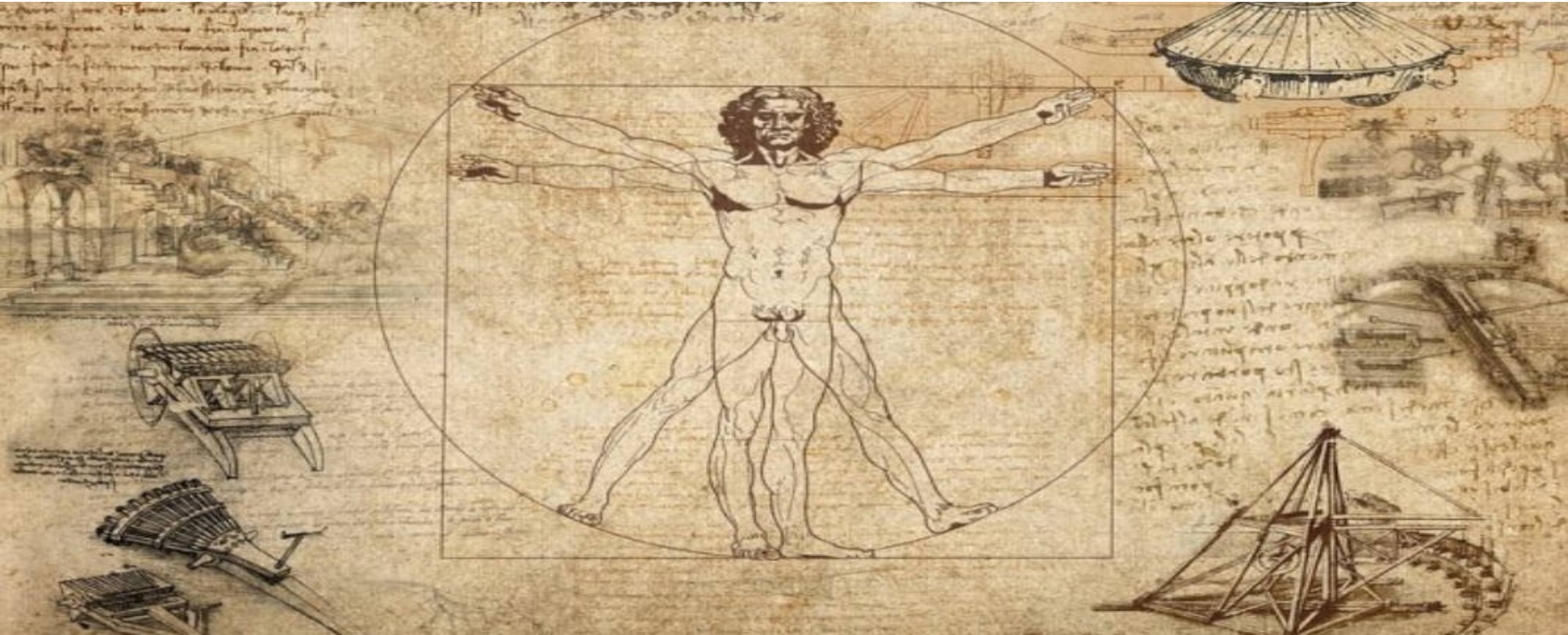
Är haven och algodling nyckeln till en hållbar framtid?

Fredrik Gröndahl, KTH fgro@kth.s




ENSURING FOOD SECURITY
MOVING FROM A FOSSIL-BASED ECONOMY TO A BIOECONOMY
USING BETTER WHAT WE ALREADY USE
natural resources management
jobs & growth competitiveness inclusiveness
LONG TERM SUSTAINABLE DEVELOPMENT
climate change
global sustainability
responsible development with citizen sustainable consumption
UNLOCKING THE POTENTIAL OF SEAS & OCEANS
USING WELL WHAT WE DON'T USE YET

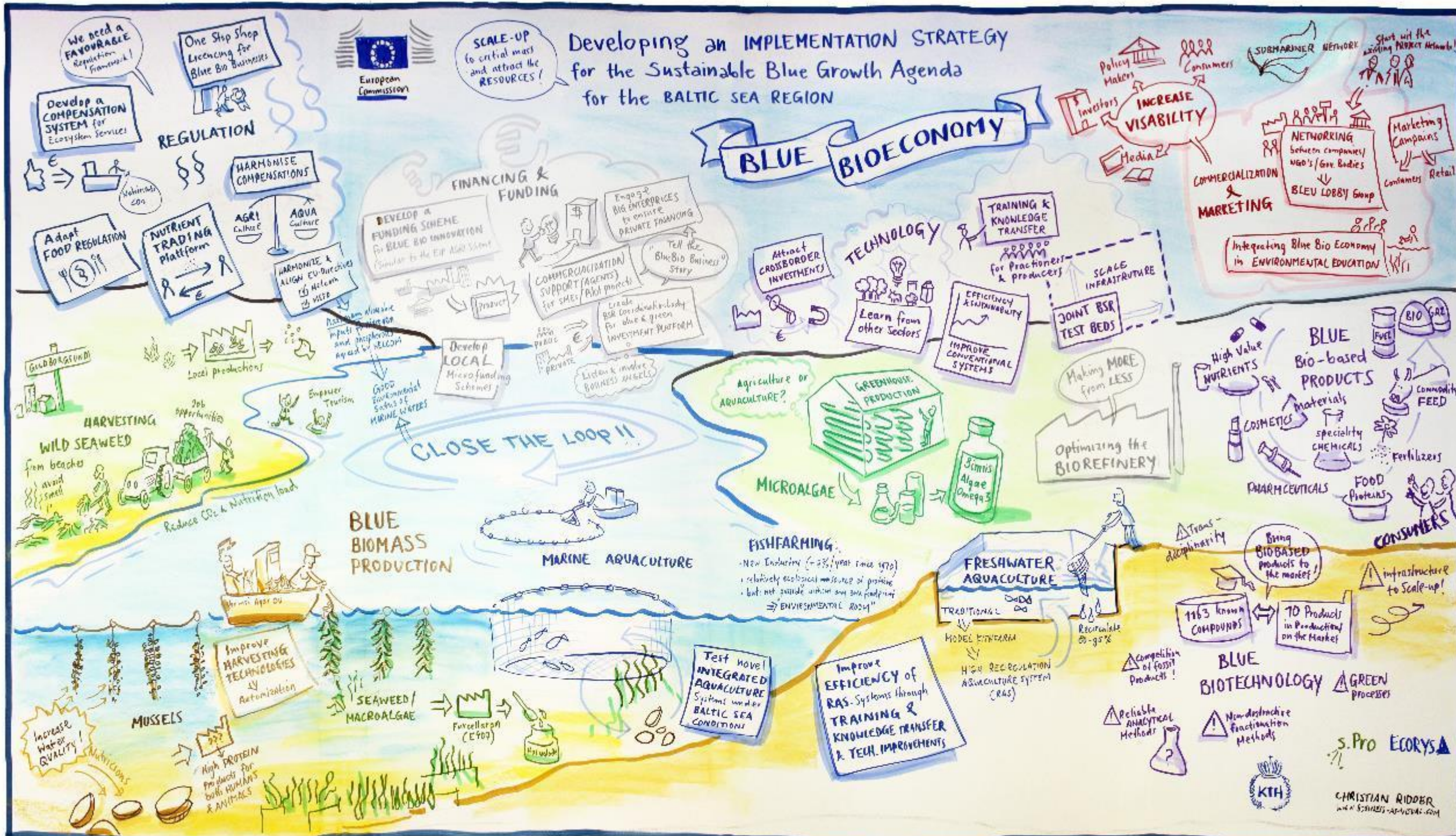
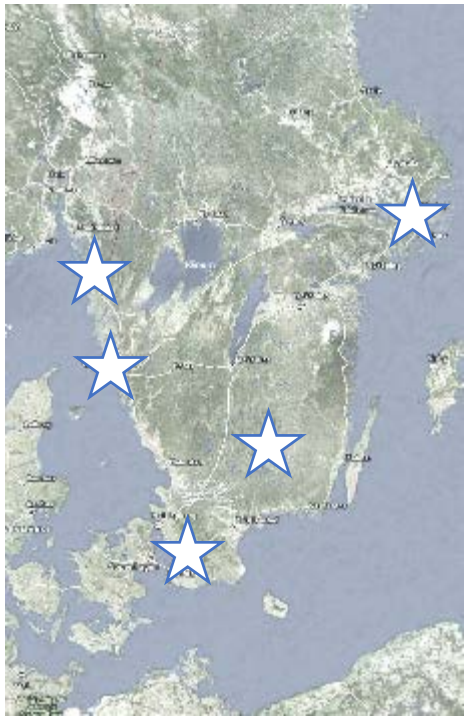

Developing an IMPLEMENTATION STRATEGY for the Sustainable Blue Growth Agenda for the BALTIC SEA REGION
BLUE BIOECONOMY
We need a FAVOURABLE Regulation framework!
One Stop Shop Licencing for Blue Bio Businesses
European Commission
SCALE-UP to critial mass and attract the RESOURCES!
Develop a COMPENSATION SYSTEM for Ecosystem Services
REGULATION
Habitats Directive
HARMONISE COMPENSATIONS
AGRI Culture
AQUA Culture
Adapt FOOD REGULATION
NUTRIENT TRADING Platform
HARMONIZE & ALIGN EU-Directives
FINANCING & FUNDING
DEVELOP a FUNDING SCHEME for BLUE BIO INNOVATION
Engage BIG ENTERPRISES to ensure PRIVATE FINANCING
COMMERCIALISATION SUPPORT (AGENTS) for SMEs / R&I projects
"Tell the BlueBio Business" Story
Project
Create BSR Coordination body for blue & green INVESTMENT PLATFORM
Listen & involve BUSINESS ANGELS
Develop LOCAL Micro funding Schemes
Local productions
Empower Tourism
Good Environmental Status of MARINE WATERS
GULDBORGSUND
HARVESTING WILD SEAWEED
from beaches
avoid smell!
Job opportunities
Reduce CO2 & Nutrient load
CLOSE THE LOOP !!
BLUE BIOMASS PRODUCTION
MARINE AQUACULTURE
Improve HARVESTING TECHNOLOGIES by Automization
MUSSELS
SEAWEED / MACROALGAE
Increase Water QUALITY!
Nutrients
High PROTEIN products for both HUMANS & ANIMALS
Furcellaran (E407)
Test novel INTEGRATED AQUACULTURE Systems under BALTIC SEA CONDITIONS
TECHNOLOGY
Attract CROSSBORDER INVESTMENTS
Learn from other Sectors
TRAINING & KNOWLEDGE TRANSFER for Practioners & producers
EFFICIENCY & SUSTAINABILITY
IMPROVE CONVENTIONAL SYSTEMS
SCALE INFRASTRUCTURE
JOINT BSR TEST BEDS
Agriculture or AQUACULTURE?
GREENHOUSE PRODUCTION
MICROALGAE
Simris Algae Omega 3
Making MORE from LESS
Optimizing the BIOREFINERY
FISHFARMING
• New Industry (+8%/year since 1970)
• relatively ecological resource of protein
• but: not possible without own footprint
⇒ ENVIRONMENTAL ROOM"
FRESHWATER AQUACULTURE
TRADITIONAL
MODEL ESTONIA
HIGH RECIRCULATION AQUACULTURE SYSTEM (RAS)
Recirculate 85-95%
Improve EFFICIENCY of RAS-Systems through TRAINING & KNOWLEDGE TRANSFER & TECH. IMPROVEMENTS
Trans-disciplinarity
Competition of fossil Products!
Reliable ANALYTICAL Methods
Non-destructive fractionation Methods
BLUE BIOTECHNOLOGY
GREEN processes
1163 known COMPOUNDS
Bring BIOBASED products to the market!
10 Products in Production/on the Market
CONSUMERS
Infrastructure to Scale-up!
BLUE Bio-based PRODUCTS
BIO GAS
FUEL
High Value NUTRIENTS
Commodity FEED
Materials
COSMETICS
speciality CHEMICALS
Fertilizers
PHARMACEUTICALS
FOOD Proteins
INCREASE VISABILITY
Policy Makers
Consumers
Investors
Media
SUBMARINER NETWORK
Start wit the existing PROJECT Networks!
NETWORKING between companies/ NGO's/Gov Bodies
BLEU LOBBY Group
Marketing Campains
Consumers
Retail
COMMERCIALIZATION & MARKETING
Integrating Blue Bio Economy in ENVIRONMENTAL EDUCATION
s.Pro
ECORYS
KTH
CHRISTIAN RIDDER

Photo: Cervin/Nylund

seafarm

MAKROALGER FÖR ETT
BIOBASERAT SAMHÄLLE



KTH VETENSKAP OCH KONST

CHALMERS
UNIVERSITY OF TECHNOLOGY

GÖTEBORGS UNIVERSITET

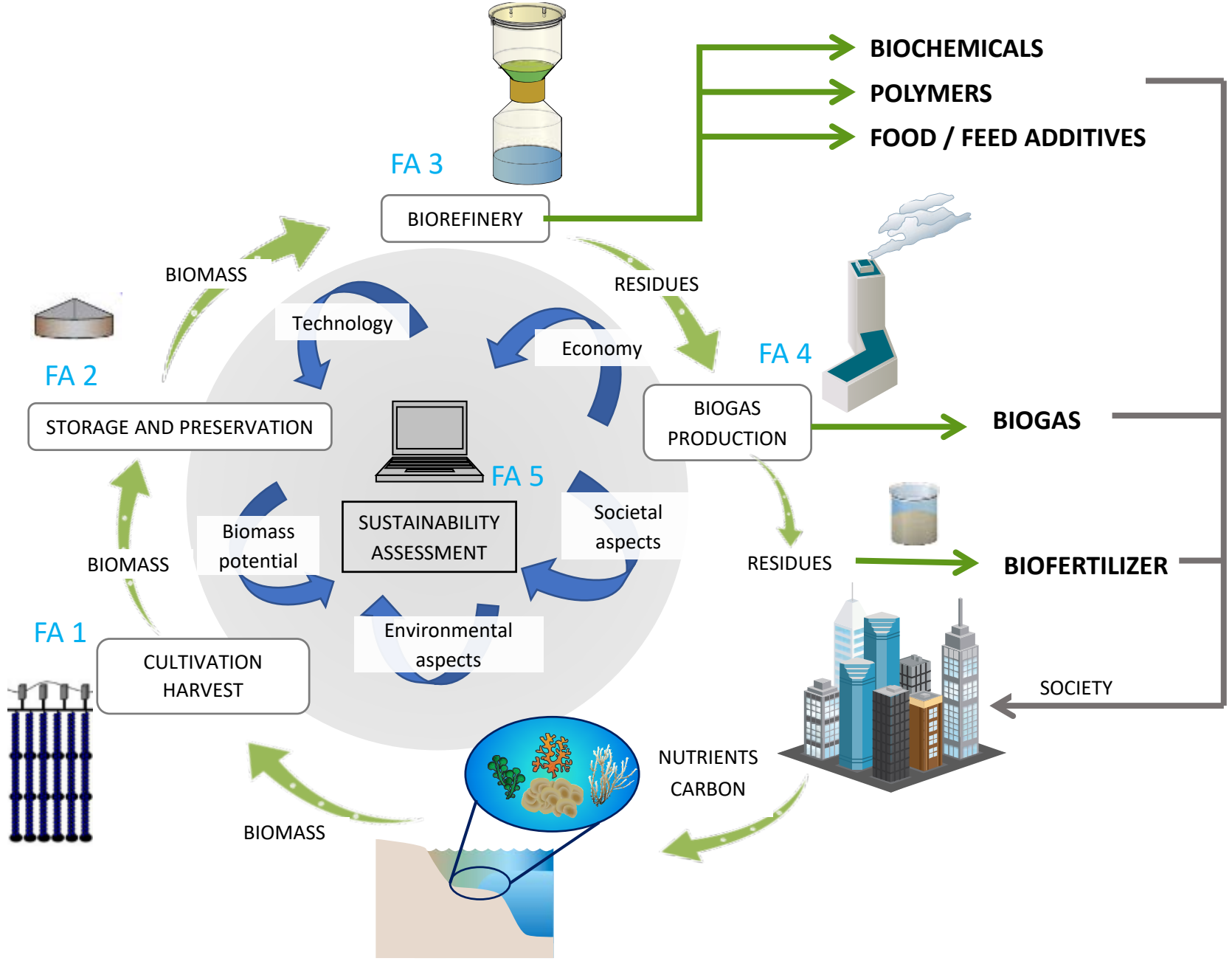
Linnéuniversitetet

LUNDS UNIVERSITET

Forskningsrådet Formas


A TENE

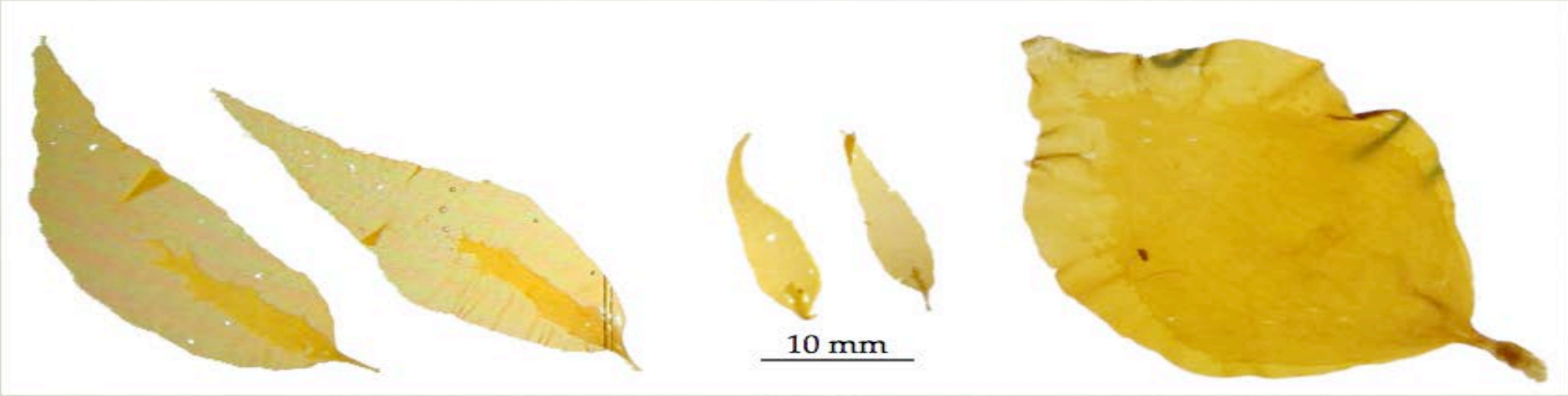

© Eduardo Infantes


FA 3
BIOREFINERY
BIOCHEMICALS
POLYMERS
FOOD / FEED ADDITIVES
BIOMASS
RESIDUES
FA 2
STORAGE AND PRESERVATION
Technology
Economy
FA 4
BIOGAS PRODUCTION
BIOGAS
FA 5
SUSTAINABILITY ASSESSMENT
Biomass potential
Societal aspects
Environmental aspects
BIOMASS
RESIDUES
BIOFERTILIZER
FA 1
CULTIVATION HARVEST
SOCIETY
NUTRIENTS
CARBON
BIOMASS

CONDUCTED/ONGOING EXPERIMENTS

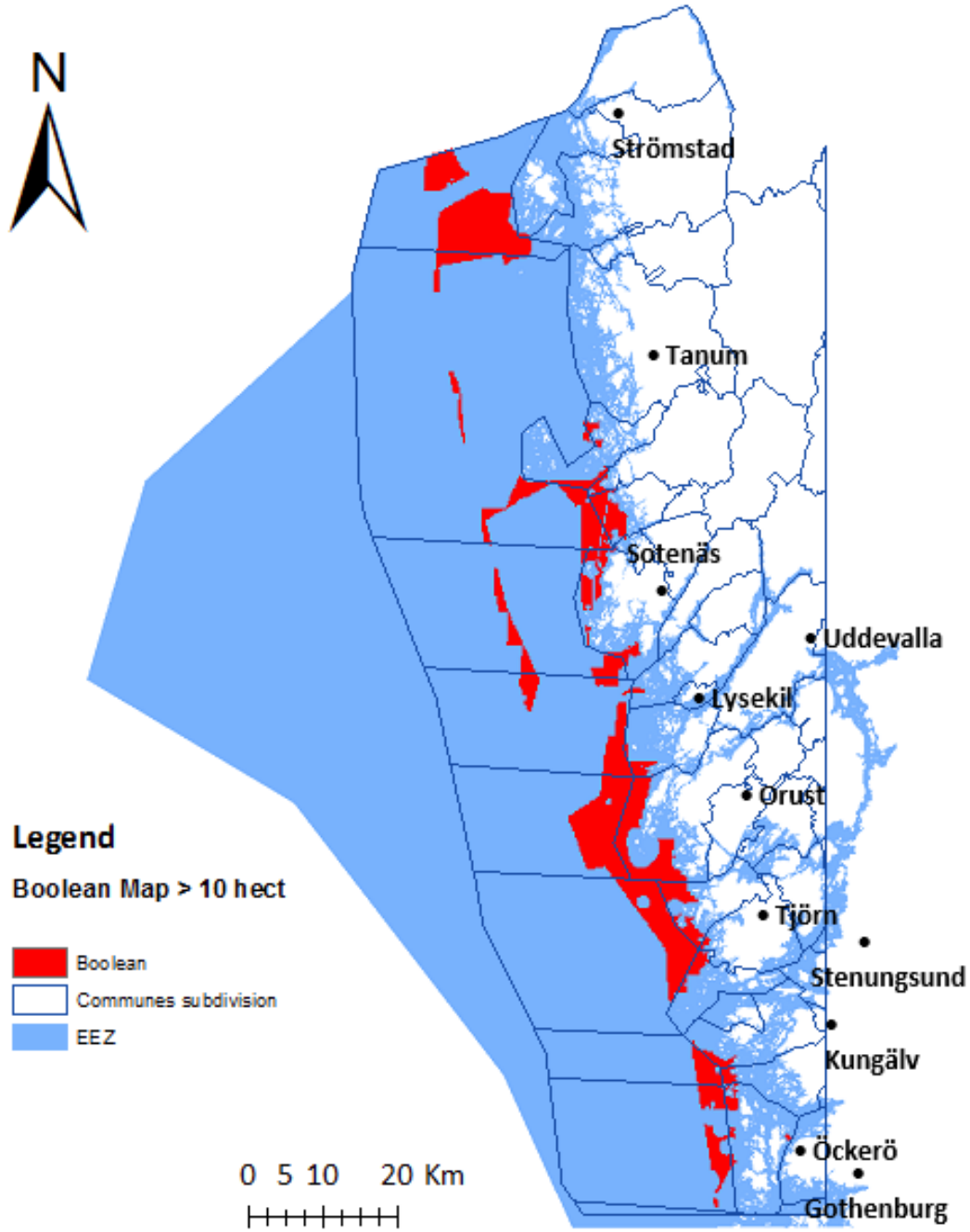
Exp 4: Effect of spore density

- 5 spore densities: 125, 250, 500, 1000, 2000 spores/ml
- indoor cultivation for 9 w
- cultivation depth 2 m, 100 m seeded line at Vedskär
- start of seabased cultivation 6/2 2015

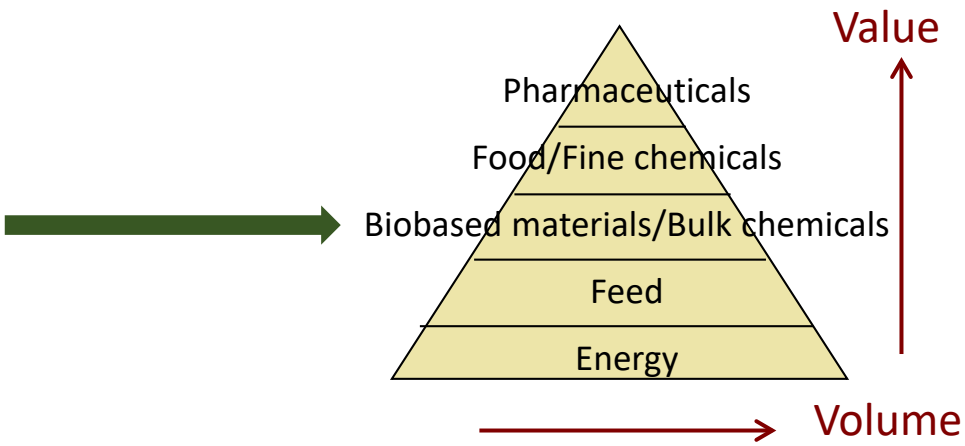


seafarm

Boolean Suitability Map



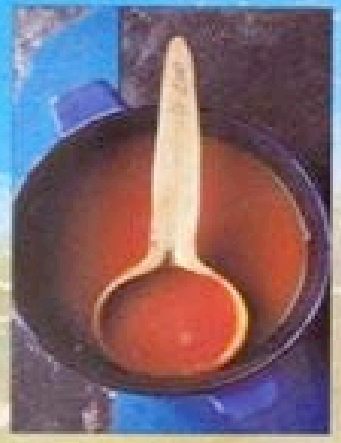

algaeBASE



Objectives:

To design integrated biorefineries that fractionate seaweed biomass in order to produce e.g. plastics/polymers, biofuel, biochemicals and functional food/feed components.

Prannie Rhatigan's



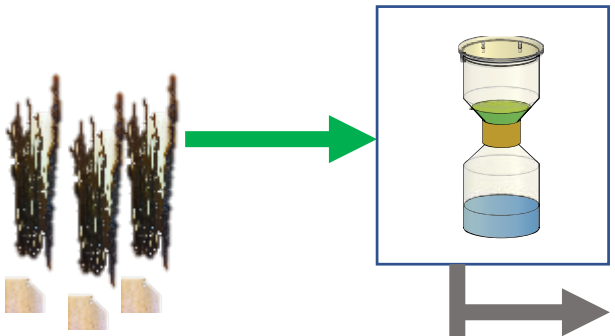
Irish SEAWEED KITCHEN

The comprehensive guide to healthy everyday cooking with seaweeds


ICA
Tång caviar
RÖDA VEGETARISKA KORN 75G


KELP CHIP
VARIETY PACK
LES AUTHENTIQUES
Haricots verts marins
au naturel
algoplus
Tartare aux Algues

FA 3:2 Materials design

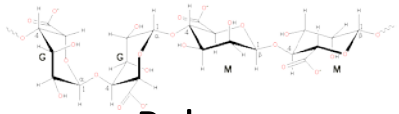


Proteins

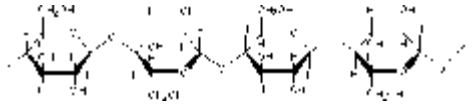
Lipids

Other chemicals

Fuel



Polymers

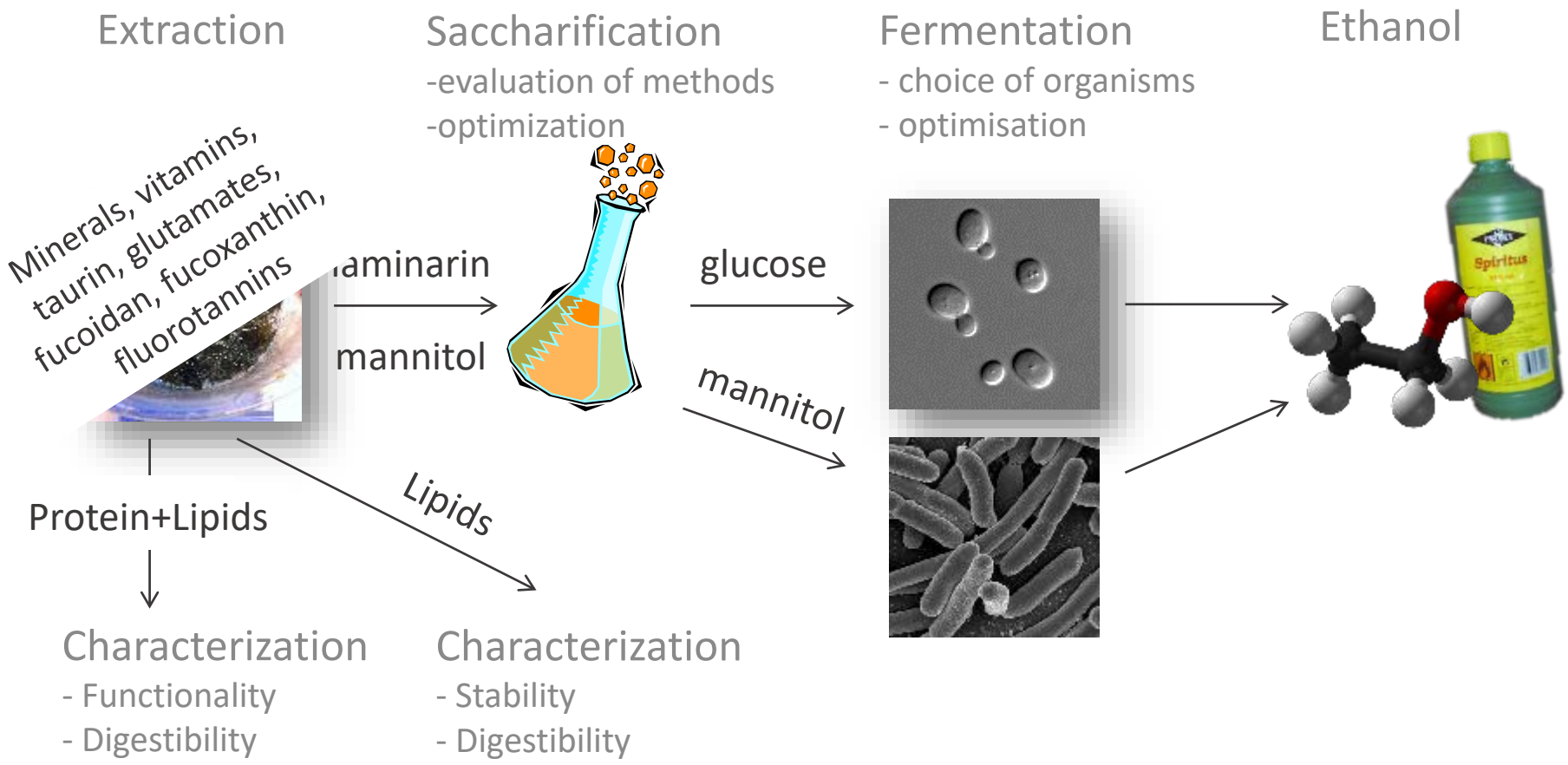


- Characterization of performance
- Sustainable production
- Mixed fractions

Green materials

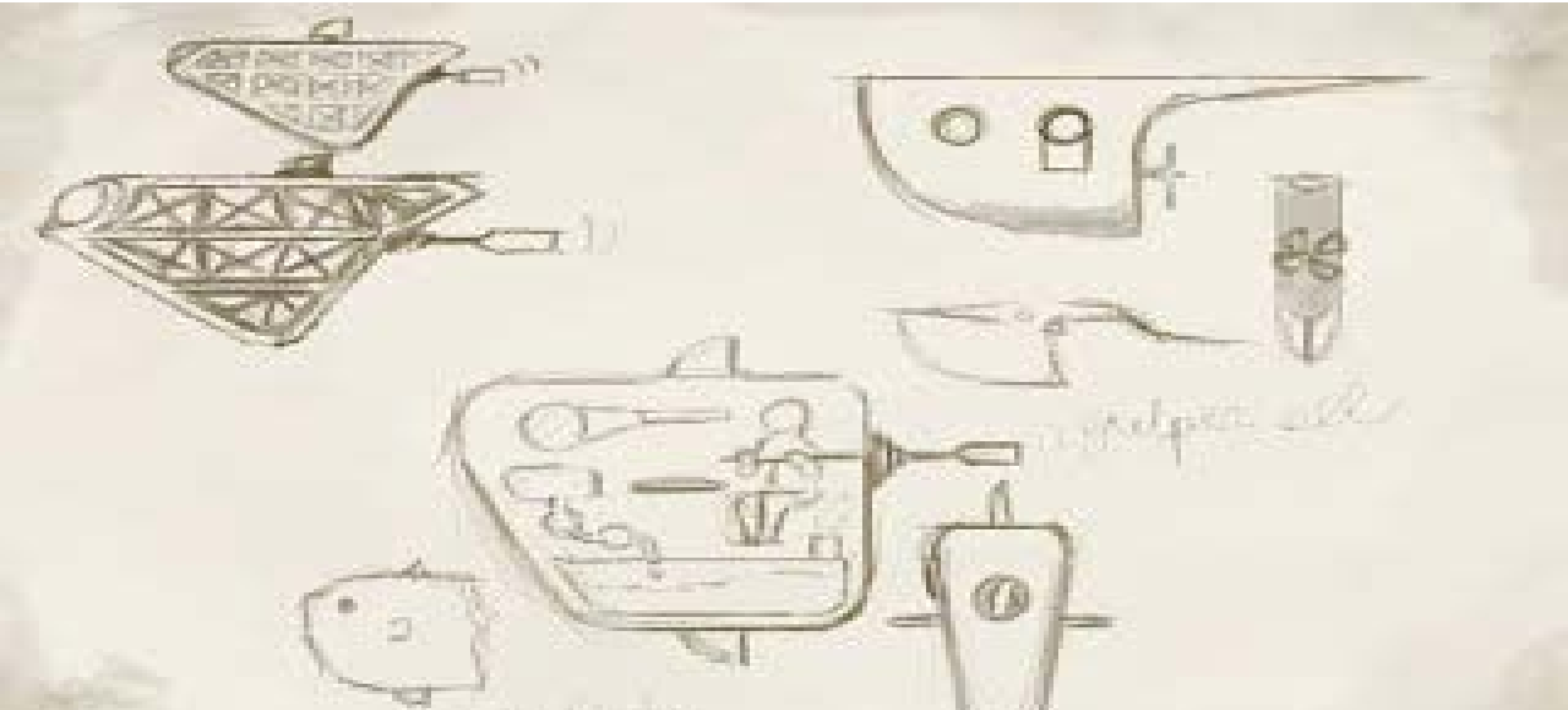
Demonstrator: A macromolecular demonstrator material derived from seaweed carbohydrate biorefining

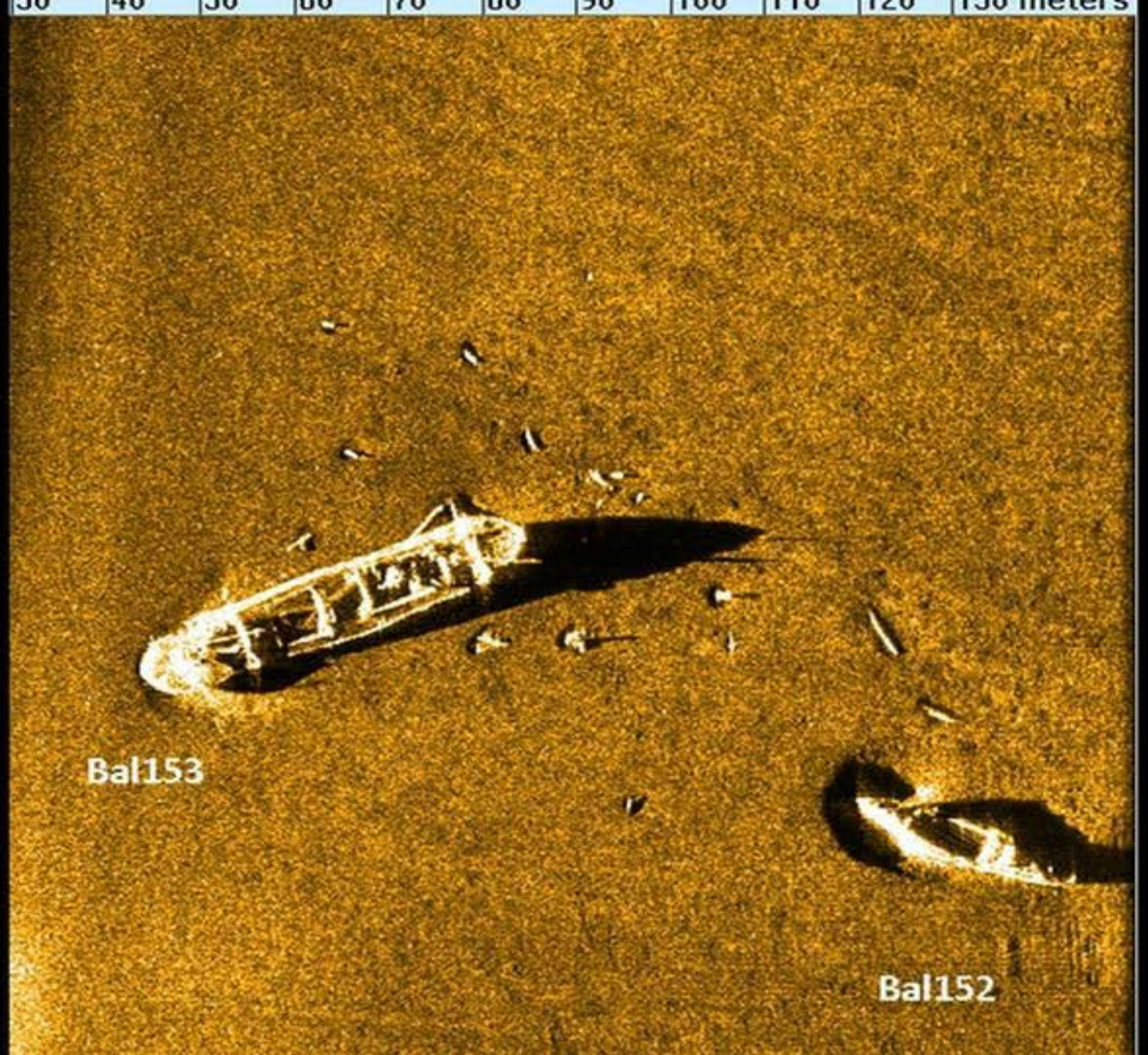
FA 3:5-3:6 Additional valuable compounds (e.g. lipids)



Demonstrator: A multifunctional food ingredient based on a smart combination of high value compounds

”Hur och varför jag inte kommer beskriva min metod att vara under vatten samt hur länge jag kan klara mig utan mat kommer jag inte publicera eller avslöja. Anledningen är att människans onda natur skulle använda min metod som ett nytt sätt av förstörelse vid havets botten, genom att sänka skepp tillsammans med dess manskap.” Citat: Leonardo Da Vinci

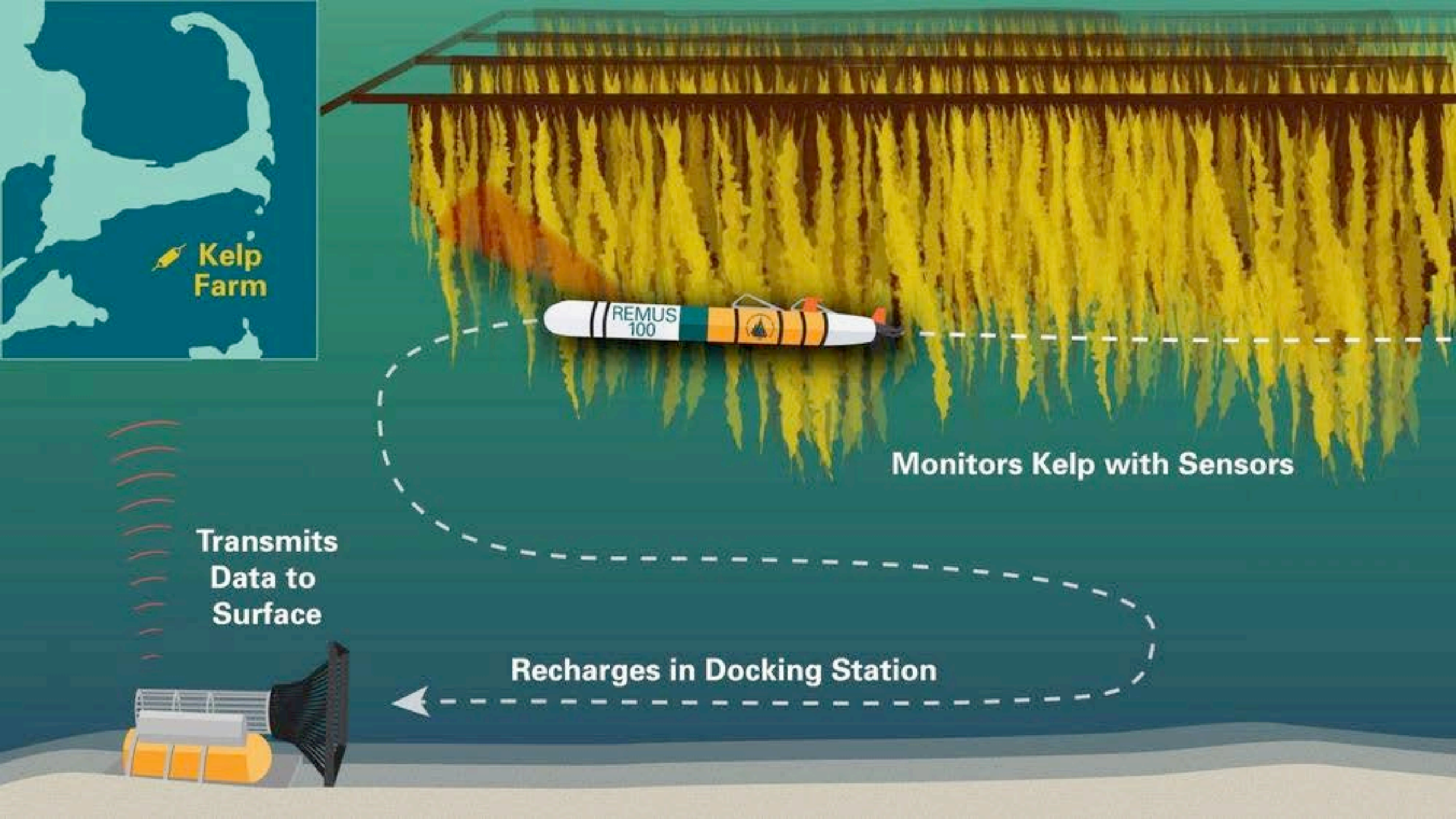



Bal153
Bal152


SWE
UNMANNED
KEEP
CLEAR
please :)
If you can read this, you are too close!
maribot
Vane

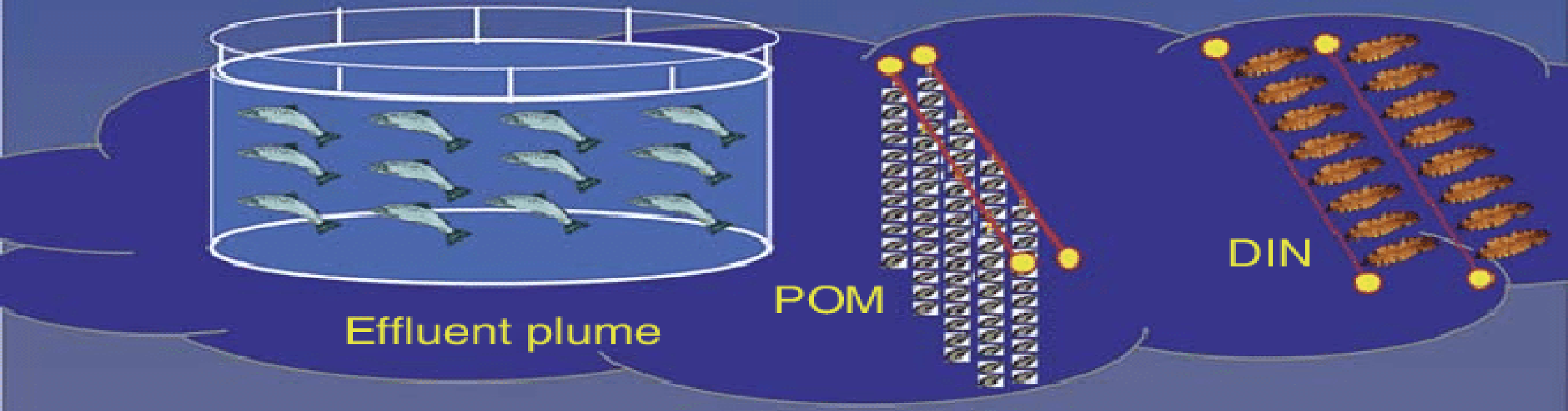

maribot LoLo
SMaRC
SWEDISH MARITIME ROBOTICS CENTRE

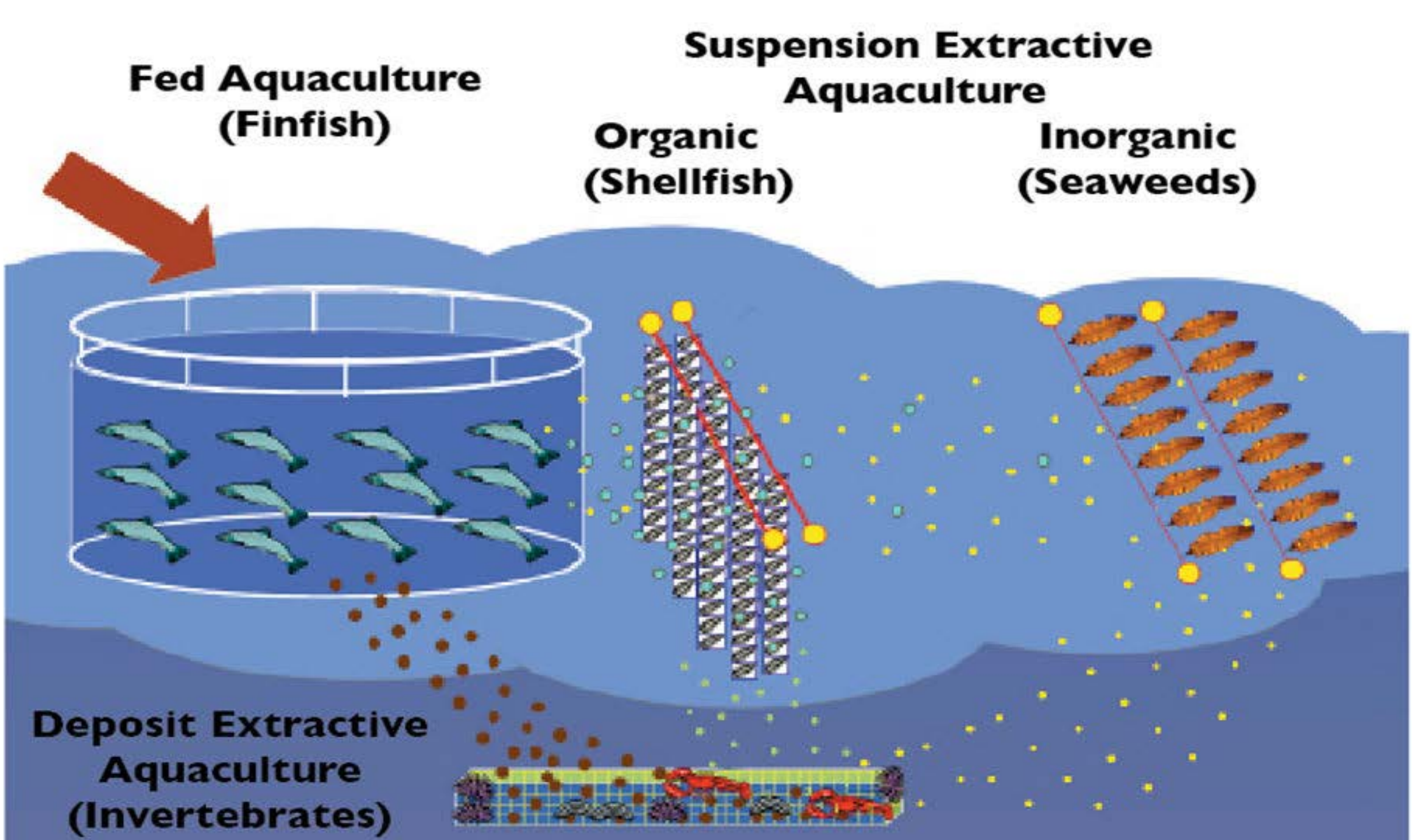

EVINRUDE
115


Kelp Farm
REMUS 100
Monitors Kelp with Sensors
Transmits Data to Surface
Recharges in Docking Station

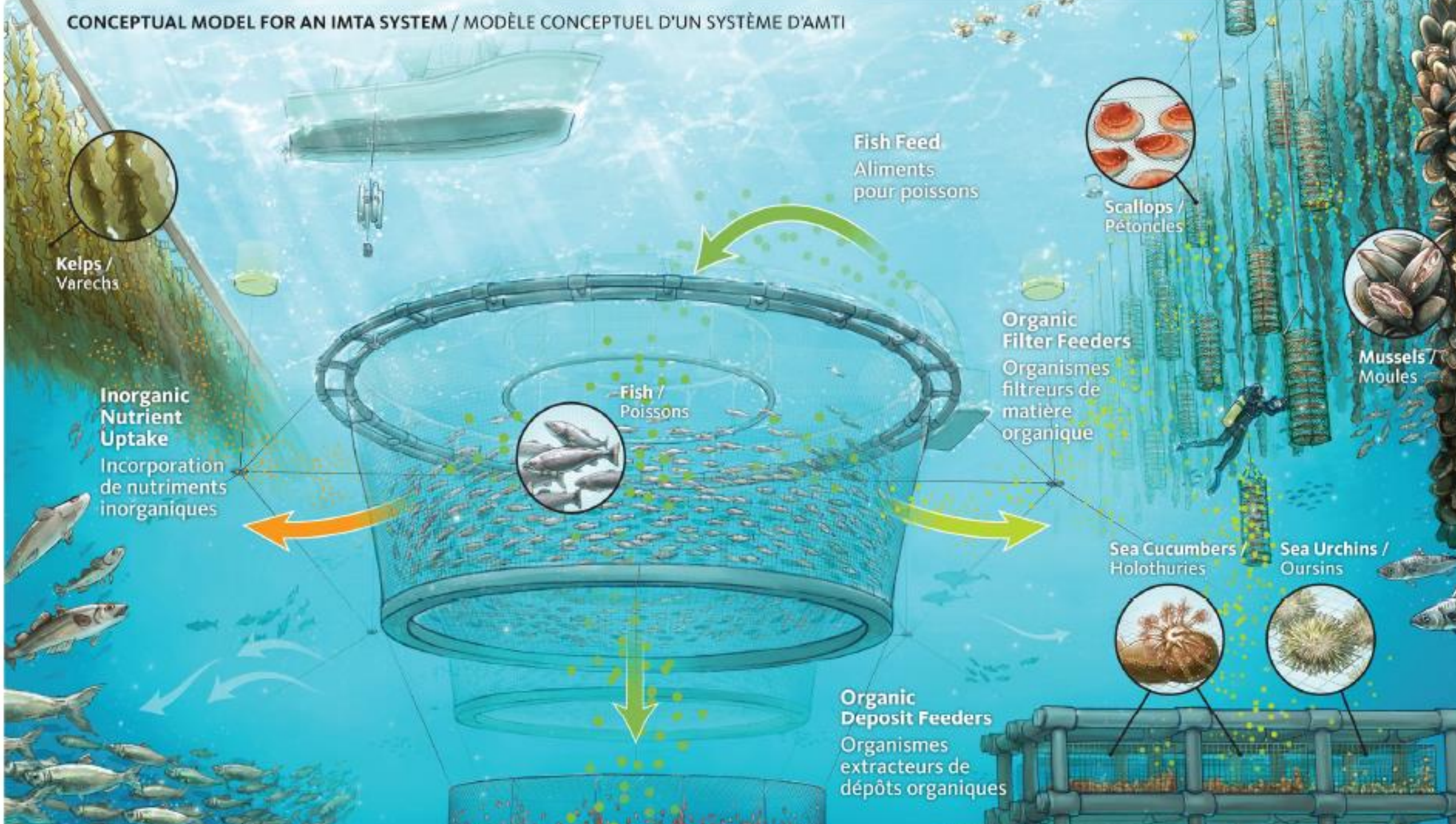
Integrated multitrophic aquaculture (IMTA)

Fed aquaculture (Finfish) + Extractive aquaculture: Organic (Shellfish), Inorganic (Seaweed)




Fed Aquaculture
(Finfish)
Suspension Extractive
Aquaculture
Organic
(Shellfish)
Inorganic
(Seaweeds)
Deposit Extractive
Aquaculture
(Invertebrates)


salmon
mussels
seaweeds
mussels
seaweeds
mussels


CONCEPTUAL MODEL FOR AN IMTA SYSTEM / MODÈLE CONCEPTUEL D'UN SYSTÈME D'AMTI
Kelps / Varechs
Fish Feed
Aliments pour poissons
Scallops / Pétoncles
Mussels / Moules
Organic Filter Feeders
Organismes filtreurs de matière organique
Fish / Poissons
Inorganic Nutrient Uptake
Incorporation de nutriments inorganiques
Sea Cucumbers / Holothuries
Sea Urchins / Oursins
Organic Deposit Feeders
Organismes extracteurs de dépôts organiques

Skördefest på blåa åkrar

När nästa generations mat och råvarutillgångar ska identifieras letar forskarna i havet – där algerna närmar sig ett kommersiellt genombrott. Algforskaren Fredrik Gröndahl ser stora möjligheter och älskar sina blåa åkrar.

TEXT: BELLA LINDE FOTO: LENA GRANEFELT

Fredrik Gröndahl med en knippa fingersäng som är näringsrik, på grunden till hållbart fiske.