Spill response for the future

Part I: Strategies for development

Development trends in private oil spill contingency

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Oil spill response technology
Status

- Substantial theoretical knowledge is gained through decades of R&D addressing various aspects of oil spill response.
- Exercises and accidental releases have clearly demonstrated both possibilities and constraints related to available response methods.
- Within a tight and well defined operational envelope, today's oil spill response systems perform well. Outside this envelope, performance often decrease rapidly.
- Considering available oil spill response equipment for off-shore & coastal response and shoreline clean-up, the gap between theoretical knowledge and the technological level in hardware offered by the industry has increased.

In 2009, NOFO and NCA defined 18 technological challenges addressing this gap. More than 170 whitepapers were submitted and 20 projects are now part of the NOFO/NCA technology development programme
Oil Spill Response 2010.

Our technological and operational challenges

- Operations in low light and reduced visibility conditions
- Operations in strong currents and high sea states
- Operations in areas with limited infrastructure (transport, services)
- Operations in low temperatures (icing, safety for personnel)
- Oil exploration closer to coastlines, more emphasis on coastal and shoreline operations
- To improve dispersants *application* technology
- Remote sensing, data fusion and data flow management

How we will improve oil spill response capacity and efficiency

1. We have to ensure that oil spill response systems always overlap areas of combatable oil thicknesses in «time and space (location)».
2. We should work with forces of nature, not fight them.
3. We need optimalisation of each link in the oil spill response chain (detect>map->focus–>collect–>recover/disperse->separate->store->dispose)
4. We want to improve (further develop) existing response systems.
5. We must make sure to stay inside operational envelopes at all times (Boom management/monitoring systems, dispersant application dosage &monitoring etc.)
6. Two-boat operations -> 1 boat systems

NOFO wants:

- Response organisations to define operational and technological objectives
- Manufacturers/service providers to submit proposals to responders
- Manufacturers/service providers to co-operate with research institutions.

In the Oil Spill Response 2010 program , we seek commitment through risk sharing, - the potential gain should be mainly through future sales of a product or service. New industry and service providers are encouraged to join the oil spill response community.

The " Oil spill response 2010 " announcements

Phase 1: Concept development 2009 -10

A: Oil recovery-tecnology (Pri 1)	B: Dispersant application	C: Remote sensing	D: Coastal and shoreline operations
A1: Off-shore oil recovery system (pri 1)	B1: Application inde-pendent of today's application principles	C1: Oil detection from ship by use of radar	D1: High capacity granulate application on beaches
A2: Oil recovery management system	B2: Application based om today's application principles	C2: Infrared remote sensing from ship	D2: Mechanical oil recovery in shallow waters
A3: Tactical situation plot in OP command	B3: Automatic oil detection and dosage	C3: Ship-based real-time plot of oil pollution at sea	D3: Protection of fish farms etc.
A4*: Oil spill recovery, open class	B4: Application in coastal waters	C4: Remote sensing of dispersed oil	D4*: Coastline and shoreline operations, open class
		C5: Innovative platforms for remote sensing	
		C6*: Remote sensing, open class	

Typical funding:

- **33% from the industry (contract holder)**
- **33% from NOFO and NCA**
- **33% from R&D funds**

** Threshold for project acceptance is higher for open class tenders.*

List of projects - Oil Spill Response 2010

No.	PROJECT TITLE	CATEGORY	CONTRACTOR(S)
1	High sea oil recovery system (HISORS)	A	FRAMO,Ro-Clean Desmi
2	Oil Shaver oil recovery system	A	Åkrehamn Trålbøteri AS
3	High speed continuous oil recovery system	A	Vikoma LTD
4	Marine Oil Spill Sweeper - multibarrier focusing system	A	MDG Group AS
5	Concept studies	A	NOFO (multiple contractors)
6	Boom Management system (coastal)	A	Salford Electronics LTD
7	Boom Management system (offshore)	A	Aanderaa Data Instruments AS
8	Dispersant application by use of paravane	B	ORC AB
9	Dispersant application monitoring system	B	Aptomar AS
10	Adaptive two channel digital video/data downlink	C	Salford Electronics LTD
11	Coherent FMCW radar for oil spill detection	C	ISPAS AS
12	Portable SeaSonde HF radar, ocean currents mapping	C	CodarNor, Qualitas, Met.NO
13	Bridge console (GIS) for remote sensing data (TCMS)	C	Aptomar AS
14	Unmanned aerial system (UAS) for coastal mapping	C	Aranica AS
15	Compact aerostat system for oil spill remote sensing	C	Maritime Robotics AS
16	High capacity granulate application & removal system	D	Vakumkjempen AS
17	Messor - spill kit for beach cleaning	D	Mercur AS
18	Foxtail mini, rope mop skimmer (portable by hand)	D	H. Henriksen AS
19	Large working platform for shoreline operations	D	H. Henriksen AS
20	Archimedean Screw Vehicle for shoreline operations	D	Team Innovation Trondheim AS

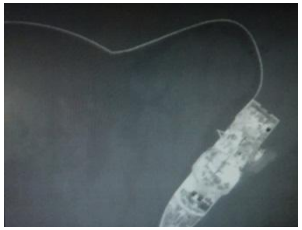
Total budget, all projects, 14 million US$

1.

To ensure that oil spill response systems always overlap areas of combatable oil thicknesses in «time and location»

- During accidental releases, airborne remote sensing show that response systems often struggle to maintain an optimal trajectory with respect to recoverable/dispersable oil thicknesses.
- For oil spill response system manoevring, visual assessment from low altitude (bridge) must be replaced by real-time remote sensing systems.
- To define an optimal trajectory for ship movements in 1-2 hour timeframe can not be provided by large scale oil trajectory modelling currently in use for overall response management.
- Sensor data fusion, real-time tactical display on ships bridge will soon be implemented, and we need a strategy to handle large data flows.

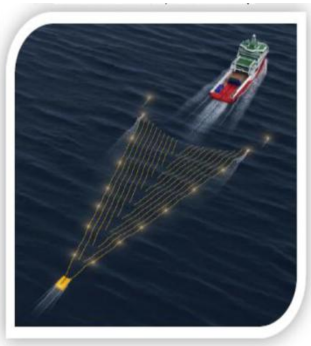





2.

Working with forces of nature

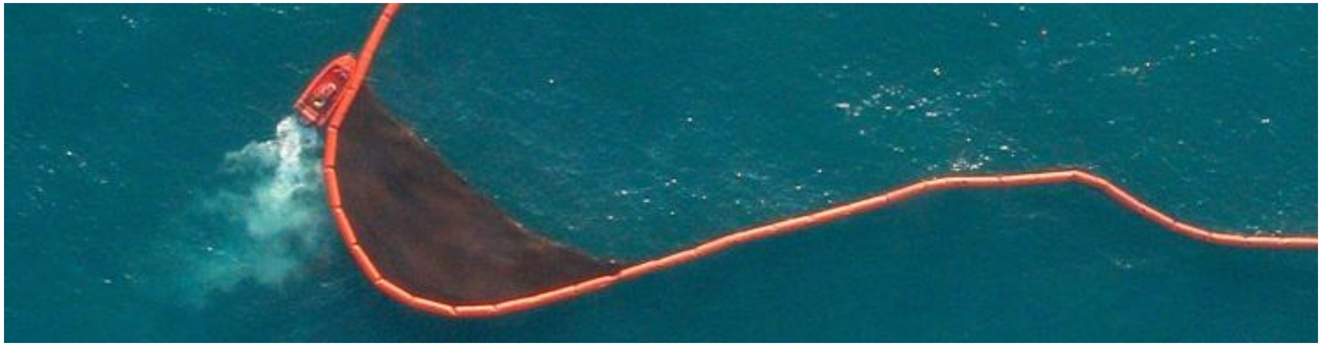
- We want to explore the potential to focus oil at sea without towing large, single vertical barriers (booms) through water.
- Can complex skimmer systems on the sea surface be replaced by high capacity pumps combined with oil-water separation systems on board?
- Is it possible to enhance natural dispersion of oil by use of high energy mechanical systems instead of chemicals?
- Can high speed recovery or application systems with moderate efficiency provide a higher total capacity?
- Given new regulations, the true potential of (mechanical or chemical) dispersant response tehnology is still not identified...



3.

Optimizing each link in the chain of operations

- NOFO want to optimize each link in the chain of operations before focusing on integrated systems.
- We are performing «case studies» of critical technologies, such as oil-water separation, cavitation, remote sensing platforms, etc.
- It is extremely important to define objectives for each optimalization step so actual progress can be verified.
- We believe oil spill response technology development in the past too often has resulted in «building systems by use by non-optimal elements».



4.

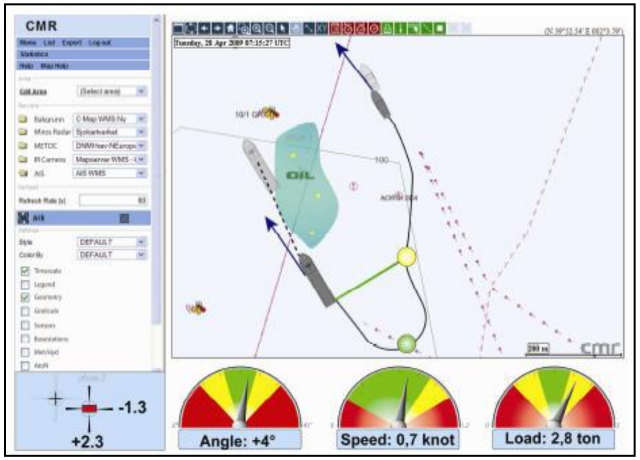
Further development of existing response systems

- NOFO believes optimalization of existing eqipment can provide a good cost-benefit solution to enhanced oil spill response.
- Modification of conventional oil booms for high speed operations, enlargement of working barges, compact mop skimmer and sorbent application systems are examples of on-going projects of this category.
- Due to a larger market for coastal and harbour response systems, NOFO sometimes has to encourage the industry to develop off-shore versions of proven technology.

5.

Staying inside operational envelopes at all times

- During accidental releases and exercises, staying within the (narrow) operational envelope has proven extremely demanding.
- Systems to monitor operations providing alarms and corrective advice will be tested in the near future.
- Such systems may later be connected to remote sensing systems providing optimal trajectories to ensure that combatable oil and response systems overlap in «time and space (location)».



6.

From two-vessel operations -> 1 vessel systems

- NOFO believes the future is in high-speed 1-boat systems.
- Such systems reduce overall complexity and costs, and increase maneuverability.
- Both application of dispersants and recovery operations should therefore be performed by one vessel only.

Due to:

- Faster deployment
- Less equipment
- Less personnel
- Less expensive
- Ease of operation

Technology development in NOFO
- the way ahead

- Finalize current projects
- Pilot services
- Phase in new technology in day to day operations
- Purchase new technology developed in the program
- Upgrading national test facility
- Testing new products on the market
- New NOFO announcements
  of technological challenges in 2012?

Project 13 (C)

Remote sensing data fusion

SECurus / TCMS

Project 14 (C)

Unmanned Aerial System (UAS) for coastal oil spill monitoring

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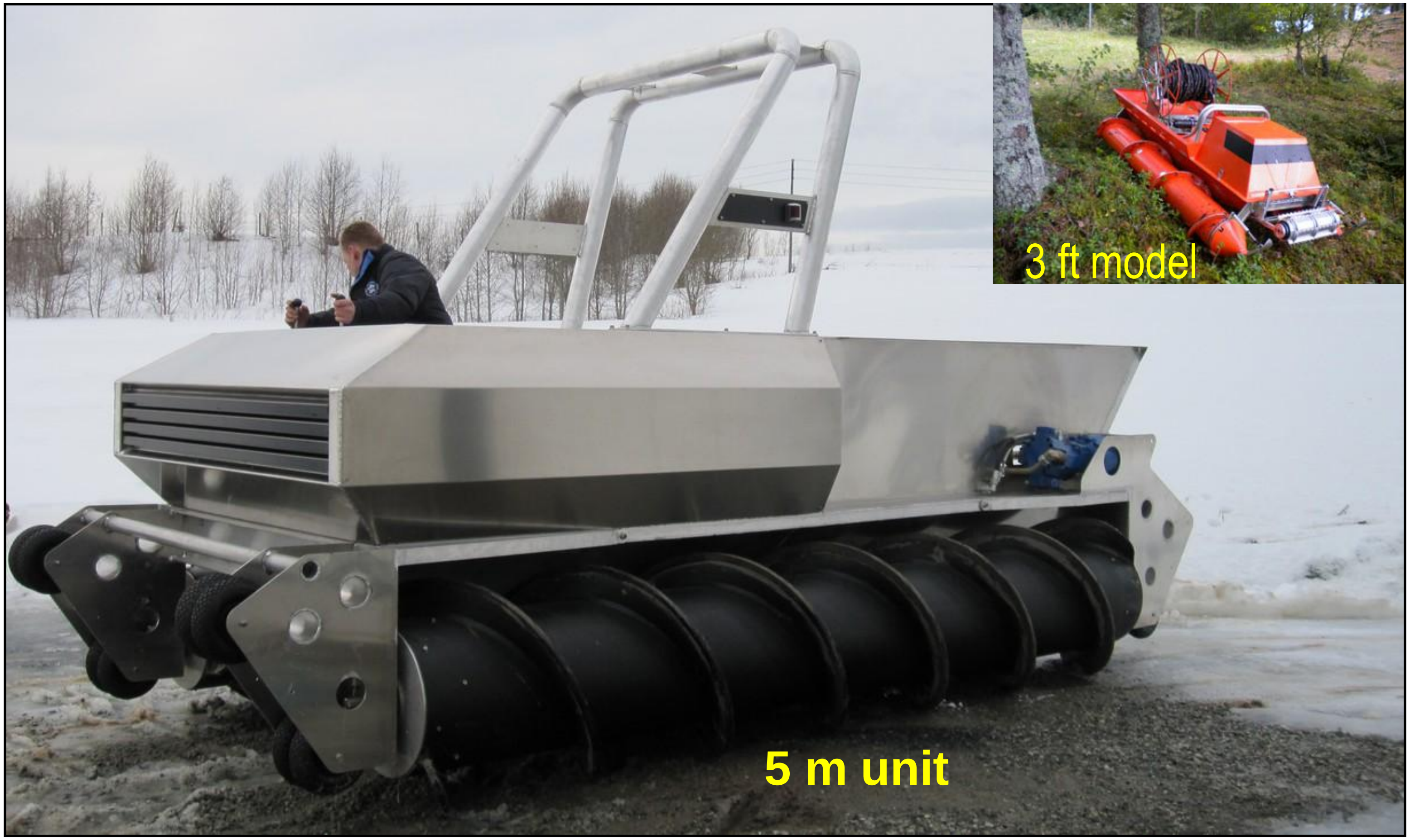
Bodø, September 2010

Project 20 (D)

Archimedean screw vehicle for shoreline operation



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Project 16 (D)

High capacity granulate distribution and recovery system