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Where to invest best?

Guide for the selection of valorisation option

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@Sostenibilidad

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THE FRAMEWORK PROGRAMME FOR RESEARCH AND INNOVATION

HORIZON 2020

January 2019. Denmark

Alternative uses

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<u>Objectives</u>: obtain the maximum use of fish resources, but:

- With compliance of landing obligation
- Not encourage the overfishing
- Do not damage current markets and commercialization channels

<u>Type of uses:</u>

- New strategies of commercialization
- New fish products
- Extracted added-value compounds
- Ingredients for feed
- Other technical uses

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Alternative uses

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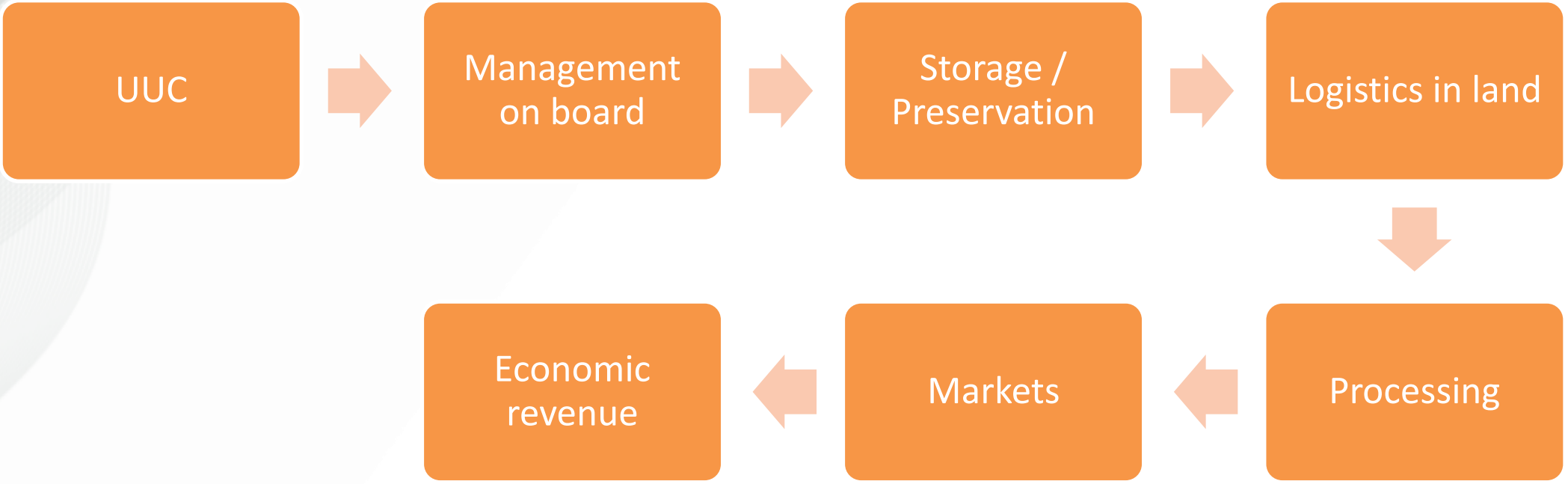
New strategies of commercialization :

- HORECA
- Stock storage (frozen,…)
- Fish processing
- Adjust the catches to de demand



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Alternative uses

NEW FISH PRODUCTS

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Opportunity: New concepts adapted to the USER - CUSTOMER

- **Value–added products** : fillets, loins, pulps…
- **Re-structured high quality**: filled products (two-three layers, different shapes: balls, dumplings.. .), surimi concepts: spaghetti, balls, fish-chips...
- **Sushi** products…
- **Products for kids/seniors**: burgers, patties, nuggets, sausages, sliced cooked products...
- **Ready-to-Eat meals and minimally-processed foods "gourmet" quality**: Salads&Sides, "semi-prepared" foods…

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Alternative uses

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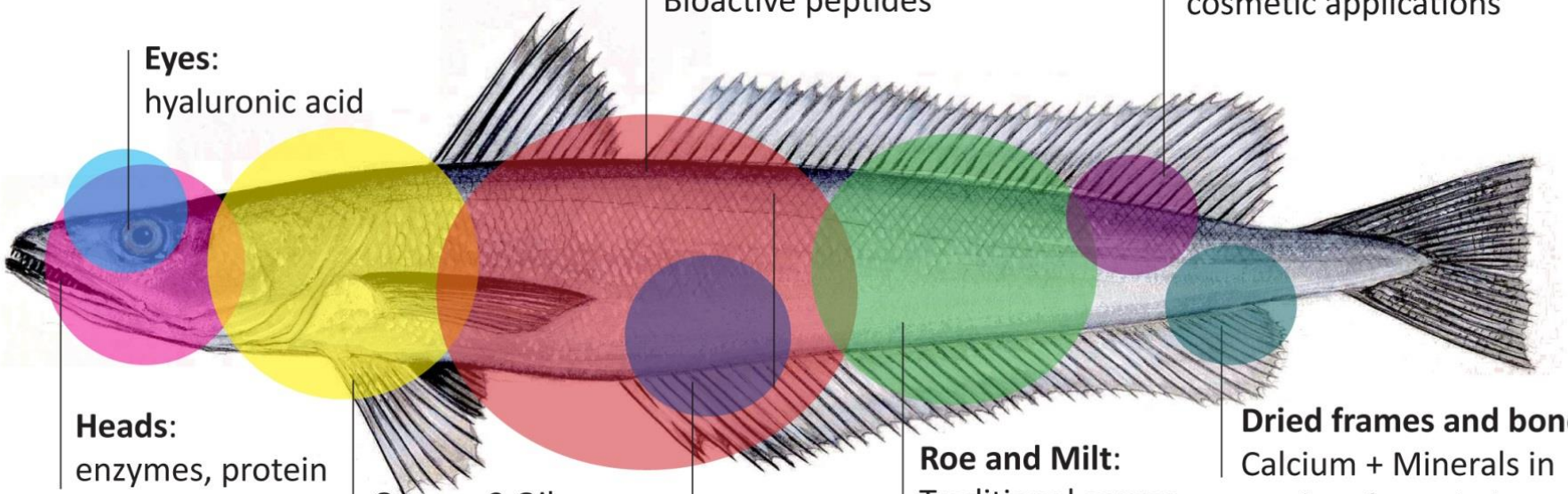
HIGH-ADDED VALUE COMPOUNDS



Fish Flesh:
Surimi, Minced fish, Marine Nutraceuticals, Hydrolisates, Bioactive peptides

Skin:
Collagen + Gelatin for human and animal nutrition and cosmetic applications

Eyes:
hyaluronic acid

Heads:
enzymes, protein

Omega-3 Oil
Omega-6
Fatty Acids

Liver: fish oil
Viscera: enzymes, protein

Roe and Milt:
Traditional source of Aa in Asian cuisine for food and nutraceutical applications

Dried frames and bones:
Calcium + Minerals in product formulations and animal feed (pet-food, aquaculture, livestock)

All Ingredients: For foods, dietary supplements, animal nutrition, medicine, cosmetic Ingredients, and what cannot be used previously , can go ultimately to bioenergy (biogas)

Alternative uses

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ANIMAL FEED USES

Ingredients for feed (dried, silage,...):

- Pet-food
- Aquaculture
- Livestock

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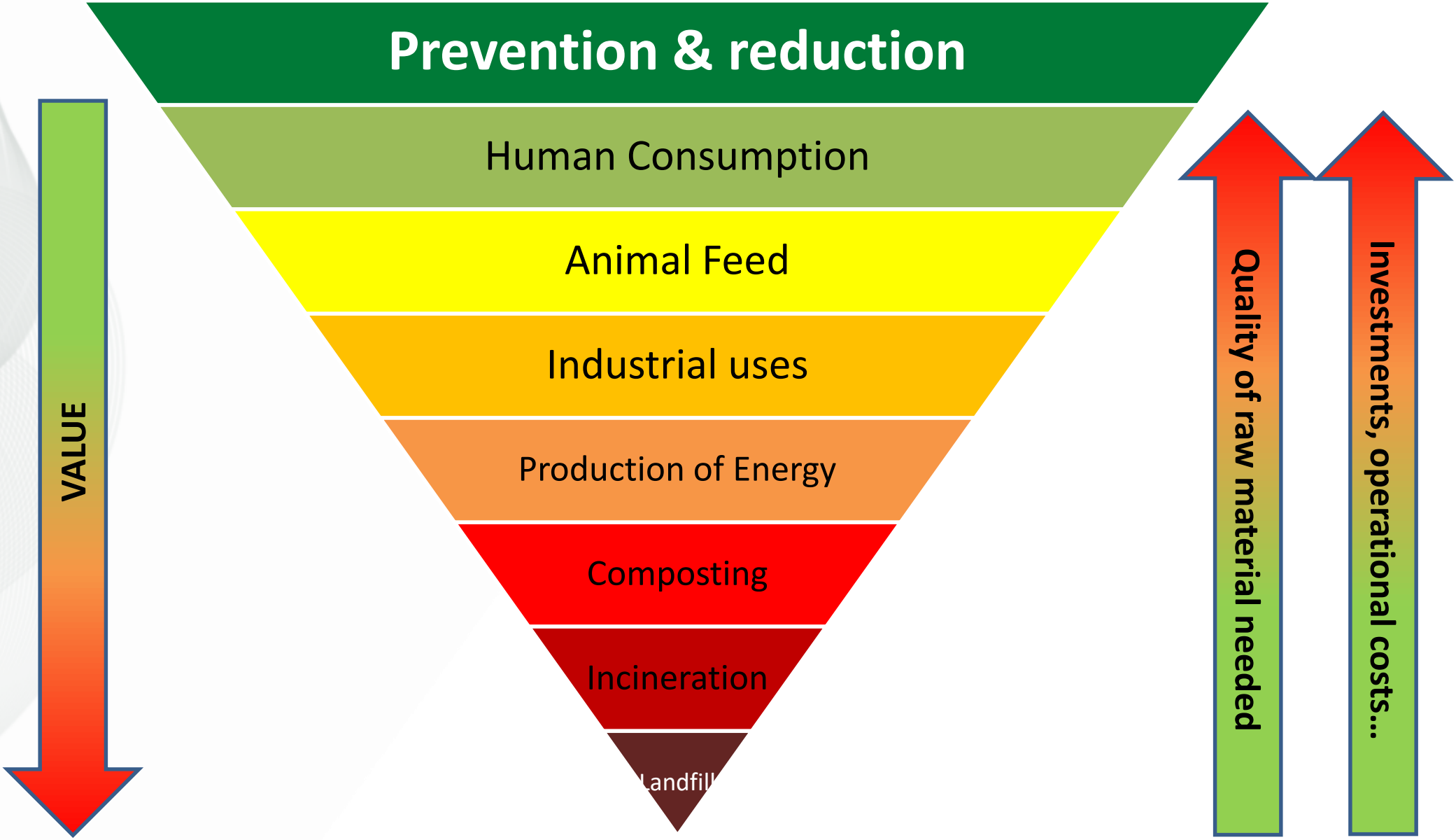

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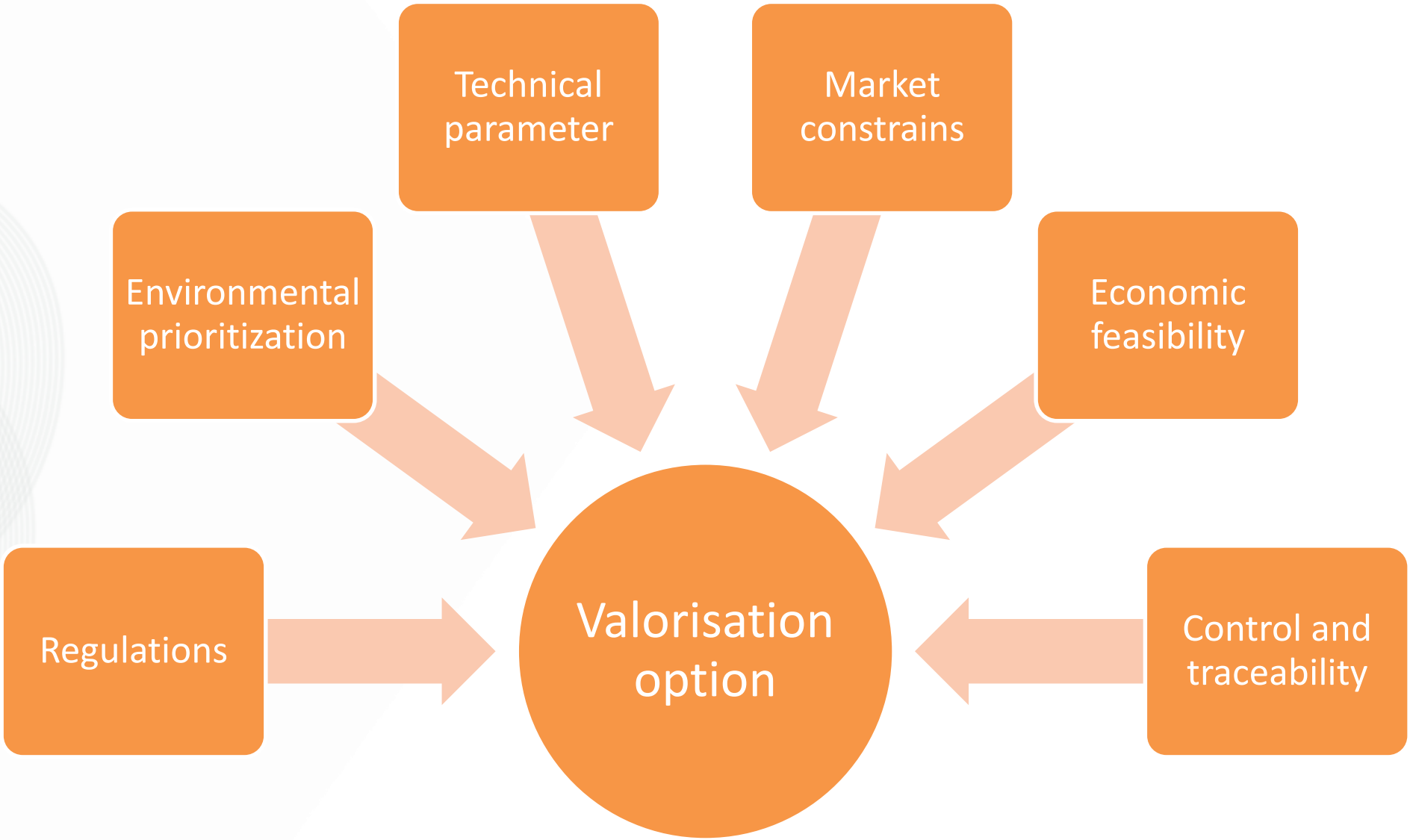
Implications



Best option selection methodology

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Simplified methodology

- ✓ More than 30 valorisation possibilities evaluated
- ✓ Detailed Product Data sheet and Simplified Fact sheet created

Product data sheet	Name of the product: e.g. Fish meal / Gelatine ...
PRODUCT INFORMATION	
Product description	Describe the characteristics of the products and the different qualities if it applies, indicating the quality parameter(s)...
Product applications (Category)	Food / Pharma / Cosmetic / Bulk chemical / Feed / Pet Food / Energy / Fertilizer / Others
Product applications	In each category of use, describe a more detailed application of the product. (e.g. Bulk chemical: use as paint solvent)
Product main characteristics and quality factors	When information is available, detail the properties of the product: Functional properties (Technological and health properties, such as textural properties, antioxidant, solvent....) Quality parameters. (physic and chemical characteristics...)
Product Market	Describe the Market Segmentation. Volume, prices, main producers/competitors... (for each different use) (Values and trends when possible) Other pro ducts that may compete with?
Legal Factors	Refer only to those critical legal restriction or rules specific that may affect the commercialization of this product.
RAW MATERIAL REQUIREMENTS	
Possible raw materials	From which species, part of the fish...
Requirements for the raw material	For example information, such as: Physico-chemical characterization For food: Nutritional characterization (nutritional label and claims) Feed Microbiological characterization. Any microbiological requirement. Technological characterization, Bones distribution, mechanical deboning and/or skinning feasibility... Need separation... Alteration under refrigeration conditions before and after thawing Sensory alteration for food... Microbiological spoilage... Off odours... Biomolecules degradation... (low/quick)
PROCESS INFORMATION	
Integral use of fish?	YES / NO / % of use (aprox)
Process description	Describe the process need for the obtaining of the product from the raw material. If various processes are available describe them. If different raw materials can be used and different process is needed describe them. Technology maturity...
Technical Factors	Describe which factors, criteria of each raw material are critical or may influence in the process, its economic feasibility... Indicate yields... Critical aspects... Energy consumption... Water consumption... Minimum raw material amount... Logistics...
Economic Factors	Determine parameters that can affect the economic viability. Inversion needed... Operational costs...

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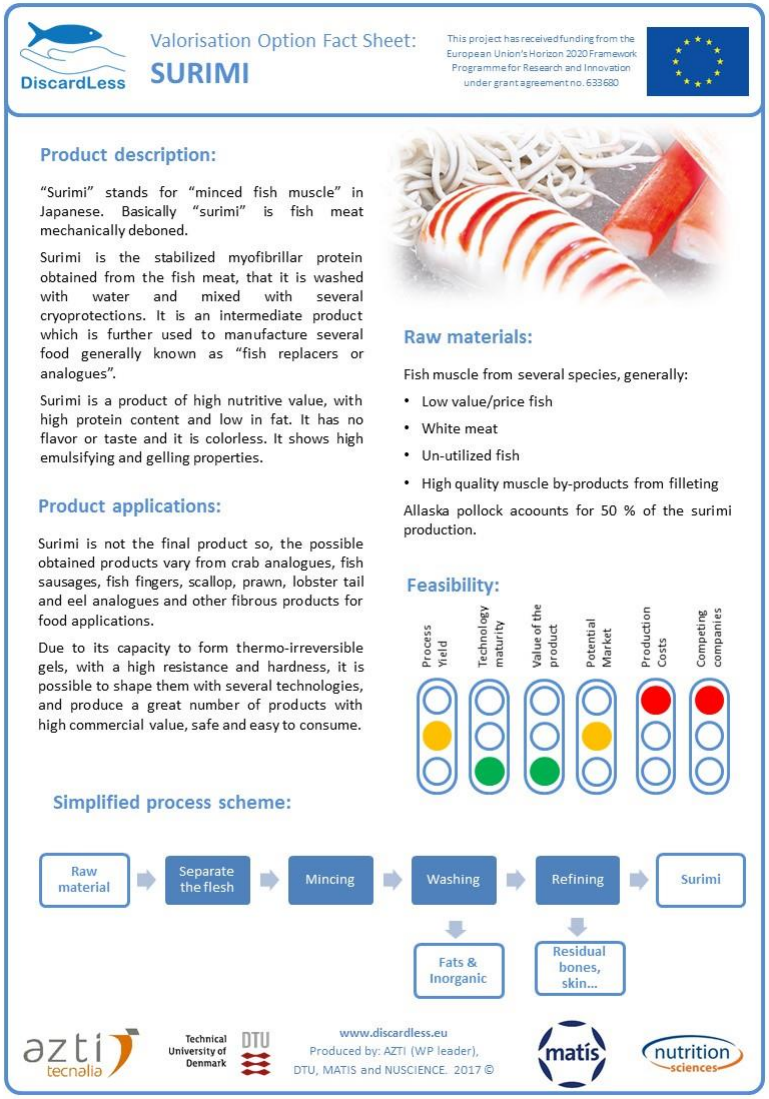

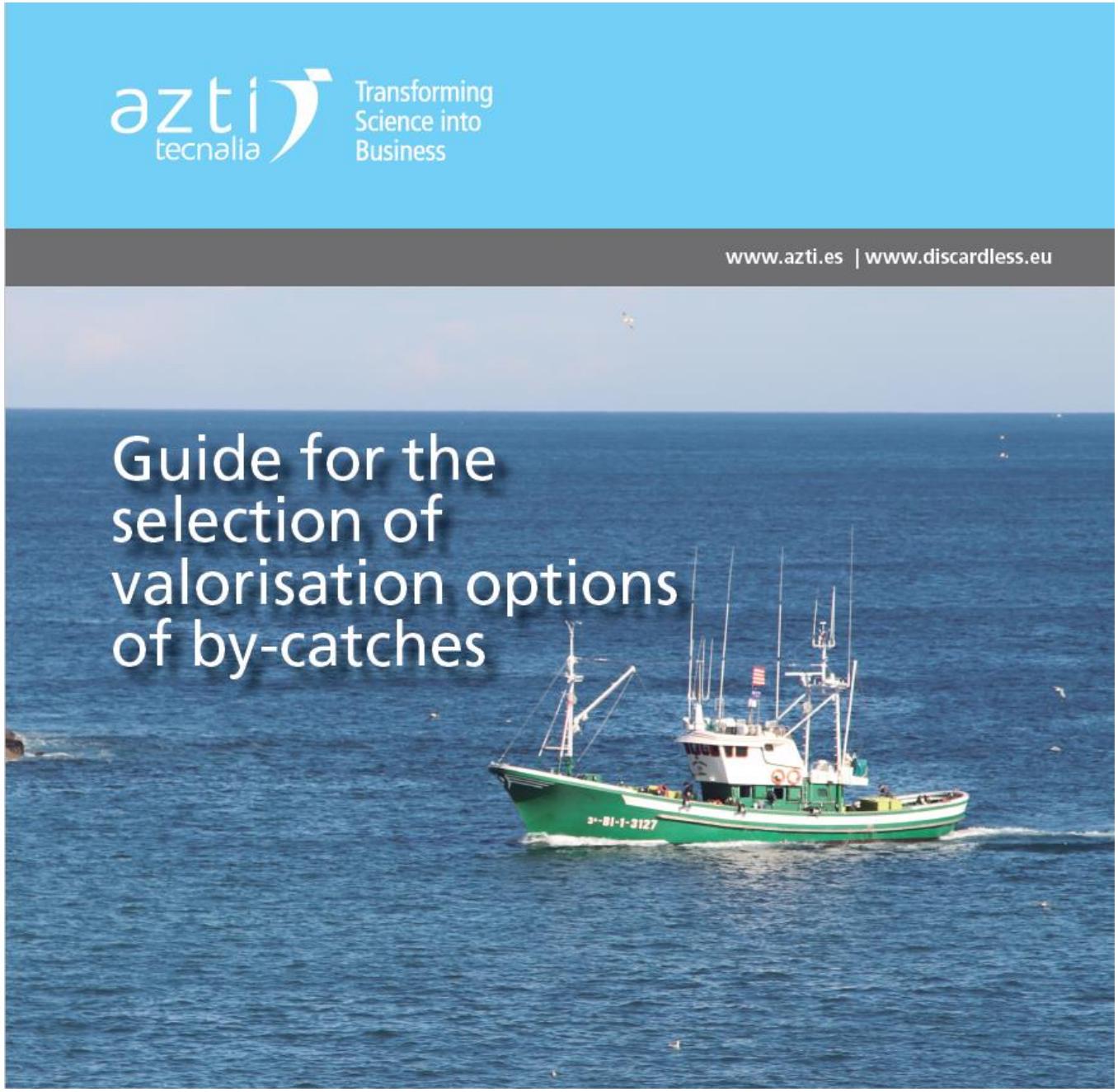
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Guide for the selection of valorisation options of by-catches

Pilots

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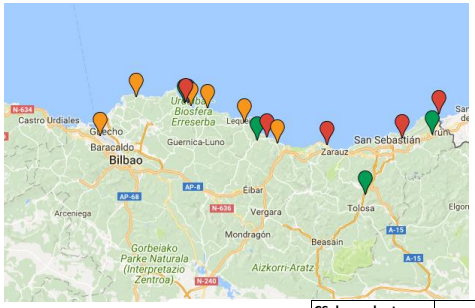
Evaluate the scenario

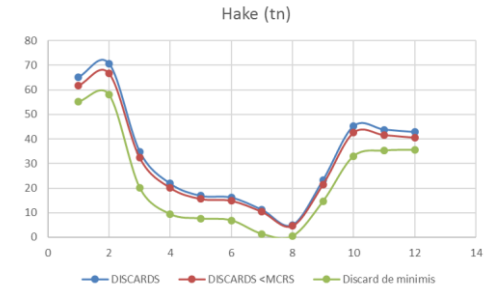
Prioritize solutions

Fine tune of the solution

Pilots

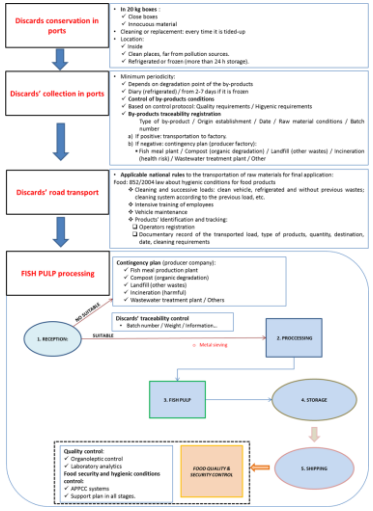
Economics

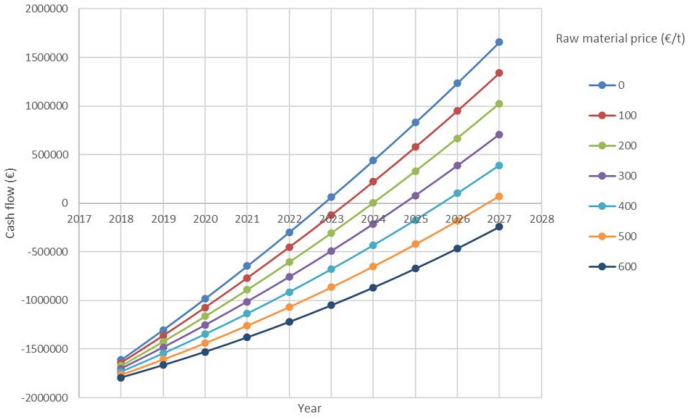




	Option	CS dependent: Available Raw Material (A)	CS dependent: Existing facilities (C)		Technical Parameters: Yield (B)	Technical Parameters: Technology maturity (D)		Economical Parameters: Value of the product (E)	Economical Parameters: Potential Market (F)	Economical Parameters: Production Costs (G)	Economical Parameters: Competing companies (H)		Total Score (FACTOR)
Category	Valorisation option	10	7	5	7	5	7	10	10	7	2	7	
FOOD	New Fish Products	5	5	1,00	5	5	1,00	5	5	3	1	0,91	0,97
	Surimi	3	0	0,35	3	5	0,77	5	5	1	1	0,66	0,62
	Fish pulp	5	5	1,00	3	5	0,77	5	5	5	5	1,00	0,94
BIO-PRODUCTS	Bioactive Peptides	5	1	0,67	3	3	0,60	5	5	1	3	0,69	0,65
	Polyunsaturated fatty acids (PUFA)	5	3	0,84	3	5	0,77	5	5	3	1	0,91	0,84
	Proteases and Proteolytic enzymes	3	0	0,35	0	1	0,08	1	1	1	1	0,33	0,20
	Chondroitin sulphate	0	3	0,25	1	5	0,53	5	3	1	1	0,66	0,50
	Fat-soluble vitamins	3	0	0,35	1	3	0,37	3	3	1	1	0,51	0,42
	Minerals: Calcium, CaCO3	5	3	0,67	3	5	0,77	3	3	5	3	0,75	0,73
	Dye / pigments (Astaxantin)	1	0	0,12	0	5	0,42	5	3	1	3	0,69	0,44
	Collagen	3	3	0,60	1	5	0,53	3	3	1	1	0,61	0,58
	Gelatine	3	3	0,60	1	5	0,53	3	3	2	1	0,61	0,58
	Keratin	1	0	0,12	1	3	0,37	3	3	0	3	0,49	0,35
	Insulin	3	0	0,12	3	3	0,43	3	3	0	0	0,30	0,30
	Histamine	1	0	0,12	0	3	0,25	1	1	0	0	0,00	0,20
	Hyaluronic acid	1	0	0,12	1	3	0,37	3	3	1	0	0,50	0,35
	Chitin / Chitosan	1	0	0,12	1	5	0,53	5	3	3	1	0,76	0,51
	Plant Essence	3	0	0,35	1	5	0,53	1	0	3	3	0,27	0,39
	Phospholipids	3	0	0,35	1	3	0,37	3	3	0	3	0,49	0,41
	Proptone	5	1	0,67	3	5	0,77	1	1	5	1	0,62	0,65
	Squalene	0	0	0,00	1	3	0,37	5	3	1	0	0,64	0,37
FEED	Fish meal	5	5	1,00	5	5	1,00	1	1	5	1	0,72	0,90
	Fish oil	5	5	1,00	5	5	1,00	1	1	5	1	0,72	0,90
	Mink feed	5	3	0,84	5	3	0,83	1	1	5	3	0,85	0,69
	Marine beef/Bait	5	1	0,67	5	3	0,83	1	1	5	3	0,85	0,65
	Direct Pig Feed	5	1	0,67	5	3	0,83	1	1	5	3	0,85	0,70
	Protein concentrate (FPC)	5	3	0,84	5	5	1,00	3	5	1	3	0,90	0,92
	Protein Hydrolysate (FH)	5	3	0,84	5	5	1,00	3	5	1	3	0,90	0,92
	Silage	5	0	0,59	5	5	1,00	1	1	5	5	0,88	0,70
	Bioactive growth	5	0	0,59	3	3	0,60	1	1	5	5	0,88	0,55
INDUSTRIAL USES	Leather	1	3	0,36	1	5	0,53	3	1	3	5	0,53	0,49
	Fish oil	5	5	1,00	5	5	1,00	1	1	5	1	0,72	0,90
	Minerals: Calcium, CaCO3	5	3	0,84	3	5	0,77	1	1	5	3	0,85	0,72
	Chitin / Chitosan	0	0	0,00	3	5	0,77	1	1	5	1	0,47	0,45
ENERGY	Biogas	5	1	0,67	1	3	0,37	1	1	3	1	0,47	0,48
AGRONOMIC USES	Compost	5	1	0,67	3	3	0,60	0	3	5	1	0,50	0,58
	Fertilizers	5	1	0,67	3	5	0,94	0	3	5	1	0,50	0,94

- Pilot of “Mackerel burger for scholar catering”
- Favouring agent
- Fish hydrolysate and bioactive peptides





Pilots

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CONCLUSIONS

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- ✓ There is many options for valorisation solution for UUC
- ✓ Each scenario as its own solution Ad Hoc: different UUC quantity, quality, dispersion, available infrastructures…

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Strategies for the gradual elimination of discards in European fisheries

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No: 633680

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What can we do with unavoidable unwanted catches?

Thank you !!!

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