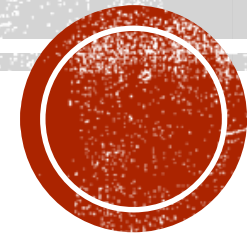


FOODTECH & ALTERNATIVE PROTEINS

Plant-Based Meat: The Path to Competition

Raphaëlle O'Connor, Ph.D.




iNewtrition
FOOD SCIENCE EXPERTISE

LANDSCAPE

PLANT-BASED MEAT: THE PATH TO COMPETITION – GFI 2018

Optimizing Raw Materials to Improve Plant-based Meats

FRACTIONATION		FUNCTIONALIZATION
Chemical isolation of raw materials		Biological and chemical processes to functionalize ingredients
Mechanical methods to separate and isolate raw materials		Mechanical methods to enhance raw material function



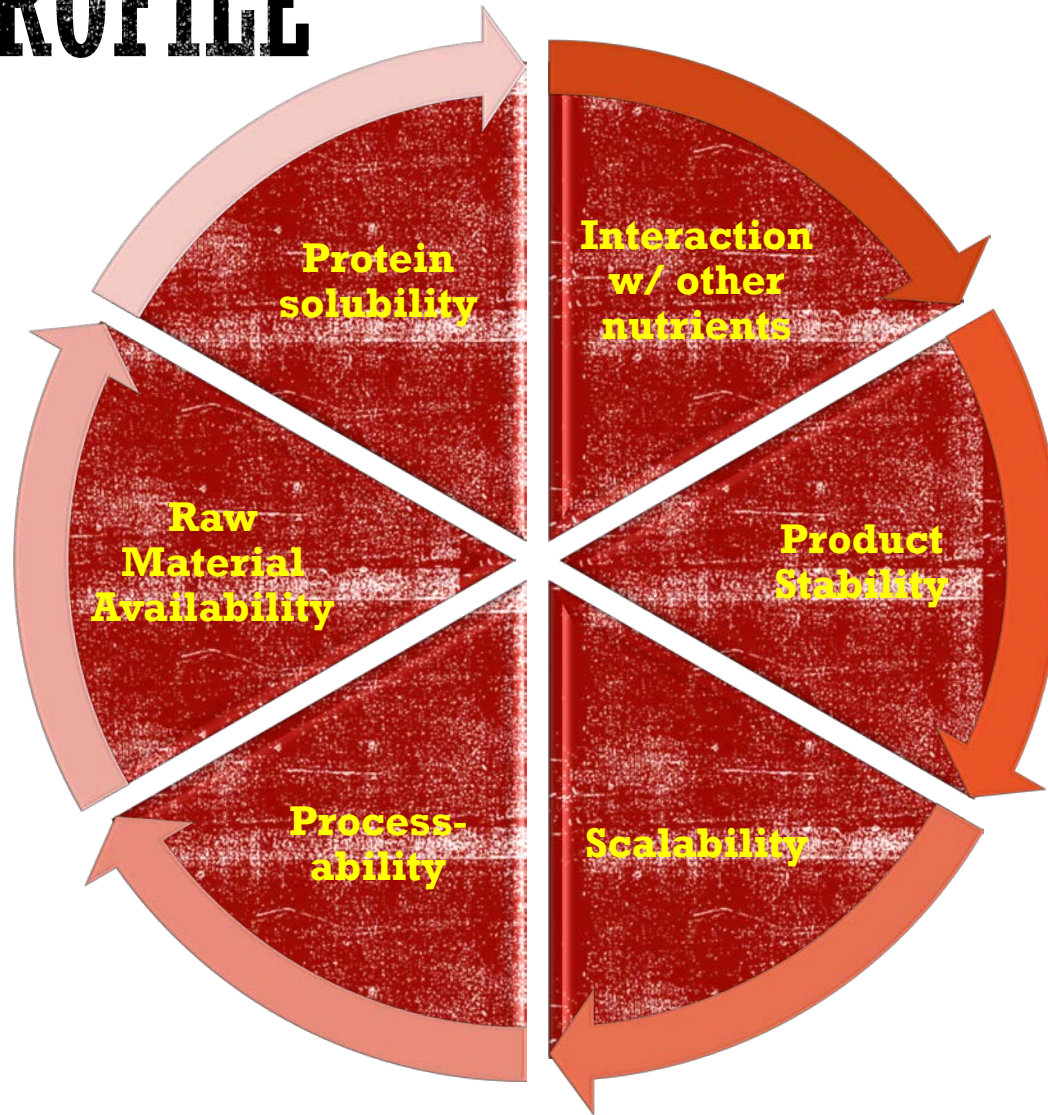
Product Composition and Process Optimization

Establishing the correct mix of **ingredients and processes** to create the desired **taste, texture, smell, and structure**



Plant-based Protein and Flavoring Supplier Database

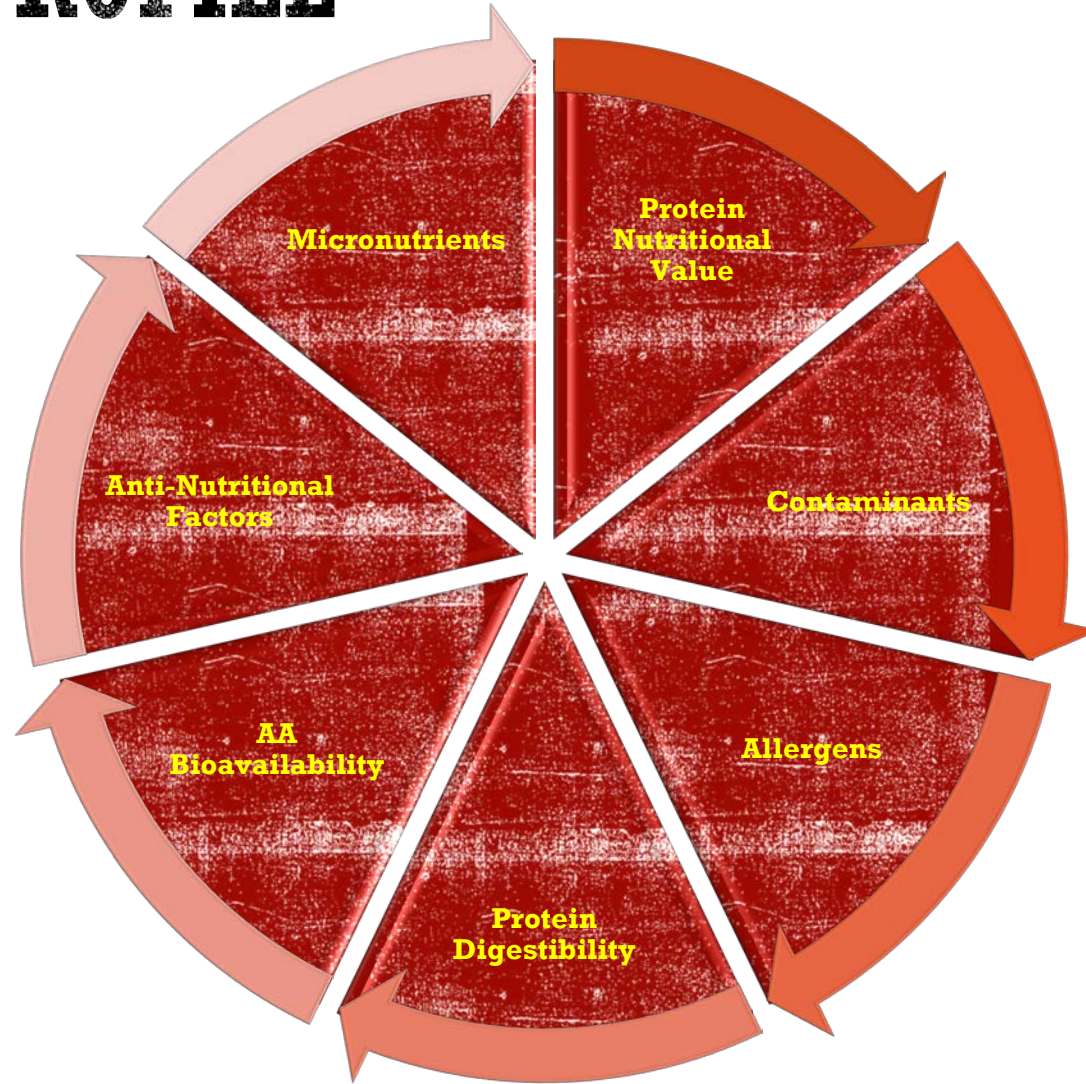
TECHNICAL PROFILE



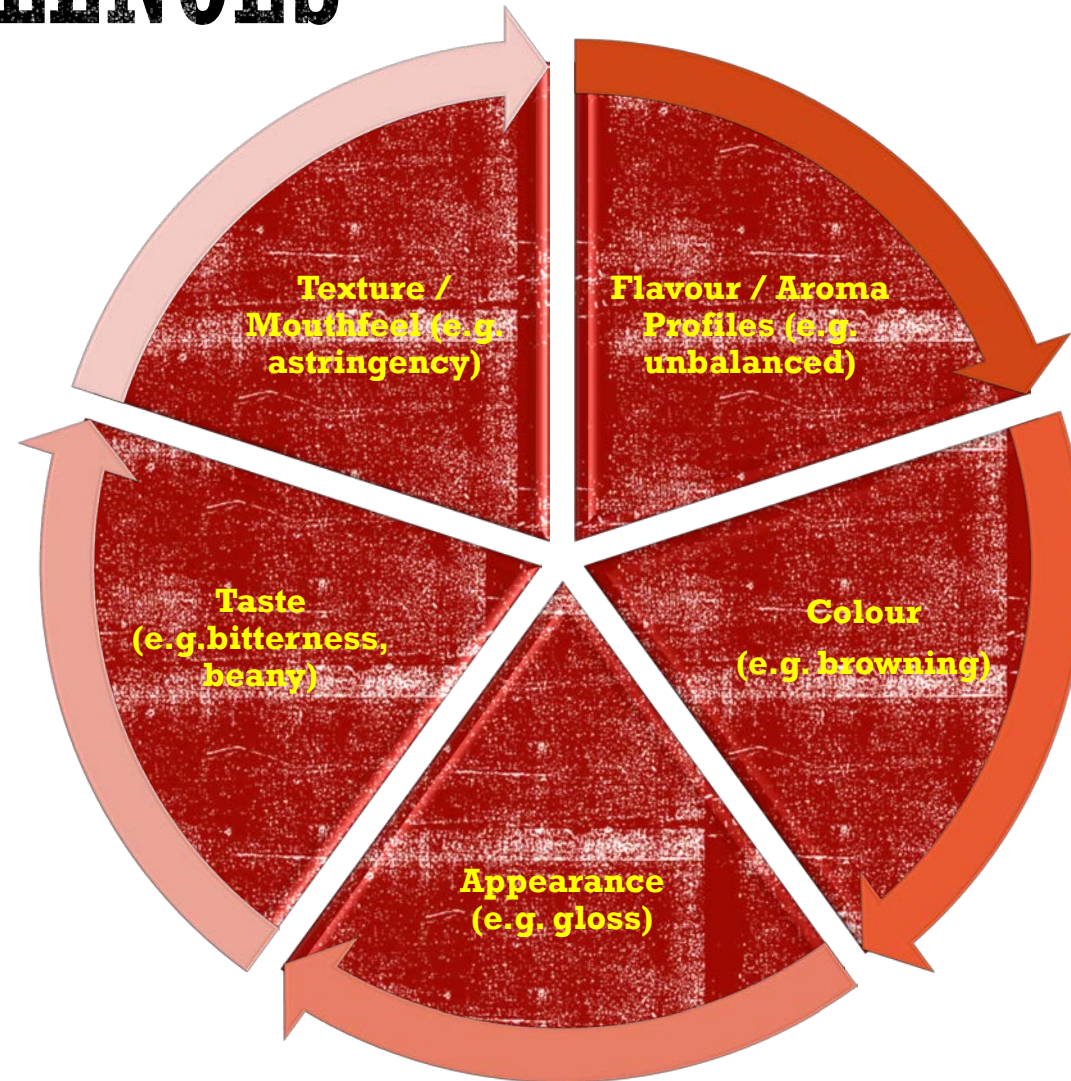
OTHER PROPERTIES:

- Physico-chemical structure
- Viscosity
- Hygroscopicity
- Heat / Shear Stability

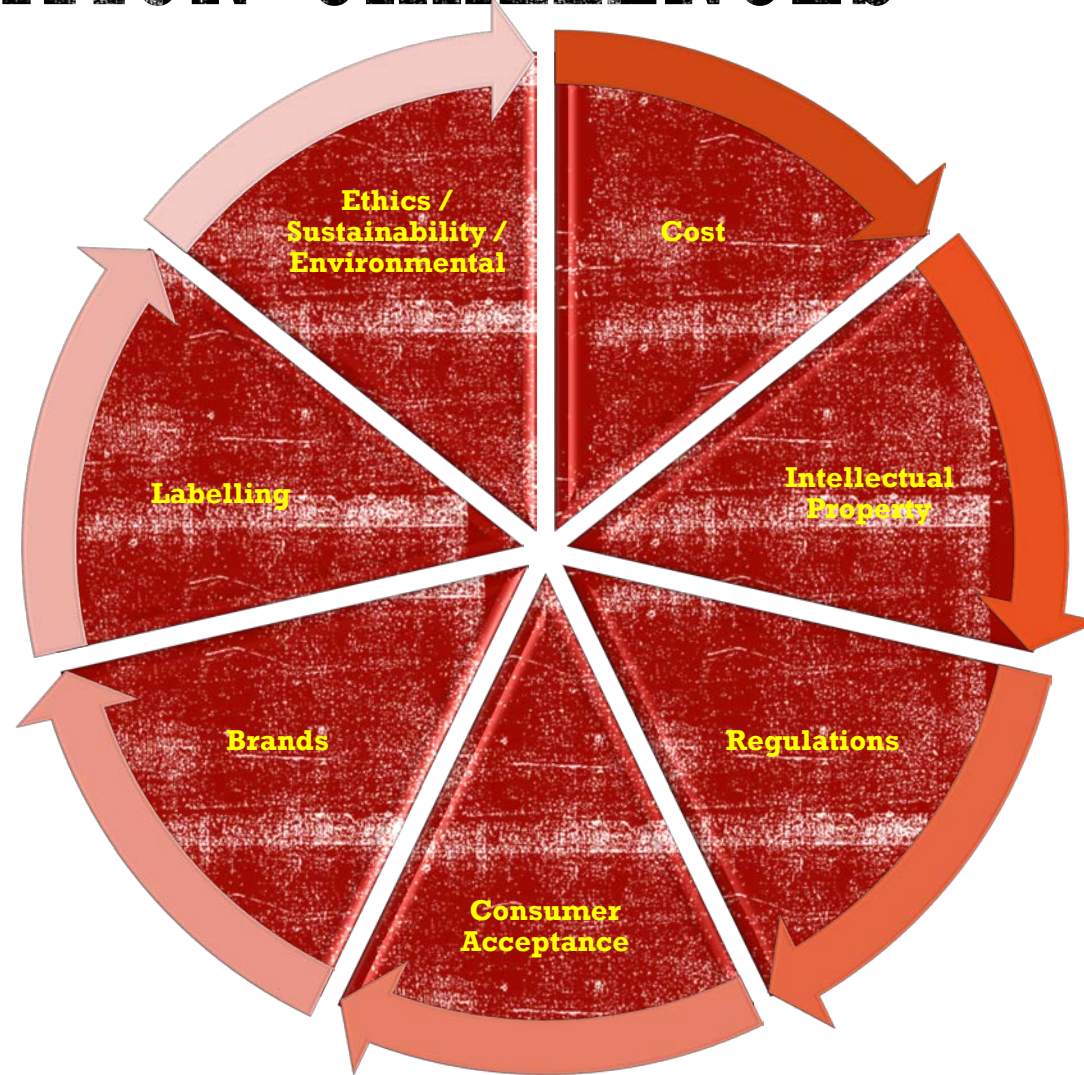
NUTRITIONAL PROFILE



SENSORY CHALLENGES




COMMERCIALISATION CHALLENGES



MEAT SUBSTITUTES:

INVESTOR PUSH OR CONSUMER PULL?

DO PEOPLE WANT TO EAT MORE PLANTS? OR DO THEY WANT TO EAT MORE MEAT ALTERNATIVES?



Plant-based meat substitutes fail the test of “Naturalness” & “Least-Processed”

PLANTS

FUNGI

LIFE3

NotCo

Sunfed

VIVERA

schouten

UPTON'S
NATURALS

Nutcase | Vegan
MEATS

Amy's

V

Quorn

Ojah
Producer of Plants

NO EVIL

PRIMAL
Plant Based Foods

Seamore

BEFORE
The Butcher

MOVING
MOUNTAINS

Outstanding
FOODS

BTRfy

Lightlife
SINCE 1979

Boca

JACKFRUIT
COMPANY

Cauldron

OCEAN HUGGER
FOODS

good dot

THE VEGETARIAN
BUTCHER

JUST

Terramino
Foods

FRY'S
FAMILY
SINCE 1954

heura

Sol
CUISINE

Bonduelle

Sophie's

THE ABBOT'S

veggiefit

GOOD
CATCH
right {treat}

WILD
EARTH

New Wave
FOODS

Yves
VEGGIE CUISINE

SEATTLE FOOD TECH
SUSTAINABLE FOODS

IMPOSSIBLE

HOW DO WE INNOVATE?

GOOD
CATCH
right {treat}

SCELTA
MEATROOMS
ESTD 1982

Jet-Eat
Printed Food

gardein

IMPOSSIBLE

WICKED
HEALTHY

MEAT

THE BETTER
MEAT CO.

wessanen

W. WORTHINGTON

Leep Foods

OLJCK

vegg

alpha
FOODS

THE MEATLESS
FARM CO

MorningStar
Farms

amidori
The HERBIVOROUS
BUTCHER

LIKE
MEAT

HUNGRY PLANET

Garden Gourmet

GOLD&GREEN

VERY GOOD
BUTCHERS
PLANT BASED BUTCHERY

BETTER
Chew

NATURLI'

no cow.

spero

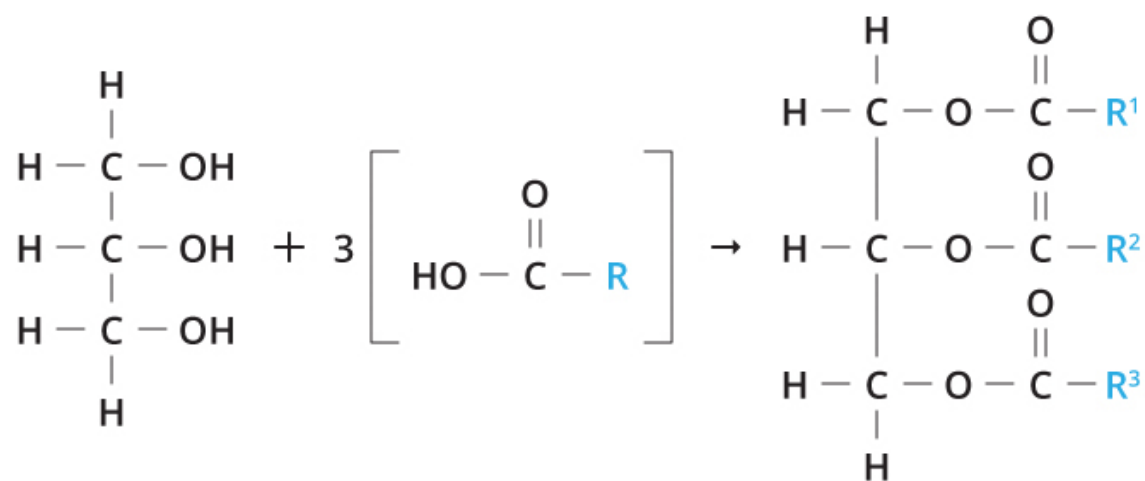
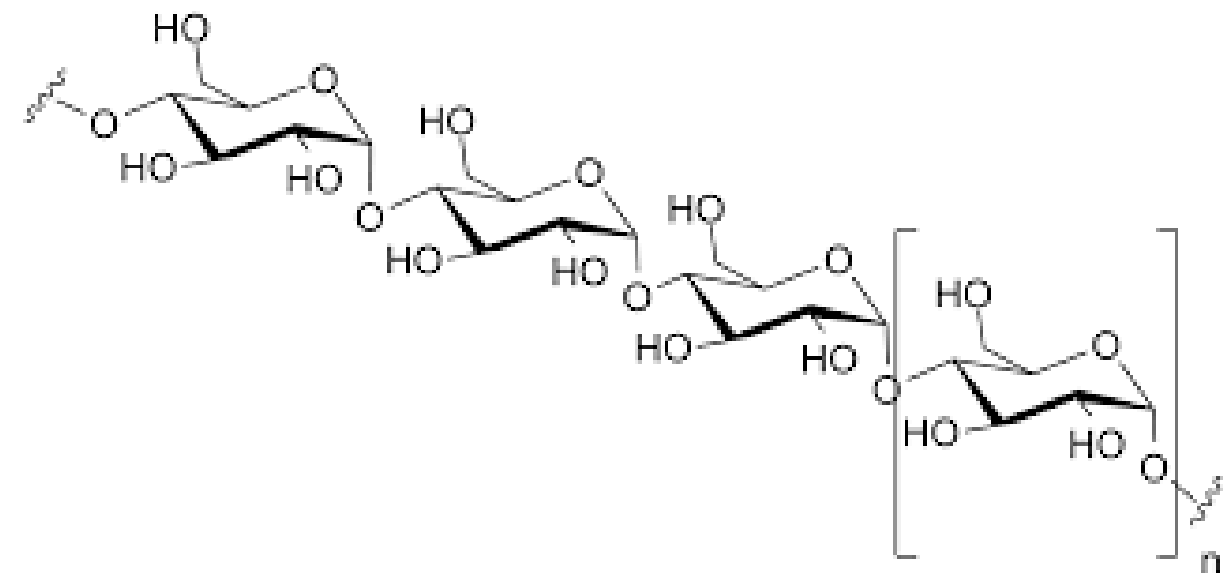
HERITAGE
HEALTH & FOOD

FIELD ROAST

iNewtrition

FOOD SCIENCE EXPERTISE

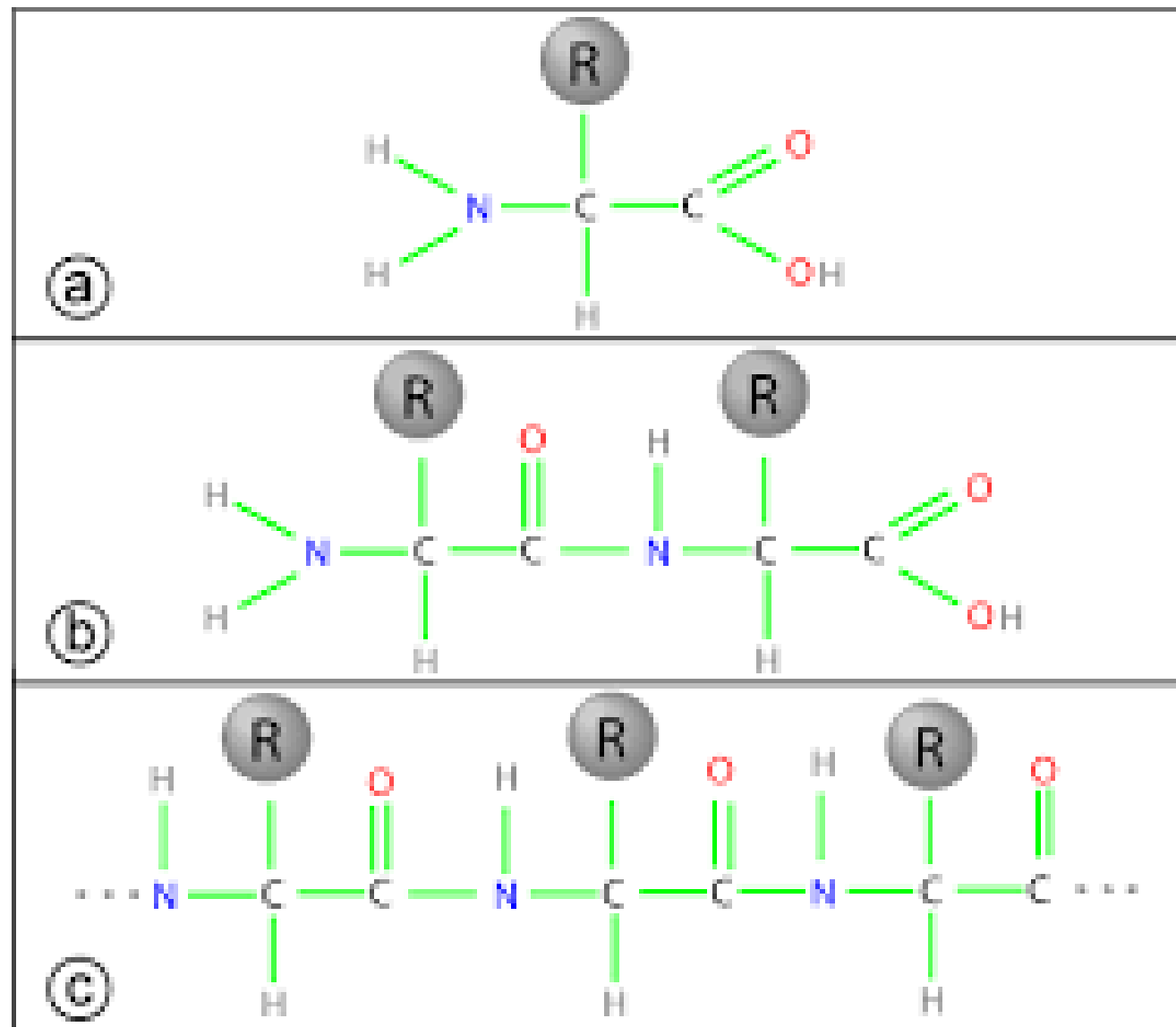
FATS, PROTEINS & COMPLEX CARBOHYDRATES



Glycerol

3 Fatty Acids

Fat (triglyceride)

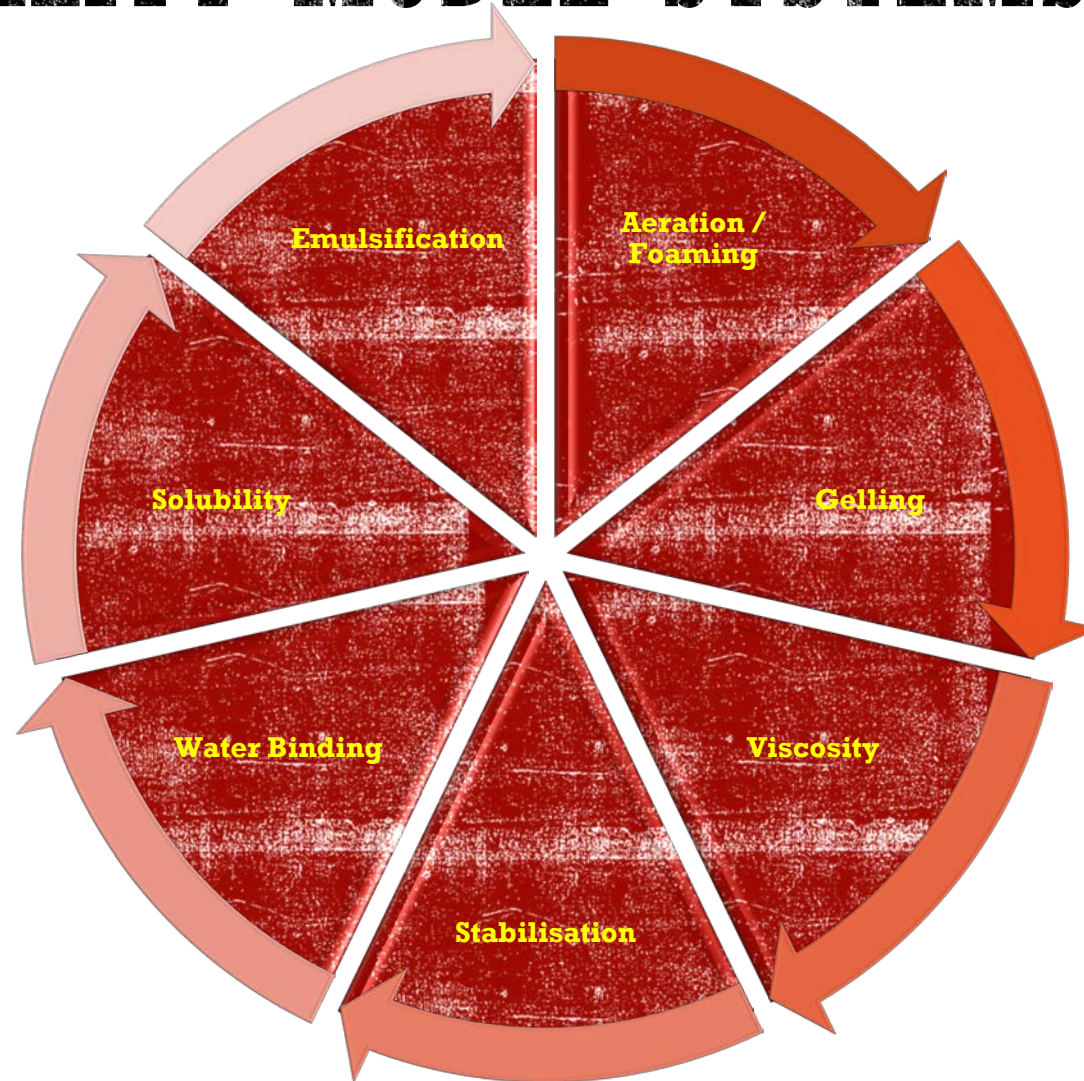


(a)

(b)

(c)

FUNCTIONALITY MODEL SYSTEMS



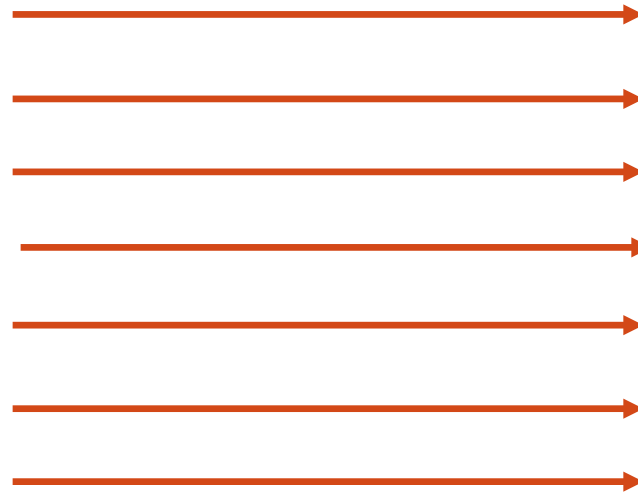
OTHER PROPERTIES:

- CRYSTALLISATION
- BINDING
- THICKENING
- ANTIMICROBIAL
- COAGULATION
- HUMECTANT

Design research to support innovation

Traditional market research

- Improve existing things
- Explicit needs reported
- Market segments
- Artificial settings
- Static interviews
- Inform maintenance
- Consumer research



Design research

- Inspires new possibilities
- Latent needs revealed
- Individuals
- Natural context
- Dynamic conversation
- Inform creation
- **Advanced data modelling & analytics**

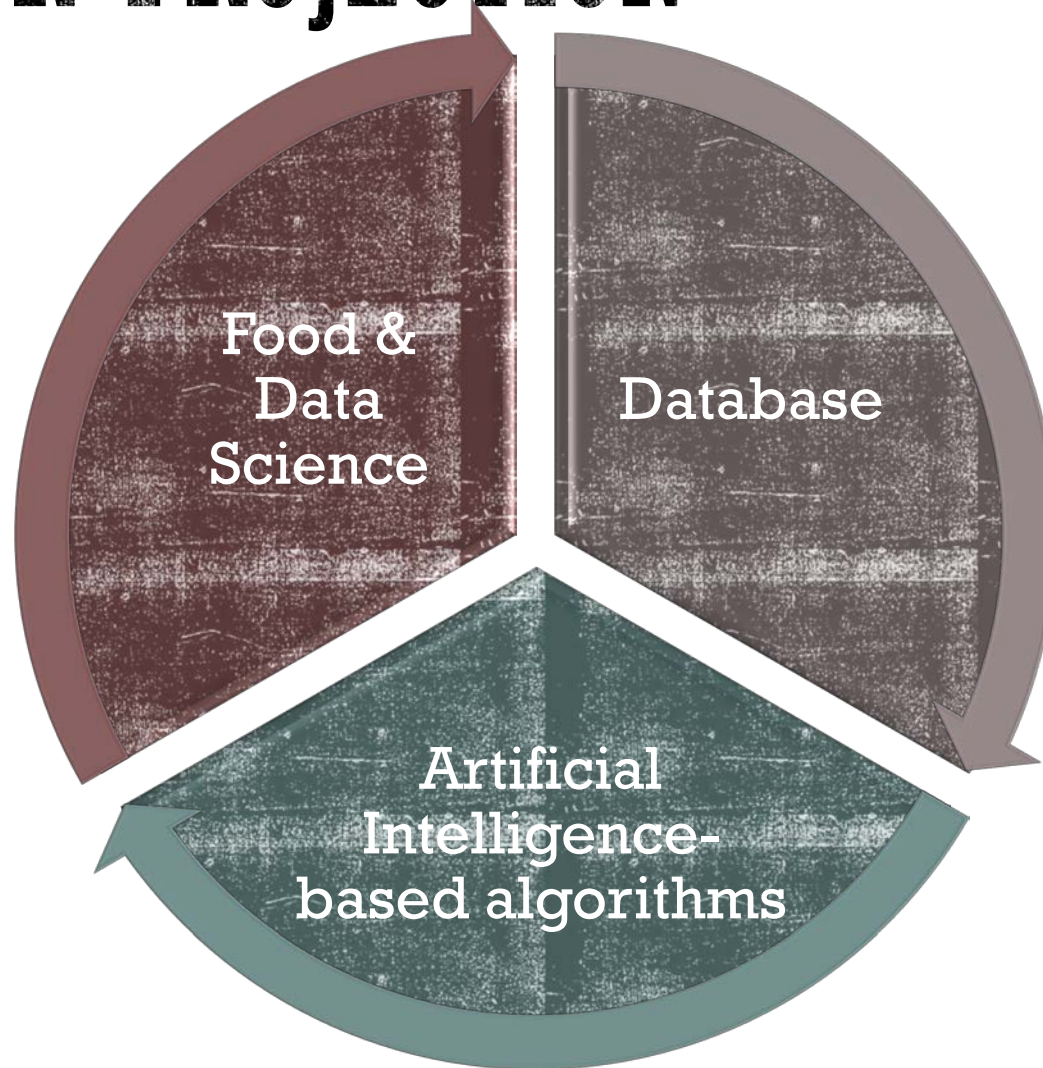
Collection and intelligent use of data to refine and rank consumer preference drivers:

Obtain, Scrub, Explore, Model, Interpret, Curation.

iNewtrition

FOOD SCIENCE EXPERTISE

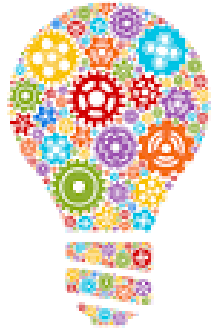
ALGORITHMS FOR PROJECTION



FROM CHALLENGES TO SOLUTIONS & FROM INCREMENTAL TO DISRUPTIVE INNOVATION



Data modelling & analytics to build predictive models (AI)



Innovation management:

- New Product Development
- Product reformulation
- Portfolio management
- Product adaptation

 FlavorWiki



Deep market insights:

- Competitive market
 - mapping
- Emergent preference
 - prediction

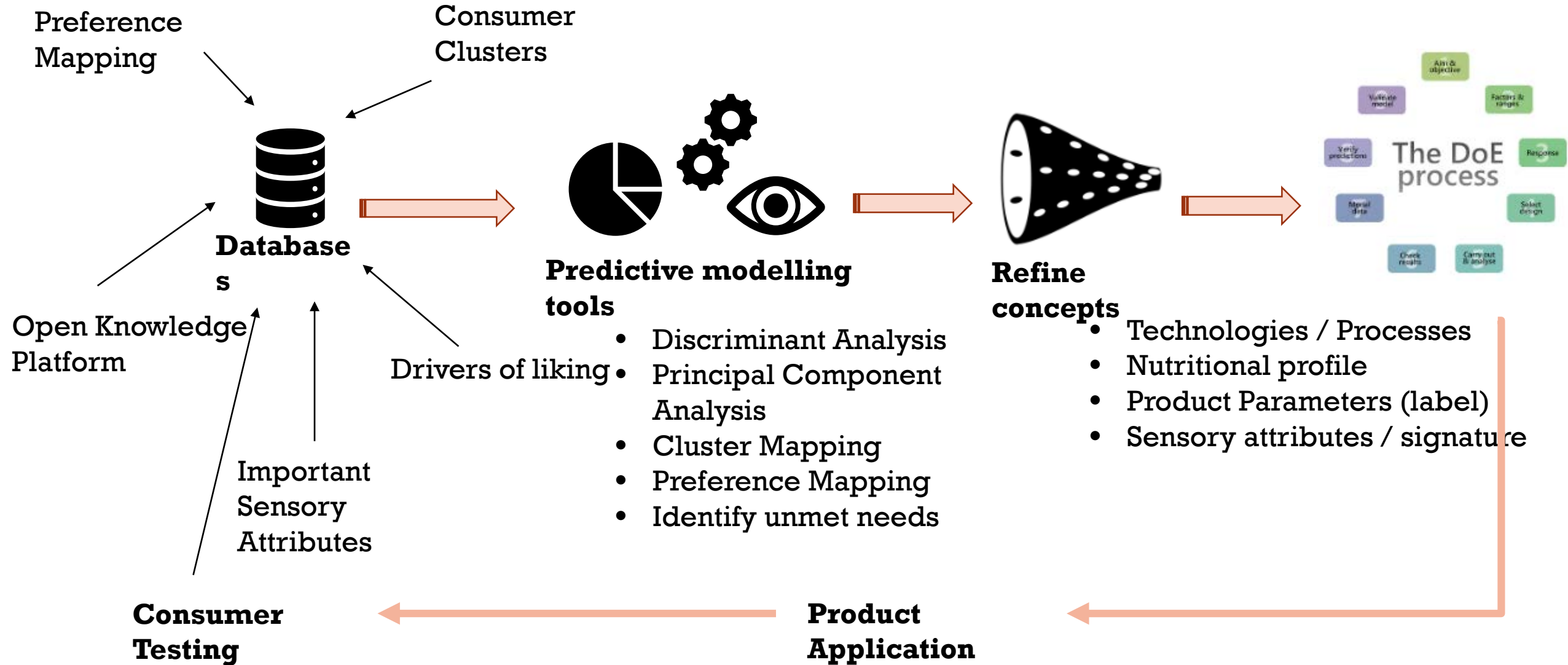


Cognitive marketing:

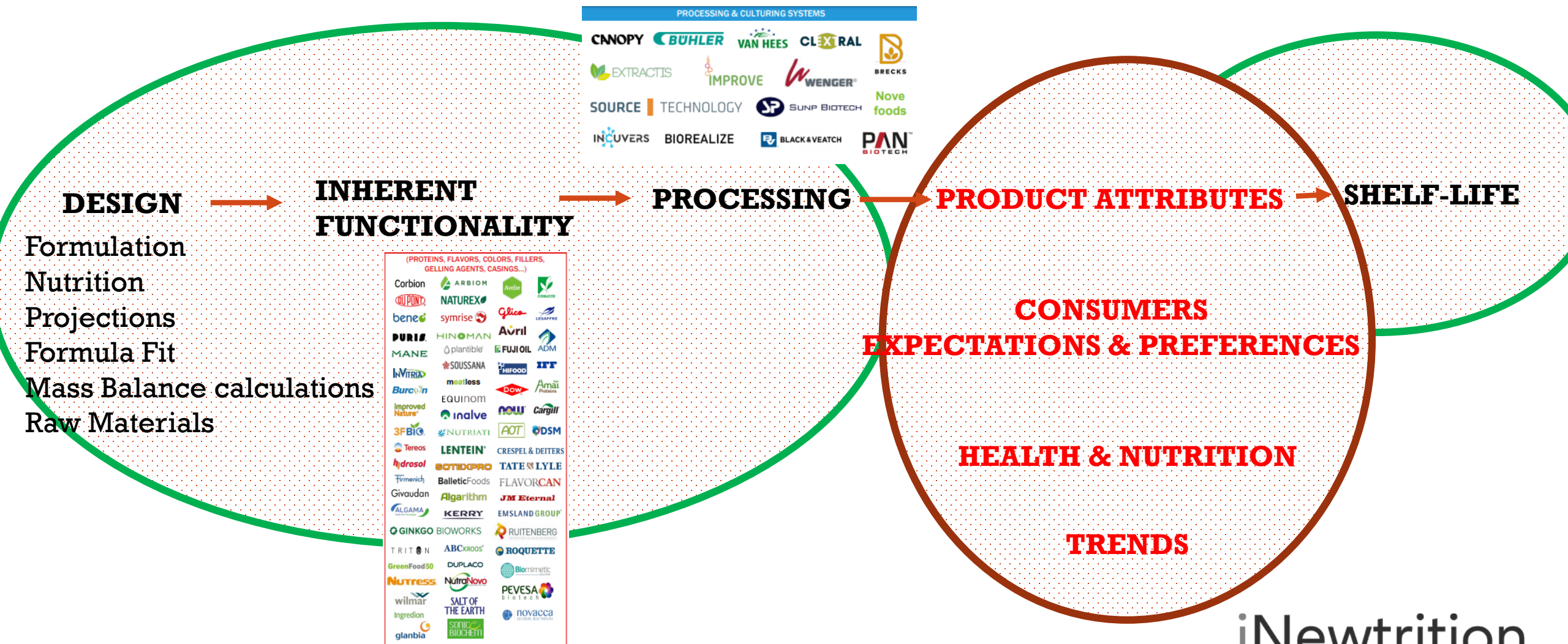
- Flavor profile preference priming
- Consumer value chain psychology prediction

PouxMatok
iNewtrition
FOOD SCIENCE EXPERTISE

Faster Innovation - Empathic Design & Agile Market Orientation



ADVANCED DATA ANALYTICS INNOVATION PROCESS



CLEAN FOOD SCIENCE & TECHNOLOGY: SOPHISTICATED SOLUTION FOR SIMPLIFIED PRODUCTS

- **Lower viscosity of plant-based ingredients**
- **Use Maillard Reactions to your advantage: precursor of flavours**
- **Consumer preferences - Global and local Sensory Mapping**
- **Food Model Systems and its benefits**
- **Scientific proof for efficiency and health claims / benefits (gut health and digestive wellness through fibers)**
- **Natural preservatives, antimicrobials and antioxidants, natural sweeteners, natural flavourings**
- **Clean label. Novel Ingredients. Nutraceuticals. Alternative protein sources. Create consumer-friendly ingredient statements transparent & reassuring. Free-from, etc.**
- **New product attributes through advanced analytical techniques: flavour & texture**
- **Physical processing, extrusion, micro extrusion, PowerHeater, polymathic (pulses), protein texturization, proprietary technologies (Textrudates[®], Grill, AeroExpander[™], AeroToast[™]), post-extrusion processing technologies (freeze/thaw, storage, packaging)**
- **Enhance plant protein solubility and stability (Ionic strength, pH, Temperature, etc.)**
- **Fortification, Nutrition Profiling, Formula Fits & Mass Balance of (Cereal Grains + Vegetables + Nuts + Seeds + Insects Proteins + Microalgal + Yeasts + Myconutrition + Plants) proteins**
- **Biotechnology: controlled enzymatic hydrolysis, seed germination & sprouting, fermentation**
- **Tailored profile - Flavour masking & flavour matrix interactions**
- **Encapsulation technologies**
- **Culinary arts**
- **Flexitarian / Reducetarian => blend of animal and non-animal proteins. Potential synergies**
- **Digital in Manufacturing - Co-packing / Co-manufacturing**

TASTE & PLEASURE!

Proprietary information of iNewtrition Ltd and Raphaele O'Connor – This document should not be reproduced or disclosed without prior authorisation

iNewtrition
FOOD SCIENCE EXPERTISE

CHALLENGES

- **IP / Patent (Giuseppe / Blackbird) vs. Open Innovation**
- **Compliance by Design - Screening and structuring of the data captured**
- **Call for Action: get suppliers on board to share data using standardised methods**
- **Lab / Pilot Plant available at GFI or collaboration universities / industrial partners?**
- **Reducetarian / Flexitarian**
- **Premiumisation - Other trends associated w/ plant-based proteins: fermentation/probiotics, anti O2, gluten-free, lactose-free, fibre, FODMAP, digestive wellness**
- **Structure / function relationships of existing ingredients database. Basic ML-based algorithm Systems vs. skilfully applied old fashioned human intelligence (data analysis & modelling). Linear Discriminant Analysis**
- **Synergistic interaction with dairy proteins (casein micelles) for encapsulation**
- **New product categories and eating occasions w/ plant proteins**
- **New customer segments: fighting sarcopenia and dysphagia with seniors**
- **Food scientist support for clean meat (clean-label hydrocolloids)**
- **Micronutrients fortification for plant-based diets (Vit B12, Vit. D, iron, zinc, calcium, polyunsat fatty acids EPA/DHA)**

iNewtrition

FOOD SCIENCE EXPERTISE

 **Raphaëlle O'Connor**

 +353876765112

 info@inewtrition.com

 <https://www.inewtrition.com/>

THANK YOU



iNewtrition
FOOD SCIENCE EXPERTISE

BACK-UP SLIDES

CALL 4 ACTION... & REFLEXION

- **Disruptive Innovation:** where do we need to see new thinking and innovation? What's needed to take current technologies to the next level?
- **Accelerating Scale:** Is there a secret recipe for designing and scaling innovation? What are the milestones and key metrics of success?
- **Shelf Life Stability:** How can we leverage technology and innovation to improve the quality of shelf stable products?
- **Food Tribes:** How are food tribes driving new trends and products and why do they represent a highly influential market segment?
- **Food as Medicine:** How big is the market opportunity and where should we expect to see breakthroughs in this space?
- **Food & Health:** How are food companies enhancing the wellness profile of food and bringing better-for-you foods to market?
- **Consumer Trends:** What areas of innovation, research and technology are leading CPG brands watching closely in response to changing consumer trends?
- **Plant-Based Innovation:** What new innovative ingredients and products are we seeing emerge? Where do we need to see further innovation in processing techniques to maximize nutrition and sustainability?
- **Corporate Innovation:** How can food companies maintain a start-up culture and entrepreneurial mindset?
- **Innovating with Plant-based ingredients:** How can added plant ingredients create healthier products for the consumer and improve targeted health benefits? Can we accelerate the development of plant-based/nature driven ingredients through Open Innovation? What are the benefits? What are the challenges?
- **Open Innovation:** What collaborative models work most effectively and what does a successful partnership look like for both the start-up and the corporate?
- **Food as Medicine:** What technological and scientific breakthroughs are paving the way?

NEW PRODUCT CATEGORIES

- Convenient vegetables-based crisps for snacking
- Plant-based waters
- Dairy alternatives
- Naturally functional
- Pulse / Bean / Nuts -based pasta & noodles
- Traditional ingredients reinvented through technology
- Myconutrition
- Super-herbs, super-plants, super-spices, super-roots and combinations thereof
- New consumption moments (snacking)