



**Applied Research Center**  
FLORIDA INTERNATIONAL UNIVERSITY

# DOE-EM Cooperative Agreement – Year 4 Mid-Year Research Review Project 4: Waste and D&D Engineering and Technology Development

Presented: January 22, 2014  
to the U.S. Department of Energy  
by Dr. Leonel Lagos, PhD, PMP®  
Director of Research

*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.



# Project Description

Scope for FIU Year 4 includes:

- Integrating new waste and transportation forecast data;
- Identifying and evaluating innovative technologies in support of SRS 235-F project;
- Supporting DOE's EFCOG group by engaging DOE Fellows and FIU staff in the development of Best Practices and Lessons Learned;



# Project Description

Scope for FIU Year 4 includes (con't):

- Continuing the development and maintenance of a complex-wide Knowledge Management Information Tool (KM-IT);
- Creating a FIU-DOE Research website to capture and make available all the resulting research documents; and
- Publishing an environmental contamination and remediation model over the web.



# Staff and Students

**Project Manager:** Leonel Lagos, PhD, PMP<sup>®</sup>

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

**Present DOE Fellows (6):** Mariela Silva, Revathy Venkataraman, Mariana Evora, Steve Noel, Pedro Cordon, Michelle Embon

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





# Project Clients & Collaborators





# 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 waste streams on an annual basis.

**Task 2. D&D Support to DOE EM for Technology Innovation, Development, Evaluation, and Deployment** – Innovative technologies and methodologies for SRS 235-F. Support to EFCOG and EM-13 on special topics of interest. Development of lessons learned and best practices with EFCOG.



# Overview of Project Tasks

**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 4. FIU-DOE Research Website – New task to capture and make available all the resulting research documents developed under the CA.**

**Task 5. Cyber Security Compliance and Deployment of Environmental Contamination and Remediation Models – New task to publish and deploy an environmental contamination and remediation model over the web using ArcGIS.**





# Task 1. Waste Information Management System

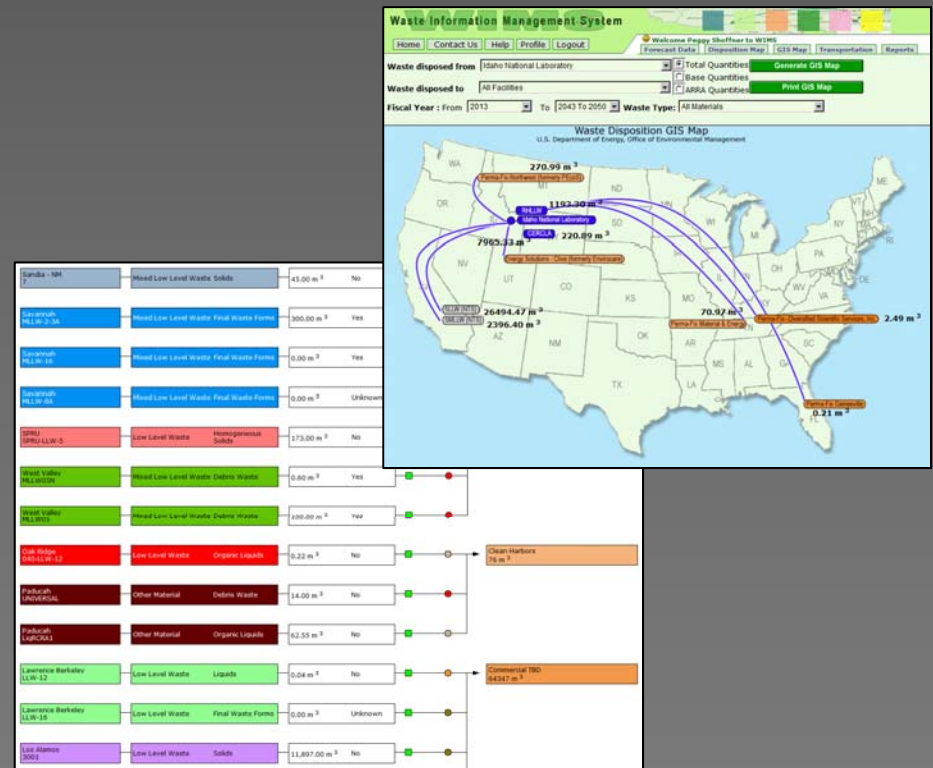
- Subtask 1.1 – Maintain WIMS – database management, application maintenance, and performance
- Subtask 1.2 – Incorporate new data files with existing sites into WIMS



# Major Accomplishments

## Task 1. Waste Information Management System

Completed integration of 2013 waste forecast and transportation data into WIMS. New 2014 dataset expected in April 2014, will be integrated and deployed on WIMS.





# Major Accomplishments

## Task 1. Waste Information Management System

- Conducted administration and management of the WIMS database and web server. Conducted user support on a continual basis.
- Will present WIMS at WM14 Symposia.

**Waste Information Management System with 2012-13 Waste Streams**

H. Upadhyay, W. Quintero, P. Shoffner, J. Phillips, L. Lagos  
Applied Research Center, Florida International University  
10555 West Flagler Street, Suite 2100, Miami, FL 33174

**Introduction**

The Waste Information Management System is a web-based information management system designed, developed, deployed and maintained by the Applied Research Center (ARC) at Florida International University (FIU) for the United States Department of Energy (DOE) and site waste managers. This system enables stakeholders to easily visualize, understand, and manage the vast volumes, categories, and problems of forecasted waste streams and their associated forecasted shipments.

This system integrates waste stream and transportation information from various DOE sites and facilities to waste treatment and disposal facilities, including commercial ones. It provides forecasting of waste disposal volumes through the year 2050, filtered by various selection criteria such as waste sites, disposal facilities, year range and material types.

**Objectives**

To provide DOE HQ and site waste managers with the tools necessary to easily visualize, understand, and manage the vast volumes, categories, and problems of forecasted waste streams.

- Expediting site waste management decisions.
- Providing DOE complex-wide information.
- Identifying, understanding and resolving existing barriers and choke points.
- Providing a mechanism for achieving the accelerated cleanup objectives.

**Results**

- Meeting the need of DOE for the waste forecast information to be available to the public.
- Assisting DOE and local sites in meeting individual site goals and milestones.
- 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 capacity.
- Sharing on-site resources and treatment capabilities to allow the sites to leverage capacity and expertise.

**Conclusions**

- Developed and deployed a DOE complex-wide, high performance, n-tier web-based system for generating waste forecast information, disposition maps, GIS maps, successor stream relationships, and custom reports.
- WIMS is updated to show the name and locations of the commercial treatment and disposal facilities.

**Path Forward**

- Update with new functional modules and annual waste forecast data to ensure the long-term viability and value of the system.
- Import waste stream information for 2013-14 with associated sites, facilities and waste type.

Visit the system on the web at <http://www.emwims.org>

FIU's Applied Research Center (ARC) is supporting the U.S. Department of Energy Headquarters in its mission to gather, organize, and display waste forecast data from across the DOE complex.



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

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

- Decontamination agents/materials for radiological surface contamination
- Fogging research and evaluation
- Organic semiconductor thin films for polymer interface and electrostatic applications

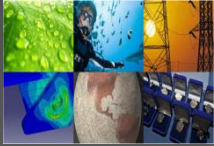


## Task 2. D&D Support to DOE EM for Technology Innovation, Development, Evaluation, and Deployment

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

- Support for aging infrastructure
- EFCOG best practices and lessons learned





# Major Accomplishments

Task 2.1 D&D Support - Decontamination agents/materials for radiological surface contamination

FIU is working with the SRS to investigate the decontamination agents and materials available on the market for radiological surface contamination.

Results will help the SRS project team develop their decontamination concepts for the PuFF process cells and define the FY14 and outyear's technical activities.





# Major Accomplishments

Task 2.1 D&D Support - Decontamination agents/materials for radiological surface contamination

Conducted literature search (KM-IT, ALARA Reports, web search, vendor info, etc.)

Interacted with SRS to identify search parameters based on application needs

40 strippable and fixative coatings have been identified.

Report sent to Savannah River Site.





## Decision Model for Selection of Decontamination Coatings

A decision model for mobile application use is being created to better guide the product end users in the selection of the appropriate products depending on their specific needs and site application.

Preliminary work done on decision model:

Type of Radiation	Surface Properties	Location	Surface Type	Isotopes Involved	Product	% Decon
Beta	Carbon Steel	N/A	Smooth	Plutonium 239	Decon Gel 1101	98%
Type of Radiation	Surface Properties	Location	Surface Type	Isotopes Involved	Product	% Decon
Beta	Plexiglass	N/A	Smooth	Plutonium 239	Decon Gel 1101	53%
Type of Radiation	Surface Properties	Location	Surface Type	Isotopes Involved	Product	% Decon
Beta	Concrete	N/A	Rough	Plutonium 239	Decon Gel 1101	71%



# Major Accomplishments

Task 2.1 D&D Support - Organic semiconductor thin films for polymer interface and electrostatic applications

This subtask will provide support to SRS 235-F by conducting a focused literature search to identify suitable organic materials that could be fused using low temperature. Needs for the fused material include high flexibility and low cost.

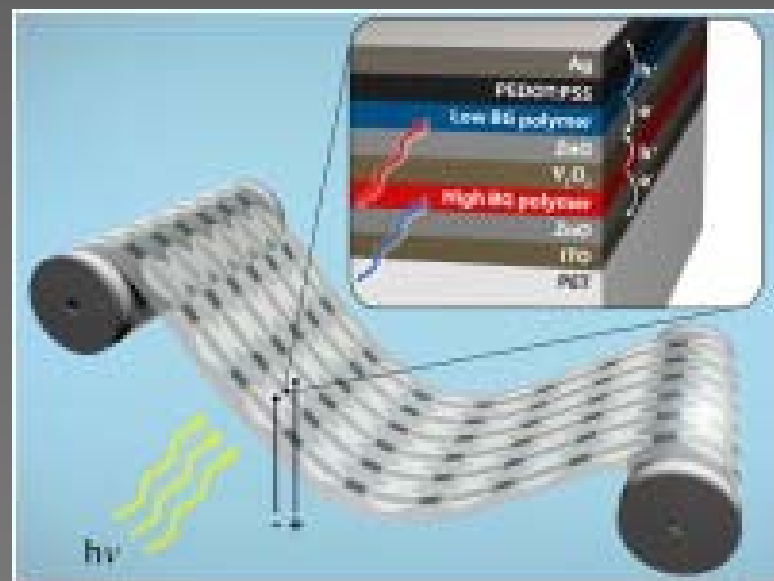


Image shows roll-to-roll processing taken from: Thue T. Larsen-Ols, et al., *Solar Energy Materials and Solar Cells* Volume 97, February 2012.



# Major Accomplishments

## Task 2.2 Support for Aging Infrastructure

The poor physical condition and the presence of hazardous materials at inactive DOE facilities can pose serious risks to workers in and around them. FIU is working in collaboration with the EFCOG D&D/FE Working group on the issue of aging infrastructure.



*Former aging facility at ORNL.*





# Major Accomplishments

## Task 2.2 Support for Aging Infrastructure

FIU is performing a literature search and will also contact each of the major DOE sites to gather information on what efforts are being implemented to:

- a) identify all the excess facilities,
- b) prioritize the maintenance/surveillance activities, and
- c) prioritize D&D when funding becomes available.



*D&D at ETTP (Oak Ridge)*



# Major Accomplishments

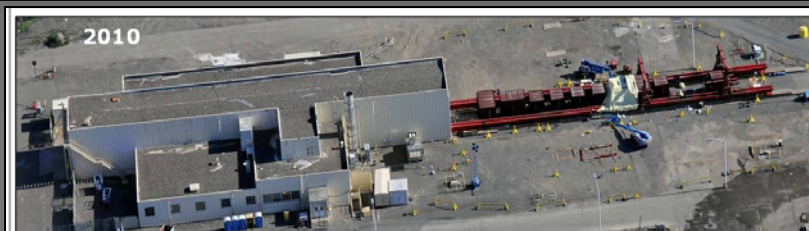
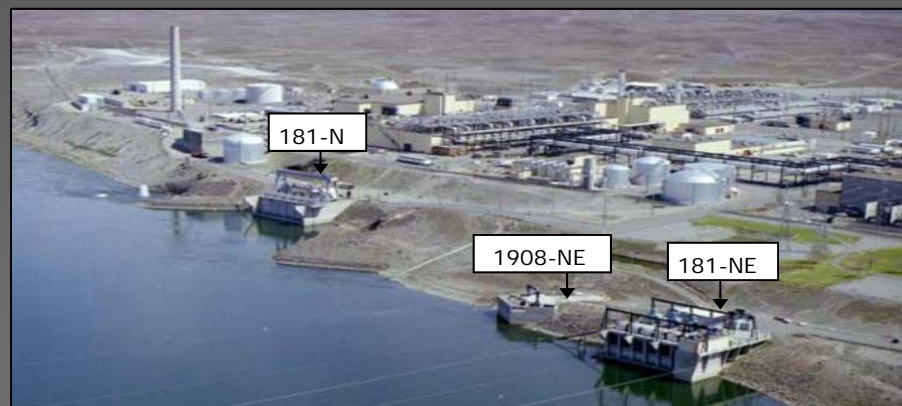
## Task 2.2 Lessons Learned / Best Practices

Collaboration with EGCOG in the development of Lessons Learned and Best Practices.

A total of 13 have been developed.

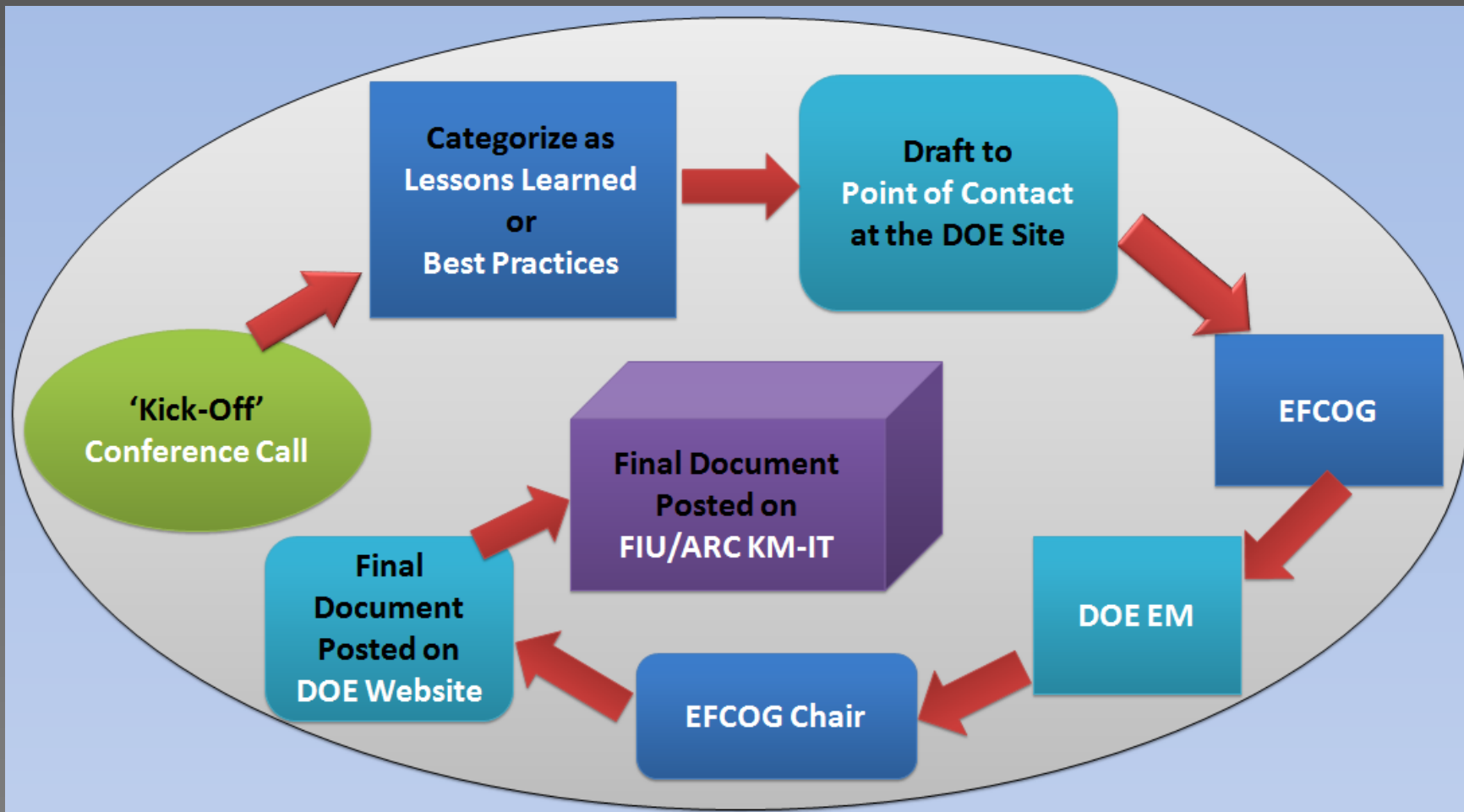
7 final and published on the D&D KM-IT and EFCOG websites.

6 in review process: 2 at DOE HQ, 3 at EFCOG, 1 at FIU.





# Process for LL / BP





## Process for LL / BP

- Relevant D&D LL/BP are identified in collaboration with EFCOG D&D Working Group members
- DOE Fellows at FIU contact 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



# 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	<b>FINAL</b>
2	BP	Open Air Demo of Asbestos Gunite by Using a Track Mounted Wet Cutting Saw	Rob Vellinger	<b>FINAL</b>
3	BP	185-3K Cooling Tower Demolition	Bill Austin	<b>FINAL</b>
4	BP	Historical Hazard Identification Process for D&D	Paul Corrado	<b>FINAL</b>
5	LL	Closure of the Reactor Maintenance, Assembly, and Disassembly Facility and the Pluto Disassembly Facility at the Nevada National Security Site	Annette Primrose	<b>DOE review</b>
6	LL	Unanticipated High Dose During the Removal of Wire Flux Monitor Cabling from the HWCTR Reactor Vessel	Bill Austin	<b>FINAL</b>
7	LL	SPRU Lessons Learned	EFCOG	<b>DOE review</b>





# Status of LL / BP

Doc #	BP or LL	Title	POC	Status
8	BP	Structural Code Guidance for D&D Activities at DOE Facilities	Kirk Dooley	<b>FINAL</b>
9	BP	Electrical Code Guidance for D&D Activities at DOE Facilities	Kirk Dooley	<b>FINAL</b>
10	BP	SRS R and P -Reactor Disassembly Basin In Situ Decommissioning	Bill Austin	<b>Under revision</b>
11	BP	Use of Earthen Benches and other Technologies to Support River Structures' Demolition Activities	Brad Smith	<b>EFCOG review</b>
12	BP	327 Facility Source Term Stabilization and/or Removal Prior to Demo	Brad Smith	<b>EFCOG review</b>
13	BP	Remote Tapping Tool at INL	Kirk Dooley	<b>EFCOG review</b>

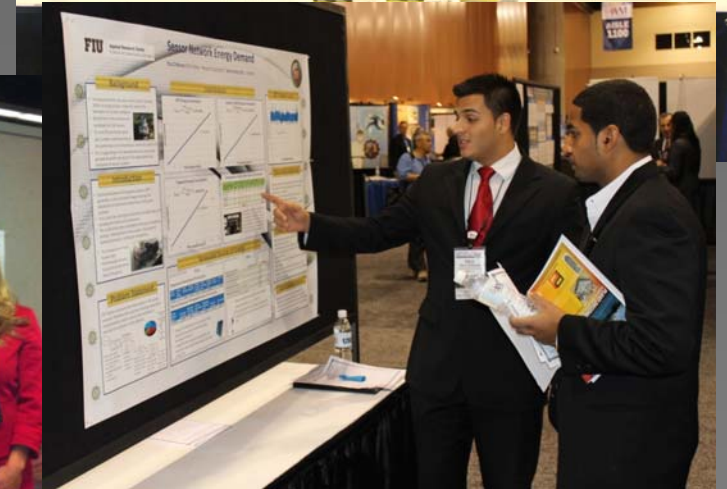


# Major Accomplishments

## Task 2 D&D Support – Conference Participation

Results of project research to be presented at:

- ANS - Decommissioning & Remote Systems (June 2014)
- Waste Management 2014 Symposia (March 2014)





## 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 w/ newsletters, updates, and direct email
- 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



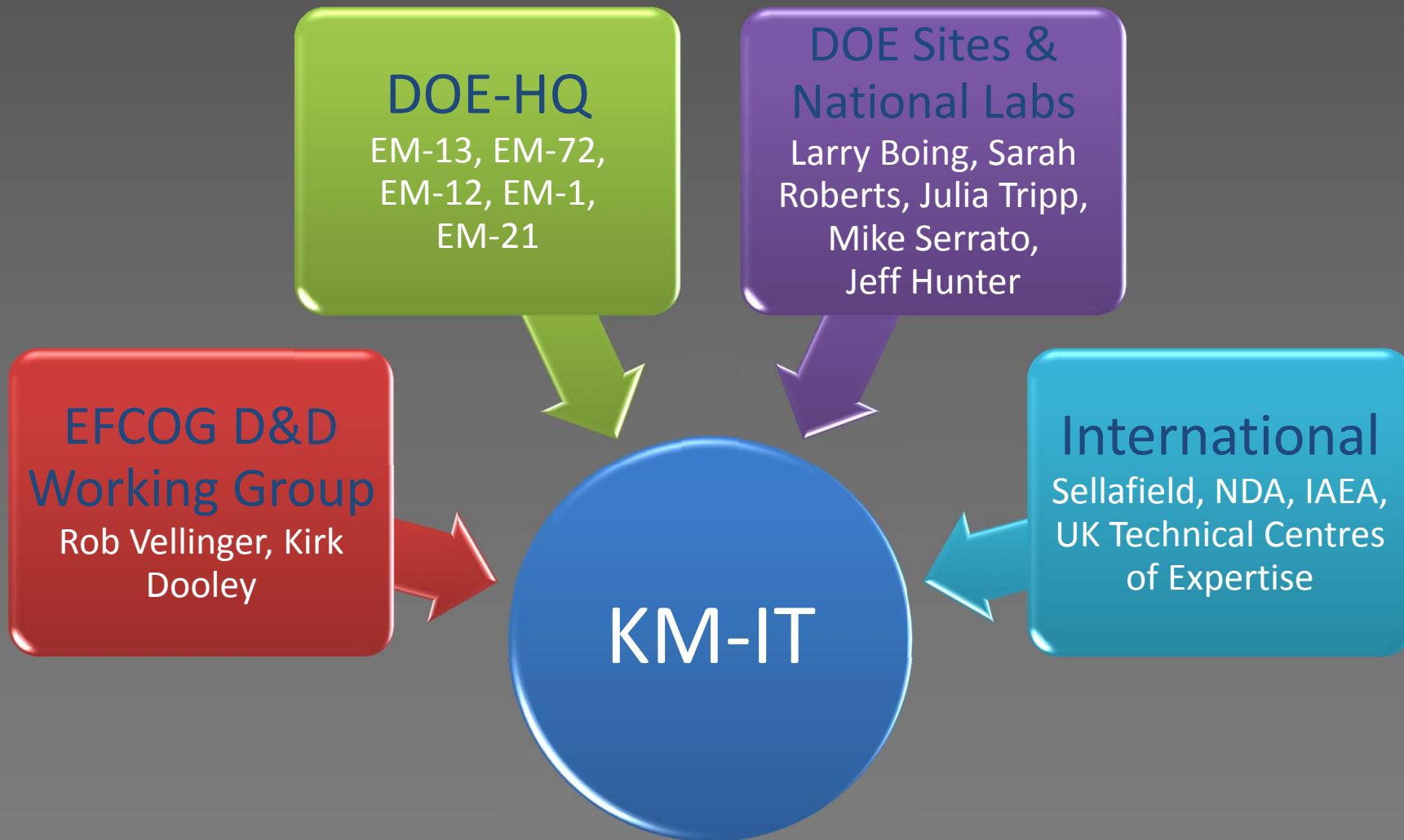
# Task 3 D&D KM-IT

## Task 3 D&D KM-IT - Outreach

- 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





# Major Accomplishments

## Task 3 D&D KM-IT

Anticipated accomplishments for FIU Year 4 include:

- Deployment of Hotline lite mobile application
- Deployment of community contribution module
- Deployment of popular content displays

m.dndkm.org

**D&D KM-IT** is now mobile

**Mobile Features**  
You can now use your iPhone, iPad, Blackberry, Android, or Windows smart devices to access the Vendors module and Specialist Directory with more modules on the way. You can easily access a specialist or vendor and place a call directly on your phone with our easy to use Mobile System.

Developed by:  
**FIU** Applied Research Center  
FLORIDA INTERNATIONAL UNIVERSITY

In Collaboration with:

m.dndkm.org



# Major Accomplishments

## Task 3 D&D KM-IT

Anticipated accomplishments for FIU Year 4 include:

- Wikipedia integration editing/articles
- Presentation of D&D KM-IT at WM14
- Completion of 2 D&D KM-IT workshops

The screenshot shows the D&D KM-IT website. At the top, it says "D&D KM-IT Knowledge Management Information Tool". There is a search bar and a "Search" button. Below the search bar are navigation links for "Home", "About", and "Contact Us". A "Welcome Guest" message and a "Login" button are also present. The main content area features a world map and the text "Powered by the Global D&D Community". Below this is a grid of yellow buttons for various features: "Hotline", "Technology", "Web Crawler", "Mobile System", "Lessons Learned", "Best Practices", "Picture Video Library", "Document Library", "Specialist Directory", "Vendors", "Collaboration Tools", and "Training". There are also buttons for "U.S. Registration" and "International Registration". A section titled "Additional Features" includes links for "ICM Crawler", "D&D Program Map Addendum 2013", "ICM Demo at FIU", and "ITSR Module". A "Quick Links" section at the bottom left lists "DOE EM D&D", "ALARA Center", and "EFCOG". A large banner at the bottom right says "D&D KM-IT is now Mobile" and includes an image of a smartphone. To the right of the banner is an "Industry News" section with several news items.





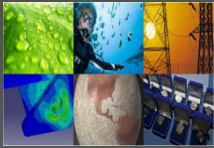
# Major Accomplishments

## Task 3 D&D KM-IT

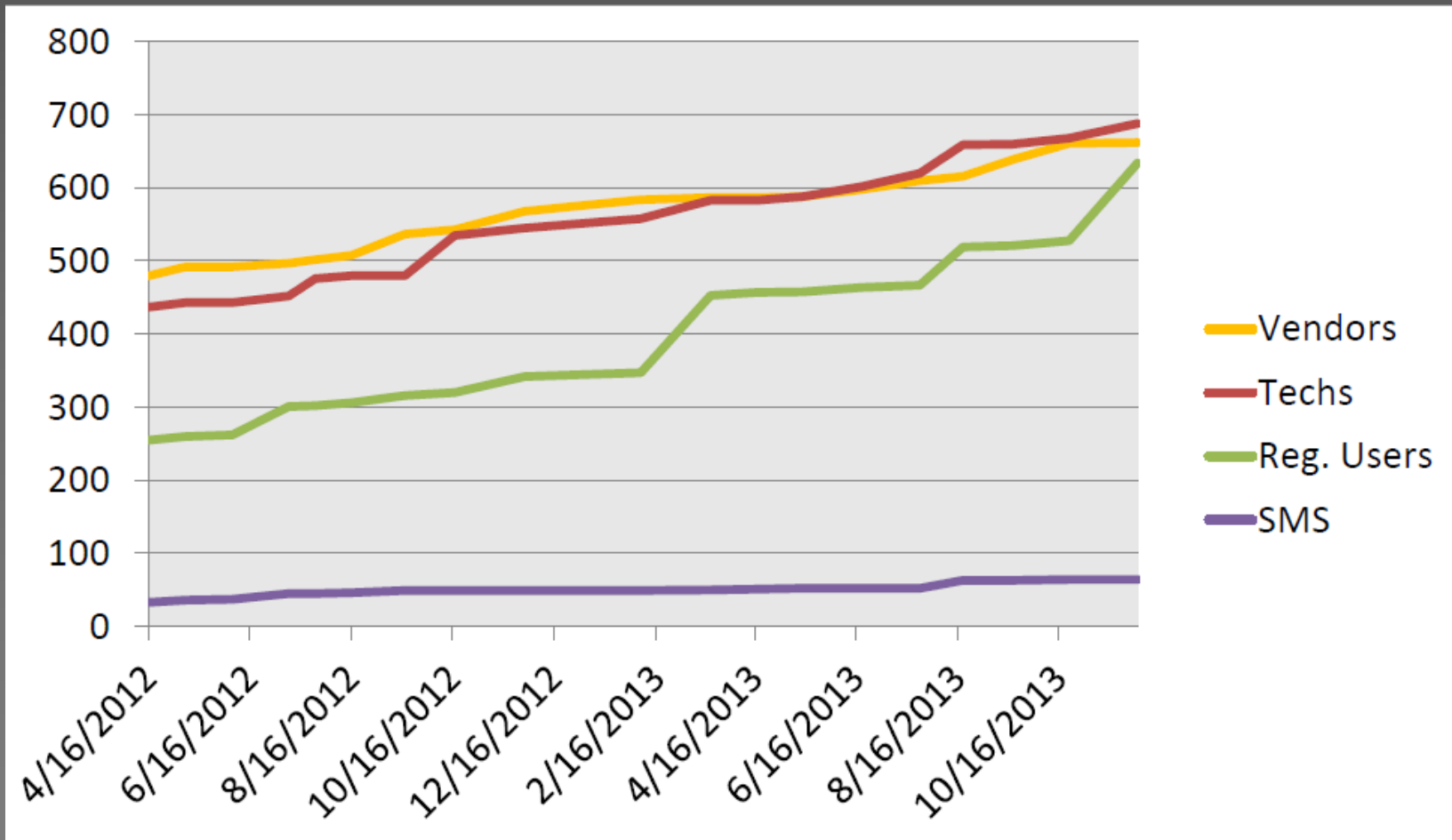
### D&D KM-IT Help Videos

- 15 videos complete.
- The final 10 videos will be complete by end of January.
- These videos will assist users in the overall use of D&D KM-IT and specific uses of each module.





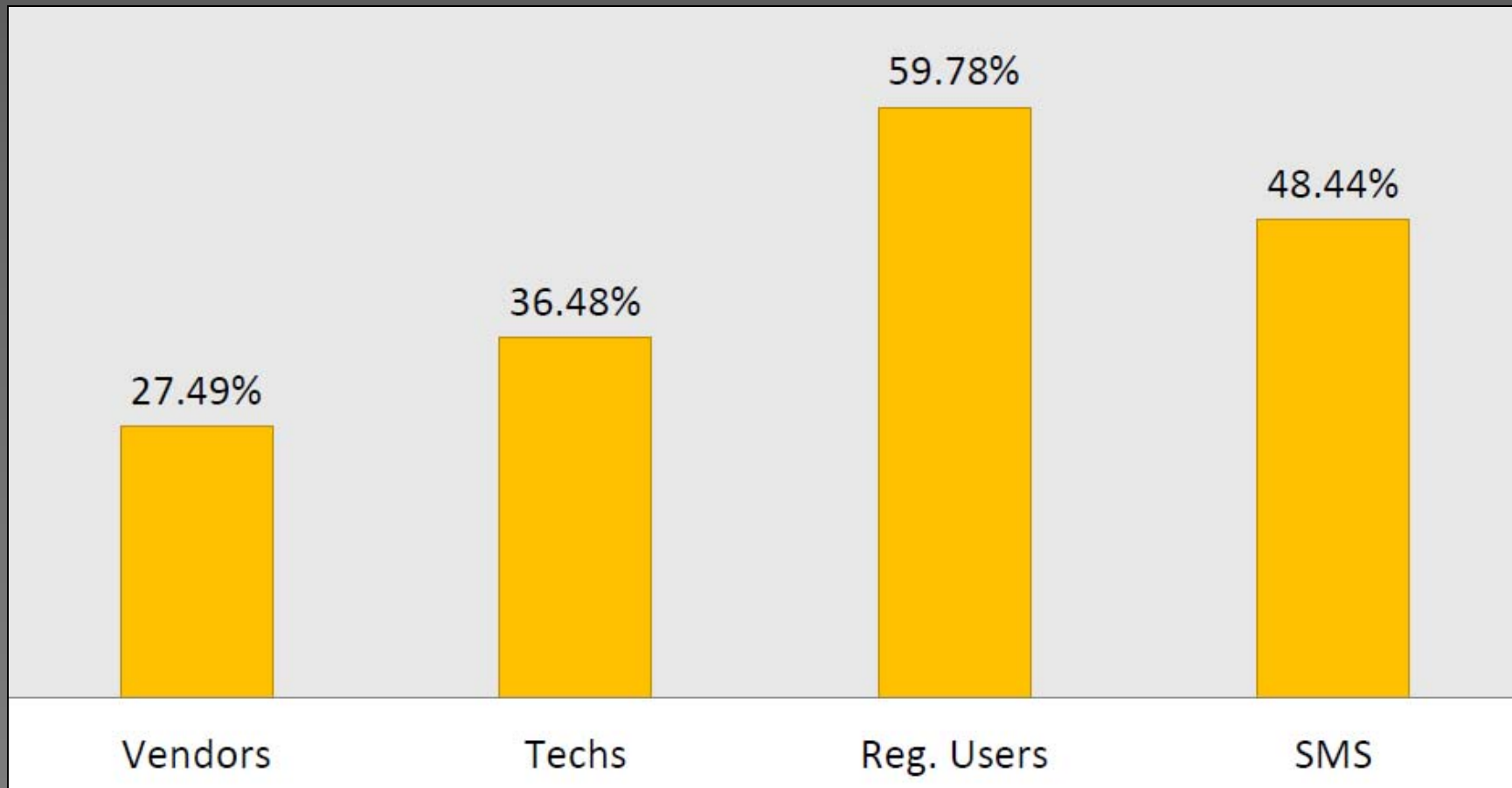
# D&D KM-IT Status and Use





# D&D KM-IT Status and Use

Increase from April 2012 to December 2013



# 2013 Q3 DND KM-IT WEB ANALYTIC DATA (dndkm.org)



## TOTAL VISITS

**8,229**

NEW

**72.2%**

RETURNING

**27.8%**

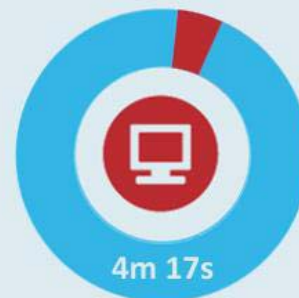
AVG. MONTHLY VISITS

**2,743**

FIU

**5%**

## AVG. TIME ON SITE



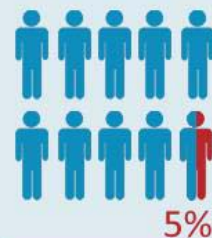
## TRAFFIC TYPE



## TOP 5 DEMOGRAPHICS



## FIU FACTOR



95% OTHER

## POPULAR KEYWORDS

air andor an avacen avr dambo clean **com** concrete condu  
 crane dehg demron denitration em tr  
 gempler gloves kapstomey hilti ice inc international jet  
 knucklehead laboratory laser **mobile** mobllysystem  
 nochar online ortec paint pigging pipe polar  
 post removal shaver special steam suit  
 system te technologies low tree vacuum www  
 zeosorb

## BROWSERS

INTERNET EXP.



**38.37%**

CHROME



**35.95%**

FIREFOX



**12.95%**

SAFARI



**7.60%**

## MODULE DESTINATION

TECHNOLOGY

**45.2%**

VENDORS

**14.8%**

HOTLINE

**5.3%**

ALARA REPORTS

**4.1%**



## Task 4. Centralized Knowledge Base System and FIU-DOE Research Website

- Subtask 4.1 – Knowledge Base for Environmental Management
- Subtask 4.2 – FIU-DOE Research Website





# Major Accomplishments

## Task 4 Central KB and FIU-DOE Research Website

A simple interface was developed to illustrate the connection between all the independent applications or systems developed for DOE-EM under different projects.

**D&D KM-IT**  
Deactivation & Decommissioning Knowledge Management Information Tool

**Waste Information Management System**

**EFPC Watershed**  
Legend: Water Route, Other Routes, EFPC Domain, Wetlands, Stream Network, East Fork Prairie (Open), East Fork Prairie (Closed), Oak Hollow Branch, Oak Branch, Middle Branch, Other Tributaries

**DOE Research**  
DOE-FIU Cooperative Agreement

**DOE / FIU Science & Technology WorkForce Development Initiative**



# Major Accomplishments

## Task 4 Central KB and FIU-DOE Research Website

The DOE Research website has been deployed at to provide a centralized location for the research information developed under the Cooperative Agreement and includes technical reports, quarterly progress reports, end of year reports, presentations, journal articles, conference papers, and more.



[www.doeresearch.fiu.edu](http://www.doeresearch.fiu.edu)



# Task 5. Cyber Security Compliance and Deployment of Environmental Contamination and Remediation Model

This is a new task for FIU Year 4 under which FIU will publish and deploy one environmental contamination and remediation model, developed under Project 3, through the secured KM-IT infrastructure for the research stakeholders.

GIS Models for Environmental Contamination and Remediation

Home About Contact

GIS Applications

Surface and Groundwater Air Dispersion Stormwater Geodatabase Development

**GEO Database Modeling & Development**

This area presents the Soil and Groundwater modeling research being performed for the Oak Ridge National Laboratory, Y-12 National Security Complex, and Moab Sites via Numerical modeling of the fate and transport of pollutants of concern.

Environmental Contamination and Remediation Models

The Applied Research Center at Florida International University (ARC-FIU) is a multidisciplinary research unit which provides environmental engineering services that vary in complexity. ARC's projects range from feasibility studies to design alternatives. In all stages, sustainability is the main guiding principle which allows built projects to achieve low infrastructure costs while maintaining highest environmental performance.

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## Work Proposed for CA FIU Year 5

### 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.





# Work Proposed for CA FIU Year 5

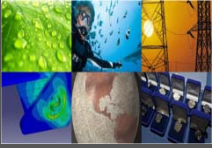
## Task 2. D&D Support to DOE EM for Technology Innovation, Development, Evaluation, and Deployment

FIU will assist DOE EM-13 in meeting the D&D needs and technical challenges around the DOE complex. 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.

FIU will complete the literature search in support of the SRS-F organic semiconductor thin films for polymer interface and electrostatic applications.

FIU will also further develop a decision-making tool for the use of decontamination agents and materials available on the market for radiological surface contamination.





## Work Proposed for CA FIU Year 5

### 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.



## Work Proposed for CA FIU Year 5

### Task 4: IT Support to GIS

FIU will provide IT support to the GIS work being performed under Project 3 (Soil & Groundwater Research) for environmental contamination and remediation modeling.



# Questions and Discussion

