Deepwater Horizon Incident Response: Actions and Expectations

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"Alternative Response Technologies"

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Alternative Response Technology Overview

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BP - Gulf Coast Restoration Organization

Deepwater Horizon MC252 Incident

ART - Outline

- ART program and organization description
  - Timeline of key events during the response
- ART "triage process" for evaluating technology
- List of Successful Technologies field tested
  - Example Technology Successes deployed
- Future Plans & Summary

Statistics on Ideas

Total	**123,000 individual ideas**		
Subsurface well issues		80,000	
Spill Control		43,000	
Within Spill Control			
Ideas worth considering		**470**	
Remediation		170	
Booming, skimming, sorbents, sand cleaning, mechanical, etc			300
Formally evaluated or tested in Field		**100**	
Significant Use		**> 30**	

NOTE: PSE (Product, Services & Equipment), a separate database containing ~57,000 entries for existing & established capabilities created

ART Program Sponsor and Objectives

- Sponsor: Unified Area Command (UAC)
- Objectives: Evaluate use of new, improved and emerging technologies to address operational needs
  - Establish a system to gather & categorize new ideas
  - Evaluate & rank technologies within categories
  - Prioritize technologies to address operational needs
  - Conduct tests and provide feed-back to Command
  - Coordination with Federal Interagency Alternative Technology Assessment Program (IATAP)

ART Success Measures
Area Commander, June 2010

- **Material** – will it make a real difference in terms of capability or result?
- **Scalable** – can it be used across the response effort?
- **Timely** – can it be used now?
- **Viable** – is it realistic to believe it will work soon?

ART Timeline

April 20	Deepwater Horizon MC252 Incident begins
April 27	Houston Call Center
April 30	Database
May 2	ARTS representative at ICP Houma
May 3	Houma/Houston teleconferences (3X/week) begin
May 20	High Interest Technology Testing Strike Team
May 25	Initial sorbent boom field testing
June 4	IATAP announcement
June 23	Biological & Chemical Technology Strike Team
July 15	Well flow stopped
Sept 30	Comprehensive ART interim report issued
Oct 4	ART Transition to BP Gulf Coast Restoration Org

ART Organization

- ART Houston: Management, Support and Coordination
- High Interest Technology Team (HITT): Field Testing
- Strike Teams as needed: Evaluations & Field Testing
- Liaison/Coordination positions: Houma ICP and Mobile ICPs, Unified Area Command & Interagency Alternative Technology Assessment Program (IATAP)
- Experts from various organizations
  - BP
  - USCG
  - NOAA
  - OSPR
  - EPA
  - Other organizations, Consultants and professional responders

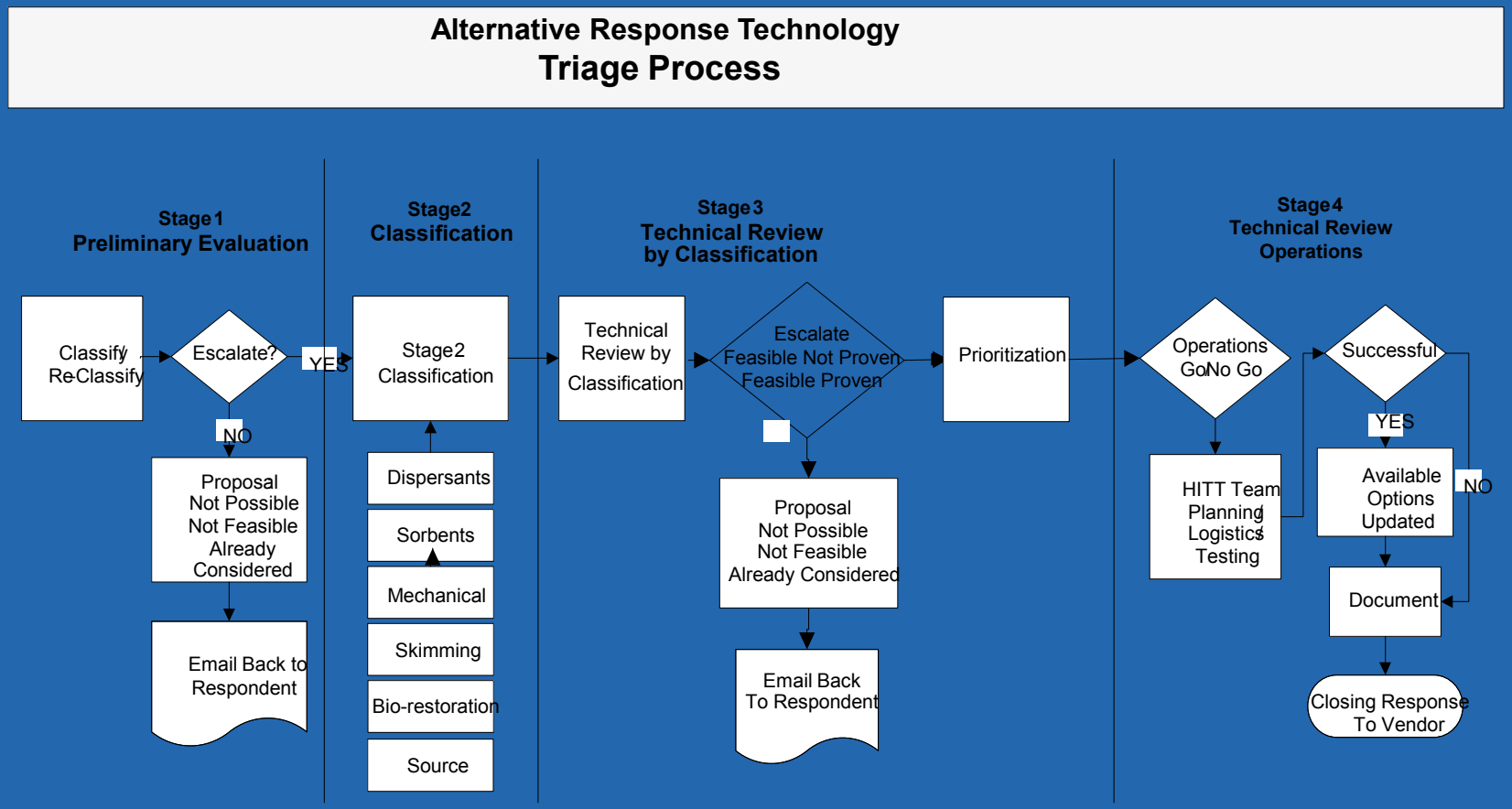
Sources of Ideas

- ART database (direct submission on internet or thru BP call center)
- Operations & field-derived
- “Open House” Meetings held at parishes
- Louisiana Business Emergency Operations Center
- Public Information Emergency Response (PIER) System used before deployment of the ART database

All ideas entered into ART database for tracking/scoring

Ideas came from over 100 countries

Four Stage Comprehensive Evaluation of Ideas



ART - Booming, Skimming, Separation

ART – Sand Cleaning

Evaluated Technologies Used During Response – 1 of 2

- **Big Gulp Skimmer: over a million gallons of oil/water recovery**
- Low Pressure Marsh Flusher – cleaned 15 miles of Barataria Bay oiled marsh
- **Water Curtain at Pensacola Beach: operated without impacting vessel travel**
- Ocean Therapy oil/water separators – 32 ordered and put into service
- **Heavy Oil Skimming System (HOSS) – invented by a boat captain and adopted widely (100 manufactured)**
- Silt Fence Barrier – 30 miles installed protecting shorelines in MS and AL
- Rigid Boom - Over 3 miles installed in Pass Abel, Barataria Bay
- **Boom Blaster cleaning system (using "car wash" concept) operated at Grand Isle**
- Yates boom cleaning system (using "dishwasher") with assembly line like transport system in use in Biloxi – processing over 15,000 feet of boom a day

Evaluated Technologies Used During Response – 2 of 2

- **Sand Shark' beach cleaning device developed and five deployed**
- Industrial Mobile Sand Cleaners used:: Ozzies, two Beach Tech models (six machines used at Horn Island) and two Cherrington models (Grand Isle)
- 3 Gravely sand cleaners in use – Grand Isle State Park, Fourchon LA, & Ala.
- Sand Cleaning MI Swaco System being used at Grand Isle with capacity of 1 million pounds of sand per day
- "Current Buster" Skimming System for collecting and retaining oil at towing speeds up to 4 knots
- Boom Vane – a fast water-oil boom deployment system
- Degreaser by Chemstation for cleaning vessels and equipment with encrusted heavy oil
- Ergonomic Beach Cleaning Tool for scooping tar balls from beaches
- **Wave Glider (Advanced Unmanned Water Quality Monitoring Vehicles) by Liquid Robotics deployed in Gulf of Mexico**
- Opflex buoyant open-cell foam – 2 million square feet utilized (mix of boom, pads, pom-poms, etc.) in LA in the marshes

Big Gulp Skimmer

- Concept
  - Recovering the oil from the surface, offshore, close to the source
  - Fixed weir skimmer, mounted on barge, towed by two boat
  - Mechanical aspects, monitoring, water and oil phase handling well defined
  - Competitive with more complex and expensive skimmers
- Proving/Testing
  - Evaluated on 19 July 2010
  - Put into service early in the event, as a critical resource
  - Deployed in Louisiana, offshore
  - Over a million gallons of oil and water recovered (mostly oil)
- Origin
  - LAD Services; Lance DeHart

Heavy Oil Skimming System (HOSS)

- Concept
  - Collect Heavy Oil or Tarball near shore –reduce onshore impact
  - Aluminum frame equipped with netting, pulled by shrimp boats
  - Earlier called as Heavy Oil Recovery Device (HORD) (or Tarball Recovery Device - TRD)
- Proving/Testing
  - Concept tested and deployed; all ICs are pursuing
  - One boat collected two tons during testing
  - Manufactured in quantity
- Origin
  - Gerry Matherne, a responder from Florida

Boom Blaster - Boom Cleaning Machine

- Concept
  - Car washing machine idea
  - Rinsing, adding citrus cleaner or other detergent, scrubbing, pressure washing, and then rinsing again
  - Six oscillating nozzles power wash the boom with a max pressure of 2700 psi and water temperature of 180 degree F
  - Machine can operate continuously, 24-hrs a day and requires 5 personnel to operate
  - Designed capacity under ideal condition 600 feet of boom/hr
- Proving/Testing
  - Evaluated on 14 July 2010 and 19 Aug 2010 at Grand Isle Staging Area
  - Several ideas proposed to further improve the efficiency of cleaning boom
- Origin
  - Gulf Coast Environmental Resources, LLC

Sand Shark 3000 LeeBoy for Beach Cleaning

- Concept
  - Beach Cleaning by mechanical means without using any chemicals
  - LeeBoy 3000 originally designed as a material loader for the paving and road maintenance. Extensively modified.
  - Uses 2 mm sieve for removal of contaminated material.
- Proving/Testing
  - Comparable tests were performed at the Eglin Air Force Base in Fort Walton Beach, FL
  - Tested Sand Shark 3000, Ozzies OPP-200, Beach Tech 2000 & 3000, Cherrington 4600 & 5000.
  - Reduced contaminated material from 100 ppm to less than 10 ppm, tested for 12" sand c
- Origin: BP

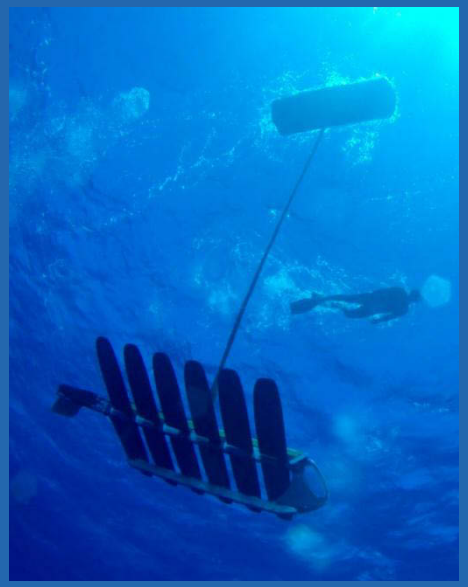
Contaminated Beach Example

Sand Shark Cleaned

Material (oil) recovered

Wave Glider for Monitoring of Water Quality

- Concept
  - Constant monitoring of water quality by satellite-controlled, unmanned vehicles
  - Energy self-sufficient and autonomous: Vehicles propulsion power from wave action and solar power for electronics
  - Provides water quality (detection of oil in water, dissolved oxygen); marine mammal vocalizations; and water temperature
- Proving/Testing
  - First prototype built in 2005 by Liquid Robotics in Silicon Valley, California
  - Used by Government/Military, Scientific/Environmental and Industries
  - Further development and testing in progress
- Origin
  - Roger Hine, President of Liquid Robotics



Coda Octopus Sonar for Submerged Oil Detection

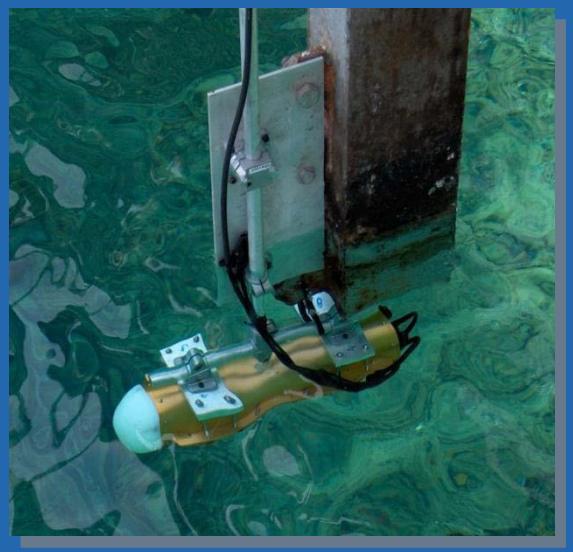
- Concept
  - Sonar to detect solid tar mats or dense locations of tar balls on the sea floor
  - U.S. Coast Guard used for detection of divers/underwater intruders and other underwater searches
  - Runs at 375 and 610 khz – frequencies not harmful to sea life
- Proving/Testing
  - Coda tested by Coast Guard in a facility (Ohmsett, NJ) during 2009 and observed to detect oil in clear water conditions
  - Tested with EIC Oscar prototype in water depths from 3 to 33 ft. Testing in Coast Guard Fire Safety Test Facility; Mobile Bay Area, AL; Dauphin Island and Katrina Cut; Fort Morgan and Mobile Point
- Origin
  - US Coast Guard R&D Center, Coda Octopus Products Inc

Coda Sonar Head

Coda & Oscar on vessel

Laser Fluorometer: for Oil Detection – EIC Oscar

- Concept
  - Uses laser fluorescence polarization (FP) to detect sunken heavy oil in the sea floor or water column
  - Remotely operated FP sensor can be deployed underwater to a depth of 1500 meters, can detect oil at a standoff distance range of 1-10 meters
- Proving/Testing
  - EIC Oscar prototype tested in water depths from 3 to 33 ft. Testing done in Coast Guard Fire Safety Test Facility; Mobile Bay Area, AL; Dauphin Island and Katrina Cut; Fort Morgan and Mobile Point
  - EIC Oscar works best when coupled with the sonar based Coda Octopus and a fish finder for detection of subsurface oil, tar, and tar particles.
- Origin
  - Job Bello, EIC Laboratories, Inc.



Future Plans

- Continuing BioChem Strike Team Projects
  - LSU lab tests, field tests
  - Possible testing of other agents thereafter
- Remainder of the feasible ideas to be addressed by:
  - Gulf Coast Restoration Organization (GCRO) as part of its ongoing spill response R&D program, or by
  - BP's Drilling and Completions Technology Group for source related submissions

ART Program Lessons - Organization

- Team should report to UAC be part of the ICS
- Need defined roles and accountabilities for planning & project management
- Need experienced responders & agency reps (USCG, NOAA, OSPR)
- Establish HITT Teams in ICPs for field testing purposes
- Establish alignment with ICP Operations Section for take-up of new proven/recommended technologies
- Establish a tracking tool for take-up of new technologies
- Establish and implement an external, pro-active communication strategy and promote successes

ART Program Lessons - Process

- A single database should be used for the public to submit ideas
- Submission format & minimum required info level should be established
- Database should have an effective “search” engine
- A 4 Stage review and testing process should be established
- Develop a scoring system that considers ability to test and “fit” with current spill recovery operational needs
- Include a communication mechanism for informing submitters

Summary

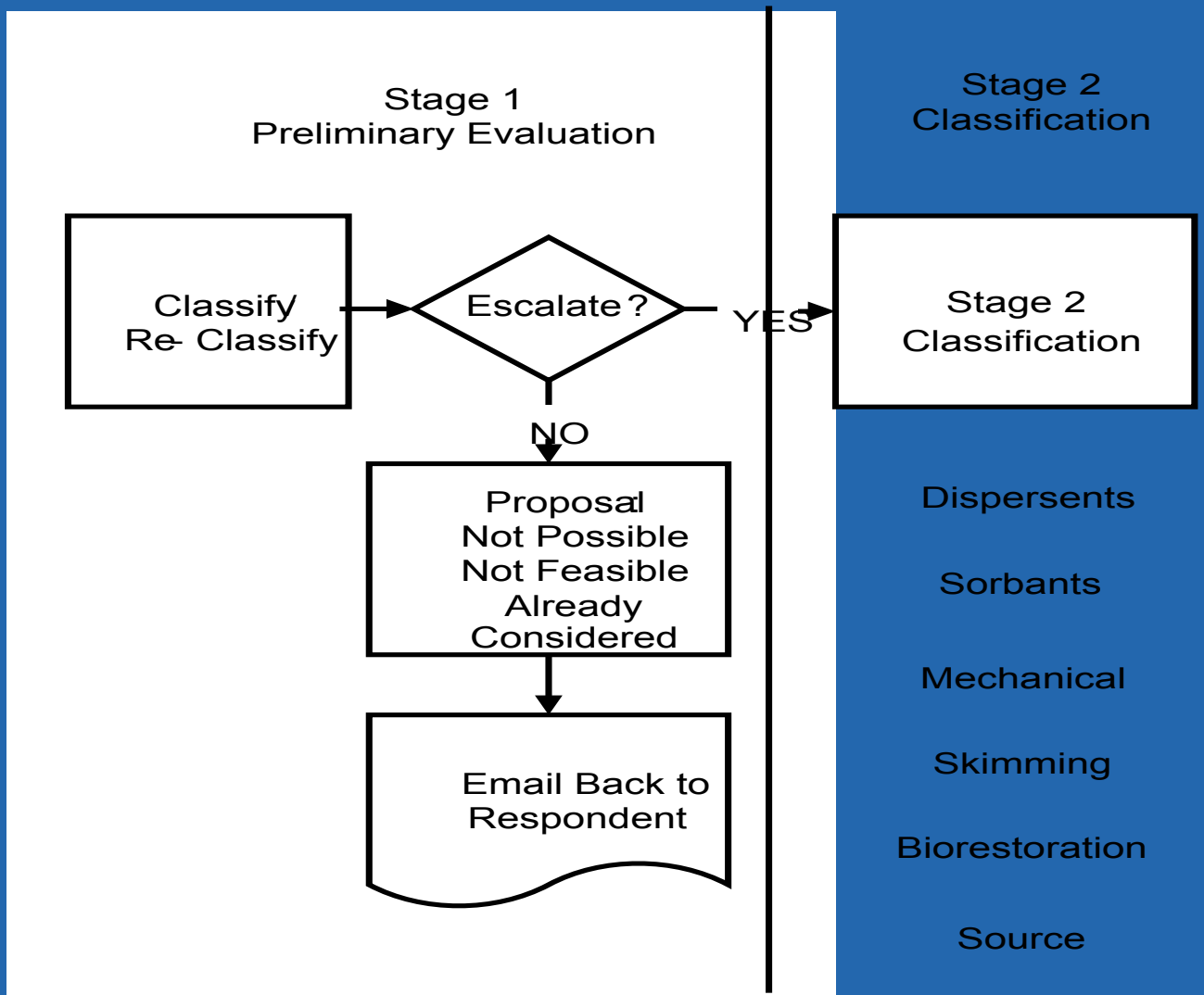
New approach for Alternative Response Technology:

- **Inclusive process** for capturing ideas real time mostly via internet
  - Leveraged public's ingenuity & entrepreneurial spirit.
- **Collaboration** of technical experts from diverse organizations
  - BP, USCG, NOAA, OSPR, EPA, other organizations, consultants,
- **Comprehensive process** used for selecting ideas for evaluations/testing
- **Many successful ideas** recommended to the UAC
- **Significant impact** from evaluated technologies

Backup Slides

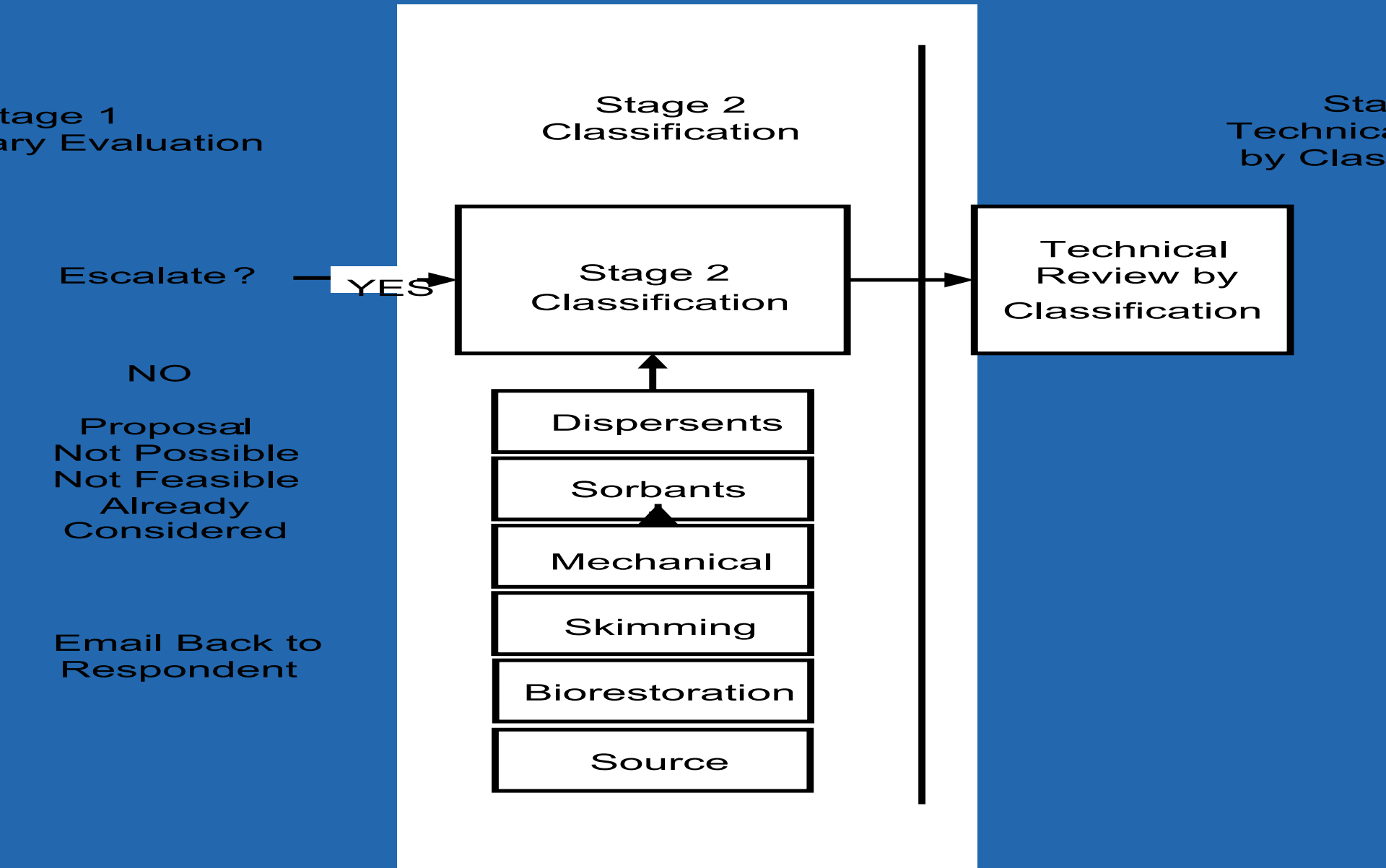
- Triage Process

Triage Process: Stage 1 - Preliminary Evaluation

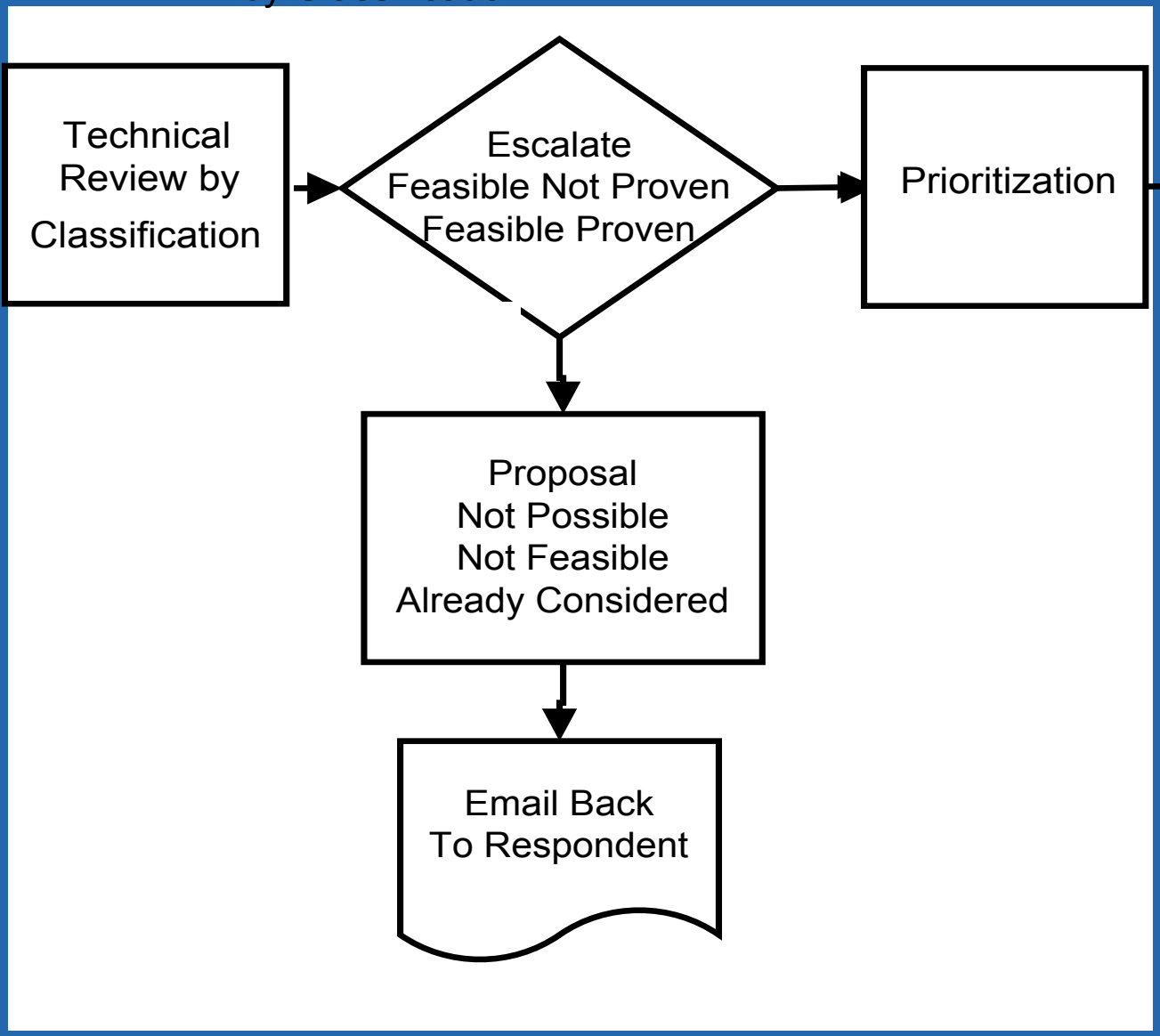


Alternative Response T
Triage Proces

Triage Process: Stage 2 - Classification

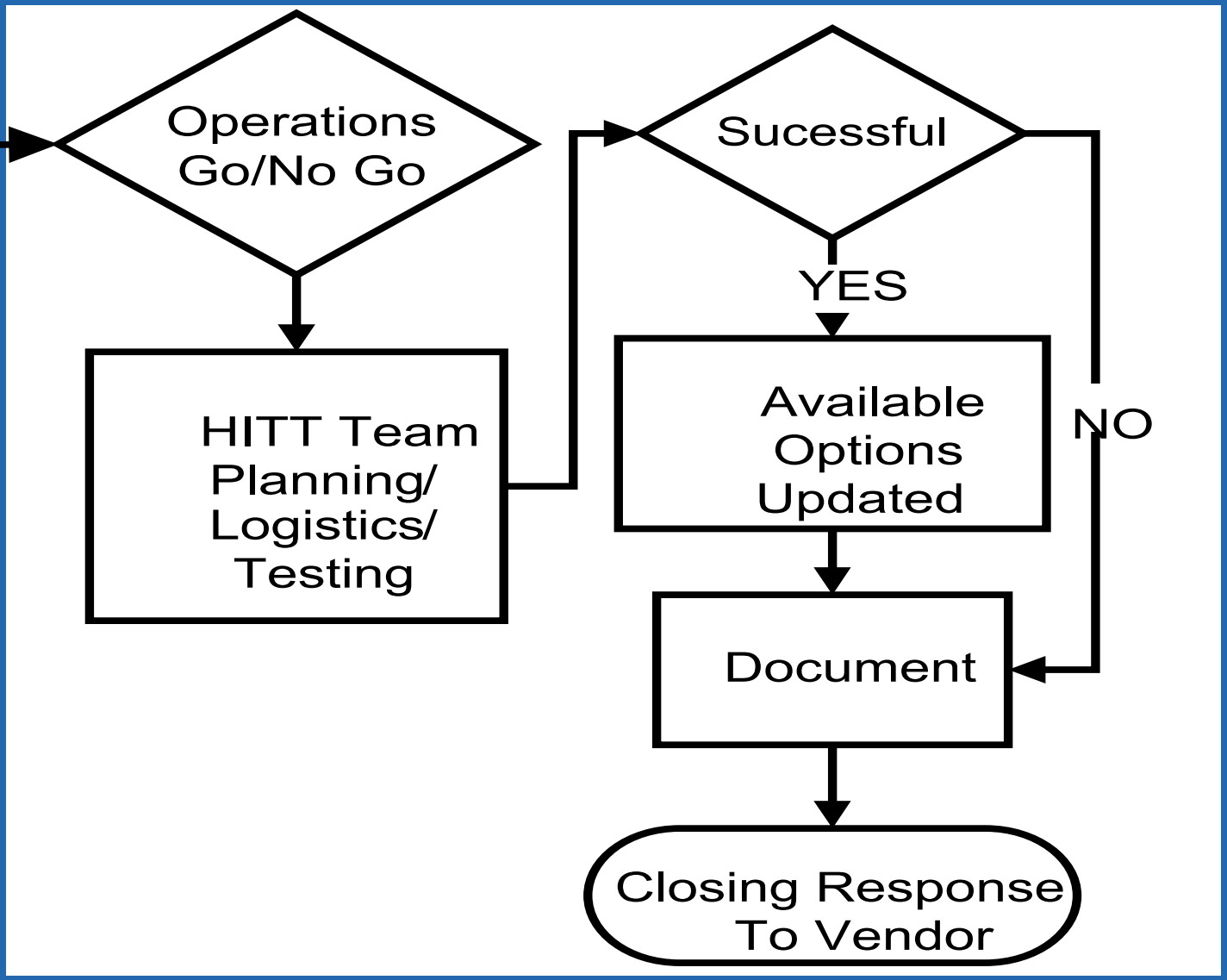


Triage Process: Stage 3
Technical Review by Classification



Stage 4
Technical Review
Operations

Triage Process: Stage 4
Technical Review by Operations



List of Recommended Items (Successes)

- Offshore
  - Laser Fluorometer Submerged Oil Detection (Oscar)
  - Coda Octopus for Submerged Oil Detection
  - Big Gulp Skimmer
- Near Shore
  - Tarball Net and Test Net
  - V2 Vyper Platform for Marsh and Shallow Water Skimming
  - Parachute Surf Skimmer
  - Helicopter Boom Removal
  - Yates Boom Cleaner
  - Boom Blaster (Boom Cleaning Machine)
  - Opflex Buoyant Open-cell Foam
  - Low Pressure Marsh Flusher
  - Amphibious Tool Carrier (Truxor DM 5000)
  - WaterCurtain(Do2E Wastewater Treatment)
  - Oil/Water Separation: Ocean Therapy Solutions
  - Bio Based Absorbent (Nature's Broom) - oil cleaning on beaches/marshes
  - Bio Based Absorbent (Nature's Broom) - decon/cleaning procedures
  - Heavy Oil Skimming System (HOSS)
  - Silt Barrier Fence (X-Tex®)
  - Eco-Barrier Trinity Fence
  - RAT (Rapid Attack Tactic) for Skimming
- Onshore
  - Bio Energy Gasifier
  - Green Earth Sand Cleaner
  - Petromax Sand Wash
  - M-I SWACO Sand Cleaning
  - STS-101 Solids Washing
  - Eco-Oil Vortex (Beach Sand Washer)
  - Gravely Sand Cleaner
  - Ergonomic Beach Cleaning Tool (EZ-Zacks)
  - Sand Shark 3000 LeeBoy for Beach Cleaning
  - Ozzies OPP-200 for Beach Cleaning
  - Beach Tech 2000 & 3000 for Beach Cleaning
  - Cherrington 4600 & 5000 for Beach Cleaning
  - RECOVERIT from GOLF Energy Service
  - Clean Beach Technologies, Inc (Beach Restoration System™)
  - Chemstation Degreaser
  - Biomass Based Sorbent (Show Me Energy)
  - Field Analytical Methods (SiteLab Corporation)
  - REUSE recycling