

**Assessing and Improving Regulatory Communication Processes: The Case of the
WIPP CRA - 15151**

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ABSTRACT

This paper will focus on how and why effective communication is useful and meaningful for a multi-organizational project team and the concrete practices through which this team assessed and intervened in its communication. First, the effort generated five recommendations that may be useful in other similar projects. The five primary areas of improvement include the use of an electronic platform for collaboration and document sharing, the continued use of an in-house technical editor, improved direction for authors and technical editors, improved comment resolution process (development of Communication Guidelines) and improved management of the project schedule. These areas for improvement were translated into process changes that were identified and agreed upon by the team. Specific actions were assigned to members of the team with the intent to streamline the complex regulatory process. Second, and more importantly, we demonstrate how the assessment of communication, thinking about our communication practices together (reflexive engagement), and the implementation of insights about communication fit into a larger continuous improvement framework. Third, the experience of the interdisciplinary team provided preliminary evidence about the efficacy of the approach and the need for continuous engagement with communication. The intensified participation in the second assessment encouraged greater ownership and satisfaction with corrective actions. The substance of the recommendations was made more robust as well, focusing on improving communication within the project team. Early anecdotal evidence suggests that improvements in communications continue to enhance the project team's efficiency and efficacy of the planning phase through submittal of the Compliance Recertification Application.

INTRODUCTION

The Waste Isolation Pilot Plant (WIPP) is authorized by the WIPP Land Withdrawal Act [1] (Pub. L. 102-579) to demonstrate the safe disposal of radioactive waste materials generated by atomic energy defense activities. The WIPP Land Withdrawal Act requires the U. S. Department of Energy Secretary not later than 5 years after the initial receipt of transuranic (TRU) waste for disposal at WIPP, and every 5 years thereafter until the end of the decommissioning phase, to submit to the U. S. Environmental Protection Agency Administrator documentation of continued compliance with the final disposal regulations. To date, the Department of Energy has submitted and has been recertified by the Environmental Protection Agency twice (in 2006 and 2010). The Department of Energy submitted the third Compliance Recertification Application [2] to the Environmental Protection Agency on March 26, 2014.

The Compliance Recertification Application is a technically complex regulatory document that is developed by a multi-organizational project team. The project team is comprised of highly educated, senior researchers and managers who have decades of project-specific regulatory and scientific experience. They are in some cases 'world experts' in their fields. Team members bring diverse perspectives on the regulatory framework and application process. The project team collaborates from the planning phase through submittal of each Compliance Recertification Application to meet the required regulatory deadline for the U. S. Department of Energy submittal to the U. S. Environmental Protection Agency.

Negotiating the complexity, expertise, and diversity of perspectives requires careful attention to their collaborative communication processes. This paper focuses on the communication assessment and intervention efforts undertaken as part of continuous improvement of the CRA process. The assessment and intervention methods offer a model that may be useful in the management and regulation of complex industrial systems.

After the Environmental Protection Agency approved the second Compliance Recertification Application on November 18, 2010 [3], an internal management assessment was conducted to assess and improve communication effectiveness and interfaces between the members of the project team during the process of developing, writing and reviewing the Application. Communication experts from Texas A&M University were engaged to develop survey instrumentation to obtain input from the project team on the robustness of the project team's interactions. The assessment produced a report [4] and a follow-up workshop for sharing and discussing the survey results with the project team and identifying process improvements for the next application.

The third Compliance Recertification Application [2] was submitted to the Environmental Protection Agency on March 26, 2014. Shortly after submittal, a second management assessment survey was distributed to the project team, which included authors, reviewers and technical editors. Survey questions in the second management assessment were based primarily on the original survey questions. However, based on insights from the first assessment process, substantial improvements were made in the execution of the assessment and the team's sense making process.

First, questions were modified to accommodate differences from the previous application process. In the second management assessment, increased participation was noted in the total number of survey responses received. The efforts of the project team to identify and come to consensus on definitive and actionable corrective actions were also improved. Second, based on insights from the first assessment, the second assessment provided several avenues to record responses from participants (i.e., hard-copy, emailed electronic copy, online platform). In addition, whereas the first assessment provided a high-level summary of the results, the second included not only a high-level summary but also a detailed unpacking of the results. That increased transparency and evidence served as a more effective communication tool for identifying corrective actions and developing consensus around process improvements. Third, rather than discussing the results in a single meeting, the second assessment was followed by a series of project team meetings to craft, implement, and process the assessment with input and involvement from members of each organization on the project team. Fourth, based on this

process, the project team prepared Communication Guidelines to establish shared frameworks for engagement and allowances for agreement, clarification, and disagreement for use at future project team meetings.

HISTORICAL PERSPECTIVE

A brief historical review of the WIPP long term regulatory compliance should provide useful context for understanding these insights. The WIPP Project was created as the United States' only radioactive disposal facility for TRU waste generated by weapons research and production. The U. S. Congress established a comprehensive regulatory structure to oversee the operations of the disposal facility. The regulations [5] establish the limits of radiation doses that members of the public may receive as a result of the management and storage of TRU radioactive waste. In order to open the facility, the United States Department of Energy (hereafter referred to as Department of Energy) was required to submit an initial Compliance Certification Application to the United States Environmental Protection Agency (hereafter referred to as the Environmental Protection Agency). The WIPP Land Withdrawal Act [1] requires the Department of Energy to submit a Compliance Recertification Application every five years after the first receipt of waste, which occurred on March 26, 1999. To date, three Compliance Recertification Applications have been prepared and submitted to the Environmental Protection Agency.

The content and other regulatory detail of the Compliance Certification Application and subsequent Compliance Recertification Applications is defined in 40 Code of Federal Regulations Part 194, "Criteria for the Certification and Re-Certification of the WIPP's Compliance with the 40 Code of Federal Regulations 191 Disposal Regulations [5]." The crux of the application is a Monte Carlo-based performance assessment calculation that shows the repository will not release radioactive material to the environment that exceeds limits defined in 40 Code of Federal Regulations 191.13. In order to perform those calculations, much data is collected and models are created, run and peer reviewed. Every five years, the WIPP Land Withdrawal Act requires the Department of Energy to document the basis for their performance assessment results. The WIPP project has assembled a team of engineers, scientists and project managers to collect the data, perform calculations and document the results in the quinquennial Compliance Recertification Application.

To accomplish this task, a recertification project team was created. Activities of the team are guided by a project execution plan. Team members can be characterized as senior-level professionals in their chosen field of study, highly educated with advanced degrees, and 15 years plus of WIPP project experience. The complexity of their knowledge-intensive work [6], [7], [8]; the multiple disciplines and domains [9]; the mix of scientific, engineering, and regulatory problems [10]; and the need to integrate inputs from multiple, interconnected organizations [12], [13], [14]; all contribute to the need for and the difficulty of effective communication [15], [16]. Research has demonstrated that the negotiation of just one of these issues can make communication more challenging, and working at the intersection of all them adds layers of complexity on complexity. The teams' communication must support and document the solution of engineering and regulatory problems informed by the leading edge of scientific discovery. In this space, multiple competing frameworks for what the work should be and how it should be communicated circulate. The team must negotiate them all through communication [17].

The WIPP project has specifically defined procedures on how to review, as well as make and resolve comments on regulatory documents. Approximately 21 days were spent developing consensus agreement on the resolution of over 5500 comments on the Compliance Recertification Application that was submitted in 2009. Process changes and document formatting facilitated improvements that reduced the number of comments generated to 3800 in the 2014 Compliance Recertification Application. In addition, the number of meeting days to reach consensus on the resolution of comments was reduced from 21 to 12, a 43% decrease. See Figure 1 for the impact of process improvements from the 2009 application to the 2014 application. However, much of the same interpersonal conflicts that resulted in time consuming and inefficient resolution of comments have existed since the development of the first Compliance Recertification Application.

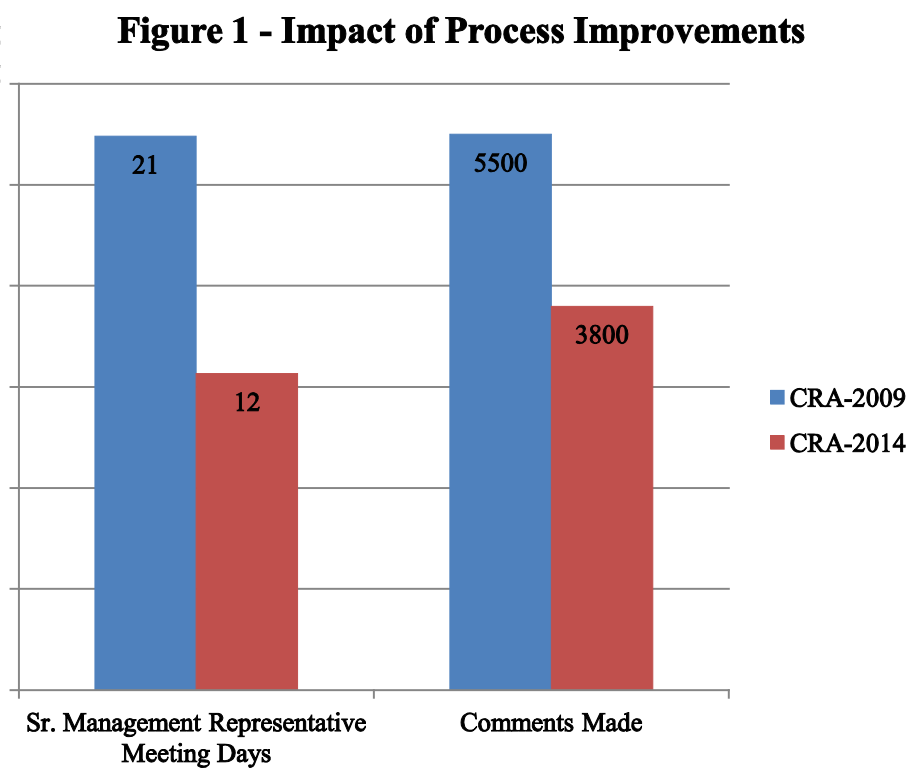


Fig. 1. Impact of Process Improvements.

After submittal of the second Compliance Recertification Application [18], the Deputy Project Manager initiated efforts to survey participants for feedback on the communication effectiveness of the Recertification Schedule Manager and the communication robustness of the Recertification Project Team and the Recertification Response Committee as a whole. The Recertification Schedule Manager manages the Recertification Project plan and schedule, coordinates development and production of application documentation and assists in project organization, planning and management. The Recertification Response Committee consists of at least one representative of each of the project participants. This committee makes compliance and strategy-related recommendations. To support the assessment, a collaborative relationship was developed with researchers in the Department of Communication at Texas A&M University. Through our collaboration, we prepared a survey design and an analysis of survey results. In

addition, the Texas A&M University researchers developed a workshop to discuss survey results and presented it to the Recertification Project Team in Carlsbad, NM. The workshop focused on the following teamwork issues:

- Complexity
- Distance
- Meaning management
- “Childhood brouhahas”
- Balance of directive and facilitative leadership
- Turf-guarding, and
- Mental models of the nature of the work

The workshop kicked-off meta-conversations about the team’s interaction and communication processes. However, the first workshop did not include all stakeholders. No single workshop could have in one day developed the sustained energy to manage communication issues in near-term Environmental Protection Agency comment resolution activities and in developing a strategic plan for application to the 2014 Compliance Recertification Application.

Improvements to communication processes during the development of the 2014 Compliance Recertification Application included kick-off meetings, documentation of the biweekly meeting, limited format changes and implementation of an in-house technical editor. Approximately 45 team members participated in each question and answer kick-off meeting to discuss the activities planned during the development of the application and instructions on how to use the online platform for uploading and downloading documentation. Draft meeting minutes were generated from biweekly meetings to capture discussions and action items and were prepared for the team’s review. The final minutes were distributed and often used as a resource for clarification during document preparation. Authors used an existing document structure (agreed upon by the Environmental Protection Agency during preparation of the previous application) to document new content required for compliance. A benefit of using an in-house technical editor as opposed to using a third-party technical editor included significant cost avoidance for the Department of Energy. Also, the team benefited from the technical editor’s extensive years of project- specific experience.

POST COMPLIANCE RECERTIFICATION APPLICATION-2014 PROCESS IMPROVEMENTS

Recertification Project Team leadership decided to conduct a follow up survey of project team members after the 2014 Compliance Recertification Application was submitted. The assessment tool was revised by removing and adding items to reflect an interest in comparing results to the baseline data and generating new data. Questions were modified to accommodate differences from the previous application process.

We also undertook changes focused in particular on improving participation in the assessment processes. The efforts of the project team to identify and come to consensus on definitive and actionable corrective actions were also improved. Three things changed in the second survey that significantly influenced the number of returned survey responses from the previous survey.

- A concerted effort was made to contact each survey participant to obtain survey responses.
- Previously the only response mechanism was the commercially available, “Survey Monkey^{®1}”. For the second survey, three avenues to record response from participants were provided. Responders could submit responses on a collaborative workplace website (URS Corporation eRoom^{®2}) and also by responding through email or providing a hard-copy to Recertification Project Team leadership. In addition, whereas the first assessment provided a high-level summary of the results, the second included not only a high-level summary but also a detailed unpacking of the results. That increased transparency and evidence served as a more effective communication tool for identifying corrective actions and developing consensus around process improvements.
- The consensus meeting to discuss survey results was much better attended and included senior management representatives from each of the project team organizations. All five of the senior management representative organizations’ decision makers were present in the 2014 post-survey workshop compared to only three in the 2011 workshop.

Results from the 2014 survey were summarized and five process improvements areas were crafted with support from Texas A&M University researchers and presented to Recertification Project Team senior management and members for discussion and agreement on action items to address the five areas of improvement. The Recertification Project Team identified action items from the meeting and provided the status of those action items at weekly WIPP technical exchange meeting that have the most of the project team members in attendance. A discussion of the five process improvement areas and the agreed path forward to implement corrective actions follows.

Electronic Platform for Collaboration and Document Sharing

As with the previous Compliance Recertification Application, the project team used an eRoom to manage the document preparation and comment resolution process. An eRoom is an electronic platform established by project management to allow members to collaborate and share information pertaining to work-in-progress. Project documents are made available to team members for reviewing, copying, commenting, and editing irrespective of organizational affiliation or geographic location. The eRoom was a place where authors uploaded approximately 1600 references used in 2014 Compliance Recertification Application, project meeting minutes, 2014 Compliance Recertification Application style Guide and other tools were posted to support authors during the application’s development. The eRoom content primarily consists of files, folders, and images. Depending on their role, team members would be able to add content by drag and drop or upload content from another location. The eRoom maintains document configuration control as changes are made. The team member making changes may also send an email alert to individual or multiple members to advise them of the availability of revised content. Classroom training and written desktop instructions, in how to operate within and take advantage of all the eRoom tools, was provided to all eRoom users.

¹ SurveyMonkey is a trade of xyz in the United States and/or other countries.

² eRoom is a trademark of EMC Corporation in the United States and/or other countries.

Project team members were in agreement that the eRoom was a helpful tool. An action item for improvement involved resolving difficulties with eRoom access and the challenges of logging on from a non-WIPP Internet Protocol address. The URS organization has subsequently decided to discontinue the use of eRoom in favor of a SharePoint^{®3} software platform. Irrespective of software platforms used for future document development, difficulties with collaborate workspace access will likely be a continuing problem that needs to be resolved especially in light of increasing computer security systems required by government users. Currently, the user must log in at least once every 45 days or the account is deactivated without notice. If the account is deactivated, the user is required to personally contact a technical representative to re-set the password and reactivate the account. This activity is critical to maintain cyber security, but also requires additional time and effort for users to log onto eRoom to access information. The team agreed that improvements to streamline this process would result in a higher probability that users could maximize the platform to its fullest capabilities.

Continue Use of In-House Technical Editor

In the two previous Compliance Recertification Applications, a third-party technical editor was used to ensure consistent formatting was implemented throughout the document. This was driven by the fact that there are over a dozen different authors from four separate organizations. In a cost saving move, a technical editor from one of the Recertification Project Team organizations was used for the 2014 application. This resulted in a cost avoidance of nearly \$0.5 million.

The project team members' survey feedback recommended having additional editorial support during 2019 Compliance Recertification Application document preparation. Specific resource augmentation would be most helpful during initial style formatting of the larger ancillary documents developed to supplement specific technical topics of importance to support a firm regulatory position. Having additional editorial support at this point in the document development process will enable the project to meet scheduled time frames. When scheduled dates cannot be met, marshalling additional resources are rarely effective for recovering the lost time. The most typical impact of such schedule compression is to decrease time available for technical peer reviews, which could potentially result in a loss of document quality. At the same time, finding the right technical editor was key. Technical editors with experience with the project were especially helpful, because they had not only their own expertise but also a mastery of the particular concerns and standards of the WIPP Project and increased credibility with the authors. Stronger instructions for authors and editors could also help build credibility.

Improve Instructions for Authors and Technical Editor

In the two previous Compliance Recertification Applications, a *Format and Content Guide* [19] was created and used primarily to assist the third-party technical editor with document consistency. Project team members agreed that this guide should be revised with a focus on being author-friendly with a search function. The revised document would be renamed, *Style Guide*. The two major process improvements to this guidance document would involve generating format and style templates to be used in the preparation the applications' sections and

³ *SharePoint* is a trademark of the Microsoft Corporation in the United States and/or other countries.

appendices. Such templates would be reviewed by project team members well in advance of document preparation. It was also agreed that once the new/revised templates had received team member consensus, these templates would not change for the duration of the documentation preparation phase. The *Style Guide* will also be revised to include the lessons learned that were documented from the development of the latest application.

Improve the Process for Reaching Consensus on Comment Resolution

The internal review of the 2014 Compliance Recertification Application generated over 3800 comments that required a consensus agreement from the senior management representatives and authors from each of the member organizations of the Recertification Project Team. After the author and reviewers reached agreement on comment resolution, documentation of the resolution was required to meet the Department of Energy's Quality Assurance requirements [20] for regulatory documents. The review process can be separated into two different document preparation phases, the internal document production and review phase and the Department of Energy document review phase.

Project management staff developed a comprehensive schedule that defined over 1400 activities. A subset of those activities defined the length of time authors had to resolve senior management review comments. There was a consensus of all authors that the length of time to resolve comments should be extended. The goal of the extension is for the author to prepare a draft resolution to respond to senior management comments and then independently collaborate with each reviewer prior to the senior management review session to obtain each member's consensus (or better yet agreement) of comment resolution. If the author and the commenter are unable to reach a consensus on a resolution, the author will document the author's proposed resolution and the reviewer's proposed resolution. A new column will be created in the modified document review spreadsheet to capture if the author and commenter reached a consensus on the resolution of each comment (Yes or No). If a consensus could not be reached between the reviewer and the author, a group consensus will be reached by senior management during the comment consensus meeting. The modified comment status spreadsheet will be revised in real time to capture the final resolution of each comment.

One common theme across the survey responses dealt with the lack of a method to effectively deal with comment resolution where the author could not reach consensus with the reviewer(s) in an expedient manner. On several occasions, comment resolution discussions dragged on for 30 minutes or longer without reaching a comment resolution. One corrective action that will be implemented in future Compliance Recertification Application comment consensus meetings and other related regulatory document sessions was the development of communication guidelines. These guidelines established shared frameworks for engagement and allowances for agreement, clarification, and disagreement for use at future project team meetings. Guidelines prepared and agreed upon by project team members are not unique to this project but worth mentioning for use by similar groups resolving comments on complex regulatory documents. The Communication Guidelines not only encourage the team to be more mindful of communication during the process, they also created a specific moment to talk about communication, to talk about talk (meta-communicate) [17]. In creating them (and revising them in the future), discussing the guidelines gets the team to think about their process, which is useful in and of itself.

Communication Guidelines

- **Empower the Facilitator** – authorize the facilitator to implement Communication Guidelines during meetings
- **Be Respectful** – limit verbal conversation to one person at a time, listen to and consider the input of others
- **Participate** – provide input and quality comments; they are wanted and needed
- **Limit Distractions** – put cell phones on vibrate, don't interrupt the meeting
- **Limit Redundant Discussion** – suggest specific ways to resolve the comment and reach group consensus; if consensus cannot be reached, stop discussion and place the issue in a "parking lot"
- **Use Parking Lot** – document issues identified during the meeting that need further post-meeting discussion

A second process improvement recommendation for the comment consensus meeting was to limit the number of meeting participants. There was a general agreement that it would be preferred to have only one voice speak for each of the seven organizational members. These specific tactics reflect a strategy whereby the project team leadership carefully manages the discussion during the meeting (making it as focused as possible) and also outside of the meeting (relocating issues that can be deferred into other conversations).

Improve Schedule Management

Project Management staff used Microsoft Project^{®4} software to track the 1400 plus activities involved in the Compliance Recertification Project schedule. Several process improvements were recommended for implementation to improve the schedule management process. The process improvements include the following:

- Ensure that applicable participating organizations' activities are integrated into the master schedule early in the document development process. This includes not just the project team but some of the other management review teams with oversight responsibility of the WIPP, for example the Department of Energy Headquarters technical and legal staff.
- Redefine and clarify what the data cut-off dates mean, specifically for the Compliance Recertification Application references and published data that may be used to support the application's documentation. This is especially important in some of the more technically complex appendices of the application.
- Start some Compliance Recertification Application development activities (i.e., publish and collect literature, collect data) as soon as possible and/or available before document preparation begins.

The assessment and implementation process reflects the same elements of a continuous improvement model made popular by Dr. W. Edward Deming. It is layered with communication-focused efforts for a Plan, Do, Check, Act continuous improvement process used

⁴ Microsoft Project is a trademark of the Microsoft Corporation in the United States and/or other countries.

by the project team. The Plan, Do Check, Act model is designed to cycle over and over again, with improvements hopefully coming with each cycle. The assessment becomes the focus of this continuous improvement effort, but it is key to highlight the importance of reflecting on communication processes at each stage (see Figure 2).

CONCLUSION

The WIPP multi-organizational project team operates within a complex regulatory environment. Regulatory submittals often require the input of multiple organizations. Communications to support regulatory document preparation is critical to ensure accurate regulatory compliance information is communicated to WIPP regulators. As a result of this complexity, the WIPP Recertification Project team participated in a survey to proactively manage the broad range of communication issues that arise and ensure regulatory compliance. The survey was tailored to accommodate differences in the previous application process and provided multiple avenues for participants to respond including hard-copy, email and online through an eRoom platform. The survey was followed up by several project team meetings to craft, implement and process results with active participation from members of the WIPP multi-organizational project team.

The survey respondents identified five primary areas for improvement to enhance communication effectiveness during the regulatory document development process (Check). The survey process itself provides time and resources for reflecting explicitly on communication as well as generating specific insights for improvement. The five primary areas include the use of an electronic platform for collaboration and document sharing, the continued use of an in-house technical editor, improved direction for authors and technical editors, improved comment resolution process (development of Communication Guidelines) and improved management of the project schedule. These areas for improvement were translated into process changes that were identified and agreed upon by the team (Act). The insights were engaged through a participatory process wherein the team acted on its own policy. Specific actions were assigned to members of the team with the intent to streamline the complex regulatory process. Those insights and the process itself were codified in the development of Communication Guidelines, which will inform the conduct of the next review process (Plan). The spirit of participation and reflection on process that made the creation of policy successful should also inform the enactment of the policy in planning. As we conduct the next submission process, the communication guidelines become a resource for being reflexive in the actual conduct of the work (Do).

The identification of lessons learned by the multi-organizational project team is characterized by mutual trust and openness, where problems and solutions are shared and resolved collectively. As identified in Figure 1, each action contributed to measurable improvements in a streamlined process since the first Compliance Recertification Application. These improvements innovate, enhance productivity, reduce costs and improve quality that supports the mission of the customer, the Department of Energy and the regulator, the Environmental Protection Agency. Relationships within the WIPP multi-organizational project team have been established and are continuously improving due to the team's commitment to find improvements and develop a consensus to assure the product is of the best quality, on schedule and within budget. The exercise to collectively explore the strengths and weaknesses of the integrated team is a living

WM2015 Conference, March 15-19, 2015, Phoenix, Arizona, USA

process and a priority for effectively managing communications for a complex regulatory process.

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