

Engineering With Nature

**Enabling Efficient and Sustainable
Delivery of Benefits Through Optimal
Alignment of Natural and Engineering
Processes**

August 30, 2011

Presented to: SWG

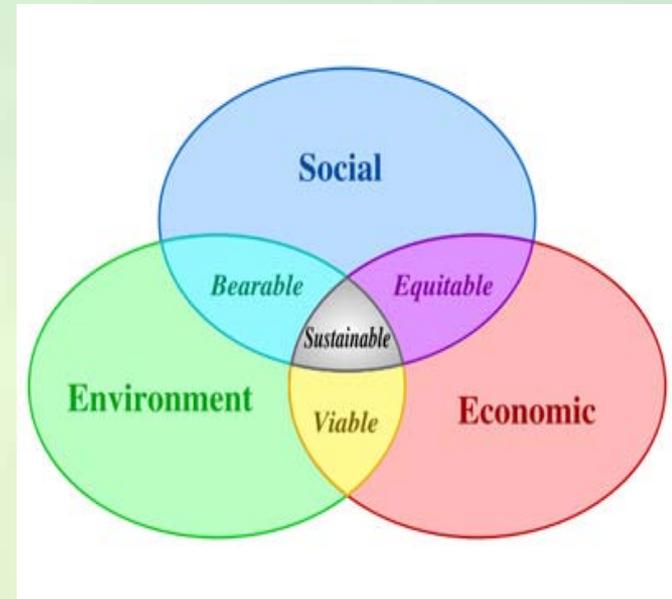
Presented by: John Childs

Original presentation created by: Todd Bridges

The Challenge

The Status Quo is Not An Option

- **USACE needs an efficient, cost effective way to achieve its missions, while simultaneously producing environmental and social benefits.**
- **We need to do this in a way that fosters collaboration and cooperation with our partners and stakeholders – Ports, commercial interests, EPA, NOAA, FWS, NGOs and others...**
- **... While building respect and credibility for USACE.**



Definition

- ***Engineering With Nature*** is the intentional alignment of natural and engineering processes to efficiently and sustainably deliver economic, environmental and social benefits.

Context

- ***Engineering With Nature* calls for an ecosystem approach whereby USACE (in collaboration with our partners and stakeholders) seeks to understand and use natural processes to achieve a broad range of objectives within an aquatic systems project.**
- **An *Engineering With Nature* strategy for USACE will enable our navigation infrastructure development efforts to provide economic, environmental and social benefits – producing a “triple win”.**
- **EWN is consistent with and advances the USACE Environmental Operating Principles.**

Engineering With Nature

Guiding Principles

- ***Engineering With Nature* is:**
 - » **A holistic, ecosystem approach for planning, designing, constructing and operating projects.**
 - » **Focused on the long-term sustainability of the project and it's benefits stream over time within the system.**
 - » **Based on first understanding, then working deliberately with natural forces and processes to accomplish engineering goals.**
 - » **Collaborative. It calls for effective stakeholder engagement from the initial stages of a project, through its completion.**
 - » **Efficient and cost effective, reducing time and rework, while minimizing social friction.**
 - » **Aligned with the values, interests and priorities of USACE, partners, stakeholders and society at large.**
 - » **Provides a comprehensive framework and approach for pursuing effective beneficial use of dredged material**
 - » **The right thing to do – socially, environmentally and economically.**

Engineering With Nature Vision

- **Starting in 2011, we will demonstrate this vision in action within our Navigation Program by working for increased environmental, economic and social value at the local, regional and system levels**
- **By 2017, all of us at USACE will be working in a way that demonstrates the principles and progression of *Engineering With Nature* in everything we do.**

Engineering With Nature: *The Progression*

Inputs and Outputs *'Degree of'*

System Resilience

Efficiency

Benefits Related to the Project

Outcomes

Inputs

Communications and Technology Transfer

Technical Understanding

Innovation and Creativity

Diversity of Skills and Expertise

Stakeholder Engagement



Business
as Usual

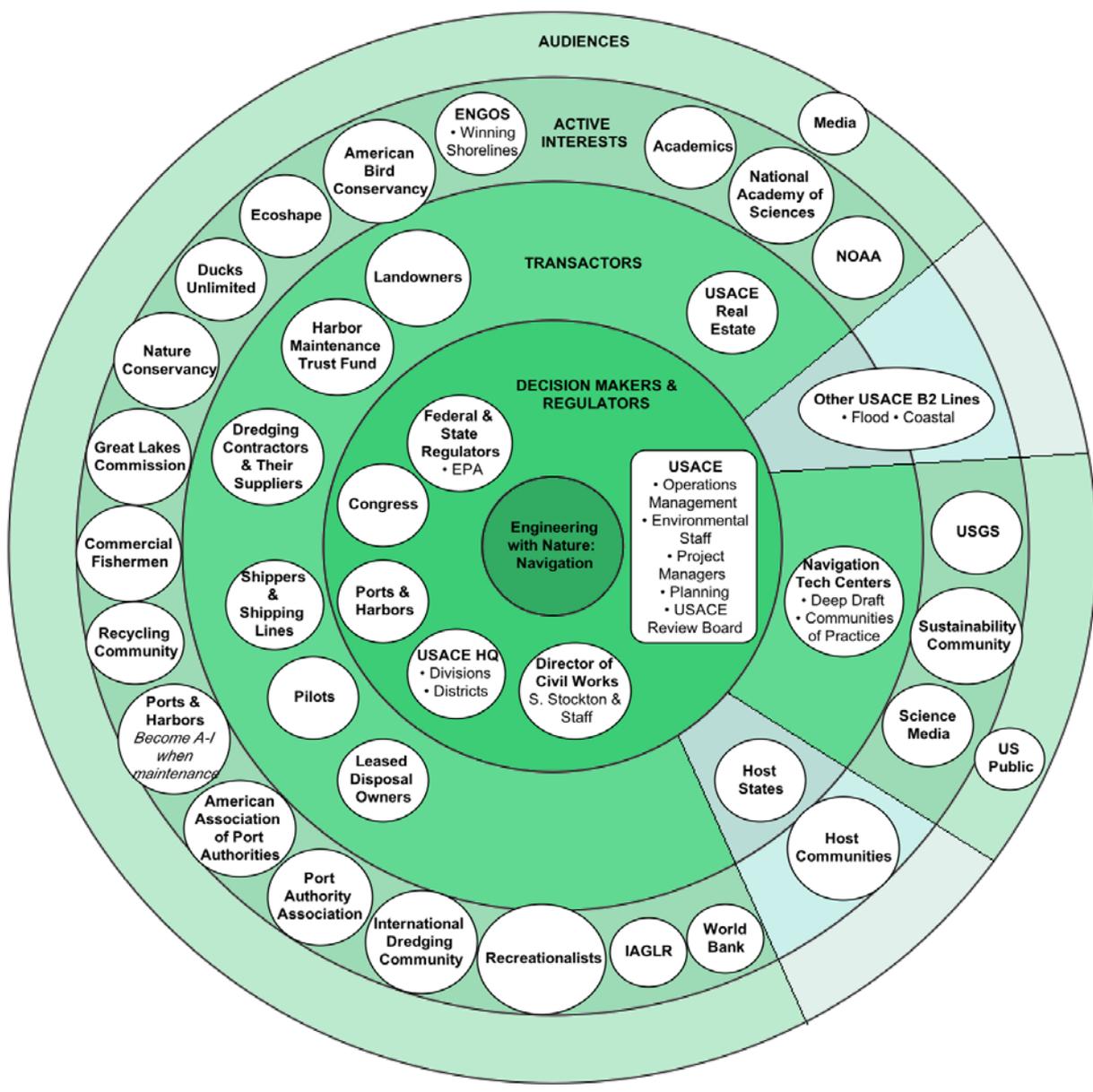
Understanding
Natural
Processes

Aligning
Processes

Expanding
Benefits

Enabling
Self-Sustaining
Benefits

Draft Engineering With Nature – Navigation -- Stakeholder Map



Decision Makers / Regulators: Stakeholders who have direct decision-making or regulatory authority.

Transactors: Stakeholders who are most affected by decisions regarding navigation and have some transaction (e.g., financial) in the decision-making process.

Active Interests: Individuals or groups who have a stake in navigation, but are not directly involved in the decision-making process.

Audiences: Individuals or groups that may have an interest in navigation, but are not directly affected by nor involved in the decision-making process.

Engineering With Nature

Path Forward

Over the next 5-7 years, we will implement *Engineering With Nature* in our navigation and dredging operations in three strategic waves:

- 1. Build our base of support within USACE and with key external stakeholders through dialogue on EWN principles and opportunities.**
- 2. Focus R&D investments to expand technical and social science capabilities required for successful EWN.**
- 3. Demonstrate the EWN approach through concrete case examples, which we will communicate broadly.**
- 4. Establish USACE leadership on EWN, while expanding our reach, capacity and evolution through a range of EWN applications.**

Wave 1 – EWN R&D Requirements

- **Over the next year, we will focus our R&D investments to expand our capabilities by:**
 - » **Improving modeling and engineering capabilities for characterizing and using natural processes over the long term.**
 - » **Defining informed processes, methods, tools and training to enable collaborative and constructive communications, action and outcomes among stakeholders.**
 - » **Developing multi-objective system models and decision criteria frameworks.**
 - » **Developing multi-metric benefits assessment tools.**
 - » **Supporting structured demonstration and pilot projects.**

Beneficial Uses & Engineering with Nature

- **Problem**

Navigation infrastructure is infrequently designed to serve both navigation and environmental objectives. Opportunities and challenges for changing the status quo need to be identified.



Objectives

Identify ways in which USACE can increase the integration of environmental enhancements into navigation infrastructure projects

Information Dissemination

ERDC/EL TR-11-X

Environmental Laboratory



**US Army Corps
of Engineers®**
Engineer Research and
Development Center

Environmental Enhancements and Navigation Infrastructure: A Study of Existing Practices, Innovative Ideas, Impediments, and Research Needs

Thomas J. Fredette, Christy M. Foran, Sandra M. Brasfield,
and Burton C. Suedel

April 2011



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Existing Practices, Innovative Ideas, Impediments, and Research Needs for Environmental Enhancements and Navigation Infrastructure

*by Thomas J. Fredette, Christy M. Foran, Sandra M. Brasfield,
and Burton C. Suedel*

PURPOSE: The concept that navigation infrastructure can serve as valuable habitat is not novel. However, the concept of designing navigation infrastructure with the specific intent of accomplishing both the engineering goal and specific environmental goals is, in most instances, a new idea for many planners and designers. The inclusion of environmental enhancements in navigation infrastructure represents both opportunities and challenges for project managers. The purpose of this document is to present an overview of the advantages, while addressing some of the implementation challenges, as seen by the current planning and engineering contingents. This study sought to (1) identify existing and potential navigation project features that were designed with the express intent of enhancing environmental benefit; (2) identify laws, regulations, and policies (formulation boundaries) that both support and hinder such design features; (3) identify opportunities for increasing environmental benefits for navigation projects within existing formulation boundaries; (4) propose potential changes to formulation boundaries that would further increase opportunities for environmental benefits; and (5) identify potential areas where research may increase the opportunity to integrate environmental features into future projects.



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