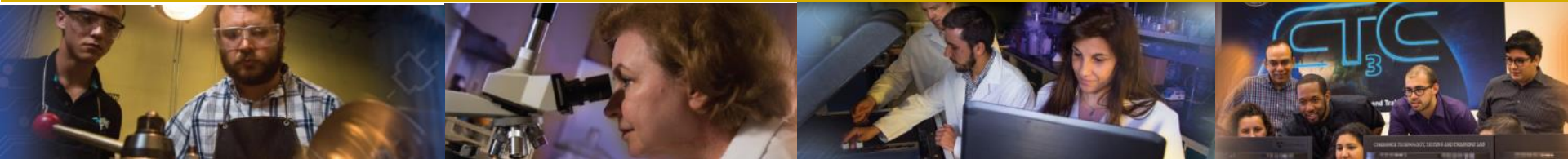




FIU Research Review

DOE-EM Cooperative Agreement

Dr. Leonel Lagos, PhD, PMP[®] (Principal Investigator)
Applied Research Center
Florida International University





FIU Research Review for DOE EM



Tuesday May 29, 2018	Wednesday May 30, 2018	Thursday May 31, 2018
<p>10:00 - 12:00 D&D and IT for EM (FIU Project 3)</p>	<p>10:00 - 12:00 Workforce Development & Training (FIU Project 4)</p>	<p>9:00 - 11:00 Wrap Up (all FIU Projects)</p>
<p>2:00 - 4:00 High Level Waste / Waste Processing (FIU Project 1)</p>	<p>1:00 - 3:00 Soil / Groundwater (FIU Project 2)</p>	

Presentations available at doeresearch.fiu.edu



Florida International University

- FIU is among the 10 largest public universities in the U.S. (~56,000 students in 2016)
- Top tier research institution - R1 Carnegie Classification for Highest Research Activity
- ABET accreditation
- **First in nation in awarding bachelor's and master's degrees to Hispanic students.**
- Designated a Minority-Serving Institution.



The Applied Research Center



- Founded in 1995
- Executed over \$100 million in research with DOE, DoD, other Federal and State agencies and private industry.
- Portal concept provides ease of access to FIU's Colleges and Centers to facilitate collaborative research.
- Multicultural and multilingual staff.
- Project Management Professionals (PMP®) and Professional Engineers (PE).
- Successful STEM Workforce Development Programs (DOE Fellows and Cyber Fellows).





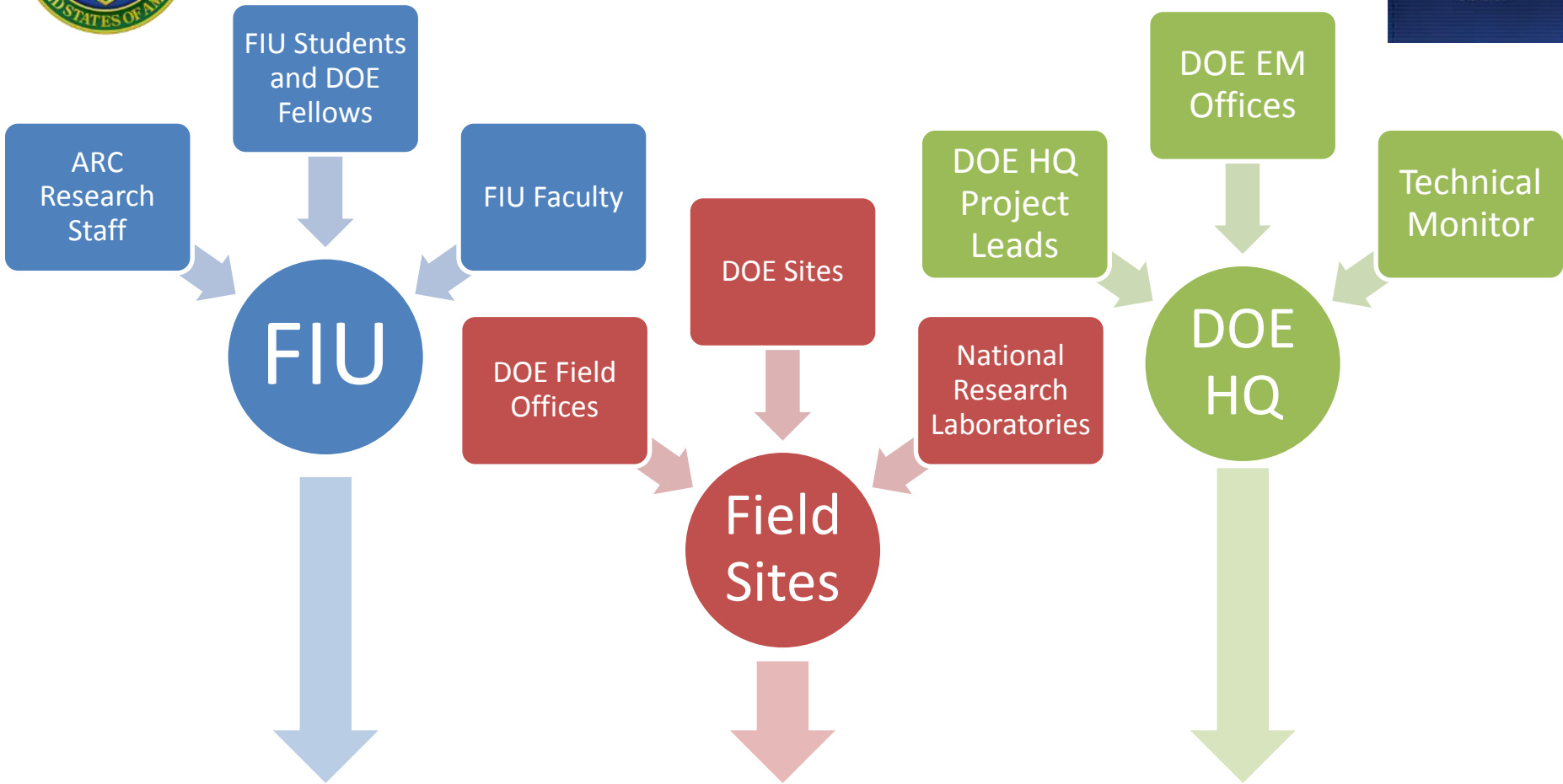
Applied Research Center Facilities



Robotics & Sensors Lab - Technology Testing & Demonstration Facility – Radiological Lab – Analytical Chemistry Lab – Soil & GW Lab – Multi-Function High Bay – GIS Lab – Cybersecurity Lab – Secure Server Room – Engineering Design Center – Machine Shop



Cooperative Agreement Team



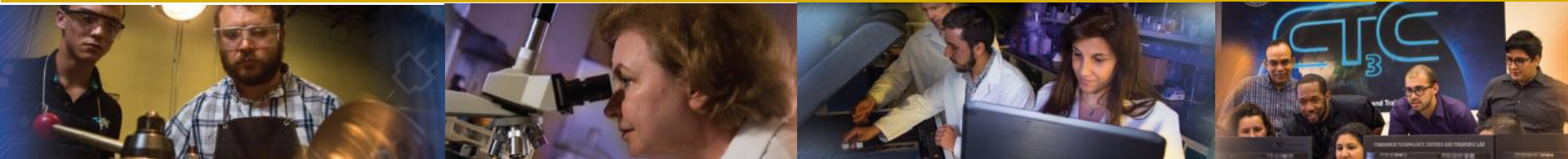
DOE-FIU Cooperative Agreement



FIU Project 3 – Waste and D&D Engineering and Technology Development

Presented: May 29, 2018

Dr. Himanshu Upadhyay and Mr. Joseph Sinicrope





FIU Personnel and Collaborators



Principal Investigator: Leonel Lagos

Project Manager: Leonel Lagos

Faculty/Staff: Himanshu Upadhyay, Joseph Sinicrope, Walter Quintero, Clint Miller, Peggy Shoffner, Jesse Viera

DOE Fellows/Students: Joshua Núñez, Tristan Simoes-Ponce, Ryan Cruz, Alejandro Koszarycz

DOE-EM: Bart Barnhart, Andy Szilagyi, Dinesh Gupta, Rod Rimando, Genia McKinley, Jonathan Kang

SRNL: Mike Serrato, Aaron Washington, Connor Nicholson, Brent Peters

SRS: Jack Musall



Project Tasks and Scope



Task 1 Waste Information Management System (WIMS)

- Manage complex-wide waste forecast information for planned treatment/disposal
- Provide web-based tool to receive, organize, and report DOE waste forecast data via a common application

Task 2 D&D Support for Technology Innovation, Development, Evaluation and Deployment

- Address high priority fire resiliency and safety requirements in support of SRS 235-F D&D project in collaboration with SRNL
- Implement phased approach for standards development, testing/evaluation, and deployment of D&D technologies
- Identify broader applications for intumescent coatings to meet other challenges across DOE complex

Task 3 Knowledge Management Information Tool (KM-IT)

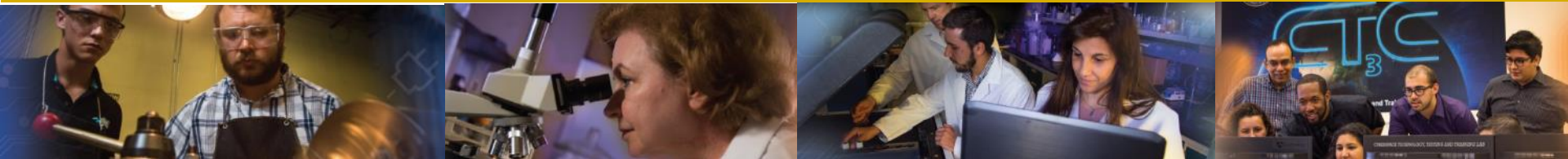
- Maintain and preserve D&D knowledge by enhancing communication, information sharing, and distribution to assist future D&D projects and workforce



Knowledge Management Information Tool (KM-IT)

www.dndkm.org

Dr. Himanshu Upadhyay





Task 3 – Knowledge Management Information Tool (KM-IT)

Site Needs:

To prevent the loss of the collective knowledge from the aging workforce, the need to collect, retain and disseminate knowledge in an organized and structured way through the development and maintenance of a universally available and usable knowledge management system was identified by EM.

Objectives:

Knowledge management (KM) is a modern approach & discipline being used within EM to capture knowledge. Objectives for KM-IT are to attain the long-term active use, operation, and continued growth of the knowledge from across the DOE global community and capture within the KM-IT system, resulting in enhanced worker safety, improved operational efficiencies, improved communication & knowledge among stakeholders, and the cross-generational transfer of knowledge to the future workforce.



IMPORTANCE OF KM TO EM



- A significant portion of the EM workforce (including DOE and contractors) is past or nearing retirement age.
- KM aids in the retention of knowledge and experience when employees leave.
- KM provides a centralized location for data and information, improving time management of users.
- KM allows experiences to be captured and shared with Lessons Learned and Best Practices.
- KM reduces redundant work by helping users avoid re-inventing the wheel.
- KM allows the sharing of valuable information throughout the organization.



KM-IT Modules

- D&D Hotline
- Technology Module
- Vendor Module
- Collaboration tools
- Mobile applications
- Lessons Learned
- Documents
- Pictures/videos
- Search tools
- Training
- Specialists
- Best Practices

The screenshot displays the D&D KM-IT website interface. At the top, it features the title "D&D KM-IT Knowledge Management Information Tool" and navigation links for "Home", "About", and "Contact Us". A search bar and a "Search" button are visible. Below the navigation, a banner reads "Powered by the Global D&D Community" with a world map background. A grid of yellow buttons lists various modules: Hotline, Technology, Web Crawler, Mobile System, Lessons Learned, Best Practices, Picture Video Library, Document Library, Specialist Directory, Vendors, Collaboration Tools, and Training. A registration prompt is present: "Please register to access all of the features of D&D KM-IT." Below this, an "Additional Features" section highlights "ICM Crawler Demo of Strippable Coatings" and "D&D Program Map Addendum 2013". A "Quick Links" section includes "DOE EM D&D", "ALARA Center", and "EFCOG". A large banner at the bottom promotes the mobile version: "D&D KM-IT is now Mobile" with the text "You can now use your iPhone, iPad, Blackberry, Android, or Windows smart devices to access the D&D". To the right, a separate advertisement for the mobile version shows the website on various mobile devices and includes a QR code and logos for "FIU Applied Research Center" and "ALARA Centers".

www.dndkm.org

m.dndkm.org

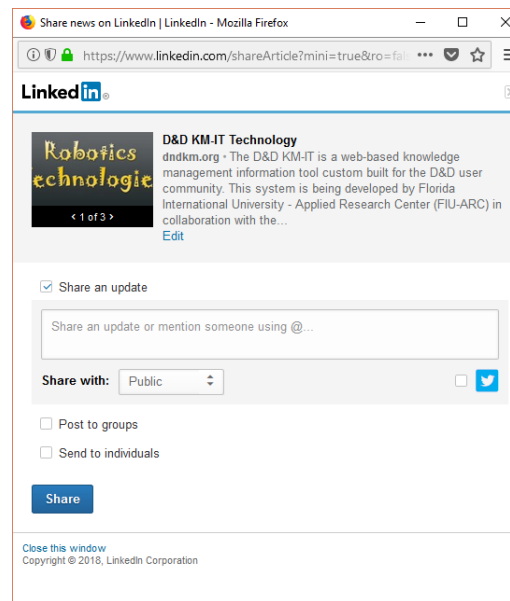
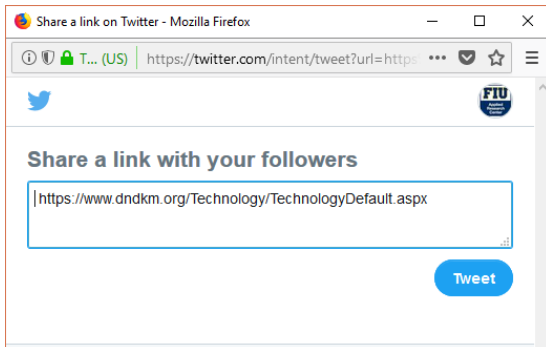
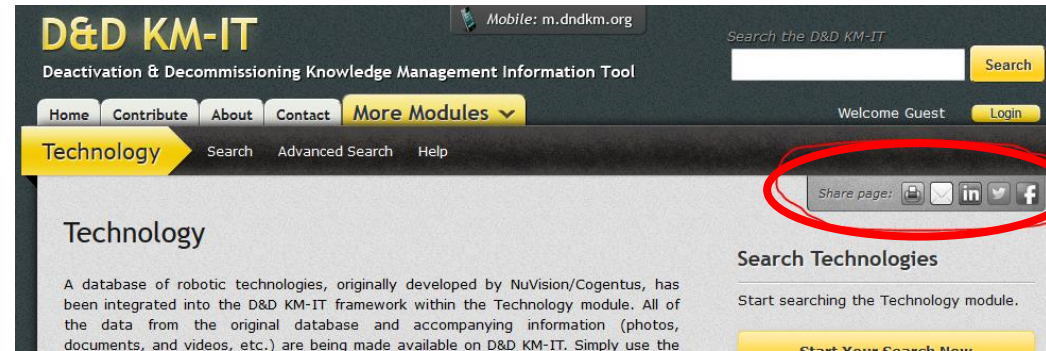


Task 3 – Knowledge Management Information Tool (KM-IT)



Accomplishments Year 8:

- Integrated social media buttons to Like/Share on
 - Facebook
 - Twitter
 - Linked In
- Users can share KM-IT pages with their social media accounts



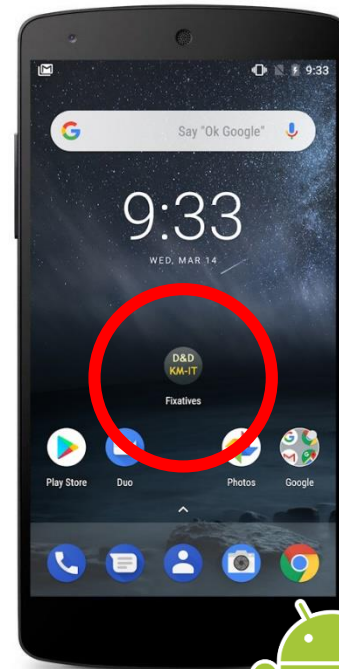
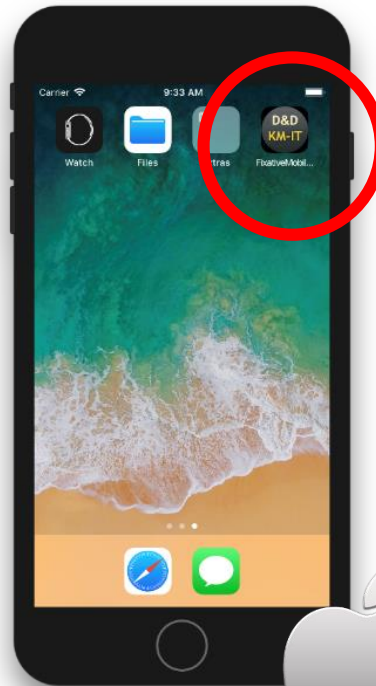


Task 3 – Knowledge Management Information Tool (KM-IT)



Accomplishments Year 8:

- Pilot native mobile application for the D&D Fixatives Module
 - Android platforms
 - iOS platforms
 - Windows platforms





Task 3 – Knowledge Management Information Tool (KM-IT) – Fixative Mobile App

About D&D KM-IT Fixative Mobile App

The D&D Fixatives module can assist in the selection of fixatives, strippable coatings, and decontamination gels for application during D&D activities. The module includes a comprehensive database of commercially available fixatives and other contamination control products and is capable of filtering and sorting the available products according to the criteria entered by the user.



Runs on iOS7 and newer
Minimum target iPhone7



Runs on Android 7.1
(Nougat)
Minimum target Android
4.4 (Kit Kat)



Runs on Windows 10
Minimum target
Windows 8

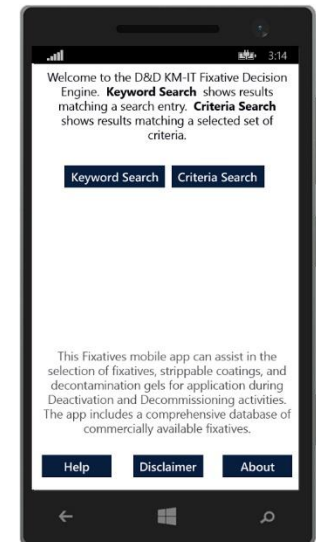
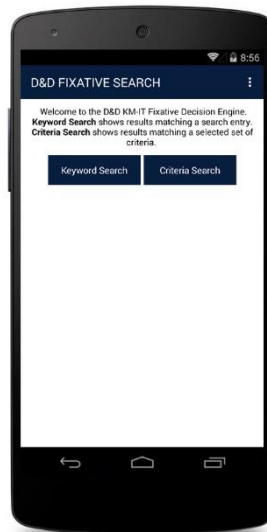
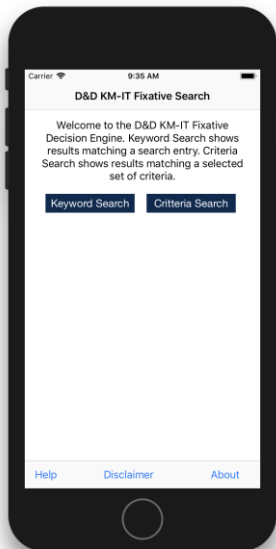


Task 3 – Knowledge Management Information Tool (KM-IT) – Fixative Mobile App



Home Screen

- Welcome screen for app
- Users can choose to proceed by performing a Keyword search or Criteria search
- Mobile toolbar menu at the bottom of the screen shows additional information for the user



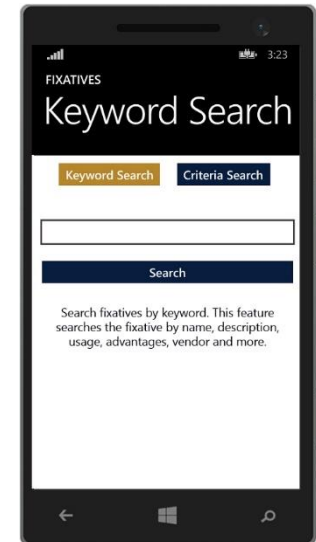
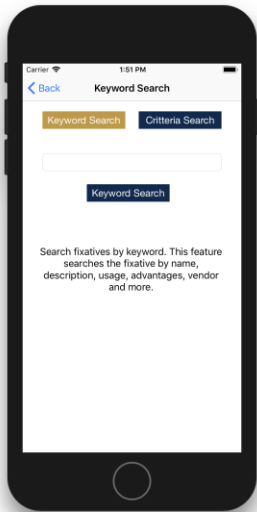


Task 3 – Knowledge Management Information Tool (KM-IT) – Fixative Mobile App



Keyword Search

- Keyword search will search for fixative products according to the search word
- If no search keyword is entered and the search button is clicked it will return all fixative products



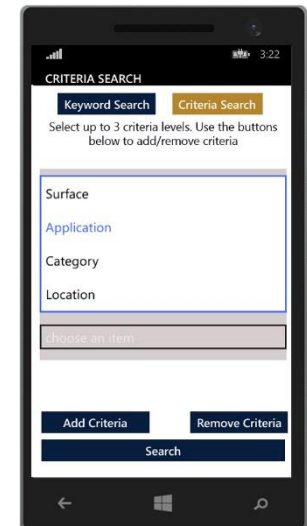
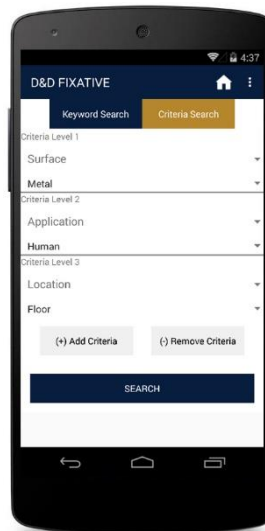
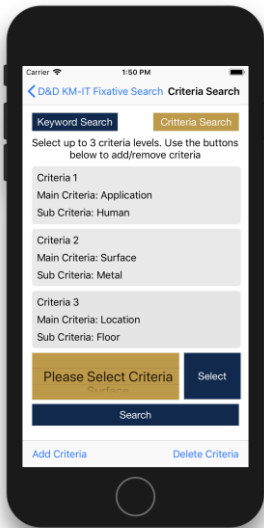


Task 3 – Knowledge Management Information Tool (KM-IT) – Fixative Mobile App



Criteria Search

- Criteria search allows the users to build multi-tier criteria searches for fixative products by adding criteria and subcriteria.
- Each time a new criteria is added it will be filtered according to the previous selection, allowing for targeted results



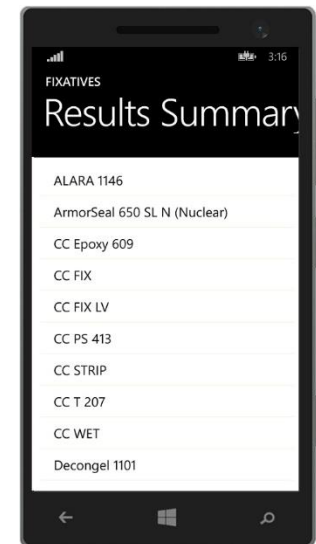
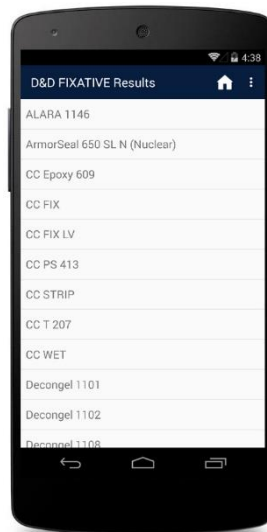
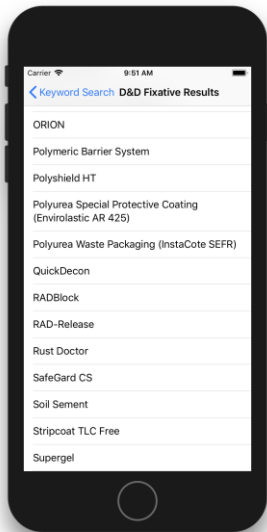


Task 3 – Knowledge Management Information Tool (KM-IT) – Fixative Mobile App



Search Results

- This view displays the summary of the search results by the name of the fixative products
- Clicking on any of the result options will send the user to the details of the fixative product

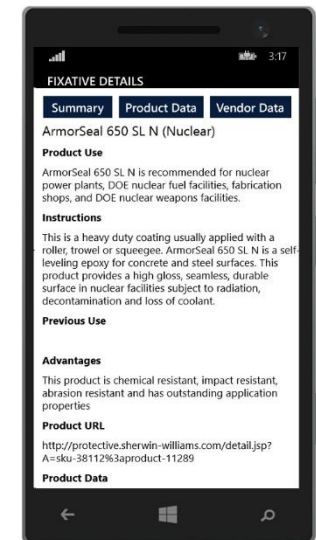
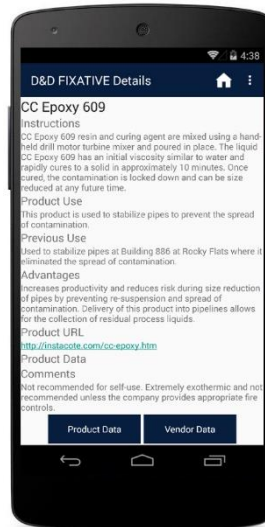
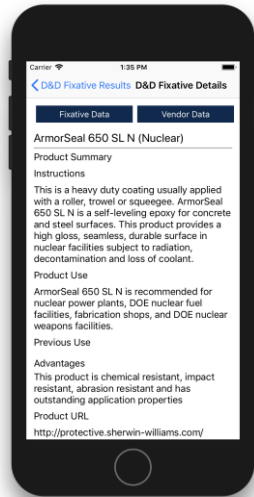




Task 3 – Knowledge Management Information Tool (KM-IT) – Fixative Mobile App

Fixative Product Detail

- After clicking on a product from the search results, the user can view the details of the fixative product
- This view provides the general details of the product with an option to view the product and vendor data by clicking on the corresponding buttons



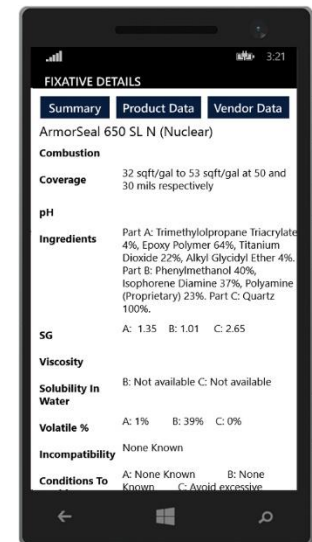
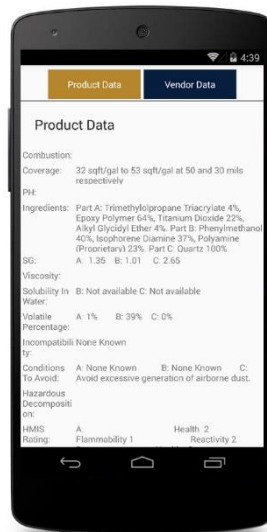
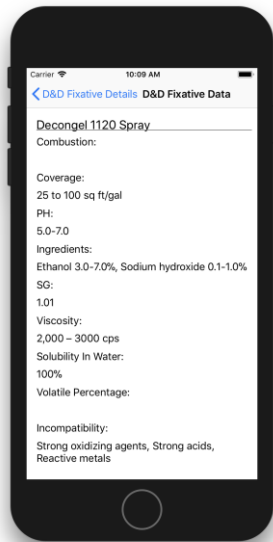


Task 3 – Knowledge Management Information Tool (KM-IT) – Fixative Mobile App



Fixative Product Data

- After pressing the product data button, the user is taken to the product data available for this particular fixative product



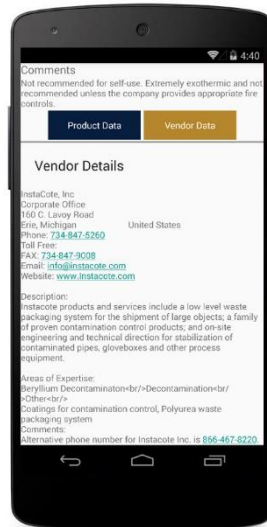
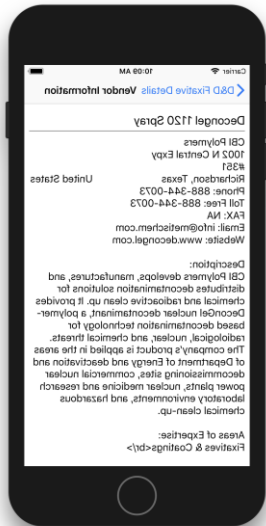


Task 3 – Knowledge Management Information Tool (KM-IT) – Fixative Mobile App



Fixative Vendor Data

- After pressing the vendor data button, the user is taken to the vendor data available for this particular fixative product
- Again, the mobile app allows for communication by phone when a phone number is clicked and by phone browser when an URL is clicked



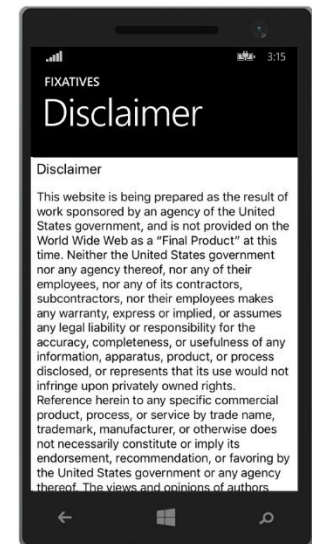
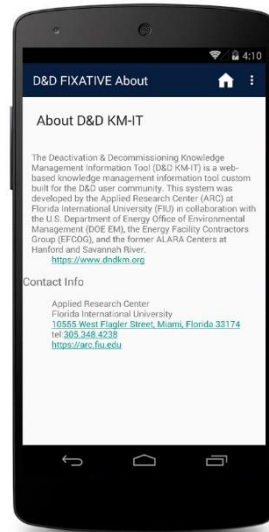
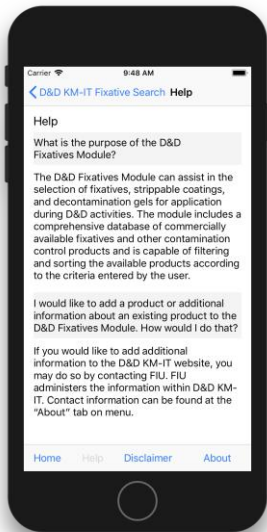


Task 3 – Knowledge Management Information Tool (KM-IT) – Fixative Mobile App



Additional Pages

- About – Description of D&D KM-IT and contact info for FIU-ARC
- Help - Displays fixative help questions and answers
- Disclaimer - Allows the user to read the general disclaimer message





Task 3 – Knowledge Management Information Tool (KM-IT) – Fixative Mobile App



Web Service Support for Mobile App

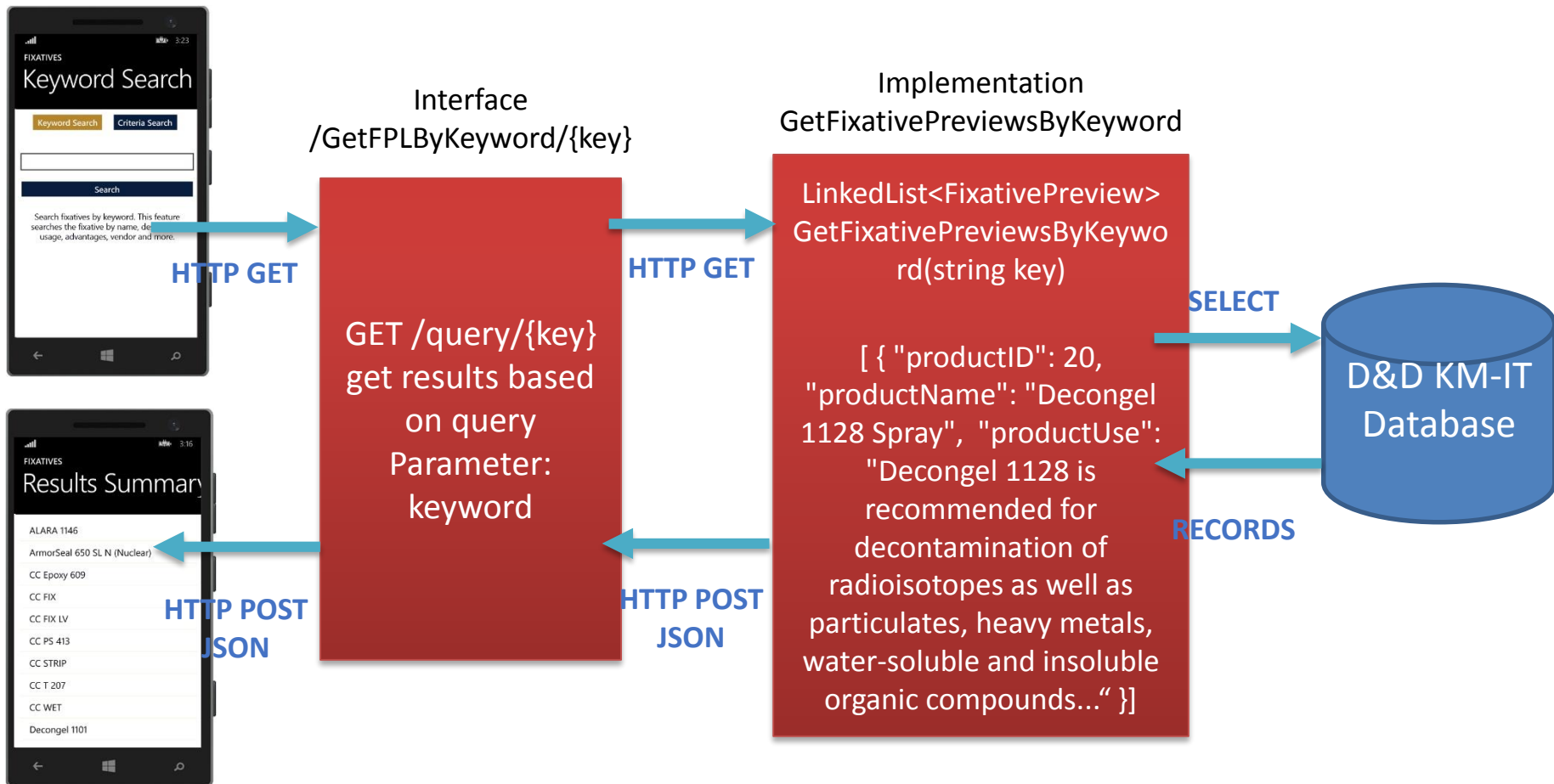
- A Representational State Transfer (REST) Web Service was built to support the iOS mobile app
- REST is an architectural style that specifies constraints, such as the uniform interface, that is applied to a **web service**. It provides desirable properties, such as performance, scalability, and modifiability
- REST relies heavily on JSON (JavaScript **Object** Notation), a minimal, readable format for structuring data. It is used primarily to transmit data between a server and web application, as an alternative to XML.
- This REST Web Service will handle all future mobile apps as well





Task 3 – Knowledge Management Information Tool (KM-IT) – Fixative Mobile App

Web Service Architecture





Task 3 – Knowledge Management Information Tool (KM-IT) – Fixative Mobile App



Tools and Technologies used for Mobile App Development

- The following technologies were used in the development of the D&D KM-IT Fixative iOS Native Mobile App
 - Microsoft Visual Studio 2015
 - Xamarin
 - REST Web Services
 - JSON
 - Microsoft SQL Server
 - Postman
 - iOS



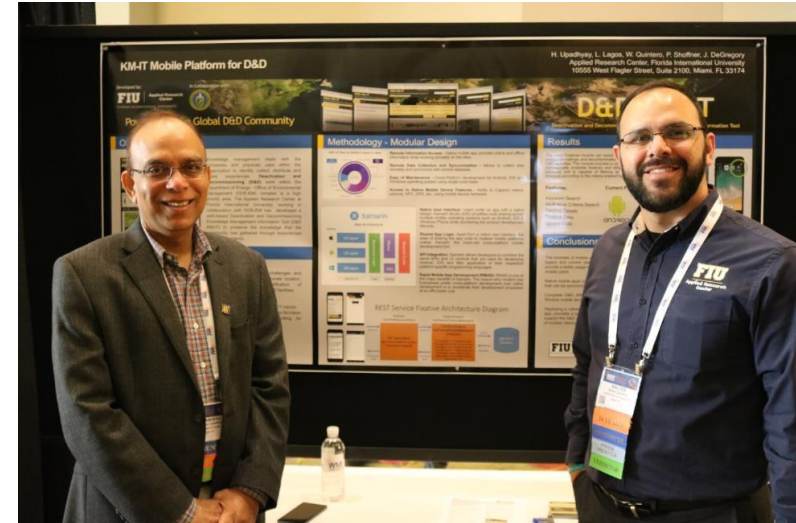


Task 3 – Knowledge Management Information Tool (KM-IT)



Accomplishments Year 8:

- Addition of current and relevant data to the KM-IT system, including news items, additional vendors, and technologies.
- Performance of website analytics and reporting to track usage metrics.
- Presentation and live demonstrations at WM18
- Development of articles, newsletters and infographics relevant to the D&D community

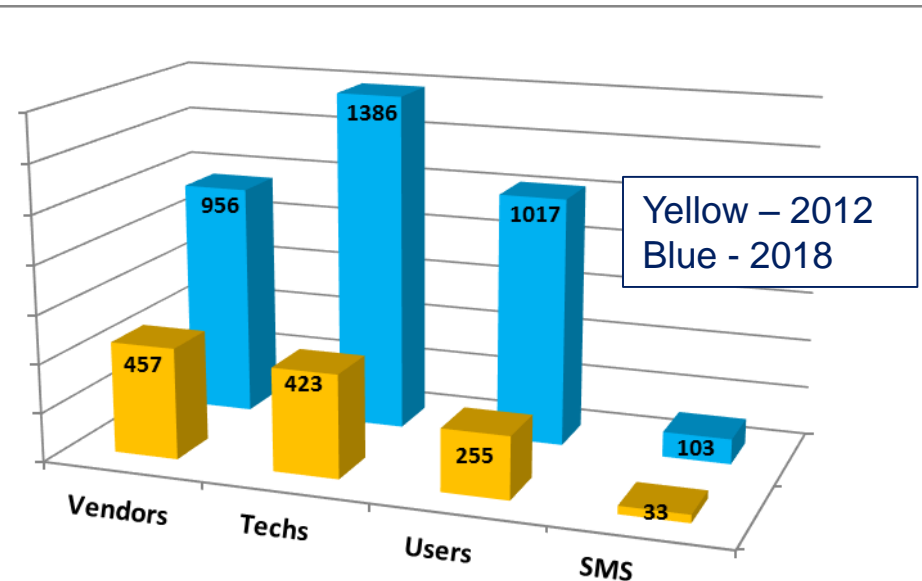




D&D KM-IT Statistics as of May 2018



- 1386 D&D technologies
- 1017 registered users
- 956 D&D vendors
- 195 Hotline questions/solutions
- 103 subject matter specialists



Growth from March 2012 to May 2018

Fully searchable resources – Original sources no longer available

- 169 ALARA Center reports archived (Hanford and SRS)
- 231 Innovative Technology Summary Reports archived

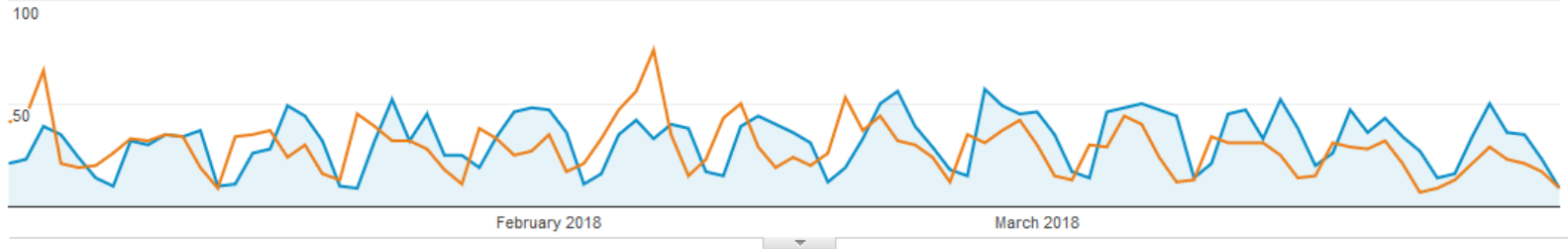


D&D KM-IT Statistics as of May 2018



Jan 1, 2018 - Mar 31, 2018: ● Users

Oct 3, 2017 - Dec 31, 2017: ● Users



Users

10.52%

2,617 vs 2,368



New Users

10.97%

2,589 vs 2,333



Sessions

12.68%

3,136 vs 2,783



Number of Sessions per User

1.96%

1.20 vs 1.18



Pageviews

46.34%

8,666 vs 5,922



Pages / Session

29.86%

2.76 vs 2.13



Avg. Session Duration

24.52%

00:01:50 vs 00:01:28



Bounce Rate

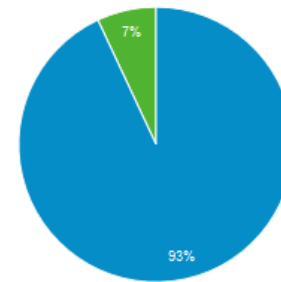
1.37%

78.09% vs 77.04%

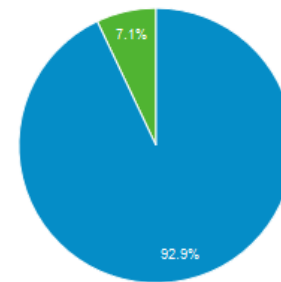


■ New Visitor ■ Returning Visitor

Jan 1, 2018 - Mar 31, 2018



Oct 3, 2017 - Dec 31, 2017





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



Proposed Scope for Year 9

- KM-IT Development and Enhancement
 - Enhance and optimize the web crawler to search and retrieve information related to D&D from identified internet sources/websites
- Outreach and Marketing
 - Participation in industry conferences and workshops
 - Newsletters and mass communications (e.g., online promotion)
 - User support, including requested ad hoc specialized reporting
- Content Management and Data Analytics
 - Publish additional technologies and vendors on the KM-IT platform
 - Update News, Training, Document Library and other sections of KM-IT
 - Google analytics, visualization, server log analysis, and metrics reporting
- Cybersecurity research and testing of KM-IT infrastructure



NEW Task 4 – Analysis of EM Data Using Machine Learning and Big Data Technologies



Proposed Scope for Year 9

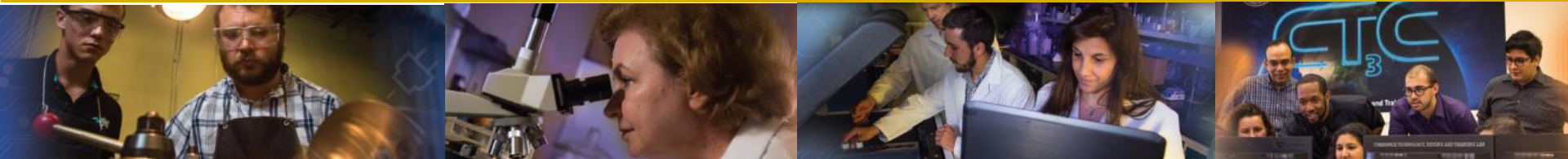
- Investigate specific applications of machine learning and big data technologies to satisfy DOE EM problem sets and challenge areas
- Develop a pilot-scale infrastructure to implement machine learning / big data
 - LiDAR technology will be used on FIU testbed mockups to collect structural image data and then processed/analyzed using machine learning and big data
 - Engage the DOE field sites on related data sets and their decision making needs



Waste Information Management System (WIMS)

www.emwims.org

Dr. Himanshu Upadhyay





Task 1 – Waste Information Management System (WIMS)



Site Needs:

Accurate estimates of the quantity and type of present and future radioactive waste streams is critical to the development of tools to integrate the complex-wide management of LLW/MLLW treatment and disposal. A complex-wide LLW and MLLW database and reporting system is needed to communicate this information to local and national stakeholders and governmental groups.

Objectives:

- Provide a central web-based location to access waste forecast data for sites across the DOE complex
- Provide easy-to-use tools to view the data in various formats
- Update data on an annual basis

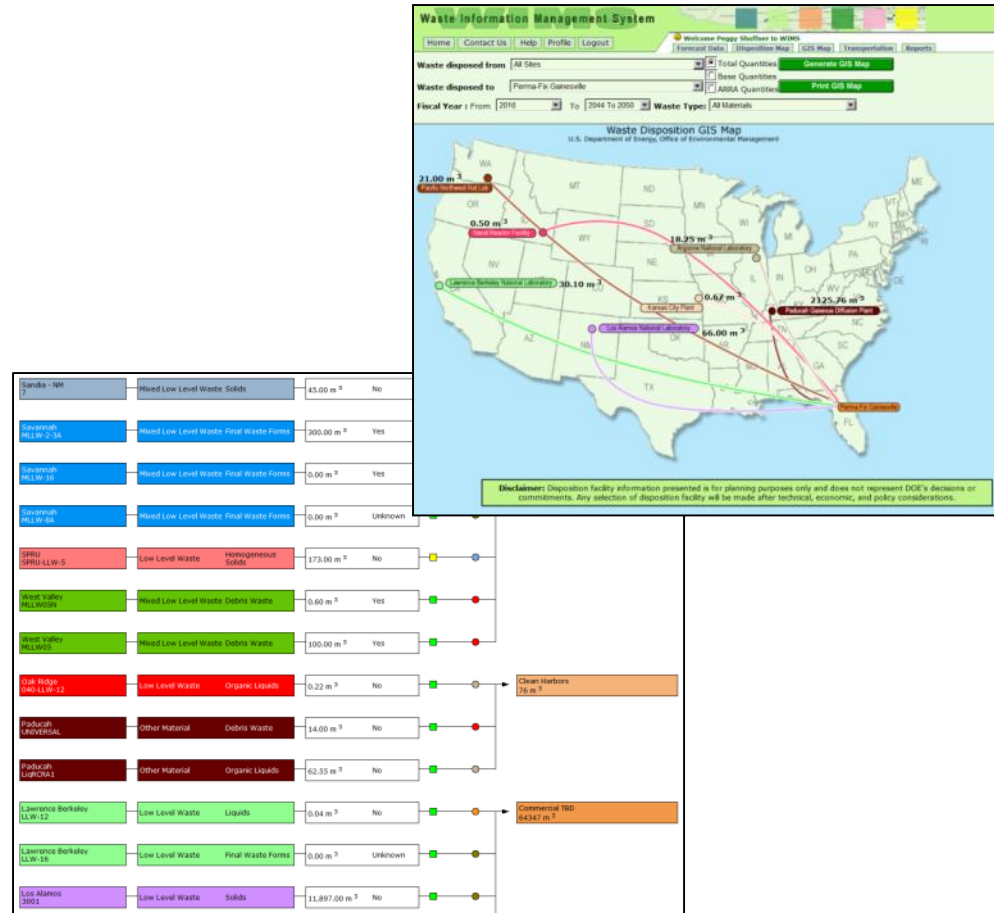


Task 1 – Waste Information Management System



Accomplishments Year 8:

- Completed integration of 2018 waste forecast and transportation data into WIMS.
- **New 2018 dataset launched on public website on May 14.**
- WIMS is deployed and available at <http://www.emwims.org>
- Easy-to-use tool to visualize and understand the forecasted DOE waste streams.



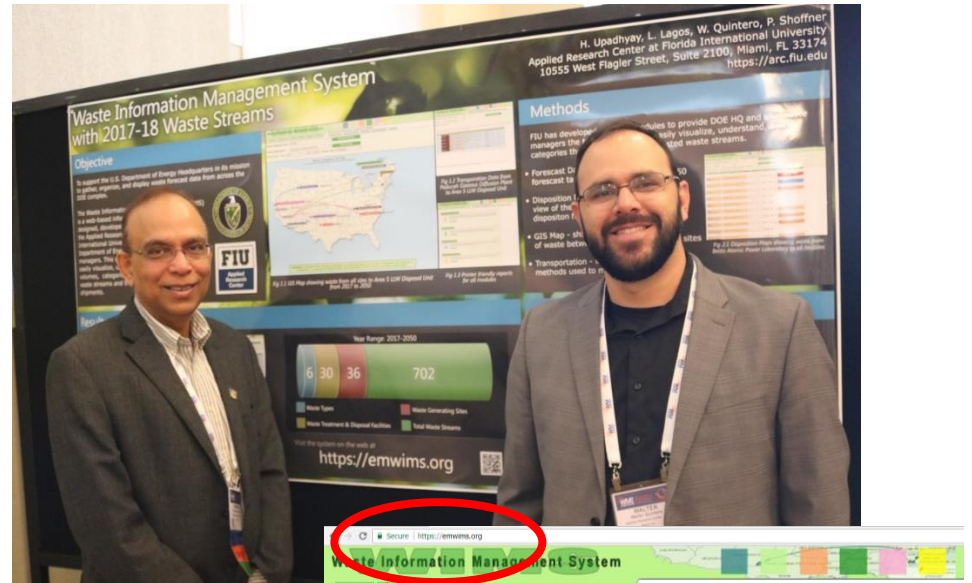


Task 1 – Waste Information Management System

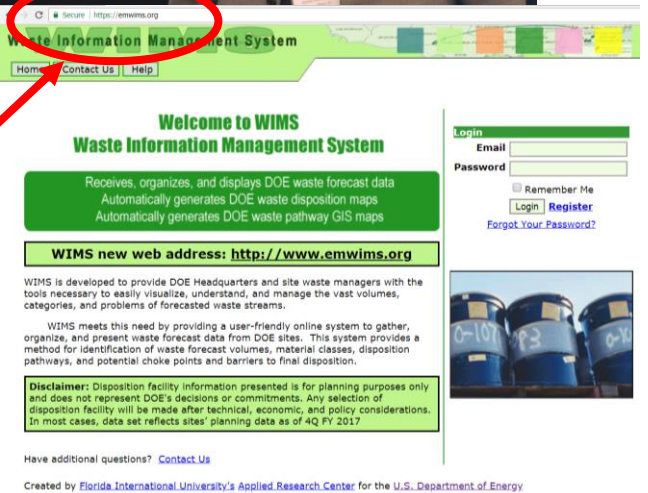


Accomplishments Year 8:

- Presented at WM18.
- Deployed a secure socket layer (SSL) on WIMS for enhanced security to establish an encrypted link to allow information to be transmitted securely.
- Performed cybersecurity, maintenance and administration of the application and the database servers to optimize performance.



https:





Task 1 – Waste Information Management System



Proposed Scope for Year 9

- Integrate annual update of waste forecast and transportation data into WIMS.
- Initiate upgrade of WIMS application framework using the latest Microsoft.Net, Visual Studio, and SQL database server tools.
 - increased reliability and cybersecurity of the system
 - increased efficiency for importing and deploying new data sets
 - improved user experience