FIU | Applied Research Center
FLORIDA INTERNATIONAL UNIVERSITY

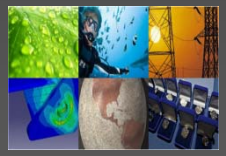
# DOE-EM Cooperative Agreement – Year 3 Research Review

## Project 4: Waste and D&D Engineering and Technology Development

Presented: April 29, 2013
to the U.S. Department of Energy
by Dr. Leonel Lagos, PhD, PMP®
Director of Research and STEM Programs

Worlds Ahead

*Advancing the research and academic mission of Florida International University.*



# Project Description

This project focuses on delivering solutions under the decontamination and decommissioning (D&D) and waste areas in support of DOE HQ (EM-13). This work is also relevant to D&D activities being carried out at other DOE sites such as Oak Ridge, Savannah River, Hanford, Idaho and Portsmouth. In FIU Year 3, FIU:

- Performed the integration of waste and transportation forecast data;
- Conducted technology evaluations, demonstrations and deployments;
- Supported *in situ* decommissioning and evaluation of remote sensors network;
- Supported DOE's EFCOG group by engaging DOE Fellows and FIU staff in the development of Best Practices and Lessons Learned; and
- Continued the development and maintenance of a complex-wide Knowledge Management Information Tool (KM-IT).

# Staff and Students

**Project Manager:** Leonel Lagos, PhD, PMP®

**Faculty/Staff:** Peggy Shoffner, Himanshu Upadhyay, Walter Quintero, Jose Varona, Clint Miller, Justin Phillips, Amer Awwad

**Present DOE Fellows (3):** Mariela Silva, Revathy Venkataraman, Heidi Henderson

**Present Graduate Students (2):** Chandrashekar Gama, Sandhya Appunni

# Project Clients & Collaborators

Sellafield Ltd

FCOG

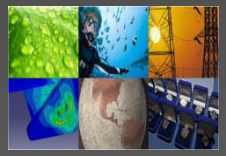
SRNL
SAVANNAH RIVER NATIONAL LABORATORY
TM

# Overview of Project Tasks

**Task 1. Waste Information Management System (WIMS) –** Maintenance and enhancement of the web-based waste forecasting and transportation system. Integration of a new forecast wastestreams on an annual basis.

**Task 2. D&D Support to DOE EM for Technology Innovation, Development, Evaluation, and Deployment –** Innovative technologies and methodologies for the application and removal of fixatives/strippable coatings on contaminated structures. Support to *in situ* decommissioning efforts at SRS; Development of lessons learned and best practices with EFCOG.

**Task 3 D&D Knowledge Management Information Tool (D&D KM-IT) –** Outreach and training. Application development. Mobile application development. Data and content management. Administration of the system, database, and network.



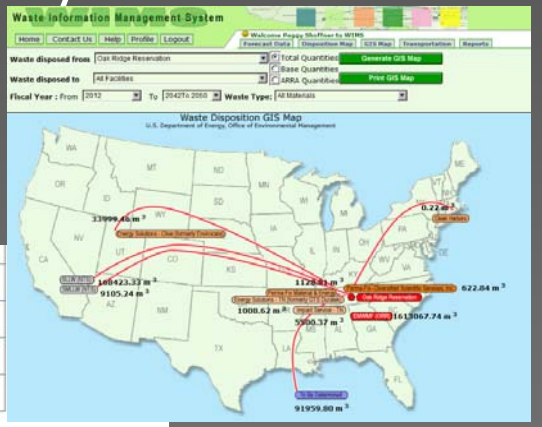
# Task 1. Waste Information Management System

- Subtask 1.1 – Maintain WIMS – database management, application maintenance, and performance
- Subtask 1.2 – Incorporate new data files with existing sites into WIMS
- Subtask 1.3 – New enhancements and customization of WIMS

# Major Accomplishments

## Task 1. Waste Information Management System

- Completed integration of 2012 waste forecast and transportation data into WIMS. New 2013 dataset received 4/17/13 and will be integrated and deployed on WIMS in coming weeks.
- Conducted administration and management of the WIMS database and web server. Conducted user support on a continual basis.
- Presented WIMS at WM13 Symposia.




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

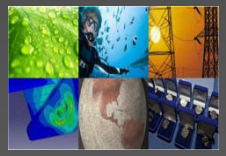
- Subtask 2.1 – Innovative technologies and methodologies for the application and removal of fixatives/strippable coatings used on contaminated structures
- Subtask 2.2 – FIU support to in situ decommissioning efforts at Savannah River Site
- Subtask 2.3 – Additional D&D and EM support - support to DOE HQ, DOE sites, and EFCOG

# Major Accomplishments

## Task 2. D&D Support – In Situ Decommissioning

FIU collaborated with Savannah River National Laboratory in the development of an experimental test site for the demonstration of multiple sensor systems for potential use in the *in situ* decommissioning process.

270 sensors, provided INL, MSU, UH, and USC were entombed in 32 $yd^3$ of special grout and monitored for 6-months while recording data pertaining to strain, compression, temperature, crack detection, moisture presence, fluid mobility, shock resistance, monolith movement, and electrical resistivity.



# Major Accomplishments

## Task 2. D&D Support – In Situ Decommissioning

FIU installed a photovoltaic (PV) system to power the sensor systems. This system provided sufficient energy (6 KWh/day) for powering the necessary systems still in operation at the MSTB without the need for additional sources.

FIU completed the development and demonstration of the shared data network. This demonstration proved the capacity to develop a low-cost, real-time, semi-autonomous, integrated data network with the existing systems with commercially-available systems and software. This capability can be used to develop an integrated sustainable monitoring system with the capacity to monitor, self-control and notify.

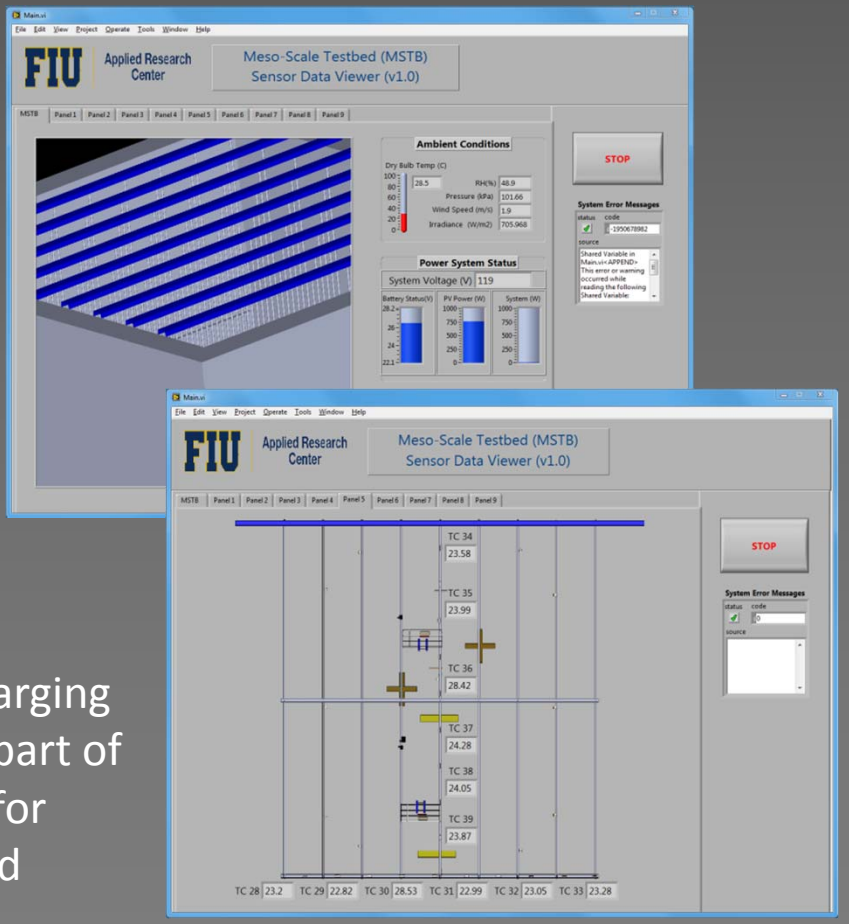
# Major Accomplishments

## Task 2. D&D Support – In Situ Decommissioning

The sensor data network is currently operational. FIU completed several modifications of the network virtual instruments (vi) to improve node communication, memory management and power management.

FIU completed preparations for the planned fluid injection studies to occur on the Meso-Scale Test Bed through technical support of sensor systems.

FIU completed research of possible wireless charging methodologies that could be integrated as part of the current MSTB, to evaluate its potential for operation with a commercial acquisition and logging systems.



# Major Accomplishments

## Task 2. D&D Support – Remote Removal of Strippable Coatings

- Successfully completed a feasibility study of a remote platform for the application and removal of strippable coatings/ decon gels for application in radiological contaminated facilities.
- Two different approaches to accomplishing remote removal of strippable coatings were investigated: a scraper/gripper tool to mimic the human hand and a mechanical brush, an “abrader” in a vacuum shroud.

# Major Accomplishments

## Task 2. D&D Support – Remote Removal of Strippable Coatings

- The brush with vacuum capture was effective at removing both a strippable coating and decon gel tested and at removing them from both concrete and metal surfaces. This method is reliable and the average productivity of 45 square feet an hour for the small size brush tested was reasonable for field expectations. A larger, more powerful production brush would yield greater productivity.

# Major Accomplishments

## Task 2. D&D Support – Remote Removal of Strippable Coatings

The gripper / scraper method was also effective at removing both coatings and at removing them from both concrete and metal. This method is particularly fast after an edge has been lifted and, duplicating the actions of a human manually removing the strippable coating, it can be pulled up in sheets. The average productivity of this method of 75 feet per hour. A tool designed with two gripper / scrapers and possibly an air ejector to help manipulate the sheets of strippable coating being removed would yield even greater productivity

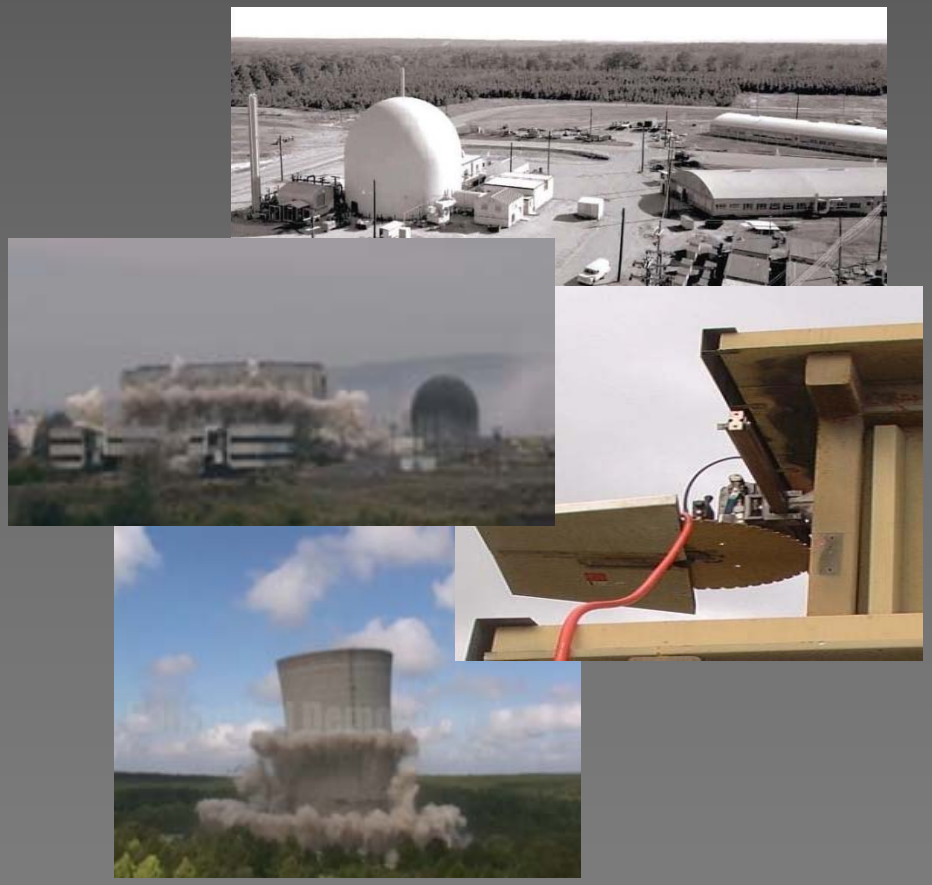
# Major Accomplishments

## Remote Removal of Strippable Coatings – Gripper/Scraper

# Major Accomplishments

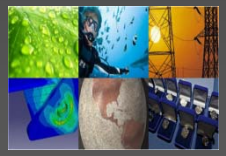
## Task 2. D&D Support – Lessons Learned / Best Practices

Collaborated with Energy Facility Contractors Group (EGCOG) in the development of Lessons Learned and Best Practices. A total of 12 have been developed and 7 have finished the review and approval process and been published on the D&D KM-IT and EFCOG websites.

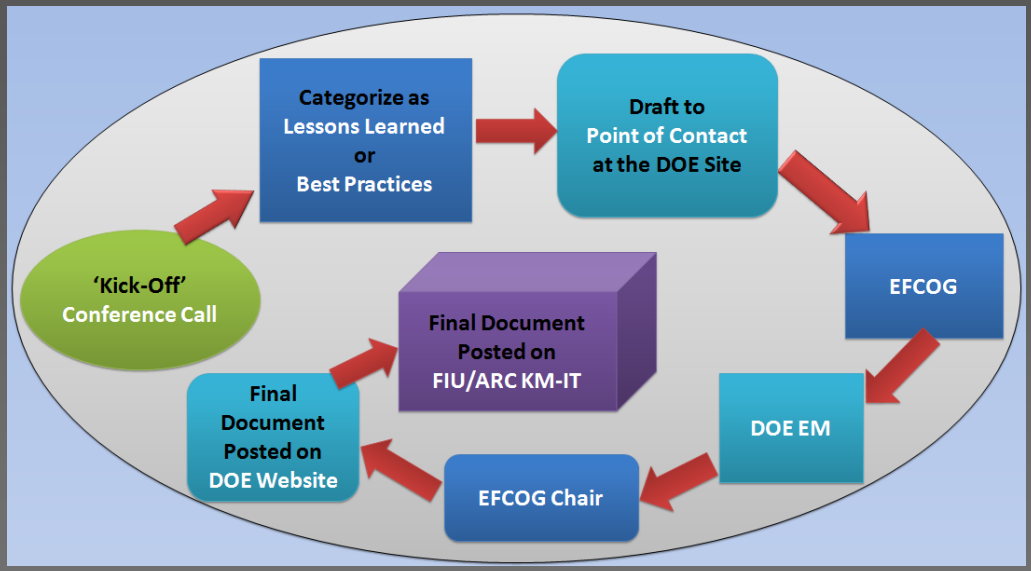


# Status of LL / BP

| Doc # | BP or LL | Title | POC | Status |
|---|---|---|---|---|
| 1 | BP | Explosive Demo of Bldgs 337, 337B & 309 Stack at Hanford's 300 Area | Daniel Beckworth, Bob Smith, and Thomas Kisenwether | FINAL |
| 2 | BP | Open Air Demo of Asbestos Gunite by Using a Track Mounted Wet Cutting Saw | Rob Vellinger | FINAL |
| 3 | BP | 185-3K Cooling Tower Demolition | Bill Austin | FINAL |
| 4 | BP | Historical Hazard Identification Process for D&D | Paul Corrado | FINAL |
| 5 | LL | Closure of the Reactor Maintenance, Assembly, and Disassembly Facility and the Pluto Disassembly Facility at the Nevada National Security Site | Annette Primrose | In revision. |
| 6 | LL | Unanticipated High Dose During the Removal of Wire Flux Monitor Cabling from the HWCTR Reactor Vessel | Bill Austin | FINAL |
| 7 | LL | SPRU Lessons Learned | EFCOG | In revision. |
| 8 | BP | Structural Code Guidance for D&D Activities at DOE Facilities | Kirk Dooley | FINAL |
| 9 | BP | Electrical Code Guidance for D&D Activities at DOE Facilities | Kirk Dooley | FINAL |
| 10 | BP | SRS R and P -Reactor Disassembly Basin In Situ Decommissioning | Bill Austin | Under development/review |
| 11 | BP | Use of Earthen Benches and other Technologies to Support River Structures' Demolition Activities | Brad Smith | Under development/review |
| 12 | BP | 327 Facility Source Term Stabilization and/or Removal Prior to Demo | Brad Smith | Under development/review |



# Process for LL / BP




- Relevant D&D LL/BP are identified in collaboration with EFCOG D&D Working Group members
- DOE Fellow at FIU contacts appropriate site personnel for interview and available documentation and to gather information
- DOE Fellow drafts LL/BP using established template format
- Review flow: FIU staff – Site Contact – EFCOG – DOE
- Approved documents are published on the D&D KM-IT and EFCOG websites

# Major Accomplishments

## Task 2 D&D Support – Conference Participation

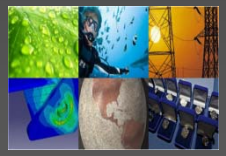
Presented results of project research:

- DD&R Conference (June 2012)
- 2nd Annual D&D Supply Chain Conference (Nov 2012)
- Waste Management 2013 Symposia (Feb 2013)



# Task 3. D&D Knowledge Management Information Tool

- Subtask 3.1 – Outreach and training (D&D community support)
- Subtask 3.2 – D&D KM-IT application development
- Subtask 3.3 – Mobile D&D KM-IT application development
- Subtask 3.4 – D&D KM-IT C&A certification
- Subtask 3.5 – Data and content management
- Subtask 3.6 – D&D KM-IT administration and support



# Task 3 D&D KM-IT

## Long Term Strategic Vision

*D&D KM-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.*

## Goal

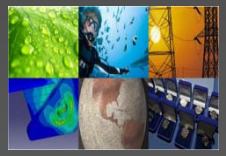
To attain the long-term active use, operation, development and continued growth of the D&D knowledge base within the D&D KM-IT system resulting in enhanced worker safety, improved operational efficiencies, and the cross-generational transfer of D&D knowledge to the future workforce.

# Task 3 D&D KM-IT

Task 3 D&D KM-IT

**Strategic Approach**

- Search engine optimization
- Offer original and quality content
- Supplement original content from other sources
- Get linked and get more backlinks
- Social media
- Promote web presence with newsletters, updates, and direct emailing
- Collaborate with Wikipedia, Powerpedia
- Engage user involvement via user advisory group and feedback loop on website
- Evaluate and incorporate information from web analytics



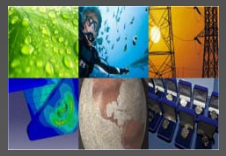
# Task 3 D&D KM-IT

Task 3 D&D KM-IT

## Outreach

**To share and build knowledge through the active participation from the D&D community**

- Increase contribution from international D&D community (UK, Japan, France, Germany, etc.)
- Potential for active collaboration with Nuclear Decommissioning Authority (NDA)
- Collaborate with EFCOG – D&D group members
- Initiate a D&D KM-IT user advisory group
- Participation in conferences (e.g., Waste Management Symposium, DD&R, International Conference of Environment and Waste Management)
- Newsletters to registered D&D KM-IT users, SMS, and published vendors
- Periodical memos from DOE HQ to site managers
- Collaboration with other databases/systems like Decontamination and Decommissioning Science Consortium (DDSC), OSTI and ORAU



# D&D KM-IT User Group

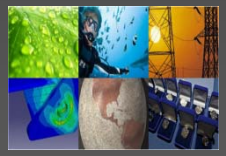
## DOE-HQ
EM-13, EM-72, EM-12, EM-1, EM-21

## DOE Sites & National Labs
Larry Boing, Sarah Roberts, Julia Tripp, Mike Serrato, Jeff Hunter

## EFCOG D&D Working Group
Rob Vellinger, Kirk Dooley

## KM-IT

## International
Sellafield, NDA, IAEA, UK Technical Centres of Expertise

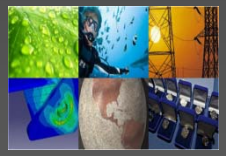


# Major Accomplishments

## Task 3 D&D KM-IT

Completed the development of new features and modules for D&D KM-IT:

- Global search feature
- D&D dictionary
- Mobile application for technology, and picture modules added to the existing mobile vendor and specialist modules.
- Integrated SRS ISSC reports into the document library module with Hanford ALARA newsletters
- Multiple SMS Support for Hotline

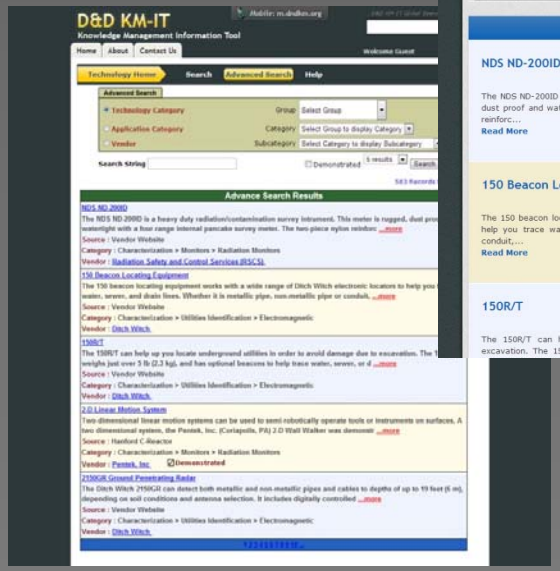



# Major Accomplishments

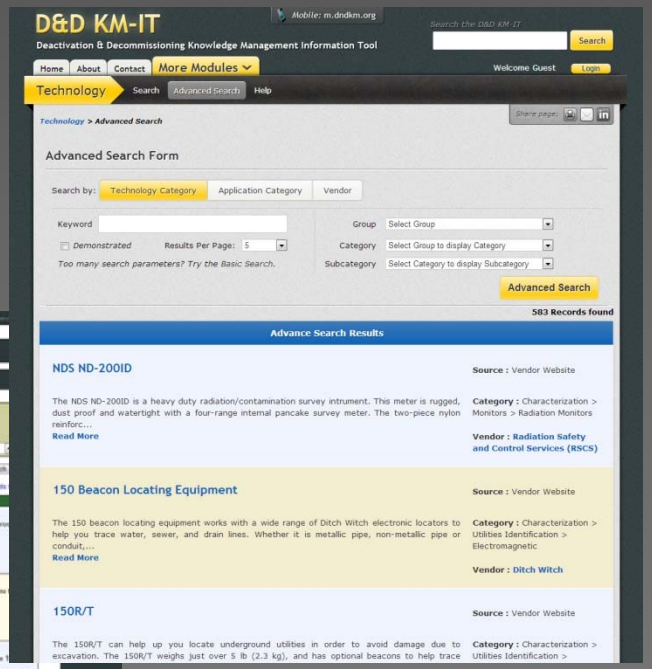
## Task 3 D&D KM-IT

Updated look and feel of the D&D KM-IT Modules.

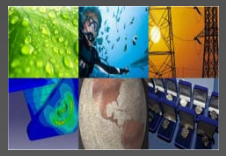
- Hotline
- Technology
- Web Crawler
- Lessons Learned
- Best Practices
- Picture Video Library
- Document Library
- Specialist Directory
- Vendors
- Collaboration Tools based Share Point technology
- Training




Old




New

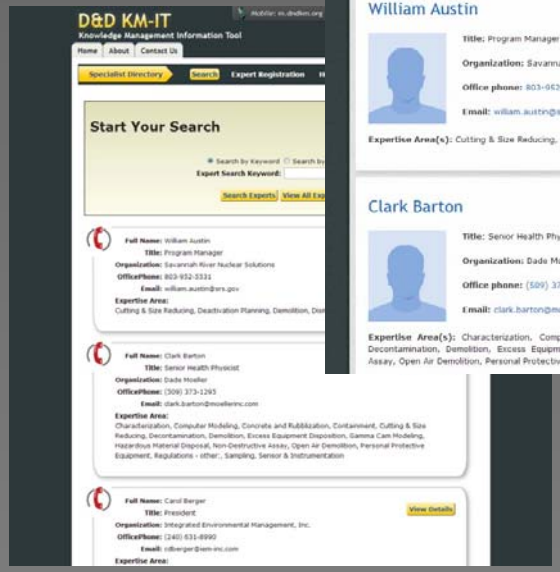


# Major Accomplishments

## Task 3 D&D KM-IT

The new look includes many enhancements

- Search engine updates
- Machine readable data
- Dynamic user interface enhancements
- RSS feeds
- HTML5 / CSS3 standards
- More instructions and helpful text

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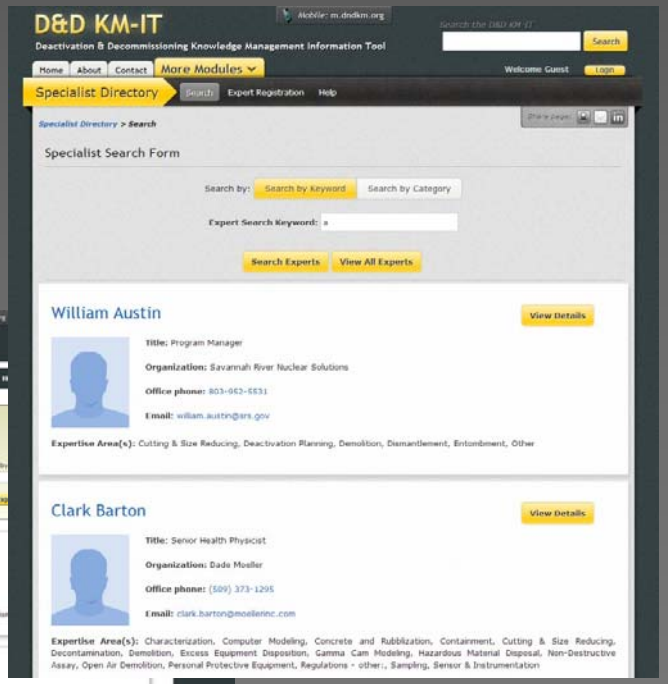


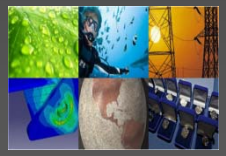

New

# Major Accomplishments

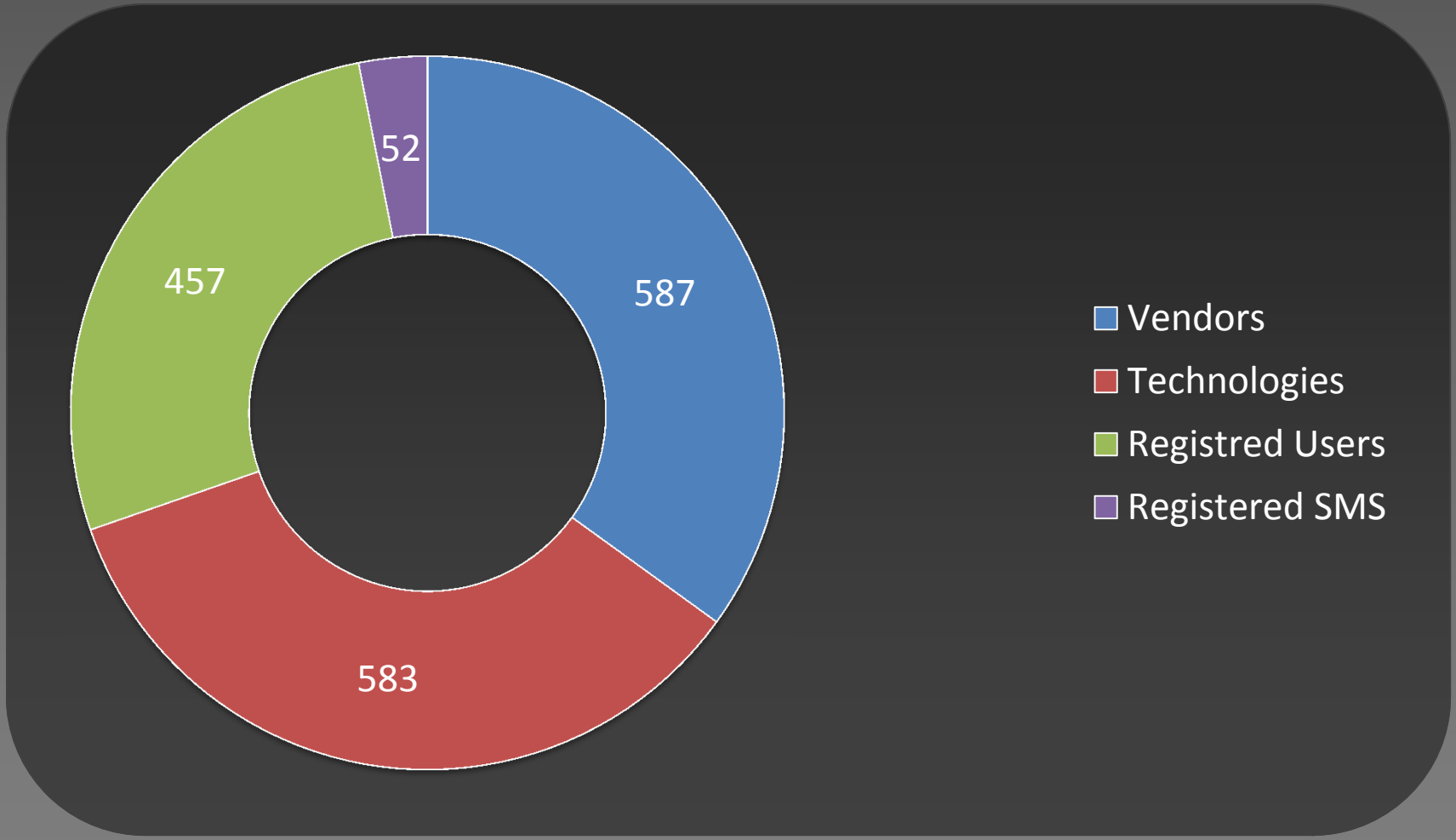
Task 3 D&D KM-IT

D&D KM-IT Help Videos

- 10 videos complete, 5 in progress.
- The final videos will be completed by mid-May.
- These videos will assist users in the overall use of D&D KM-IT and specific uses of each module.



# D&D KM-IT Status and Use



# 2012 DND KM-IT WEB ANALYTIC DATA

## TOTAL PAGEVIEWS

**75,095**

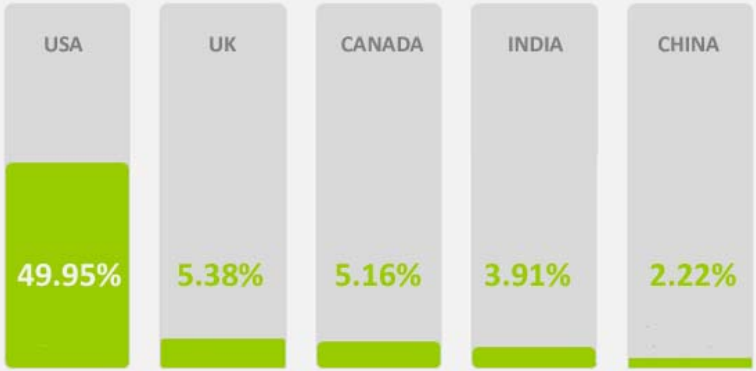
JAN 2012
**5,263**

NEW
**64.9%**

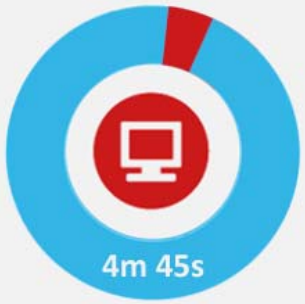
RETURNING
**35.1%**

FIU
**8.4%**

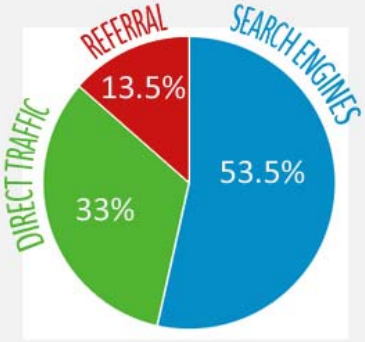
### TOP 5 DEMOGRAPHICS



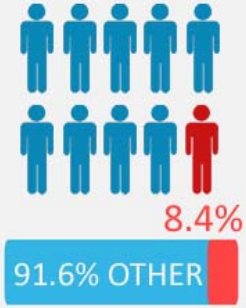

### AVG. TIME ON SITE




### TRAFFIC TYPE

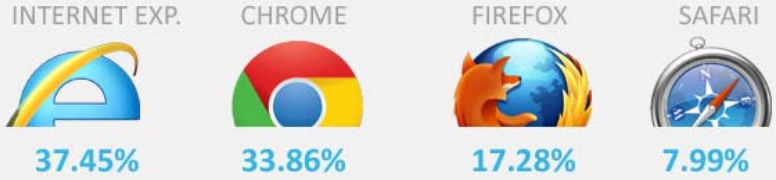



### FIU FACTOR

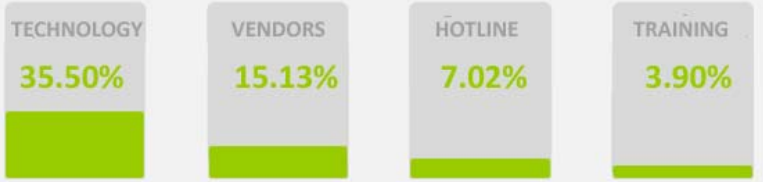



### POPULAR KEYWORDS


### BROWSERS




### MODULE DESTINATION

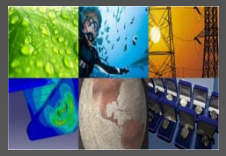


# Sellafield Ltd

- FIU worked with Sellafield Ltd to find areas of collaboration within the scope of D&D KM-IT.
- Links to the D&D KM-IT have been placed on the Sellafield intranet for the technical organizations, along with a descriptor paragraph on its benefits.
- Compared D&D KM-IT subject matter specialist (SMS) areas of expertise to the UK Centres of Expertise (CoEs). CoEs were invited/encouraged to register as SMS. Four (4) SMS are currently registered from Sellafield Ltd.

# Sellafield Ltd

- Report by Sellafield Ltd for the UK Nuclear Decommissioning Authority titled "Technology Development and Delivery Summary 2011-2012" has been integrated into the D&D KM-IT Document Library and is available for download.
- FIU extracted D&D related technology information from the report for integration with the D&D KM-IT Technology Module. 23 D&D technologies from the report have been integrated into KM-IT.
- The development stage of these technologies range from TRL 2-4 to commercially available technologies.



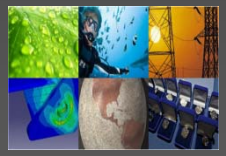
# Work Proposed for CA FIU Year 4

**Task 1. Waste Information Management System (WIMS) –** FIU will maintain and enhance the web-based waste forecasting and transportation system as well as integrate a new forecast data set on an annual basis.

**Task 2. D&D Support to DOE EM for Technology Innovation, Development, Evaluation, and Deployment –** FIU will assist DOE EM-13 in meeting the D&D needs and technical challenges around the DOE complex. During this FY, FIU will concentrate its efforts on working with the Savannah River Site to identify and demonstrate innovative technologies in support of the SRS 235-F project. In addition, FIU will also support DOE EM-13 in their interactions with EFCOG on special topics of interest to DOE EM-13 and DOE Complex.

**Task 3: Knowledge Management Information Tool – Application to Deactivation & Decommissioning -** FIU will work with DOE EM-13 and EFCOG to maintain and enhance KM-IT; expand the user base via outreach, participation, and collaboration; and pursue potential collaboration with the national and international communities.

**Task 4: Knowledge Management Information Tool – Application to Environmental Contamination and Remediation -** The KM-IT framework will be expanded to environmental contamination and remediation areas for user registration module, specialist directory module, technology module, and vendor module.



# Work Proposed for CA FIU Year 4

## Task 1. Waste Information Management System

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

- Day-to-day maintenance and administration of the application and the database servers.
- Maintenance of the WIMS application system to ensure a consistent high level of performance including monitoring the network and server traffic and performing changes necessary to optimize the application performance.
- 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

- Receive and incorporate one set of revised waste forecast data files each year. The new waste data will replace the existing previous waste data and will become fully viewable and operational in WIMS to any user.
- Receive and incorporate one set of revised transportation data files each year. The new transportation data will replace the existing transportation data.

### Subtask 1.3: New enhancements and customization of WIMS

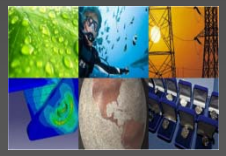
- Deploy modification of the WIMS application to provide additional functionality as needed after the data import process is complete.

# Work Proposed for CA FIU Year 4

Task 2. D&D Support

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

- FIU will work with SRS to identify and demonstrate innovative technologies in support of the SRS 235-F project.
- SRS has discussed potential involvement by FIU and share potential areas of interest that FIU can execute. An initial list of technical needs includes:
  - Radiological assay and characterization.
  - Characterization data analysis process improvement for attenuation.
  - Screening tools for qualitative debris characterization.
  - Remote access methodology for removal and packaging Pu debris and residue.
  - Improved worker protection approaches to address fugitive Pu airborne release.

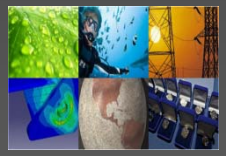


# Work Proposed for CA FIU Year 4

Task 2. D&D Support

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

- FIU will support the SRS 235-F efforts by providing technology evaluation/demonstration and deployment experience and capabilities.
  - Since its inception in 1995, FIU has conducted over 300 technology demonstrations for DOE-EM. Most of these technologies have been D&D innovative technologies.
  - FIU will work with the SRS team and identify technologies to address the technology gaps. FIU will conduct a search of appropriate systems and develop recommendations for SRS.
  - The top systems/technologies will be recommended for demonstration and evaluation. A formal test plan document will be developed and appropriate technology evaluation/ demonstration areas (test sites) will be developed to evaluate the technologies at FIU.



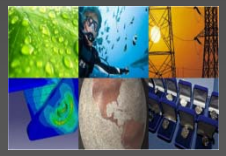
# Work Proposed for CA FIU Year 4

## Task 2. D&D Support

### Subtask 2.2: Support to DOE EM-13 and Interface with EFCOG

FIU will support DOE EM-13 in their interactions with EFCOG on special topics of interest to DOE EM-13 and DOE Complex. These topics may include the evaluation of technologies as identified and recommended by EFCOG. Based on previous feedback from EFCOG group and EM-13, the scope for FIU Year 4 can include the following topics of interest:

- **Subtask 2.2.1: Pilot Demonstration Project for Benchmarking D&D Innovative Technologies**
  - Perform preliminary testing and proof-of concept demonstrations of technologies identified, selected and recommended by the EFCOG DD/FE Working Group.
  - Develop the Technology Demonstration Test Plan for EFCOG and DOE EM-13 review
  - Perform technology evaluations at FIU testing centers
  - Develop final Demonstration Report
  - Recommendations for potential further evaluation at DOE facilities undergoing D&D



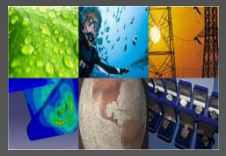
# Work Proposed for FIU Year 4

Task 2. D&D Support

## 3D Planning and Radiation Dose Reduction

3D used for:

- rad and work planning,
- pre-job briefings,
- familiarization,
- valve lineups,
- clearance and tagging,
- operation of cranes



# Work Proposed for CA FIU Year 4

## Task 2. D&D Support

**Continued: Subtask 2.2: Support to DOE EM-13 and Interface with EFCOG**

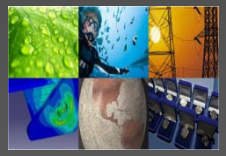
- **Subtask 2.2.2: Alternative methods for asbestos abatement**
  - Work with the EFCOG DD/FE Working Group to develop recommendations for DOE and EPA on alternative methods for asbestos abatement.
  - Identify sites that are or will be dealing with these issues (Hanford, Portsmouth, Paducah, INL, etc.).
  - Define the scope of the issues in the DOE complex as well as the site-specific issues and scope.
  - Brainstorm ideas and solutions. FIU will reach out to members of EFCOG and identified site contacts to gather and document logical recommendations by this group of experts in an attempt to lead to practicable, safe solutions to the problem.
  - Develop a summary report containing findings from previous steps and recommendations for future work, including the ultimate development of a “Best Practices for Asbestos Abatement.”

# Work Proposed for CA FIU Year 4

Task 2. D&D Support

## Continued: Subtask 2.2: Support to DOE EM-13 and Interface with EFCOG

- **Subtask 2.2.3: Technologies from other industries applicable to D&D**
  - Technologies from other industries that may be applied to D&D even though they were not originally developed for D&D applications are largely untapped.
  - Perform search of literature, internet, and industry to find technologies from industries other than D&D that could be applied to D&D activities, either directly or with minor modifications.
  - Add information to the Technology Module within D&D KM-IT
  - Summarize results into a final technical report.

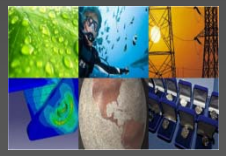


# Work Proposed for CA FIU Year 4

Task 2. D&D Support

## Subtask 2.3: Technology Development

- **Subtask 2.3.1: Robotics and laser technology for decontamination**
  - Perform literature and industry research on robotics and laser technology in regards to decontamination of highly contaminated sites. Information will be compiled on the technical and functional requirements of each, the issues preventing the development and use of these technologies, whether they be developed to be more efficient and less expensive, etc.
  - Develop a table listing D&D challenges, constraints, and limitations associated with these technologies. FIU will reach out to technology providers for remote platforms and laser decon technologies to identify state of the art on both technologies and identify challenges that need to overcome to combine these two types of systems into one feasible deployable unit.
  - Extend the previous work performed with International Climbing Machines (ICM) to include the integration of a selected laser decontamination technology. This integrated technology prototype will be used to perform preliminary testing and a proof-of-concept demonstration.



# Work Proposed for CA FIU Year 4

Task 2. D&D Support

## Continued: Subtask 2.3: Technology Development

- **Subtask 2.3.2: Remote Technology Development for Implementation at SRS 235-F Facility**
  - DOE's SRS 235-F facility has the immediate need of identifying a remote system that can make one-time entry to highly contaminated areas.
  - The needs include a remote wall climber system that has no tethered attachment to the remote platform. Based on previous FIU work and research with the ICM remote climber, FIU proposes to conduct applied research on new methodologies to make the current configuration of the ICM climber tetherless.
  - Additional investigation and proof of concept has to be developed to identify electronic components that will resist the high radiation field that will be encountered in this application. FIU will work with ICM in identifying the technical challenges for the development of a remote tetherless system capable of addressing SRS technical needs.

# Work Proposed for CA FIU Year 4

Task 3. KM-IT – Application to Deactivation & Decommissioning

## Subtask 3.1: Outreach and Training (D&D Community Support)

- **Newsletters**
- **Web-Based Workshops**
- **Collaboration with D&D Working Groups**
- **Conferences**
- **Help Videos**

## Subtask 3.2: KM-IT Application Development

- **Community Content Contribution Process-** To be integrated with the homepage of KM-IT to provide users with more readily accessible information on how they can participate in the knowledge management goals of the D&D KM-IT.
- **Popular Technologies -** Record the page views and display links to the most viewed content, relevant to the content being viewed.

# Work Proposed for CA FIU Year 4

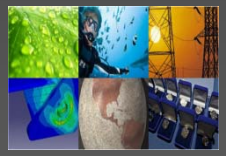
Task 3. KM-IT – Application to Deactivation & Decommissioning

## Subtask 3.3: Mobile KM-IT Application Development

- **Hotline Lite -** mobile application targeting currently popular mobile devices like iPhone, Blackberry, Android and Windows along with tablets like iPad from Apple and Surface from Microsoft
- **Mobile System Deployment and Evaluation at a DOE Site -** identify a DOE site for application of the KM-IT mobile application capability and work closely with site personnel to identify a direct application of mobile KM-IT capabilities to ongoing D&D activities at the selected site.

## Subtask 3.4: KM-IT C&A Certification Process

- Work with the DOE EM IT department to achieve C&A certification for the KM-IT infrastructure.



# Work Proposed for CA FIU Year 4

## Task 3. KM-IT – Application to Deactivation & Decommissioning

**Subtask 3.5: Data and Content Management**

- DOE Fellows will work with EFCOG, ALARA Center Reports (SRS and Hanford), DOE sites, national labs, Waste Management 2013 and other conferences to collect information and publish them in D&D KM-IT.
  - SRS Data and Content Management
  - Vendor Information
  - Technology Information
  - Lessons Learned/Best Practices
  - Hotline
  - Video/Pictures
  - D&D Dictionary

# Work Proposed for CA FIU Year 4

## Task 3. KM-IT – Application to Deactivation & Decommissioning

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

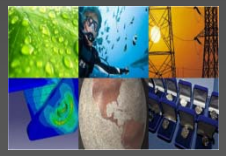
- System administration
- Database administration
- Network administration
- Performance Analysis and Reports
- User Support

# Work Proposed for CA FIU Year 4

## Task 4. KM-IT – Application to Environmental Contamination & Remediation

FIU will leverage the existing KM-IT framework developed for D&D to publish knowledge for environmental contamination and remediation areas. The following modules from the existing KM-IT framework will be used during FIU Year 4 to publish environmental contamination and remediation information.

- Subtask 4.1: User Registration Module
- Subtask 4.2: Specialist Directory Module
- Subtask 4.3: Technology Module
- Subtask 4.4: Vendor Module



# Questions and Discussion