Expected impacts

This Demonstration project aims to bridge the gap between research and market, by contributing knowledge to verify the viability of a new solution that will facilitate the direct commercialisation of the research results. The business objective of the MICCS-DEMO project is to **strengthen the competitiveness of the SMEs in the consortium** drastically by demonstrating that the MICCS technology is superior to existing investigation methodologies of contaminated sites, considering both cost efficiency and performance. Given that the MICCS System will ensure significant time savings and at the same time drastically improve accuracy and the amount of data for decision making compared with conventional methods, it will equally **improve the competitiveness of SME end-users** within the soil investigation and remediation industry. The following sections will pursue and quantify positive effects for, first, the SME consortium, then the end-users, before finally looking at broader Community societal impact.

MICCS-DEMO Unique Selling Propositions:
- In-situ soil investigation, a time saving which exceeds 30% compared with conventional soil investigation methods.
- Reduced investigation cost of at least 20% compared with current available techniques.
- Online measurement data and increased data for analysis providing significant benefits towards decision making.

Background and market potential

In order to arrive at conclusions about impact and market opportunity, some background of the addressed problem and market for the final MICCS system is provided below. The analysis here is based on a full update and revision of market studies done for the original MICCS proposal, with the analysis documenting an overall market potential for MICCS-DEMO and anticipated commercial impact for the SMEs at a similar, although adjusted, level as previously.

Soil contamination has not always been a high priority of the EU Member States. Previously, the focus was on water, air and waste management, where problems caused by pollution can be seen as more imminent than those from soil pollution. Following the positive effects of legislative initiatives on water, air and waste management, political focus has now shifted more towards soil degradation. This shift is highly needed, 250,000 sites[1] are currently identified as contaminated and this number is expected to grow. The European Environment Agency (EEA) has estimated that at least 1.2 million contaminated sites exist in Europe, and potentially polluting activities are estimated to have occurred at nearly 3 million sites where comprehensive investigation is needed to establish whether remediation is required. If current investigation trends continue, the number of sites needing remediation will increase by 50% by 2025[2]. During the last thirty years, only 80,000 sites have been remediated. With the current speed, it would take over 90 years just to remediate the 250,000 sites that are currently identified as contaminated. Based on the goal stated in the EU Soil Framework Directive (article 11) alone, of preparing national inventories within a 25 year frame, at least 40,000 sites need to be investigated each year to reach the objective. The average cost for investigating sites is in the range of € 500 - € 50,000[3]. Therefore; a **MICCS system that can shorten the time used with more than 30% on site investigation through advanced on-site investigation** will save significant amount of resources corresponding to a total **cost reduction of at least 20%**[4]. This huge amount of released resources can be used for more investigations and remediation.

The expenses used by Member States on remediation and investigation vary, but it is estimated that an average of € 12 per capita in the EU is spent each year. This correspond to approximately € 6 billion[5] annually and based on the estimate that roughly 40%[6] of the budgets for soil and water contamination are used for investigations, the **cost is € 2.4 billion annually for soil investigation in the EU**. More importantly we also need the new method to improve our basis for foundation for decisions on whether to employ remediation or not, as well as to help us to find the most effective remediation techniques for a given site. Approaches and technologies to site contamination are required on a site-by-site basis, as determined through site characterization and assessment. It requires skill and expertise to be able to select and/or design the right clean-up approach. An appropriate site investigation not only highlights problems, it also acts as a guide to the remediation solution[7]. The experience from DGE shows that **in up to 70% of the investigation cases the data foundation for decision making is not sufficient**. This implies that there is high possibility of making a wrong decision. DGE estimates that **a wrong conclusion is reached in up**

[1] European Environment Agency (EEA)
[2] European Environment Agency (EEA)
[3] COM 2006; EEA 2007
[4] Based on DGE figures (based on more than 2,000 investigations carried out in Denmark, Sweden and the Baltic States) and the EEA average cost figures.
[5] Eurostat 2011
[6] It is difficult to distinguish between cost for remediation and cost for investigation, firstly because the member states measures this differently and secondly because soil investigation take place several times throughout the process, including as part of the remediation process itself. This is why we have chosen to show the market potential as an estimation based on the ratio between investigation and remediation.
[7] Vik, E.A, P. Bardos, J. Brogan, D. Edwards, F. Gondi, T. Henrysson, B.K. Jensen, C. Jorge, C. Mariotti, P. Nathanail and N Papassiopi (2001): *"Towards a Framework for Selecting Remediation Technologies for Contaminated Sites"*.CLARINET Working Group 7.

to 5% of the cases, implying extra costs for rectification when it later is identified that pollution was present. More importantly, this brings the environment and public health at danger, especially if left unaware of the hazard.

Compared with current SOA, the MICCS system will reduce investigation time with more than 30% and enhance the decision foundation for a remediation strategy by delivering reliable measurement results in real-time. The market for the new system is significant. Based on the assumption that all equipment produced and sold will be used 4 hours a day in 200 days of the year - and given that a traditional investigation processing time of 66 man-hours per average site[8] - the **world market potential is 4,600 MICCS units** if 80,000 sites are investigated yearly (40,000 in EU and, conservatively, 40,000 in the rest of the world) Marked data from Environmental Industries (2005) even suggest, that this is a conservative estimate. Based on the estimated price for MICCS, € 110,000 and the potential units (4,600) **the potential European market for MICCS is € 253 million annually, with the estimated global market twice as large at € 506 million.**

Project contribution to European and SME consortium competitiveness

The final MICCS product can be characterised as falling into the newly defined **eco-industry** which embraces a term covering a wide range of activities that relate to the **measurement**, prevention or **minimisation**, and **correction of environmental damage**. The eco-industry is a key contributor to the Europe 2020 strategy for smart, sustainable and inclusive growth. It covers activities ranging from equipment and services for pollution and waste management to the development and provision of better technologies. The European eco-industry has grown to be one of Europe's biggest and most important industrial sectors, employing more than four million people (2008)[9] and **is mainly made up by specialized SMEs**. The market size is estimated and measured by the turnover which is equal to the total EU environmental protection expenditures, EPE[10]. In 2004 the EU eco-industry had a turnover of €232 billion (2.2% of GDP) and €319 billion (including recycling) (2.5% of GDP) in 2008, corresponding to compound annual growth rate in nominal terms of 8.3%[11]. The 'sub-segment', soil and groundwater, accounted for approximately 6.3 billion in 2008.

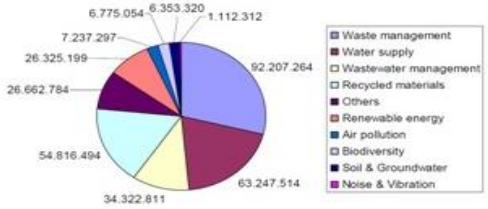

Fig 1: Sizes of the various sub-sectors within the eco-industry

Europe is leading the way globally in exploiting technological and economic opportunities in the eco-industry. Europe is ahead in recycling with a 50% market share, water supply with 30% and renewable energy with 40%. However, Europe is lagging behind in certain areas where especially USA and Japan concentrate on hardware development and eco-design, enabling them to take the lead in hybrid cars, cradle-to-cradle approach and eco-design[12]. The global competition is expected to increase and within the 'sub-segment', soil and groundwater; the MICCS-DEMO consortium sees major competitors from USA in particular. Compared with other regions of the world, the EU has enforced a stricter legislation on soil contamination, which is reflected in the strong focus in the region on improving contaminated sites. Therefore, the potential market for soil investigation and remediation technologies is estimated to grow strongly in Europe. This has attracted many companies from abroad, who have initiated their entry strategies[13]. This poses a competitive threat to European SMEs, not only within investigation and remediation services, but also in their value chain, as e.g. the manufacturing of investigation equipment.

However, by **reaching the MICCS-DEMO project objective to bridge the technical and market gaps between MICCS activities and market launch**, we aim to strengthen the competitiveness of the SMEs in the consortium, and also strengthen Europe's position in the remediation market, thereby serving EU to obtain its market position. The MICCS system will be a highly competitive alternative to traditional investigation of polluted sites because of its clear advantages regarding both time and cost savings. The competitive advantages of the MICCS product will make it harder for global players to access the European soil investigation and remediation market with their technologies. This will also strengthen EU's competitiveness within the area of eco-products and retain EU in the driving seat of the global eco-industry. Moreover, the MICCS product will put European SMEs in a stronger market position than the existing overseas competition by providing a technology that is both quicker and significant more cost efficient.

Economic impact and justification – SME consortium

[8] Figures taken from DGE based on total man-hours spent divided by total number of sites (more than 2000 sites investigations).
[9] European Union 2011
[10] Eurostat's definition; expenditures related to technologies and products of both a preventive or remedial nature for the prevention, reduction, elimination and treatment of air emissions, waste and wastewater, soil and groundwater contamination, noise and vibration as well as radiation, the prevention, reduction and elimination of soil erosion and salinity as well as other kinds of degradation, the prevention of biodiversity and landscapes as well as monitoring and control of the quality of the environmental media and waste.
[11] Study on the competitiveness of the EU eco-industry, within the Framework Contract of Sectoral Competitiveness Studies – ENTR/06/054, October 2009.
[12] European Union 2011
[13] Environmental Industries 2005; ITRC 2003

In order to demonstrate the cost and profitability for the SME consortium of launching the final MICCS system, we will in the following sections describe the benefits for each participating SME, also detailing the expected revenue and profit scenarios for the consortium, its individual partners, as well as overall Return on Investment.

Market Penetration Rate and Profitability

Throughout the implementation of the MICCS-DEMO activities, reengineering and design engineering, the consortium is targeting a selling price of the new MICCS investigation equipment following table 3.1.1 below. As illustrated we expect a selling price of € 110,000 for the integrated MICCS system following the aggregated price model of MICCS key components including expected gross profit margin. The overall sales price is illustrating a typical customer who is not having any investigation equipment and it is assumed that in 50% of the cases the targeted market is in possession of a drilling rig where the other key components can be integrated. Furthermore, it is estimated that 50% of the targeted market will integrate the GPR system which is dependent on the requirements for the investigations. Where investigation plans are known beforehand and the investigations restricted too few parameters, the GPR survey is not required.

Table 3.1.1 Targeted sales price and gross profit margin of the total MICCS system and distribution on system key components

SME Partner	Equipment part	Sales Price	Gross profit margin	Estimated sales in % of site investigation cases
GSS	GPR system	€ 20,000	€ 7,500	50% of the case
UST	Sensors & related electronics	€ 10,000	€ 5.000	100% of the case
SSD	MICCS probe, incl. SW control system & training	€ 17,000	€ 7,000	100% of the case
SSD	Sonic Drilling rig	€ 50,000	€ 20,000	50% of the case
Biorem	Integration of equipment & sales incl. Management SW	€ 13,000	€ 7,000	100% of the case
	Total price €	**€ 110,000**	**€ 46,500**	

Europe is the primary market to be penetrated by the consortium, but since SSD has a developed distribution network in place in both North America and Asia, and are planning to expand these markets, the consortium is also targeting the global market for investigation equipment, which is at least double the size of the current European market. The global market is growing, primarily due to the increased focus on environmental issues in less developed countries. Based on a realistic potential of 4,600 MICCS units supplied annually (cf. above), our market penetration rate is estimated to increase gradually starting from 1% of the European market the first year after project completion, increasing to 5% after the first 5 years. However, we do not expect to target the global market before year 2 post-project and we expect lower market share here, assuming 2% share in year five post-project. In total, with these qualified assumptions, after 5 years we expect to have sold approximately 437 equivalent MICCS units. In table 3.1.2 below, the consortium has summarised the realistic target for market penetration in year 1 to 5 after completion of the MICCS-DEMO project.

Table 3.1.2 MICCS system estimated unit sales and penetration rate

Market	Year 1	Year 2	Year 3	Year 4	Year 5	TOTAL
Market share EU	1%	1%	2%	4%	5%	
MICCS Units Sold	12	23	69	92	115	322
Rest of the world Market Share	-	0,5%	1%	2%	2%	
MICCS Units Sold	-	12	23	46	46	115
TOTAL SOLD MICCS UNITS	12	46	92	127	161	437

Based on the estimated market penetration illustrated in the table above we assume **total sales of 437 MICCS** systems 5 years post-project distributed by 322 units sold in Europe and 115 units in the rest of the world. Calculated with the estimated sales price of € 110,000 per MICCS unit and the above estimations of key components (table 3.1.1), the consortium presumes a **total increased turnover of € 32.7 million five years post-project with a total consortium gross profit of € 14 million** as demonstrated in table 3.1.3 below.

Table 3.1.3 MICCS system expected turnover and profit in million €

Market	Year 1	Year 2	Year 3	Year 4	Year 5	TOTAL
Total EU turnover	€862 K	€2.58 M	€5.17 M	€6.90 M	€8.62 M	€24.15 M
Global turnover	-	€862 K	€1.72 M	€2.58 M	€3.45 M	€8.62 M
TOTAL TURNOVER	€862 K	€3.45 M	€6.90	€9.48 M	€12.07 M	€32.77 M
TOTAL CONSORTUM PROFIT	€376 K	€1.50 M	€3.01 M	€4.14 M	€5.27 M	€14.30 M

Impact on participating SMEs

A common feature of the SMEs is that the innovative aspects of the MICCS System will help them to gain competitive advantages and differentiation from competitors in markets that are relatively conservative and competitive. The assumption here is that a facility to produce the projected number of MICCS Systems is operational during year one after the project is finished.

Table 3.1.4 Estimated growth for participating SMEs

SME Partner	Activities	Turnover	Aggregated turnover post 5-year project	Accumulated gross profit after 5 years	Total employee growth after 5 years
DGE	Training Additional site consultancy work 8% yearly	€ 831.600 €2.111.976	€2.943.576	€1.800.000	25
Biorem	Additional investigation and remediation 10% yearly Integration of equipment & sales incl. Management SW Distribution	€184.112 €4.151.500	€4.335.612	€3.059.000	35
SSD	Probe casing (100% of all cases) Sonic Drilling system (50% of all cases)	€4.429.000 €10.925.000	€18.354.000	€7.429.000	150
UST	Sensors (100% of all cases)	€4.370.000	€4.370.000	€2.185.000	35
Total, year 1-5			€34.373.188	€15.811.750	280

As can be seen from the break-down above, all partners are estimated to benefit from a significant increase in turnover. In total the MICCS project will provide us, the group of SMEs, with a **€34 million increase turnover five years post project and a total SME consortium gross profit of €16 million**. The calculated jobs to be gained by implementing the MICCS-DEMO project will be spread between the consortium members, sub-contractors and suppliers, with the clear majority going to SSD. In total, **we expect to have created approximately 280 jobs among the partners in year 5 post-project**, based on assumptions of current SMEs and labour intensity. Furthermore, excluded from the table above, **DTI** as participating RTD will gain increased sales through training activities within chemometrics and process data interpretation of at least **€250,000 5 years' post project**.

Justification and impact for individual SMEs

Based on the estimated market potential and the price model above we have calculated the economic benefits per SME partner to verify that each of the partners will regain their investment in a reasonable time. With the assumptions made, the calculations indicate a **high profitability and Return on Investment (ROI) for all the involved SMEs**. The conclusion, based on a simple calculation disregarding the discounting of cash flows, is that all SMEs involved will recoup their initial investment in the project within 2 year post project. Combined, ROI after year 5 post-project will be 5 times the invested amount, which must be considered as high for a commercial project, even with this risk profile

Table 3.1.5 ROI (€1) for individual SME and in relation to the project

SME Partner	MICCS (person months)	MICCS-DEMO (persons months)	Own contribution to project costs[14]	Profit per system [15]	Profit year 1	Profit year 2	Profit year 3	Profit year 4	Profit year 5	Total profit
DGE	9,5	28	179,111	4,119	200,000	350,000	350.000	400.000	450.000	1,800,00
Biorem	14	32	264,020	7,000	80,500	322,000	644,000	885,500	1,127,000	3.059.000
SSD	8	33,5	259,041	2,.00	195,500	782,000	1,564,000	2,150,500	2,737,000	7,429,000
UST	7	18,5	171,883	5,000	57,500	230,00	460,00	632,500	805,000	2,185,000
GSS	7,5	13,5	140,781	7,500	43,125	172,500	345,000	474,375	603,750	1,638,750
TOTAL	46	141,5	1,014,836	50,619	376,625	1,506,500	3,013,000	4,142,875	5,272,750	14,311,750

As can be seen from Table 3.1.5, the profits are going to be more or less balanced among the participating SMEs in accordance with their respective contributions to the project. Biorem and SSD will gain comparatively high profits, as both are having a larger contribution than the other SME partners. Both will also have a central role in the distribution of the MICCS system. SSD will gain significantly more revenue than its partners. By year 3, their combined annual profits are expected to reach more than €5 million and the accumulated profit exceeding €14 million.

In addition, **DTI**, as left out of the SME table above, will mainly benefit through improved knowledge within design and use of advanced sensor technologies, but it is expected that DTI will equally gain increased economical benefits through increased sales of training services of at least €200,500 5-years' post project.

In conclusion, the initiation of the MICCS-DEMO project is economically justified for all participating SMEs. All involved SMES will gain a healthy ROI within the two first years post project. Moreover, there is a strategic match for all participating SMEs, not only in creating growth and jobs on the basis of expanding their core businesses, but also in creating diversification away from competitive sectors and into new areas.

Mainly, the SME partners will benefit from their participation in the MICCS-DEMO project through increased sales of products or services. The specific benefits, for each individual partner, are briefly summarised below:

- ⇨ **DGE** will benefit from the partnership through income mainly from training of end-users in using the system, and indirectly through a more competitive position on the market – through providing better decision making with the new MICCS System at a significant lower cost.
- ⇨ **Biorem** will benefit from participating in MICCS-DEMO through increased market share of investigation in Denmark, integration of the system and distribution of the system in Scandinavia. Furthermore, Biorem will benefit from the improvement of the basis for decision on what remediation strategy to use for a contaminated site.
- ⇨ **SSD** will benefit from participation in MICCS-DEMO through increased sales of drilling rigs based on vibration techniques and sale of the novel probes/casing worldwide (except Scandinavia). In addition, the knowledge generated through the development of the novel probe and casing will be of relevance to other products in mainstream markets and applications.
- ⇨ **UST** will benefit from participation through production and supply of MICCS System's sensor modules, in conjunction with additional chances for the further and new development of relevant sensor systems, new possibilities for further common development projects and finally through the increased market position as a component supplier for environmental technology in Europe.
- ⇨ **GSS** will benefit through considerable increased sale of GPR tracer equipment to the final MICCS System.

Overall Cost Effectiveness of the Proposed Research

The above analysis indicates an **overall ROI for the EU** associated with the original MICCS project and MICCS-DEMO proposal (total EU contribution is estimated at 2,146,906), measured as total turnover generated after year from the finished product in relation to total project budget, **of 16 times the initial investment**.

In conclusion, the MICCS-DEMO project is a cost-effective investment proposition not only in terms of the return for the involved SMEs and for end-users, but also for the EU and European competitiveness as such and therefore fits perfectly with the programme objectives for the Research for SME – Demonstration Action.

Societal and Political objectives

[14] (MICCS + MICCS-DEMO)

[15] DGEs profit per system is calculated by dividing profit from training activities and additional investigation & remediation activities with number of MICCS units sold.

Impacts from contaminated soil: Contaminated soil is mainly a result of inappropriate legislative management in the past, but nowadays there are still harmful substances leaking to the environment. The 'Polluter Pays' principle is implemented in most European countries, but due to the legislative problems in the past and ongoing activities at least 25% of the total remediation expenses come from public authorities[16].

The goal for the MICCS-DEMO project is to fully prepare a newly developed investigation technique, which can reduce the time for investigation by 30% and thus reduce the cost for site investigation by at least 20%. With this 20% cost reduction, and given an annual €2.4 billion spent on investigation, the new MICCS-product has a full saving potential of €480 M. With our estimated market penetration rate, market introduction of the MICCS technology is likely to save costs cumulatively on the order of € 60 M five years post-project.

Furthermore, surveys backed by the EU Commission have estimated that society's loss per year due to soil contamination is € 17.3 billion[17]. With the increased speed of the MICCS penetration rate, it will become possible to accomplish 30% more site investigations, which could result in a corresponding 30% annual reduction of societal losses from site pollution. This would result in a potential cost reduction of over € 5 billion. For the given MICCS market penetration rate, it would hence be possible, if the conversion rate was 1:1 between the increased speed for investigation and remediation, to obtain a total saving in societal losses from soil contamination of more than € 250 million five years post-project.

Policy initiatives: In recent years there has been more political focus on the contamination problem, and it has become a political goal to eliminate or minimize the threat from contaminated soil hazards. This has resulted in several political treaties in the European Community as a means of control to protect the environment, water supply and public health. The most direct threat and risk for soil contamination comes from waste management, here several legislative elements have been implemented such as Integrated Pollution Prevention and Control Directive, Landfill Directive and Waste Framework Directive[18]. For more general environmental protection, the Strategic Environmental Assessment Directive is implemented to ensure that a risk assessment needs to be carried out before any potentially environmental harmful industrial, agricultural and other type of projects are permitted. The Habitat directive[19] is of particular relevance since it defines a number of terrestrial habitats that depend on specific soil characteristics and in this way indicates the status of different nature types and thereby the soil condition. Other treaties that have been ratified by the member states are "Nitrates Directive and Water Framework Directive, which aim is to protect the ground and surface water from contamination.

Currently, the Member States face the implementation of the EU Soil Framework Directive, which among others entails the implementation of monitoring and surveying strategies for all countries' potentially contaminated sites, as well as the creation of an inventory of the European soil condition. The MICCS system should be seen as a new instrument that can drastically improve the investigation process, and in this way help the individual member states full fill their obligations in relation to these directives.

Public health: Sites that are contaminated possess a great threat to the public health. Harmful substances in the soil can be released to the ground- or surface water, but can also be harmful by direct contact by humans or through uptake by plants. Soil contamination due to diffuse pollution is in Europe mainly caused by acidification. Local contamination or site contamination is often due to high density urbanisation and industrialisation or military installations. In extreme cases soil contamination can be very serious and may lead to a variety of complications, from sickness, to cancer and mutations, health effects of pollutants may be acute or chronic[20]. Benzene, chromium, pesticides and other substances are well known carcinogen and causes higher risks on cancer. Pollution with lead can cause brain and nerve damage especially to children, and it's the reason that leaded gasoline was banned. Lead has a long decay time and are still a problem due do past disposal or leaking from underground storage tanks. Other common contamination substances can typically cause liver, kidney changes or headache, eye irritation, nausea and skin rash. According to Cornell researchers about 40% of deaths worldwide are caused by water, air and soil pollution, with soil pollution mainly through polluted groundwater causing almost 0.5 million life yearly[21]. This corresponds to more than 50.000 lives lost yearly in the EU with 8% of the global population[22]. The MICCS-DEMO project can, with a potential penetration rate of 5 % after five years, save a total of 500 lives due to more effective investigation and remediation practices.

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[16] EEA 2005: Progress in management of contaminated sites (CSI 015)

[17] Independent study have estimated this number to be as high as € 208 billion per year, but due to uncertainties the € 17,3 billion is retained according to the Commission (EUR-Lex 2006)".

[18] EEA 2005: Progress in management of contaminated sites (CSI 015)

[19] COUNCIL DIRECTIVE 92/43/EEC, of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora

[20] Environmental Protection Authority of Western Australia, 2007

[21] Cornell University, 2007

[22] It may be that EU is not equally affected from soil pollution and lack of groundwater protection as poorer countries, but on the other hand heavier industrialisation in Europe contributes to more sites being polluted, and hence our assumptions seem fair.

Environment: Contaminated soil has a severe impact on nature habitats, plants, birds and wildlife protected by the Habitat Directive and the Wild Birds Act, including some of the most threatened species in Europe. Chemical solutions diffusing into rivers and lakes are greatly disturbing the natural ecosystems and endangers wildlife in various ways. Low fertility, genetic deformity, increase in mortality rate, succession due to change in the ecosystem, resulting in loss of habitats and diversity of species, and pollution to these areas, are typical consequences of contaminated soil.

Whereas pollution of surface water like lakes and rivers will show instant effects, e.g. in the form of fish death and lack of oxygen in water, the effect from contaminated soil emerges more slowly. This is due to the soil's buffering capacity, resilience and capability to filter and absorb contaminants, which means that the damage to environment is not perceived until it is far advanced. When the soil capacity level is over the threshold, substances will leak to ground or surface water typically in the form of acidification[23]. The MICCS-DEMO project will help to improve the environment and help protect the 11,000 species of animals and plants that face a high risk of extinction in the near future[24], through a speedier implementation of remediation techniques.

Loss in Property value: A Danish EPA study on property loss when selling polluted grounds of houses has showed that the value of Danish real estate decreases by 5 - 11% when under suspicion for contamination in the ground. When pollution is known, however, the loss in property value is only 2%. Applying these figures, lost property values for houses in Denmark due to suspicions of pollution add up to € 17 million[25]. Extrapolated into EU figures, this gives a yearly property value loss of € 1.5 billion, of which the MICCS System can potentially save € 40 million five years post project.

In conclusion, societal aspects of the MICCS-DEMO, by enhancing the decision making foundation from reliable measurement results, and by reducing the time and cost spent on site investigation, this project will contribute to lowering the negative societal impacts from the above threats. At European level, this yields the following results for MICCS-DEMO five years post-project:

- Total savings for Europe of more than € 0.5 billion in general from soil site contamination.
- Reducing the time and cost for investigation and remediation of contaminated soil of more than € 60 million.
- Help for EU Member States aiming to fulfil EU legislation on soil site pollution.
- A total of 1,200 lives saved from exposure to contaminated sites.
- Improvement of our general environment, habitats, plants, birds and wildlife.
- Savings of € 40 million for property loss when selling polluted grounds of houses.

European approach needed

As an extension of an already funded EU project, and as the MICCS-DEMO project contributes to a number of European policy objectives with regards to environment protection, increased public health and reduction in loss in property value, there is a clear continued need for EU support and involvement also in the final demonstration of the solution developed. As with the original project, it is still the case that the transnational partnership provides a significantly greater impact than, theoretically, similar efforts at national level or local level. First and foremost, this project combines expertise regardless of its geographical location – as is needed in a globalized economy with fierce competition. Secondly, the bringing together of partners from three European markets will make the international market launch of the solution easier.

In addition, in our examination of national research programmes we have found that no single demonstration programme allows for the width of competencies and financial volume characteristic of the MICCS-DEMO project. Specifically, since Danish Biorem developed the original idea, it has been a consideration that no comparable programme is available in Denmark that has the same financial possibilities to support demonstration projects.

[23] EEA 2000

[24] ECBCH 2004

[25] Yearly average sale of polluted grounds of houses sold in Denmark is 866. Miljøprojekt nr. 1046, 2005 "Value loss by sale of poluted or formerly poluted properties for housing".

B3.2 Plan for the use and dissemination of foreground

This section will describe the consortium's route to market by **describing dissemination of project results, management of intellectual property rights and a market analysis of different market, which will frame how each partner expect to exploit the results of the project**. The market analysis will also discuss market barriers and constraints and how these will be mitigated, hence outlining each partner's steps towards bringing the product to the market after the demonstration. However, as evident in the work plan - and specifically in WP6 on market studies and exploitation - the consortium expects to develop detailed market studies and business plans as part of the MICCS-DEMO project. In fact the consortium considers the possibility to conduct market studies as part of the Research for Demonstration Action; a key benefit as it makes it possible for the partners to expand their partnership towards a strategic business partnership where it will be possible to discuss and develop joint market access strategies for the final in-situ soil investigation system.

Route-to Market

In the original MICCS proposal, it was anticipated that the route to market would be relatively short after the on-site tests of the integrated in-situ investigation prototype. However, even though the MICCS project has proved successful in terms of the results – i.e. the development and successful individual on-site tests of the MICCS systems different key prototypes - a number of demonstration activities still have to be accomplished to bridge the technical and market gaps between MICCS activities and market launch. Generally, the legislation regarding soil contamination and risk assessment of contaminated sites are getting more comprehensive, and the requirement to the execution of investigation and characterization of contaminated sites are getting more stringent. For a new methodology in the market for performing site investigations it has therefore become a crucial condition to provide convincing documentation for the efficiency and reliability of the new methods. Accordingly, the route to market will be longer than expected if the project is to successfully overcome market and regulatory barriers. With this in mind, WP6 addresses the need to carry out detailed market studies which can form the base for the development of market access strategies for the partners. This will also ensure that decisions on how to approach market launch are based on validated and tested market information.

Dealing with market and regulatory barriers through demonstration

One of the key objectives of the large scale on-site demonstration at 8-12 differently polluted and geologically varying sites will be to address the market and regulatory barriers. As described in B1 the soil investigation and remediation industry is reluctant to introduce new technology if the novelty is lacking regulatory validation and acceptance. The reason for this customer reluctance is due to the fact that regulatory authorities are issuing the necessary site approvals.

Hence, the demonstrations will not only aim at demonstrating that the in-situ MICCS soil investigation system is operating more effectively and efficiently than conventional techniques – it will also emphasise the system's significant time- and cost savings and improved measurement accuracy and amount of measurement data for decision making through comprehensive scientific documentation of the results compared with existing data obtained from representative samples analysed by conventional methods. WP4 will ensure on-site demonstration of the MICCS system to secure that it lives up to product related objectives and user specifications compared with conventional measurement, where WP5 will provide an inclusive documentation of the results compared with currently available technology to gain regulatory acceptance as required by the industry.

Time to market after the end of the MICCS-DEMO

Less than 1 year after project completion it is anticipated that the consortium will be able to bring the MICCS system to the market. This short time to market is primarily due to the design of the MICCS-DEMO project itself and the vision of a full on-site demonstration at 8-12 differently polluted and geologically varying sites including documentation of the results to gain regulatory and customer acceptance. In addition, the combined consortium holds a solid market foundation for a broad market exploration of the in-situ soil investigation system. On the supply side, SSD, UST and GSS will begin the capacity planning of increased production of MICCS key components and Biorem will begin the preparation of capacity and the possible building of a new facility for assembly of the finished product. The production is expected to start incrementally with at least 12 systems sold during the first year post project.

Business analysis – Market segments to be exploited and others to be developed

The consortium behind the MICCS soil investigation system has identified following market access strategy:

Northern Europe: The consortium will first target and access the North European soil investigation and remediation market, mainly Scandinavia and Germany, before targeting rest of Europe. This strategy is mainly due to the geographic position for distribution

and Biorem and SSD's position in the specific markets. The extensive on-site demonstrations in Denmark are expected to make up the bulk of the initial market, which is well in line with the key drivers in the market described in B3.1.

Global market: To access the global market, the consortium will utilise SSD's international position with an already solid established distribution channels and business strategy to further expand the global participation. It is expected that the consortium will access this market in year 2 post project.

Broaden the market to other industries: The soil investigation and remediation industry is the ideal market for introducing the MICCS technology. However, even in other industries where environment analysis and soil samples are needed, the MICCS system should become a competitive alternative over time. This market is not to be developed until the production costs have been cut to a level where they can compete directly with other technologies on the market.

New sensors & measurement techniques: In addition to the market segments mentioned above, DGE, SSD and UST in particular will be looking into the market potential in going one step further by developing **new sensors and measurement techniques that will offer the end-user in the soil investigation and remediation industry the full advantage of using MICCS system** with regards to measuring and analysing additional groups of soil polluting compounds. The existing MICCS System with an integrated Triple Sensor System is made to measure conductivity and volatile organic compounds. The possibility to measure and detect other groups of soil polluting compounds that are not volatile organic is of large interest. Hence, the development and design of a new sensor system and measuring technique specifically designed for the MICCS system could open a new business venture for the partners in the future. In WP6 the partners will be looking to quantify the costs and understand the barriers to pursuing this market. As the access to this market will demand initiating a new development project, this should be considered a long term goal.

Other exploitation possibilities: After completion of the project, SSD and UST will be looking into how they can transfer the knowledge and products developed in the original MICCS project and in the MICCS-DEMO project to other markets. For SSD this will concern how the probe sensor can be applied in other product applications not necessarily limited to the soil investigation and remediation industry. For UST, the knowledge and skills developed in the demonstration project will be used to develop new sensor solutions for the soil investigation and remediation industry or other eco-sub-segments.
The abovementioned strategies will fully be developed in the market exploration studies in WP6 aiming to detail the market opportunity and market barriers associated with entering the aforementioned markets.

Management of Intellectual Property Rights
As the MICCS-DEMO project is a continuation of a Research for SME project, there is already an IPR agreement in place which ensures a fair distribution of IPR rights and access to technology among the partners. This agreement will be carried through to the new consortium agreement making room for any minor adjustment needed to accommodate specificities in the demonstration project. This means that the Consortium Agreement (CA) will include an agreement on the distribution of IPR, including access rights and licensing strategy, among the SME consortium members, and shall also lay out the rules of confidentiality that will apply to all consortium partners. Moreover, the CA includes descriptions of background knowledge in the project and, where relevant, excludes background as allowed for in the Rules for Participation. However, it should be emphasised that, since this is a proposal for demonstration of a technology developed in the original MICCS project, the basic issues regarding IPR have already been addressed and agreed upon, and the consortium remains committed to the overall principles. The only area where new issues of IPR may realistically arise is in connection with product design, where WP2 and WP3 may lead to product design features which the partners may want to register.

Management of IPR Issues to mitigate risks
Even though the above indicates that IPR are not expected to create issues in the demonstration project the partners have put in place a process for IPR management during the project which has been designed to guarantee that the SME partners have a structured process in place to identify, assess, protect and subsequently exploit the IPR generated throughout the project. This process will be activated on a "need-to" basis by the Coordinator at the request of the individual partners.

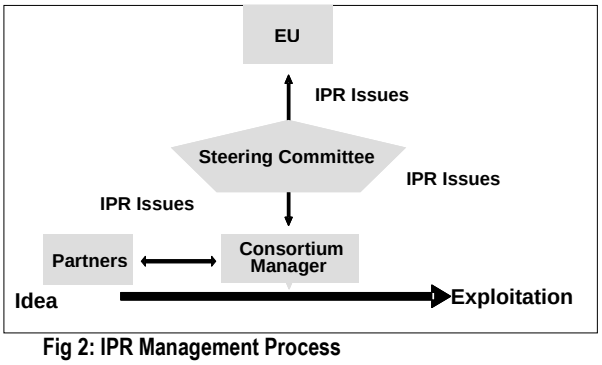

Fig 2: IPR Management Process

At the centre of the IPR management process is the Steering Committee, which will be in charge of implementing the consortium agreement. The Consortium Manager/coordinator will be responsible for ensuring that the necessary IPR, license and royalty agreements are in place with all SME consortium partners to ensure exploitation of the project. During the project, the Exploration

Manager (EM) will be responsible for management of IPR issues through three distinct phases: **identification, assessment and (possibly) protection**. **IPR emanating from the original project and, new rights foreseen as results of MICCS-DEMO.** As a direct result of the MICCS project the following intellectual property rights and licensing have been secured:

Table 3.2.1 Division of IPR

Project Result no.	Description of Foreground	Type / Protection Approach	IPR Holder / Responsible	Licences / Royalty Receivers Among SME Participants
1	GPR system	International patent pending	GSS	License to DGE for soil investigation & remediation
2	Measuring Probe	International patent pending	SSD	Licence to DGE for soil investigation & remediation
3	Triple Sensor	International patent pending	UST	Licence to DGE for soil investigation & remediation
4	Membrane	Possible patent	SSD & Biorem	License to Helmholtz.Zentrum Geesthacht
5	The total MICCS concept	International patent pending	DGE	- Licence to Biorem sales in Scandinavia. - Licence to SSD, sales worldwide except Scandinavia

DGE will hold the rights for the finished integrated system and enter into necessary commercial licensing and production contracts agreements with SSD, UST and GSS on the supply of MICCS key components and assembly, respectively; probe drilling sensor, Triple Sensor System and GPR system. These latter SMEs will hold exclusive licenses globally and, eventually, for production by the consortium for other markets. Biorem and SSD will get an exclusive license to sell the MICCS system, respectively, to the Scandinavian and global market. In addition to the tasks mentioned, the EM will also takes responsibility for exploitation related aspects as listed below:

With respect to production	**With respect to distribution**
Planning up-scaling of production	Market segmentation
Logistics and supply chain management	Consortium distribution capability
Licensing strategy outside Europe	Inclusion other European SMEs

Dissemination of project results to targeted audience and the wider public

The consortium partners have a clear business interest in a dissemination of the results of the demonstration project as, in the end, only the knowledge of the existence of the MICCS technology among regulators and end-user can drive sale. Hence, the partners will adopt a strategic approach to communicating the results of the demonstration. The approach will include three channels of communication:

- The partners will seek to have articles and op-eds on the demonstration results printed in key industry magazines targeting the soil investigation and remediation industry.
- The partners will present the results of the demonstration test at industry fairs and conferences targeting end-users. As a part of the work to distribute knowledge of the MICCS system among targeted markets the consortium will also produce a brochure on the system and the demonstration results.
- The consortium will attempt to access national/regional media in countries participating in the project to present the results of the demonstration. This is seen as a viable approach as the media spotlight environmental technologies is immense and one should not underestimate the possible PR value in communicating that the technology developed has been demonstrated and validated by governmental regulators.

In addition to the above activities the webpage www.miccs.eu will be continued, and updated with a description of the objectives of the MICCS-DEMO project, and as the project is implemented with non-confidential information for dissemination use.