DOER
Operations Technologies
Focus Area
Timothy Welp
Objective:
To provide the dredging community of practice with technological solutions to successfully make changes to address both today’s and tomorrow’s challenges.
OT Approach To Meeting Objective

• Identify innovative, or develop where necessary, operations technologies,
• Test these new technologies in locations and situations suitable to evaluate performance in terms of defined metrics,
• Facilitate implementation of well-performing technologies into the dredging community of practice.
OT Structure

• Diffusion of Innovative Technologies (DoIT) Work Unit
• Dredging Technologies and Operations (DTOS) Work Unit
Diffusion of Innovative Technologies (DoIT) Work Unit

• Identifies mature innovative operations technologies that exhibit potential.
• Objectively demonstrates/evaluates these technologies.
• Conducts diffusion activities to foster the successful implementation (adoption) of these technologies.
Dredging Technologies and Operations (DTOS) Work Unit

Where mature technologies are not available, or are not in a form suitable to meet specific USACE dredging operations needs, DTOS conducts research and develops new, or modifies existing technologies, for USACE use.
Diesel Fuel Additive/Alternatives Performance Investigations

• Problem/Purpose
  – Rising dredging costs a function of rising diesel fuel costs.
  – Fuel additives and alternatives available but not objectively tested by USACE.

• Solution/Approach
  – Evaluate additives and/or fuel alternatives performance and use on USACE diesel plants.
  – Optimize USACE fuel management practices.

• Products
  – Diesel fuel additive performance test results report
Sediment Treatment Processes Demonstrations

• Problem/Purpose
  – Limited institutional treatment background
    • Impediment to technical evaluation of proposals
    • Inappropriate & ineffective performance specifications
    • Higher risk = higher cost (what you don’t know CAN hurt you…)

• Solution/Approach
  – Obtain operational information on the SAJ Miami River Dredging project and support/document the SPL Sediment Treatment and Remediation (STAR) Project.
  – Transfer “lessons learned” to the Corps community

• Products
  – DOER Technical Note Miami River Project – Modular Separation and Dewatering Plant and LA STAR Project
Miami River Project
Draghead Modifications and Bed Leveler Studies for TES Protection

• **Problem/Purpose**
  – Draghead and bed leveler improvement recommendations are outlined in several Regional Biological Opinions.
  – USACE has not addressed any further evaluations of dredging equipment for TES protection since the original inception of the turtle deflector in 1994.

• **Solution/Approach**
  – To conduct engineering and biological evaluations with innovative dredging technologies for increased TES protection while minimizing impacts on dredge production rates.

• **Products**
  – Report on Model Bed Leveler Study
  – Contract Specs of “Modified Bed Leveler” equipment
High Resolution Fluid Mud/Residuals Survey System

• **Problem/Purpose**
  – Sounding pole, lead line, and acoustic echo sounding will generally not correlate with one another, or give consistent readings from one time to the next when the same type of instrument is used in fluid mud.
  – This measurement ambiguity has hindered Corps management of fluid mud projects

• **Solution/Approach**
  – Improve USACE capability to more accurately characterize fluid mud and dredging residuals with increased resolution density probe that doesn’t require calibration.

• **Products**
  – TN: World-wide Fluid mud Surveying Systems and Nautical Depth Definitions
  – White Paper discussing engineering feasibility of Corps implementation of a nautical depth policy.
  – High-resolution prototype probe and testing report.
Overdepth Dredging Tools

• **Problem/Purpose**
  – The EPA has raised concerns related to the dredging of material from outside authorized channel dimensions.

• **Solution/Approach**
  – Provide quantitative understanding of overdepth dredging.
  – Provide operations managers with tools to monitor overdepth dredging.

• **Products**
  – Statistical analyses of different dredge type excavation/overdepth accuracies.
  – Hypack overdredge statistics module
  – Peer-reviewed journal manuscript
Hypack Dredge Statistics
(Prototype I)

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<td>Material</td>
<td>Before Dredge Date 03/23/2009</td>
<td>After Dredge Date 03/23/2009</td>
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<td>Dredge Type</td>
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<td>Average Depth</td>
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<tr>
<td>Mean Depth of Nonpay</td>
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Number of Samples

1 Sigma: 1.45
Mean (Before): 3.0
Mean (After): 7.5
Median Depth of Nonpay (After): 7.4
1 Sigma: 0.65
2 Sigma: 1.30

Process Complete
SI Potential for Payment Purposes

- **Problem/Purpose**
  - Bin measure data currently obtained for payment or QA calculations is manually collected.

- **Solution/Approach**
  - Improve the USACE procedures and data accuracies for dredging contract QA and, if feasible, payments through use of SI data.

- **Products**
  - White Paper – SI Hopper Measure Potential as a Contract Payment Basis
  - Evaluation of historical SI data for potential payment report

Ullage Sensor Evaluation
Onboard GLDD Hopper
Dredge *Terrapin*
CE-Dredge

• Problem/Purpose
  – Dredging information and data are stored in multiple databases, servers, and desktops in multiple formats.
  – Information is difficult to access, visualize, and analyze in a timely manner.
  – Access to regional & national information is very limited.
  – Redundant data entry for multiple uses

• Solution/Approach
  – Provide a single, integrated, web-based system for the management, archival, access, and visualization of regional and national dredging related data and information.
  – Standardize formats, tools, methods, and procedures.
  – Improve forecasting budgets, schedules, and future volumes, capacities, and needs for dredging and disposal facilities.

• Products
  – Design Documentation, Phase I
  – CE-Dredge Application Launch Pad
  – Dredging History Database Application Phase I: Summary Reports, Online Mapping, Disposal Area Management, Sediment Sampling
  – Survey management tools, Phase I
  – Link to DIS, SI databases
  – Website, manual Phase I
Pipeline Dredge Selection and Dredge Material Placement Screening Tool

• **Problem/Purpose**
  - Evaluation of different placement sites and optimization of hydraulic pipeline dredge size and necessity of booster pumps requires labour intensive tedious calculations.

• **Solution/Approach**
  - Develop pipeline analytical program
  - Rules-based scheduling application
  - Graphical user interface

• **Products**
  - Desktop software (beta version) analyzing pipeline dredge projects
  - Accompanying draft user's manual
DoIT Website

Diffusion of Innovative Technologies (DoIT)

What is the Diffusion of Innovative Technologies (DoIT) Work Unit?
Historically, there has been no programmatic or systematic approach to demonstrating, evaluating, and communicating information on new (innovative) dredging technologies in the U.S. Army Corps of Engineers (USACE) dredging program. The Diffusion of Innovative Technologies (DoIT) work unit of the Dredging Operations and Environmental Research (DOER) program identifies mature innovative technologies that exhibit potential to improve the USACE capacity to achieve its navigation dredging mission, objectively demonstrates/evaluates these technologies, and conducts diffusion activities to foster their use by the dredging community. Candidate technologies can consist of either an object, practice, or idea (e.g., new types of dredging equipment, construction methods/techniques, software, surveying methods, tools, and contracting methods).

How Does DoIT Operate?

Innovation identification:
There are several ways the DoIT work unit identifies innovation technologies; active and passive.

DoIT active steps for identifying innovative technologies include:
1. Making contact with industry by holding “topic specific” as well as general forums for groups that have innovative dredging technologies.
2. Contacting other agencies (government and non-governmental) that have similar needs and, therefore, possibly similar innovative ideas that are being practiced by them or that have been submitted to them.
3. Conducting periodic literature reviews (at least two times per year) for

YOUR INPUT

- What needs do you see in these areas?
  - Identifying, demonstrating, and evaluating innovative technologies
  - Tools to address dredging operations needs