Programa

14:00 – Receção aos participantes
14:15 – Apresentação geral da projecto Spilless (Ana Paula Mucha, CIIMAR)
14:30 - Resposta nacional no combate à poluição do mar (Diana Pinheiro, DGAM – SCPM)
14:45 - Ferramentas biotecnológicas no combate à poluição (Fátima Carvalho, CIIMAR)
15:00 - Desafios tecnológicos no combate à poluição (André Dias, INESC TEC)
15:15 – Painel de discussão “Novos desafios na resposta a incidentes de poluição”
   Manuel Pinto de Magalhães (Portline)
   Joana Moreira da Silva (BLUEBIO ALLIANCE)
   João Graça (MARLO)
   Eduardo Silva (INESC TEC)
16:00 – Coffee break
Marine oil spills are catastrophic events that lead to high losses of marine life and ecosystems. Oil spill incidents occur regularly during the exploration, production, refining, transport and storage of petroleum and petroleum products. In recent years, several oil spill disasters have occurred, with Deepwater Horizon (2010) being considered one of the larger accidental marine oil spills in the history of the petroleum industry, leading to the spill of over 500,000 tons of crude oil, at the Gulf of México.
Oil spills

- In the last 50 years, several major spills occurred in the NW Iberian Peninsula, one of the main routes of oil cargo in Europe, as a result of tanker accidents.

### Major oil spills

<table>
<thead>
<tr>
<th>Position</th>
<th>Shipname</th>
<th>Year</th>
<th>Location</th>
<th>Spill size (Tons)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ATLANTIC EMPRESS</td>
<td>1979</td>
<td>OFF Tobago, West Indies</td>
<td>287,000</td>
</tr>
<tr>
<td>2</td>
<td>ART SLUMBER</td>
<td>1981</td>
<td>750 nautical miles off Angola</td>
<td>240,000</td>
</tr>
<tr>
<td>3</td>
<td>CASTILLO DE BELLEVER</td>
<td>1983</td>
<td>OFF Salalona Bay, South Africa</td>
<td>252,000</td>
</tr>
<tr>
<td>4</td>
<td>ARUCCI CINDA</td>
<td>1976</td>
<td>OFF Al toska, France</td>
<td>227,000</td>
</tr>
<tr>
<td>5</td>
<td>HAVEN</td>
<td>1991</td>
<td>Venice, Italy</td>
<td>144,000</td>
</tr>
<tr>
<td>6</td>
<td>ODYSSEY</td>
<td>1968</td>
<td>700 nautical miles off Nova Scotia, Canada</td>
<td>132,000</td>
</tr>
<tr>
<td>7</td>
<td>TORKLEY CANYON</td>
<td>1987</td>
<td>Scilly Isles, UK</td>
<td>119,000</td>
</tr>
<tr>
<td>8</td>
<td>SEA STAR</td>
<td>1972</td>
<td>Gulf of Orca</td>
<td>170,000</td>
</tr>
<tr>
<td>9</td>
<td>IRENE SERENIDAD</td>
<td>1990</td>
<td>Navarino Bay, Greece</td>
<td>100,000</td>
</tr>
<tr>
<td>10</td>
<td>DONALDA</td>
<td>1976</td>
<td>Le Corinca, Spain</td>
<td>100,000</td>
</tr>
<tr>
<td>11</td>
<td>HAWAIIAN PATRIOTI</td>
<td>1977</td>
<td>300 nautical miles of Honolulu</td>
<td>95,000</td>
</tr>
<tr>
<td>12</td>
<td>ENDE ANAKA</td>
<td>1997</td>
<td>Odyne, Portugal</td>
<td>85,000</td>
</tr>
<tr>
<td>13</td>
<td>AMELIA BOE ASIA</td>
<td>1993</td>
<td>La Corina, Spain</td>
<td>85,000</td>
</tr>
<tr>
<td>14</td>
<td>BERGEN BAY</td>
<td>1994</td>
<td>Moidrod Haven, UK</td>
<td>72,000</td>
</tr>
<tr>
<td>15</td>
<td>VENDA ISLAND</td>
<td>1989</td>
<td>130 nautical miles off Atlantic coast of Morocco</td>
<td>70,000</td>
</tr>
<tr>
<td>16</td>
<td>NOVA</td>
<td>1985</td>
<td>Off Klang Island, Gulf of Iran</td>
<td>70,000</td>
</tr>
<tr>
<td>17</td>
<td>PRECINCT</td>
<td>2002</td>
<td>Off Galicia, Spain</td>
<td>66,000</td>
</tr>
</tbody>
</table>
Response to oil spills

• The occurrence of such incidents requires immediate, simple, effective and eco-friendly actions to minimize environmental damages.

• First-line responses typically include physical (e.g., controlled burning; absorbing) and chemical (e.g., dispersing) removal of oil, which is largely constrained by maritime conditions.

• Though these treatments are important to rapidly control the diffusion and drift of the oil, they are not suitable for ecological restoration.

New solutions in need:

• Environment-friendly
• Fast
• Low-cost
A new solution to tackle oil spills

- New and viable solution based on the production of *native microbial consortia* with bioremediation capacity, and the adaptation of unmanned *autonomous vehicles* for in-situ contamination combat.

- This novel approach can be used as first line responders to pollution incidents in a fast, efficient and low cost way.

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Bioremediation

[Image: https://commons.wikimedia.org/w/index.php?curid=52383842]
Objectives

- be environment-friendly, by using native organisms to naturally degrade oil spills, and thus avoiding the introduction of additional chemical or biological additives
- integrate first line responses to oil spill incidents, by using unmanned and autonomous vehicles, which are able to operate under unfavourable and harsh conditions with low human intervention
- set-up holistic pollution combat missions, by jointly combining air, surface and underwater vehicles
- increase the overall efficiency of the oil spill combat missions, by acting on defined targets and areas
- offer valuable data, by equipping the vehicles with sensors, which can perform environmental monitoring (before, during and after oil spill combat missions)
- decrease the overall time to reaction and mission costs, by using unmanned and autonomous vehicles, whose deployment is faster and less costly than using boats, planes or helicopters

Strategy

Development of a new concept of georeferenced library of native microbial consortia, with capacity to degrade petroleum compounds, to be applied by autonomous vehicles (aerial, surface and underwater) at specific geographic areas
Strategy

To produce a georeferenced microbial consortia bank at a pilot scale. The native consortia with high ability to degrade petroleum compounds will be viably preserved for future biomass production and application at the native geographic region from which the microbial consortia has been obtained;

- develop a work flow for scale up production of the selected native microbial consortia;
- specify, develop and deploy the containers and release systems for microorganisms and nutrients, which will be coupled to three different types of unmanned systems;
- specify, develop and deploy the application for planning and controlling the oil spill combat mission, and for data acquisition and processing;
- demonstrate the full multi-domain semi-autonomous in-situ oil spill combat system at a “quasi-real” scenario,
- exploitation of results to bring the products/services to the market in the appropriate sea basins and beyond (exploitation plan).

SpillLess structure
Innovative products and services:

• an integrated protocol for bioremediation application

- Microbial consortia for bioremediation
- Cocktail of additives to stimulate bioremediation
- Microbial launchers (aerial, surface and underwater)

- The combination of these technologies will enable fast response to maritime pollution incidents from several origins that may occur:
  - inside ports,
  - around industrial and extraction facilities,
  - during transport activities.

- Besides, the proposed holistic system is a major step towards the development of a fully integrated and turn-key solution for oil spill first line response, which can be available:
  - at maritime and port authorities,
  - at corporate facilities (e.g. oil tankers and offshore drilling platforms).
Result-oriented

• The project will work at the interface between research and commercial exploitation, so that results from research are taken forward to the market.

• By doing so, it aims at creating jobs and business opportunities in the blue economy, and also at adding social and environmental value.

Multidisciplinary

• A team of post-graduate students with biotechnology and engineering backgrounds, which will combine their skills and creativity to contribute to sustainable blue economy, while preserving marine resources and ecosystems and increasing awareness of marine challenges and opportunities.

• A consortium with a multidisciplinary profile, combining competences from three research institutions which range from marine sciences to engineering and three companies.
Stakeholders driven

• Create a network of relevant maritime stakeholders from the Atlantic coast, with focus on the sub-regions of Euroregion Galicia - Norte Portugal.

• These stakeholders will cooperate to ensure that the project activities and expected results are aligned with the real needs of both regions.

• Local stakeholders’ knowledge will be capitalised through different interaction activities that will be promoted from the early stage of the project.

www.spilless.ciimar.up.pt

spilless
First-line response to oil spills based on native microorganism cooperation

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Painel de discussão
“Novos desafios na resposta a incidentes de poluição”

• Casos de estudo (incidentes de poluição)
• Necessidades tecnológicas
• Eventuais limitações
• Oportunidades de mercado
• Outras aplicações
• Outras questões

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