

U.S.-GERMAN BILATERAL WORKING GROUP: INTERNATIONAL RESEARCH COOPERATION TO DEVELOP AND EVALUATE TOOLS AND TECHNIQUES FOR REVITALIZATION OF POTENTIALLY CONTAMINATED SITES

Paper 1: U.S.-GERMAN BILATERAL WORKING GROUP – MISSION, WORK PROGRAM, STATUS, AND OUTLOOK ON FURTHER ACTIVITIES

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INTRODUCTION

The U.S. German Bilateral Working Group originated in 1990 in order to share and transfer information, ideas, tools and techniques regarding environmental research. The U.S. Environmental Protection Agency (EPA)/Office of Research and Development (ORD) and the German Federal Ministry for Education and Research (BMBF) developed this partnership. Initially they worked together in Phase 1 (1990-1995) to evaluate innovative treatment technologies for contaminated sites. Much of this early research cooperation was dedicated to learning about each country's sampling and analytical methods and quality assurance procedures, in addition to learning about each organization's respective mission and policies. From 1990-1995, five innovative treatment technologies were evaluated in the U.S. and five in Germany. U.S. and German sampling and analytical methods were used in both countries. EPA and the BMBF focused primarily on developing and implementing quality assurance procedures for the sampling and analytical methods and also quality management procedures for the overall technology evaluation. During Phase 2 (1995-2000), the quality assurance/management procedures developed in Phase 1 were evaluated with ten additional technology evaluations (five in each country). In the U.S., Phases 1 and 2 resulted in a refinement of quality assurance/management procedures for technology evaluations. For Germany, Phases 1 and 2 resulted in the German Standard Procedures for the Evaluation of Remedial Technologies (DETAD). Additionally, many of the technologies were implemented for site remediation and the technology evaluation information was transferred to other countries.

In 2000, EPA and BMBF decided to continue their cooperative activities in Phase 3 with a focus on removing obstacles to the revitalization of potentially contaminated sites. During Phase 3, products were

developed in each country that will continue to be tested and refined over the next several years. Now, EPA and BMBF are beginning Phase 4 of the Bilateral Working Group, which will focus on sustainable land revitalization.

PHASE 3 ORGANIZATION

While EPA and BMBF are the lead organizations for the Working Group, many other organizations are involved. In the U.S., EPA's Office of Brownfields Cleanup and Redevelopment joined EPA's Office of Research and Development as a co-lead for Phase 3. EPA/ORD is responsible for program management in the U.S. while GSF GmbH is responsible for program management in Germany. The core working group in Germany includes: Ferber, Graumann und Partner, Probiotec GmbH, Difu, and Universität Stuttgart. In addition to EPA's primary contractors, Tetra Tech EM Inc. and Neptune and Company, Inc., EPA invited the Interstate Technology Regulatory Council (ITRC), a state-led organization, to assist in Phase 3 research as part of the core working group. "Model projects" (projects that were successful in one or more aspects of revitalization) were selected in both countries in order to develop the Phase 3 products. Experts in both countries from federal agencies, state and local governments, universities, developers, and non-governmental organizations (for example, Northeast-Midwest Institute) were also asked to participate in product development.

PHASE 3 GOALS/PURPOSE

EPA and BMBF agreed to the following goals for Phase 3:

- Facilitate equitable land use
- Facilitate faster redevelopment of sites
- Allow greater independence from public money
- Enhance benefits to society

These are similar to EPA's Office of Brownfields Cleanup and Redevelopment Goals, which are to:

- Protect the Environment – address brownfields to ensure the health and well-being of America's people and environment
- Promote Partnerships – enhance collaboration and communication essential to facilitate brownfields cleanup and reuse
- Strengthen the Marketplace – provide financial and technical assistance to bolster the private market
- Sustain Reuse – redevelop brownfields to enhance a community's long-term quality of life

PHASE 3 APPROACH

The purpose of Phase 3 was to help revitalization practitioners overcome obstacles to revitalization. The EPA and BMBF follow a systematic approach for each phase of the bilateral. For Phase 3 this included five steps: (1) baseline workshops, (2) feasibility studies, (3) product development, (4) beta testing of products, and finally (5) transferring information, tools, techniques, and approaches through publications, websites, and conference presentations.

Step 1 was to hold baseline workshops in each country to identify these potential revitalization obstacles. In 2001, representatives of each revitalization stakeholder group (for example, bankers, developers, lawyers, community representatives, environmental specialists, economists, local governments, etc.) attended a baseline workshop in their home country. A few Bilateral Working Group members attended both baseline workshops. A list of obstacles was developed and then evaluated during the feasibility studies (Step 2).

Following the baseline workshops, EPA and BMBF developed feasibility study reports to compile the information regarding obstacles collected from the baseline workshop participants and to decide which

obstacles would be researched further by the Bilateral Working Group. The intent of the EPA and BMBF was to provide tools, approaches, and technologies to overcome barriers to revitalization; however, it was not feasible for the Bilateral Working Group to provide tools, approaches, and technologies for every obstacle identified (for example, the EPA and BMBF were not going to try to change any laws in either country). EPA and BMBF decided that it would be feasible, and within the scope of the goals listed above, for the Bilateral Working Group to develop tools, approaches and techniques to overcome the following list of obstacles:

Economic Concerns

- Revitalization options do not include market and non-market costs and benefits
- Identifying private and public financing options
- High cleanup costs deter businesses and municipalities from redeveloping contaminated sites
- It often is not clear what types and amounts of cleanup and redevelopment information will be required when a party applies for a loan
- Funding for site characterization/assessment
- Insurers, developers, and stakeholders want to know the entire cost of a cleanup and redevelopment and how it would benefit them
- No market driver

Environmental/Liability Concerns

- Evaluating and communicating environmental risks
- Identifying and evaluating innovative characterization, remediation, and long-term monitoring technologies
- Regulatory agencies often are overburdened
- Fear of federal liability even after complying with state regulations hinders cleanup and redevelopment of contaminated sites
- Potential liability at redeveloped sites at which residual contamination is discovered hinders owners from selling their property or obtaining financing for redevelopment
- Uncertain liability of owners, developers, lenders, and investors involved in the redevelopment of contaminated or potentially contaminated properties hinders cleanup
- Misapplication of existing regulation guidance including guidance versus regulatory interpretation
- Access to site characterization/assessment information
- “Bad” information on site characterization/assessment
- Technical knowledge of site assessment
- Technical information about cleanup processes and technologies is difficult to explain to some stakeholders

Community Concerns

- Communities often oppose redevelopment efforts because future uses of a site are unknown and it is not clear how those uses will affect the surrounding area. Their concerns encompass environmental; economic; and civil, political, and social factors.
- Communities may hesitate to redevelop sites that have historical significance
- Community “fear” and distrust
- Lack of information about what is in community and their role
- Real or perceived quality of life – urban
- Conflicts within community regarding site reuse
- Community apathy
- Business/developer may not bring in community

Strategic Issues

- Successful cleanups and redevelopment projects should reflect the views and have the support of local, regional, and state stakeholders
- Finding state-specific information and requirements
- Multiple redevelopment activities in an area can lead to inconsistent regional planning

- Uninformed and uninvolved stakeholders can hinder the redevelopment process
- Absence of vision/creativity for land use; lack of forums on vision/creation of ideas
- Making team work
- Coordination of effort
- Too much focus on site – no big picture strategy
- Private owners allowing access
- Time
- Uncertainty
- Buyer/seller agreement; negotiation; lack of disclosure; no consistency w/ clauses
- Lack of education
- Information distribution
- Scope of responsibilities of stakeholders
- No business motivation

In Step 3, the Bilateral Working Group developed tools to assist revitalization stakeholders to overcome the obstacles identified and to meet the Phase 3 goals. EPA and BMBF determined that two tools (one in the U.S. and one in Germany) would be developed, but that the Working Group would use similar approaches and information in order to develop them. For example, EPA and BMBF used and shared information collected from the open literature and the internet, model projects in each country, national and international conferences, discussions with experts, and joint workshops.

EPA and BMBF jointly developed and held five workshops in order to collect further information where data gaps were identified. The topics were:

Economic Tools – Charlotte, North Carolina in November 2002
 Project Management and Marketing – Saarbruecken, Germany in May, 2003
 Environmental Risk Assessment and Communication – Portland, Oregon in October 2003
 Social Acceptance – Leipzig, Germany in June 2004
 Sustainable Reuse – St. Louis, Missouri in September 2004

EPA compiled the presentations, discussions, and small group exercises on CDs that can be obtained free of charge. Information for ordering copies of CDs, and summaries of each workshop, can be obtained on the U.S.-German Bilateral website (www.bilateral-wg.org).

The information collected from the literature, internet, model projects, conferences, discussions and joint workshops were incorporated into two comparable tools. In the U.S., Sustainable Management Approaches and Revitalization Tools – electronic (SMARTe) is being developed; while in Germany, the START-UP Guidance was developed. SMARTe (current beta version at www.smarte.org) is a web-based decision support tool that will allow users to evaluate future reuse scenarios in a multi-criteria decision analysis framework. It is intended to be used by a diverse group of stakeholders working together to revitalize a potentially contaminated site. It contains information, links, best practices, electronic analysis tools, and presentation/communication assistance. START-UP Guidance is intended to guide users to develop a target-group specific, integrated project and business plan that is tailored to a specific brownfield. It helps to organize available, but often unstructured information, and draws attention to the details necessary for information transfer and communication between involved parties, project planning and securing project funding.

Step 4 of the approach is the testing of SMARTe and START-UP Guidance. Feedback on the products is being obtained through various mechanisms including the SMARTe web-site and demonstrations at workshops, conferences, and on webcasts. Additionally, sites at various stages of redevelopment will be selected in 2005-2006 to test the products thoroughly. These “beta test projects” will be asked to use the products and provide direct feedback regarding the usefulness and usability of the tools.

As part of Step 5, joint conferences are being held in Germany and in the U.S. in order to present summaries of each of the joint workshops and to introduce SMARTe and START-UP to a large group of

stakeholders. The summary conference in Germany was held in Berlin in April 2005. Approximately 200 revitalization professionals attended. The conference presentations, question and answer discussions, and the expert panel discussions were strongly tied to the status of SMARTe and the START-UP Guidance. Comments received will contribute to the further development of the products. Attendees provided suggestions for the practical application of SMARTe and the START-UP Guidance and identified additional research needs. The summary conference in the U.S. will be held in November 2005 immediately preceding the National Brownfields Conference in Denver, Colorado.

Additionally, webcasts, workshops and conferences are being used to introduce/demonstrate SMARTe and START-UP Guidance to potential users and to raise the awareness of the existence of these tools and their status.

PHASE 3 STATUS

While Phase 3 is coming to an end and Phase 4 is just beginning, SMARTe and START-UP Guidance will continue to be developed and refined over the next several years. SMARTe, for example, is being developed in an overlapping phased approach. While information, links and some analysis tools are currently available and more will be added each year, the total decision support capability will not be completed until 2007. In Germany, institutions are being asked to implement the START-UP Guidance and provide direct feedback. A new version of the START-UP Guidance may be prepared by the end of 2006.

PHASE 4

Phase 4 of the U.S.-German Bilateral Working Group is being planned with an anticipated start date of January 2006. According to the results of Bilateral Discussions during the Phase 3 work, Phase 4 will focus on sustainable reuse and revitalization. Sustainable reuse and revitalization seek to incorporate a balance of social, economic, and environmental interests and objectives into growth and development that will not negatively impact future generations. This will require a focused effort to identify consequences/impacts of site decisions in a regional and global context. Phase 4 goals are similar to Phase 3:

- Facilitate environmentally, socially, and economically viable land use
- Facilitate transfer of information both nationally and internationally
- Allow more revitalization projects to be independent from public grants
- Enhance benefits to society and the environment

Approaches to achieve these goals include:

- Demonstrate innovative and integrative approaches to sustainable revitalization
- Share ideas and experiences to facilitate understanding of sustainable revitalization
- Provide tools and techniques to reduce or manage uncertainties regarding sustainable revitalization
- Evaluate sustainable aspects of revitalization efforts

The same systematic approach used in Phase 3 will be used in Phase 4. The baseline workshops were completed and feasibility studies were performed in 2005. The workshops and feasibility studies resulted in the following focus areas for Phase 4:

- Regional and local land revitalization planning
- Sustainable project management
- Brownscape design
- Brownfield communication network

Currently, the program managers are working to organize teams and research ideas within the four focus areas. In the U.S., research will focus on providing information, tools, and best practices for SMARTe. In Germany, the teams will develop stand-alone products for revitalization practitioners.

SUMMARY

For the past 15 years, EPA and BMBF have cooperated in performing environmental research. Our research seems to evolve approximately every 5 years to respond to emerging environmental issues. We are now entering a new "phase" of research to address the sustainable reuse and revitalization of potentially contaminated sites. The U.S.-German Bilateral Working Group places an emphasis on product development using a systematic approach. The approach and structure of the Working Group allows different organizations and individuals to be added as needed in each of the work phases, without significant disruption to product development. The systematic approach used by the Working Group allows enough flexibility to enable the group to grow and change as needed to meet new research challenges.

As the Working Group moves into Phase 4, we will again exercise flexibility to attract practitioners to help us develop products in the mutually agreed focus areas. We will attempt to measure the impact of the products/tools we develop relative to the identified goals and seek continuous feedback on the usefulness of our products. We anticipate our products will be found useful not only in Germany and the U.S., but in other countries as well.

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Paper 2: SUSTAINABLE MANAGEMENT APPROACHES AND REVITALIZATION TOOLS – ELECTRONIC (SMARTe), A DECISION SUPPORT TOOL TO EVALUATE FUTURE REUSE SCENARIOS

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INTRODUCTION

In 2000, the United States Environmental Protection Agency (EPA) and the German Federal Ministry of Education and Research (BMBF) began Phase 3 of the U.S.-German Bilateral Working Group. EPA and BMBF have an ongoing partnership designed to gain an understanding of each country's approach to the cleanup of chemical and/or biological contamination in order to protect human health and the environment. Phase 3 has focused on providing a variety of tools, approaches, and techniques that could streamline, cost-effective cleanup and redevelopment/revitalization of potentially contaminated sites (for example, brownfields). The Interstate Technology and Regulatory Council (ITRC), a key state-led organization, is also a significant partner in Phase 3 activities. The U.S.-German Bilateral Working Group is developing two comparable products. The U.S. is developing Sustainable Management Approaches and Revitalization Tools-electronic (SMARTe), which is the subject of this paper. The German side is developing the START-UP Guidance, which is the subject of the third paper of this session.

SMARTe PURPOSE/DESCRIPTION

In 2001, EPA and BMBF held workshops in the U.S. and Germany (respectively) to identify obstacles to revitalization. The U.S.-German Bilateral Working Group reviewed the list of obstacles generated in order to determine what products could be developed to help stakeholders overcome these obstacles (see the first paper in this session for more information). The Working Group determined that a resource or guidance document could be developed to assist stakeholders in overcoming the obstacles that were identified. In the U.S., the resource document evolved into SMARTe.

SMARTe is a web-based decision support tool that will allow revitalization stakeholders to evaluate future reuse scenarios of a potentially contaminated site or area. In general, SMARTe integrates nine key elements: introduction to revitalization; future land use; project participants; economic viability; environmental issues; community involvement; environmental risk management; sources of money; and liability. It contains information, links, best practices and electronic analysis tools that can help

stakeholders work through the very complex revitalization process. For example, imagine an abandoned gas station in an urban area. It is likely that the land is contaminated due to gasoline from leaking underground storage tanks and other types of automotive byproducts (e.g., oil, transmission fluid, etc.). The site is an eyesore for the community. It provides no economic, social, or ecological benefits as it sits idle for months or years. But what can be done? The revitalization process involves many complex issues including vision, strategy, communication, stakeholder involvement, environmental issues, economics, regulations, and liability concerns. It is virtually impossible for the human mind to consider each of these complex topics concurrently. Additionally, each diverse stakeholder group (for example, the affected community, the developer, the local and state governments, surrounding communities, the property owner, and interested investors) involved in the revitalization has a different perspective regarding the site or area. Each group also has different needs and interests.

SMARTe is intended to help stakeholders identify key aspects of a successful revitalization and assist those stakeholders in working together to determine the best reuse option for the site. In order to compile all of the information regarding the complexities of revitalization, and the interests and needs of different stakeholder groups, EPA decided that it needed to create a multi-criteria decision analysis tool that could assist the diverse groups of stakeholders to come to reach agreement regarding the reuse of a site/area.

SMARTe provides an interactive technical guidance program with analysis capabilities developed solely with open-source software employing World Wide Web Consortium (WC3) standards. The open-source philosophy is aimed at sharing information at all levels, gathering and responding to feedback for continuous improvement, and encouraging users to supply functionality and content. For SMARTe this consists of sharing content and all resources, operating a continuous feedback option, and encouraging users to submit case studies that can be shared with the SMARTe community of users.

SMARTe DEVELOPMENT TEAM

SMARTe is being cooperatively developed by the U.S. EPA's Office of Research and Development and Office of Brownfields Cleanup and Redevelopment, the German BMBF, ITRC, and other experts including those from universities, local governments, lawyers, developers, community groups, private consultants and regulators. All users are invited to give continuous feedback at www.smarte.org and are therefore also considered part of the development team.

SMARTe DEVELOPMENT APPROACH

Development of SMARTe follows a phased approach in which SMARTe components are built with each phase of development. The phases of development start, for each component of SMARTe, with relatively simple textual information and access to databases, followed by stand-alone analysis tools that support each component of SMARTe, and then completed by integrating all components using a multi-criteria decision analysis engine. SMARTe will evolve according to user needs and (explain why no end dates)

Phase 1 (2003 and beyond) Transfer of Information and Resources: The first phase focuses on content, information and guidance so that the scope of brownfields revitalization efforts is covered, information is made available for brownfields practitioners and stakeholders on each aspect of the brownfield revitalization process, and the decision support tool is structured to accommodate adding analysis tools that will enhance the capabilities of SMARTe.

Phase 2 (2005 and beyond) Interactive Tools and Templates: Phase 2 involves building stand-alone tools to support each of the components that are included in the SMARTe structure in Phase 1. For example, the revitalization strategy components are supported by drawing templates and tools for visualizing the revitalization or redevelopment options. Environmental components are supported by analysis tools for graphical and statistical analyses for site characterization and monitoring data, human health and ecological risk assessment, fate and transport modeling, and selection of remediation options. Economic and social components are supported by economic models that track market and non-market costs and benefits, stakeholder selection, and stakeholder involvement methodology tools.

Phase 3 (2007 and beyond) Expert System/Data Analysis: Integrating all the tools and templates into an expert system with data analysis capabilities that will allow users to evaluate future reuse scenarios and print out a revitalization plan based on their inputs and decisions. This includes expert system components that help the user sort through the many different options, costs and benefits that could be considered, and a multi-criteria decision analysis integrator that captures the total costs and benefits of a completed user-supplied application.

Joint U.S. and Germany workshops on the various components of brownfields redevelopment bring together recognized "experts" from Germany and the U.S. These workshops provide a comprehensive and practical foundation for SMARTe.

EPA, ITRC, and BMBF selected Model Projects that have had significant impact on the local economy, environment, and/or community. Model Projects are completed or nearly completed revitalization efforts that provide best practice examples regarding the important links between the social, economic, and environmental aspects of brownfields projects, including financing, cleanup, marketing, and land reuse issues.

Beta Projects are brownfield projects that are in the beginning stages of site redevelopment or that have encountered an obstacle preventing the project from moving forward. EPA selected two model project personnel to identify potential beta projects where SMARTe might be applied. It is anticipated that additional beta projects will be selected by EPA, ITRC, and BMBF. Beta projects will provide feedback on the usefulness and usability of SMARTe along with providing input regarding future tools.

New information received through workshops, model projects, and beta projects, in addition to the open literature, participation in national and international conferences, experts, and review comments are incorporated into the appropriate tools within SMARTe. Feedback from the user community and quality assurance through internal testing and user participation has driven the creation of user-tailored templates, and the software has been designed to allow easy incorporation of new modules as they become available.

SMARTe STRUCTURE

SMARTe is intended to be used by both technical and non-technical stakeholders. It is built so that users can begin on a non-technical level and progressively access more technical information or, for more technical users, technical tools can be accessed directly. SMARTe integrates key elements of revitalization including: an introduction to revitalization; future land use; project participants; economic viability; environmental issues; community involvement; environmental risk management; sources of money; and liability. There are links to model project descriptions that include previous and future use information and key contacts for additional details.

The searchable databases of cleanup and characterization technologies provide information on technologies that can be used to support environmental activities during the revitalization process. Users can search for characterization, remediation, or long term monitoring technologies based on a contaminant/media combination or on a site's historic use (for example, a gas station). Such information on site characterization, removal or mitigation of contamination and monitoring of contaminants can provide the SMARTe user with a wide array of applicable approaches. Each of these information databases includes both traditional and new or innovative technologies for solving environmental problems.

SMARTe, at its full capability, will combine the power of the Internet with analysis and presentation tools that can be used interactively to build decision models for solving revitalization problems. Specifically, it will include tools for:

- Identification of land use, revitalization and risk management options
- Environmental modeling (inventory, source release, fate and transport)
- Human health and ecological risk assessment
- Economic analysis, which includes market costs and benefits associated with revitalization, including insurance, tax incentives, the cost of money, return on investment, etc.
- Financing, including public and private sector options from grants to loans
- Social analysis, including tools that can translate potential costs and benefits (for example, quality of life, sense of place, etc.) into market values
- Ecological analysis, which includes revitalizing a potentially contaminated site in lieu of using more green space; using “green materials” in construction; preserving a wetland; etc.

Implementing and integrating these tools provides stakeholders with a decision support tool that will allow them to evaluate various revitalization alternatives. Using an iterative approach with extensive communication and discussion, stakeholders can use SMARTe to identify and evaluate optimal revitalization options.

SMARTe STATUS

The tools and resources within SMARTe continue to be tested and expanded for the broadest possible application. We anticipate at least annual revisions and improvements to this site, with the full decision support capabilities not being fully available until October of 2007.

The current version of SMARTe, Beta Test Version 2.0 is currently available for beta testing at www.smarte.org or through the ITRC website (www.itrcweb.org) on the Brownfields Team public page. Version 2.0 includes a variety of tools as well as basic functional components of SMARTe (for example, search functions and feedback capability). In its final form, SMARTe will be a cohesive, integrated presentation of the information and tools.

The components listed below have been completed and are currently under going beta testing:

- Databases of cleanup and characterization technologies
- QA Review Cycle, including internal testing, peer review (for example, ITRC) and EPA review
- Best Practices
- Public participation methodology tool
- Potential stakeholder tool
- Land reuse options
- Feedback capability
- SMARTe navigation tutorial
- SMARTe text search function
- Financing resources table
- Site characterization data analysis
- Monitoring data analysis
- Human health risk calculator
- Market costs calculator

SMARTe FUTURE ACTIVITIES

Future activities include on-going beta testing, continuous user feedback, and annual updates to add tools and address comments. Future versions of SMARTe will expand on additional revitalization subject areas such as: rural areas; mine-scarred lands; methamphetamine production sites; regional and local land use planning; green buildings/materials; energy conservation; and long-term stewardship.

The following list of components is scheduled for completion by May 1, 2006. The review process will commence with Beta Test Version 3.0 being made available to the public in October 2006. These components include numerous additional tools and calculators. These components are designed for both new stakeholders to the revitalization process as well as experienced practitioners.

- Additional revitalization checklists (For example, How to hire a consultant, property acquisition checklist)
- Technology database search function
- Best Practices search function
- Reuse scenario templates (drawings)
- Community benefits plan template
- Regulation access function
- Site characterization sampling design tool
- Human health risk screening calculator
- Human health risk assessment and modeling interface
- Ecological risk screening calculator
- Monitoring design template
- Market Analysis Template
- Tool for identifying financing opportunities based on non-market benefits
- Valuing tool for non-market benefits, including: community benefits, quality of life, environmental justice, impact on crime rates, cultural heritage, ecosystem protection and restoration, removing stigma
- SMARTe prototype
- Database of links and related documents
- SMARTe case study template
- Information needs and sampling design tool linked to the risk assessment
- Tool for determining relevance of human health risk numbers in regulatory context (local, state, and federal)
- Tool for incorporating project vision into human health risk assessment
- Tool for evaluating monitoring options
- Tool for determining relevance of monitoring results in regulatory context (local, state, and federal)
- Tool for capturing the costs/benefits of risk reduction vs. the cost of the monitoring options
- Multi-criteria decision analysis tools addressing:
 - Market cost and benefits and non-market costs and benefits
 - Decision analysis for financing tools and stakeholder involvement
- Tool for characterizing non-market costs and benefits
- Tool for comparing the cost of collecting additional site assessment data and the associated reduction in risk uncertainty
- Tool for comparing all decision options (revenues, development costs, financing, remediation, monitoring)

By May 1, 2007, the expert systems, multi-criteria decision analysis components of SMARTe will be fully functional. The review process will commence with Beta Test Version 4.0 being made available to the public in October 2007. These features incorporate the following new components.

- Access to other documents relevant to SMARTe users
- Fate and Transport Calculator with modeling interface
- Fate and Transport Calculator sensitivity analysis and uncertainty analysis
- Human Health Risk Assessment Calculator sensitivity analysis and uncertainty analysis
- Ecological Risk Assessment Calculator with modeling interface
- Ecological Risk Assessment Calculator sensitivity analysis and uncertainty analysis
- SMARTe Search

- Link SMARTe Templates to SMARTe multi-criteria decision analysis function
- Implement feature linking characterization choices into SMARTe multi-criteria decision analysis function
- Tool for model choice and parameter choice
- Feature linking modeling choices into multi-criteria decision analysis function
- Feature for determining relevance of ecological risk numbers in regulatory context (local, state, and federal)
- Feature for translating project vision into ecological risk assessment with potential links to risk databases
- Feature for characterizing remediation options (for example, natural attenuation, removal, containment, treatment)
- Feature for capturing the cost/benefits of risk reduction vs. the cost of the remediation options and linking to SMARTe multi-criteria decision analysis function
- Feature for updating probability distributions as new information becomes available

SUMMARY

Continuing research on contaminant remediation and land revitalization at EPA's Office of Research and Development's National Risk Management Research Laboratory has facilitated the creation of an expandable decision support system called SMARTe. With 450,000 potential brownfields in the U.S., and countless more such sites worldwide, the contaminant scenarios and reuse options are anticipated to be wide-ranging and confounding. Without a knowledge base of successful brownfields reuse approaches, decision makers, stakeholders and environmental professionals would have to "reinvent the wheel" when investigating redevelopment options at each site.

SMARTe is a unique environment for decision management. It combines aspects of guidance, help and expert system advice, with emphasis on presentation style, sharing of and accessibility to information, and decision analysis functionality. The goal is to provide an effective visualization tool for stakeholder consensus building. SMARTe contains resources and analysis tools for all aspects of the revitalization process: planning, environmental risk management, economic viability, and social acceptance. It is a holistic decision analysis system that integrates these aspects of revitalization while facilitating communication and discussion among all stakeholders through its presentation and document publishing capabilities. SMARTe combines the power of the internet with analysis and presentation tools that can be used interactively to build decision models for solving revitalization problems.

By combining access to information and data with environmental risk and economic analysis tools, SMARTe will enhance the decision making process and help stakeholders develop written business plans that can become marketing tools for their site. By providing potential solutions for sites where many obstacles and few benefits are perceived (that is, facilitating the reuse of contaminated sites), SMARTe will promote successful, long-term brownfields revitalization.