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## **Performance Planning and Measurement for DOE EM-International Technology Integration Program**

A Report on a Performance Measurement  
Development Workshop for  
DOE's Environmental Management  
International Technology Integration Program

Gretchen B. Jordan, John H. Reed, L. Devon Wyler

Prepared by  
Sandia National Laboratories  
Albuquerque, NM 87185 and Livermore, California 94550  
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# Performance Planning and Measurement for DOE EM-International Technology Integration Program

A Report on a Performance  
Measurement Development Workshop

for

DOE's Environmental Management  
International Technology Integration Program

Gretchen B. Jordan  
John H. Reed (Contractor)  
L. Devon Wyler

Energy Policy and Planning Department  
Sandia National Laboratories  
Albuquerque, NM 87185-0749

## ABSTRACT

This report describes the process and results from an effort to develop metrics for program accomplishments for the FY 1997 budget submission of the U.S. Department of Energy Environmental Management International Technology Integration Program (EM-ITI). The four-step process included interviews with key EM-ITI staff, the development of a strawman program logic chart, and all day facilitated workshop with EM-ITI staff during which preliminary performance plans and measures were developed and refined, and a series of follow-on discussions and activities including a cross-organizational project data base. The effort helped EM-ITI to crystallize and develop a unified vision of their future which they can effectively communicate to their own management and their internal and external customers. The effort sets the stage for responding to the Government Performance and Results Act. The metrics developed may be applicable to other international technology integration programs. Metrics were chosen in areas of eight general performance goals for 1997-1998: (1) number of forums provided for the exchange of information, (2) formal agreements signed, (3) new partners identified, (4) customers reached and satisfied, (5) 6) dollars leveraged by EM technology focus area and from foreign research, (7) number of foreign technologies identified for potential use in remediation of DOE sites, and (8) projects advanced through the pipeline.

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## Executive Summary

This report describes an on-going effort by DOE's Environmental Management International Technology Integration Program (EM-ITI) to develop an annual performance plan and performance measures. The immediate goal of this effort was to develop a FY1997 budget submission and to tell the story of EM-ITI's activity in that context. The effort also serves to help EM-ITI develop and crystallize a unified vision of its future which it is then able to effectively communicate to its management and its internal (EM) and external customers. This effort sets the stage for responding to the Government Performance and Results Act (GPRA) for the FY 1998 budget.

This performance development effort is being supported by the Energy Policy and Planning Department of Sandia National Laboratories. The process of developing the performance plans and measurements included interviews with key EM-ITI staff, the development of a "strawman" program logic chart by Sandia personnel, an all day workshop with EM-ITI staff facilitated by Sandia personnel during which preliminary performance plans and measures were developed and refined, and a series of follow-on discussions and activities to continue the process.

The process resulted in EM-ITI personnel identifying five major group activities: gathering information and characterizing markets, disseminating market and program information, building partnerships and infrastructure, identifying and developing technology transfer mechanisms, and assisting demonstration and technology transfer projects. Through these activities, EM-ITI will help create foreign partnerships, identify, select, demonstrate and transfer innovative foreign environmental management technologies for use in the DOE complex, and identify markets for EM technologies. A program logic chart reflecting this was developed.

In response to the workshop, an activity data base was developed to allow the relationship of EM-ITI activities, projects and objectives to be viewed in different ways. One of the keys to demonstrating progress in helping DOE complete its environmental clean-up, faster, better and cheaper, is to observe and measure progress within a project. This can be a particular challenge for projects which span multiple years and for which the immediate benefits are not easily quantifiable. Thus, measuring interim progress in these projects becomes key. To this end, a project "pipeline" was developed. Project advances can be described in terms of movement through the pipeline.

Eight general performance goals were established for 1997/98. Based on these goals, preliminary measures of performance for the group's activities were identified in terms of outputs, reach and results. An example of an output is the number of workshops and technical meetings conducted. An example of reach is the number of focus areas, governmental agencies, private companies and international organizations who are users and/or participants in the technology development process. An example of a result is reduced dollars required for clean-up.

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Additional activities that can be pursued to develop the performance measurement process include:

- further refinement of the strategic goal and annual progress goals, goal areas and related performance indicators;
- identification of data collection methods for the performance indicators and developing and implementing data collection plans and data analysis procedures;
- identification of mechanisms for communicating program goals and the availability of services to internal management, other EM organizational units, and external organizations; and
- identification of areas for program improvement and/or more focused evaluations based on assessment of performance data.

# Performance Planning and Measurement for DOE EM-International Technology Integration Program

## Purpose of this report

In March 1996 the EM-International Technology Integration Program (EM-ITI) began a series of exercises to develop an annual performance plan and performance measures. These exercises are being supported by the Energy Policy and Planning Department staff of Sandia National Laboratories. This report describes the initial steps that have been taken, reports the outcomes of these steps and suggests additional steps that can be taken to build on these early successes to produce a performance plan, performance measurement, and plans for performance improvement.

## The initial activities

Typically, performance planning involves work groups in an iterative process. To successfully complete a performance planning process, work groups must identify their customers and their customers' needs and identify the activities that the work unit undertakes or needs to undertake to meet the customers' needs. Work groups specify a set of long term goals which describe what a successful conclusion for their activities might look like and relate these to the mission of the larger organizational units. Also, a set of short term goals which describe the intermediate steps that lead to the longer term outcomes are developed for annual performance planning. The structure of the process can vary but the group must establish both the short-term and long-term goals.

To date, the process with EM has involved four activities:

- a review by Sandia staff of EM literature and publications to identify a preliminary set of questions to be asked of EM-ITI staff and a list of EM-ITI's strategic goals and activities;
- a set of interviews conducted by Sandia staff with EM-ITI staff to gain a better understanding of what EM-ITI does;
- a workshop involving Sandia and EM-ITI staff aimed at taking the first steps toward defining a logic chart and performance measures for EM-ITI activities; and
- a series of follow-up activities aimed at developing a refined program logic chart and performance goals for FY 1997.

## Staff Interviews

A series of one hour interviews was scheduled with all EM-ITI staff. The purpose of the interviews was to introduce the staff to the performance management/planning process, to learn about the roles and responsibilities of the staff, to learn about the major activities of the International Technical Integration Program and to answer any questions that the staff might have about the performance planning process. Prior to the interviews, staff received a letter indicating the purpose of the interviews and stating the key questions to be covered during the interview (See Exhibit 1).

After completing the interviews, Sandia staff analyzed the data from the interviews and prepared draft program logic charts (Exhibit 2). “The [program logic] chart derives its name from its capacity to display that the program’s activities, outputs, and impacts are logically linked to achieve the program’s objective (Corbeil, 1992).” A program logic chart provides a high level view of the activities of an organizational unit, the relationships among the activities, and a description of what the organizational unit produces. The goal in producing the charts for EM-ITI was to create a “strawman” and some additional detail charts which would serve as a point of departure from which members of the organizational unit could develop and refine their own logic chart.

### Exhibit 1. Interview Protocol

Describe your program and your role and responsibilities with respect to the program.

Where does the International Program fit within the hierarchy of DOE and EM programs?

- How do other programs enable your program to achieve your mission?
- How do your programs enable others in DOE/EM to accomplish their mission?

What are the major projects of the International Program? How do they support your program goals?

Who are your partners? In what ways do your partners support your mission?

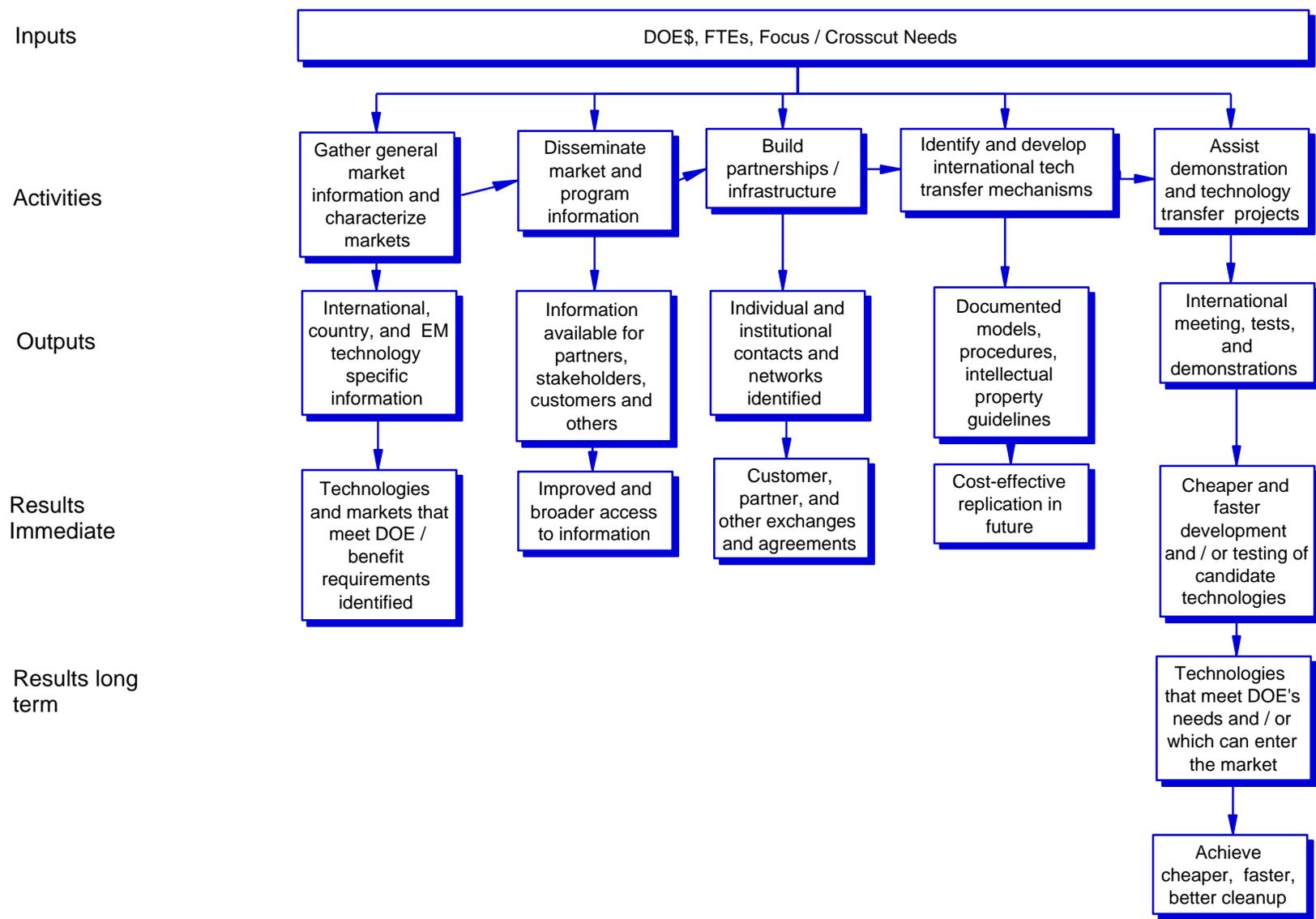
Who are your customers? What are their requirements/needs?

What are you currently measuring? In what ways do you measure service outcomes?

## Logic Charts

The standard layout for a logic chart organizes the major activities of a work unit in columns and defines resources, activities, outcomes and strategic goals in rows (Corbeil, 1986; Corbeil, 1992; Nutter, 1992). The activities are usually organized left to right in the approximate temporal order in which they occur. The work of most organizational units

Exhibit 2. Sandia Staff Version of EM-ITI Program Logic Flow Diagram, March 18, 1996



can be summarized by 3-7 major activities. Based on analysis of data from the initial interviews, Sandia suggested that key EM-ITI activities are:

- gathering information and characterizing markets
- disseminating market and program information
- building partnerships and infrastructure
- identifying and developing technology transfer mechanisms
- assisting demonstration and technology transfer projects.

EM-ITI works with and for the EM Focus Areas, and with the DOE National Laboratories, private industry and its international partners. The 7 EM-ITI Focus Areas are Tanks, Subsurface Contaminants (Integration of Plumes and Landfills), Decontamination/ Decommissioning, Mixed Waste, Characterization, Monitor and Sensor Technology (CMST), Robotics, and Efficient Separations. If EM-ITI activities are successful, EM-ITI will help DOE identify and transfer technologies that are being developed or which now exist in international venues to accomplish DOE's ultimate mission of cleaning up its environmental problems more quickly at a lower cost and with better results. Some examples of the specific EM activities associated with the general activities described above are found in Exhibit 3.

As previously noted, the rows in the logic chart are resources, activities, outputs, intermediate and long term results. The outputs are the immediate results of the activity. For example, they may be completed workshops or the analysis of the data from tests of a technology. Intermediate and long term results focus more on the consequences of the activity. An example of an intermediate result might be the decision, based on test results, to use an environmental technology at a site within the DOE complex. A long term result might be that, in comparison to current approaches, a technology provides a method for cleaning up a site that costs less, enables the site clean-up to be completed sooner, and makes it possible to complete the clean-up with less risk to the workers and the environment. These outcomes

### Exhibit 3. Examples of Specific Activities

Gathering information and characterizing markets

- Identification of EM technologies
- Identification of EM technology needs
- Report on international markets

Disseminating market and program information

- Newsletters
- Russian book
- Internet home page

Building partnerships and infrastructure

- Identify potential international constituents
- Establishing relationships with institutions in other countries

Identifying and developing technology transfer mechanisms

- Developing procedures for establishing intellectual property rights

Assisting demonstration and technology transfer projects

- Organizing technology exchange workshops
- Assisting international visitors
- Demonstrating a Russian separation technology at Idaho National Energy Laboratory

contribute, of course, to the broader DOE goals to eliminate the risks and imminent threats to the environment and public health posed by past departmental activities and decisions, and to be a world leader in environmental technology deployment and application (Fueling, 1994).

Logic charts can be read from the top down or the bottom up. When read from the top down, one reads from resources through activities to long term or strategic goals. The chart can be flipped (bottom-up) and one can start with strategic goals, go to intermediate outcomes and work to resources. People do differ, and some people find it easier to start with goals and work up (they ask, how?) while others may find it easier to start with resources and work down (they ask, why?).

One of the primary goals of the logic chart is to provide a simplified and coherent picture of the program, its elements, and the interconnections among the elements. However, programs, their elements, and the interconnections among the elements are complex human events that seldom occur in neatly ordered patterns. Thus, a logic flow diagram represents a model of a program which may not in every case match what happens. However, it does provide a framework within which the story of a program can be told and performance can be planned, measured, and reported.

For example, the EM-ITI logic chart produced by the Sandia staff suggests a flow from one activity to the next. In reality, a project may start directly with building a partnership, taking advantage of someone's contact or a particular event, and skipping the other steps. A partnership may provide information which may lead to the reassessment of EM's technology needs. An EM demonstration or technology transfer effort provides information which is then disseminated. The identification of the relationships is not so much intended to specify how activities take place as it is intended to indicate a rationale for activities. Ultimately, a partnership must satisfy some need that EM has and it should contribute in some way to the ultimate goal of better, faster, cheaper clean-up.

## Performance Planning Workshop

Developing performance plans and performance measures are activities which have to be completed by organizational units in order to be meaningful. These are best formulated as a group activity rather than as individuals contributing pieces to an overall effort. This is because a key purpose of performance planning is to develop a shared vision of the future and to identify activities that will lead to that future; to develop a common language for describing the vision and the activities within the work unit; and to develop ways of communicating the vision, the activities, and the shared language to people outside the work unit, particularly to those who may control resources that are essential for the functioning of the unit. A well done performance plan communicates what a work unit does, how it does what it does and why. The performance plan also identifies activities which are the basis for budget projections. Finally, the performance plan is the basis for creating measures of performance.

The EM team began the initial stages of a performance planning exercise on March 20 at a team workshop in Coolfont, West Virginia. The major goal of the workshop was to refine the rationale for EM-ITI and to establish the 1996 and 1997 activities within that rationale. A series of activities was structured by Sandia personnel to aid the accomplishment of this. Exhibit 4 presents the agenda for the Workshop.

One of the first activities was to present to the participants the strawman logic charts for the EM-ITI program developed by Sandia staff. The group was then formed into two working groups and asked to identify where they as individuals fit into the scheme and, on the basis of their experience, critique the existing charts and develop an improved version.

The two groups chose to operate in slightly different ways. One group, Group A, chose to modify the chart. The second, Group B, chose to identify activities that fell within the EM Technology Integration goals (shown in Exhibit 5).

Exhibit 6 illustrates the new version of the logic chart produced by Group A. Group B produced the goals shown in Exhibit 7.

Several major points emerged from the group discussions:

- EM-ITI's goal is to support EM's effort to complete the domestic clean up faster, cheaper, and better and, where feasible and appropriate, use foreign technologies to aid that clean up.
- The need for EM-ITI to show how their overall activities are tied to the EM-50's technology integration goals was emphasized. The use of EM-ITI developed information to support decision-making was also emphasized. Presumably better decisions means making optimal technology choices among existing and potentially available technologies based on criteria such as cost, effectiveness, and the amount of time required. EM-ITI's contribution most likely would be to increase the pool of remediation technologies from which to choose and to increase the pool of methods for analyzing sites.
- With some clarification, it was agreed that the five activities identified in the Sandia logic flow chart represented the major elements of the program.

#### Exhibit 4. Performance Measurement Workshop Agenda

Coolfont, WV  
March 20, 1996

- Why are we here?
- The logic behind the EM-ITI program
- Group exercise and presentations: Improve draft logic charts
- Group suggestions shared
- Confirm EM-ITI logic charts
- Match near-term activities to the EM-ITI logic chart
- Choose a balanced set of measures
- Group exercise: Writing good performance goals, starting with FY 1997
- Double-check EM-ITI's critical few performance measures
- Next steps and action items

- The initial Sandia version of the logic flow diagram indicated a directional path from left to right. While that may describe the path of some activities, some projects may include only some of the activities, and the ordering of activities is not necessarily that shown on the chart. Group A introduced bi-directional arrows to suggest the greater complexity of real world activity.
- Characterizing needs includes both characterizing or understanding EM's technology capabilities and needs to expedite clean-up and identifying international markets and the environmental technology capabilities and needs in international markets.
- Building partnerships includes international partnerships, inter-agency partnerships — including linkages with State, Commerce, EPA, and state regulatory agencies, for example — and intra-agency contacts, for example, contacts with EM-30 and EM-40 and other parts of EM-50.

During the afternoon workshop session, the group began to interpret their list of activities within the framework of the revised logic flow diagram. The group assigned their projects to activity areas and organized these by region. Exhibit 8 displays the result which:

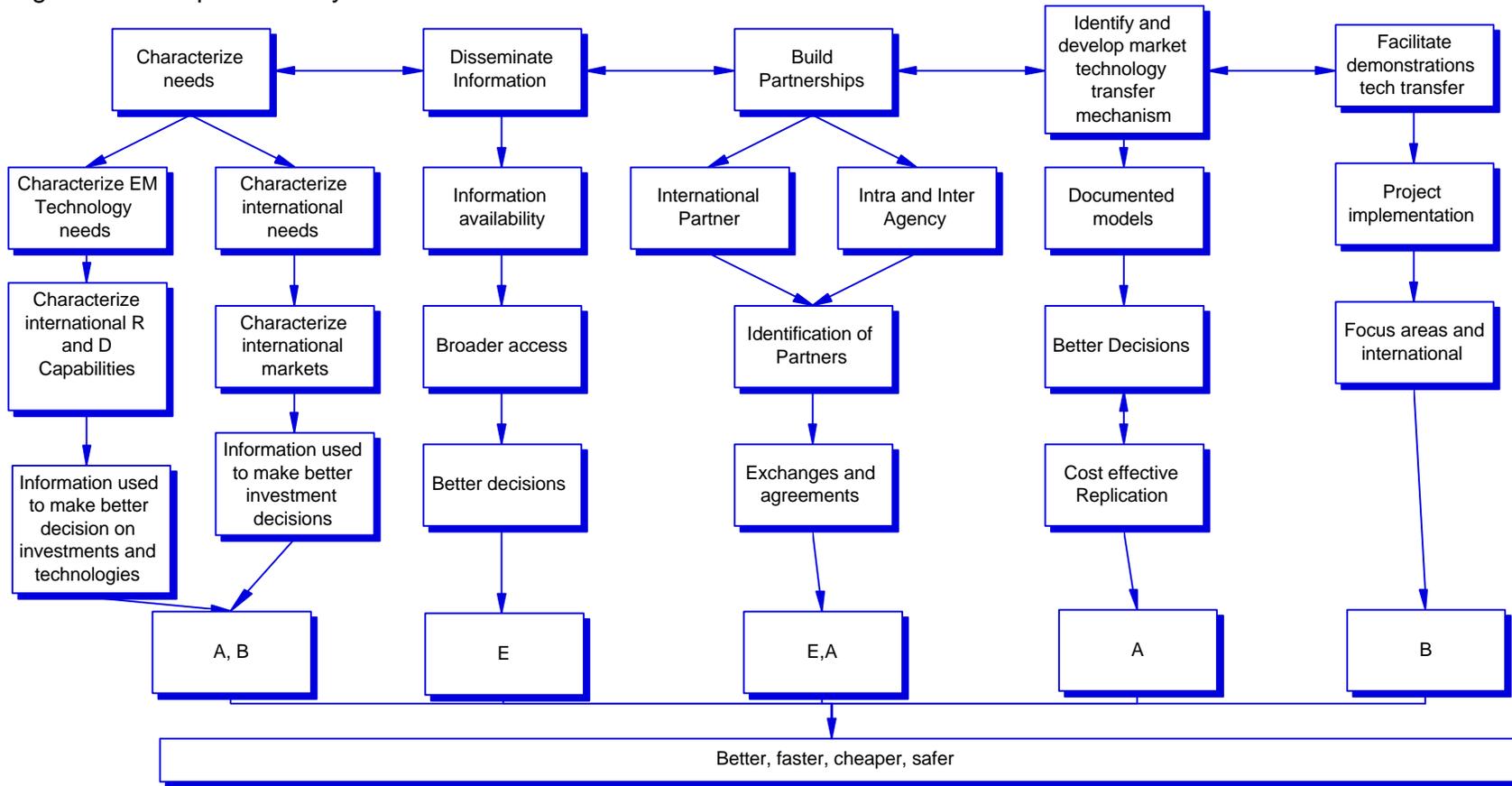
- Helps to demonstrate the rationale for the various activities.
- Shows the distribution of projects across activities. For example, there are market and technology characterization activities occurring but also technology demonstrations taking place.
- Shows how activities are distributed by international region.

#### Exhibit 5. EM-50's Technology Integration Goals

- Provide a technology selection and acceptance process using life-cycle cost engineering leveraging existing technologies wherever possible
- Facilitate regulatory reform to reduce the cost of demonstrations, accelerate regulatory approvals, and enhance the commercial environment
- Promote private sector deployment of improved technologies at DOE sites
- Promote performance based procurements
- Ensure that tribal and public sector viewpoints and assessments are integrated in the EM technology decision process

### Exhibit 6. Group A's revised logic chart

Logic flow chart produced by Team A at Coolfont March 20



- A. Provide a technology selection and acceptance process using life-cycle cost engineering
- B. Facilitate regulatory reform to reduce the cost of demonstrations, accelerate regulatory approvals, and enhance the commercial environment
- C. Facilitate private sector deployment of improved technologies at DOE sites
- D. Promote performance based procurements
- E. Ensure that tribal and public sector viewpoints and assessments are integrated into the EM technology decision process

## Exhibit 7. Goals Established by Work Group

Goal A\*: Contribute to the technology selection /acceptance process

Outcome: Help EM Focus Areas make better decisions

- Foreign technology identification process
- International partnerships – better information (accurate, timely)
- Identify the cross-cut technology needs of the Focus Areas
- Expand/get earlier data on specific technologies performance
- Identify analogs of US problems elsewhere so we can understand US problems better and apply foreign perspectives /understanding to EM sites
- Ensure decision makers have the information that they need

Goal C\*: Facilitate private sector deployment of improved technology at DOE sites

Intermediate outcome: US commercial sector is aware of opportunities

Outcome: Better, faster, cheaper clean-up

- Facilitate US global competitiveness
- Tech transfer mechanisms
- Intellectual property rights, licensing, patents
- Market assessments (“pull”, i.e., US market overseas)
- Technology demonstrations

Goal A\*: Assist the Focus Areas in leveraging R & D funds by identifying additional technology and expertise

Outcome: Leveraged \$, technical knowledge

- Cooperative R & D projects
- Overseas demonstrations
- Interagency and Intra agency cooperation
- Conferences/workshops
- Multi/bilateral agreements (management and identification)
- Participation with international organizations
- Scientific exchange

\*The letter for the goals in this exhibit relate to the EM Technology Integration Goal stated in Exhibit 6

## Beyond the Workshop

A number of steps have been taken to continue the development of performance measures and to begin to address issues of performance improvement subsequent to the workshop.

### Development of a program database

The data in Exhibit 8 were entered into a database that can be manipulated to show different views of ITI’s activities. The database is intended as a tool to help EM-ITI

Exhibit 8. EM-ITI projects by activity and region for 1996

	Characterize Needs	Identify Tech Transfer Mechanisms	Disseminate Information	Build Partnerships	Facilitate Tech Demonstration and Transfer Projects
Former Soviet Union	<ul style="list-style-type: none"> <li>• Technical Exchange Workshops</li> <li>• JCCEM Process</li> </ul>	<ul style="list-style-type: none"> <li>• Russian patents</li> <li>• Melter commercialization</li> <li>• Intellectual property rights process</li> <li>• Import Issues</li> </ul>	<ul style="list-style-type: none"> <li>• Journal Articles/ Red Book</li> <li>• Workstations</li> <li>• Technical reports</li> <li>• Foreign trip reports</li> <li>• Conf~Spectrum</li> </ul>	<ul style="list-style-type: none"> <li>• MINATOM</li> <li>• Environmental Management Moscow</li> <li>• RAS</li> <li>• JCCEM/MOC</li> <li>• Student exchanges</li> </ul>	<ul style="list-style-type: none"> <li>• Cobalt dicarbide</li> <li>• Multi-packer well tests</li> <li>• Separations post doctorate</li> <li>• Approximately 20 loop R&amp;D projects</li> <li>• Copper ferrocyanide demonstration</li> </ul>
CEE	<ul style="list-style-type: none"> <li>• Technology identification</li> <li>I. Spectrum</li> <li>II. Warsaw 96</li> <li>• Market identification</li> <li>III. Warsaw 96</li> <li>IV. Polish characterization</li> </ul>	<ul style="list-style-type: none"> <li>• Performance data</li> <li>• Liability issues</li> <li>• Intellectual property rights process</li> <li>• Project Der. Process</li> <li>• OD Model</li> </ul>	<ul style="list-style-type: none"> <li>• Warsaw 96</li> <li>• Focus areas annual program review</li> <li>• Poland brag book</li> </ul>	<ul style="list-style-type: none"> <li>• IETU</li> <li>• Memorandum of Cooperation with Czechoslovakia and Croatia</li> </ul>	<ul style="list-style-type: none"> <li>• PL ESC</li> <li>• PL Remediation</li> <li>• PL Biomarkers</li> <li>• PL Phyto</li> <li>• PL Risk Assessment</li> <li>• Czechoslovakian Sap Project</li> </ul>
Argentina	<ul style="list-style-type: none"> <li>• D&amp;D Workshop</li> <li>• Soil &amp; ground water characterization</li> <li>• Various Market Assessments</li> </ul>	<ul style="list-style-type: none"> <li>• Intellectual property rights process</li> </ul>	<ul style="list-style-type: none"> <li>• Communique</li> </ul>	<ul style="list-style-type: none"> <li>• Argentina Nuclear Energy Commission</li> <li>• Memorandum of Cooperation</li> <li>• Hemispheric Center</li> </ul>	<ul style="list-style-type: none"> <li>• Scientist Exchange</li> </ul>
Mexico	<ul style="list-style-type: none"> <li>• New Mexico Conference</li> <li>• Market Assessments</li> <li>• ORNL Bioremediation Project</li> </ul>		<ul style="list-style-type: none"> <li>• New Mexico Conference</li> <li>• Computer Workstation</li> </ul>	<ul style="list-style-type: none"> <li>• CEQ</li> <li>• BECC/ NADB</li> <li>• Inter/ Intragency</li> <li>• Trade Association</li> </ul>	<ul style="list-style-type: none"> <li>• ORNL Bioremediation Project (Plumes)</li> <li>• Scientific Exchange</li> </ul>
Asia	<ul style="list-style-type: none"> <li>• Market Assessments</li> <li>V. Korea</li> <li>VI. China</li> </ul>	<ul style="list-style-type: none"> <li>• IPR Process</li> <li>I. China</li> </ul>	<ul style="list-style-type: none"> <li>• Conferences</li> <li>I. Pacific Rim</li> </ul>	<ul style="list-style-type: none"> <li>• People's Republic of China Delegation</li> <li>• Embassy</li> </ul>	

track, measure, explain and plan its activities. For example, the data can be transformed to show projects in relation to focus areas. Similar tables can be constructed for the projected activities in 1997 and 1998 and how they might relate to the larger mission of the group. The data include the name of each activity, a description of the activity, the focus or cross cutting area(s) to which the activity was applicable and whether that focus area was active with EM-ITI staff.

Activities are categorized by the main headings from the logic chart, by international region, by technology integration goal being met by the activity (Exhibit 5), and contributions to measures of success. Further development and refinement of the database is underway.

### **Establishing a strategic goal and annual progress goals**

The EM-ITI has not yet formalized a strategic goal for five to seven years. However, the EM-ITI staff have made progress toward defining one.

A strategic goal provides a succinct statement, for the group and for others, of the activities to be completed and the expected result if the group is successful in its endeavors. The EM-ITI staff has identified its key activities and they are keenly aware that their activities need to contribute in measurable ways to a faster, cheaper, and/ or safer clean-up. Exhibit 9 illustrates what a strategic goal might look like.

### **Developing annual performance goals**

Since the workshop, EM-ITI, as part of its budget exercise, has attempted to formulate annual progress goals for FY 1997/98. Year-to-year progress needs to be captured through a finite number of measures. A preliminary list of measures identified by EM-ITI and Sandia staff are shown in Exhibit 10. These were developed based upon the strawman measures developed for the workshop and workshop discussion.

One of the difficulties in developing annual progress goals is to create goals that demonstrate that EM-ITI is helping to move EM and DOE toward the goal of a faster, safer, better clean-up by facilitating the transfer of technology to and from foreign countries. Performance goals are often stated in general terms, for example, "In 1997, we will facilitate 10 technology demonstrations." The difficulty with such statements is that

### **Exhibit 9. An example of a possible strategic goal for EM-ITI**

In collaboration with US and international technology experts and organizations, the International Technology Integration group will help to create foreign partnerships and help to identify, select, demonstrate and transfer X innovative foreign environmental management technologies for use in the DOE complex, such that by the year 2002 these technologies, in comparison to similar 1995 technologies, will reduce the estimated cost of clean up by Y% and/or will reduce the elapsed time to complete the clean-up by Z%.

they do not give any sense of movement or closure. Such statements tell little about how many projects are new, how many are continuing, or the completion rate and expected outcomes of projects. Only some projects will lead to technologies that will reach commercialization and actually be adopted for use.

One way to surmount this counting problem is to create a model “pipeline” of how projects progress and, on an annual basis, relate projects to the model and report their movement through the pipeline. Such a model should be viewed as heuristic. Specific projects may have different degrees of “goodness-of-fit” to the model, but the model can help to convey an understanding of where a particular activity may fit in the larger scheme of things. Further, projects may start at various places in the pipeline and there may be some iterations between steps.

EM-ITI’s “pipeline” is shown in Exhibit 11 and was developed in consultation with various EM-ITI staff. The first three stages represent activities aimed at building partnerships. The middle stages lead to products that EM-ITI produces, information, technologies that are demonstrated and ready for commercialization, and methods of accomplishing technology transfer activities which can be replicated in new situations and by other agencies. EM-ITI does not conduct demonstration and testing but it provides the infrastructure that is essential to completing demonstrations and testing.

The model enables EM-ITI to describe its activities in process terms rather than in terms of static counts. For example, instead of saying that there will be 10 demonstrations in 1997, EM-ITI can say that they will provide resources so that two new demonstration projects can be initiated, 5 demonstrations can be continued from 1996, and three projects can be closed with 2 projects resulting in technologies available for commercialization. A statement such as this gives a much better sense of accomplishment.

There is additional value in defining performance in process terms. Ultimately, the goal of performance planning and performance measurement is performance improvement. By identifying performance in terms of movement through a process, EM-ITI staff will be able to better identify areas in need of improvement. For instance, if technologies are failing to reach the commercialization stage in a reasonable amount of time, then it is appropriate to ask why. There are many possible answers. The technology selection might not be good. It might be difficult to complete the technology development and testing cycle because of infrastructure problems. The ability to identify barriers will enable EM-ITI and/or EM to apply appropriate resources to remedy the problem.

Exhibit 12 provides a more detailed view of the specifics of the performance measures that EM-ITI is developing.

Based on the workshop efforts and the subsequent follow-up, EM-ITI and Sandia staff have revised EM-ITI’s logic flow diagram. The current version of the diagram is shown in Exhibit 13. There are a number of critical differences between this and the version of the chart shown in Exhibit 6.

- The activities have been reordered.
- The column for building partnerships has been simplified by combining the intranational and international partnerships and focusing it more directly on visits and delegations, the outcome of which are agreements, personnel exchanges and leveraged project opportunities.
- The outputs of the characterization step result in technical concepts and papers and information which can be used for more informed decision making.
- Disseminating information has been more broadly cast as providing “information forums” so that it can include gatherings which are an important part of EM-ITI’s activities as well as the production and dissemination of the electronic and printed word.
- The outputs for technology transfer models has been specified more clearly.
- Demonstration project activity has been specified so that the role of the focus areas is now apparent and outputs such as agreements and patent rights clearly called out.
- The link to EM’s technology integration goals are spelled out.

Based on this logic chart, and EM-ITI’s developing performance measures, an attempt has been made to revise the key performance measures by activity type. Exhibit 10 shows potential measures that might be associated with resources, outputs, reach, and results. The resources are the time and money required to undertake the activities. Outputs are the immediate results of the activities. Reach speaks to the degree to which an activity engages customers and/or partners. Results are the longer term outcomes resulting from the outputs. This matrix will assist EM-ITI staff in refining its key performance measures by activity area.

Exhibit 10. Some preliminary performance measures for EM-ITI, April 12, 1995

	Build Partnerships	Characterize Needs and Capabilities	Provide Information Forums	Identify Technology Transfer Models	Facilitate R&D Demonstrations, Transfer Projects
Resources	\$\$, time	\$\$, time	\$\$, time	\$\$, time	\$\$, time
Outputs	# of MOUs/MOAs # of delegations hosted	# of reports	# publications # homepages and linkages # of forums # of conferences	# of reports # of models formalized	# workshops and /or technical meetings # of projects
Reach	# of focus and cross cutting areas who are project partners # of other governmental agencies and private sector companies who are project partners # of agencies and countries who are project partners	# of focus areas, governmental agencies, private companies, international organizations, who are users and/or participants	# of focus areas, governmental agencies, private companies, international organizations, who are users and/or participants	# of agencies, projects or focus areas using the models # of projects with active focus area participation	# of projects with active focus area participation # of projects in key international regions
Results	# of new technology projects % of partners satisfied or very satisfied	# of technology projects initiated % of customers satisfied or very satisfied	# of new actions resulting from forums % of customers satisfied or very satisfied	Improved efficiency for establishing, transferring, and maintaining resources % of customers satisfied or very satisfied	# of projects making advances \$\$ invested by focus areas Reduced time to clean up Reduced dollars required for clean-up % of customers satisfied or very satisfied

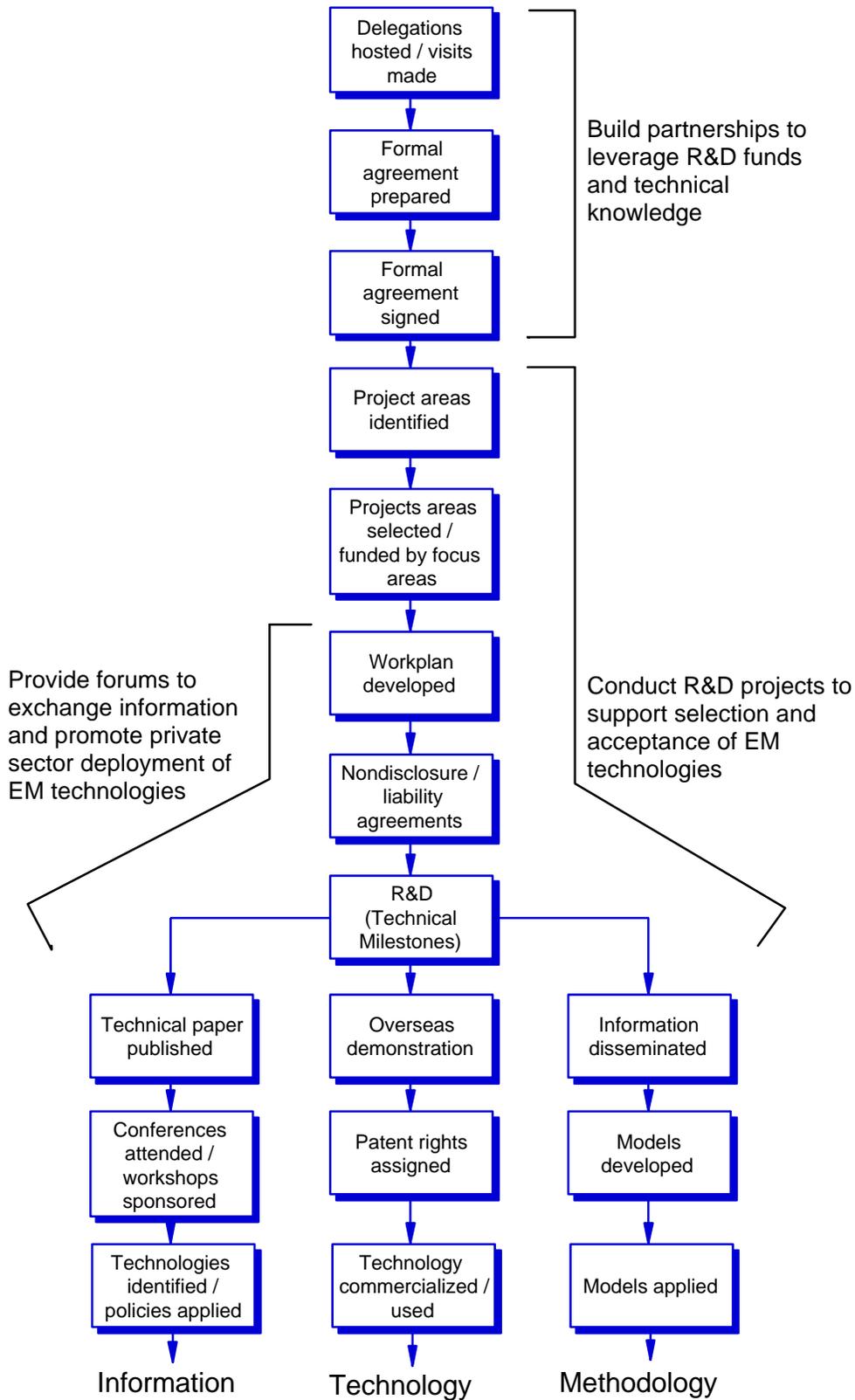


Exhibit 11. EM-ITI's Project Pipeline

## Exhibit 12. More detailed description of EM-ITI's proposed 1997/8 progress goals

### Outputs

#### **Number of forums provided**

In 1996 EM-ITI provided 16 forums for the exchange of information and new data that address the needs of the focus areas and encourages private sector deployment of international technologies for DOE clean-up. These 16 led to 10 follow-up actions, e.g., new meetings scheduled, new projects identified, etc. In 1997, EM-ITI anticipates an equal number of forums.

#### **Formal agreements signed**

The signing of formal agreements (MOUs, MOAs, MOCs, and other formalized relationships) presage the creation of new information, technology or methodologies. Formal agreements are the basic vehicle for the work of the EM-ITI. In 1997, two new formal agreements are anticipated from four potential sources, Argentina, Mexico, Department of Commerce, or Department of Defense)

#### **New partners identified**

Identifying new partners is the first step toward creating formal agreements. In 1997, EM-ITI anticipates two new partners, possibly Australia because it has site remediation problems similar to those in the US; China because the economic, political and remediation opportunities are substantial; and/or EPA because their assistance would be of value in applying performance data from overseas demonstrations to the US.

### Reach

#### **Customer reach and customer satisfaction**

In 1997, EM-ITI will attempt to develop baseline measures for how well it is reaching and satisfying its customers: EM-50 focus areas, other DOE/EM departments, US companies, international organizations and institutes, and other US government agencies. Sources for potential measures include interest in the program as expressed through inquiry cards in newsletters and other publications, workshop surveys and questionnaires and independent interviews with key customers. These data will provide a basis for measuring improvement in 1998 and for setting goals in 1999.

#### **\$\$ Leveraged by focus area**

This is the total dollars available from the focus areas and other sources for research and development outside the US or for demonstrating foreign technologies in the US. The total dollars invested are an indicator that clients find value in the projects identified by the EM-ITI and are leveraging their efforts. In 1996 the focus areas invested approximately \$3 million in international projects. A similar investment is anticipated in 1997.

## Exhibit 12. Continued

### Results

#### **Number of foreign technologies identified**

In 1996, EM-ITI undertook a major effort that identified 20 foreign technologies of potential use in the remediation of DOE sites. In 1997, a smaller but similar effort is anticipated to identify five additional technologies.

#### **\$\$ Leveraged from foreign research**

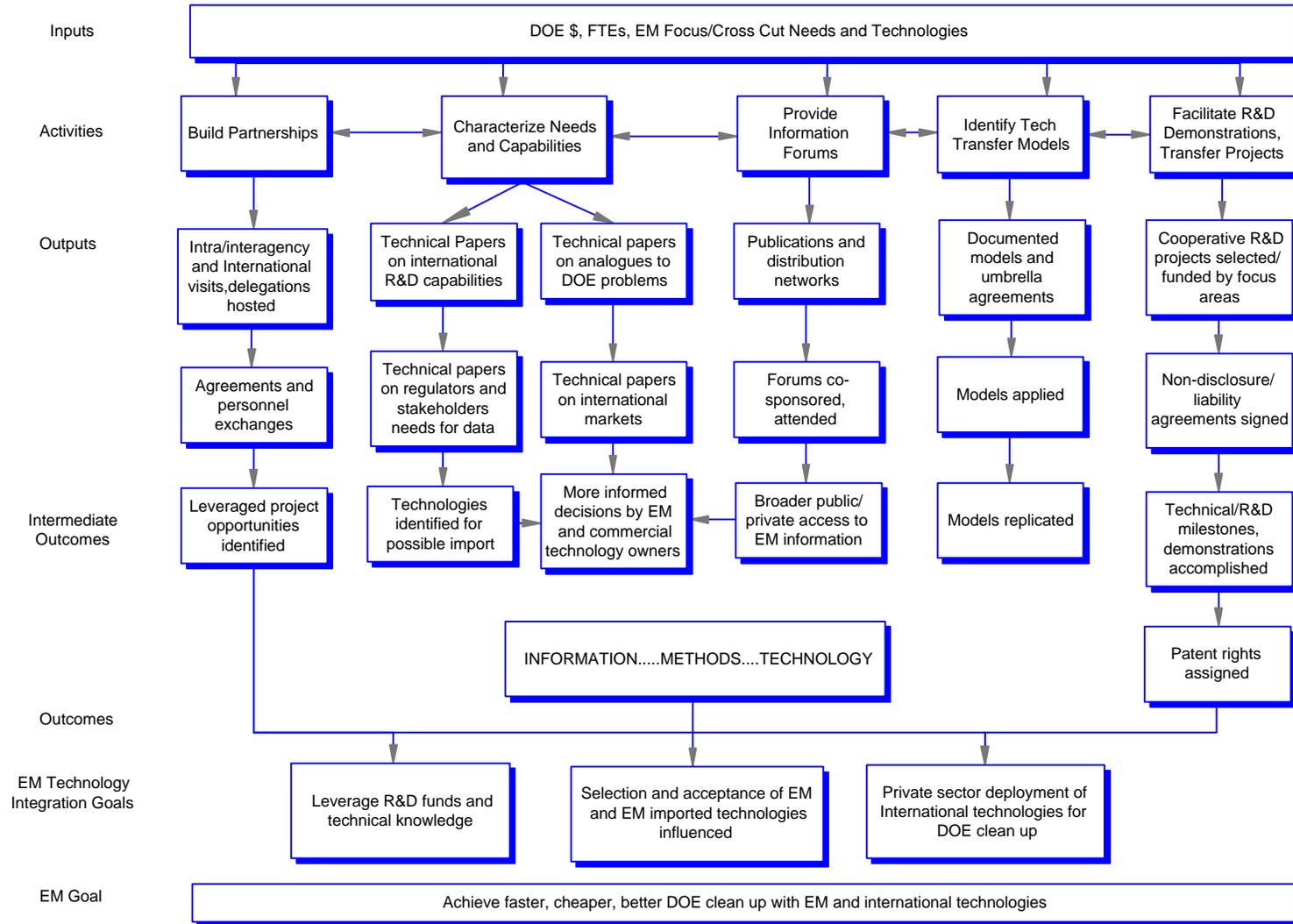
The EM-ITI program supports the world class research of scientists in the states of the former Soviet Union (FSU), CEE, and elsewhere when the costs are competitive with those in the US. An R-SLI scientist costs 1/30th and a CEE scientist 1/4 of that of a US scientist. In 1997, EM-ITI anticipates that a \$1 million investment in labor in the FSU is equivalent to \$30 million invested here and that the \$1 million investment in the CEE represents \$4 million.

#### **Projects advanced**

Approximately thirty-four projects are currently in the EM-ITI-Technology Information Development Pipeline.

- In 1997, EM-ITI anticipates “graduating” five projects. "Graduation" means that the research has resulted in a technology that is available for commercialization or is a model that can be applied to facilitate other technology development and demonstration projects.
- Approximately five projects will be lost due to non-performance or insurmountable technical difficulties
- 1-4 projects will move one step closer to completion.
- 10 new projects will be identified to replace projects that graduate and projects that are concluded for other reasons.

Exhibit 13. Revised Logic Flow Chart for EM-ITI, April 12, 1995



## Summary

This document briefly describes the early performance planning experience for Environmental Management's International Technology Integration Group. The performance planning process included document review, interviews with staff, a performance measure development workshop, and follow-up interactions with staff. The process has resulted in the following:

*Clarification of mission and goals:* The process has helped the group to clarify how it operates and its mission and goals.

*A project database:* Subsequent to the workshop, an EM-ITI activity database was developed that included data about activities such as the region with which it is associated and the focus area it supports. This database is permitting its users develop a better understanding of the inter-relation of its activities, and the relation of these activities to other EM efforts.

*A project pipeline:* A project pipeline was developed so that projects can be tracked over time and progress or its lack identified.

*Progress goals:* Eight progress goals were identified for 1997/98 budget.

*Performance measures:* A set of preliminary performance measures were developed around the concepts of outputs, reach, and results. An example of an output is the number of workshops and technical meetings conducted. An example of reach is the number of focus areas, governmental agencies, private companies and international organizations who are users and/or participants in the technology development process. An example of a result is reduced dollars required for clean-up. These activities will help the group to better interpret their activities to their management, to other parts of EM, and to parties outside of EM.

Performance management is an on-going process. Some specific activities that the group might want to consider include:

- further refinement of the strategic goal;
- further clarification and refinement of annual progress goals or goal areas and related performance indicators;
- identification of methods for collecting data for the performance indicators and developing and implementing data collection plans and data analysis procedures;
- identification of measures to assess progress toward annual performance goals;
- identification of mechanisms for communicating program goals and the availability of services to internal management, other EM organizational units, and external organizations;

- identification of areas that may need attention based on assessment of performance data; and
- identification of more focused evaluations that may be needed to provide the information required for performance improvement.

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