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Prepared for the U.S. Department of Energy

Fluor Daniel Hanford, Inc.
Richland, Washington

Hanford Management and Integration Contractor for the
U.S. Department of Energy under Contract DE-AC06-96RL13200

Approved for Public Release; Further Dissemination Unlimited

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OVERVIEW OF THE HANFORD RISK MANAGEMENT PLAN

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ABSTRACT

The Project Hanford Management Contract called for the development of a Hanford Risk Management Plan to adopt or develop a risk management system for the Hanford Site that addresses site-wide management of risks of all types and supports the Department of Energy strategic planning and site-wide decision making. Added to this requirement is a risk performance report to characterize the risk management accomplishments. This paper presents the development of risk management within the context of work planning, budgeting, and performance. Also discussed are four risk management elements which add value to the context.

I. INTRODUCTION

The Hanford Risk Management Plan was developed for the Project Hanford cleanup mission by Fluor Daniel Hanford, Inc. The intention of the document is to encompass the risk topics at the Hanford Site. Recognizing this, the U.S. Department of Energy built into the Project Hanford Management Contract Section C.2.B,(6), the following requirement:

> Develop or adopt, implement, and manage a **risk management system** which is compatible and integrates with the existing DOE-RL system types (e.g., financial, technical, safety, mortgages, environment, etc.). Submit a Risk Management Plan, which includes the methodology and how these analyses are integrated to support DOE strategic planning, work prioritization, and site-wide decision making. . . .

The intent of the Hanford Risk Management Plan is to provide a methodology of general guidance for identification, management, and communication of Hanford cleanup project risks to enable Site management to more effectively:

- identify, plan and budget for critical project activities,
- enhance the site-wide decision processes, and
- provide a consistent foundation for Site issues management and performance measurements.

A. Purpose

The risk management framework defined in the plan provides an opportunity for Fluor Daniel Hanford, Inc. and DOE-RL to work closely with the other prime contractors to ensure an overall integrated approach to risk management and for the subsequent development of implementing direction by Site contractors. The Hanford Risk Management System framework is illustrated in Figure 1.

The Hanford Risk Management Plan describes the components of risk management and how the Hanford Risk Management System integrates into existing Site activities for planning and budgeting, site-wide decisions, project performance measures, and issues management. These Site activities form the **context** within which the Hanford Risk Management System must function. The **risk elements** of the Hanford Risk Management System are defined by four support functions: (1) risk inputs; (2) risk analysis direction; (3) risk profiles; and (4) risk action plans.

The Hanford Risk Management System provides input for risk information flow and risk communications that assist senior Site managers to recognize, compare, and prioritize potential alternatives for resolution of cleanup issues. It is designed to complement existing management practices by providing risk factors, decision weighting criteria, and risk values so that managers may address and compare the relative impacts of various areas of concern as they make decisions regarding project direction and resource allocation.

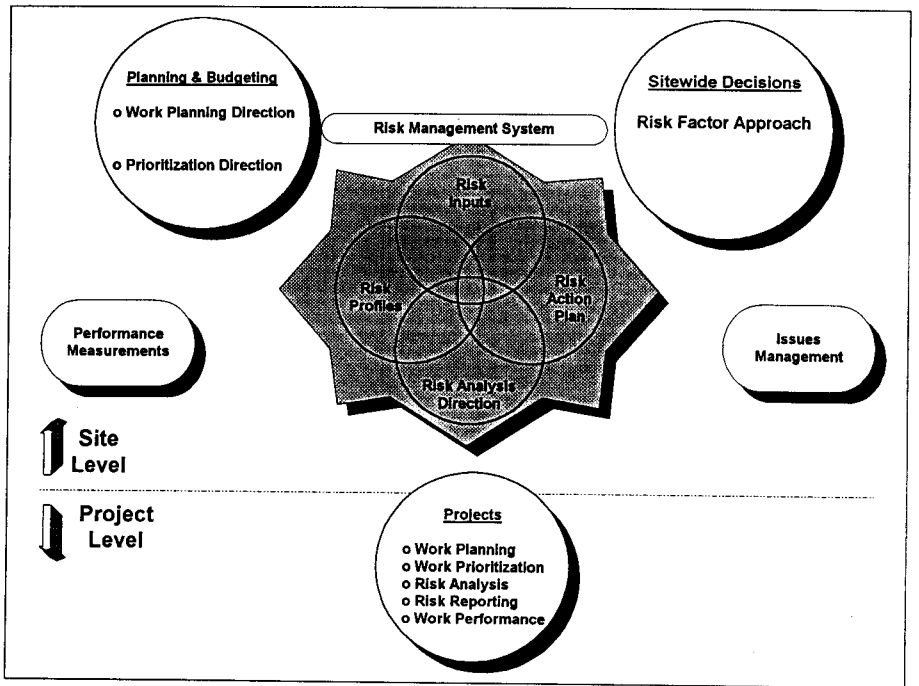


Figure 1 - Risk Management

B. Scope

Risk, in the context of the Hanford Risk Management Plan, is considered an outcome (consequence) coupled with (multiplied by) the likelihood of occurrence (probability). Risk can be focused more singularly to actions or events, or more broadly to mission or Site activities. Risk values can be expressed quantitatively with derivations obtained through mathematical analysis or qualitatively as defined by relative judgement or intuitive logic. Risk management is broader than risks to the public, worker and environment. Risk management can be applied to cost, schedule, technical performance, regulatory compliance, public acceptance, or any other risk factors important to the decision management process.

C. Objectives

The objectives of the Hanford Risk Management System are to:

1. Identify, assess, evaluate, manage, and communicate risk
2. Demonstrate progress in risk reduction
3. Provide rationale for decisions involving risks
4. Apply risk management commensurate with risk magnitude
5. Deal with changes in the risk baseline

II. THE CONTEXT

A. Planning and Budgeting

Risk direction used in planning and budgeting is defined in the annual planning guidance and currently attaches risk values to work activities contained in Project Baseline Summaries (PBSs), Units of Analysis (UAs), and the Integrated Priority List (IPL). In Figure 1, Planning and

Budgeting provides guidance through Work Planning Direction and Prioritization Direction.

1. Work Planning Direction

Risk is a dimension of work planning at the Hanford Site. It is embodied in PBSs and UAs.

a. Project Baseline Summaries

The PBSs house risk information, other summary level planning, and budgeting information to satisfy DOE-HQ's Integrated Accountability, Planning and Budgeting System requirements. In addition to risk, the PBSs include narratives, costs, schedules, performance measures, validation, assumptions, and safety and health information. The PBSs are extractions from Multi-Year Work Plans. The PBSs function as a source of project information and are working documents for supporting budget formulation. The PBSs reflect the Site baseline at a given point in time and are updated annually.

Achieving risk reduction is an integral part of setting priorities, sequencing project work, and mitigating the most serious risks first. Risks to public and worker health and safety, and the environment are evaluated for each project having risk reduction benefits or impacts in these areas, and the risk evaluation results are documented in the PBSs. The PBS risks are obtained from the risks associated with individual UAs which constitute the PBS.

The risk reduction metrics of the respective PBSs are selected to demonstrate reductions in risk achieved during the cleanup. This provides value for determining the success of Project Hanford in reducing Site health, safety, and environmental risks and eliminating Site hazards. The risk information and metrics are in development.

b. Units of Analysis

UAs contain risk analysis results and describe discrete, manageable, work elements for identification and prioritization of Site cleanup work scope. Each UA is traceable to a project Work Breakdown Structure and to an activity or summary of activities on the project baseline schedule. Risks to the public, worker, and environment; costs, and specific Executive Order or compliance drivers associated with each UA are identified. The UAs function as the individual elements for the development of project priority lists and the Site IPL.

UAs provide a further breakdown of work activities that make up a PBS. They are currently in place. DOE-RL provides guidance to Site contractors for evaluating risk according to defined factors and uniformly reporting risk values in a qualitative manner. Site contractors have the responsibility for defining and updating UAs definitions, completing evaluation data requirements, and prioritizing their work scope with their DOE-RL counterparts.

Three categories of risk (public, worker, and environment) are evaluated in each UA to have relative risks of Urgent, High, Medium, Low, or Not Applicable for each specific fiscal year. These risk evaluations are used in planning and prioritization.

2. Prioritization Direction

Risk is also a dimension of work prioritization.

a. Integrated Priority List

The risk dimension of the IPL is derived from the UAs. The Integrated Priority List is the Hanford Site's planning tool to describe prioritization of work scope required to complete the cleanup mission. Projects first develop priority lists for their work using the UAs as elements. Project priority lists are then used to develop the overall Site prioritization in the Site IPL. An IPL is developed each year to support the initial budget submittal to DOE-HQ for the fiscal year two years in advance of the current year. After the budget submittal, funding variations are managed primarily by using project priority lists and control point priorities. The various priority lists reflect prioritization criteria provided annually by DOE-RL. The project priority lists are in place and updated as required to meet Site and DOE-HQ needs.

DOE-RL provides the direction for development of the IPL. Site contractors provide input which is integrated by Fluor Daniel Hanford, Inc. for a single input to DOE-RL for the Site level IPL.

B. Projects

Risk at the project level is indicated in Figure 1 to be in the work planning and prioritization, risk analysis and reporting, and work performance activities. Projects provide the results of these activities to the site-level. The site-level risk activities in Figure 1 are dependent upon and interact with these project level activities. Project level execution of risk management complies with the Hanford Risk Management Plan through implementing directions and implementing procedures.

C. Sitewide Decisions

Risk is an important factor in decision making at the Hanford Site. Figure 1 illustrates the contents of Sitewide Decisions within the risk management methodology. The site-wide decisions function depicted in this figure does not reside in any one organization. It is currently the responsibility of all

organizations on Site to base their decisions on defendable sets of facts and judgments. Decision management tools and processes will be developed by Fluor Daniel Hanford, Inc. for use by its subcontractors at all levels.

D. Performance Measurements

Performance measurements are generated for assessment of work progress against the baseline plan. The generation of adequate risk performance measurements and the reporting of work completion progress assists in the communication of status to both internal and external organizations. This process will address risk performance measurements that relate to reducing public and worker health risks and reducing environmental risks.

Much of the information used to establish and communicate performance is the same as that used to support planning and budgeting. It is important that these two activities use risk information consistently. To support risk performance measurements the Hanford Risk Management System relates information in the Integrated Site Baseline (ISB) to measurements of risk reduction over time.

Performance measurements are under development to ensure accurate reporting of work progress against baseline planning. Performance measurements are developed by the Site contractors with direction from DOE-RL.

E. Issues Management

Issues management action planning is the process by which technical issues, important to risk reduction or the achievement of risk related goals, are identified and presented to the Site Integration Group for incorporation into the established process for issues management.

Issues management is required for specific items that are identified as requiring senior management attention. Issues are identified as Emergency, High, Medium, or Low, which, in general, characterizes their potential of causing undesired consequences, or of significantly disrupting the planning and execution of work. Through the Site Integration Group high priority issues are assigned to a DOE-RL Point-of-Contact and a Site contractor manager who are given the responsibility to recommend a resolution. If necessary to support the recommendation, these individuals may be given the authority to organize a temporary, interdisciplinary team. The team includes staff from the impacted organizations to gather and analyze available facts to support the decision. The resolution of issues is enabled through decision analysis and decision management tools.

III. RISK ELEMENTS

A. Risk Analysis Direction

Another element of the Hanford Risk Management System is Risk Analysis Direction. The direction (shown in Figure 1) provides the principles, definitions, discussion, and examples that enable Site organizations to generate and interpret risk information consistently.

Risk analysis direction will establish the framework within which Site contractors can select tools and methods for generating risk values consistent with the ultimate value of the risk information to the decision process. Such direction should avoid generating overly complex or expensive risk values or not providing enough analysis where it is warranted. The framework will allow for a graded approach to the generation of risk values and support the qualitative or quantitative needs of decision makers. This direction is being developed by the Site contractors for implementation at the project level.

A risk analysis approach is used to identify, evaluate, and assess significant risk factors and to provide alternatives to be used by management to formulate mitigation strategies. Typical project risk analysis includes a risk managment process and a risk evaluation activity. Risk evaluation is assessing the relationship of uncertainties to work tasks and determining whether the uncertainty can be managed into an opportunity or benefit or remains a risk or consequence. Figure 2 shows a typical risk management process taken from the *Life Cycle Asset Management Good Practice Guide, Risk Analysis and Management* (Ref: DOE 1996). Risk analyses are to use a graded approach to selecting tools and techniques that are commensurate with the dollar value, complexity, visibility, and risk of a project. The time and money spent analyzing risks and determining risk management and mitigation strategies should be considered from a cost-to-benefit perspective. A risk analysis should be performed if conditions warrant (i.e., a major risk is realized, the potential of a high-risk item is eliminated, the potential for new risks is identified, etc.). Once risks have been identified, they should be graded and a management or mitigation strategy selected accordingly. The development of a risk management strategy should include the identification of issues needing resolution to complete risk reduction actions and the development of performance objectives and measures.

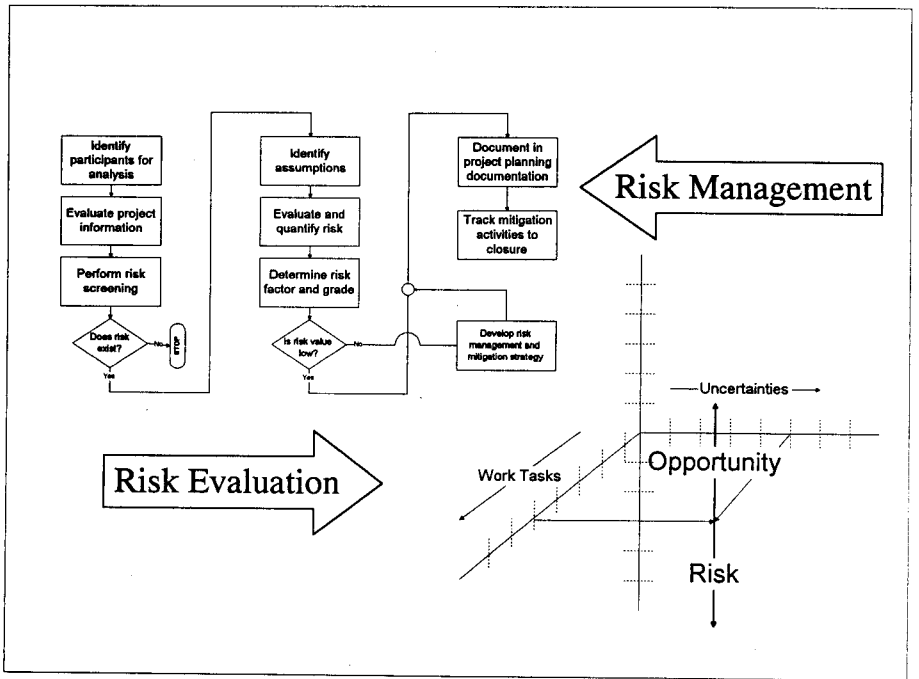


Figure 2 - Project Risk Analysis

B. Risk Inputs

An element of the Hanford Risk Management System is Risk Inputs shown in Figure 1. The Hanford Risk Management System will support site-wide decisions by providing the risk factors and risk weighting criteria. The content and defensibility of the information in the decision process is critical to its value for management support. When risk mitigation costs are compared against public, worker, and environmental risk consequences, decision makers must be able to visualize what is being traded-off and understand the operative implications of their decisions. The Hanford Risk Management System provides the risk input needed to make consistent and defensible risk-informed decisions.

Risk inputs currently are associated with protection of the public, worker, and environment and are being extended to programmatic risk factors such as cost, schedule and technical performance. DOE-RL will specify the minimum set of risk factors based on guidance; however, Site contractors can add additional specific risk factors necessary to support specific decisions or provide information on specific risk reduction actions.

The risk factor approach will utilize recognized decision theory to bring risk into decision making. The value of a defined decision theory approach is to establish decision objectives (risk factors), decision criteria (risk weighting criteria), and performance scores (risk values) in a consistent and uniform fashion and improve decision quality and defensibility. The development of the risk factor approach will include the risk factors currently specified in DOE-RL guidance (public, worker, environment, cost, schedule, and technical performance). Flexibility to add other risk factors will be built into the tool.

C. Risk Action Plans

Another element of the Hanford Risk Management System is Risk Action Plans. By assessment of the Risk

Profiles and the establishment of risk reduction performance measurements, a set of issues may present themselves that are critical to the achievement of risk reduction. By close coordination with the Site Integration Group, any necessary risk action plans will provide a consistent set of risk information for issues management.

Supporting the development of solutions for risk issues is the use of innovative technical initiatives where new or emerging technologies can enhance the confidence of achieving risk reduction goals, or provide a solution pathway which has increased assurance of completion.

Risk Action Plans, as necessary, will be developed by Fluor Daniel Hanford, Inc. to provide focused input to the Site issues management process and other appropriate interfaces.

D. Risk Profiles

Another element of the Hanford Risk Management System is Risk Profiles. Risk Profiles, as necessary, will be developed by Fluor Daniel Hanford, Inc. to serve as one performance reporting tool. The Risk Profile will be based on information in the ISB and linked in such a way to support ISB alternative evaluations ("what ifs"). The ISB, which includes the technical, schedule, and cost baselines, defines the specific approach to achieving cleanup goals. This connection of the risk profiles to the ISB provides performance data to identify and develop risk management strategies to ensure that overall risks are reduced.

Risk Profiles, as necessary, will be developed by Fluor Daniel Hanford, Inc. and will provide a long term view of overall risk reduction at the Hanford Site.

IV. RISK IMPROVEMENTS

The structure of the Hanford Risk Management System enables Project Hanford to address the spectrum of risk using a graded approach. Initially, worker safety, public health, environmental impact, technical, cost and schedule risks will be fully documented and evaluated for comparison. Risk information for other risk factors can be addressed at a later time when the dimension is commensurate with the value provided to the decision making process.

NOMENCLATURE

DOE-HQ	U.S. Department of Energy-Headquarters
DOE-RL	U.S. Department of Energy-Richland Operations Office
IPL	Integrated Priority List
ISB	Integrated Site Baseline
PBS	Project Baseline Summary
UA	Unit of Analysis

REFERENCES

1. U.S. Department of Energy, Life-Cycle Asset Management Good Practice Guide, *Risk Analysis and Management*, GPG-FM-007 (1966). (http://www.fm.doe.gov/FM-20/guides.htm)

Overview of the Hanford Risk Management Plan

Thomas G. Halverson
Fluor Daniel Hanford, Inc.

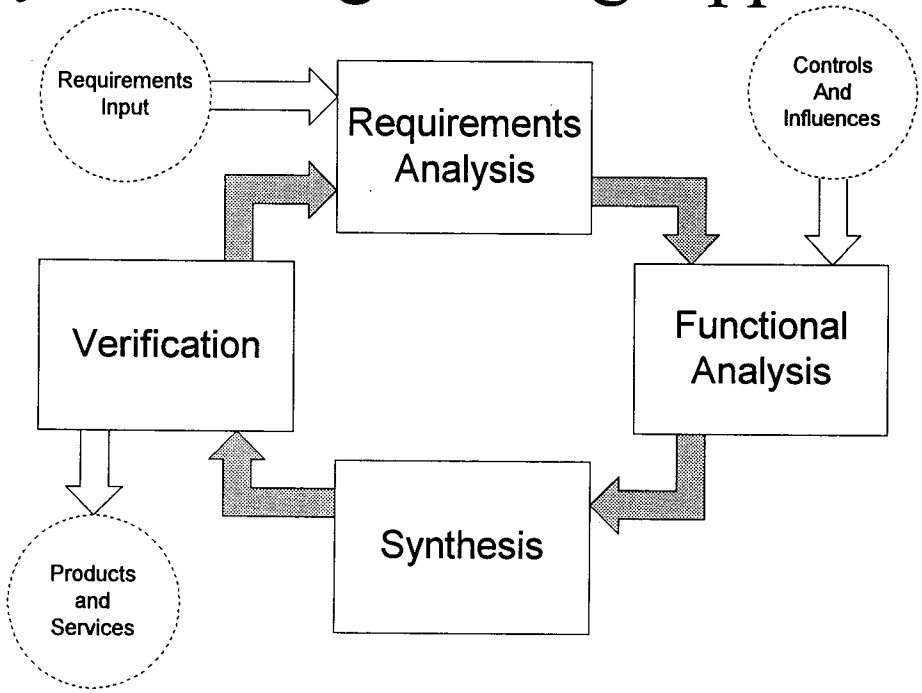
PHMC Requirement

Develop or adopt, implement, and manage a **risk management system** which is **compatible and integrates with the existing DOE-RL system types** (e.g. financial, technical, safety, mortgages, environment).

Submit a Risk Management Plan, which includes the methodology and how these analysis are **integrated to support DOE strategic planning, work prioritization, and sitewide decision making** as a part of the Management and Integration Plan.

- Section C.2.B(6)

Systems Engineering Approach



Risk Management Roles

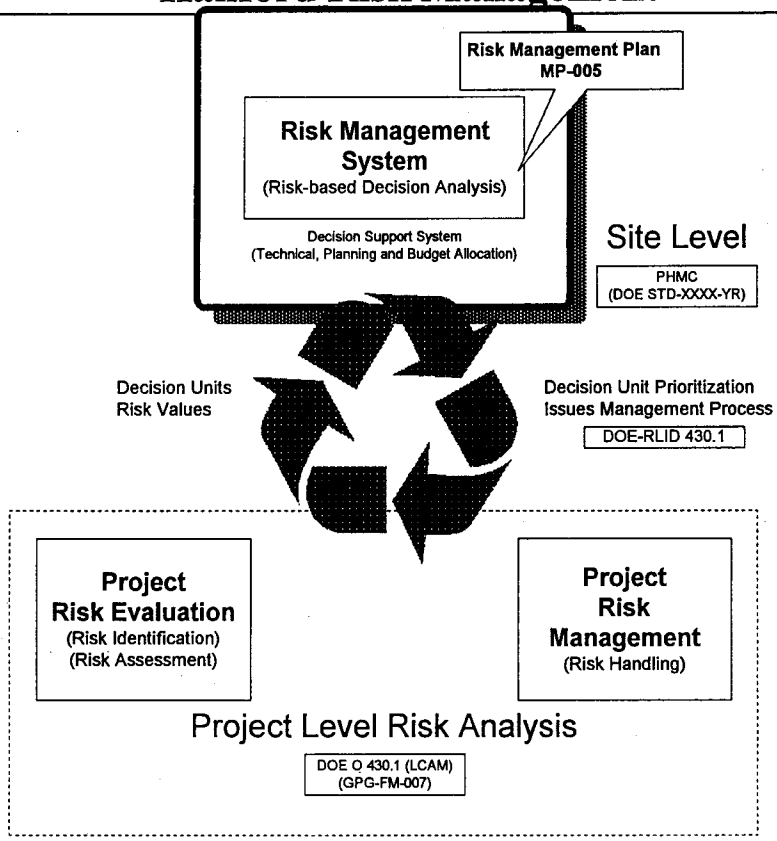
- Policy and Rule Making (thresholds)

★Decision Making (priorities, mitigation)

- Risk Analysis (safety analysis)

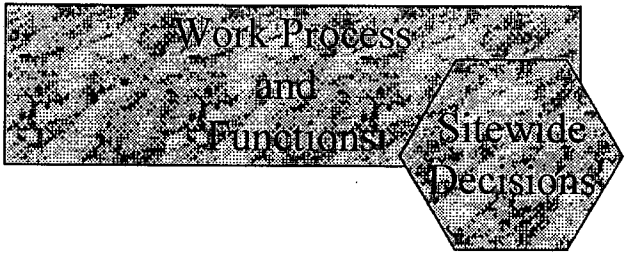
- Alternatives Selection (impact statements)

Hanford Risk Management



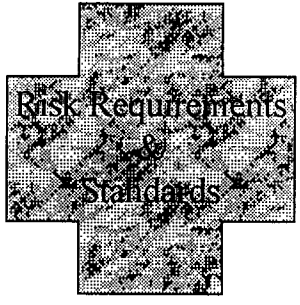
Hanford Risk Management

I- Continuity of Terms



II- Functional Context

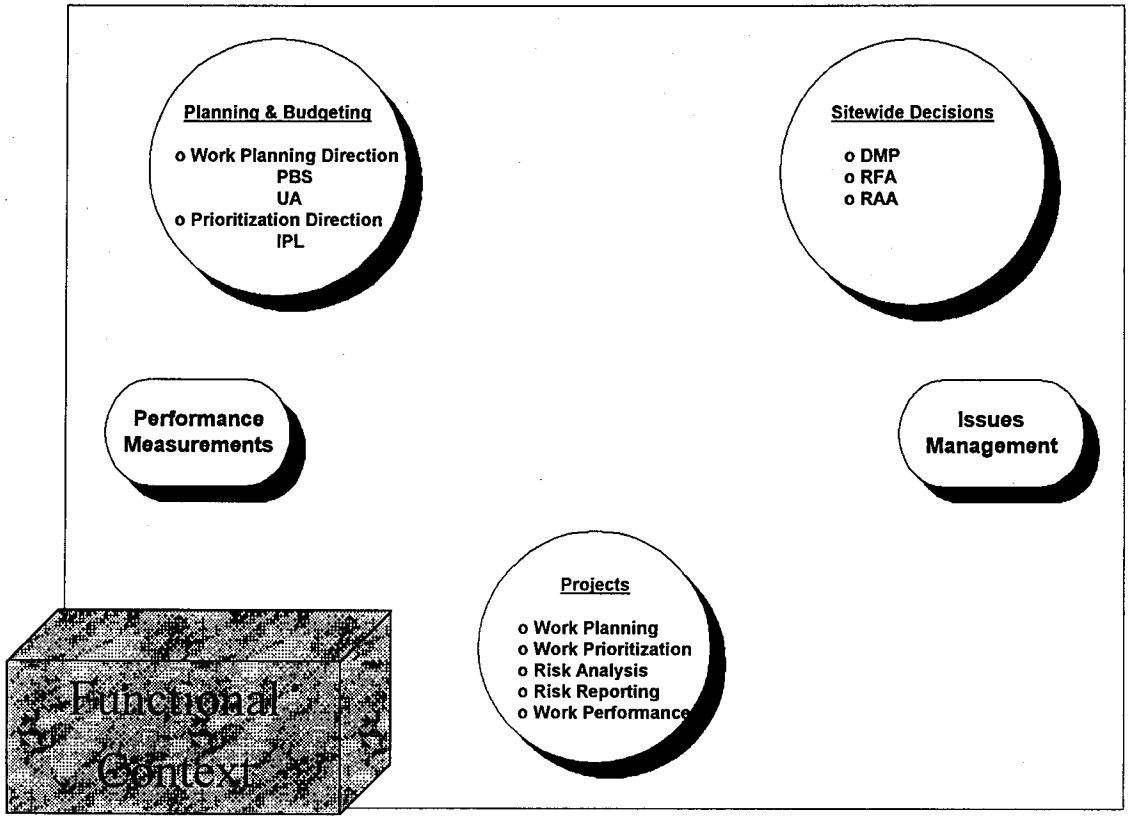
III- Value of Risk Elements



Continuity of Terms

Decision Management	Risk Management
• Decision Unit	• Work Activity
• Objective/Criteria	• Risk Factor or Type
• Benefits	• Risk Reduction
• Perf. Measure Scale	• Risk Measure
• Score	• Risk Value
• Return on Investment	• Risk Mitigation
Decision Information	**Risk Information**

Hanford Risk Management



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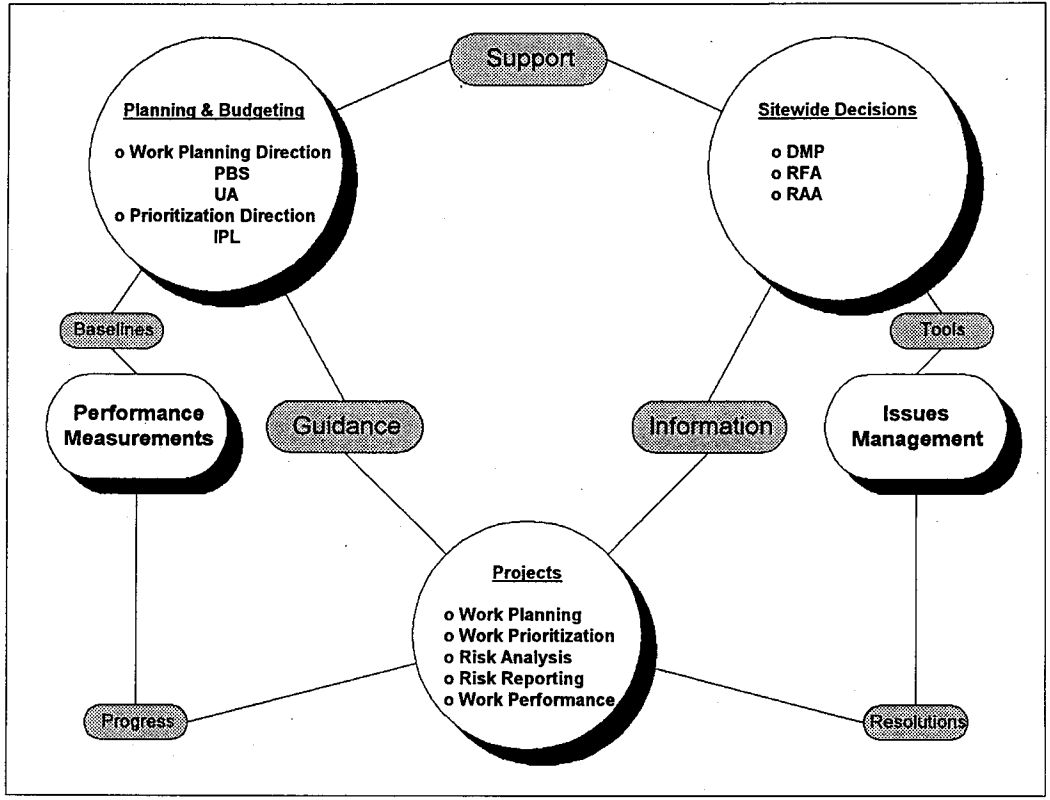

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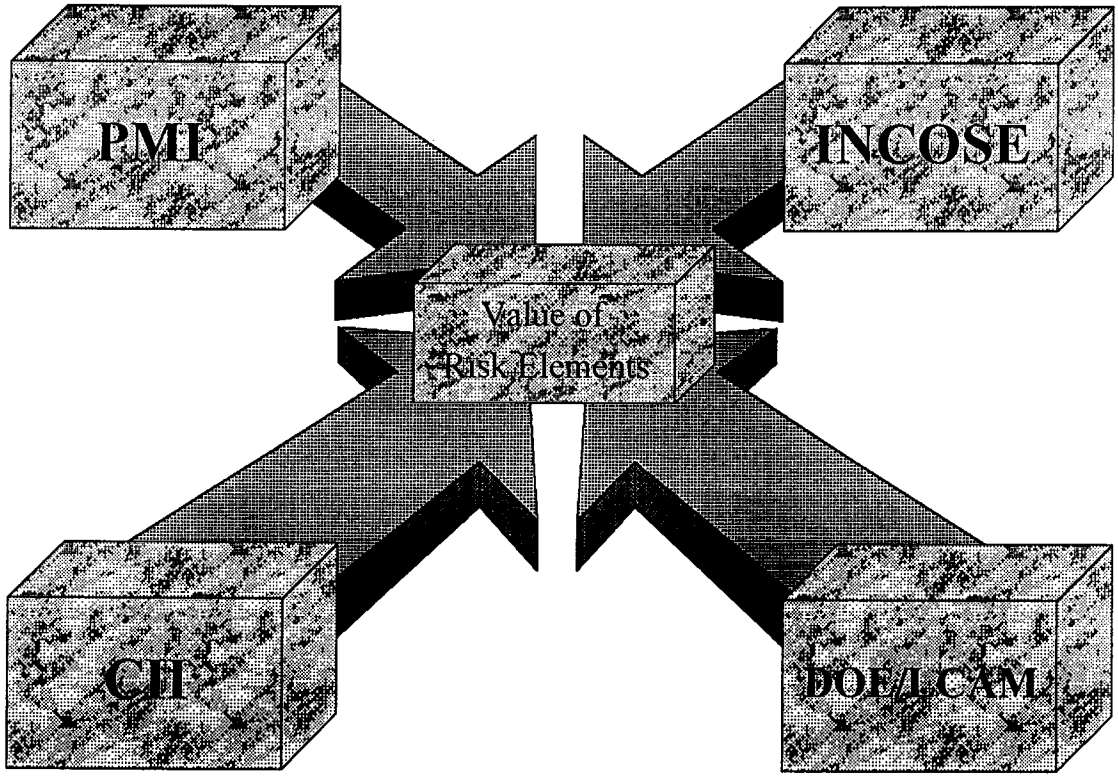

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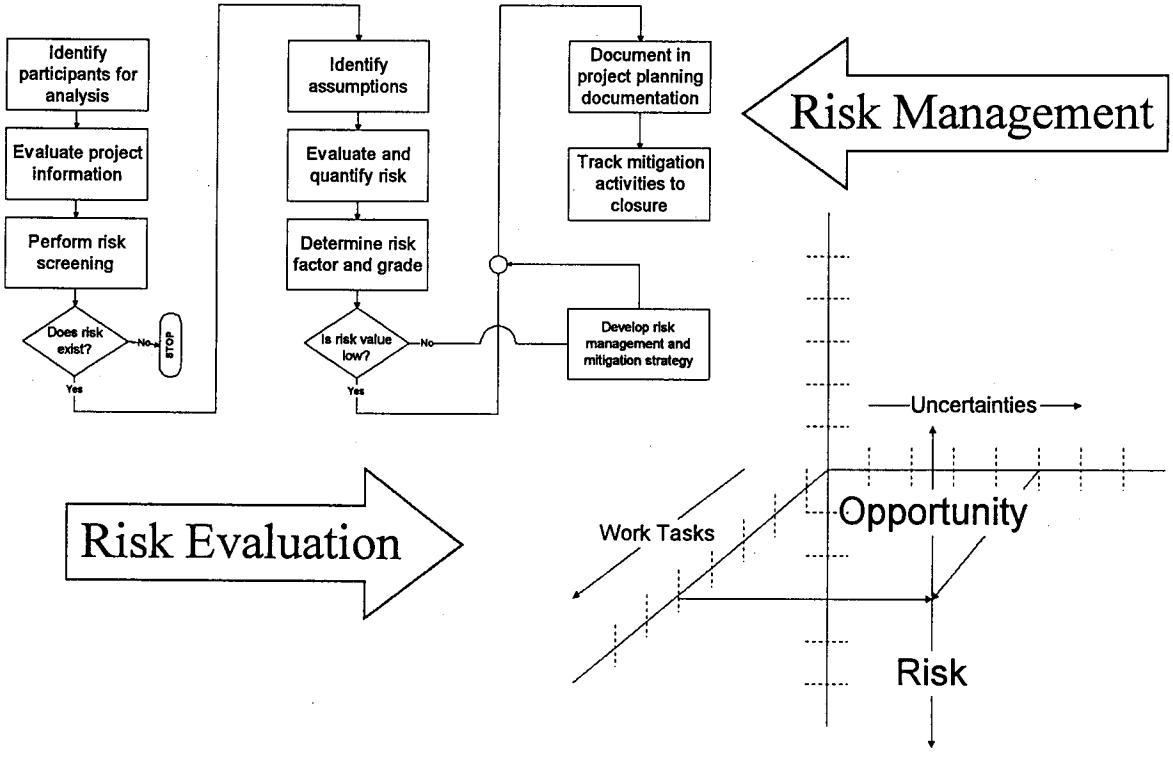
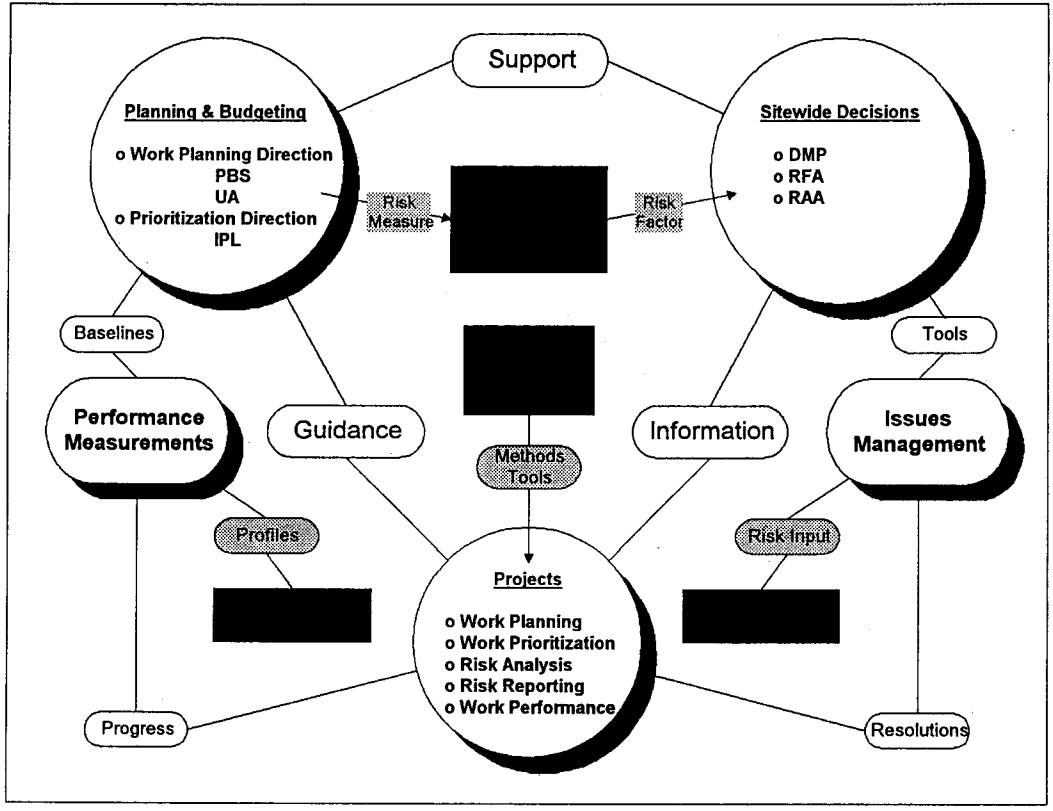


Value Added Risk Elements

- Risk Input to Decision Support
- Risk Action Plans
- Risk Profiles
- Risk Guidance for Project Risk Analysis

Hanford Risk Management



Hanford Risk Management Plan MP-005

Hanford Risk Management Plan

HNF-MP-005
Revision 0

Approved:

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Executive Vice President and Chief Operating Officer
Fluor Daniel Hanford, Inc.

2/26/98
Date

Lloyd Piper
Deputy Manager

2/26/98
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