GIS, Spill Models, and Metocean Data Services Converge to Support the **Common Operational Platform** Requirements and Improve Oil Spill Trajectory Forecasting

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Session 17: *Decision Support Tools*

RPS ASA (US)

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Outline

1. Introduction – Why we are here
2. Common Operational Platform – Definition
3. Technical Approach / Scientific Interest – Our vision
4. COP Components – Interoperability
5. GIS / Baseline Information – Examples
6. Metocean / Environmental Information – Examples
7. Oil & HNS Spill Predictions – Examples
Applied Sciences Associates Inc. (ASA, now part of RPS Group)

Environmental, Coastal and Marine Consultancy in Rhode Island, USA

*Scientific & Technological Solutions to manage and protect the marine environment.*

- **Services & Consultancy**
  - Water quality and hydrodynamic modeling
  - Support Oil Industry (E&P activities, EIA, drilling, etc.)
  - Natural Resource Damage Assessment
  - Operational Metocean Data Provision (winds and currents forecasts)
  - Training, Drill Exercises

- **Products & Modeling Tools**
  - In Support of Decision Making (Emergency, Pollution, Search & Rescue)
  - In Support of Environmental Evaluation (Impact, Risk, Mapping)
  - Water quality, hydrodynamic modeling, Biological Impact
  - GIS Framework, OGC Data distribution
  - Water, air, land dispersion modeling
  - Oil, Chemicals, LNG, Drilling materials
From a Common Operational Picture...
... to a Common Operational Platform

External Information

User / Client App

User / Client App

Guest – Reviewing results

Admin – Running cases

Web Services

Map Request Serv.

... Service

Model Run Service

COP - Server

Layers (components)

Databases & Users Admin

MODEL S

www

User / Client App

User / Client App

User / Client App
As an ‘intermediate user’, our applications aim at:

• Promoting the interoperability between layers of information
• Collecting, storing and redistributing information (e.g. metocean)
• Generating ‘advanced’ content (e.g. model predictions)
• Facilitating the integration with other layers or COP, content management, user administration
• Information analysis by developing tools (e.g. model skill assessment)
COP Key Components

Layers of information:

> GIS (static information): cartography, baseline conditions, location of sensitive resources (fishing areas, beaches, water intakes, etc.)

> Dynamic and climatic environmental information, metocean forecasts, historical data, observations and predictions

> Dynamic (real-time) location of resources, e.g. AIS, tracking buoys

> Model predictions, e.g. oil & HNS spills and search & rescue (SAR)

> Emergency Response: tools, calculators, units deployments (SAR), resource tracking
COP Key Components

Key aspects:
> Facilitate the interoperability between layers, improving the analysis and decision making

> Enhance communication/dissemination, faster transmission & interaction

> Facilitate the integration into variety of existing solutions/platforms (e.g. ArcGIS Online - AGOL)

> To add value to the existing content by generating analysis ‘on-the-fly’ (statistics, consensus analysis)
Examples of COP Components/Services

RPS ASA - Examples Web Services / Customized Applications:

- OceansMap:
  Assisted by the Environmental Data Server (EDS), it provides on-line access to observations, hindcast & forecast data. A suite of web services ensures the access, visualization and analysis of metocean datasets. The system allows to query gridded or point data, generate time-series and perform spatial & temporal statistics on-the-fly.

- OILMAP/CHEMMAP/SARMAP web:
  The webGIS system includes oil/chemical/drift models to support emergency response, integrating a variety of data sources (GIS, response strategies and AIS). Seemingly integrated in the system, EDS regularly collects metocean information and automatically provides the inputs to run the spill/drift simulations. Predictions can be shared across several platforms and integrated into other services/environments (AGOL, Mariner’s CommandBridge, Terrabase).
GIS Data Integration

The Shannon Estuary Anti-Pollution Team, Ireland (Adobe Flex technology, nautical charts, multimedia reference section – baseline info)
Metocean Component: OceansMap (1/3)

Simple/Fast visualization
- Data is rendered directly from the EDS
- Global, National and Regional Models
- Comparison Model-to-model spatial / time-series
Metocean Component: OceansMap (2/3)

Analysis on-the-fly
• Data comparison (model vs observations)
• Multiple variables from different data sources
• Spatial/time statistics
• Historic/hindcast large datasets (climatology)
Solving Challenges

- Very large metocean datasets (GB per file/time step)
- Sub-setting 3D+time-varying datasets
- Data file formats, structure and content
- Efficient/fast communication and dissemination (avoiding data post-processing)
Modeling Component: Oil Spill (1/2)

Oil Spill Modeling Service based on OILMAP package

- Metocean input data provided by EDS
- Scenarios/Cases controlled by User Database
- Portability: results exchanged across platforms
Modeling Component: Oil Spill (2/2)

OSM Integrated into other platforms, e.g. OILMAPWidget for ArcGIS Online (AGOL) and ArcGIS WebApp Builder as well as other 3rd party applications.