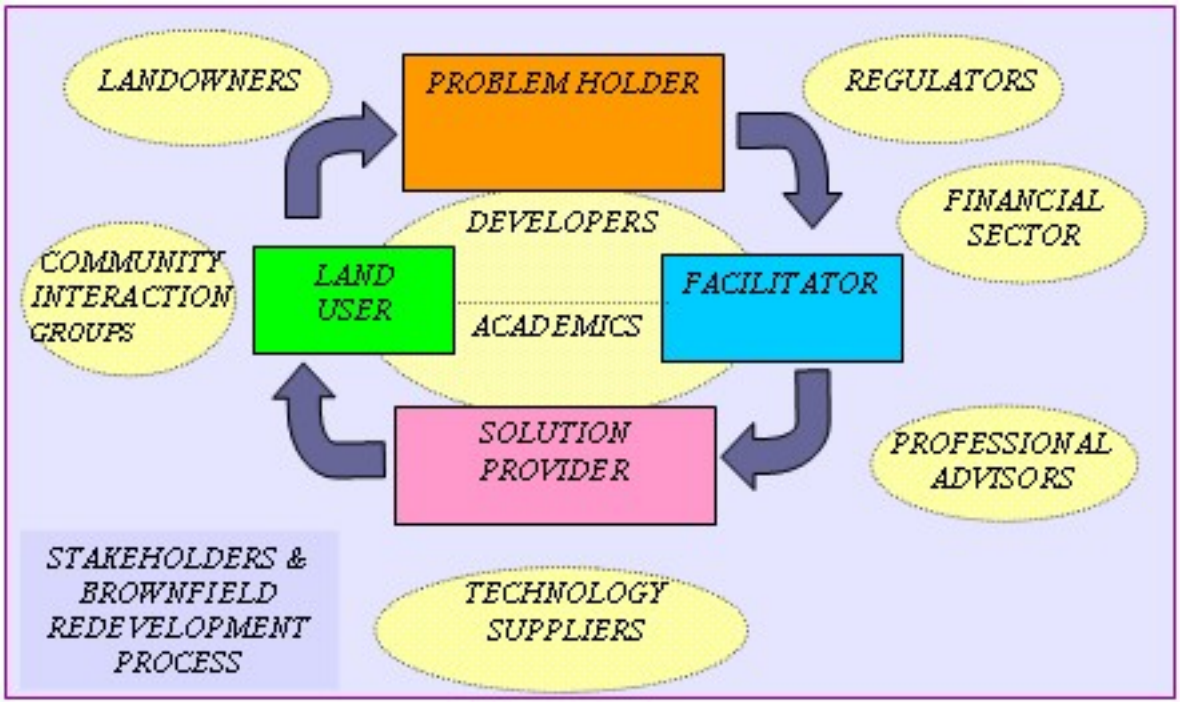

Figure 6: Stakeholders Involved in Brownfields Regeneration.

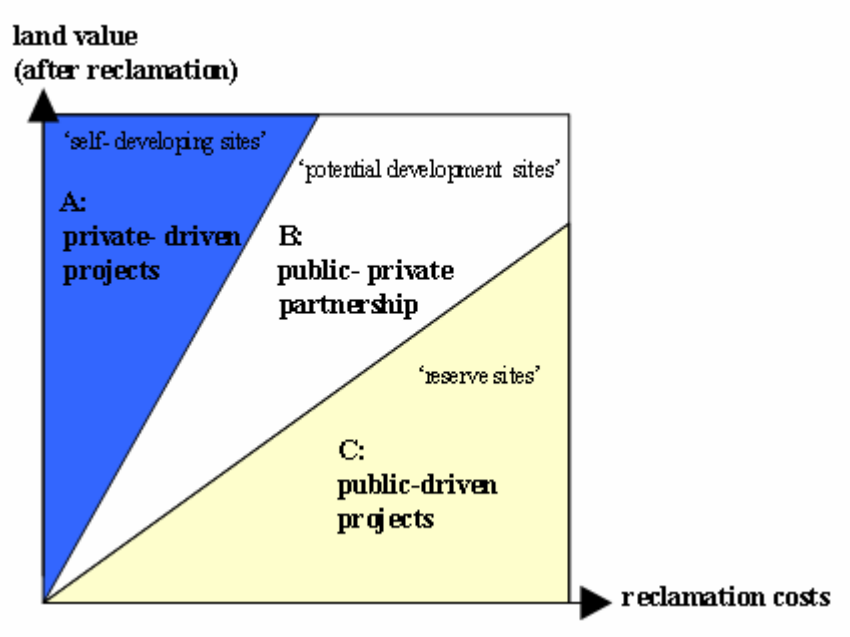

Figure 7: The "A-B-C Model" Characterising Brownfield Regeneration Drivers and Pressures

Table 3 Drivers for and Pressures against Brownfields Remediation Identified by CABERNET

Drivers	Pressures
• Availability of public funds • Mandatory clean up requirements • Availability of low cost technologies • Market for recycled material • Technical information and „Marketing" • Quality of life • Reduction of land consumption • New concepts for the recycling of material • Money • Location • Readiness for construction • Incentives • Location • infrastructure • Need for economic & social development • Taxes • Political commitment • Availability of professional competence and understanding of the problem	• Financial risks • Future liability • Costly technologies • Legal requirements for recycling material and clean up • Liability • Credit availability • Planning conditions • Use restriction • Bad reputation of the region • Requirements for site preparation • Image of the site • Complex approval processes • Too many authorities involved • Timescale for site preparation • Data availability • Decentralised planning system • Community competition (missing priorities for brownfield) • Problematic NGO and other community groups, dominance of interests • Long site investigation periods • Costs

Solutions for the sustainable management of contaminated land – a community / NGO perspective, Malcolm Barton, IBIS Consulting, UK

Barton summarised sustainable development, from the Brundtland perspective, as being inter-generational equity: ensuring that the same resources available to us are available to future generations. While there is a great attraction in ensuring remediation projects are sustainable development, the project or activity *itself* must be sustainable in another sense, i.e. that it can endure into the future. If a project does not endure the sustainable development that it represents is lost. Endurance of a project is linked to resources continuing to be provided to a project: for a project to last over time it must be economically durable so that it can continue to be resourced. This is a different perspective to the three element (social, environmental, economic) or "3P" view of sustainable development. The viewpoints are not contradictory they are complementary. What Barton was seeking to set out was a vision that would allow projects with a balanced social, environmental and economic outlook to endure and thrive over time, as illustrated in Figure 8.

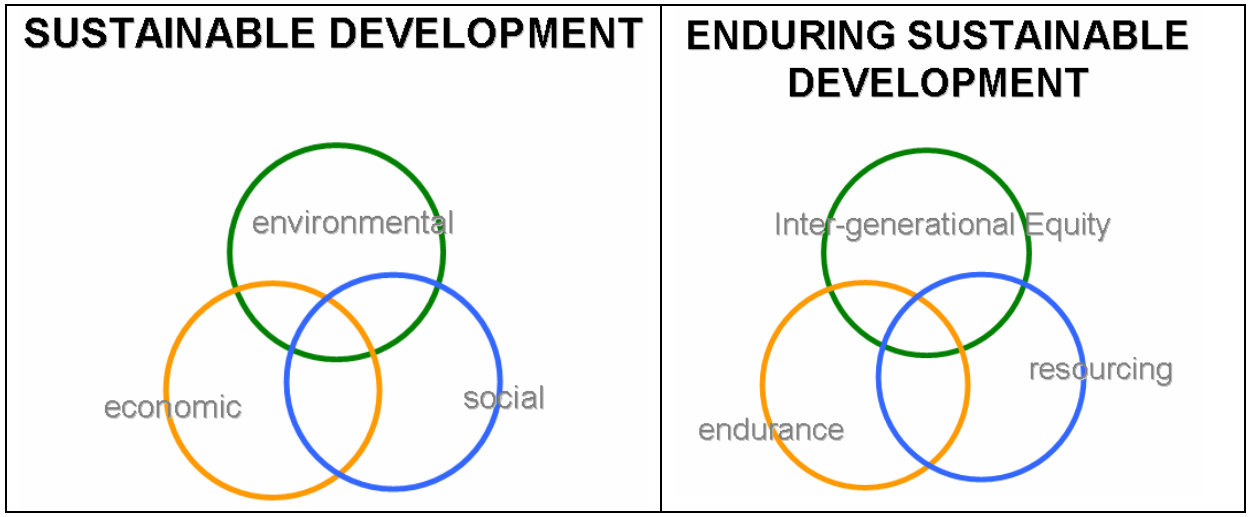

Figure 8 Enduring Sustainable Development

In many cases Nature is able to effect a remediation of land on her own. Figure 9 shows a site which has naturally regenerated. In some cases the stresses on soils on contaminated sites can produce a highly bio diverse ecology.

Local communities can be a powerful resource for ensuring that a restored landscape endures over time. However, community groups can be fragile, for example they may rely on a small number of individuals who catalyse activities, and if these move away the community group may fall away. The hard truth is that long term maintenance costs money, which in turn requires a reliable long term source of income, or a long term funder. One approach to combining both the benefits of community involvement and a long term source of income is to use "social enterprises" such as community run companies. These can have important and very attractive additional benefits, particularly for communities already disadvantaged by the ending of traditional forms of industry, blighted not only by a poor environment but also economic and social exclusion. These benefits include:

- providing education and life skills (for example conservation activities)
- helping with the long term unemployed, and
- working with the disaffected young.

Figure 9 An Example of Natural Regeneration of Land

An example of a social enterprise currently under development is the "Markham Willows" project, described below, which is taking place in a former coal mining area in Derbyshire, England (see below). Within the UK a national NGO, the "Land Restoration Trust" is set to become a long term fund holder and manager for restored landscapes in urban and rural areas to support them into the future and act as a long term "mentor" for such projects. The Land Restoration Trust (LRT) will own restored post-industrial land and hold endowments for them to fund future maintenance. It will operate with a set of core values, which are to:

- work with communities
- work in an ecologically informed manner and
- uphold the principles of eco-sustainability.

Two phases of brownfield land use can be distinguished: land that is still being actively used for processes and land that has moved to a post-industrial phase. Sustainable management of land still being actively used for processes involves, as a minimum, adding no more contamination. In a perfect world it would mean starting to treat some of the land as an on-going process - but this costs money and reduces net margins and may be unpalatable or untenable. Activities such as the LRT or "Markham Willows" assist land that has moved to a post-industrial phase.

Barton sees the future challenges for the sustainable management of post-industrial land as being

- the need to find new mechanisms and partnerships from Government / Corporate / NGO's to deliver better sustainable development, and
- finding new ways of evaluating outcomes as well as outputs.

It is relatively easy to measure outputs (e.g. area of land restored) but harder to measure outcomes such as benefits to the local community. There are barriers to delivering sustainable development in the restoration of land, in particular:

- outdated forms of action that follow conventional thinking.
- ensuring that proper funding is available to pay for the utility of land restored to benefit.

As well as barriers, there are also enormous opportunities which should be kept in sight:

- a new integrated approach to the management of contaminated land that delivers an enduring sustainable development
- the realisation that sustainably managed contaminated land can be an opportunity not a liability
- to be able to endow our children with a world that is the better for our term of stewardship.

Markham Willows

At the former Markham Colliery, colliery spoil has been landscaped and grassed to provide a natural looking feature. However, experience shows that this approach often only provides a temporary solution and that weathering and erosion can lead to exposure and oxidation of chemicals in the spoil, killing the grass and destroying the cover to re-expose the spoil.

Trials on colliery spoil have shown that some tree species such as willows and poplars can thrive on colliery spoil that has been ameliorated with organic wastes. This revegetation makes use of the tree root system to combat erosion. Leaf litter helps in soil formation and this can be enhanced by the addition of suitable green waste materials. This stabilised soil layer creates a natural environment and prevents acidification of the spoil, while the root system increases the physical stability of the site and also reduces erosion. The combination of added organic matter, roots and enhanced biological activity in the soil can degrade or stabilise a variety of contaminants. These processes are called "phyto-stabilisation". In time a new soil horizon can be formed over the old site surface, enhancing the containment of any contamination in or on the old surface.

Short Rotation Coppicing (SRC) of willows and poplars is a modification of traditional coppicing, producing woody material, sustainably as a source of renewable energy. This activity also returns an income to the site and creates local jobs. SRC, along with the establishment of a mosaic of "natural" woodland and hedgerow, will create an attractive and permanent landscape feature that can also have amenity access for local people.

Using the components of phytostabilisation, waste recycling and green energy generation, we propose an exemplar project, Markham Willows, which will provide a model for the sustainable reclamation of coal spoil heaps and other contaminated land, with income for long term management of the site coming from the sale of heat (from wood) and gate fees for the composting of green wastes.

The local benefits that will arise from the development of the Markham Willows project are:

New Amenity - The reclaimed site will integrate amenity woodland, to be enjoyed for leisure, with the production of renewable energy from SRC. By using a mixture of woodland, hedgerows and retained grassland, both the visual amenity and fauna and flora will be enhanced.

Supporting Inward Investment - Markham Colliery is adjacent to the M1 motorway, and some areas there have considerable potential for commercial development. Improving their surroundings through this project will play an important part in attracting developers and tenants. Markham Willows may make the site of particular interest to environmental industries.

New Jobs / New Income - This project will generate income from the creation of a new local wood heat supply company that will supply heat to long term contract. The income and jobs created will be linked to long-term (10 year) heat supply contracts. Local jobs created will include: woodland management, amenity management and coppicing, wood fuel processing and wood heat commercialisation and on-going site management activities. The composting and re- use of green wastes on the site will also generate employment.

Green Waste Recycling - Composted green waste will be added to the soil periodically to sustain the regrowth of the coppiced trees. Waste management fees for ‘green waste’ processing can be redirected to Markham Willows composting activities, thus providing further income to the site.
Wood Heat - Woodland residues and wood from SRC will be processed into wood chips that are burnt in modern, efficient wood boilers. Customers will be sold heat as a service against a long-term supply contract. This enables a locally formed ‘wood heat supply company’ to offer ‘green’ heat for the price

of 'brown', without customers having to pay for boiler replacement. This approach is particularly suited to local customers with ageing coal-fired boilers, but local new commercial developments can also benefit.

Sustainability - This project will not only stabilise the coal spoil substrate on the Markham site, but will provide a renewable source of local fuel. This will result in less carbon dioxide emissions. It will help to counter climate change and demonstrate commitment to sustainable development and LA21. At the same time, the woodland will provide a habitat for native wildlife. The project will be a clear demonstration of Derbyshire County Council's commitment to sustainable development.
Education and Research - Projects of this type are essential to demonstrate the long term and sustainable reclamation of derelict environments. They open the way for research to develop a better understanding of the mechanisms involved. The project can also be used to provide inspiration and a practical field centre for technical training for the environmental management industries at schools, colleges and universities in the locality and region.

REGENTIF-network for regenerating old industrial facilities, José María Lazaro, LABEIN, Spain

REGENTIF, the network for regenerating old industrial facilities, is an EC funded project under the "Innovation and SMEs" Programme. Hundreds of obsolete facilities are part of the European landscape. These potentially polluted lands can pose risks of harm to European citizens' health and safety. The ending of industrial activity is a source of unemployment and social conflict, and de-industrialisation is a process that has not concluded yet.

Regenerating areas of de-industrialisation is a huge challenge for innovation all over Europe. It is a multi-faceted challenge including environmental, technical, social and economic components. The objectives of REGENTIF are to develop, validate and transfer a methodological framework to enhance innovative thinking in regenerating old industrial facilities. This framework is called the *Anticipatory Multidisciplinary Prospective* (AMP) approach. It encompasses following steps:

- identification of key factors and players
- define dynamics to identify patterns of solution and create future scenarios
- set procedures for industrial technology assessment
- set procedures for environmental assessment
- codify the knowledge based system.

The proposed AMP approach and the project work plan are set out in Figure 10. The project partners are: LABEIN, Spain; Neotek Nervion S.L., Spain; Agenzia Sviluppo Nord Milano, Italy; Institute for Dissemination and Promotion of Scientific Culture, Italy, Cracow University of Technology, Poland; Dura Vermeer Group, the Netherlands; and Malopolska Agency Development S.A., Poland.

The Regenetif network have identified the following barriers, challenges and opportunities for the management of brownfield sites. Technological issues include:

- finding reliable tools for the assessment and prediction of changes in the behaviour of soil and building components (time factor)
- developing innovative restoration, refurbishment and construction methodologies that minimise environmental, economical and social impacts for the whole life cycle of the soil/buildings.

Opportunities include environmental benefits such as the recovery of derelict industrial areas, the improvement of environmental quality, the provision of areas for new or existing industries and

services, saving "clean soil" for more sensitive uses and the minimisation of environmental impacts (biodiversity loss, ecosystem integrity, human health, etc.).

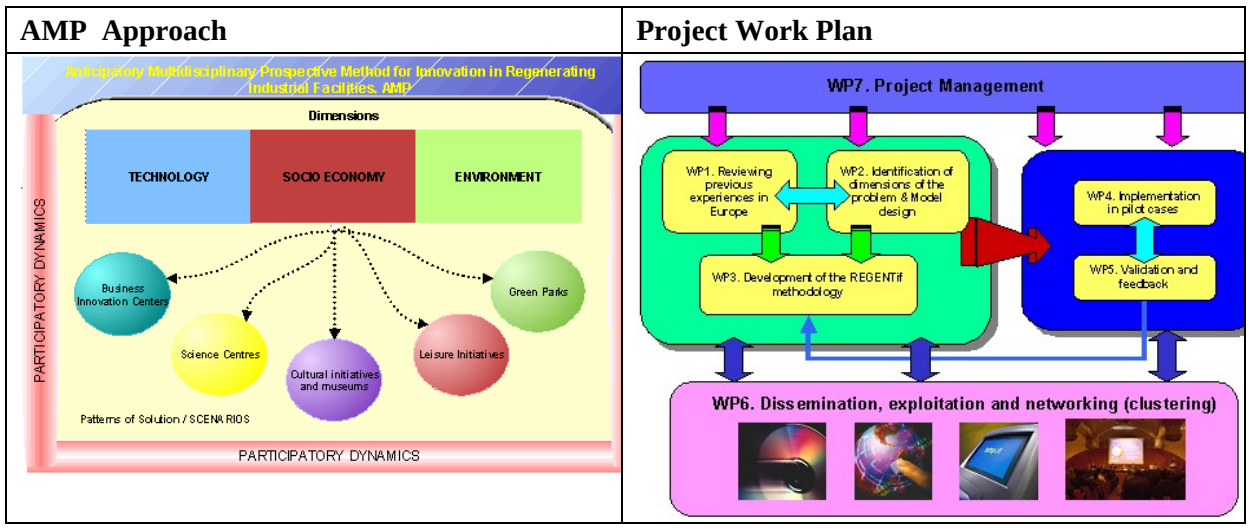

Figure 10 Regenetif AMP Approach and Project Work Plan

Brownfields restoration and management should be incorporated into a wider urban regeneration context. They should be considered in an integrated way with new construction activities and urban planning more generally. They offer new opportunities for job creation, reactivation of the economy, improvement of citizens' quality of life and health, improvement of citizens' leisure and the maintenance of cultural heritage.

Is Risk Based Land Management Sustainable? Joop Vegter, CLARINET

The concept of "Risk Based Land Management" (RBLM) originated in the CLARINET Concerted Action, to streamline discussions, analyses and recommendations about research and technology development needs in relation to contaminated land policies. As a result of these discussions the concept evolved into a general vision on developing contaminated land policies in EU countries. The common ground in these national policies is increasing with their stronger interaction with spatial planning and water protection and their longer time perspective of sustainable environmental management. Current contaminated land approaches focus on sustainable solutions, which will restore the usability and economic value of the land. These solutions can be characterised by three elements:

1. Suitability for use: achieved by reducing human health risks and ecological risks as necessary to permit the safe (re)use of the land. It is focussed on quality requirements of the land for uses and functions
2. Protection of the environment: for example preventing further spreading of pollution by surface water and groundwater. Environmental protection of soils as a resource may also lead to policies favouring redevelopment of brownfields over greenfields.
3. Long term care: sustainable solutions minimise the burden of aftercare. Endless pump and treat solutions or containment walls that require control and maintenance forever may be less desirable in view of the amount of aftercare required.

The RBLM approach provides a framework for the integration of two assessments:

1. The timetable for remediation: priority setting based on current risks or society's needs to change the use of contaminated land

2. The design of the solution: the best strategy to meet all requirements in a sustainable way, including environmental side effects, available space and facilities, local perceptions and other issues.

The three building blocks of the concept: Risk, Land and Management are defined as follows:

1. "Risk" describes the adverse environmental effects of contaminants (human health, ecosystem health, impact on aquatic environment and water resources and the socio-economic consequences of poor soil and groundwater quality)[7].
2. "Land" will be assumed to be a bounded area. The area could be a single industrial site, or it could be a region such as municipality. "Land" as such is managed (see below). The manager of land, for example, may be the owner or user of an industrial site or a municipal authority. The area involved may be large, possibly involving a number of current or planned land uses.
3. "Management" is a set of activities involving decisions about assessment, clean up, land-use restrictions and spatial planning in order to define the best solution strategy.

The risk based land manager has to address the following main requirements in order to assure the sustainability of the solution for a contaminated land problem:

- risk reduction requirements
- land use related requirements
- spatial planning requirements
- management requirements

More requirements and issues are discussed in the CLARINET overview report, which is available from www.clarinet.at.

CLARINET, the Contaminated Land Rehabilitation Network For Environmental Technologies in Europe, was a "Concerted Action" of the European Commission's Environment and Climate Research and Development Programme. The project ran from 1998 to 2002. Its primary objectives were to develop technical recommendations for sound decision making on the rehabilitation of contaminated sites in Europe and to identify research and development needs, in particular in relation to the recent EC Fifth Framework Programme (FW5 - which deals with research). CLARINET has been a successful EC project that has drawn on scientists and other experts from 16 countries in Europe to advance the state of the art in contaminated land management. Further information is available from www.clarinet.at.

Risk reduction: risk is generally considered as the result of a process where some potential hazard (a toxic substance or other agent) could lead to an adverse effect in the "receptor" (people, animals and plants, ecosystem processes, water resources and buildings). For this process to operate there must be a connection (a pathway) between the potential hazard (the source) and target for protection (the receptor). So theoretically risk reduction may be achieved by removing the source, breaking the pathway and/or by removing the receptors.

Landuse: different land uses have different needs. For example, some landuses require direct access to the soil, preventing the use of containment measures like capping with concrete or asphalt. Others may require the preparation of the site for geotechnical purposes, e.g. to support foundations

[7] The definition of risk used in this document is a general and policy oriented umbrella term for the actual and potential adverse effects of contaminated land. A formal probabilistic definition of risk is "the probability that a given adverse effect will occur". This definition may be applied to some human health effects of contaminated land, but other effects are not probabilities, they are actually occurring. In that case the term 'damage' would be more appropriate.

Spatial planning: whether land use will be allowed to change may be incorporated in spatial planning, which may then contain specific requirements for the number of potential uses the site should be treated for. Spatial planning should also address the subsoil, especially in view of groundwater and surface water. If a landuse change is considered, the consequences for the geohydrology and the behaviour of contaminants that may be present must be properly assessed.

Management: in addition to the requirements mentioned above there might be other important management issues like funding mechanisms and communication with stakeholders and the general public which may affect the choice of certain solutions over others. The manager will also have to deal with "values" which can hardly be expressed in terms of risk or utilitarian concepts like landuse of function. The conservation of pristine underground environment, and geological and archaeological values are examples of this. Moreover, legal constraints may prohibit some treatment and risk management solutions. There is also the question, how the decision making process is organised. Will it be a dynamic and open decision making process, involving all interest groups or can a standard flow chart protocol or mandatory decision support system be applied by a single decision-maker?

RBLM solutions for contaminated land problems.

In practice, optimal solutions based on RBLM are likely to involve a mixture of approaches. An interesting possibility is to combine a fast acting temporary measure with a longer term extensive treatment to provide an optimal balance of risk management, maximising wider environmental merit and limiting costs. Moreover, the soil itself has some interesting characteristics, which may help in reducing the risk. Soil has a natural capacity to act as a barrier, which can be used in containment approaches and it has a natural capacity to biodegrade substances. If these natural capacities can be used the costs of solutions will decrease. The use of the natural capacities of soils in remediation or contaminated land management solutions need to be further explored both from a scientific and a regulatory point of view, in order to meet the general sustainability requirements of soil protection.

Is RBLM sustainable?

RBLM is designed to lead to sustainability because it has the possibility to lead to solutions which are acceptable from an environmental, social and economic point of view. Elements like 'protection of the environment' and 'Long term care' main prevent the shifting of contaminated land problems to elsewhere or to the future as a solution. However the sustainability in practice will also be dependent on the "sustainability" of the land manager. Regulatory culture has to change into a management culture. Authorities will need new skills to make complex decisions and to evaluate decisions by other responsible parties. Risk based land managers must be aware of proven technologies but also provide opportunities for innovative approaches. It is obvious that this should be accompanied by appropriate RTD programmes. It is the combination of research, policy and practice that will turn the RBLM concept into a sustainable strategy.

Management of Contaminated Land – towards a sustainable future: The case of the Region North-Pas de Calais (France) Cécile Baudelet-Leclaire, Nord-Pas de Calais Regional Council

The North/Pas-de-Calais is a Region with two centuries of industrial history. Following several waves of deindustrialisation (1960-1970), the region has been left with a heavy legacy of brownfield land. Half of the French area of derelict land is located in the North/Pas-de-Calais Region, where 600 sites have been officially recognised as polluted. An inventory completed in December 2002 has identified 14,000 old industrial sites (this does not mean that these sites are contaminated. Only further investigations could provide such information, if needed). The majority of sites are located in the middle of the main cities of the region, whilst the biggest sites (primarily connected with the mining, iron and steel past of the region) are mostly around cities, in general along rivers and canals.

The French legislative and regulatory framework for contaminated land management is primarily a risk based approach, based on:

- A principle of responsibility: the "polluter pays" principle, implemented through legislation for regulated facilities (the remediation of the site is the responsibility of the last operator, or failing this, of the holder of the site even if he did not contribute to pollution).
- A remediation level determined by the future use of the site.

The French Regional authorities have competence for country planning and economic development. However they have no regulatory nor tax power to manage all the pollutions inherited from the industrial past. Therefore, dealing with the historical industrial pollution requires a national approach which is in the scope of the State.

This framework causes difficulties for the management of the polluted sites. There are a significant number of polluted sites where the polluter pays principle is not effective owing to the insolvency of the polluter. In this situation, a State substitution mechanism applies but only in the event of serious risk for the health and the environment; failing this, if the remediation is not financially viable, there is no investment for site rehabilitation. The consequence of this in Nord pas de Calais is an "urban land frost" for transaction or development. There is no re-use of the site for economic activity, resulting in a deteriorated image for a territory with major derelict sites. A number of sites have been purchased by local authorities in ignorance of the pollution risks ("innocent" owner) who are then unable to deal with the remediation costs. Furthermore, it is difficult for the local authorities to have a preventive role as they have no supervisory powers on the polluting activities on their territory. Where remediation takes place suitable for industrial re-use this limits the scope of urban renewal policies, which might involve a change in the land-use requiring a higher level of remediation) are weakened. There are no contractual mechanisms in place yet to negotiate the distribution of these additional remediation costs.

In addition, there are technical and financial difficulties:

- The cost of classic remediation techniques ;
- The lack of relevant technical answers for manage large sites which are moderately but not heavily polluted ;
- Regional operators, able to address all the problems of soil pollution, are not sufficiently developed and structured ;
- It is difficult to assess and compensate the social and environmental costs of pollution (i.e. determining the real impact on the public health, on the quality of life, on the social exclusion which tends to concentrate on the degraded areas, on the biodiversity and on the quality of the natural resources: water, air, soil)
- National policy relating to the polluted soils is mainly based on knowledge and research & development, but does not provide subsidies for remediation (except for some "orphan" sites).

Over the last two decades the North - Pas de Calais Region has implemented a voluntary policy to try and achieve sustainable management of the land. This encompasses:

- "Surface cleaning" of half of its stock of derelict areas ;
- Regional subsidies to develop the use of soil pollution diagnosis ;
- Regional subsidies to develop the knowledge on industrial sites (an inventory of all industrial sites has been launched by the Ministry of Environment and has been carried out in the North-Pas de Calais until the end of 2002) ;
- Support to multidisciplinary research programmes addressing polluted sites problems ;
- Support to develop the "skills" and engineering of the local authorities and local NGOs facing serious pollution problems ;
- Setting up of bodies with specific expertise on polluted soils .

The view of Nord-Pas de Calais Regional Council is that sustainable management of polluted land means:

- Combining risk based making with spatial (urban and rural) planning;
- Adapting the re-use to the quality of the site ;
- Tackling public health problems and also the other social impacts of pollution (living environment, attractiveness of a territory...) ;
- Encouraging urban renewal through the support given to suitable recycling of polluted urban soils ,
- Encouraging the economic recycling of the polluted sites (which limits urban sprawling and contributes to land saving) ;
- Giving a “vocation” to large areas which are partially or fairly polluted, (the Region wishes to incorporate certain sites into its “green regional plan". This would imply a close monitoring of any residual pollution and study of its ecotoxicological impact) ;
- Preserving water resources (97% of potable water comes from groundwater sources in the area)

3 Discussion Sessions

The Barcelona workshop included a series of discussion sessions and syndicate work groups. The purpose of these was to identify opportunities, challenges and barriers for the sustainable management of industrially contaminated land, and subsequently the ways in which NICOLE could contribute towards stimulating sustainable development in the contaminated land management. The starting point for discussions was NICOLE’s general objectives, which are to:

- enable European industry to identify, assess and manage industrially contaminated land efficiently, cost-effectively, and within a framework of sustainability
- provide a forum for dissemination and exchange of practical and scientific knowledge;
- stimulate collaborative research and knowledge transfer; and
- develop new relationships and strengthen existing relationships with other networks.

The activities of the workshop were therefore to: develop *opportunities*, explore *challenges* and break down *barriers*. The issues that discussions were expected to cover were:

- the constitution and range of members in NICOLE, the development of its interaction with other stakeholders and networking organisations,
- the geographical spread of its activities and
- the technical coverage of its activities, for example the possibility of broadening its scope to include related disciplines such as planning, economics, social science.

Also to be considered were the overall functions of NICOLE (without compromising its role as a forum for information and knowledge exchange rather than a lobby organisation and the promotion of NICOLE. On the basis of the workshops discussions the NICOLE Steering Group will suggest a time-tabled and prioritised action plan.

Discussions began with delegates breaking into small groups to identify general issues and thoughts relevant to the stimulation of more sustainable approaches to contaminated land management. The meeting then reconvened as a whole and prioritised these suggestions in order of their perceived importance to NICOLE on the basis of simple voting. The suggestions received and the votes “cast” are summarised in Table 4. The key themes emerging from the day’s activities were summarised by two rapporteurs (Terry Walden, BP and Wouter Gevaarts, Arcadis) as follows.

1. Sustainable development requires consideration of wider issues, i.e.
   - people or social aspects
   - planet or environmental aspects
   - profit or economic aspects

2. An initial suggestion appeared to be that NICOLE may need to move away from being strictly technical organisation.

3. Stewardship of land should be overarching goal of sustainability. Prevention of contamination should be a key consideration in the planning, development and operations of new industrial or other facilities. Land should be managed as a resource and it must be borne in mind that future generations are affected by decisions made today.

4. Legislation plays a controlling role in contaminated land management and enabling brownfield redevelopment, both in terms of regulating environmental impacts and facilitating activities. In some regions the necessary legislation is not fully advanced. However, legislation can be barrier to sustainability, particularly where regulations for different media are not compatible, as illustrated by Steve Wallace's paper.

5. A risk-based approach to contaminated land management is seen as broadly sustainable but requires training of stakeholders, for example to ensure an adequate understanding of risks are / are not posed by residual contamination, inclusion of subsoil conditions in spatial planning and to ensure continued aftercare (the alternative to this is adoption of the multi-functional approach) and that sustainable contaminated land management requires a holistic approach to problem solving.

The conclusions of the rapporteurs were developed by further syndicate discussions. These discussions were held in small groups around a central "forum" where delegates could move from discussion to discussion. Each discussion was centred on a specific statement written on the basis of the previous days discussions (summarised in Table 4). These statements were expanded and delegates were again able to vote on their significance for NICOLE on the basis of coloured stickers: green (G) – proceed, red (R) "I disagree", yellow (Y) – possibly but needs more discussion. These statements, their development and the voting upon them are listed in Annex 1[8].

These suggestions and discussions were NICOLE were then scrutinised and summarised by three parallel working groups:

- members of the Industry Subgroup (ISG), rapporteur: Terry Walden, BP.
- members of the Service Providers Subgroup (SPG), rapporteur: Wouter Gevaarts, Arcadis.
- "other" delegates present, e.g. regulators, academics, research funders, rapporteur: Victor Dries, OVAM.

[8] Annex 2 lists the Barcelona meeting delegates.

Figure 11 Location of 14,000 old industrial sites (December 2002 inventory)

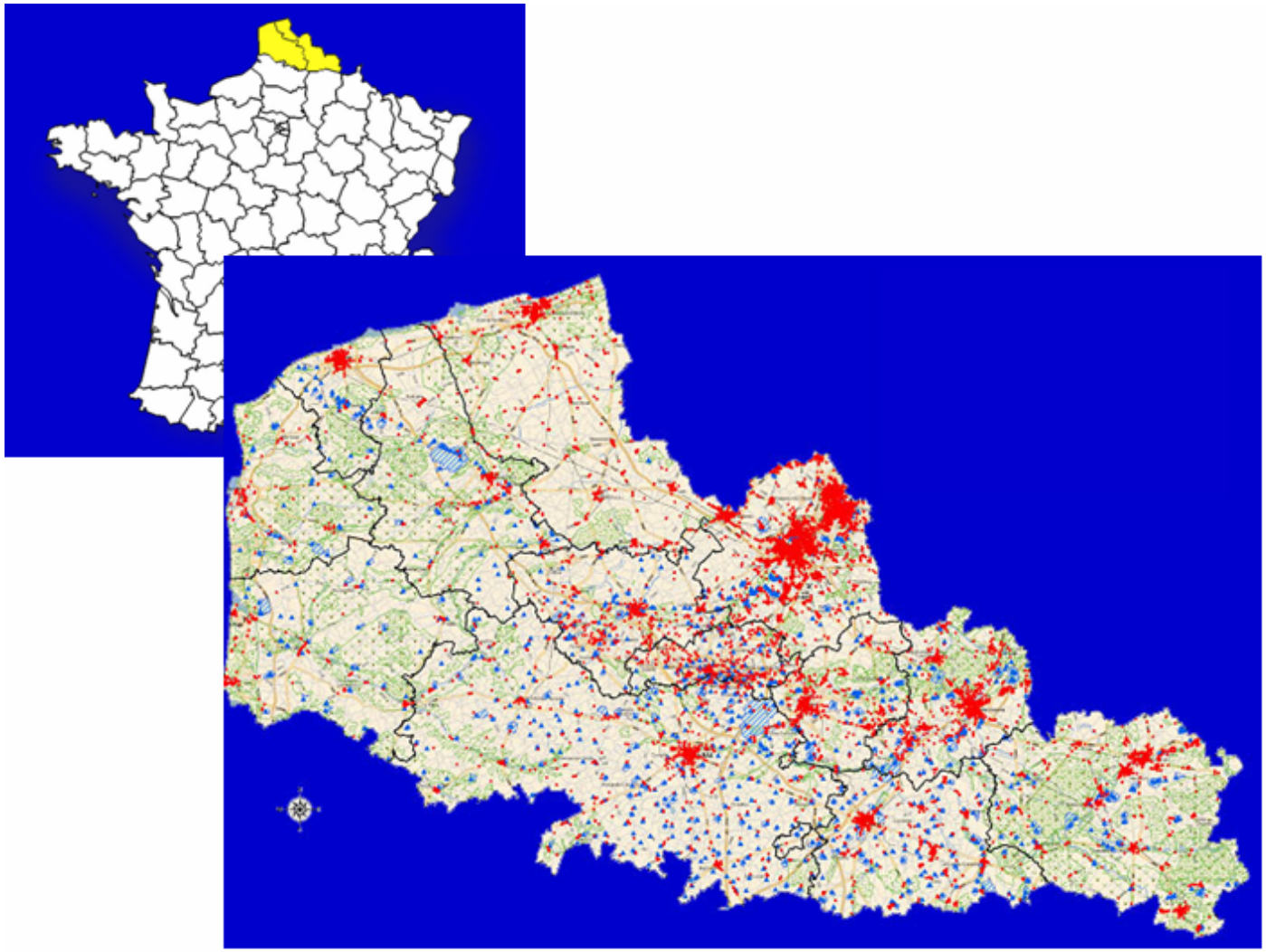

Table 4 Discussion Group Suggestions for Sustainable Land Management in General, and Voting

Score	Issue
26	Prevention is better than cure. Measures are necessary to prevent future brownfields.
25	The industry needs SEE[9] tools or measurements in order to be able to demonstrate sustainability. problems need to be prioritised.
22	Transparency in decision-making is vital and must encompass the views of all relevant stakeholders.
21	Soil is not seen as a resource hence loss of its multi-functional capacity is undervalued.
20	Education in and developing awareness of the technical aspects of contaminated land are important to develop the quality of decision-making.
18	There should be a stronger linkage of spatial and environmental themes in planning (also see below), Spatial planning should also be a clearer part of site management and *vice versa*. Perhaps businesses should have a stronger willingness to use brownfields.
16	A managed approach to the re-use of contaminated sites might encompass: - anticipating land use requirements - an inventory of barriers to re-use - an inventory of opportunities to re-use - incentives (tax reductions, educations) - increased knowledge of spatial planning

[9] Social, economic, environmental

	Is it possible to link short term actions for a site to a longer term vision.
	Brownfields development is paramount and requires more sustainable spatial planning. NICOLE can play a role in the development of more sustainable spatial planning and should develop better interaction with the land planning community.
	The ultimate "sustainable" solution is multi-functional use (based on risk assessment).
	A pan-European legal framework and industry policy for land management would be useful.
	Better measures need to be available to encourage the remediation of brownfield sites where the case for redevelopment is marginal (or worse) from an economic standpoint.
	Selection of remedial options for particular sites should include consideration of indicators of sustainability in a cost-benefit context.
	Not much consideration is given to the management of land as a resource, including over the long term.
	Another view of sustainability is balancing "people planet profit". What tools should we use to assess this and who should do the balancing?
	Non-technology issues (e.g. social aspects) should form part of the decision making process.
	NICOLE needs managed interfaces with other networks, and needs to understand which relationships are necessary.
	It may be useful to develop systems of monitoring the commercial value of sites.
	There needs to be harmonisation of legislation across sectors (e.g. waste/land management) to achieve sustainability, which may be hindered by current differences in legislative approaches across sectors.
	There should be continuity in the use of land.
	Perhaps a perspective based on 'production processes' can be applied to remediation, looking at treated land as a product at the end of a supply chain staring from brownfield land. With this model in mind, envisage that a greater efficiency in "production" might be achieved by seeking partnerships across the supply chain, having a common view of the "product" and a common language for describing the "production process"

	Is Brundlandt wrong? We do not believe that economic growth is compatible with wise stewardship.
	The use of LCA as an appraisal tool for remediation options is flawed as (a) results are dependent on the boundaries used (b) LCA does not consider all issues relevant to land management, e.g. conservation of buildings, landscape, biodiversity. Life cycle based tools face technical and public scepticism.
	Supplier customer relationships have a major impact on remediation. The current climate if low margins may have a detrimental effect on quality. Quality certification schemes may assist the development of a higher quality market.
	There is a cycle of brownfield land: old sites are converted to sites in use, which can then become new brownfield sites. A driver for this process can be the regulation of site use, which implies that there may be an opportunity cost for regulations.
	Environmental merit as a consideration should be accompanied by considerations of “social merit”.
	Whether remediation projects are more amendable to public or private funding is dependent on the likely project duration.
	Should the scope of NICOLE be evidenced from sustainable land management to sustainable resource management.
	There should be a sustainable approach to land management: SEE
	Sustainable contaminated land management needs to be more clearly defined.
	Is too much monitoring unsustainable?

ISG Conclusions

There was a general consensus that NICOLE should remain a technical network concerned with the assessment and remediation of industrially contaminated land in Europe. Diversification into other land management disciplines and into non technical areas, outside of members competences, was seen by many as a dilution, outside NICOLE's core business and not a good fit with the existing membership. However, there was a clear evidence and recognition that NICOLE needs to communicate more actively and effectively with other professions and organisations working in contaminated land management. Suggestions for achieving this included NICOLE members attending other events such as the Common Forum meetings. However, a difficulty with this type of activity is that members of NICOLE have “day jobs” and do not always have the time or the willingness to go to extra meetings. A first step would be for NICOLE to make an inventory of relevant organisations, networks and other groupings for which contact can be prioritized. Other ideas such as "open days" where NICOLE can display its wares to other groups were also put forward.

Some members thought that the membership of NICOLE should be widened to include non-European members and other groupings such as developers, the City Network, planners, architects etc.. However, there was not unanimous agreement about this.

Many members think that NICOLE should have more influence in the development of legislation and there are a number who think we should go beyond simply informing on technical matters, for example lobbying policy development. Equally there are others who completely disagree with NICOLE becoming a lobby group. However, participation on workgroups influencing the technical work of the Commission is not necessarily “lobbying”.

The Barcelona workshop was seen as a success in that it has helped NICOLE plan for its activities over the next few years. Relatively few presentations explicitly focussed on sustainable development and some aspects seemed to slip off the agenda as the workshop progressed. One possibility for capturing this missed information is for NICOLE to set out a position paper on the subject of managing industrially contaminated land within a sustainable development framework. Another is for NICOLE to circulate a follow-up questionnaire to members more widely to solicit their views.

There is increasing participation in NICOLE meetings including a broader set of attendees, and topics that reflect a wider set of issues, than purely technical meetings on for instance site characterisation. The broad interest in more diverse issues like sustainable development seems appropriate, although NICOLE has yet is to systematically identify exactly which areas it wishes to cover and which outcomes it wishes to achieve.

Lastly, NICOLE should discuss and assimilate the outcomes of the considerable research funded by the Commission. It needs to determine what these projects and networks mean for its membership and find ways to circulate key findings and debating them in an open forum.

SPG Conclusions

NICOLE needs to consider a wider range of activities. However, NICOLE can never be a federation of companies. It has to remain a network. The main goal of a network is the exchange of knowledge and information; therefore NICOLE’s organisational structure needs to be very flat and open, with all members equal. A federation has to defend points of view; that is why its structure is much more hierarchical. The SPG believes that the exchange of knowledge in a federation would not be as good as that in a network.

Over the next two to four years, the SPG wants NICOLE to have an outstanding reputation as a centre of excellence for the sustainable management of industrially contaminated land (both for operating and legacy sites). In this way NICOLE will be respected by the EU, regional authorities, as a valuable discussion partner. This will give NICOLE the opportunity to disseminate its technical views about contaminated land management into the decision making organisations and/or the lobbying organisations. NICOLE should not be a lobby organisation itself. Neither should NICOLE be some kind of an umbrella network above other networks. On the contrary NICOLE needs to be a peer of the other networks (e.g. Common Forum, CABERNET, Sednet) and interact with them on that basis. The best starting point for this would be for NICOLE to collate an inventory of the other networks and their interests.

Interactions can be enhanced by co-operating on joint workshops with an exchange of ideas without any obligations. The nature of contacts with other networks will vary in relation to the discussions taking place in NICOLE, however, developing closer contacts with spatial planning interests seems worthwhile.

NICOLE ought to set out its position and its definitions of terms such as “sustainable land management” and “land quality”. It may be appropriate for NICOLE to work with terms such as “land quality” rather than in state of “contaminated land”, as the former term is broader and encompasses sustainability, it also has a positive connotation and indicates a positive direction: away from contaminated land to “cleaner” land.

NICOLE provides a forum for SPG members to share and advance their knowledge to the benefit of all and for service providers to interact more closely in a non contractual / non competitive environment to advance the quality of land management overall, create new ideas, and develop partnerships the implement those ideas.

“Other” Delegates’ Conclusions

The critical point for dealing with contaminated land in a sustainable way is that land is a resource. The Public are concerned about the rate of land consumption in Europe, and of course land consumption is indicator for sustainable development (or its lack). Conversely, land re-use, or brownfield regeneration is generally a positive indicator for sustainable development. The “other delegates” suggested that NICOLE should make its network wider; for example inviting input from waste processors, local aothorities and, spatial planners. NICOLE should develop and expand its technical base to become more influential *and* to provide other stakeholder interests an expert forum. NICOLE could relatively easily provide case studies for land management of use to a wide range of stakeholders, and its workshops could make greater use of demonstration projects and case studies to stimulate discussions between different stakeholder groupings. An emerging concern that NICOLE might also consider are the problems of managing water resources and dealing with agricultural dereliction and contamination, i.e. NICOLE could include an agro-industry component, which would also provide match current DG Environment soil policy and DG Research soil R&D interests.

4 Conclusions

These conclusions have been drawn from comments invited from NICOLE Steering Group members, the meeting organisers and speakers in the fortnight following the workshop.

The fundamental point is of course that land is a limited resource.

The meanings ascribed to terms such as “sustainable” or “sustainable development” vary widely. There is clearly not (yet) a common language for discussing contaminated land management in the

context of sustainable development. It would be both a major challenge, and also a major achievement, for NICOLE to catalyse the development of a common framework, widely used across Europe in the same way that risk based decision making has become used.

Distinguishing land that is still being actively used for processes from land that has moved to a post-industrial phase may be useful because the funding, stakeholders, beneficiaries will all to some extent be different. Discriminating between the phases also eliminates confusion about who will/should provide funding for managing the land, what sustainable management means and who should be the problem holders and problem solvers.

Without clear definitions everybody can claim that they are acting sustainably when sometimes perhaps they are not. There were some differences in point of view between NGOs and businesses, with NGO delegates tending to equate sustainable development less strongly with sustainable business management.

The most important single outcome was the acceptance that NICOLE needs both to take a broader view in its discussions and to engage with a wider audience. In particular a strong synergy was seen between NICOLE's interests and spatial planning. This broader view, in conjunction with some degree of clarity on the phases of land under consideration, should move the agenda forward for sustainable land management both for land which is still in commercial use or is to be returned to commercial use, and post-industrial land such as that in the former mining region of Nord pas de Calais.

NICOLE's next steps are to establish the concrete needs of stakeholders for sustainable contaminated land management, perhaps using case studies to facilitate this process.

Annex 1: Barcelona Meeting Statements, their Development and the Voting on them

Statement The main asset of NICOLE is connecting people and processing information on several aspects of sustainable land management. "Mapping" people and information should be a continuous activity. This could be achieved by:

Support 16G, 2Y, 1R

Input Support the knowledge network with an information system – connect people with similar interests and questions. Interact with other stakeholders, in particular spatial planners, regulators, policy advisors. Invite other industries to NICOLE. Make an inventory of important interfaces.

Statement Demonstrating successes and failures of case studies is an effective way to exchange information and to achieve a group learning process. By choosing appropriate case studies NICOLE could set the agenda, to begin with Nord Pas de Calais.

Support 15G, 13Y, 5R – different aspects.

Input
1) NICOLE to develop a standard format and 'content' headings to secure relevance to stakeholder interests.
2) NICOLE to establish an appropriate 'peer review' process.
3) NICOLE to
   a) accept offered papers subject to the above (reactive)
   b) Call for case studies in particular special interest areas ("pro-active") e.g. Nord pas de Calais.
4) The case study process should support NICOLE'S existence.

Comment All statements are positive from the responsible environmental point of view. Hence it is hard to prioritise without a specific goal for NICOLE as an organisation, as a network, we should avoid setting specific goals on specific topics in order to avoid conversion to a federation.

Statement Stewardship of land is essential for sustainable waste management, land is a resource and not a consumable. NICOLE should do the following to underline this.

Support 18G, 3Y

Input Prevention is a primary aim, and this should be linked to spatial and land planning considering geology/hydrogeology as well as zoning.
As regards prevention, soil is an asset and should be handed back in no worse a condition than it was received.

Statement Sustainable land management should aid the spatial planning process. NICOLE could work on this by:

Support 18G, 7Y, 4R

Input Network with spatial planners and local authorities, promote brownfield re-use. Perhaps a new subgroup in NICOLE could facilitate communication with these stakeholders and at an EC level. develop tools for decision making criteria for spatial planning, including for the subsurface. Link with other brownfield stakeholders e.g. lawyers economists, urban architects etc.

Statement NICOLE is effective because it has a clear focus on the technical aspects of remediation and risk management and should continue this way (a network on everything cannot be effective).

Support 13G, 6Y, 4R

Input NICOLE's original mission was just a beginning and NICOLE should now widen its interest to include: policy, legislation and communication.

The term should be 'sustainable resource management'.

Statement:
NICOLE should focus on the exchange of conceptual models for remediation, risk management and sustainable land management. That is what is most needed in a divers Europe. The models could be developed by …

Reaction:
- The models are already available. We do however require generic examples based on experiences (archetypes) -> 12 green, 5 red
- Dissemination of available knowledge -> 1 green, 1 yellow

Statement:
Legislation plays a key role in sustainable land management. NICOLE could facilitate education/communication to make people aware of the importance of legislation by…

1) guide

2) help small industries (2 green)
3) provide tools – authority
4) involvement in decision processes helps authorities
5) lawyers
6) case studies
7) comparison of legislation between countries

9 green

Risk based land management requires awareness of professional advisors

NICOLE could work on:
- long human efforts (5 red, 1 yellow, 2 green)
- mixture effort
- communicative EU
- information to stakeholders
- risk assessment (1 yellow)
- more statements

NICOLE needs to be in dialogue with more stakeholders, such as:
1) architects
2) partners
3) lawyers
4) politicians
5) legislation

Manage dialogue through managed interfaces

26 green – 1 red – 1 yellow

Statement:
NICOLE should build on reputation as useful industrial and service providers & academic network for whole Europe (or EU and accession countries). This could be done by….
(4 yellow, 1 red, 1 green)

Reaction:
Making clear what advantage is for industrial and SP-companies to be in NICOLE
How: - informing by EU legislation
- to come
- invitation Quevauviller
- invite Common Forum

addressing other fields of industry (they all own land) -> 1 green, 1 yellow
painting out advantages for SME, not only global players (1 green)
members should sell NICOLE at every opportunity
make NICOLE known via the different industrial lobby organisations
growing attractiveness by presenting the results of all network outcomes (e.g. Cabernet) and research projects (WELCOME, PURE) to prevent from all the nice results in the archive - > link to tools
combine it with success stories / studies (link to case studies)

6 green

and not by:

- inviting too many stakeholders from other disciplines, as members not to lose our point of view
- well learning from them
- no merging with Common Forum

Statement:
NICOLE needs a wider perspective than the technical and risk related issues of contaminated land. E.g. ……

Reactions:

- economic issues
- sustainable res. Management, incl. Soil and groundwater
- social issues
- spatial planning
- NICOLE looks to the future
- Ecological impact
- Development conc. Strat. On long term
- Translate technological knowledge into management concepts and v.v.
- Contract with children, don't just look at what grond dad did, match needs to research
- sustainable resource

Management includes soil + groundwater

- economic issues
- social issues
- ecological issues

NICOLE must look to the future, must develop concepts, strategies, long term

Translate technical knowledge to management concepts
Translate management needs to technical questions
Find solutions and translate
Match needs -> resources

40 green, 1 orange

Consensus: take a long term vision to identify our strategy but then focus on deliverables to address medium term issues, e.g. identify dynamics of land use change within industry, ensure remediation strategies are aligned

7 green

Suggestion: combine tools with far reaching vision

NICOLE should focus on tools for SLM and cess on for reaching visions.

Most important tools are….

Premise: any tool must first be developed in collaboration, not isolation

1) environmental indicators (risk models etc.)
2) fin. Incentivization tool
3) remediation toolbox
4) indicators that look at broader aspects of sustainability
5) workshops on pollution prevention

15 green, 5 orange, 2 yellow

Annex 2 List of Participants

José	Abascal	Covitecma, SA	Spain
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