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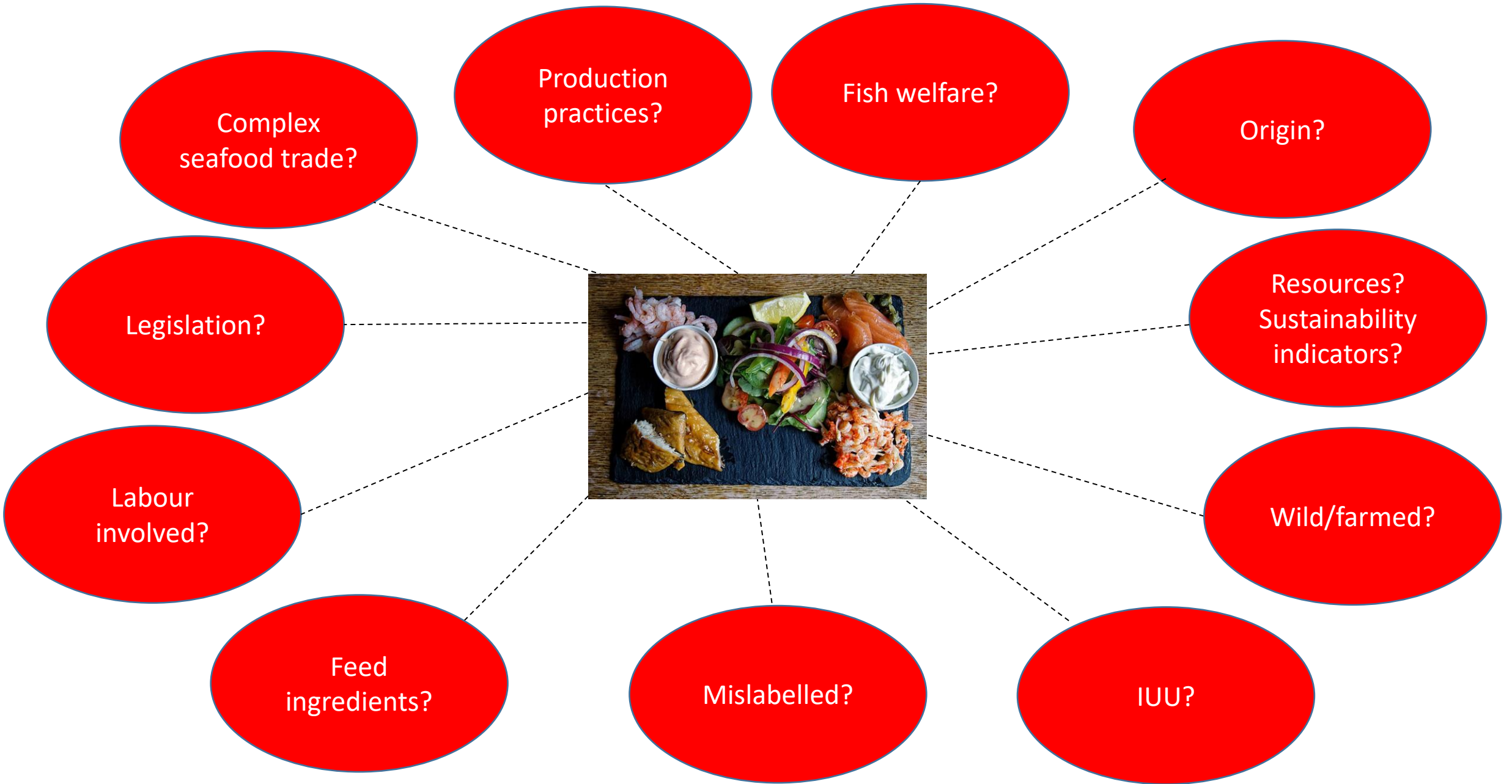
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Traceability: Why where something comes from matters



Sustainable?



What is 'sustainable'?

Complex
seafood trade

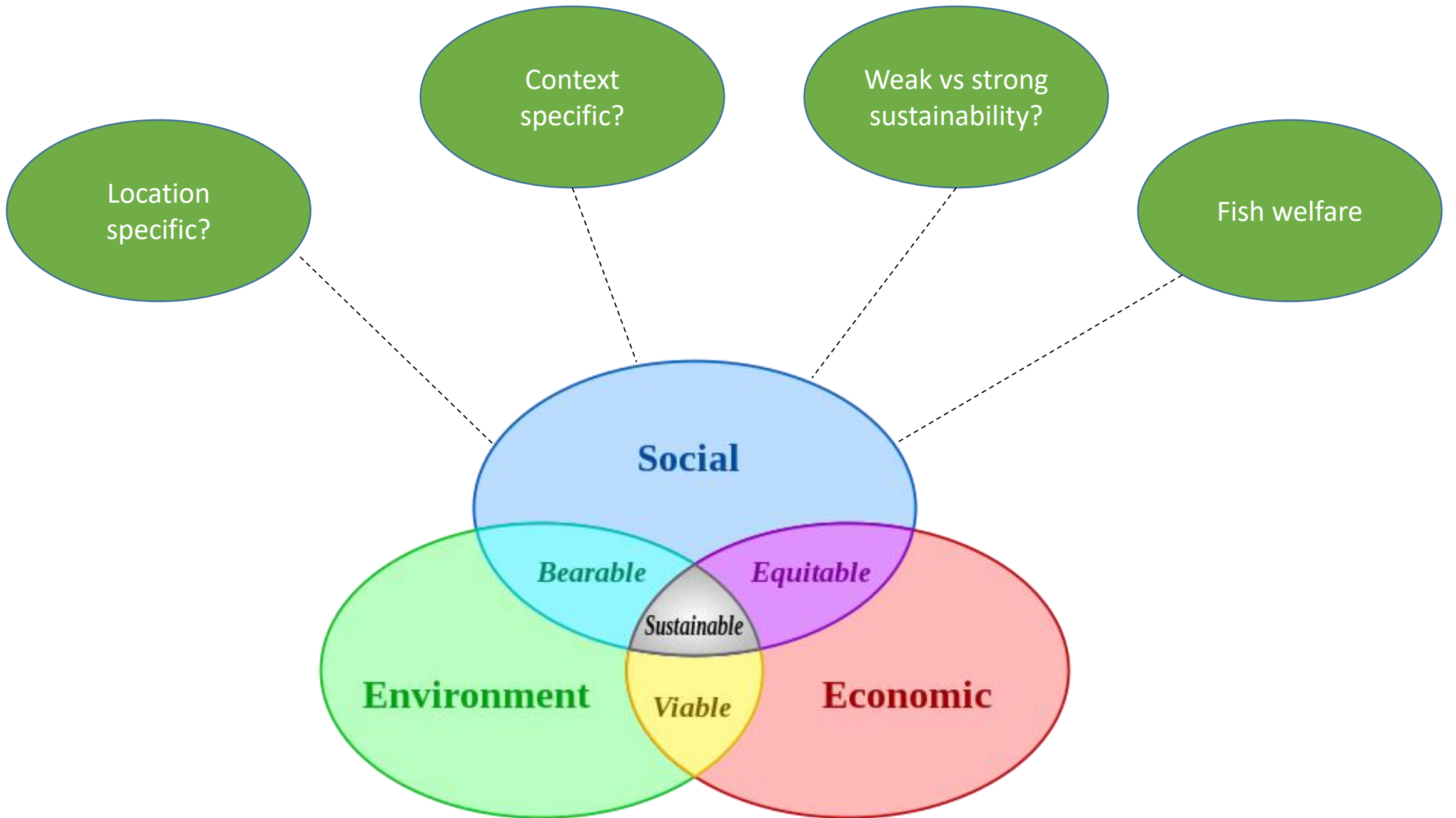
Production

Origin?

inv

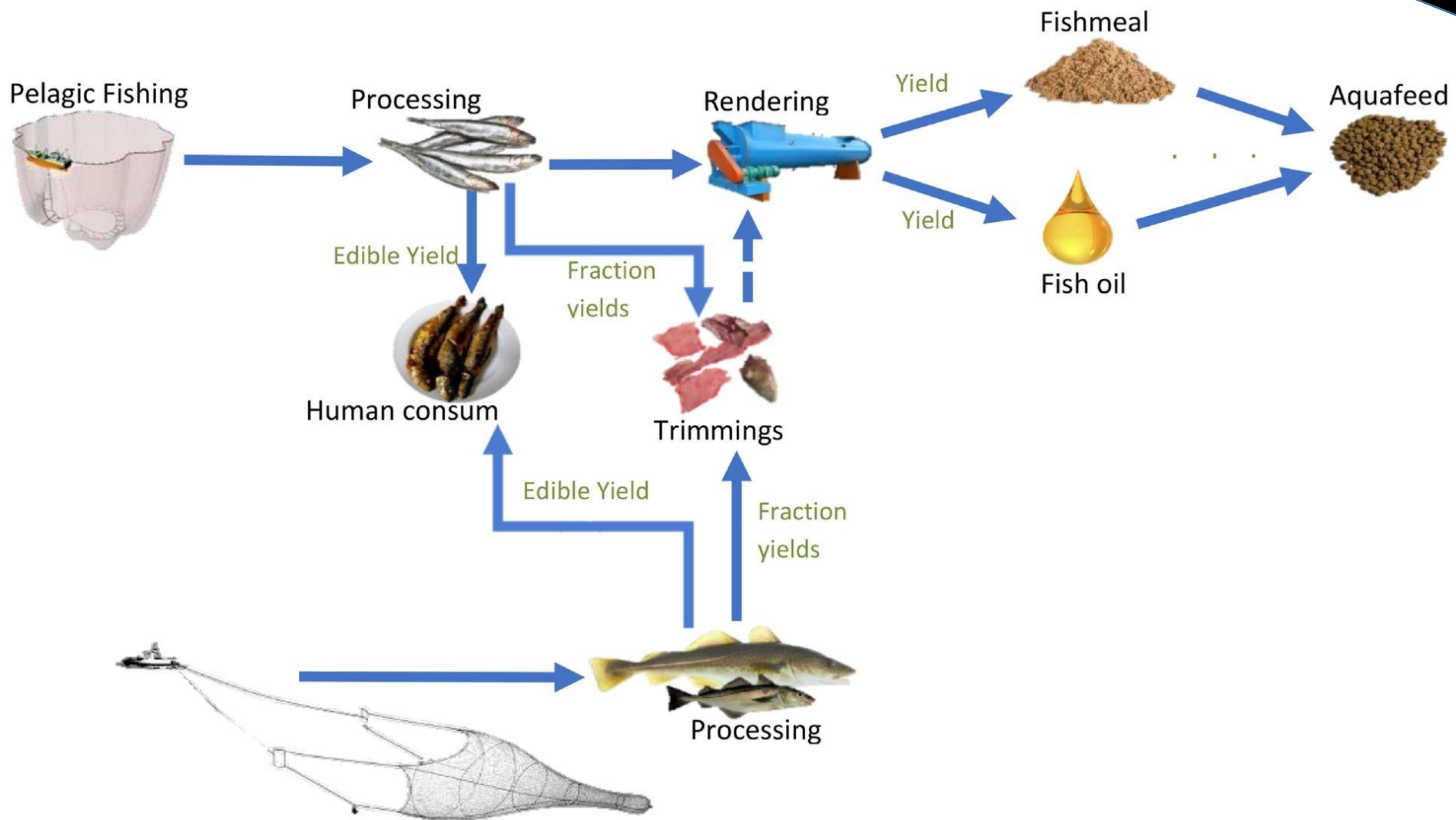
Feed
ingredients?

IUU?



Weak vs strong
Weak vs strong
Locat
Context

Sustainability is a JOURNEY, not an endpoint!



- Environmental data
- Social data
- Economic data
- Fish welfare data

Image by Newton *et al.*, 2023



SALMONE
10 EURO
+ tasse

TRIGLIA
5 EURO
+ tasse

SPORGLIA
8 EURO
+ tasse

Sgombini
4 EURO
+ tasse

Sustainability indicators



<https://freesvg.org/eco-carbon-footprint-vector-icon>

Industry perspectives on sustainability indicators

Feed (costs)

Ocean health

Recycling by-products

Norwegian Atlantic salmon



Photos by Wesley Malcorps

Polish common carp

Freshwater availability

Predation

Land footprint

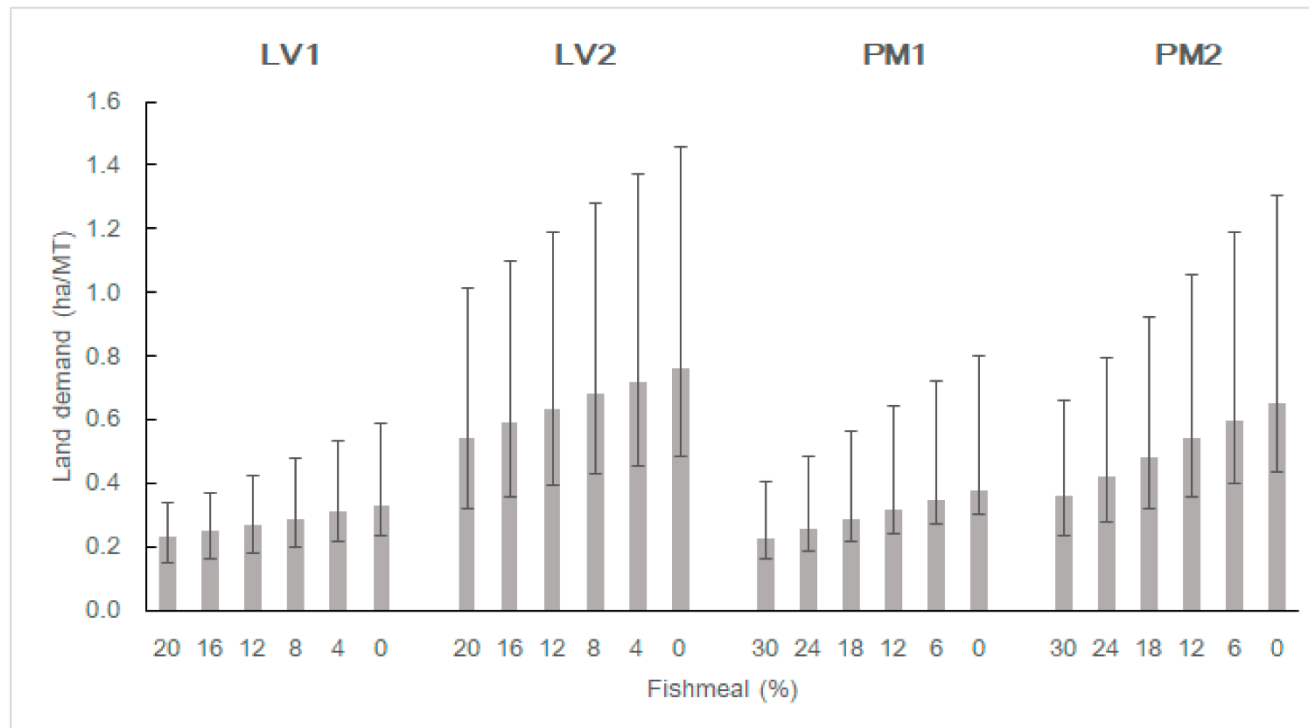


Cultural perceptions towards seafood products and values



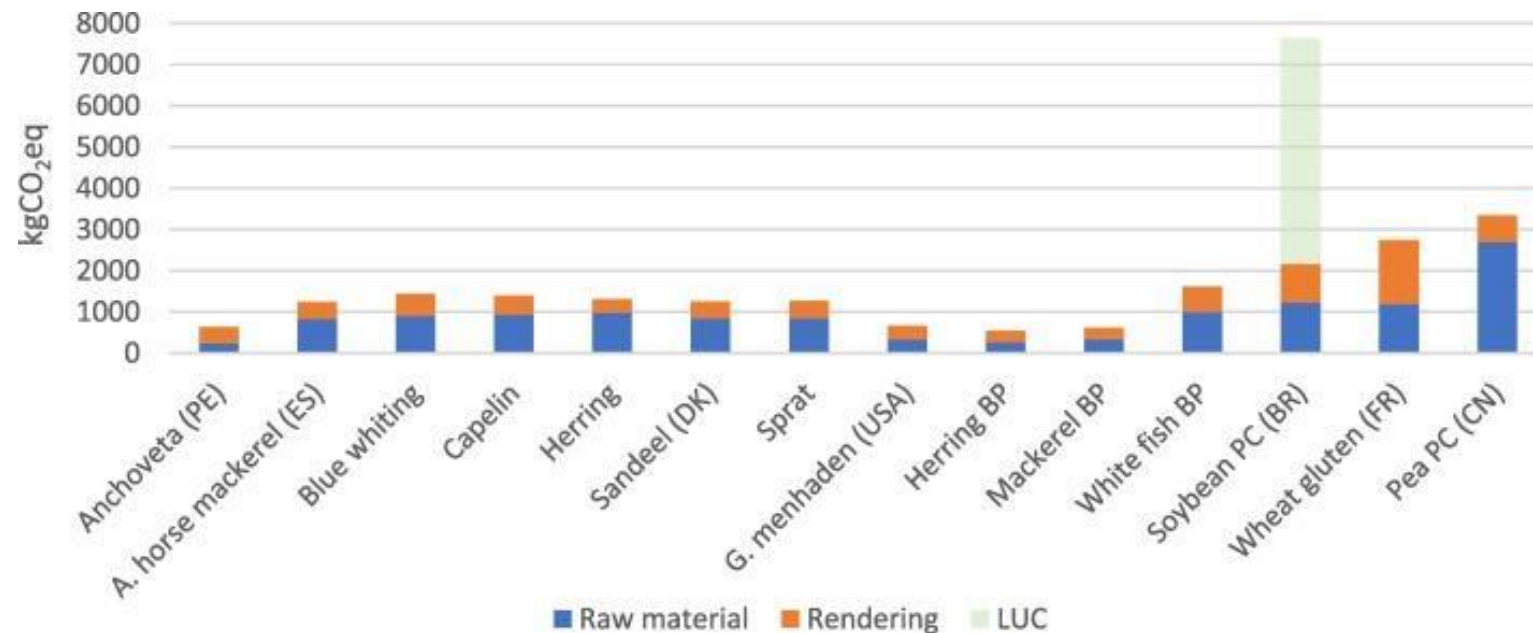
Trade-offs between marine and terrestrial system

- Change in land demand → fishmeal substitution with plant ingredients in shrimp diets (*L. vannamei* and *P. monodon*)
- Measuring resource trade-offs between the marine and terrestrial environmental



Need for traceability for MI from fisheries

- Marine ingredients are very variable in their impact between and even within species, mostly depending on the fuel intensity of the fishery from which they are sourced
- Large proportion of MI sourced from by-products (BP)
- Certified fisheries?



Incentives to utilise fish by-products

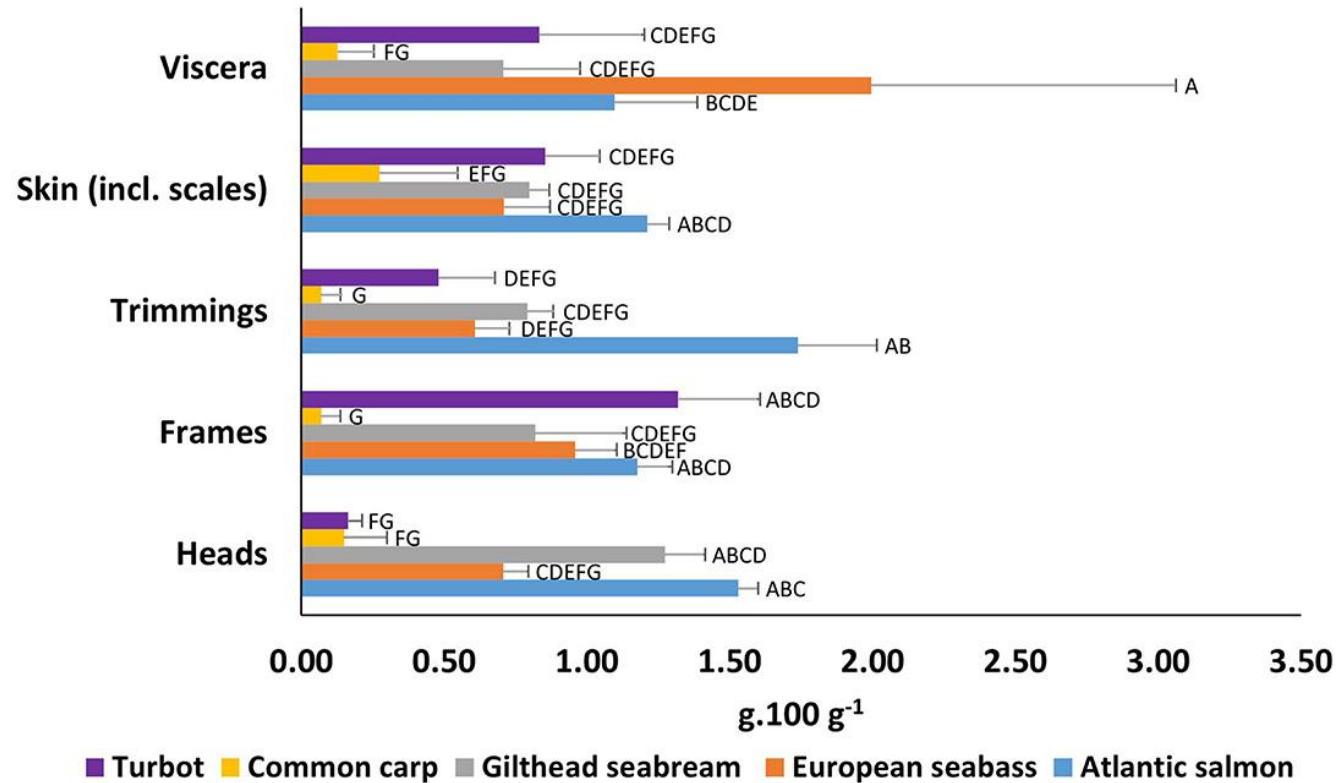
- **eFIFO**: Using economic allocation to quantify the Fish In : Fish Out ratio Kok et al., 2021
 - Allocating less “*whole fish*” towards low value fish ingredients originating from by-products
 - Aligned with LCA



“Filleting sole by hand”, by the National Institute for Occupational Safety and Health. Public domain.
Source: <https://www.flickr.com/photos/niosh/4755041685/in/photostream/>

Incentives to utilise aquaculture by-products

- Aquaculture processing by-products → interesting nutritional characteristics

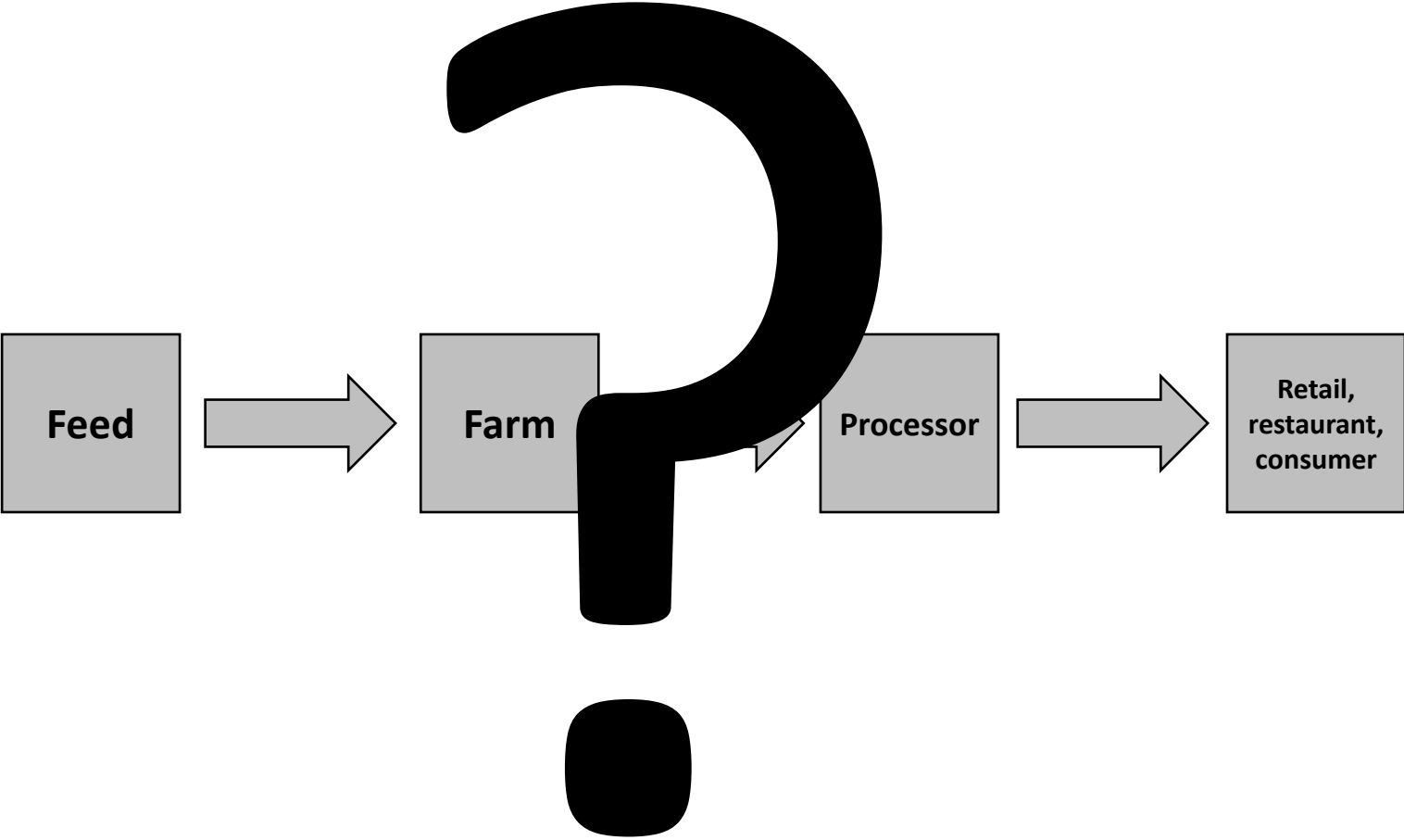


Total EPA+DHA content (g.100 g⁻¹) of wet weight by-products from European aquaculture species. Means that do not share letter(s) (A–G) are significantly different.

Malcorps *et al.*, 2021

- Legislation

How to manage traceability in the supply chain?



No records
or paper
records

- No records
 - Can get damaged, easy to make mistakes
 - Poor handwriting
 - Difficult to share
- **Missed opportunity**



Computer
records

- Centralised, one person got ownership
 - Difficult to share
- **Missed opportunity**



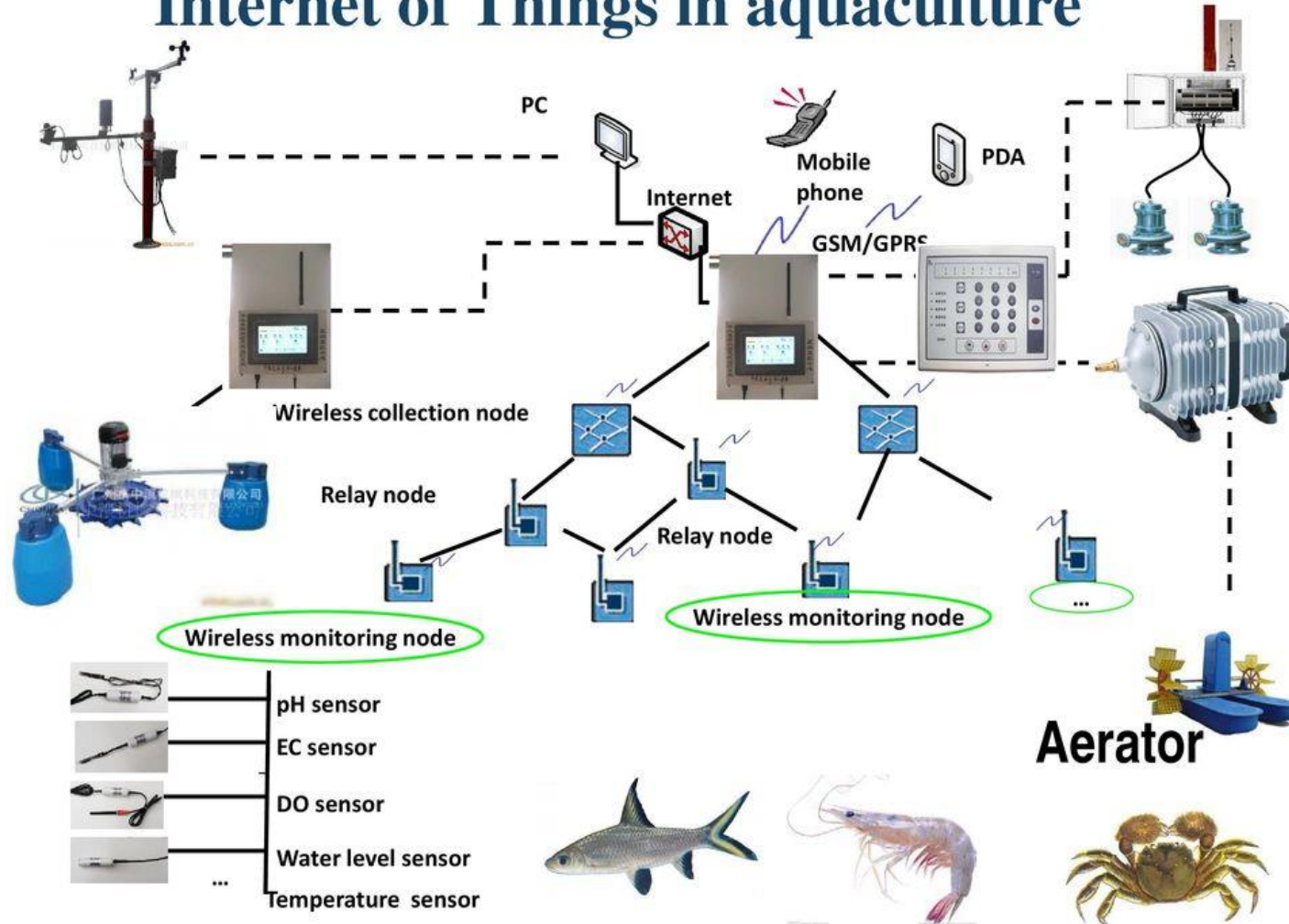
Shared
network

- Decentralised
 - Real-time
 - Big data
 - Offers opportunity to exchange data
- **The Future**

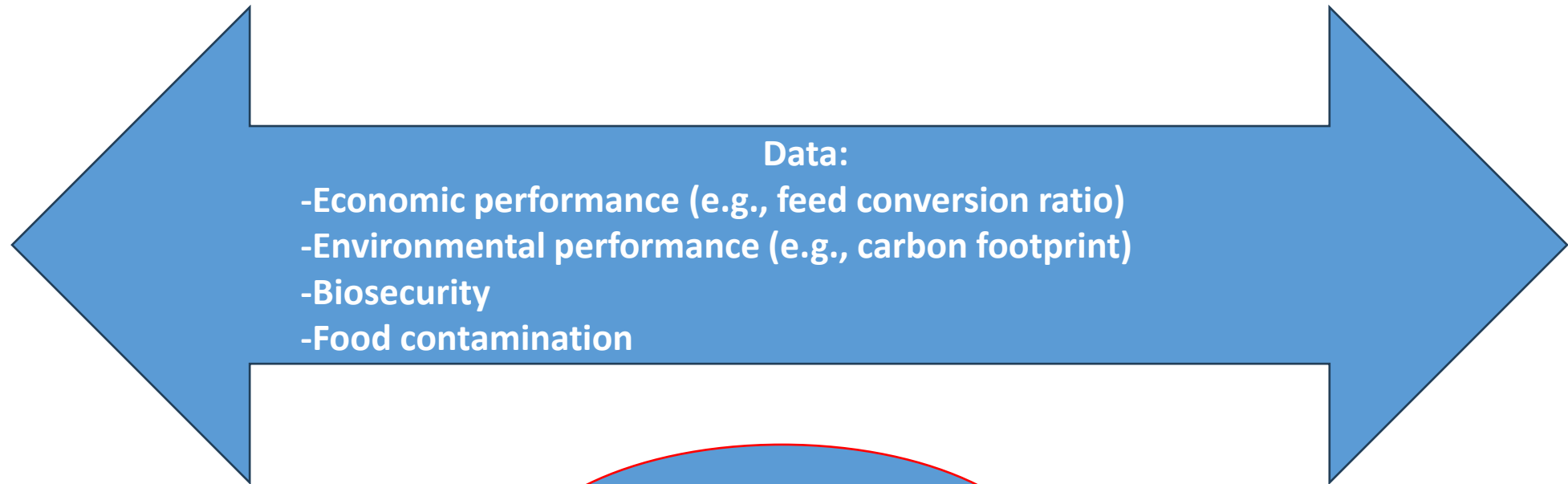
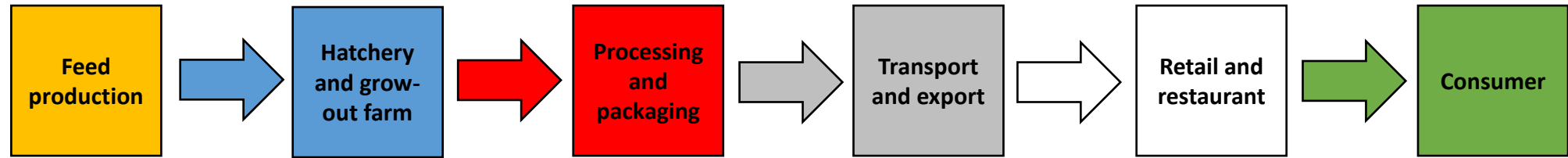
Photos by Wesley Malcorps

Supply chain of the future

Internet of Things in aquaculture

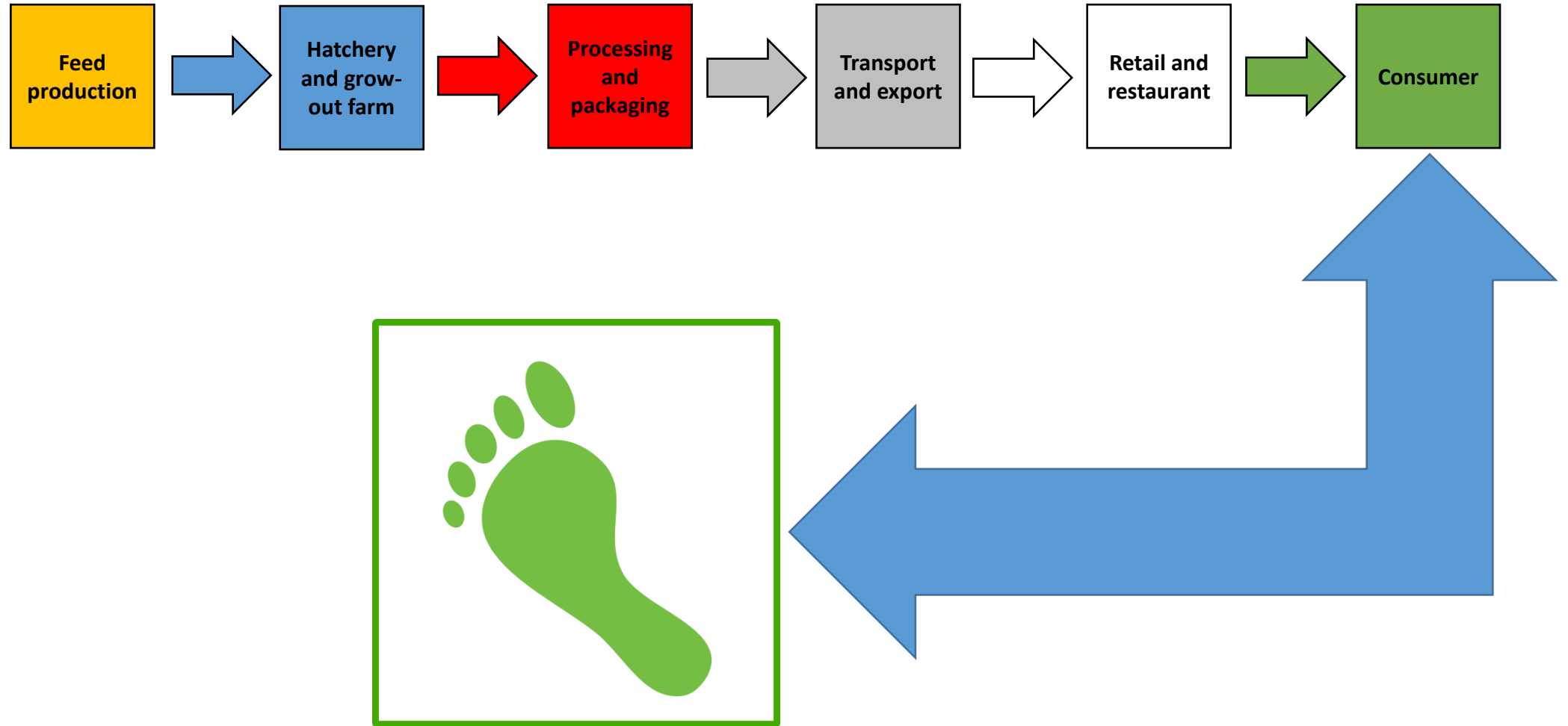


Critical Tracking Events and Key Data Elements



IMPORTANT!
All participants need
to feel comfortable
and protected...

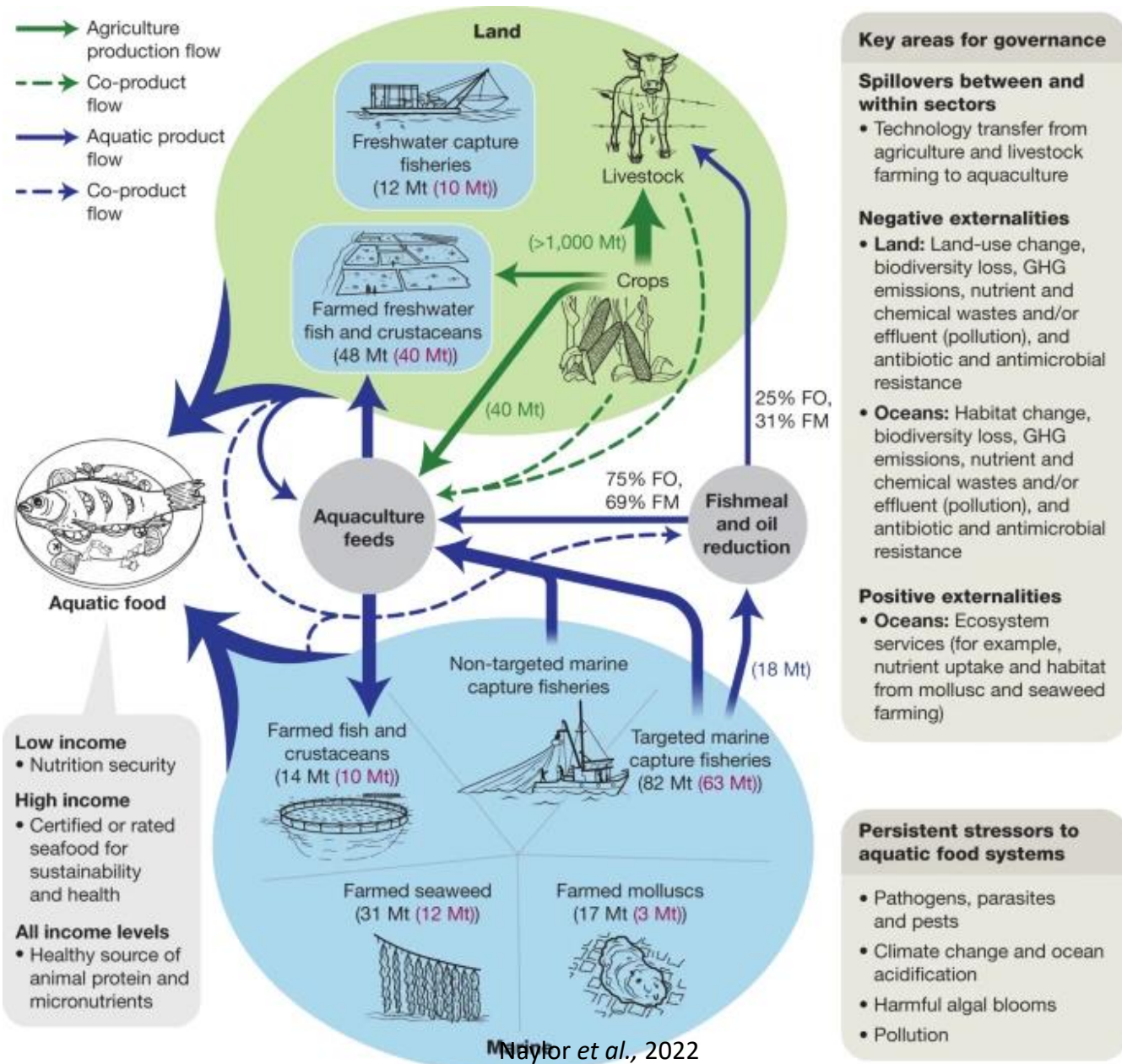
Ownership and access to data



<https://freesvg.org/eco-carbon-footprint-vector-icon>

Sustainability is a JOURNEY, not an endpoint!

Aquaculture linked...



Take home messages

-Sustainability

-“Impact” is location, culture and context specific.

-Sustainability is a journey...

-Where are we? What path do we want to follow? What do we need (to know)?

-What is the key data, who wants it and who needs it?

-Different levels of data for different stakeholders, e.g., carbon footprint not confidential, but certain data to measure it is confidential.

-Characteristics of aquaculture → small and large companies

Questions?

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Newton *et al.* (2023) Life Cycle Inventories of marine ingredients

Malcorps *et al.* (2022) Video: Fish By-Products and Blockchain Technology to Maximize Utilisation

Naylor *et al.* (2021) A 20-year retrospective review of global aquaculture

Malcorps *et al.* (2021) Global Seafood Trade: Insights in Sustainability Messaging and Claims of the Major Producing and Consuming Regions

Malcorps *et al.* (2021) Nutritional Characterisation of European Aquaculture Processing By-Products to Facilitate Strategic Utilisation

Kok *et al.* (2020) Fish as feed: Using economic allocation to quantify the Fish In : Fish Out ratio of major fed aquaculture species

Malcorps *et al.* (2019) The Sustainability Conundrum of Fishmeal Substitution by Plant Ingredients in Shrimp Feeds

Thøgersen & Thøgersen (2017) Claiming seafood is 'sustainable' risks limiting improvements

Thøgersen *et al.* (2012) Refocusing Seafood Sustainability as a Journey Using the Law of the Minimum