

PROJECT TECHNICAL PLAN

Project 3: Waste and D&D Engineering and Technology Development

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INTRODUCTION

This project focuses on delivering solutions under the deactivation and decommissioning (D&D) and waste areas in support of DOE HQ (EM-13). This work is also relevant to D&D and facility engineering activities being carried out at other DOE sites such as Oak Ridge, Savannah River, Hanford, Idaho and Portsmouth. Efforts on this project include the following tasks:

Task 1: Waste Information Management System (WIMS)

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This task provides direct support to DOE EM for the management, development, and maintenance of a Waste Information Management System (WIMS). WIMS was developed to receive and organize the DOE waste forecast data from across the DOE complex and to automatically generate waste forecast data tables, disposition maps, GIS maps, transportation details, and other custom reports. WIMS is successfully deployed and can be accessed from the web address <http://www.emwims.org>. The waste forecast information is updated annually. WIMS has been designed to be extremely flexible for future additions and enhancements.

Task 2: D&D Support to DOE EM for Technology Innovation, Development, Evaluation and Deployment

This task provides direct support to DOE EM for D&D technology innovation, development, evaluation and deployment. For FIU Year 6, FIU will assist DOE EM-13 in meeting the D&D needs and technical challenges around the DOE complex. FIU will expand the research in technology demonstration and evaluation by developing a phased approach for the demonstration, evaluation, and deployment of D&D technologies. One area of focus will be working with the Savannah River Site to identify and demonstrate innovative technologies in support of the SRS 235-F project. FIU will further support the EM-1 International Program and the EM-13 D&D program by participating in D&D workshops, conferences, and serving as subject matter experts.

Task 3: D&D Knowledge Management Information Tool (KM-IT)

The D&D Knowledge Management Information Tool (KM-IT) is a web-based system developed to maintain and preserve the D&D knowledge base. The system was developed by Florida International University's Applied Research Center with the support of the D&D community, including DOE-EM (EM-13 & EM-72), the former DOE ALARA centers, and with the active collaboration and support of the DOE's Energy Facility Contractors Group (EFCOG). The D&D KM-IT is a D&D community driven system tailored to serve the technical issues faced by the D&D workforce across the DOE Complex. D&D KM-IT can be accessed from web address <http://www.dndkm.org>.

TASK 1: WASTE INFORMATION MANAGEMENT SYSTEM

TASK 1 TECHNOLOGY NEEDS

In order to facilitate accelerated cleanup initiatives, waste managers at DOE field sites and at DOE headquarters in Washington, D.C., need timely waste forecast information regarding the volumes and types of waste that will be generated by the DOE sites. Waste information from all sites needs a common application to allow interested parties to understand and view the complete complex-wide picture. A common application allows identification of total waste volumes, material classes, disposition sites, and any known barriers to treatment and disposal.

The Applied Research Center (ARC) has developed a Waste Information Management System (WIMS) to receive and organize the DOE waste forecast data from across the DOE complex and to automatically generate waste forecast data tables, disposition maps, and other displayed reports. This system offers a single information source to allow interested parties to easily visualize, understand, and manage the vast volumes of the various categories of forecasted waste streams in the DOE complex.

TASK 1 DESCRIPTION

Objectives

The objective of the WIMS effort is to provide DOE and other stakeholders with the tools necessary to easily visualize and assist in understanding and managing the vast volumes of the various categories of forecasted waste streams in the DOE system and to offer a single source for this information. With this information available, decision making and achieving waste disposition goals and other EM goals will be less cumbersome and more efficient.

Benefits

The benefits of WIMS include:

- Providing a central location to access DOE waste forecast data for sites across the DOE Complex,
- Providing easy-to-use tools to view the DOE waste forecast data in various formats,
- Achieving improved efficiencies of scale when outsourcing treatment and disposal services by providing information regarding complex-wide waste streams,
- Providing information to technology vendors regarding DOE waste needs to plan future technology capabilities and capacity, and
- Sharing site-to-site resources and treatment capabilities to allow the sites to leverage capacity and expertise.

FIU YEAR 6 TASK 1 EXECUTION PLAN

Project Tasks

The successful web deployment of WIMS, complete with waste information from all DOE sites, occurred in May 2006. Individuals may visit the website (<http://www.emwims.org>), choose the desired DOE facility, and view the projected volumes of waste that the facility plans to treat or dispose through the year 2050. The waste forecast information may be sorted or filtered in a variety of ways and presented in a tabular format, exported to other applications such as MS Excel[®], or displayed with a disposition map, a geographical information system (GIS) format, or in a printable report. The data may also be viewed in a 'reverse' format that displays the volume of forecasted wastes scheduled to arrive at a specific treatment or disposal location from any or all generation sites. WIMS has been designed to be extremely flexible for future additions and enhancements. WIMS has been labeled DOE's tool-of-choice for waste forecasting.

Waste management support across the DOE Complex includes updating and improving DOE's official internet-based, waste forecasting and transportation information technology known as the Waste Information Management System (WIMS). Waste and transportation data is updated annually and technical support is provided to the DOE sites in the use of WIMS.

The following subtasks have been identified for the WIMS task for FIU Year 6:

Subtask 1.1: Maintain WIMS - database management, application maintenance, and performance tuning

- This subtask includes the day-to-day maintenance and administration of the application and the database servers. FIU will maintain the WIMS application system to ensure a consistent high level of performance. In addition, the database administrators will perform routine maintenance in order to keep the WIMS database and server in a stable condition.
- The WIMS application is also maintained on the web server by the Web Server Administrator. This administrator monitors the network and server traffic and performs changes necessary to optimize the application performance.
- In addition, as part of this subtask, FIU will provide application and database security as well as help desk support to DOE site waste managers, HQ managers, and other users who need assistance in using WIMS.

Subtask 1.2: Incorporate new data files with existing sites into WIMS

- Upon HQ request, FIU receives revised waste forecast data as formatted data files. To incorporate these new files, FIU builds a data interface to allow the files to be received by the WIMS application and imports it into SQL Server. SQL server is the database server where the actual WIMS data is maintained. Under this subtask, FIU will receive and incorporate one set of revised waste forecast data files (expected in the March 2016 timeframe). The new waste data will replace the existing previous waste data and will become fully viewable and operational in WIMS.

- Upon HQ request, FIU receives revised transportation data as formatted data files. Under this subtask, FIU will receive and incorporate one set of revised transportation data files (expected in the March 2016 timeframe). The new set of transportation data will replace the existing previous transportation data and will become fully viewable and operational in WIMS.

Project Milestones for Task 1

Milestone No.	Milestone Description	Completion Criteria	Due Date
2015-P3-M1.1	Import 2016 data set for waste forecast and transportation data	Data imported into WIMS and available for testing over the web	Within 60 days after receipt of data from DOE
2015-P3-M1.2	Waste Management Symposium 2016	Submit draft paper to conference	11/6/2015

Deliverables for Task 1*

Client Deliverables	Responsibility	Acceptance Criteria	Due Date
Draft Project Technical Plan	Project Manager	Acknowledgement of receipt via E-mail two weeks after submission	10/05/2015
Draft Year End Report	Project Manager	Acknowledgement of receipt via E-mail two weeks after submission	10/14/2016
Monthly Progress Report	Project Manager	Acknowledgement of receipt via E-mail two weeks after submission	Monthly
Quarterly Progress Reports	Project Manager	Acknowledgement of receipt via E-mail two weeks after submission	Quarterly
Presentation overview to DOE HQ/Site POCs of the project progress and accomplishments (Mid-Year Review)	Project Manager	Presentation to DOE HQ and Site POCs	2/29/2016**
Presentation overview to DOE HQ/Site POCs of the project progress and accomplishments (Year End Review)	Project Manager	Presentation to DOE HQ and Site POCs	8/31/2016**

*Final documents will be submitted to DOE within 30 days of the receipt of comments on the draft documents.

**Completion of this deliverable depends on availability of DOE-HQ official(s)

Anticipated Issues

Funding for WIMS beyond this project period will be needed to ensure the system will continue to be available for the user community.

Integration and deployment of new data onto the WIMS website will be completed within 60 days of receipt of the data from DOE. Delays in receiving the data will result in a subsequent delay in deployment of the new data.

FIU has provided recommendations to DOE for upgrading the WIMS hardware and software, including upgrading the WIMS application to the latest Microsoft.Net framework using the current Visual Studio development environment and migrating the database and reporting services to the latest SQL database server. Failing to make these improvements increases the risk of the system failing and becoming unavailable to the stakeholders.

The WIMS task is supported by DOE Fellows and FIU graduate students, primarily during the testing and quality checks performed after the importation of new data sets. During this time, WIMS usually has 2 to 3 students supporting the work for a couple of months.

TASK 2: D&D SUPPORT TO DOE-EM FOR TECHNOLOGY INNOVATION, DEVELOPMENT, EVALUATION AND DEPLOYMENT

TASK 2 TECHNOLOGY NEEDS

Many of the facilities DOE has historically operated have been shutdown as a result of changes in scientific and military objectives. This change in laboratory mission within the DOE complex, along with facilities that have reached the end of their operating life, has led to an increased need to deactivate and decommission (D&D) surplus and aging facilities. Many such facilities exist across the DOE complex and are currently or will soon undergo D&D. The facilities that will undergo D&D include highly contaminated hot cells, reactor pools, and a variety of other buildings and process systems. D&D of these facilities will require characterization, decontamination, demolition, material sorting and segregation, size reduction, and waste packaging. In addition, many of these structures may remain in place, where the need exists for unconventional surveillance and monitoring capabilities.

TASK 2 DESCRIPTION

Objectives

This task provides direct support to DOE EM for D&D technology innovation, development, evaluation and deployment. For FIU Year 6, FIU will assist DOE EM-13 in meeting the D&D needs and technical challenges around the DOE complex. . FIU will expand the research in technology demonstration and evaluation by developing a phased approach for the demonstration, evaluation, and deployment of D&D technologies. One area of focus will be working with the Savannah River Site to identify and demonstrate innovative technologies in support of the SRS 235-F project. FIU will further support the EM-1 International Program and the EM-13 D&D program by participating in D&D workshops, conferences, and serving as subject matter experts

Benefits

The benefits of this task include:

- Providing DOE with the information necessary to complete D&D safely and effectively with technologies that include remotely operated technologies for facilities which contain hazards that prevent the use of safe manual techniques,
- Reinforcing efforts in the theory development, laboratory experimentation, and proof-of-principle phases associated with the basic and fundamental research of D&D technologies,
- Enhancing safety while reducing risk to workers, the public, and the environment,

- Reducing the future cost, schedule, and risk for similar work through a thorough understanding of existing technologies and technical approaches from past D&D projects, and
- Providing the tools necessary to successfully complete difficult D&D tasks that can then be applied complex-wide to similar DOE facilities.

FIU YEAR 5 TASK 2 EXECUTION PLAN

Project Tasks

Subtask 2.1: D&D Technology Demonstration & Development and Technical Support to SRS's 235 F-Facility Decommissioning

During FIU Year 4 and 5, FIU concentrated its efforts on working with the Savannah River Site to identify innovative technologies in support of the SRS 235-F project. The SRS 235-F facility was constructed in the 1950's as part of the weapons complex materials production and fabrication. The most significant quantities of residual contamination remaining in 235-F building are found in the Plutonium Fuel Form (PuFF), Plutonium Experimental Facility (PEF), Old Metallography Lab (OML), and Actinide Billet Line (ABL) facilities.

For FIU Year 6, FIU will support the SRS 235-F efforts with the following subtasks:

Subtask 2.1.1: Incombustible Fixatives

DOE's SRS 235-F facility has a current high priority need in the area of incombustible fixatives. The objective of this subtask task is to select and validate operational performance of incombustible decontamination products and fixatives for residual surface contamination within the process cell and glove box after gross decontamination is completed. During FIU Year 5, FIU worked closely with SRNL to define the technical requirements for achieving this objective, identified a select list of contamination control products for testing, and developed a Phase I test plan to baseline the selected products.

During FIU Year 6, FIU will collaborate with SRNL to finalize and implement the Phase I test plan. The Phase I testing and evaluation has the following main objectives: 1) to determine the fire resiliency of each selected product; and 2) to perform basic proof-of-concept testing for layering a contamination control product with a fire retardant product to improve performance during fire resiliency tests.

The results of the Phase I testing will be evaluated by FIU and SRNL to determine how best to proceed with Phase II. If the initial hypothesis is proven correct, specifically that the fire resiliency of fixatives can be enhanced through the layering/combining of an intumescent coating, then the primary objective for Phase II will be research and development focused on optimizing the methodology. FIU will develop a Phase II test plan during FIU Year 6. Execution of the Phase II testing would be planned for FIU Year 7.

Subtask 2.1.2: Development of a Decision Model for Contamination Control Products

During FIU Year 4, FIU conducted a focused literature review (using D&D KM-IT, archived ALARA Reports, internet research, and vendor info) on contamination control products for radiological surface decontamination in support of the SRS 235-F Risk Reduction Project. The resulting summary report will help the project team develop their decontamination concepts for the PuFF process cells and define the out year's technical activities. FIU compiled data on each of the 40 products identified in the study and developed a matrix spreadsheet. During FIU Year 5, FIU worked with SRS to identify the product search parameters based on project-specific needs and site applications. A selection of these search parameters were used to develop a preliminary decision model to better guide the product end users in the selection of the appropriate products.

For FIU Year 6, FIU will refine the decision support model for the selection of fixatives, strippable coatings, and decontamination gel products specific to site applications. FIU will incorporate feedback from SRS and Idaho site beta testers and additional search parameters into the decision model to begin development of a more robust decision model.

Subtask 2.1.3: Robotic Technologies for SRS 235-F (New)

The SRS 235-F facility has a need to identify a remote system that can make one-time entry to highly contaminated areas. The one-time-entry requirement indicates that the technology will not be retrieved at the end of the work but would remain inside the facility due to the high levels of contamination.

During FIU Year 6, FIU will perform research to identify robotic technology systems applicable to the challenges and needs of the SRS 235-F Facility. Research will include working with SRNL to define the requirements for the robotic technology and utilizing the Robotic Database in D&D KM-IT to search and identify potential technologies that meet the defined requirements. A summary report will be developed to document the results.

Subtask 2.1.4: Fogging Research and Evaluation

During FIU Year 5, FIU collaborated with Idaho National Laboratory and the Savannah River Site in the identification, selection, testing, and evaluation of fogging products. FIU developed a formal test plan document in conjunction with SRS and INL to test the FX2 advanced fogging agent, developed at INL. FIU developed an appropriate technology evaluation/ demonstration area by modifying the existing hot cell mockup facility at the ARC Technology Testing and Demonstration Facility and executed the test plan in late March and early April. A formal technology demonstration report as well as a DOE Tech Fact Sheet were developed and sent to INL, SRS and HQ for review. The report will be distributed to the broader D&D community via D&D KM-IT, ARC's DOE research website, and OSTI.

During the summer of 2015, two DOE Fellows worked with INL in development of a mercury fogging decontamination method and a strippable fog decontamination method. The mercury fogging decontamination method is currently in development at the bench scale and will transition into pilot scale testing. The strippable fog decontamination method is currently in the conceptual phase with plans to begin bench scale testing. The DOE Fellows participated in summer internships at INL during the summer 2015 to begin this research subtask and will continue the research during FIU Year 6, as needed, when they return to ARC at the end of the internship.

Subtask 2.2: Technology Demonstration and Evaluation (New)

FIU will expand its effort in the technology demonstration and evaluation research and develop a phased approach for the demonstration, evaluation and deployment of D&D technologies. This multi-tier/multi-year approach will include the identification and selection of appropriate D&D technology(ies), a proof-of-concept demonstration (Phase I), a large scale demonstration at the FIU Test Facility (Phase II), and a “hot” demonstration at a selected DOE facility (Phase III). FIU will collaborate with DOE EM, DOE site officials, and national labs to determine the utility and applicability of the selected technologies in addressing specific challenge areas at DOE sites (e.g., SRS, WIPP, Idaho, etc.).

FIU aims to standardize and implement proven processes to refine and better synchronize DOE-EM technology needs, requirements, testing, evaluation, and acquisition by implementing a three-phased Technology Test and Evaluation Model:

- Phase I: Identification, initial assessment, and approved selection of technologies for further test and evaluation.
- Phase II: Test and evaluate designated technologies at FIU Testing and Evaluation Facility that replicates operating environment and conditions in which technology will be employed to the maximum extent.
- Phase III: Formal operational test and evaluation of technology in a radioactive environment at DOE facilities. Execution of Phase III requires major participation and commitment from an identified DOE site. FIU will work with DOE HQ to identify an appropriate DOE site and necessary resources to support technology evaluation (test plan development, test engineer, fact sheet and final report development).

The FIU research review to DOE in March 2015 highlighted the requirement to develop uniformly accepted testing protocols and performance metrics as an essential component for testing and evaluating D&D technologies. During FIU Year 6, FIU will integrate this requirement as a fundamental building block under the three-phased Technology Test and Evaluation Model subtask, and lead the effort in engaging the international testing community and the DOE complex's stakeholders in developing: 1) Uniform testing protocols and performance metrics for the various categories of D&D technologies (e.g.; fixatives, decon gels, robotics, etc.), and 2) Standardized methods to conduct cost savings / cost avoidance assessments for D&D technologies. These efforts will help to ensure that the FIU three-phased Technology Test and Evaluation Model is uniform in its application and defensible in its findings and results.

It is envisioned this will be a multi-year effort, with FIU Year 6 objectives as follows:

1. Obtain official membership on ASTM International's E10 Committee on Nuclear Technologies and Applications.
2. Introduce a requirement for standardized testing protocols and performance metrics for D&D technologies as an agenda item for the E10 Committee meeting in January 2016.
3. In collaboration with E10 Committee membership, develop a detailed plan for implementing the initiative, and gain concurrence from the ASTM International Executive Steering Committee in June 2016.

Subtask 2.3: Support to DOE EM-13 and the D&D Community

During FIU Year 6, FIU will continue to support the DOE EM-13 D&D program by participating in D&D workshops, conferences, and serving as subject matter specialists. FIU will also collaborate with DOE EM-13 and the D&D community of practice in the identification and development of Lessons Learned and Best Practices related to D&D. Once approved by DOE, these documents will be made available via D&D KM-IT.

Project Milestones for Task 2

Milestone No.	Milestone Description	Completion Criteria	Due Date
2015-P3-M2.1	Completion of Phase 1 testing of incombustible fixatives	E-mail notification to SRS and DOE	12/31/2015
2015-P3-M2.2	Participate in ASTM E10 Committee Meeting to introduce a requirement for standardized testing protocols and performance metrics for D&D technologies	E-mail notification to DOE	01/31/2016
2015-P3-M2.3	Participate in ASTM International's Executive Steering Committee Meeting to solicit final approval for development of standardized testing protocols and performance metrics for D&D technologies.	E-mail notification to DOE	06/30/2016

Deliverables for Task 2*

Client Deliverables	Responsibility	Acceptance Criteria	Due Date
Summary Report on Robotic Technologies for SRS 235-F Facility	Project Manager	Acknowledgement of receipt via E-mail two weeks after submission	05/29/2016
Draft Test Plan for Phase II incombustible fixatives testing and evaluation	Project Manager	Acknowledgement of receipt via E-mail two weeks after submission	06/30/2016

Decision brief to DOE-EM 13 on recommended technologies to test for FY'17 using FIU's 3-Phased Technology Test and Evaluation Model.	Project Manager	Acknowledgement of receipt via E-mail two weeks after submission	07/29/2016
Draft technical reports for demonstrated technologies	Project Manager	Acknowledgement of receipt via E-mail two weeks after submission	30-days after evaluation/demo
Draft Tech Fact Sheet for technology evaluations/ demonstrations	Project Manager	Acknowledgement of receipt via E-mail two weeks after submission	30-days after evaluation/demo
Monthly Progress Report	Project Manager	Acknowledgement of receipt via E-mail two weeks after submission	Monthly
Quarterly Progress Reports	Project Manager	Acknowledgement of receipt via E-mail two weeks after submission	Quarterly
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**Final documents will be submitted to DOE within 30 days of the receipt of comments on the draft documents.*

***Completion of this deliverable depends on availability of DOE-HQ official(s)*

Anticipated Issues

The D&D task receives significant support from DOE Fellows, including the robotics and fogging research subtasks and the technology demonstration, evaluation, and development subtasks. It is anticipated that 3 to 4 DOE Fellows will be supporting this task during FIU Year 6. It is anticipated that research under this task may be used by students as the basis for an undergraduate senior design project or a thesis or dissertation towards a graduate degree and would be impacted by a re-direction of the project task scope. FIU will communicate closely with DOE HQ and site contacts throughout the performance of the research tasks in order to

accurately forecast the duration of the research tasks and minimize the potential negative impact of scope redirection on the graduate studies of any students working on that task.

FIU will collaborate with DOE EM, DOE sites officials, and national labs to determine the utility and applicability of the selected technologies in addressing specific challenge areas at DOE sites (e.g., SRS, WIPP, Idaho, etc.) and to identify technology deployment opportunities at DOE sites.

TASK 3: D&D KNOWLEDGE MANAGEMENT – INFORMATION TOOL

TASK 3 TECHNOLOGY NEEDS

The web-based D&D KM-IT was developed to capture and preserve the knowledge-base of the D&D community and to provide a platform tailored for easy retrieval by the user base. This system collects information from the subject matter specialists and builds a knowledge repository for future reference. The D&D Knowledge Management Information Tool goes beyond lessons learned, since it functions as a point-of-access to broad D&D information on the world-wide-web. In addition, functionality will continue to be expanded over time to strengthen the focus of the D&D information sources available via the web from other government agencies, industry and academia.

TASK 3 DESCRIPTION

Objectives

The objective of the D&D KM-IT is to provide a focused web-based tool to assist the DOE D&D community in identifying potential solutions to their problem areas by using the vast resources and knowledge-based tools available through the web. The D&D KM-IT archives in a retrievable module within the system information collected from the subject matter specialists, thereby building a knowledge repository for future reference. The long-term *strategic vision* for the D&D Knowledge Management Information Tool (D&D KM-IT), which has been developed for DOE's D&D community of practice, is that *it will continue to grow and mature into a self-sustaining system through the active participation of the D&D community it was designed to serve.*

Benefits

D&D KM-IT makes excellent use of the knowledge that exists within the D&D community by allowing D&D project managers around the DOE complex to share innovative ideas, lessons learned, past experiences, and practices. The system is a knowledge tool that harnesses web technology, thereby enhancing communications; information searching, gathering, and distribution; and knowledge collection and exchange. Most importantly, the system encourages collaboration within the D&D community of practice.

Too frequently, people in one part of the community “reinvent the wheel” or fail to solve problems quickly because while the knowledge they need exists elsewhere, it is not known or accessible to them. This tool helps to resolve these issues through better collaboration, knowledge sharing, and by following best practices for D&D application.

D&D KM-IT defines, stores, categorizes, indexes and links digital information. It allows searching for relevant content and it presents the content with sufficient flexibility in order to render it meaningful and applicable across multiple contexts of use.

D&D KM-IT makes D&D knowledge available to the people who need it, at the time they need it, and in a readily usable format. It uses the world wide web as the primary source for content in addition to information entered by the subject matter specialists and D&D community of practice.

FIU YEAR 5 TASK 3 EXECUTION PLAN

Project Tasks

The following subtasks have been identified for the KM-IT task:

Subtask 3.1: Web and Mobile Application for D&D Decision Model

Under this subtask, FIU will design, develop, and deploy a web-based application and a mobile application for the D&D Decision Model developed under Task 2 for the selection of fixatives, strippable coatings, and decontamination gel products specific to the site application in an online and offline environment. The pilot web-based application will be initially deployed for beta testing by site users at SRNL and INL for feedback on improving the model and the application.

FIU is researching the technology and architecture to develop a single code base for desktop and mobile applications for developing this model. With the recent advancements in mobile technology and with different vendors offering multiple devices running different operating systems, advanced frameworks are being developed to keep to single code base deployment and publish applications for multiple desktop and mobile platforms. FIU will develop the D&D Decision Support Model using the latest Microsoft.Net technologies and open source framework to implement a common platform for desktop and mobile applications. This will result in a scalable solution with ease of deployment and maintainability. After successful development, this module will be integrated into the KM-IT platform.

Subtask 3.2: Mobile Applications/Platforms for DOE Sites

During FIU Year 6, FIU will research mobile applications/platforms using development tools (e.g., Xamrin, Visual Studio) to create native mobile applications for each of the three major mobile device platforms (i.e., Android, iOS, Windows Phone 8) with the ability to work offline and sync with the main system when the connection is available. FIU will work with DOE sites like SRS, Hanford, INL and Oak Ridge to identify additional high priority needs for mobile applications and perform a feasibility analysis for the design, development and deployment of the needed mobile app.

Subtask 3.3: Development & Integration of International KM-IT Pilot for UK Collaboration

This new subtask replaces the “Expansion of the D&D Knowledge Base to Other EM Areas” that was described in the renewal application and builds on a study performed in the previous year on the protocols and standards for collaboration and knowledge sharing with the international community with a focus on the United Kingdom. During FIU Year 6, FIU will use the results of this study to develop and integrate an international KM-IT pilot system for collaboration with the UK.

FIU will develop, test and deploy a secured collaborative knowledge/information sharing pilot platform for D&D collaboration with the UK. This knowledge, based on non-classified information, will be accessible to a restricted group of individuals approved by the agencies and the established process over the web. The initial pilot system will provide a secured controlled environment for conversation and collaboration among the DOE and identified international community members. FIU will work with stake holders to develop a web based virtual meeting place for discussions and knowledge sharing on non-classified technical topics. The system will include features to manage current and past meeting agendas, quarterly/ bi-annual and annual reports, meeting minutes, technical draft documents being developed and under discussion. A search process will allow the users to search through the technical information published inside the secured platform. This feature will search through all the lists, libraries and other information published as a part of under this scope and display the search results.

Subtask 3.4: Outreach and Training (D&D Community Support)

The key to the future of D&D KM-IT operation and development is that the basic tenets of the “*D&D Knowledge Management Information Tool –A Strategic Approach for the Long-Term Sustainability of Knowledge*” be kept as key drivers. FIU’s activities for outreach and training will be guided by this strategic document. The basic drivers include the following, which will be implemented in FIU Year 6. Metrics progress on these drivers will be demonstrated through the completion of two metrics progress reports during FIU Year 6.

- **Newsletters:** Newsletters are a great way to bring waves of traffic to the website. By using the registered users as recipients, websites can keep the users up to date on new features and content on the website. FIU will employ expanded use of interactive newsletters (e.g., embedded video, graphics and short simulations) to present graphically interesting information. A total 6 newsletters will be sent during FIU Year 6.
- **Workshops:** Scheduling a workshop with the target audience is a great way to promote the website and increase ownership. At these workshops, the site features can be explained in detail and participants can share their feedback and ideas. As a result, they feel like contributors of the product and stay involved. Two workshops will be hosted by FIU during FIU Year 6 for the D&D community, either live at DOE sites/national laboratories or at industry meetings/conferences or done over the web using web conferencing tools. In addition, FIU will host two workshops with EM staff at DOE HQ with participants to include EM-13, HQ site liaisons, and site staff. This workshop will provide an orientation to D&D KM-IT and solicit ideas for future development and refinements.
- **Conferences:** Participation and presentations of D&D KM-IT at industry conferences will boost awareness of the website and its capabilities to the target users. D&D KM-IT will be presented at conferences such as the Waste Management conference in Phoenix, AZ and the American Nuclear Society (ANS) Utility Working Conference in Amelia Island, FL. Additional industry conferences will be targeted to widen the audience.
- **Social Media:** FIU will work with EM-72 (EM IT) to explore the use of at least two social media services while applying federal cyber-standards.

- **Contributing to D&D Knowledge Base on Wikipedia:** The general D&D knowledge which has been gained through this project offers an opportunity to expand access to a broad audience via Wikipedia, which has a significant presence on the web, thereby offering greater opportunities for collaboration on D&D knowledge. FIU will research and target D&D information on Wikipedia where D&D KM-IT can provide additional information that is lacking. FIU will provide Wikipedia with information that is missing while citing the D&D KM-IT as a source with a link back to the original information on D&D KM-IT. During FIU Year 6, FIU will generate at least 4 edits to existing articles or, if no article exists, create a new article on the topic. Each edit or new article will conform to Wikipedia standards and contain citations linking back to the D&D KM-IT as the source for the information.
- **Infographics:** As part of the outreach efforts, FIU will identify the use of infographics in the following areas and develop at least two infographics in FIU Year 6:
 - D&D technologies (e.g., robotics)
 - Scope of D&D (D&D Program Map)
 - Workforce Development (DOE Fellows Program)
 - D&D knowledge tools (e.g., mobile apps)
- **Web analytics:** FIU will capture usage and search data on the KM-IT using various tools and code, including Google Analytics. The data will be analyzed and used to market the site, measure the sites usage, and support decisions for ongoing content development to ensure that it remains relevant to the needs of the community the system serves. Detailed reports will be generated from the captured data and reviewed on a quarterly basis with an annual analysis summary report with trends and recommendations to improve performance and outreach.

Subtask 3.5 Data Mining and Content Management

This task will focus on capturing information in KM-IT from different sources. Vendors, technologies, lesson learned, best practices, videos and pictures will be captured, reviewed and published in KM-IT. DOE Fellows will work with EFCOG, DOE sites, national labs, Waste Management Symposia and other conferences to collect information and publish them in D&D KM-IT.

- **Vendor Information:** Publish vendor information from Waste Management Symposia and other similar conference, DOE sites /contractors and by contacting vendors directly.
- **Technology Information:** Publish technology information by collecting technology information directly from vendors published in KM-IT.
- **Lessons Learned/Best Practices:** In an effort to capture the lessons learned and best practices acquired at DOE sites, FIU will work with DOE and the D&D community to share their experiences and lessons learned with the EM D&D community.
- **Video/Pictures:** Publish videos and pictures from demos and sites. This effort will include reviewing legacy videos of technology demonstrations, digitizing the content from the archived VHS format, and publishing relevant content onto D&D KM-IT.

Subtask 3.6: D&D KM-IT Administration and Support

- **System administration:** This task includes the day-to-day maintenance and administration of the D&D KM-IT Servers. Major tasks involve load balancing, active directory accounts, security patches, operating system updates, system optimization, server monitoring, emergency problem resolution etc. FIU will maintain the KM-IT application system to ensure a consistent high level of performance.
- **Database administration:** This task includes database backup, optimization, performance tuning, and system security, controlling and monitoring user access to the database, maintain database cluster and other management tasks on a regular basis.
- **Network administration:** This task involves monitoring the network and server traffic, installation and maintenance of network hardware/software, assigning address to computer and devices on the network, troubleshooting network activities and performance tuning.
- **D&D KM-IT Support:** This task includes supporting KM-IT users with a help desk role to resolve issues on a day to day basis.
- **KM-IT Cyber Security:** FIU-ARC will maintain the KM-IT cyber security infrastructure based on the guidelines provided by DOE EM IT (EM-72) and NIST. The KM-IT system and infrastructure will continue to be audited by internal and external auditors on a periodic basis. Monthly and six-month audits will be performed by Symatec and the FIU Security Team. Findings of the audits will be implemented in the application, servers and infrastructure.

DOE fellows and FIU graduate students will be assigned to research and develop expertise in the cyber security area to protect the KM-IT infrastructure. They will work with penetration testing tools, malware analysis, and digital forensics tools. They will also explore commercial off-the-shelf products, open source products and custom built solutions. This will allow ARC to develop expertise in cyber areas and will be used to test against the KM-IT system and infrastructure.

Project Milestones for Task 3

Milestone No.	Milestone Description	Completion Criteria	Due Date
2015-P3-M3.1	Waste Management Symposium	Submit draft paper to conference	11/06/2015
2015-P3-M3.2	Deployment of pilot web-based D&D Decision Model application	E-mail notification to DOE	01/16/2016
2015-P3-M3.3	Completion of development & integration of International KM-IT pilot for UK collaboration	E-mail notification to DOE	03/04/2016
2015-P3-M3.4	Four Wikipedia integration edits/articles	E-mail notification to DOE	03/31/2016

2015-P3-M3.5	Deployment of pilot mobile application for D&D Decision Model	E-mail notification to DOE	05/20/2016
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Deliverables for Task 3*

Client Deliverables	Responsibility	Acceptance Criteria	Due Date
Draft Project Technical Plan	Project Manager	Acknowledgement of receipt via E-mail two weeks after submission	10/05/2015
First D&D KM-IT Workshop to DOE EM staff at HQ	Project Manager	Acknowledgement of receipt via E-mail two weeks after submission	11/30/2015**
Preliminary Metrics Progress Report on Outreach and Training Activities	Project Manager	Acknowledgement of receipt via E-mail two weeks after submission	02/29/2016
First D&D KM-IT Workshop to D&D community	Project Manager	Acknowledgement of receipt via E-mail two weeks after submission	03/31/2016
Second D&D KM-IT Workshop to DOE EM staff at HQ	Project Manager	Acknowledgement of receipt via E-mail two weeks after submission	05/31/2016**
First infographic to DOE for review	Project Manager	Acknowledgement of receipt via E-mail two weeks after submission	07/25/2016
Second infographic to DOE for review	Project Manager	Acknowledgement of receipt via E-mail two weeks after submission	08/08/2016
Metrics Progress Report on Outreach and Training Activities	Project Manager	Acknowledgement of receipt via E-mail two weeks after submission	08/15/2016
Second D&D KM-IT Workshop to D&D community	Project Manager	Acknowledgement of receipt via E-mail two weeks after submission	08/25/2016
Draft Security Audit Report	Project Manager	Acknowledgement of receipt via E-mail two weeks after submission	30-days after completion of audit
D&D KM-IT Web Analysis Report	Project Manager	Acknowledgement of receipt via E-mail two weeks after submission	Quarterly
Monthly Progress Report	Project Manager	Acknowledgement of receipt via E-mail two weeks after submission	Monthly

Quarterly Progress Reports	Project Manager	Acknowledgement of receipt via E-mail two weeks after submission	Quarterly
Draft Tech Fact Sheet for new modules or capabilities of D&D KM-IT	Project Manager	Acknowledgement of receipt via E-mail two weeks after submission	30-days after deployment of new module or capability
Draft Year End Report	Project Manager	Acknowledgement of receipt via E-mail two weeks after submission	10/14/2016
Presentation overview to DOE HQ/Site POCs of the project progress and accomplishments (Mid-Year Review)	Project Manager	Presentation to DOE HQ and Site POCs	02/29/2016***
Presentation overview to DOE HQ/Site POCs of the project progress and accomplishments (Year End Review)	Project Manager	Presentation to DOE HQ and Site POCs	08/31/2016***

**Final documents will be submitted to DOE within 30 days of the receipt of comments on the draft documents.*

***Completion of this deliverable depends on scheduling and availability of DOE EM staff*

****Completion of this deliverable depends on availability of DOE-HQ official(s)*

Anticipated Issues

Funding for the D&D KM-IT System beyond this project period will be needed to ensure the system will continue to be available for the user community.

Continued enhancements to the system will have to be implemented based on feedback from the D&D community and a User Advisory Group.

The D&D KM-IT task receives significant support from DOE Fellows and FIU graduate students, including the data mining and content management subtask as well as for community outreach and training. It is anticipated that 3 to 5 DOE Fellows and FIU graduate students will be supporting this task during FIU Year 6. It is anticipated that research under this task may be used by students as the basis for a thesis or dissertation towards a graduate degree and would be impacted by a re-direction of the project task scope. FIU will communicate closely with DOE HQ and site contacts throughout the performance of the research tasks in order to accurately forecast the duration of the research tasks and minimize the potential negative impact of scope redirection on the graduate studies of any students working on that task.

COMMUNICATION PLAN, REGULATORY POLICIES AND SAFETY CONCERNS

Communication Plan

The project has some elements that require significant information and/or action from the site in order to proceed with proposed scope. Therefore, the communication with the clients and relevant experts at DOE sites and DOE-HQ is a critical component of the project. The mode of communication will be e-mails, telephone/conference calls, meetings at the site, and where possible and warranted, web meetings such as Webinars and WebEx. Though site-specific contact persons have been identified, constant communication will be maintained with client stakeholders at DOE HQ and the DOE sites to ensure all parties involved are aware of the project progress.

Information Item	Client Stakeholder	When?	Communication Method	Responsible Stakeholder
Status Update Teleconferences	DOE-HQ (John De Gregory, Andy Szilagyi, Jonathon Kang); Site POCs	Monthly	Phone	Project Manager
EM-HQ Status Update Phone Call	DOE EM-13 (John De Gregory)	Bi-Weekly	Phone	Principal Investigator/Project Manager
Quarterly Report	DOE EM-13	End of Q1, Q2, Q3, Q4	E-mail	Project Manager
Project videos, photographs, and graphics	DOE EM	At completion of demonstrations and other project activities where the collection of multi-media data is appropriate and allowed	E-mail	Project Manager
Draft Year End Report	DOE EM-13	30 working days after completion of performance period	E-mail	Project Manager
Papers and presentations	DOE EM	As developed for conferences (e.g., WM)	E-mail	Project Manager
Milestone completion E-mail	DOE EM	At completion of milestone	E-mail	Task Manager

Regulatory Policies and Safety Concerns

Tasks 1 and 3 involve information technology development. Therefore, standard health and safety issues normally associated with field activities and laboratory experiments do not directly apply. All pertinent ARC health and safety policies will be followed.

Task 2 includes research conducted in facilities at the Applied Research Center which are designed specifically for R&D and technology development/demonstrations. All primary, secondary, and tertiary waste generated by these technology demonstrations will be disposed of according to local, state, and federal regulations. In-house testing will be conducted, and necessary health and safety precautions will be followed in accordance with FIU and ARC procedures. All student employees will complete online safety courses as well as a briefing for the safety in the laboratory in which they are performing research. No undergraduate student will perform research in a laboratory without direct oversight of faculty, staff, or a qualified graduate student.