



NERC Marine Ecosystems Research Programme

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PML | Plymouth Marine Laboratory



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£6M Nerc / Defra Marine Ecosystems Research Programme

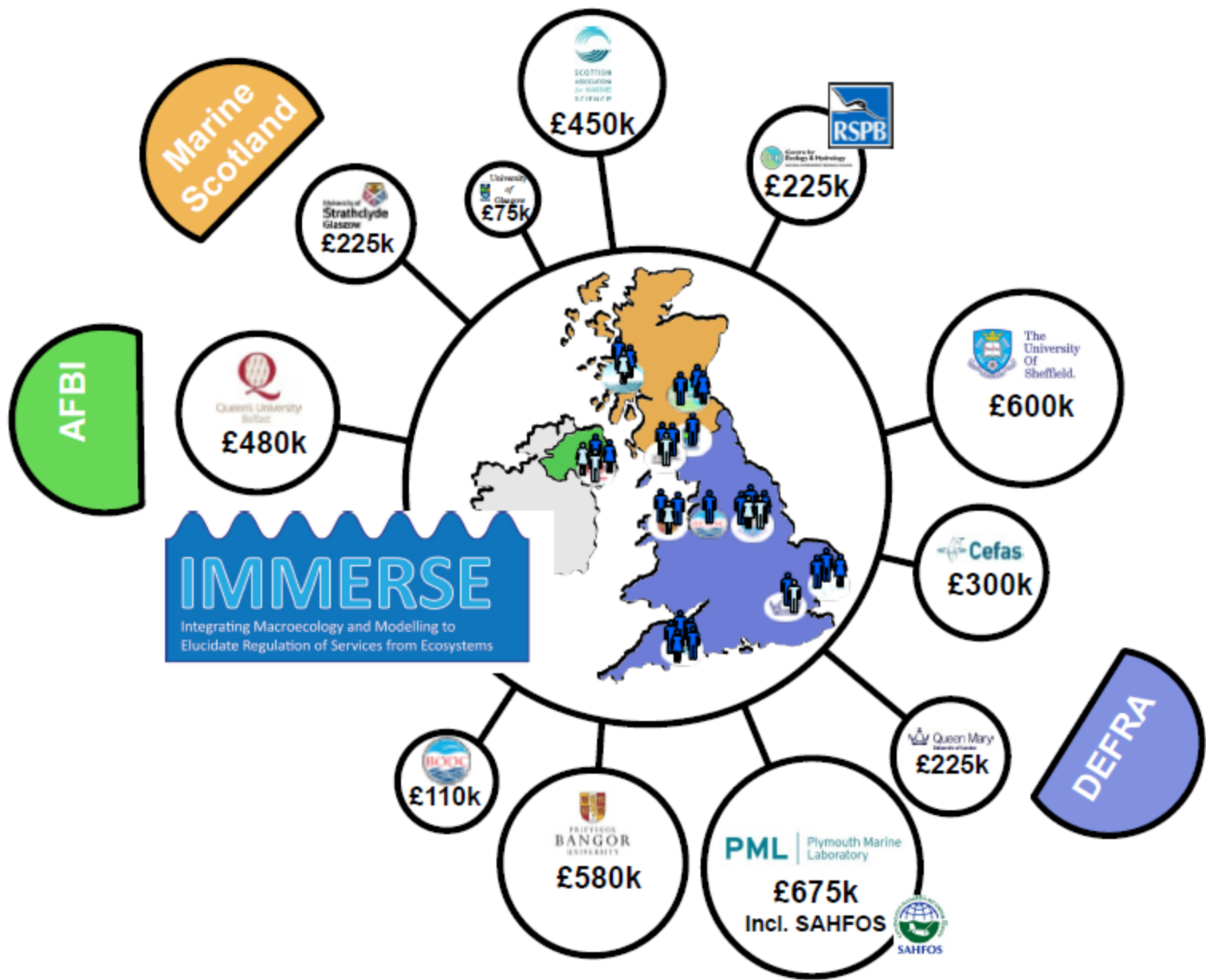
- How are marine ecosystems impacted by on-going environmental change?
- How does environmental change cascade through marine food webs, and what effect does this have on ecosystem service provision?
- What is the scale dependence of these effects?
- How can we turn improved understanding into more realistic ecosystem models?

Marine Ecosystems Research Programme

- WP1: Improved understanding of the regulation of key ecosystem services and integration of knowledge into ecosystem models
- WP2 Integration of improved understanding of ES regulation into ERSEM
- (WP 3 Application of model development to test impact & efficiency of potential management solutions)

WP1 requirements

- Improved understanding of how marine ecosystems respond to bottom-up or top-down perturbations
- Novel combination of existing data, field- and experimental observation, and recent ecological theory
- Predictions of the fate of marine ecosystems under different past and future scenarios, across scales
- Translation of this improved understanding into ES currency
- Integration of all this into marine a range of ecosystem models

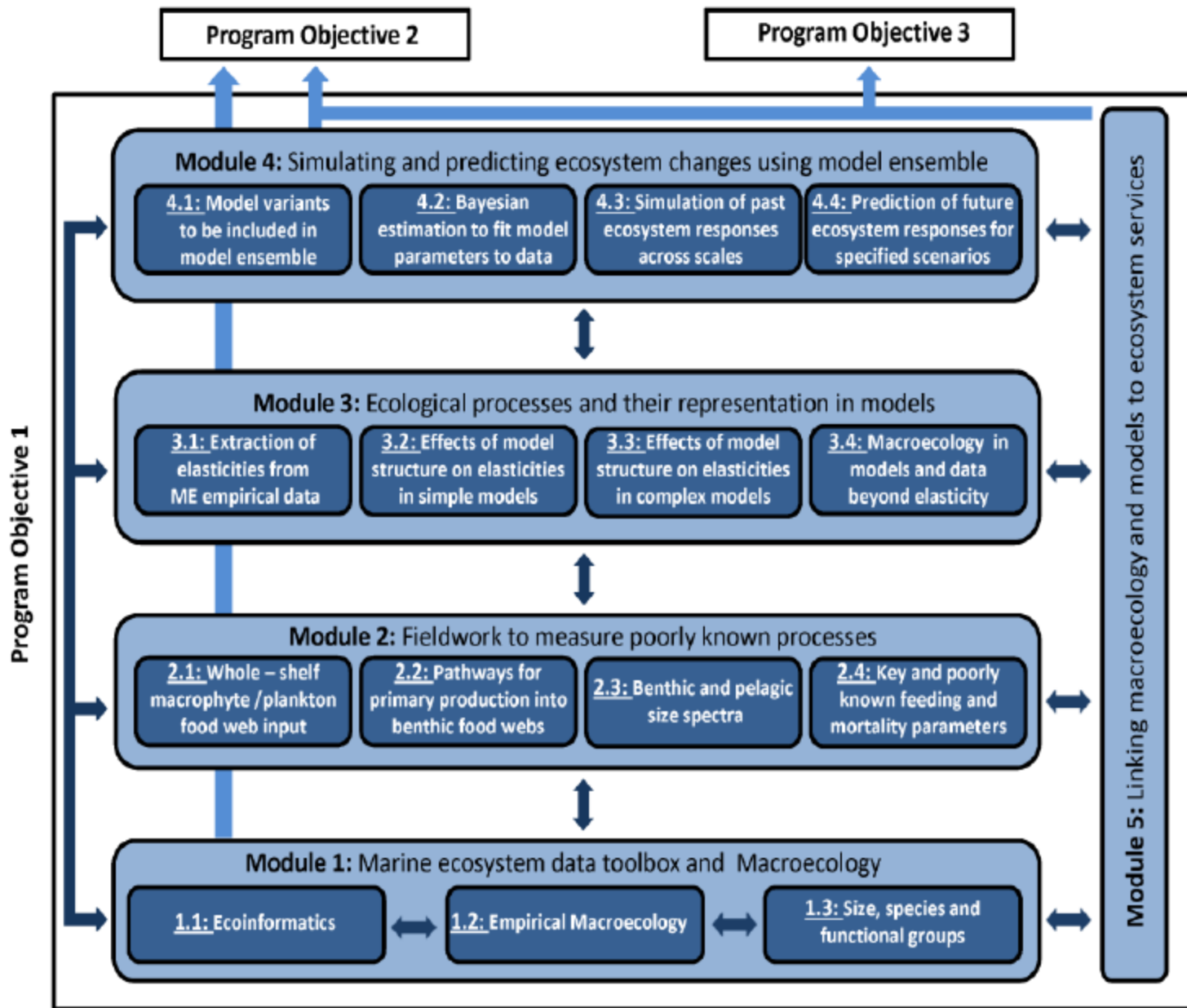


IMMERSE Aims

- Understand the processes that drive marine ecosystem dynamics
- Understand how bottom-up and top-down perturbations propagate through the entire ecosystem
- Understand how these changes affect the delivery of a range of ecosystem services

IMMERSE Approach

- Combine ecological theory with integration of existing data in a system-wide macroecological study
- Employ targeted field sampling and experimental studies of key understudied components of the ecosystem
- Develop an ensemble of ecosystem models and test their performance and assumptions
- Combine empirical and modelled measures of ecosystem states with indices of ecosystem service provision



New Development: The Integrated Marine Ecosystems Programme

- Programme Work Packages 1 & 2 now combined into a single Marine Ecosystems Research Programme
- WP 2 (ERSEM development) is now a 6th module of this integrated MERP

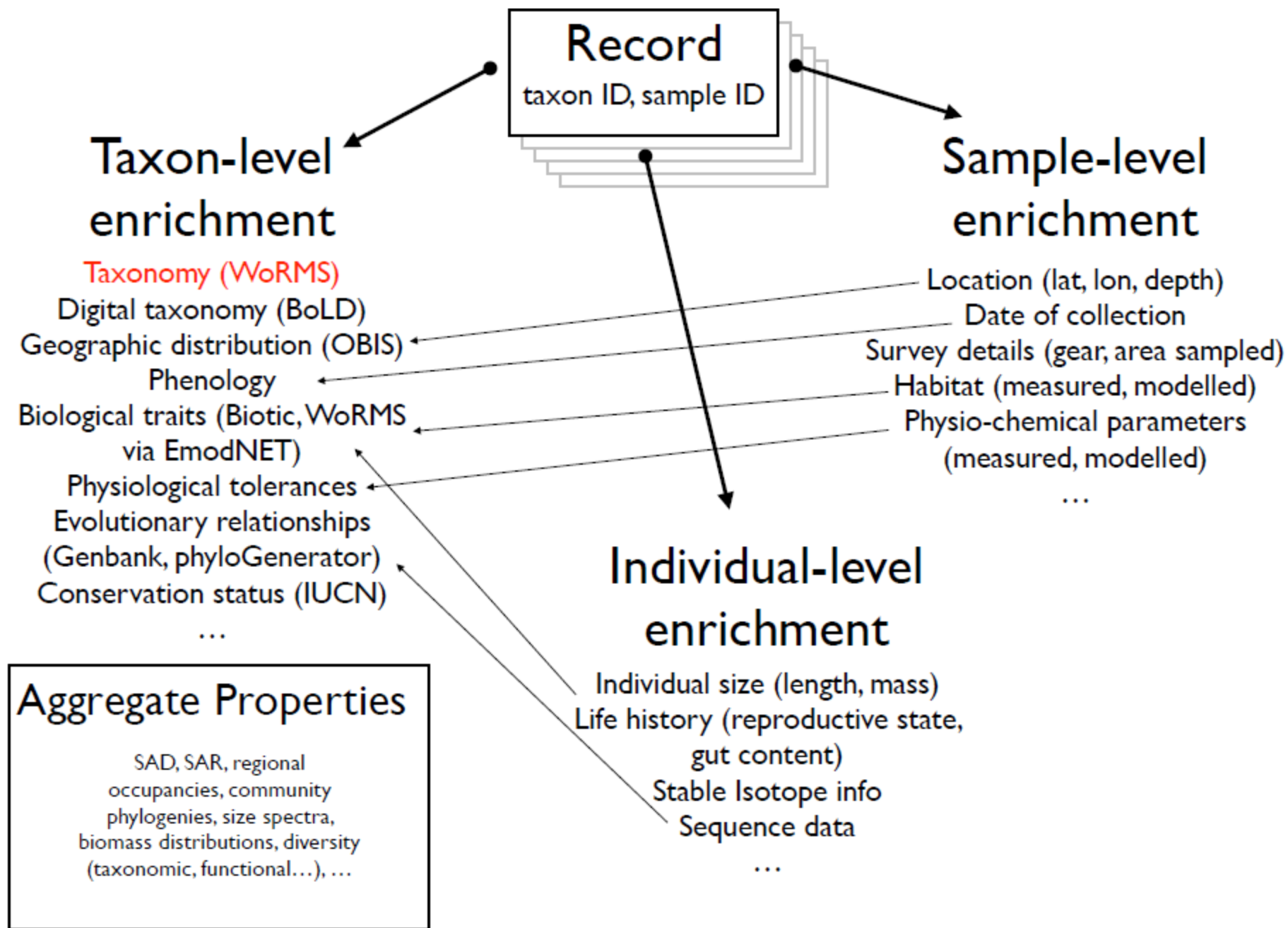
Key Personnel

- Chair: Paul Somerfield, PML
- Co-Chair: Mark Emmerson, QUB
- Module Leaders: Tom Webb (UoS), Angus Atkinson (PML), Axel Rossberg (Cefas), Julia Blanchard (UoS), Mel Austen (PML), Icarus Allen (PML)

How can MERP & SSB work best to share data and resources?

Ecoinformatics & Macroecology

- Accessing data (inventory of available data, building tools to access it programatically)
- Enrichment of existing data

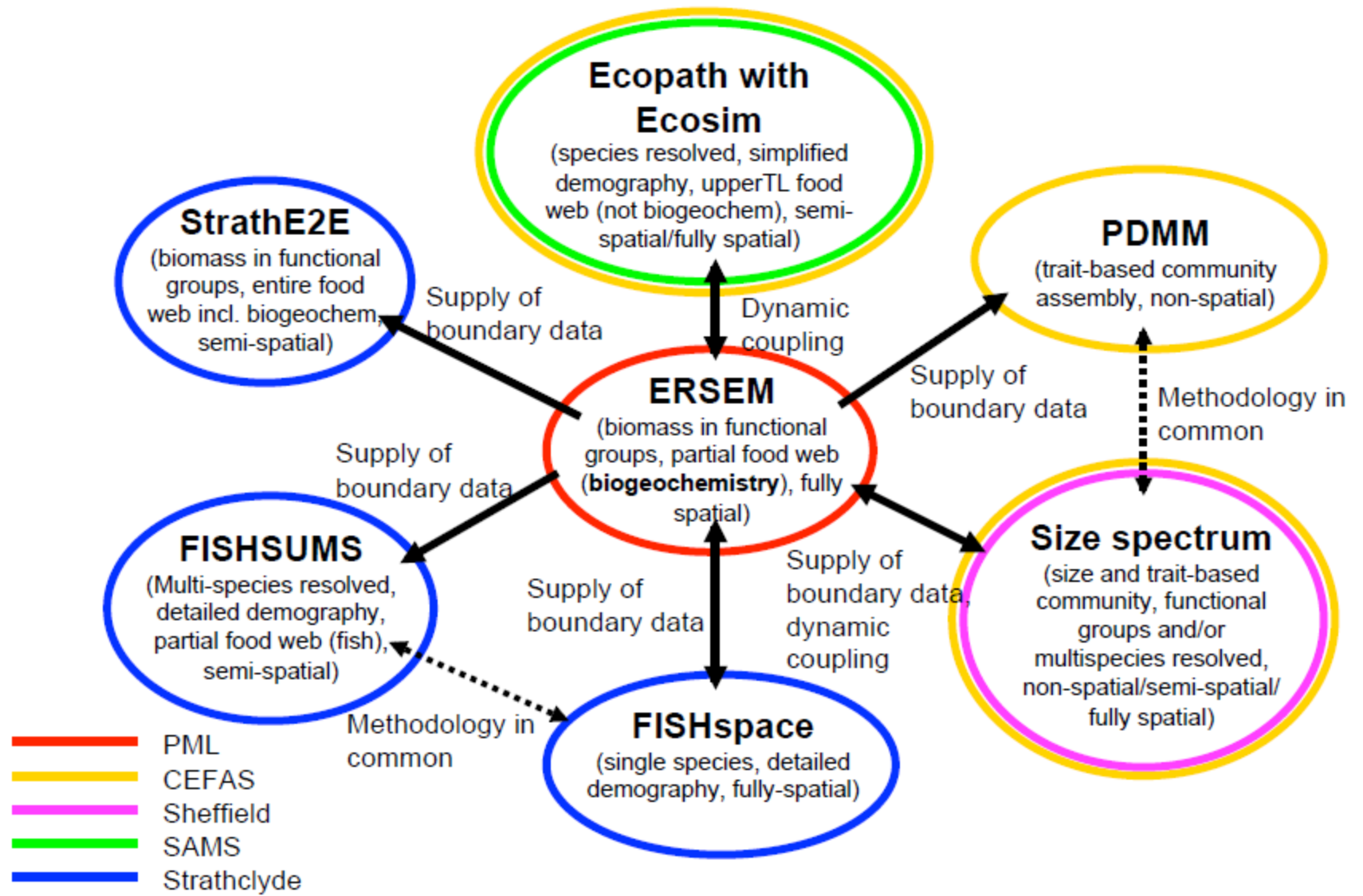


Fieldwork and experiments

- Same geographic area (including Celtic Seas, seasonally resolved observations at Western Channel Observatory)
- MERP extends SSB past meso-zooplankton to capture entire size spectrum up to top predators
- More focus on ecological detail (e.g. multi-food functional responses)
- Opportunity to derive parameters (e.g. mortality rates) for models like ERSEM

Modelling

- We can test each others' models - tests of assumptions, emergent properties, ground truthing with empirical data
- We can add in top-down effects, e.g. feedbacks from fish to the inorganic carbon cycle
- We will work on how best to do this using a model ensemble approach



Ecosystem Services

- We can benefit from working with shared stakeholders
- We can help to expand the range of services considered
- We can assess the role of top-down perturbations on provision of key services

Summary...

- Our understanding of marine ecosystems depends critically on the process-based work of SSB
- The Marine Ecosystems Research Programme will expand this understanding to the whole food web
- We can share empirical, theoretical, and computational resources to address the common questions:
 - How can marine ecosystem models best incorporate higher trophic levels?
 - To what extent is this necessary to predict ecosystem function and service in a changing world?



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