



CONCEPT PAPER

ePME R&D PORTFOLIO MANAGEMENT: PLANNING, TRACKING AND REPORTING, AND EVALUATION AND ANALYSIS

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**ePME:
R&D PORTFOLIO MANAGEMENT: PLANNING; TRACKING AND REPORTING; AND
EVALUATION AND ANALYSIS**

CONCEPT PAPER

1.0 INTRODUCTION

This concept paper is prepared to lay the foundation for the second phase of the e-Government Corporate R&D Portfolio Management Environment (**ePME**) Project. The paper has three primary objectives:

- To provide multiple audiences with a better understanding of R&D Portfolio Management;
- To serve as a guiding tool for the Business Process Re-engineering (BPR) activity, including a PSO assessment of existing systems, which will precede the development of a technology solution to support the simplified and unified R&D management processes; and
- To identify the primary PSO functions to be developed during Module 2.

It is important to note that this concept paper describes an initial, going-in vision of ePME Module 2 features and functionality. The final character of ePME Module 2 features and functionality will be developed through an open and transparent **Business Process Reengineering** Activity (BPR).

The BPR activity has two main components, the development of a detailed description of the “As-Is” (Current) process associated with portfolio management including planning, tracking and reporting, and evaluation and analysis; and the development of a proposed “To-Be” set of processes. The “As-Is” description process will include development of a glossary of standard terms and definitions applicable to DOE R&D Management.

PSO Subject Matter Experts (SMEs) will be identified and interviewed for the purpose of gathering information on current processes, organizations and resources involved, and the information technology supporting the processes. It is also anticipated that facilitated workshops will be held with the SMEs to identify common process and information elements, understand process and information differences, identify opportunities for process and information standardization and improvement, and identify DOE policy issues that need to be addressed. In addition, a performance baseline will be established, including identification of key performance indicators. Associated measurement plans and methodologies will also be developed.

The “To-Be” (future) business processes will be designed, including supporting data and information flows. To facilitate “To-Be” process design, DynCorp will benchmark best practices and concepts in the area of R&D Portfolio Management, including Planning, Tracking and Reporting, and Evaluation and Analysis. Expected benefits and process performance improvements associated with the “To-Be” processes will be documented. Reports on the “To-Be” work will include the evaluation of any alternative “To-Be” processes that were developed and considered by the BPR team, as well as the recommended “To-Be” process. The “To-Be” definition process will also include investigation and review of



systems solution alternatives, including analysis of existing system solutions that could provide required features and functionality.

2.0 LOGIC

This concept paper first provides background information, a definition of R&D portfolio management, a detailed description of the portfolio management process and finally the approach of ePME within the context of the core R&D portfolio management processes.

Note that this concept paper is NOT intended as the business case or financial justification for the ePME project. That information can be found in the existing Exhibit 300. An updated Exhibit 300 will be released in April/May 2003.

3.0 BACKGROUND

This section provides the background for DOE's need for portfolio management, how implementing portfolio management practices support the President's Management Agenda, and addresses the uniqueness of R&D management activities.

3.1 DOE's Need for Simplifying and Unifying R&D Management Processes

Launched in August 1999 under the auspices of the R&D council, a Strategic Information Management (SIM) Study identified significant inefficiencies in current R&D management processes. The SIM study found, improving these processes would represent a savings of approximately \$40 million annually to the Department.

The DOE Program Secretarial Offices (PSOs) with significant R&D activities -- namely the Offices of Science, Energy Efficiency, Fossil Energy, Nuclear Energy, and Environmental Management -- are committed to working together to streamline and unify their R&D management processes, and recognize that a common solution will provide the highest return on investment for the Department.

3.2 Supporting the President's Management Agenda

The President's Management Agenda (PMA), specifically, the Expanded Electronic Government initiative calls for government agencies to maximize efficiency through the effective use of technology. ePME not only supports DOE's response to the PMA as characterized by it being a top-five IDEA Task Force Initiative¹, but also has been selected by the Office of Management and Budget (OMB) to be the flagship activity for R&D management within the Federal Government.

3.3 R&D Uniqueness

OMB recognizes the uniqueness of R&D investments and the importance of ePME in regards to:

- Multi-year planning for scientific and technology programs;
- High risk inherent in federal R&D activities;
- Pre-budget application of OMB's R&D criteria;
- R&D scientific peer review; and

¹ Published in the e-Government Strategic Action Plan by the Office of the CIO in October 2002, the Innovative Department of Energy e-Government Applications (IDEA) Task Force identified nineteen (19) technology initiatives that the Department plans to undertake in response to the President's Management Agenda.

- R&D evaluation and analysis of results.

4.0 PORTFOLIO MANAGEMENT

Portfolio management is a dynamic decision process, whereby an organization's list of projects is constantly updated and revised. In this process, new projects are planned, evaluated, selected and prioritized; existing projects may be accelerated, terminated or de-prioritized; and resources are allocated and reallocated to the active projects. Portfolio management allows Program Managers to evaluate projects according to the program's specific objectives and to allocate resources that will achieve the balance of projects necessary to meet the program requirements.

Portfolio management is defined as the continuous process of defining portfolios; measuring, tracking and analyzing portfolio performance; reporting performance results to stakeholders; and applying analytical and stakeholder inputs to improve portfolio performance.

4.1 The Characteristics of Portfolio Management

A portfolio is any collection of assets or objects related by a definition that has some business interest or value. The definition includes an identification of a subset of all the assets available in a domain. Portfolio definitions should also include measures used to analyze and describe portfolio performance. The measure used to analyze portfolio performance could be overall portfolio ROI, ROI vs. other portfolios, risk mitigation, and so on.

There are two basic kinds of portfolios, permanent and dynamic. Permanent portfolios are used repeatedly and have stable definitions that reside as persistent data in a physical data store. Underlying the creation of these permanent portfolios is a process in which portfolio definitions are proposed, approved, revised and deleted as appropriate. Dynamic portfolios are created ad hoc by users needing to perform one-time analyses on the R&D project domain. These analyses can be the result of queries from internal requests for information, external requests information, and a need to perform sensitive or scenario analysis on permanent portfolios.

In the case the DOE R&D, the domain of assets is the total universe of R&D projects. The portfolio definition would include the identification of some subset of those R&D assets and an analytical rule that would measure performance in some way. Examples of R&D portfolios include all projects associated with a particular organizational entity, those linked to a corporate or PSO-level performance metric, and those linked to a science or technology pathway. The measures used to analyze portfolio performance could include evaluation of uncosted funds, cost overruns, schedule creep, PMA goals fulfilled, and progress on technology goals.

4.2 The Characteristics of R&D Portfolios

R&D portfolios are complex, interdependent, responsive to sudden changes in the research environment (e.g. breakthroughs, new barriers, and collaboration changes), and heavily reliant on expert judgment to maintain quality, relevance and performance.

Program quality is largely assessed through peer review of projects and Advisory Committee (or other outside expert panel) review of programs. Merit evaluation, workshops, expert panels and other pieces of information are combined by knowledgeable and experienced



technical program managers to ensure that programs remain relevant. While the process is largely qualitative in nature, the results are often quantitative in nature.

The process by which performance is monitored and documented, by necessity, varies greatly across programs. Large-scale, complex, construction projects follow clear and validated processes with quarterly milestones and regular reviews. This approach is neither appropriate nor meaningful for a basic research program that measures progress toward answering a list of key questions over periods of decades, through a variety of approaches, and numerous collaborations with hundreds of scientists supported by a multitude of agencies and even nations. Between these two extremes, R&D portfolios populate a full spectrum of activity.

5.0 R&D PORTFOLIO MANAGEMENT PROCESSES

R&D Portfolio Management will enable DOE Program Managers to conduct pre-budget multi-year program planning and program development activities, monitor progress, report accomplishments, guide R&D projects at National Laboratories, universities, and businesses, and perform portfolio evaluation and analysis of results. These activities are represented in the following core R&D portfolio management processes:

- R&D Program Planning;
- R&D Program Tracking and Reporting; and
- R&D Program Evaluation and Analysis.

Each of these core processes has a set of sub-processes which utilize multiple sets of information as input and produce many outputs. The following sections describe the main issues associated with each core process and how portfolio management within ePME addresses these issues.

5.1 R&D Program Planning

Today, the R&D Portfolio Planning function across the PSOs is largely a paper-based activity with individual Program Managers having developed their own solution via spreadsheets, text documents, and paper and pencil. The problem with this low-technological approach is that there is little institutional knowledge being captured or shared across DOE programs or even within programs.

ePME will enable program management offices to decrease levels of fragmentation and “stove-piping” that currently exists across DOE, and enhance communication within the R&D community. In addition, the establishment of a multi-year planning environment will enhance planning and operations at the national laboratories and non-lab activities, create a uniform method of planning multi-year R&D activities, and eliminate the current uncoordinated, cumbersome, and expensive stove-piped approach used by the PSOs that often requires multiple submission formats. Specifically, ePME’s portfolio management supports pre-budget multi-year planning by:

- Providing five-year program planning information relative to defining the key priority research areas or technical pathways, the key questions or technical barriers in those areas or on those pathways, and the linkage of the objectives of each project to



addressing key questions or technical barriers. This concept provides a focus of all work on results and also provides a monitor on progress toward completion.

- It is understood that basic science is conducted on a much longer time horizon than applied science and results vary from publications of approaches and findings to new scientific breakthroughs;
- Developing the key building blocks that feed our R&D program management such as projects, cost share, and technical objectives largely developed from (1) multi-year DOE-awarded non-lab projects and (2) the multi-year national laboratory projects;
- Developing the program management capability to address both R&D financial assistance needs of the PSOs;
- Addressing the OMB R&D criteria relative to program planning, evaluation, and analysis of applied and basic R&D; and
- Interfacing, as required, with the eGrants Initiative and activities currently being developed through the DOE Office of Procurement Policy and Procurement Systems.

5.2 R&D Portfolio Tracking and Reporting

DOE R&D Portfolio Management today is a difficult and cumbersome task as data is scattered across individual Program Managers, who have a very limited view into the investment decisions of other Program Managers, have limited access to historical data without a central repository of past R&D proposals, and project reporting is often not up-to-date.

ePME supports R&D portfolio tracking and reporting activities in the following ways:

- Facilitating PSO ability to respond to the numerous and duplicative queries to the research organizations for project status, including replacement of the annual R&D Tracking System;
- Improving program monitoring and characterization of progress in research activities, programs and portfolios; and
- Enabling the collection and sharing of research activities, results, accomplishments, and advances in the fields of discipline of interest to the Department to improve coordination.
- Identifying and eliminating undesirable duplications and gaps in the DOE R&D Portfolio; and the elimination of multiple submission formats through uniform reporting protocols.

These ePME tracking and reporting activities provide the basis for effective Portfolio Management by enabling Program Managers to:

- View their entire portfolio and balance the project mix with regard to strategic objectives, performance requirements and other program criteria;
- Analyze on-going research and forecast future resource needs through the aggregation of projects and comparative analysis; and
- Analyze, coordinate, and communicate the breadth of research they sponsor in the context of other on-going initiatives within the Department.



5.3 R&D Portfolio Evaluation And Analysis

The portfolio management, tracking, and reporting capability serves as the underpinning for the planning, analysis, and evaluation functions of the PSOs. ePME supports R&D Portfolio Evaluation and Analysis activities by:

- Providing more consistent and current data on the spectrum of activities within a PSO's research portfolio;
- Identifying linkages to the research portfolios of other PSOs, including new opportunities for collaboration;
- Improving the documentation of peer, merit and other expert evaluations;
- Improving the quality of data through the establishment of clear and consistent definitions of key terms, and
- Linking isolated but related processes (e.g. linking project information and program reviews to the laboratory appraisal system).

6.0 ePME APPROACH

To meet PSO R&D management needs, ePME is being implemented in three modules:



ePME Modular Approach

MODULE	MAJOR FUNCTION(S)
Module 1	<ul style="list-style-type: none"> • Supports electronic processing and storing of DOE National Laboratory Field Work Proposals for ongoing R&D projects as well as R&D proposals (i.e., potential, new projects) submitted in response to program announcements; • Intends to store competitive financial assistance award data; and • Enables electronic merit and peer review for R&D proposals.
Module 2	<ul style="list-style-type: none"> • Supports multi-year program planning, tracking and reporting, and evaluation and analysis
Module 3	<ul style="list-style-type: none"> • Supports electronic generation of program guidance and work authorizations.

Working collaboratively with the R&D PSOs along with the related Operations Offices and National Laboratories, the ePME team has completed the functional design of Module 1 with the exception of competitive financial assistance, which will be completed collaboratively under the Streamlining Departmental Grants Processing Initiative.

The ePME team also recognizes that each PSO may have activities that are unique, and therefore, plans to allow for some customization of the solution for PSO-specific needs.

7.0 ASSUMPTIONS OF ePME AND R&D PORTFOLIO MANAGEMENT

ePME planning, tracking and reporting, and evaluation and analysis, Module 2, works under the following assumptions:

- A comprehensive program management component is necessary and desirable to improve the DOE corporate portfolio;
- That ePME will support R&D management decisions in planning, tracking, monitoring, evaluation, and analysis;
- Through the use of a comprehensive program management system, R&D organizations will incorporate these requirements into their respective program management operations and will establish necessary discipline and facilitate culture change;
- The incorporation of best practices as delineated by a variety of GAO, OMB, IG, and internal program management reviews are valid and necessary to improve program performance;
- OMB’s R&D criteria are necessary in both the planning and evaluation of research and development programs;
- I-MANAGE is the DOE corporate business management system; and
- ePME must interface with I-MANAGE, and these interface points must be mutually developed by I-MANAGE and ePME.



8.0 CONCLUSION

Module 2 of ePME addresses the key functionality that is critical to the success of the DOE R&D program managers. The BPR effort must be under the leadership and management of the business process owner (Hammer, Champy, Harrington, etc.). Aligning the business strategy with IT is a best practice, and is best achieved when the organizational component with responsibility for the business line works with and directs the IT development (Gartner). Furthermore, the number one best practice for successful project management is “committed executive leadership” in the business area the project falls under (Fortune 500 Project Management Benchmarking Forum). Given these fundamental management requirements, Module 2:

- Is strongly supported by the DOE R&D community because it addresses R&D program management needs;
- Reduces quality risk because it maintains the R&D focus on program management needs/priorities;
- Compels the involvement and commitment of the DOE R&D community, because it is considered critical to the mission;
- Involves DOE R&D program representatives who have ownership (a stake in the outcome) of ePME;
- Addresses mission critical programs that are unique, and that require a thorough understanding of research and development, a view also shared by OMB, as evidenced by their selection of subject matter experts to lead each of their E-Government initiatives;
- Is aligned with The President’s Management Agenda, OMB policy documents and the DOE E-Government Strategic Action Plan which recognize the uniqueness of the R&D mission through the special attention and treatment they give to it (PART, R&D Investment Criteria, ePME in DOE’s G2B category); and
- Provides program management tools and portfolio management capabilities to allow program managers to do a better job in the development, implementation, and evaluation of their programs.