Smart Diaspora 2023. Diaspora în învățământ superior, știință, inovare și antreprenoriat

Workshop Exploratoriu

Sustainable food in the context of climate change

(Alimentație sustenabilă în contextul schimbărilor climatice)

10-13 aprilie 2023, Timișoara

Smart Diaspora 2023. Diaspora în învățământ superior, știință, inovare și antreprenoriat

Innovation towards food personalisation – product oriented approaches

(Inovație în personalizarea alimentelor – abordări orientate către produs)

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10-13 aprilie 2023, Timișoara

The future of nutrition
is
personalised nutrition

What do we mean by food personalisation?

"Levels" of personalisation :

- **Level 0 – no personalisation**: you eat what you want until health warnings such as a high level of cholesterol or pre-diabetes.
- **Level 1 – assistance**: getting to know **the broad needs of any individual** – what are his/her needs in terms of macronutrients (proteins, fats, carbs) and which foods are to be avoided. With this knowledge, services can assist the consumer in its daily choices.
- **Level 2 – nutritional plan**: getting to know **the specific needs** in terms of micronutrients, the predisposition to certain illnesses and the specifics of digestion.
  This enables the creation of personalised nutritional plans and food supplements.
- **Level 3 – personalised foods**: making the previous data **adaptable** to the environment of the individual(daily activity and intakes) to create **fully personalised foods** such as meals.
- **Level 4 – automation**: as level 3 but without the need for intervention from the consumers to add their food intakes, levels of energy, daily activities, etc.
- **Level 5**: no human intervention is needed, your food is fully automated and personalised

Personalized food is relevant to us all !!

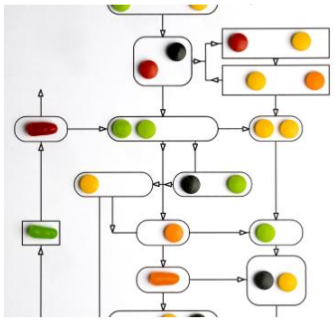
- The scientific literature refers to a **number of factors** that can **affect food intake** and that in turn can **lead to undesirable effects** such as **obesity or malnutrition**.

- **Physiological, social and health-related conditions** can impact a **person's eating abilities, meal experience and appetite**.

- **Malnutrition** represents a major health problem in the world with an increasing strain on each country's health budget.

- For the **elderly** and **people with impaired general health** due to illness and medical treatments it can be particularly challenging to provide the body with proper nutrition.

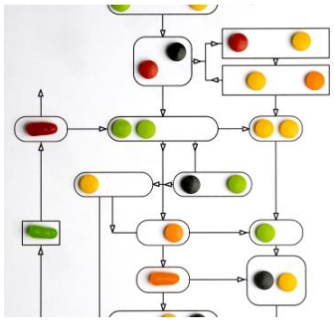
- That is the reason why a lot of **research** is now being **done to develop food and food products tailored for an ageing population**.



Food personalisation has been seen the future for at least the past 20 years.

It may well remain a thing of "**the future**" for the next decade.

- Food companies will certainly focus on situations where the incentive to follow a strict diet and to track all your intakes is strong.
- Obvious **candidates** are **sport (endurance, muscles gain, weight loss)** and **food-related (often) avoidable illnesses (such as Diabetes Type 2)**.
- These two **markets** alone represent a **huge potential**.



- The research literature on certain nutrients' health benefits and the relationship between health and physical activity is vast.
- A variety of dietary products, cookbooks and diets with promises of better health are available on the market.
- However, the level of documentation for such products varies, and has a more general application which does not take individual needs into account.
- An increasing focus on diets that are adapted to specific groups or individuals, and it has become more common to speak of personalised food.
- The scientific community has a strong focus on developing good solutions with a preventive effect which will help us achieve better health over the long run.

What about Food supplements

Dietary supplements also called **food supplements** or **nutritional supplements**

Food supplements are concentrated sources of nutrients (i.e. mineral and vitamins) or other substances with a nutritional or physiological effect that are marketed in “dose” form (e.g. pills, tablets, capsules, liquids in measured doses).

A wide range of nutrients and other ingredients might be present in food supplements, including, but not limited to, vitamins, minerals, amino acids, essential fatty acids, fibre and various plants and herbal extracts.

Food supplements are intended to **correct nutritional deficiencies**, maintain an **adequate intake** of certain **nutrients**, or **to support specific physiological functions**.

They are not medicinal products and as such cannot exert a pharmacological, immunological or metabolic action.

Therefore their use is not intended to treat or prevent diseases in humans or to modify physiological functions.

(source: https://www.efsa.europa.eu/en/topics/topic/food-supplements)

EU framework

In the EU, according to the **EU General Food Law Regulation (EC) No 178/2002**, food supplements are considered as foodstuffs. Responsibility for the safety of these products lies with the food business operator placing the product on the market.

The reference EU legislation in the area of food supplements is **Directive 2002/46/EC**, which establishes harmonised lists of the vitamins and minerals substances used in the manufacture of food supplements and the labelling requirements for these products.

The directive lays down the rules applicable only to the use of vitamins and minerals in the manufacture of food supplements. The use of substances other than vitamins or minerals in the manufacture of food supplements may be governed by national rules or may be subject to other specific EU legislation.

For ingredients other than vitamins and minerals, the European Commission has established harmonised rules to protect consumers against potential health risks and maintains a list of substances which are known or suspected to have adverse effects on health and the use of which is therefore controlled.

EU framework

The addition of nutrients or other substances to fortify a food does not fall within the definition of food supplement and it is addressed by **Regulation (EC) 1925/2006**.

As with all the other food products, food supplements may contain additives (e.g. sweeteners, colours, coating agents). In the EU, only food additives that are specifically authorised for use in this food category according to **Regulation (EC) No 1333/2008** can be added to food supplements.

EFSA provides scientific opinions to support the evaluations carried out by the European Commission.

In **May 2018, the EFSA Panel on Food Additives and Nutrient Sources Added to Food (ANS)** adopted guidance on the evaluation of sources of nutrients and bioavailability of nutrient from the sources.

Each person is unique and has different goals and food habits, and a truly innovative nutrition system cannot ignore that!

Research programmes such as Horizon 2020 and other EU initiatives, support **research into personalised food, nutrition and meals**.

Use the term **personalised** (or customised) when talk about insights into **dietary food supplements** that are **adapted** to the **needs of certain groups of people**, not tailored food for individuals.

A **sustainable production** of **personalised dietary food supplements** must be based on products adapted to the needs of groups of people. -> Increased knowledge and access to new products will make it easier for individuals to build a diet that is adapted to them.

Centre for innovative process engineering GmbH

Main activities

Food
development & production

Food technology
development

Networking

FOUNDED IN 2005

Our facilities are in Syke, Germany (northern Germany)

Main activities

- Several projects in what may define as personalised dietary food supplements, which have had a focus on dietary food supplements which are tailored to the needs of sport/active people or elderly people.

Our expertise:

- on consumer preferences, trends and habits provides insight and new knowledge which is a prerequisite for targeted product development;
- in product development and process optimisation applied to projects which, together with project' partners, focus on the development of personalised dietary food supplements and further appealing food products solutions.

R&D Projects

Food Supplements
from microbiological conversion of lignin-rich side streams from lignocellulosic biorefineries

ELBE-NH
Bioraffinerie der Zukunft

OPTIFEL
food for elderly

Optimised food products for elderly populations

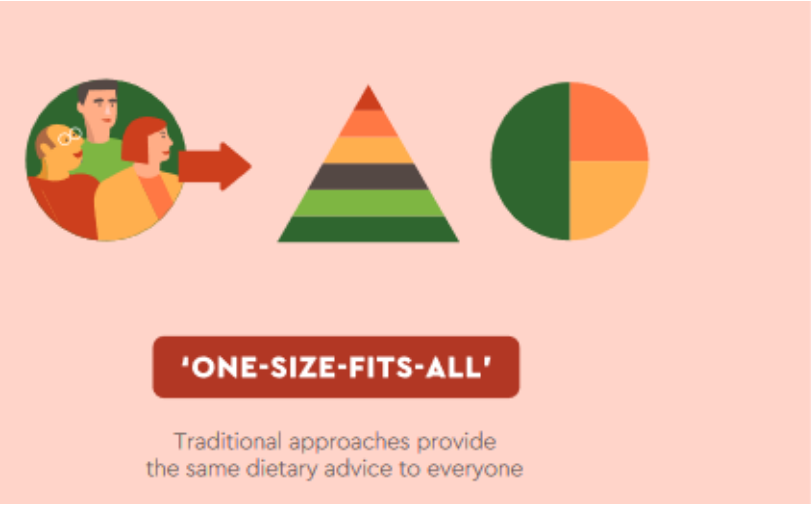
Food Supplements
from bioconversion of waste glycerol from biodisel production

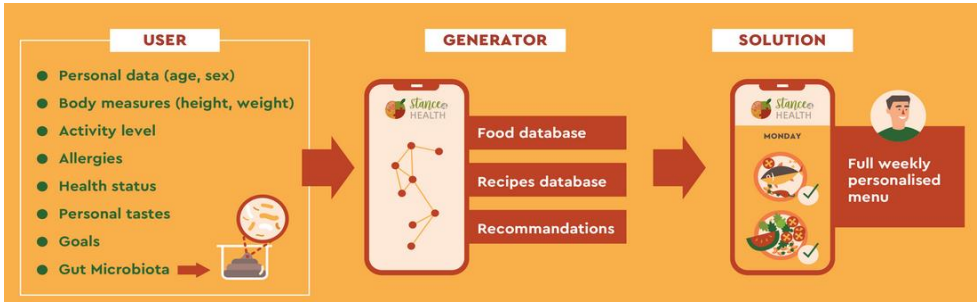
GRAIL
Glycerol Biorefinery Approach for the Production of High Quality Products of Industrial Value

R&D Projects

Smart Technologies for Personalised Nutrition and Consumer Engagement
(funded by European Union's Horizon 2020)

Overall objective to develop a complete **Smart Personalized Nutrition (SPN) service** based on the use of mobile technologies as well as tailored food production that will optimize the gut microbiota activity and long-term consumer engagement.





R&D Projects

CENTIV GmbH

stance4 HEALTH

Smart Technologies for Personalised Nutrition and Consumer Engagement

i-Diet
include specific foods and nutrients in the recipes proposed to the software
users based on their microbiota composition and individual health
needs.

R&D Projects

Smart Technologies for Personalised Nutrition and Consumer Engagement
funded by European Union's Horizon 2020 research and innovation programme

Individualized dietary supplements to modulate the gut microbiota

Health-Up – Supplement for everyday

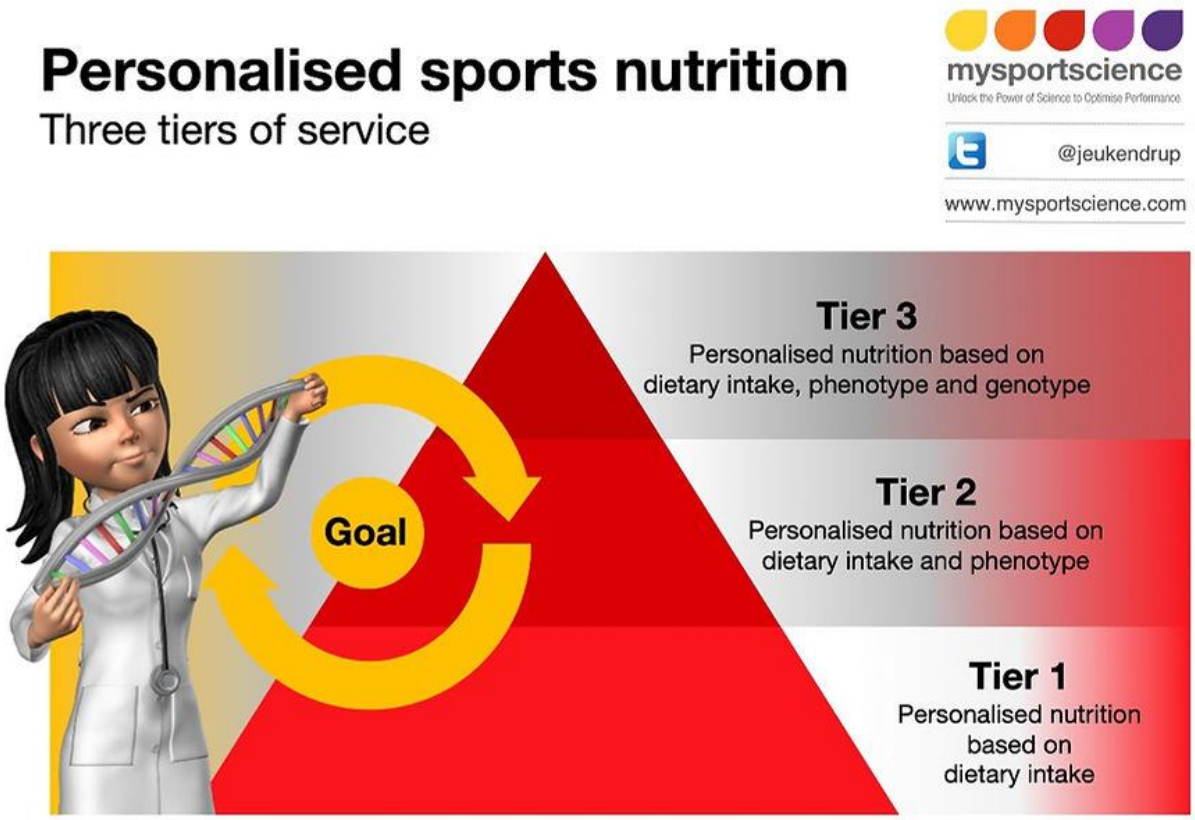
Lifestyle product - contains ingredients to encourage a healthier diet, boost immune system and health promoting

An overall principle of product convenience corroborated with high ingredient concentration in smallest possible volume (60ml) in form of a powder have been followed within the developments to obtain a "fast" supplement.

Personalised Sports Nutrition

Some form of personalisation has been the basis of the work of a sports dietitian or sports nutritionist.

There are different levels of **personalized nutrition**:



Tier 3 - the top of the pyramid, builds on the **previous two levels** but includes **genotypical information**.

Tier 2 - **personalized nutrition** is based on **an individual's diet** as well as **phenotypic markers** such as anthropometric measurements or blood biochemical markers.

Tier 1 - most **traditional form of personalized sports nutrition**: typical tailored advice of a dietitian that is based on **an individual's dietary intake**. A dietary assessment is made and, based on the outcome, suggestions for improvement are communicated to the individual that are specific to that individual.

Personalised Sports Nutrition

- **Personalized nutrition in athletic populations** aims to **optimize health, body composition,** and **exercise performance** by **targeting dietary recommendations** to an individual profile.

- Sport dietitians and nutritionists have long been adept at placing additional scrutiny on the **one-size-fits-all general population dietary guidelines** to accommodate various sporting populations.

- However, generic "**one-size-fits-all**" recommendations still remain.

- Genetic differences are known to impact absorption, metabolism, uptake, utilization and excretion of nutrients and food bioactives, which ultimately affects a number of metabolic pathways.

FACTS

- One of the ultimate goals in the field of personalized sport nutrition is the design of tailored nutritional recommendations to improve direct and indirect factors that influence athletic performance.

- Personalized nutrition is important but at the moment, genotyping has no role to play in nutrition advice.

- Personalized nutrition based on genotype is not ready for prime time and it will be a long time before it will be ready…

- In sport where performance is the main outcome of interest rather than health - far less research and therefore this timeline is even longer.
- For now, personalized sports nutrition is about clearly defining the goals of the athlete, and tailoring the advice to these goals, and the specific training needs of that individual.

FACTS

- Although personalization could be achieved by taking into account dietary, phenotypic and genotypic characteristics - **big question** is of course whether **personalized nutrition** will result in **better, more sustainable, or more cost effective behavior changes than conventional dietary advice** ?!?

- Will **personalised nutrition result** in **better health** or **better performance** for our **athletes**?

- One could argue that if personalized nutrition means that iron deficiency can be prevent , can avoid gastro-intestinal problems and can optimise glycogen resynthesis -> this may in many cases result in improved exercise performance.

- But does **personalisation based on genotype add any additional value**?

- At present we would have to conclude that there is **limited evidence connecting genotypical information to nutrition** and **performance** and there is no evidence that receiving **genotypical information** will induce **behaviour changes** or **greater improvements in performance**.

FACTS

- There is **huge inconsistency** in the analysis as well as in the reporting.
- Different companies provide different advice, based on the same sample.
- Even when the outcome of the analysis is comparable, there is difference in the interpretation of the results and the recommendations that follow.

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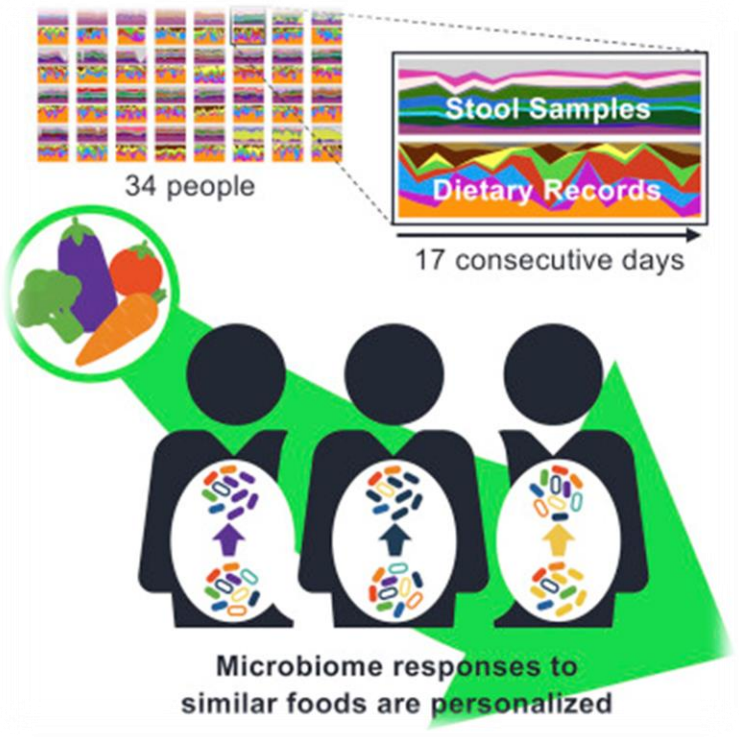
Clearly NEED - more research to connect certain genes to nutrition and health and a lot more research than have to date connecting genes, nutrition and performance.



Sport and exercise performance is influenced by many contextual factors and by individual responses.

Responses to an exercise intervention

- ✓ **generally highly variable between individuals, and**
- ✓ **may be mediated, in part, by nutritional intake,**

even though individuals respond differently to the same nutrients and/or supplements intake.

R&D Projects

The BioSportiv Calculator

- The Software Calculator runs at the moment with the support of the database MySQl.
- The software runs at the moment only in the language German, but the forms for English is already created and the program can be extended in the future.
- Also a function to create a self-designed recipe can be created.

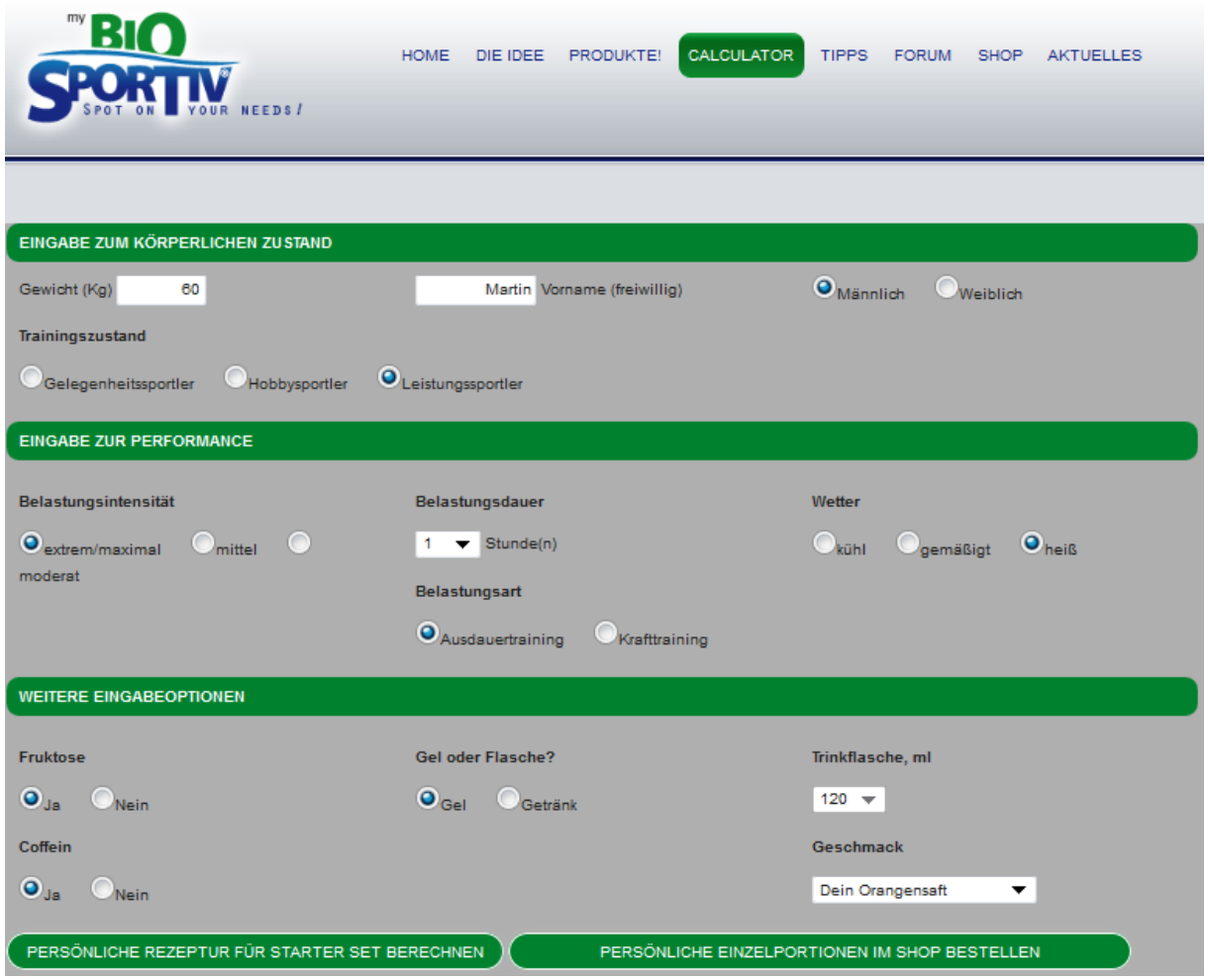
This option will allow entering the components (i.e. sugars, caffeine, minerals) in the amounts that the customer require.

Powders products in the Kit

Energy!
Effect!
Taste!
Kick!
Mineral!

R&D Projects

The BioSportiv Calculator



- The BioSportiv Software determines the **best recipe** for a **nutritional beverage** - **personalised for the needs of a high performance athlete during physical activity**.
- Information about the athlete's physical condition/constitution and the type of activity the athlete is performing will be considered by the Software.
- As a result of the software correlation, a recipe (including the powders in the Kit) of a personalised nutritional beverage will be indicated.

R&D Projects

The BioSportiv Calculator

An example of one calculated recipe

After filling out the information a personalised general recipe will be correlated and generated by the calculator.

- The personalised recipe indicates the amount of water and the names of the powders that should be mixed.
- The required quantities for the nutritional powders are given in number of spoonful's in a scale of 1/3, ½ and 2/3.

Energy!
Effect!
Taste!
Kick!
Mineral!

DE-Öko-007
EU/Nicht EU Landwirtschaf

R&D Projects

CENTIV GmbH

my BIO SPORTIV® SPOT ON YOUR NEEDS!

BASIC - Getränk

Personalisiert durch die Dosierung entsprechend der Tabelle…

Kurzzeit-Belastungen | Langzeit-Belastungen | Regeneration

Dosiertabelle Getränke oder Gel für eine Stunde Kurzzeitbelastung (0,7-1 l):

Körpergewicht in kg	Angabe in Anzahl Dosierlöffel*)		
	Leistungssportler	Hobbysportler	Gelegenheitssportler
40	$1\,^2/_3$	$1\,^1/_3$	1
50	$2\,^1/_3$	2	$1\,^2/_3$
60	3	$2\,^1/_3$	2
70	$3\,^1/_3$	3	$2\,^1/_3$
80	4	$3\,^1/_3$	3
Über 80	$4\,^2/_3$	4	$3\,^1/_3$

*) $^1/_3$ entsprechen 10ml Skalierung auf dem großen Dosierlöffel, $^2/_3$ entsprechen 20ml

BIO nach EG-Öko-Verordnung

DE-Öko-007
EU/Nicht EU Landwirtschaft

Sports drinks

- **protein** is an essential nutritional component in the diet of athletes to repair and build muscle tissue broken down during exercise.

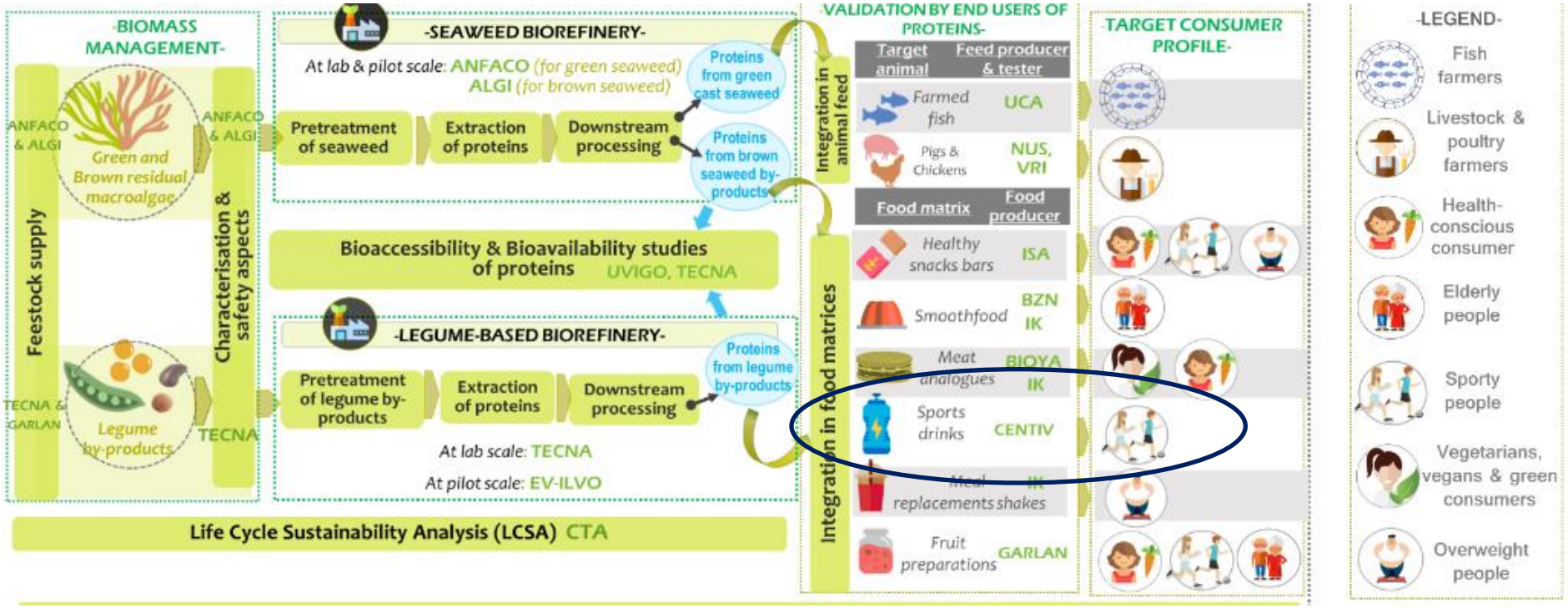
- **novel powder formulations** comprising legume by-products based proteins and different nutrients (carbohydrates, dietary fibre, minerals, and vitamins) will be implemented and adapted to the individual needs

Proteins targeted

- ✓ a valuable resource for athletes requiring high levels of protein
- ✓ especially for vegan athletes for whom eggs and dairy whey protein may not be suitable

R&D Projects

Biorefineries for the valorisation of macroalgal residual biomass and legume processing by-products to obtain new protein value chains for high-value food and feed applications



(Coordinator: Contactica, Spain)

This project has received funding from the Bio Based Industries Joint Undertaking (JU) under grant agreement No 887259. The JU receives support from the European Union's Horizon 2020 research and innovation programme and the Bio Based Industries Consortium".

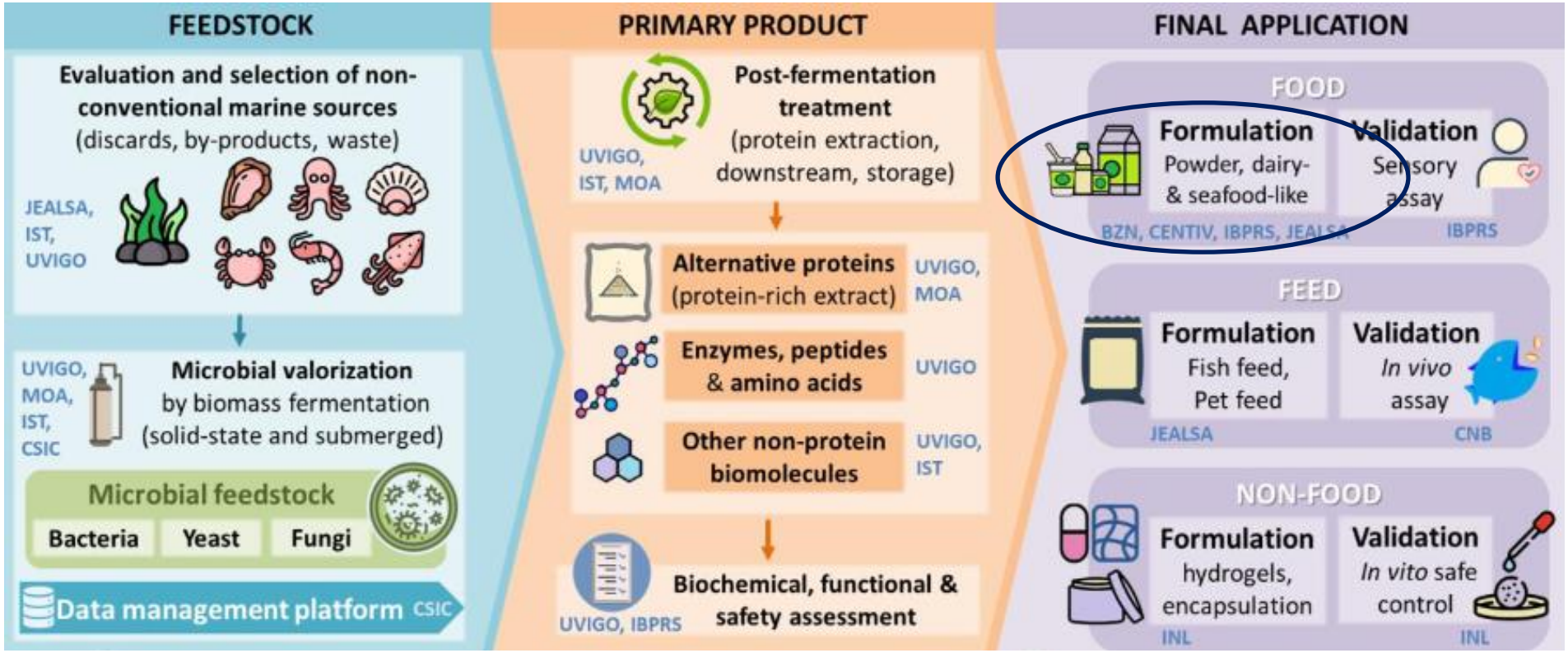
R&D Projects

HORIZON-JU-CBE-2022-R-04: Proteins from alternative and unconventional sources

Horizon Europe – Circular Bio-based Europe Joint Undertaking – *Research & Innovation Action*

PROMISEANG

Alternative PROteins from MIcrobial fermentation of non-conventional SEA sources for Next-Generation food, feed and non-food bio-based applications



(Coordinator: University of Vigo, Spain)

Networking

HIGHTECH EUROPE

The portal is accessible free of charge:
www.foodtech-portal.eu

More than 200 Technology Sheets
700 Expert Profiles
50 Infrastructures

Research Topics - Nutrition and Sustainable Diets

Frontiers in Nutrition **(IF 6.590)**

- **Current Trends in Food Processing and Nutrition to Mitigate Nutritional Health Issues**

Frontiers in Sustainable Food Systems **(IF 5.005)**

- **Dietary Change Strategies for Sustainable Diets and their Impact on Human Health - Volume 2**

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Thank you for your attention !

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