Research into the way ports operate and organise, servicing the reception and safe passage of the majority of our goods, and how to make ports function at an optimal level is necessary in modern times, as Jens Froese, from the EFFORTS technical coordination team points out.

Rethinking port operations for optimisation

World-wide distributed production and consumption is the trigger of globalisation, and is only possible through effective and efficient transport chains. Container shipping is the most visible transport, but one must not forget about break bulk and project cargo, solid and liquid bulk cargo, liquefied and pressurised gas and specialised transports ranging from cars to cattle. By a large margin, most of these cargoes that are transported around the world are carried by ships, and ports are the vital interface from sea transport to other modes or again to ships to distribute the goods along the coasts and inland waterways.

As research topics go, seaports do not have a long history and this is because the industry has always relied on its practical experience, and success has proved it right in the past. However the port business environment has gone through, and still goes through, significant changes. New solutions are needed and these solutions can no longer be based on experience alone.

Examples include:
- Close-mesh global transport networks providing fragments of productions from all parts of the planet are very sensitive to lead times and changes in supply/demand
- Inappropriate legacy infrastructure often lagging far behind actual transport need
- Discerning environmental requirements
- Human resources development serving equally the industry and the society

Extrapolating the past will certainly not result in optimum future solutions so science will have to play a stronger role within the port industry. The current economic crisis adds to the challenges but also paves the way for increased acceptance of research as many of the tools, having been successful in the past, currently show inadequacies.

Nobody could foresee the current economic crisis when the European Commission’s Directorate General Research launched a port-specific project within the 6th Framework Programme for Research and Technological Development but EFFORTS, the acronym for Effective Operations in Ports, was perfectly timed when it began, in May 2006 – to become concluded in October 2009. Before the crisis the main headaches of ports were to cope with continuously increasing transport volumes, but now it becomes a question of economic survival to manage port processes in the most competitive way. The term ‘competitive’ here is not restricted to cost-efficient but also covers environmental and socio-economic issues.

The EFFORTS approach

European Commission research conditions include terms of reference which require projects to improve the services for the citizens and to strengthen the competitiveness of European industry. Ideally both main objectives should be matched at the same time resulting in a significant and measurable socio-economic impact.

Research aims at creating innovations, which can be categorised as:
- Development of new products and services
- Improvement of existing products and services
- Improvement of processes to e.g. increase productivity or sustainability
- Optimisation of organisations to e.g. improve effectiveness in relation to productivity or contributions to the society
Within EFFORTS all these aspects are taken into account. The following table shows the main impacts by activity:

<table>
<thead>
<tr>
<th>Innovation by</th>
<th>EFFORTS Activity</th>
</tr>
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<tbody>
<tr>
<td>Development of new Products / Services</td>
<td>Tug Simulation Portable Pilot Unit / Tug Display Port ECDIS</td>
</tr>
<tr>
<td>Improvement of Products / Services</td>
<td>Risk Assessment Framework Port Training</td>
</tr>
<tr>
<td>Improvement of Process</td>
<td>Energy Management Port Water Quality Port Air Quality Port Noise Annoyance</td>
</tr>
<tr>
<td>Optimisation of Organisation</td>
<td>Port Processes</td>
</tr>
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Port organisations and hence the roles of managers and operators are distinct from port to port even within the same country. Therefore EFFORTS relates its research to processes dictated by operation of ships, terminals and cargo flows thus providing a common denominator applicable to all European ports of all sizes.

**Project content**

In order to clearly allocate research and to maintain the project, manageable activities were grouped into four areas led by the ports of Dublin, Le Havre and Gijón:

- Navigation in ports
- Port environment
- Port organisation
- Training, education and human resources development as a cross-project activity important for all operative areas

**Navigation in ports**

The EFFORTS navigation team aims at optimum exploitation of existing navigable infrastructure in port by improved mathematical modelling of hydrodynamic ship-tug interaction in order to allow for sophisticated training of tug masters by means of simulators. Also in focus are improved portable pilot units to support ship-borne SOLAS V equipment not sufficiently meeting some of the conning requirements for large vessels in narrow waters. Finally the team will champion Port ECDIS as a further component to the maritime geographical information system providing specific port-related features, high accuracy and a gridded 3D-model allowing more precise navigation and dredging.

**Port environment**

The mantra for environmental tasks in EFFORTS is ‘better prevention than cure’. The port industry is well advised to become an environmental protagonist instead of fighting the image of an industry trying to hide environmental problems. EFFORTS activities cover the energy management of ports and terminals including ‘clean’ energies to contribute to a reduced CO2 footprint and reduced emissions in general but also to save energy costs. Also covered is port water quality and air quality. For instance, port water quality is endangered by ships’ ballast water carrying harmful aquatic organisms from other parts of the world and by diluted aluminium from sacrificial aluminium anodes protecting port steel constructions. Similarly, port air quality is endangered by volatile organic compounds (VOCs) which are emitted through loading or discharging operations of petroleum products and are considered as carcinogenic. On another tangent better knowledge is sought about the annoyance factor of port-specific noises to allow for tailor-made noise combating.

**Port organisation**

The operation of ships and cargoes in ports requires a wide variety of services. Additionally industries dependent on export and import operate their business in the port or close to it so that ports often are very complex industrial areas. EFFORTS contributes to transparency by providing a scheme to organise all port-related processes under one coherent umbrella and to develop standard business processes. EFFORTS also provides a risk assessment system hosting proven methodologies, technologies and tools for easy access by port professionals, not being risk experts themselves.

In relation to the wide scope of port aspects, EFFORTS can only be a starting point. Thus it is important that project achievements are sustainable and extendable by follow-up activities, either on national or European level, funded publicly or privately. Specific demonstrations in Hamburg, Dublin, Le Havre and Thessaloniki, followed by a wrap up workshop in Brussels, will provide opportunities to the port industry and administrations to become familiar with the project results and to investigate their value to contribute to a highly innovative European port industry being best prepared to meet actual and future requirements.