EFCOG Best Practice #219

Facility: Savannah River Remediation (SRR) Savannah River Site, Liquid Waste Contract

Best Practice Title: Use of Premortem Technique in Risk Identification

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Brief Description of Best Practice: The use of premortem techniques was identified at Savannah River Site as having greatly enhanced the ability of project teams to identify risks and was singled out as a topic by the EFCOG Risk Management Task Team under the Project Management Subgroup for further investigation and evaluation.

This report describes the history of the premortem process, describes in step by step detail how to perform a project premortem and provides an analysis of the efficiency and effectiveness of the process by reviewing and evaluating 39 actual premortems performed at Savannah River Site.

Data was gathered on the efficiency of risk identification, the nature of risks identified and the effectiveness of the overall process. After reviewing the data from almost 8 years of premortem use, the conclusion of the team is that the premortem technique elicits risks far more efficiently than other techniques. During Team meetings where the process was used, up to 60 risks were identified and handling strategies developed with an approximate project team commitment of half a day.

EFCOG Risk Management Task Team concluded that the premortem process be a recommended "Best Practice," for project risk identification within the DOE complex.

Why the best practice was used: The premortem technique elicits risks far more efficiently than other techniques.

What are the benefits of the best practice: The premortem technique reduces the time necessary to identify project risks.

What problems/issues were associated with the best practice: If performed correctly as described in the best practice, there are no significant problems/issues as this is an extremely simple process.

How the success of the Best Practice was measured: The process was consistently used to identify up to 60 risks and handling strategies developed with an approximate project team commitment of half a day. This compares to other methods which produce a fraction of this.

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Description of process experience using the Best Practice: Data was gathered on the efficiency of risk identification, the nature of risks identified and the effectiveness of the overall process. After reviewing the data from almost 8 years of premortem use, the conclusion of the team is that the premortem technique elicits risks far more efficiently than other techniques.

EFCOG Position Paper

The Use of Premortem Techniques in Risk Identification

Project Delivery Working Group

Risk Management Task Team

May 2017

Approvals

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Executive Summary

The Energy Facility Contractors Group (EFCOG) is a self-directed group of contractors of U.S. Department of Energy Facilities. The purpose of EFCOG is to promote excellence in all aspects of operation and management of DOE facilities in a safe, environmentally sound, secure, efficient, and cost-effective manner through the ongoing exchange of information and corresponding improvement initiatives.

The EFCOG Project Management Working Subgroup (PMWSG) established a Risk Management Task Team to promote, coordinate, and facilitate the active exchange of successful Risk Management programs, practices, procedures, lessons learned, and other pertinent information of common interest that have been effectively utilized by DOE contractors and can be adapted to enhance operational excellence and cost effectiveness for continual performance improvement by other DOE contractors.

During Risk Management Task Team discussions, the use of premortem techniques was identified as having greatly enhanced the ability of project teams to identify risks was singled out as a topic for further investigation to determine if EFCOG should recommend this as a Risk Management "good practice."

This report describes the evolution of the premortem technique and the results obtained during the last several years of its application.

Data was gathered on the efficiency of risk identification, the nature of risks identified and the effectiveness of the overall process. After reviewing the data from almost 8 years of premortem use at DOE sites, the conclusion of the team is that the premortem technique elicits risks far more efficiently than other techniques. During Team meetings where the process was used, up to 60 risks were identified and handling strategies developed with an approximate project team commitment of half a day.

EFCOG Risk Management Task Team concludes that the premortem process be a recommended "good practice."

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1.0 Purpose

Risk Management is required to be performed within the DOE complex on Programs, projects and selected operational activities (Reference 1). Premortems have been used to enhance the risk identification process at several DOE sites. The purpose of this position paper is to investigate and evaluate the effectiveness of the premortem process based on records of actual results of premortems performed during the last several years and provide recommendations on the use of premortems within the DOE complex. The effectiveness of the premortem technique will be evaluated from two perspectives:

- How quickly risks can be identified and risk handling strategies developed (how efficient is the process)
- What kind of risks are identified and how relevant they are when compared to follow-on risk identification activities (i.e., how comprehensive is the process)

Based on the evaluation of these two main characteristics and other salient points, a conclusion will be reached and recommendations made for the use of premortem techniques.

2.0 Detailed Premortem Process

The premortem process uses retrospective hindsight to identify risks. Retrospective hindsight is a technique that has the project team assume the project has failed and then postulate the risk events that have occurred and contributed to the project failure. The process uses isolation techniques during risk brainstorming and team synergy to elicit risks and handling strategies such that all identified risks are handled to the best ability of the team. Figure 2.1-1 shows the steps of the process and each step is described in detail within this section.

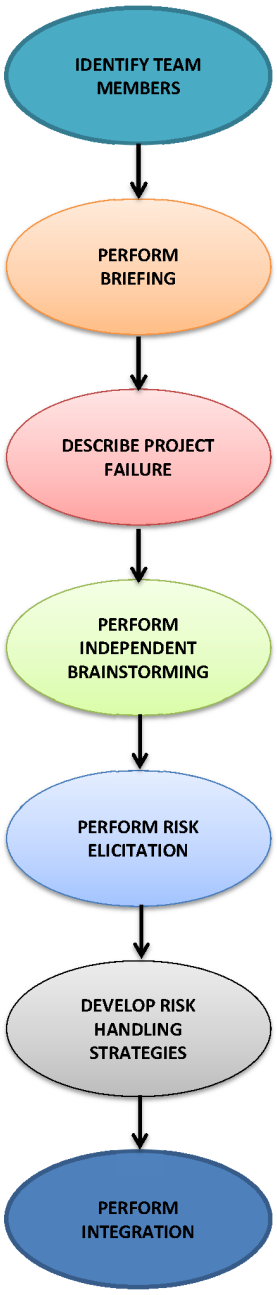


Figure 2.1-1: Premortem Process Steps

The timing of a premortem is important. The earlier in the project, the less guilt associated with identifying risks, which could be misconstrued to be criticism of an individual or organization. The balance between being informed and yet not fully underway and committed to an irreversible string of actions must be struck. This maximizes the potential for a comprehensive identification of risk.

2.1 Identify Team Members

Generally the project team and Stakeholders with significant roles are the target choice for the premortem team. The project team has the intimate knowledge of the project and has representative Subject Matter Experts (SMEs) from each functional area. The functional areas of a typical project team may be as follows:

- Project Manager
- Quality Assurance
- Engineering
- Estimating
- Design
- Project Controls
- Training
- Construction
- Nuclear Safety
- Safety
- Radiological Controls
- Operations
- Risk Management
- Environmental
- Other

An enhancement to the team membership may be made by adding "Wild Card" members. A wild card member is a person not directly connected to the project team, who has a well-rounded experience and knowledge base from which to draw when identifying risks. This type of individual usually challenges the status quo and provides a different and useful experience-based perspective. A wild card could also be a stakeholder or DOE representative.

It is important to set aside time to identify team members correctly, discussion with the Project Manager can aid the process.

2.2 Perform Briefing

After convening the premortem meeting, the first order of business is to perform a briefing. Performing a briefing ensures that the scope of the premortem is clearly defined. A briefing is normally done by a senior member of the Project Team e.g. the Project Manager. The briefing describes the activities to be performed during the project execution phase (Design, R&D, Testing, Construction, D&D, Safety Analyses, permitting, etc.) and should extend into initial operations. The reason for extending into initial operations is to ensure that operational vulnerabilities that may be crippling to the operational phase are identified and factored into the design/construction as risk handling strategies.

2.3 Describe Project Failure

The facilitator's job is to ensure the team is considering themselves in the far distant future after the project has been declared a total failure. It is so bad that passing another team member on the street, you will deliberately avoid eye contact. The project was an abysmal failure, way over budget, way past due date, lawsuits are flying, the corporate black eye resulted in dismissal of individuals, all that could go wrong came to pass. Visual examples and case histories of failed projects may be used to enhance the process.

Once the team acknowledges this, they are in the mindset to be critical and identify risk events with minimal associated guilt to constrain them. Studies cited within Attachment 1 have shown this increased the ability to identify risks by up to 30%.

2.4 Perform Independent Brainstorming

This activity has a very specific set of rules. During this activity the team members are given a blank piece of paper and asked to write down the events which in their opinion led to the project being unsuccessful. Absolutely no talking between team members is allowed. The reason for this is to allow an uninterrupted stream of thought which works best when individuals are identifying risks in this manner. During conventional brainstorming, the most vocal of the team tend to dominate the thought process and others simply follow or even worse go off on a tangent, try to solve a perceived problem or further an agenda. This isolation process ensures that the less vocal members of the team and the easily distracted members of the team remain focused.

This is a very quiet period and can last up to 20 mins. A good rule of thumb is that when less than 20% of the team are simultaneously writing, then it is time to move on to the next phase. Explain at this point that the team can still continue to write down/identify new risks if any arise.

2.5 Perform Risk Elicitation

Risk elicitation is performed in a "Round Robin" style. Each team member provides one risk from their list and then the next team member is asked for one risk, continuing around the table until all risks are exhausted, this process allows participation by all team members. If the first team member was to "unload" all of their risks they may have captured all of the next team member's risks, so it is important to give everyone "ownership" of the results.

Each risk is written down within clear view of all team members (large easel sticky sheets/super-size "post its" are good for this). Place the blank sheets around the walls during the quiet period of brainstorming so they are ready for documenting the risks. Each risk is written on the sheet leaving

sufficient room for the handling strategy under the risk. Three risks per sheet is about the limit, so as to leave room for the handling strategies. After all team members' lists of risks have been exhausted and the risks are written down, it is time to move to the next step.

2.6 Develop Risk Handling Strategies

At this point, the isolation of the team members is left behind and the entire team is encouraged to use their synergy to develop risk handling strategies. Using the whole team to brainstorm the handling strategies brings together expertise from all of their individual functional areas. Handling strategies are listed under each risk. It is recommended the risk statements are in one color and the handling strategies in a contrasting color to make them easier for the team to read.
Once all handling strategies have been documented the premortem process is essentially complete.

In most cases, the premortem will be used to identify risks and handling strategies at the beginning of a project and they will go on to be graded as High, Moderate and Low risks. In some cases, the need is limited to simply identifying risks. In all cases a useful and easy process can be applied to identify immediately which risks are of major concern to the team (prioritizing risks). Simply provide each team member with an equal number of small "Post it" pads (say 3) and ask them to place one on each of what they consider to be the top three risks of most concern. After totaling up, you will have the collected team's risk ranking.

2.7 Integration

As the premortem is performed early or at the start of the project, it will never capture all the risks, but should capture most of the significant risks. The premortem data usually forms the initial input to a risk register. Although projects may use different approaches for risk management, development of assessable elements is used most often. Assessable elements are usually project activities e.g., R&D, Design, Safety Basis Development, Permitting, D&R, Construction, Testing, Startup, etc., which collectively represent the entire scope of the project. The risks identified by the premortem can be binned into assessable element groups and each element reviewed to identify additional risks using brainstorming techniques. The risk register is matured, and all the aspects of Risk Management applied that are appropriate and required for the specific type of project.

3.0 History of Use

Shortly after the publication of Harvard Business review in September 2007 (Attachment 1), the premortem process was piloted at Savannah River Site (SRS). This initial premortem demonstrated that risks could be efficiently identified in a short period of time. This initial pilot produced 46 documented risks in approximately two hours. The premortem then became institutionalized at SRS as a process to identify risks at the beginning or early stages of a project and has been used on a multitude of projects since that date.

Since the initial work at SRS, project premortems have been performed at the Waste Isolation Pilot Project (WIPP), Hanford Site, Oak Ridge Site and others. They have also been introduced at Sellafield Site in the UK.

4.0 Discussion Results Achieved to Date

The results of this study draw from the history of premortems performed at SRS (Attachment 2). The following were studied:

- How quickly are risks identified ?
- What kind of risks are identified ?
- How effective is the identification ?

4.1 How Quickly are Risks Identified?

Generally a premortem can be performed in half a day and has the following approximate time scale:

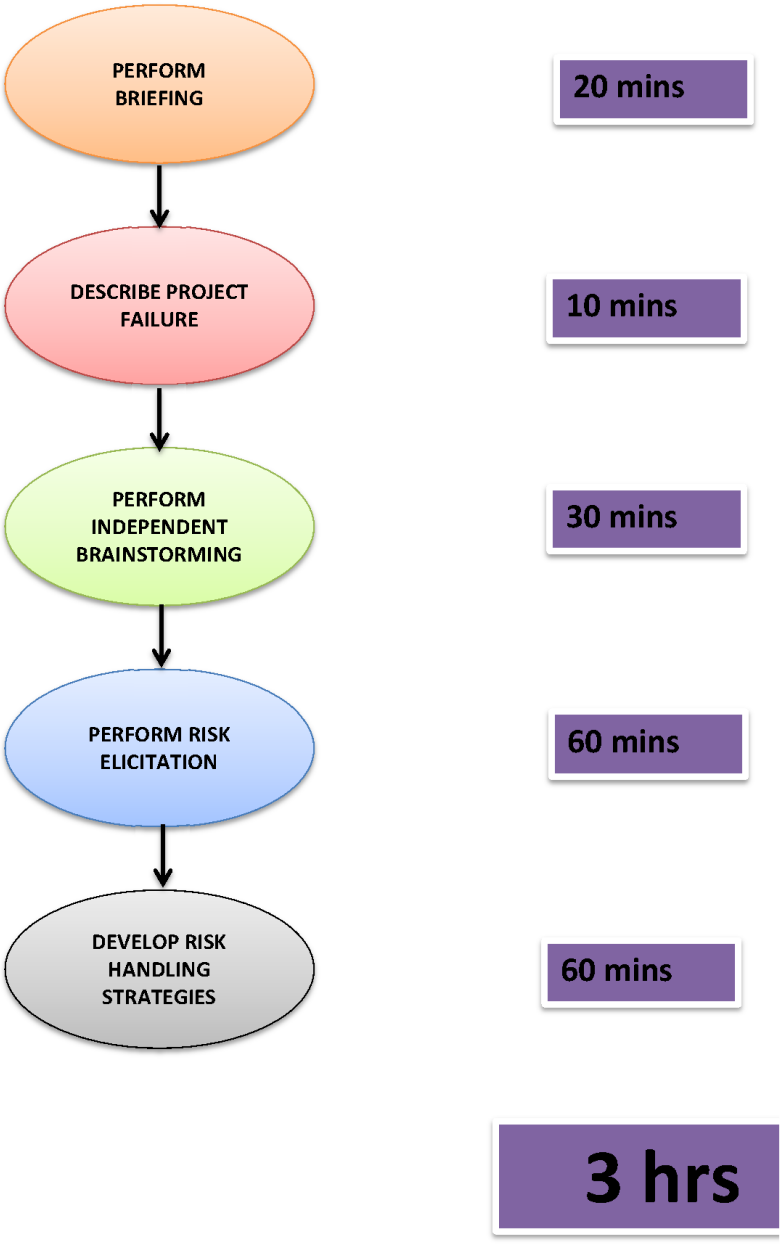


Figure 4.1-1: Premortem Time Scale

The average time for a premortem is approximately 3 hrs. The data gathered to support this evaluation (Attachment 2) came from 39 premortems which identified 1232 risks. The frequency of risks identified is shown in Figure 4.1-1:

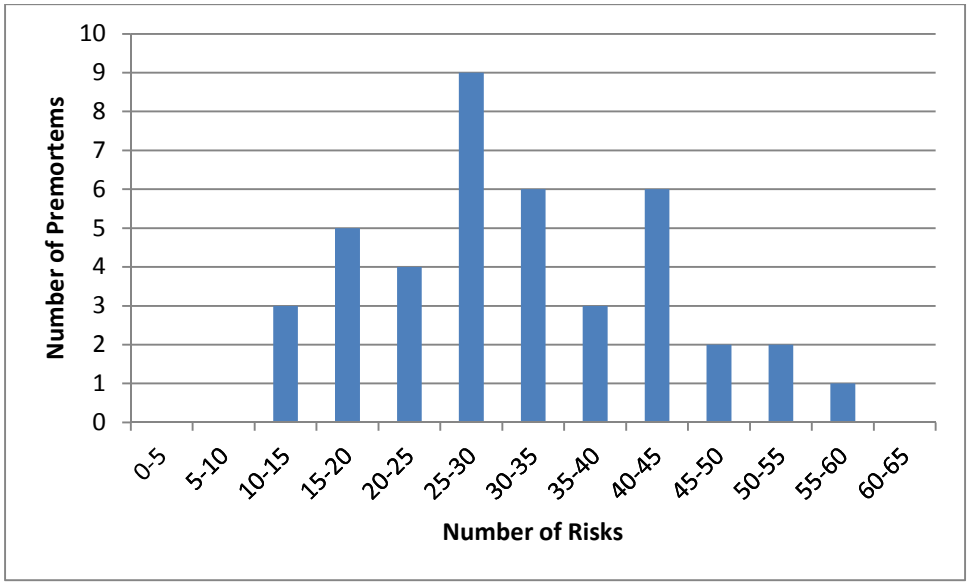


Figure 4.1-1: Number of Risks Identified

The greatest number of risks identified in a premortem was 60, the average number of risks was 32 and the lowest number 11. When looking only at projects the average increases up to 34.

With an average of 3 hrs per premortem and when considering only project premortems and only the identification phase (2 hrs) this is an average of identifying, validating and documenting one risk every 3.5 minutes.

The actual identification of risks is performed individually early on in the process, so once documented, the process can be halted and reconvened to perform the risk handling strategy development if the team is unable to commit for the entire session.

Based on the entire premortem process for projects, an average of 34 risks can be identified, validated, and documented along with their handling strategies in three hours. This would result in an average of 5.5 minutes per risk.

4.2 What Kind of Risks are Identified?

After the premortem is performed, projects typically develop their risk register based on a standard approach such as Assessable Element review. After this is completed, the risks are graded. To determine the type of risks that are being identified in the premortem, their grades (High, Moderate or Low) can be identified within the risk register. Based on reviews of the 19 projects matured through this phase, Figure 4.2-1 shows the risk profile of the risks identified by premortem:

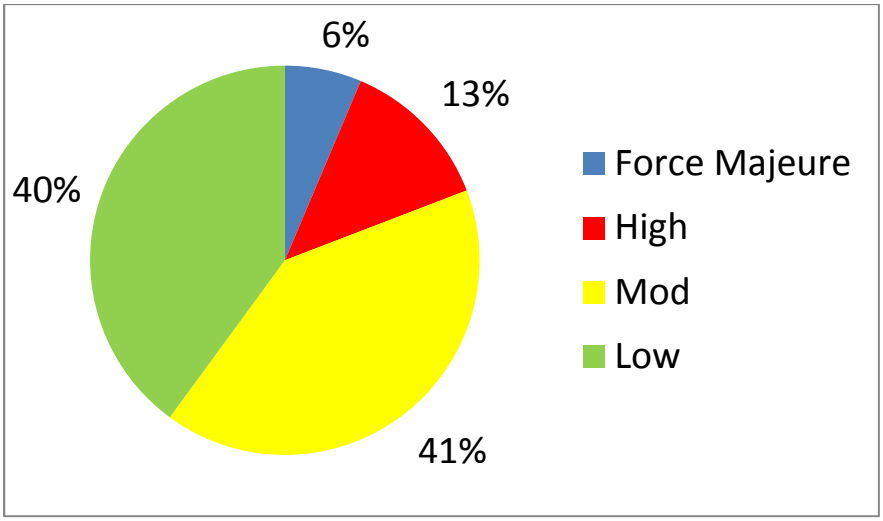


Figure 4.2-1: Profile of Risks Identified by Premortem

4.3 How Effective is the Identification?

The effectiveness of the identification was measured in two ways:

(1)The difference in risk profiles between risks identified in premortems and the risks identified in assessable element reviews and
(2) The percentage of risks identified after the premortem

(1) Risk profiles
Based on a comparison of risks identified using premortem techniques (Figure 4.2-1) and additional risks identified by assessable element techniques (Figure 4.3-1), it can be seen that both processes are essentially equally effective at identification of relative proportions of major risks (i.e., Force Majeure and High risks), Moderate risks and low risks.

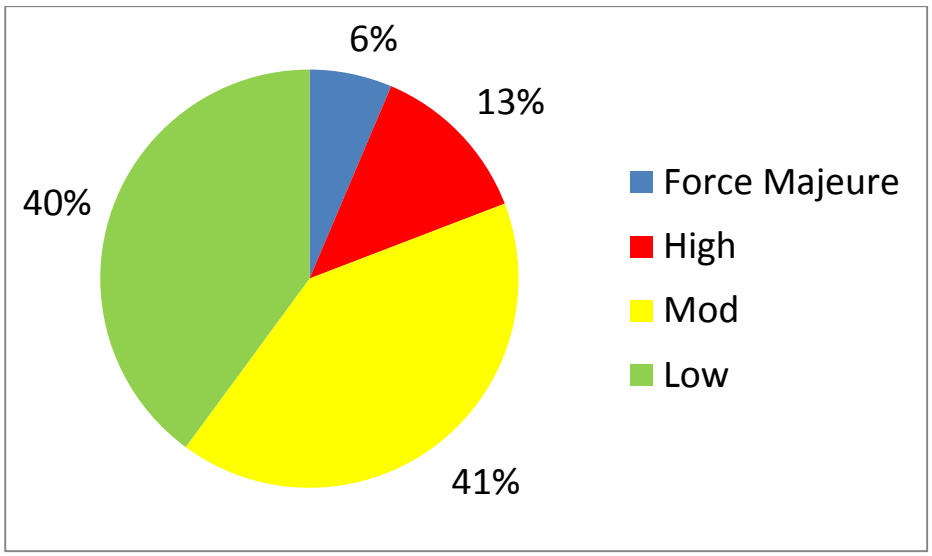


Figure 4.2-1: Profile of Additional Risks Identified by Assessable Element Review

(2) The percentage of risks identified after the premortem
Based on the data from projects, of the 425 risks carried through to project risk registers, 313 or 74% were identified using premortem techniques. The remaining 26% were identified by assessable element reviews later on in the project.

5.0 Conclusions

From the results it can be seen that the premortem process is an extremely efficient method of risk identification and can be applied with great success very early in the project life cycle. When used on projects, it does identify the vast majority of risks, yet later on in the life cycle focused assessable element review are shown to identify risks not uncovered at the premortem. This may be due in part to the team being better informed (further into the project life cycle) when assessable element reviews are peformed, or due to the more focused approach assessable element reviews have by utilizing guide lists, risk topics, Risk Breakdown Structures, etc. When used in other applications e.g., alternatives analysis/optioneering etc., premortems can be performed by the evaluation team in a very short time frame to effectively provide the risk-based component of the analysis.

6.0 Recommendations

It is recommended that the premortem process be identified as a “good practice,” and be performed in the early stages of a project to provide early identification of risks during the planning stages. This will result in a cost savings both in Risk Management and in planning activities. Additionally, the process establishes a sensitivity and awareness of project risks within the Project Team from the very beginning of the project. However, the premortem must not be the only risk assessment a project makes. It is recommended that an assessable element assessment also be performed after binning the premortem risks into assessable elements. Essentially the team begins its assessable element review with 75% of the work already complete, resulting in a significant savings.

It is also recommended that premortems be used as a quick and easy way to identify risks during alternative analysis/optioneering.

7.0 References

7.1 DOE O 413.3B, Program and Project Management for the Acquisition of Capital Assets, Chg 3, 12-20-2016.

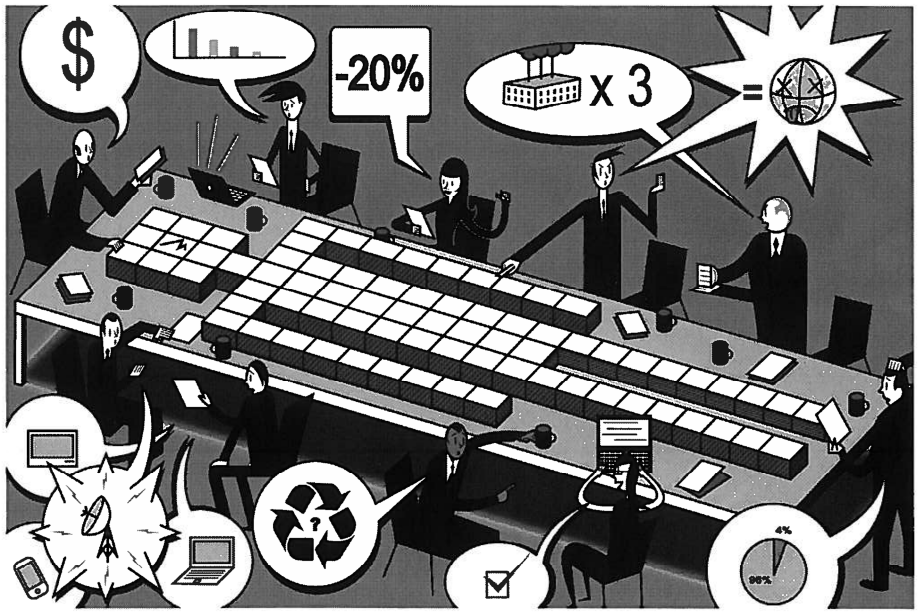
7.2 DOE G 413.3-7A, Risk Management Guide, Chg 2, 10-22-2015.

NOTE: Reference to sources of risk data are contained within Attachment 2

Attachment 1 – Harvard Business Review Article

forethought

A survey of ideas, trends, people, and practices on the business horizon



GRIST

Performing a Project *Pre*mortem

by Gary Klein

Projects fail at a spectacular rate. One reason is that too many people are reluctant to speak up about their reservations during the all-important planning phase. By making it safe for dissenters who are knowledgeable about the undertaking and worried about its weaknesses to speak up, you can improve a project's chances of success.

Research conducted in 1989 by Deborah J. Mitchell, of the Wharton School; Jay Russo, of Cornell; and Nancy Pennington, of the University of Colorado, found that prospective hindsight – imagining that an event has already occurred – increases the ability to correctly identify reasons for future outcomes by 30%. We have used prospective hindsight to devise a method called a *premortem*, which helps project teams identify risks at the outset.

A premortem is the hypothetical opposite of a postmortem. A postmortem in a medical setting allows health professionals and the family to learn what caused a patient's death. Everyone benefits except, of course, the patient. A premortem in a business setting comes at the beginning of a project rather than the end, so that the project can be improved rather than autopsied. Unlike a typical critiquing session, in which project team members are asked what *might* go wrong, the premortem operates on the assumption that the "patient" has died, and so asks what *did* go wrong. The team

Joel Castillo

members' task is to generate plausible reasons for the project's failure.

A typical premortem begins after the team has been briefed on the plan. The leader starts the exercise by informing everyone that the project has failed spectacularly. Over the next few minutes those in the room independently write down every reason they can think of for the failure – especially the kinds of things they ordinarily wouldn't mention as potential problems, for fear of being impolitic. For example, in a session held at one *Fortune* 50–size company, an executive suggested that a billion-dollar environmental sustainability project had "failed" because interest waned when the CEO retired. Another pinned the failure on a dilution of the business case after a government agency revised its policies.

Next the leader asks each team member, starting with the project manager, to read one reason from his or her list; everyone states a different reason until all have been recorded. After the session is over, the project manager reviews the list, looking for ways to strengthen the plan.

In a session regarding a project to make state-of-the-art computer algorithms available to military air-campaign planners, a team member who had been silent during the previous lengthy kickoff meeting volunteered that one of the algorithms wouldn't easily fit on certain laptop computers being used in the field. Accordingly, the software would take hours to run when users needed quick results. Unless the team could find a workaround, he argued, the project was impractical. It turned out that the algorithm developers had already created a powerful shortcut, which they had been reluctant to mention. Their shortcut was substituted, and the project went on to be highly successful.

In a session assessing a research project in a different organization, a senior executive suggested that the project's "failure" occurred because there had been insufficient time to prepare a business case prior to an upcoming corporate review of product initiatives. During the entire 90-minute kickoff meeting, no one had even mentioned any time constraints. The project manager quickly revised the plan to take the corporate decision cycle into account.

Although many project teams engage in prelaunch risk analysis, the premortem's prospective hindsight approach offers benefits that other methods don't. Indeed, the premortem doesn't just help teams to identify potential problems early on. It also reduces the kind of damn-the-torpedoes attitude often assumed by people who are overinvested in a project. Moreover, in describing weaknesses that no one else has mentioned, team members feel valued for their intelligence and experience, and others learn from them. The exercise also sensitizes the team to pick up early signs of trouble once the project gets under way. In the end, a premortem may be the best way to circumvent any need for a painful postmortem.

Gary Klein (gary@decisionmaking.com) is the chief scientist of Klein Associates, a division of Applied Research Associates, in Fairborn, Ohio. He is the author of *Sources of Power: How People Make Decisions* (MIT Press, 1998) and *The Power of Intuition* (Doubleday, 2004).

Reprint F0709A

EMPLOYEE MORALE

How to Teach Pride in "Dirty Work"

Managers in occupations that the public considers repellent can use an array of techniques to help their employees cope with and, indeed, feel proud of their work, according to a study that drew on interviews with 54 managers in 18 stigmatized occupations, including exterminator, "exotic" entertainer, and prison guard.

Perhaps the most potent method is to develop an occupational ideology that confers a more positive image on the work by reframing it, according to Blake E. Ashforth, of Arizona State University, and three coauthors in the February 2007 *Academy of Management Journal*. A manager at a pest-control company, for instance, might emphasize the value of the knowledge that exterminators acquire. Managers can also help employees establish social buffers, in the form of professional associations or informal groups of coworkers and friends or family members who understand the work. As one manager of morticians said in an interview that was part of the study, "You go to...a national convention and you find out everybody's in the same boat."

A third tactic is to provide training on how and when to confront clients and the public to challenge their perceptions of the job. A fourth is to teach how and when to use defensive tactics, such as avoiding specifics during conversations with outsiders. The manager of an abortion clinic, for example, might advise staff members to say that they work "in women's health care."

The study also found that the organization as a whole can do things to protect employees, such as training them to deal with antagonistic members of the public; providing tours (if appropriate)

Attachment 2 – Risk Data

	PREMORTEM DATA					GRADINGS				ADDITIONAL RISKS IDENTIFIED				PROJECT DATA			
DATA SET	Document Number	Date	Title	Risks Identified	Opps Identified	Force Majure	High	Mod	Low	Force Majure	High	Mod	Low	Document Number	Date	Title	DATA CODE
1	LWO-LWP-2008-00003	10/14/2008	SDIP Premortem	46	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	4
2	SRR-LWP-2009-00016	10/22/2009	ARRA Premortem	38	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	4
3	SRR-LWP-2010-00055	7/27/2010	Small Column Ion Exchange Pre-Mortem Risk Assessment	29	0	5	2	11	6	1	2	19	20	Y-RAR-H-00081,R0	11/1/2010	Small Column Ion Exchange Program	1
4	SRR-LWP-2011-00058	11/1/2011	Saltstone Disposal Unit 6 Pre-Mortem	43	0	7	0	7	14	2	2	9	5	Y-RAR-Z-00012, R0	6/28/2012	Saltstone Disposal Unit 6 Project	1
5	SRR-LWP-2012-00006	1/30/2012	Tank 10 Closure Pre-Mortem	53	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1
6	SRR-LWP-2012-00019	3/12/2012	Canister Interim Storage Project (CISP) Premortem	33	0	0	OUO	OUO	OUO	N/A	N/A	N/A	N/A	Y-RAR-S-00025, R1	2/7/2013	Canister Interim Storage Project	1
7	SRR-LWP-2012-00023	3/23/2012	Tank 18 & 19 Grouting Pre-Mortem	42	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	4
8	SRR-LWP-2012-00008	3/30/2012	DWPF Alternate Reductant Pre-Mortem	60	0	6	8	9	3	0	0	0	0	Y-RAR-S-00024, Rev 1	8/21/2012	DWPF Alternate Reductant Project ROAR	1
9	SRR-LWP-2012-00065	10/24/2012	Tank 12 Bulk Oxalic Acid Chemical Cleaning Pre-Mortem	31	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No ROAR developed	N/A	N/A	1
10	SRR-LWP-2012-00066	10/25/2012	Tank 15 Closure Pre-Mortem	33	0	0	0	16	5	0	3	2	3	Y-RAR-H-00088, R0	4/24/2013	Tank 15 Closure	1
11	Y-AES-S-00003, Rev 1	11/12/2012	Glass Waste Storage Options Systems Engineering Evaluation	19	2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	3
12	SRR-LWP-2012-00072	1/25/2013	Next Generation Solvent (NGS) Pre-Mortem	42	0	0	1	5	15	0	0	0	0	Y-RAR-H-00089,Rev0	4/18/2013	NGS Deployment	1
13	SRR-LWP-2013-00020	4/1/2013	Tank 5 & 6 Grouting Pre-Mortem	26	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Y-RAR-F-00054 and Y-RAR-F-00055	N/A	Neither ROAR updated to include these risks	1
14	SRR-LWP-2013-00022	4/17/2013	Tank 33 Bulk Waste Removal Pre-Mortem	34	0	1	4	5	13	0	0	0	3	Y-RAR-F-00060, R0	6/12/2013	Tank 33 Sludge Removal	1
15	SRR-LWP-2013-00028	5/14/2013	Saltstone Sampling Pre-Mortem	35	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	3
16	SRR-LWP-2012-00076	6/3/2013	Vault 4 Stabilization Pre-Mortem	24	18	0	1	2	3	0	2	5	4	Y-RAR-Z-00013, R0	5/6/2014	Vault 4 Stabilization-CleanCap and Roof Coating (Partial Scope Only)	1
17	SRR-LWP-2013-00064	10/28/2013	Vault 4 Minimum Clean Cap Grout Supply Options	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	3
18	SRR-LWP-2014-00010	3/11/2014	Tank 12 Closure Pre-Mortem	27	0	0	4	4	10	0	0	0	0	Y-RAR-H-00051, R2	9/23/2014	Tank 12 Closure	1
19	SRR-LWP-2014-00013	4/15/2014	Delta V Upgrades Pre-Mortem	26	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1
20	SRR-LWP-2014-00011	4/24/2014	Vault 4 Stabilization-Evaluation of Roof Coating Options	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	3
21	SRR-LWP-2014-00015	5/12/2014	Tank 22 and DWPF Recycle Pre-Mortem	18	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	4
22	SRR-LWP-2014-00018	5/12/2014	Large Tank MST Strike Project Pre-Mortem	30	0	1	5	1	2	0	1	2	0	Y-RAR-H-00094, R0	9/30/2014	Large Tank MST Strike	1
23	SRR-LWP-2014-00028	7/1/2014	Pre-Mortem for Resumption of MCU Operations	27	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	4
24	SRR-LWP-2014-00036	8/14/2014	Canister Double Stack Pre-mortem	42	0	3	2	2	14	0	0	0	2	Y-RAR-S-00026, R0	2/25/2015	Interim Canister Storage-Double Stack	1
25	SRR-LWP-2014-00039	9/2/2014	FY15 Execution Pre-Mortem	40	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	SRR-LWP-2014-00039	9/2/2014	FY15 Execution Pre-Mortem	4
26	SRR-LWP-2014-00046	10/23/2014	WCS 2.0 Pre-Mortem	19	0	0	1	5	2	1	0	0	0	YRAR-H-00103, R0	9/22/2015	WCS Online	1
27		1/3/2015	D-Ash Basin Pre-Mortem	36	0	0	1	25	10	0	1	1	0	SRNS	2015	N/A	
28	SRR-SWPF-2015-00001	2/18/2015	SRR SWPF NGS Deployment Study	14	2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	SRR-SWPF-2015-00001, R0	2/24/2015	SRR SWPF NGS Deployment Study	4
29	Y-RMP-G-00020	5/15/2015	A-Area Fire Water Pre-Mortem	14	1	0	4	10	0	0	2	1	2	SRNS	2015	N/A	
30	SRR-LWP-2015-00021	7/21/2015	Lab Waste Handling Project Pre-Mortem	30	0	1	1	4	8	0	0	0	2	Y-RAR-S-00029, R0	11/9/2015	Lab Waste Handling	1
31	SRR-LWP-2015-00033	8/31/2015	FY16 Execution Pre-mortem	49	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	SRR-LWP-2015-00033	8/31/2015	FY16 Execution Pre-mortem	4
32	SRR-LWP-2015-00034	9/9/2015	Tank Closure Cesium Removal Pre-Mortem	44	2	2	2	8	9	0	1	3	2	Y-RAR-H-00118, RA	1/10/2017	Tank Closure Cesium Removal	1
33	SRR-LWP-2015-00035	9/30/2015	Tank Closure Cesium Removal Risk Evaluation Meeting Minutes	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2
34		11/15/2015	TRM Canadian Fuel Pre-Mortem	11	0	0	5	6	0	0	3	2	2	SRNS	2015	N/A	
35	SRR-LWP-2015-00036	11/19/2015	Integrated PISA Resolution with Alternate Reductant Flowsheet Risk Identification Meeting	27	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Y-RAR-S-00024, R2	4/21/2016	PISA Resolution With Alternate Reductant ROAR	2
36	Y-AES-S-00004, Rev 0	11/20/2015	Vault 4 Contamination Minimization Study	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2016	N/A	3
37	Y-AES-G-00013, Rev 0	1/12/2016	LWS Mecury Removal Study	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2016	N/A	3
38		2/16/2016	K/L Reliable Power Pre-Mortem	22	0	0	4	11	7	0	0	0	0	SRNS	2016	N/A	
39	Y-AES-Z-00002, Rev 0	3/28/2016	SDU 6 Floor and Roof Repair Study	24	4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	SRNS	2016	N/A	4
40	SRR-LWP-2016-00024	6/23/2016	Preliminary Selection of T10 TCCR Feed Flowsheet	16	3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	3
41	SRR-LWP-2016-00022	6/29/2016	Saltstone Disposal Unit 7 Pre-Mortem	52	1	2	7	11	6	2	2	1	12	Y-RAR-Z-00015,R0	9/29/2016	Saltstone Disposal Unit 7 Project. One additional new opportunity identified. Not included in these numbers.	1
42	SRR-LWP-2016-00026	8/9/2016	FY17 Execution Pre-Mortem Results	33	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	SRR-LWP-2016-00026, R0	10/4/2016	FY17 Execution Pre-Mortem Results	4
43	SRR-LWP-2016-00040	10/19/2016	Tank 3 Salt Dissolution pre-Mortem	25	1	0	3	6	7	0	0	1	1	Y-RAR-F-00066, R0	3/1/2017	Tank 3 Salt Dissolution	1
44	Y-AES-S-00002, Rev 0	10/20/2016	DWPF Mercury Removal Study	18	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Y-AES-S-00002, R0	10/20/2015	DWPF Mercury Removal Study	4
			TOTALS	1232	34	28	55	148	134	6	19	46	58				

CODES
1-Premortem results directly used to generate project risk register — 780 — 23
2-Not a premortem process - Remove from sample
3-Premortem process used for identification of risks used in evaluating options
4-Not directly related to a single specific risk register
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