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# Integrating various data products to predict risk and impacts of HAB events on the Aquaculture Sector (PRIMROSE).

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## Why?

The aquaculture sector on Europe's Atlantic Arc is negatively affected by of harmful algal blooms (HABs) and microbial pathogens. PRIMROSE partners in this region (Fig. 1) will take existing information from monitoring programmes investigating the presence of microscopic algae, shellfish biotoxins, other HAB events, microbial pathogens, such as *E. coli* or norovirus and other physical and modelled data to generate short term forecasts across the EU Atlantic Arc region.

Different sectors have different requirements and expectations for this forecast, and can provide different information and data streams that will be processed to generate the forecast (Fig 2).

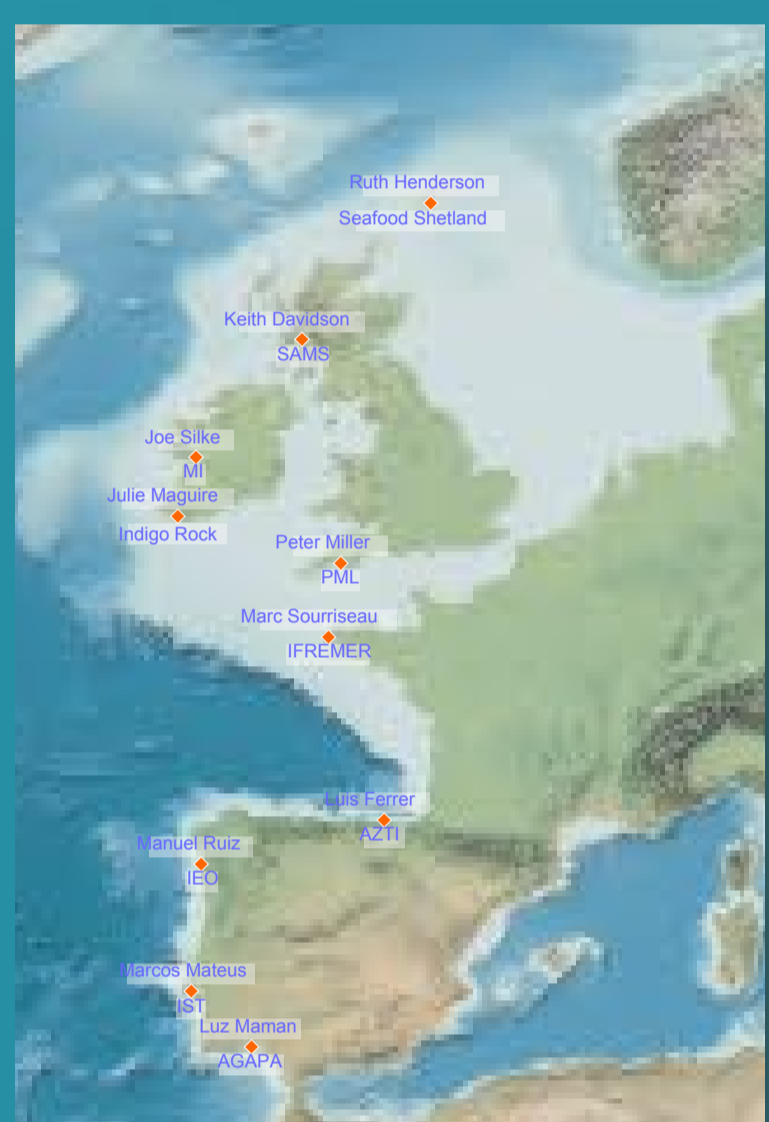


Figure 1: PRIMROSE's partners along Europe's AA.

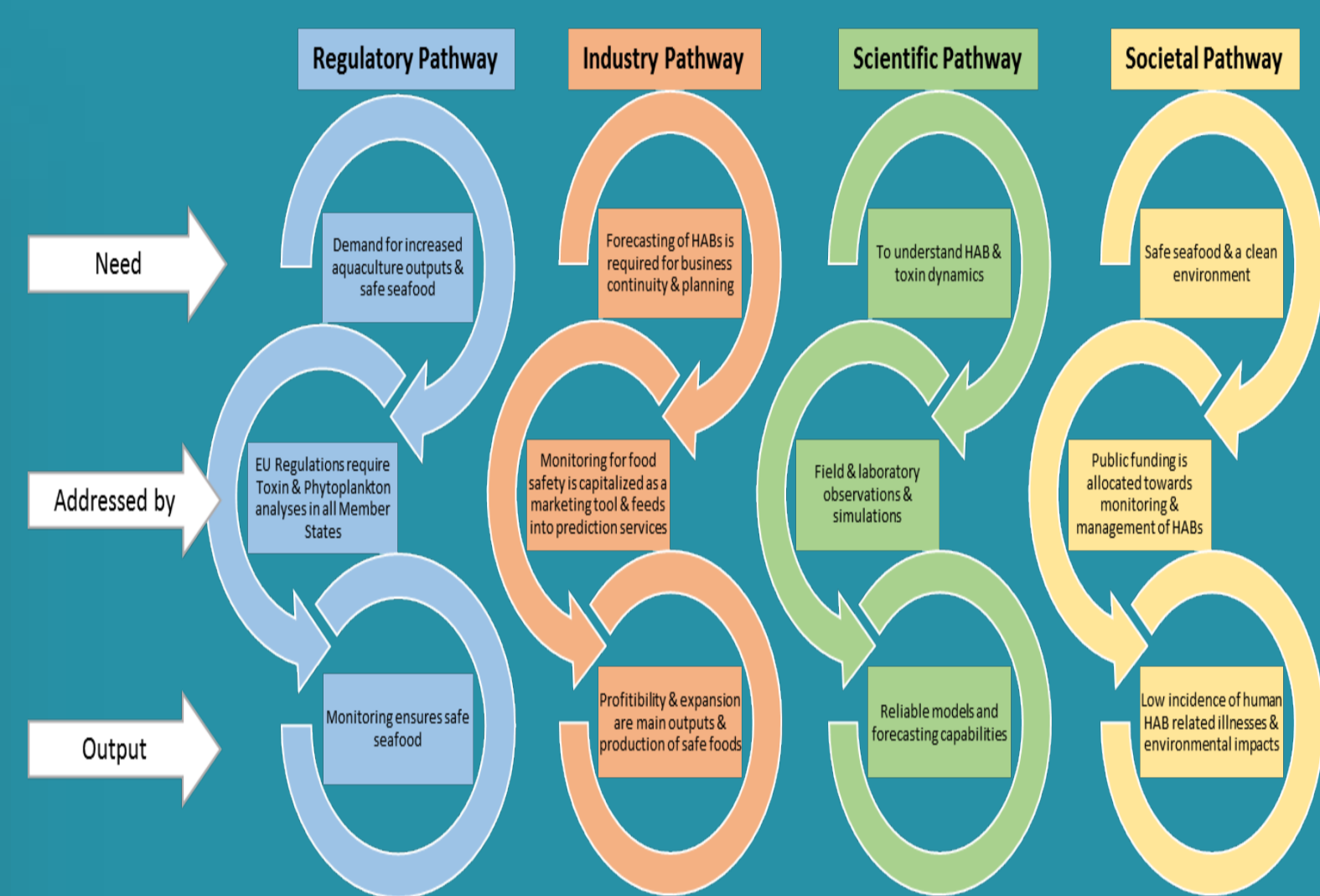


Figure 2: Different sectors have different priorities for HAB and Shellfish toxin forecasting in the EU.

## PRIMROSE will deliver:

By acquiring existing and novel data provided by Regulators, Industry, Scientists & Society (Fig. 3) the project aims to deliver:

- Improved forecasts with increased resolution, combining ocean models with satellite Earth observation data.
- A wider suite of parameters.
- New index based risk assessment.
- Encompass aquaculture from Shetland to Canary Islands.

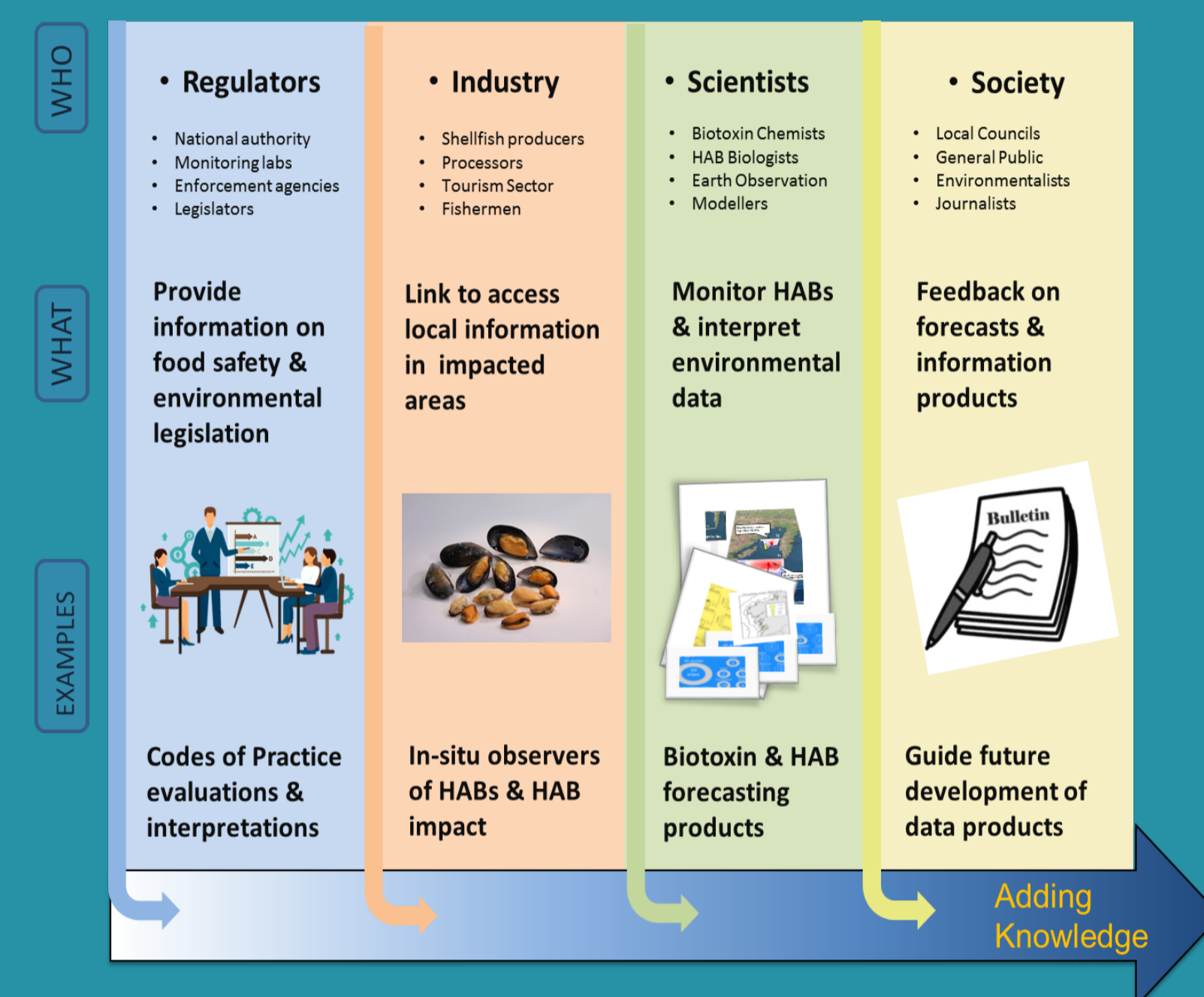


Figure 3. Harmful Algal Bloom value chain: application of knowledge along the pathway to forecasting bulletin production from different sectors, regulators, industry, scientists and society and examples of the knowledge they provide. "Users" of the products along the chain are vital as they provide expertise to determine the HAB forecast and other data derived products

## Summary of Work packages

1. Project Management
2. Project Communication

To ensure that the produced forecast system will be beneficial and successful, it will be disseminated in an effective and understandable manner among partners and key stakeholder.

### 3. Project Capitalization

Through an Exploitation Management exercise all avenues for a successful capitalization on the outputs of PRIMROSE will be identified.

### 4. Predictive Capacity Advancement

The development of a web portal system will provide a joint front end for transnational forecasts of harmful events.

### 5. Implementation and Efficiency

Evolving the forecast system to an optimum service through generating improved and standardised graphical elements will cut production time.

### 6. Transnational activity

The forecasting system will be an inter-regional effort, sent to participating individuals EU wide via the web portal.

### 7. Impact and End-User Engagement

By engaging with end users during the project the maximum impact and sustainability of the project is envisaged.

## Aim

The PRIMROSE project will develop a web portal system providing a joint front end for transnational forecasts of harmful events for the aquaculture sector. In addition to the HAB forecasting, PRIMROSE will investigate forecasts models for microbial contamination. Reporting procedures will be standardised, and partly automated for an expert evaluator to have information available to make an accurate forecast.

The long terms effects of the project will be the improvement of the economic resilience of the Aquaculture industry within European Atlantic Arc region to HAB and pathogen impacts. This will be achieved through cross border collaboration and methodology exchange leading to early warning risk methodologies and alerts that produce: a) A reduction in the risk of shellfish toxicity to humans; b) A reduction in the business impact/losses though either shellfish product harvesting delays or product recalls and c) The opportunity to take mitigating action and prevent potential farmed fish kills.

Regulators	Industry	Scientists	Society
<ul style="list-style-type: none"> <li>• Low cost monitoring programmes</li> <li>• Appropriate legislation</li> <li>• Reliable traceability measures</li> <li>• Reliable and standardised international alert systems</li> <li>• Increased understanding of economic impacts (losses &amp; gains)</li> </ul>	<ul style="list-style-type: none"> <li>• Reliable and consistent information from scientists</li> <li>• Rapid on-farm / in-water monitoring technologies</li> <li>• Long term forecasts</li> <li>• Mitigative measures</li> <li>• Multi trophic aquaculture &amp; bio-control of HABs</li> </ul>	<ul style="list-style-type: none"> <li>• Integration across disciplines</li> <li>• Artificial neural networks &amp; computer aided decision making</li> <li>• Continuity of skills</li> <li>• Building capacity &amp; Training Improved</li> <li>• Standardised spatial measurements from remote multi-sensors</li> <li>• Cheap, operational high quality data collecting <i>In Situ</i> sensors</li> <li>• Increased sharing of transferable 'Best Practice(s) / methodologies</li> </ul>	<ul style="list-style-type: none"> <li>• Seafood Security</li> <li>• Seafood Safety</li> <li>• Thriving healthy marine ecosystems</li> <li>• Functional Foods</li> <li>• Employment from developing coastal economies</li> <li>• Clean seas</li> <li>• Low carbon</li> </ul>

Figure 4: Future directions and some proposed priorities identified by the stakeholder groups for HAB and Shellfish microbiological contaminant short term forecasting

The future of short term shellfish forecasting will also be addressed in the project taking into account sectoral requirements (Fig.4) against a backdrop of climate and other environmental change, and future increased aquaculture demand for fish based protein sources.

The market for our product includes policy makers, risk regulators, food safety authorities and the shellfish and fin-fish industry and will exploit existing EU investment in marine observing infrastructure.