MNIFT

SOUTHWEST
MINNESOTA STATE UNIVERSITY

RCA Research Chefs Association®
Defining the Future of Food®

Closing the Gap Between the Culinary Gold Standard and the Commercialization Process

Product Development with Culinology® 4.0

Professor Michael Cheng, PhD, CHE
Assistant Professor Mark Traynor, PhD

Dr. Michael Cheng

PhD Hospitality Management, Iowa State U
MS Nutr Science & Dietetics, U of Nebraska
BS Restaurant Management, U of Nebraska

- Chair, Professor of Culinology, Southwest Minnesota State University
- Former Chair, RCA Higher Education Sub Committee
- Director, RCA Board 2006 - 2010
- Two time Winner of RCA President's Award
- Co-advisor, 2013 RCA Culinology Competition Championship team
- 20 years food industry experience, 13 years higher education (Director, Professor, Assistant Dean)

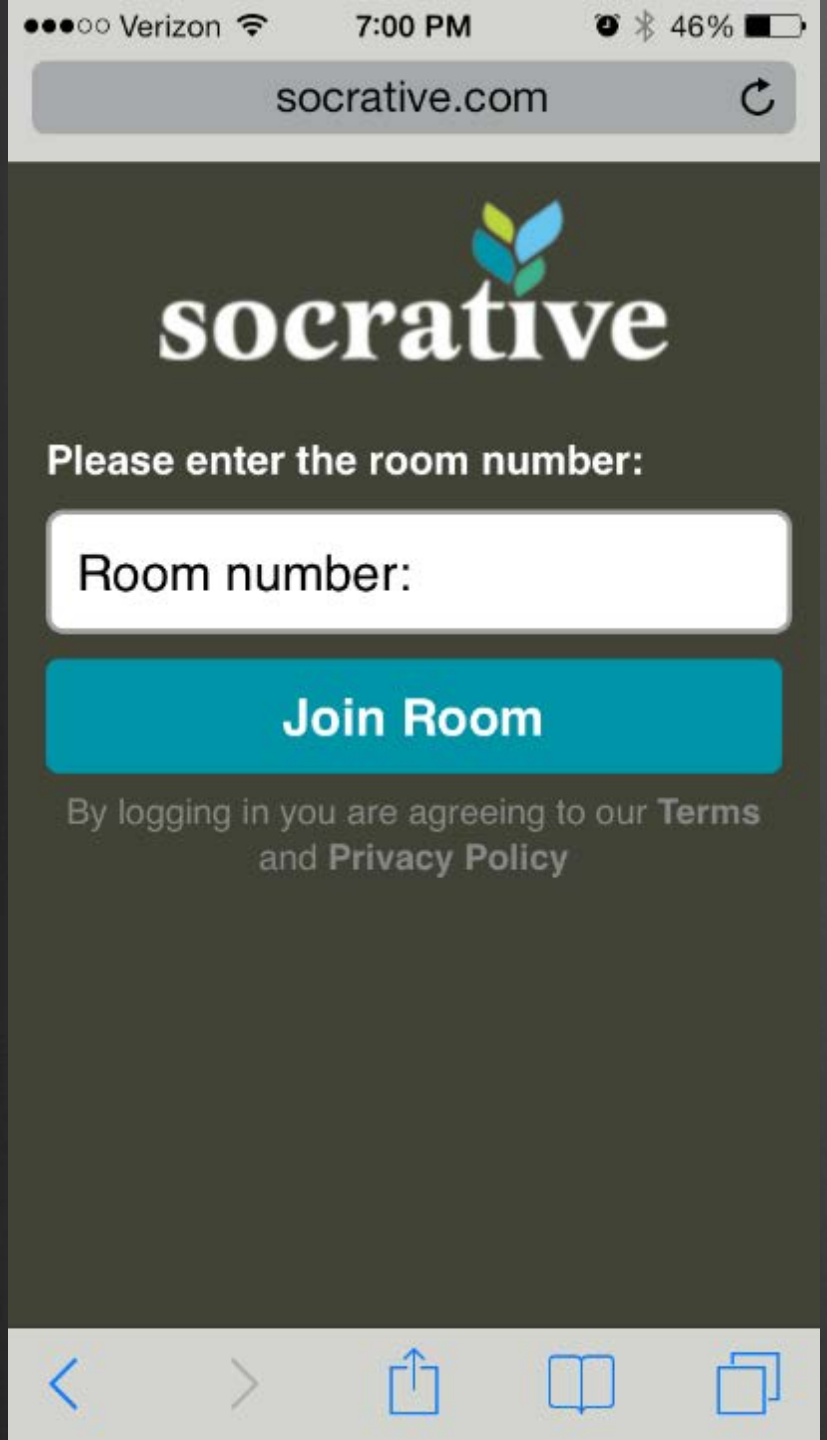
Dr. Mark Traynor

PhD, Molecular Gastronomy and Food Product Development, DIT, Ireland.
BA Culinary Arts (Hons), DIT, Ireland

- Assistant Professor of Culinology, Southwest Minnesota State University
- Three time winner of RCA Student poster competition (2011-2013).
- Awarded the Higher and Continuing Education Scholarship, RCA, 2012.
- Five published research papers in food science and technology journals.
- 14+ years food industry experience

Outline

- Product Development Overview
  - Culinology 1.0 – *making food safe*
  - Culinology 2.0 – *chef-inspired*
  - Culinology 3.0 – *the blending of culinary arts and food science*
  - Culinology 4.0 – *a new breed*
- Product Development using Molecular Gastronomy
  - Examples



- On your smartphone, go to m.socrative.com
- Enter SMSU116 as the room number

What is Culinology®?

"cu-lin-ah-loh-gee"

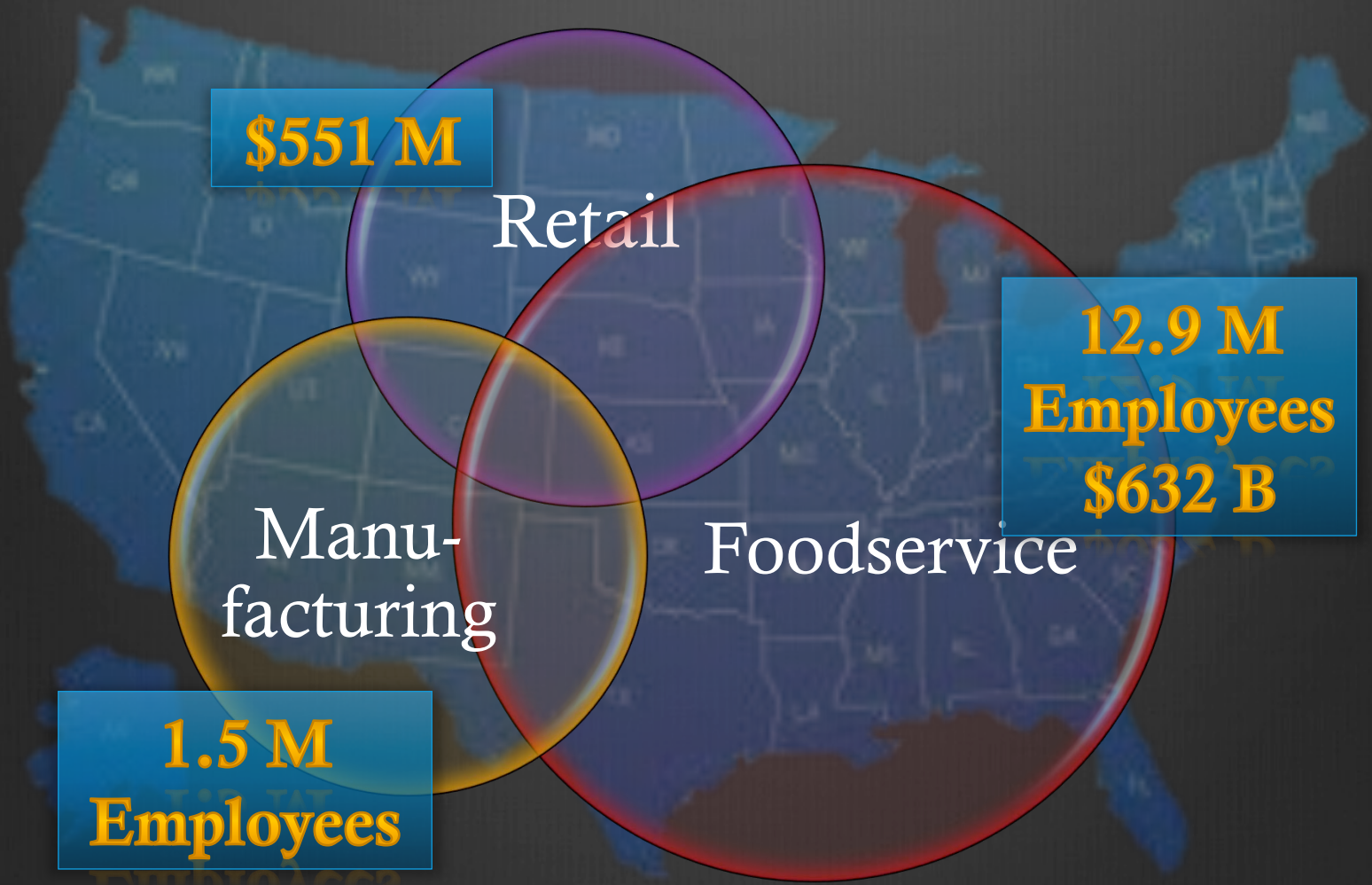
A true Chef is an artist and a gourmet, a manager

and a leader.

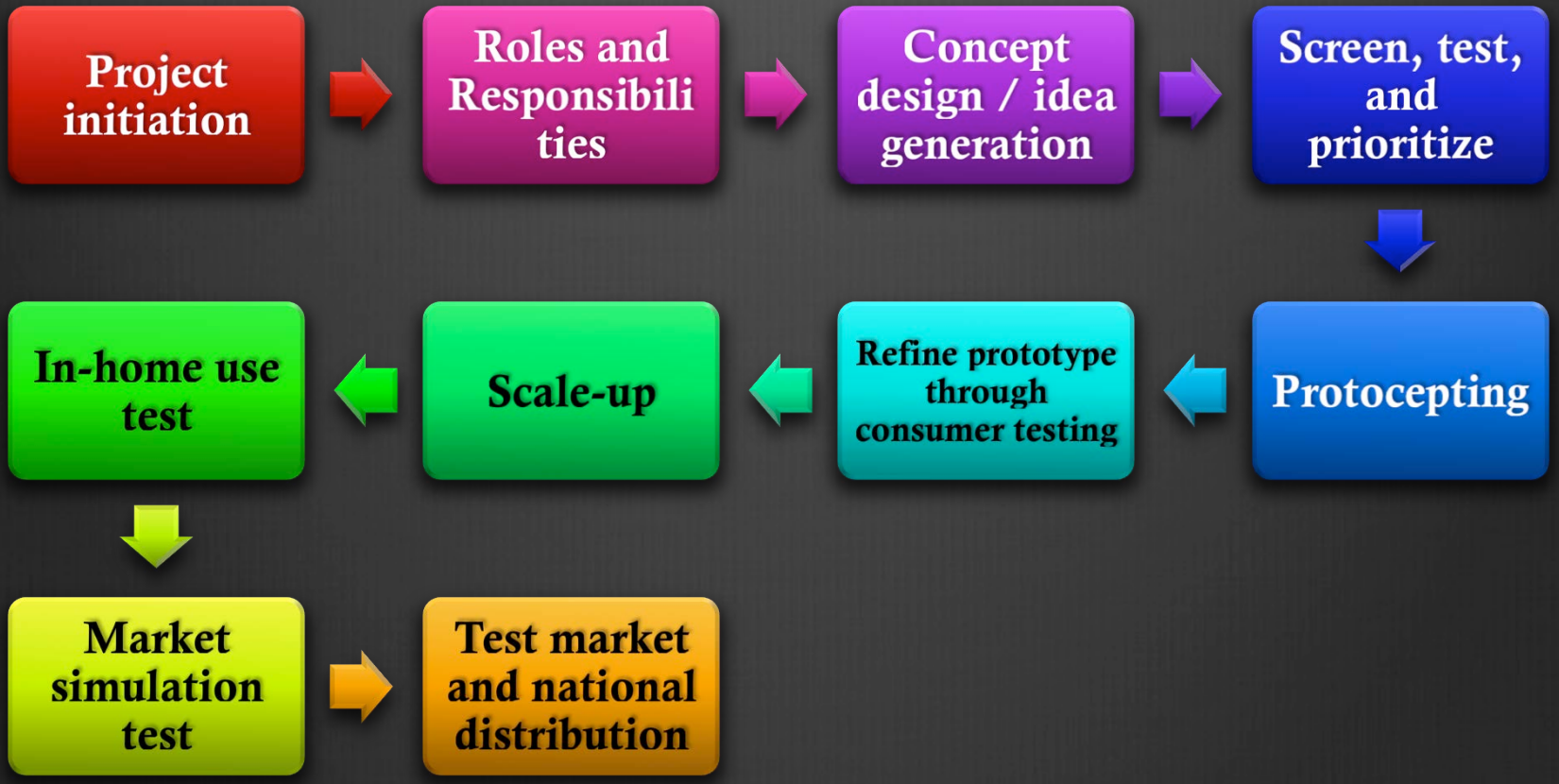
A true Food Scientist is a technologist and statistician, an engineer and a nutritionist.

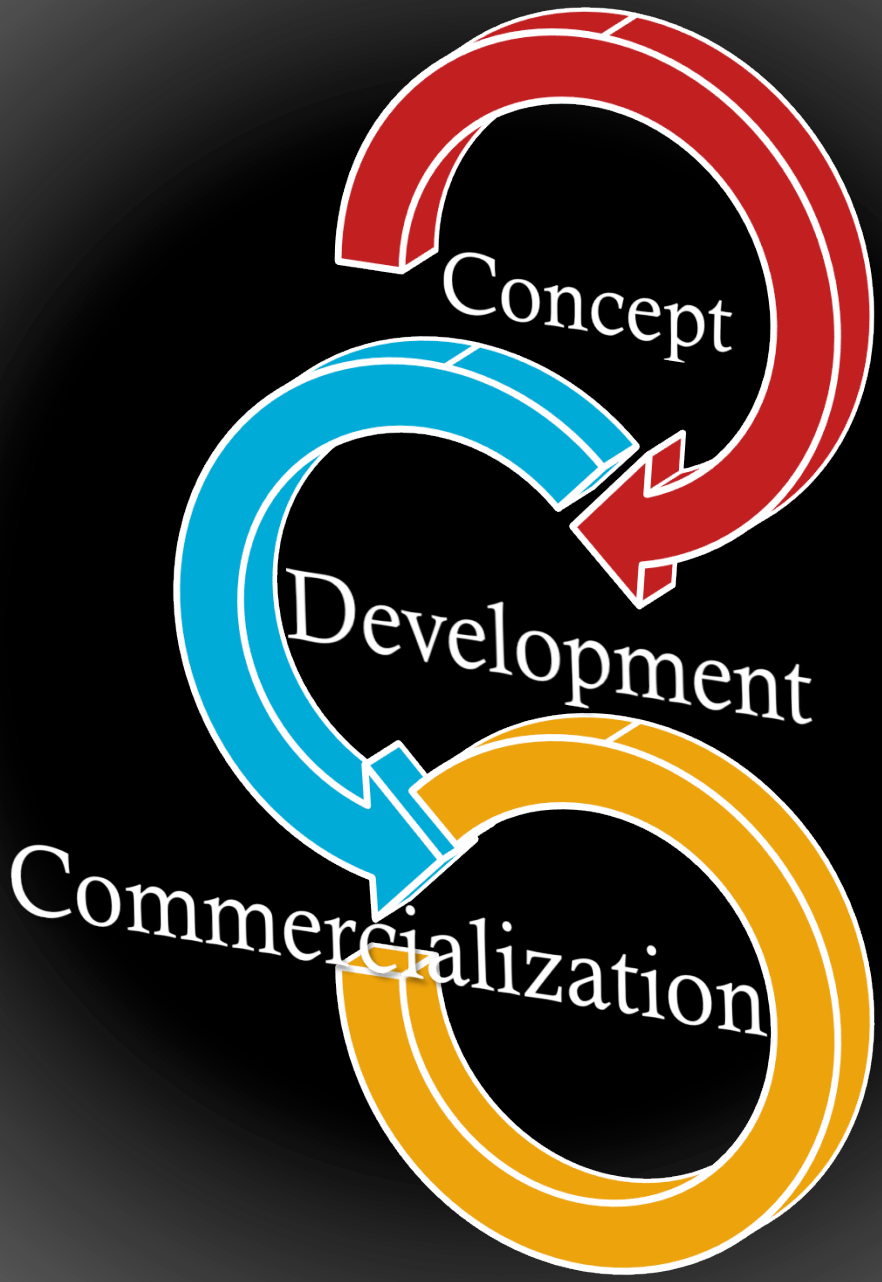
"Culinology® – the blending of the culinary arts and the science of food."

Food Product Development Industry



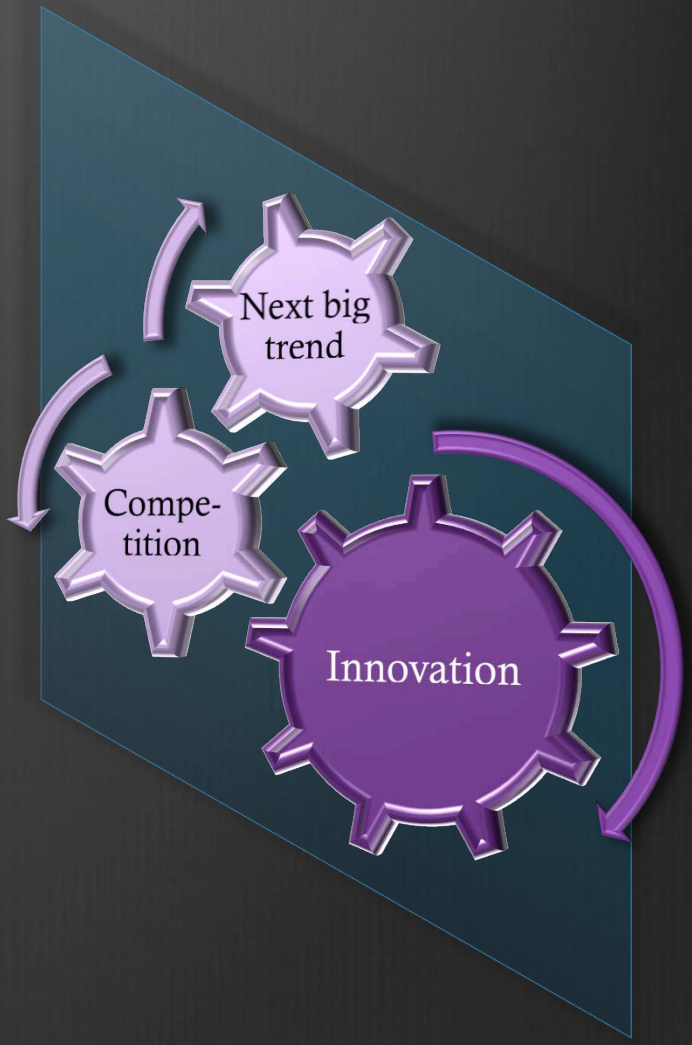
The Food Product Development Process




Concept
Development
Commercialization

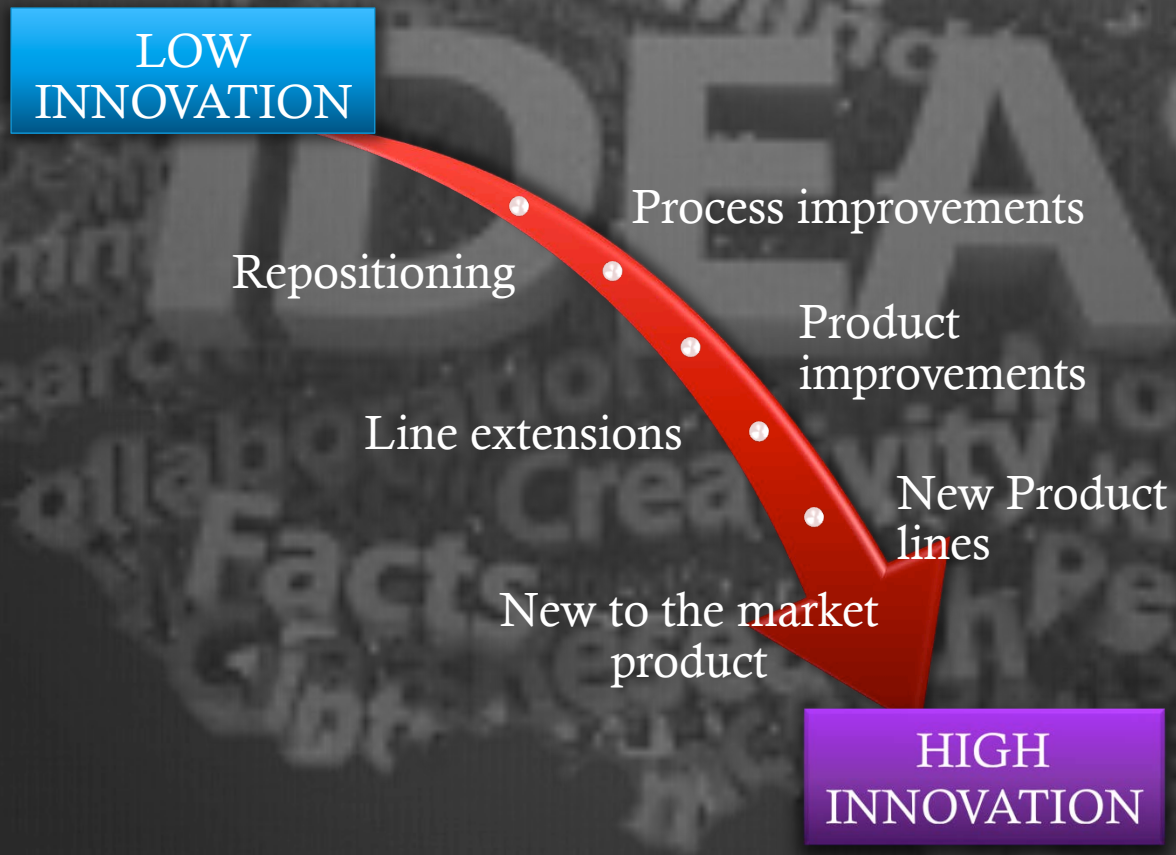
Classical Food Product Development

Culinology® 1.0



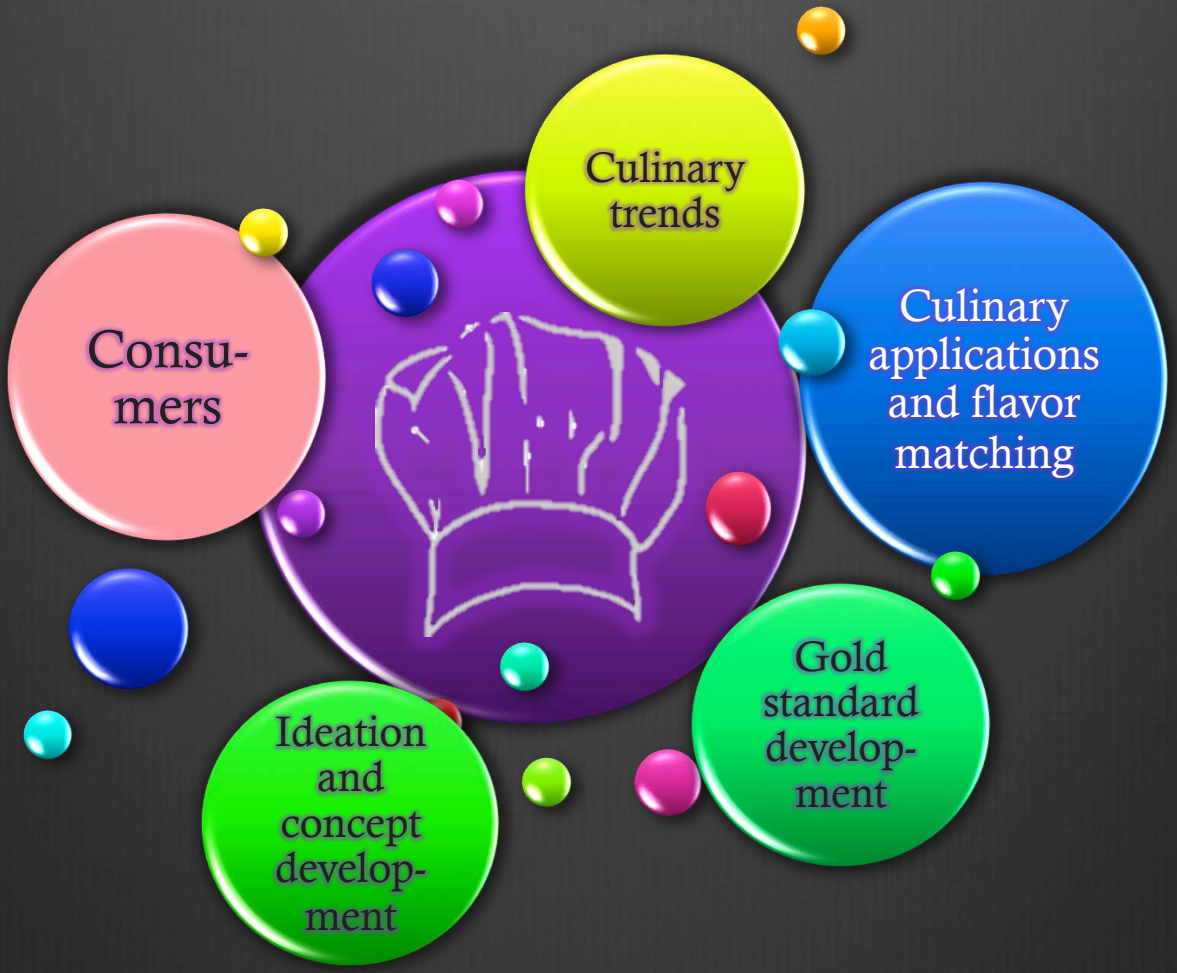
MRE's (Meals Ready to Eat)

Innovation Continuum



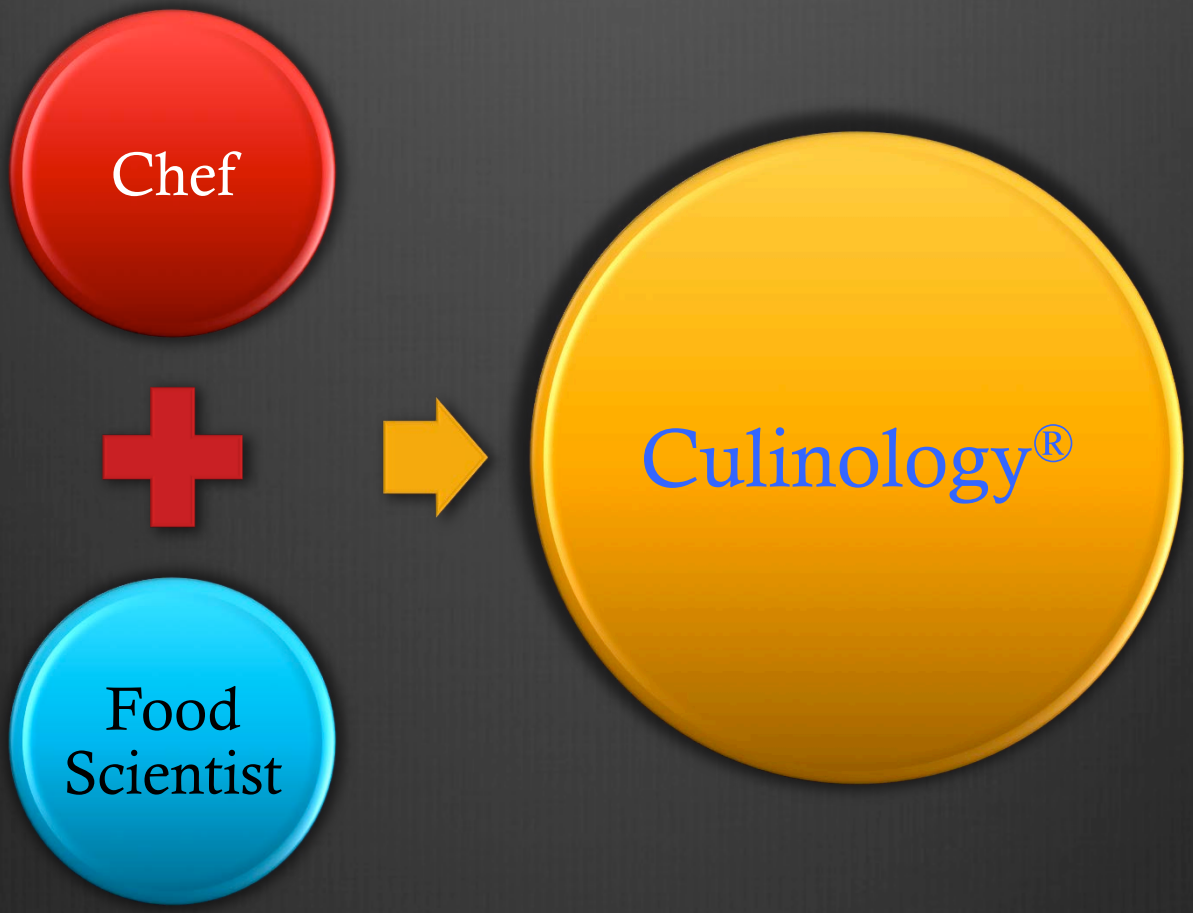
In the Hands of the Chef

Culinology® 2.0



In the Hands of the Chef *(cont.)*

Culinology® 2.0

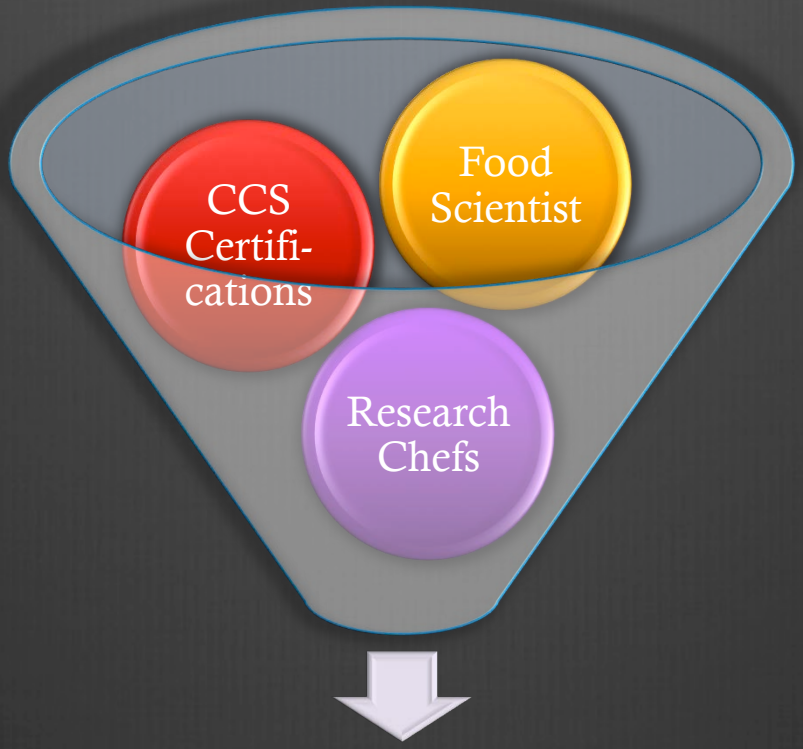


In the Hands of the Chef *(cont.)*

Culinology® 2.0

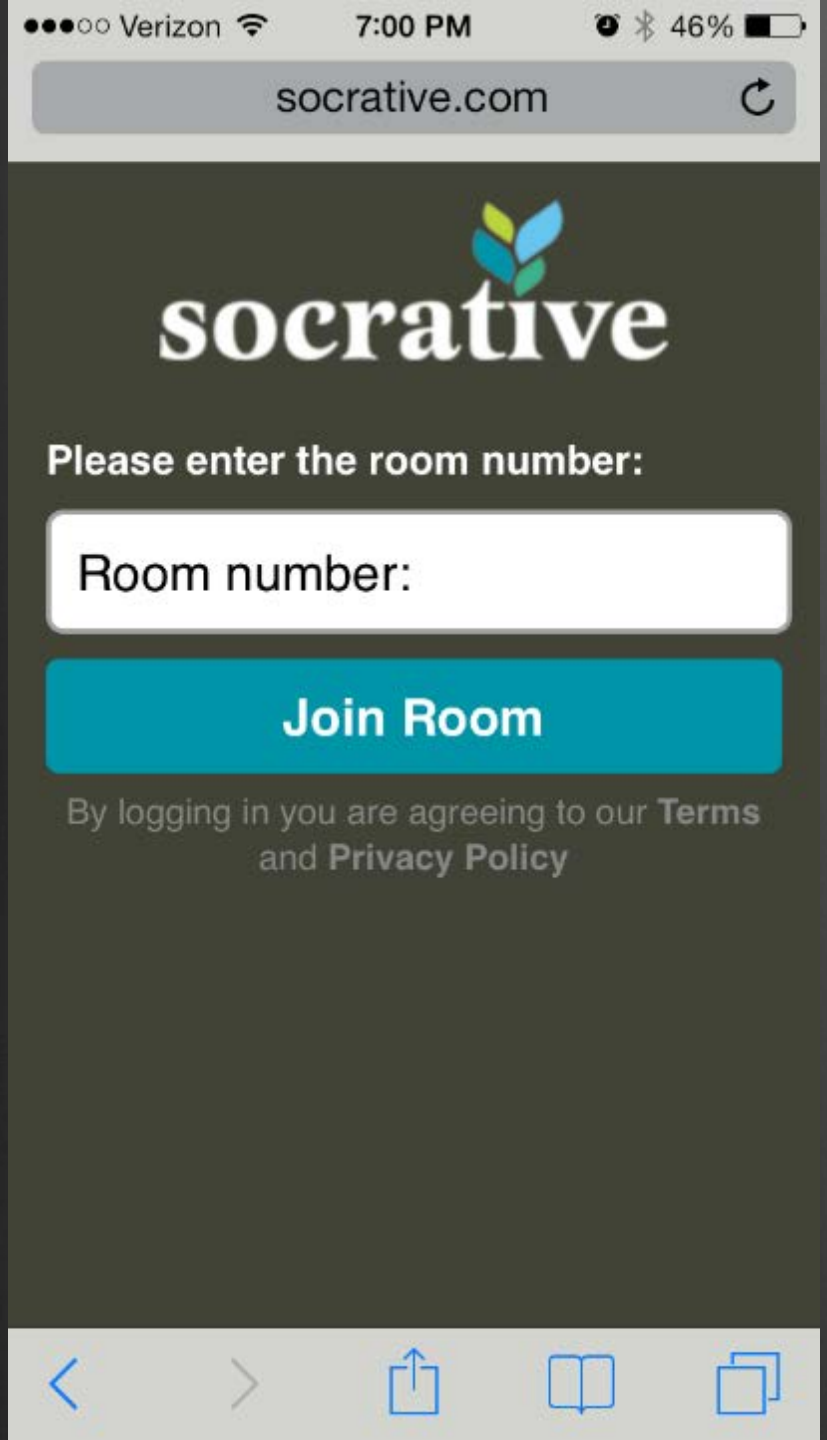
From the Scientist to the Developer

Culinology® 3.0



From the Scientist to the Developer

Culinology® 3.0



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A Molecular Gastronomy approach

Dr. Mark Traynor

What is Molecular Gastronomy?

Ferran Adria – El Builli

René Redzepi - Noma

Heston Blumenthal – The Fat Duck

Wylie Dufresne – WD 50

Jason Knibb – Nine-Ten


Mango juice "yolk" – Alginate (inverse technique)
www.jocooking.typepad.com


© David Levene


Molecular Cocktail
XANTAN GUM


METHYLCELLULOSE
Apple juice leaf - Methylcellulose
www.jocooking.typepad.com

“molecular cooking” (it ‘s cooking, using “new” ingredients and tools),

“molecular gastronomy (science: production of knowledge)

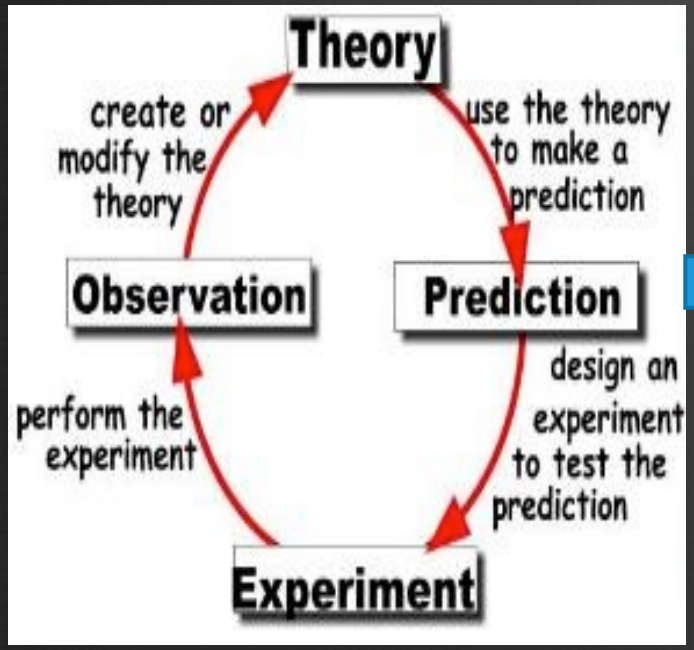
First of all, I would stress the important difference: between “molecular cooking” and “molecular gastronomy”

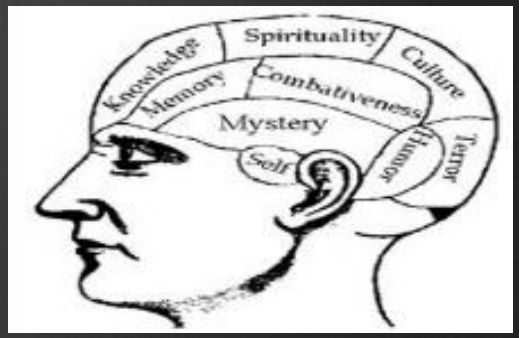
Molecular Gastronomy

- The scientific discipline dedicated to the exploration and investigation of culinary mechanisms of phenomena which are related to the sensory perception of food (Snitkjær, 2010)

- Aim: to **analyze from a scientific point of view** the phenomena that occur in the kitchen during cooking, in order to improve the final results.

- **Principles?**
- Better understand and control culinary transformations during preparation and consumption.
- knowledge allows for the introduction of innovative culinary techniques and novel food products.





- Founded by Hervé This and Nicholas Kurti in 1988.
- Annual Molecular Workshops
- 1st PhD in 1995

"I think it is a sad reflection on our civilization that while we can and do measure the temperature in the atmosphere of the planet Venus we do not know what goes on in our soufflé."

Nicholas Kurti - 1969 -"The Physicist in the Kitchen" - Friday Evening Discourses da Royal Institution

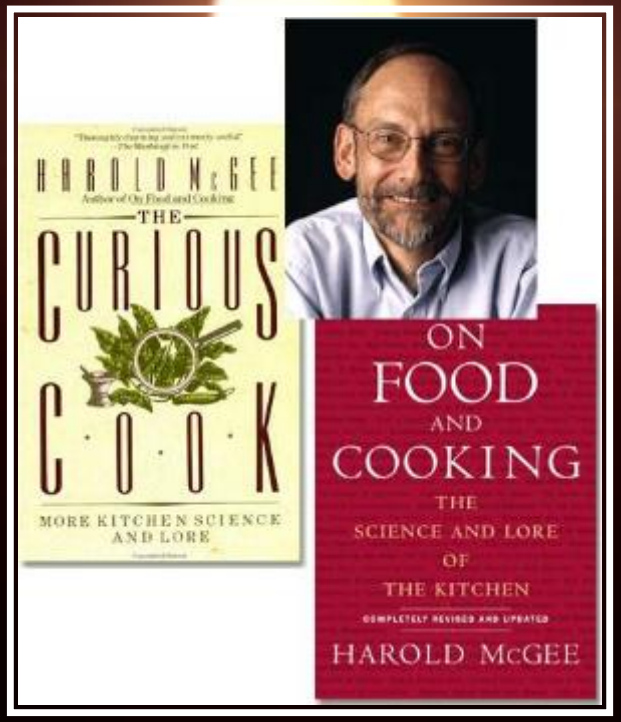
The three objectives of Molecular Gastronomy

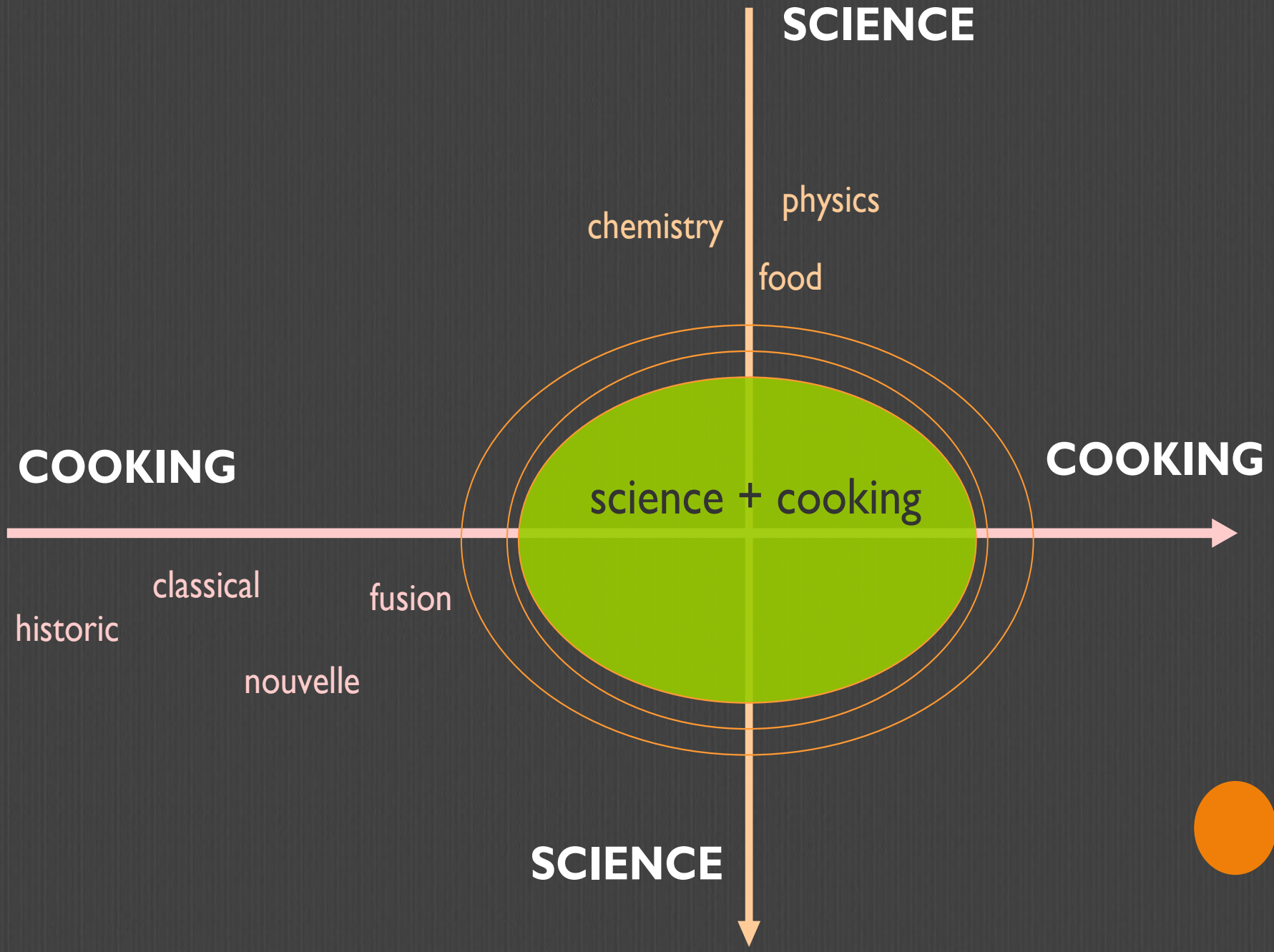
- 1. Explore "definitions" and "precisions"
- 2. Explore the art component of cooking
- 3 . Explore the social component of cooking

(This, 2006)

Harold McGee

"The science of deliciousness"




SCIENCE
physics
chemistry
food
COOKING
COOKING
science + cooking
classical
fusion
historic
nouvelle
SCIENCE

Research in the area

- Herve This - PhD in molecular and physical gastronomy (France)
- Juan Valverde - Analysis of photosynthetic pigments from various "green plants" used as food. Evolution of these pigments during culinary processes. (France)
- Anne Cazor - what goes out of the carrot tissues and how? (France)
- Pia Snitkjær - Investigations of meat stock from a Molecular Gastronomy perspective. (Denmark)
- Rachel Edwards Stuart - Creating Innovative Flavour and Texture Experiences. (England)

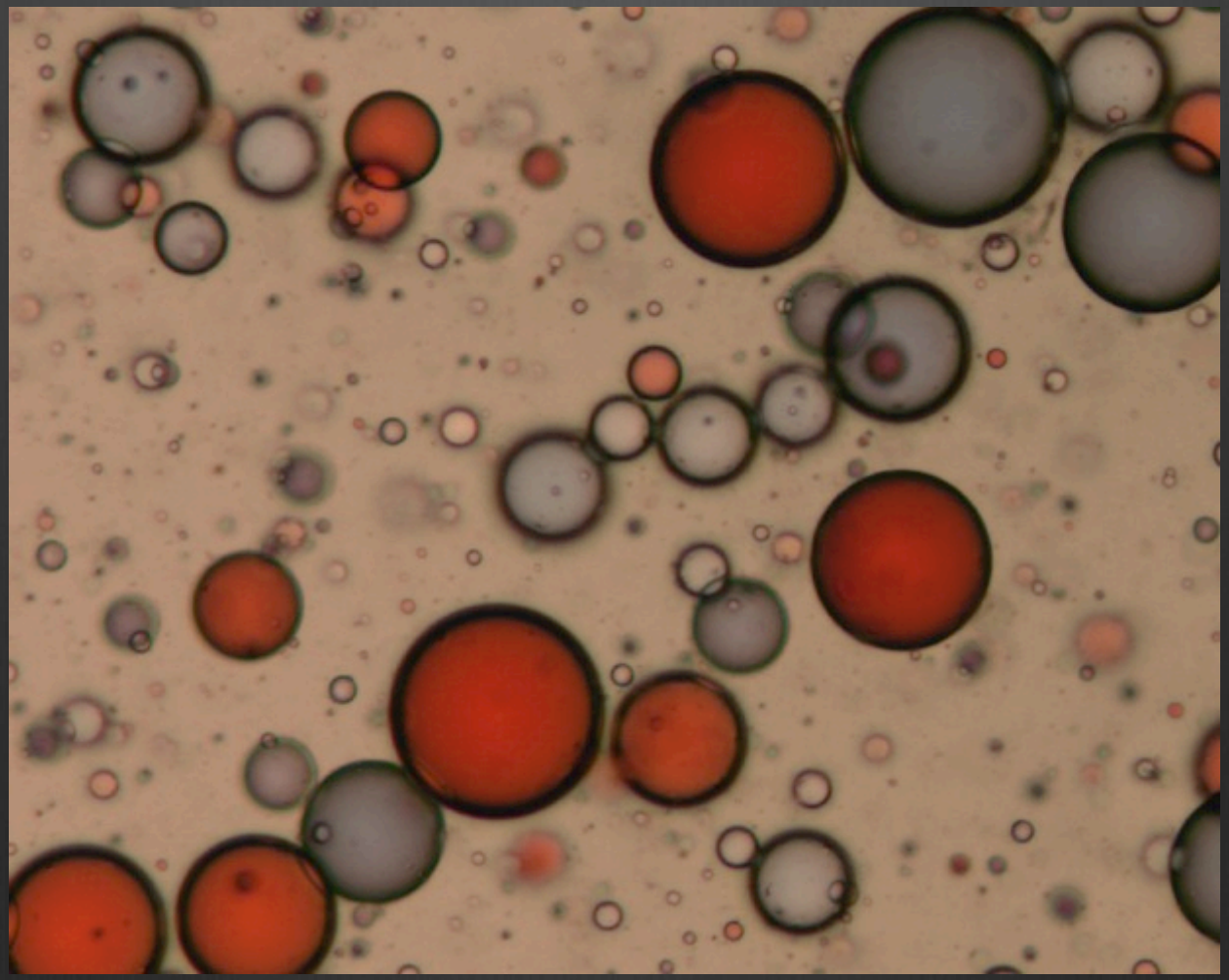
PhD - Innovative Food Product Development using Molecular Gastronomy; a focus on Flavor and Sensory Evaluation

Mark Traynor, DIT 2013

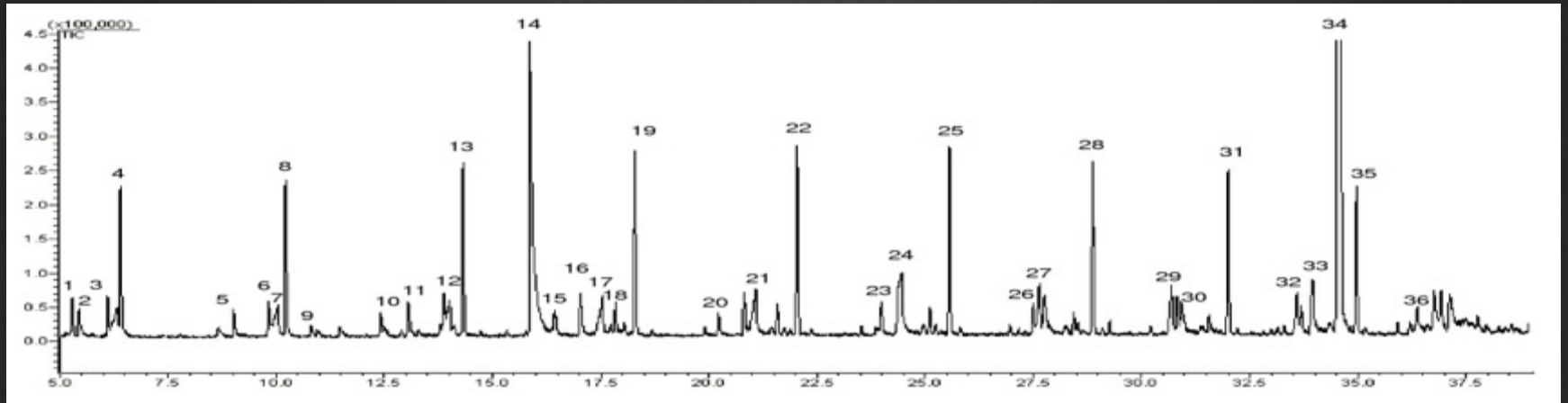
Objectives of PhD

- To optimise the formation and stability of a food dispersion model system.
- To optimise the flavour volatile release from the optimised dispersion model system.
- To investigate novel flavour combinations in terms of sensory hedonic responses and flavour volatile interactions.
- To produce innovative food products based on the findings of the previous objectives
- To assess the consumer acceptability and preference for these products and their suitability to a specific market sector.

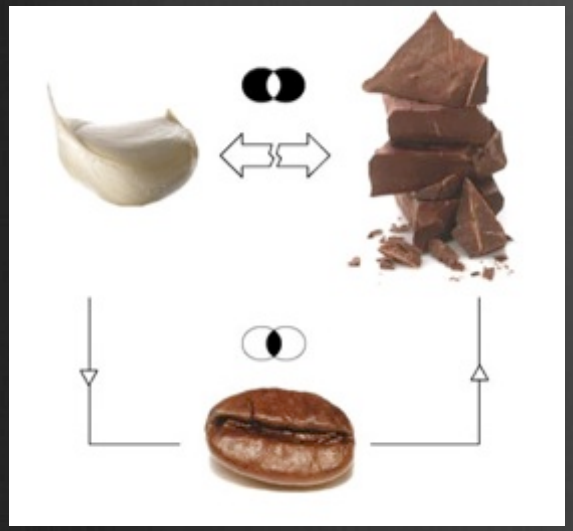
Optimisation of dispersion model system formation and stability



Optimisation of flavour volatile release from the dispersion model system.



Investigation of novel flavour combinations.



Elucidation of Results

- All shared a large percentage of compounds
- Volatile – matrix interactions.
- Conc. of key compounds:
  - Change in the aroma of compounds
  - Increase above threshold
- Interaction between odor active compounds
  - Esters and sulphurous compounds
  - Esters and aldehydes
  - Esters and aldehydes, ketones and alkenes
- **It is all about the right balance!!!!**

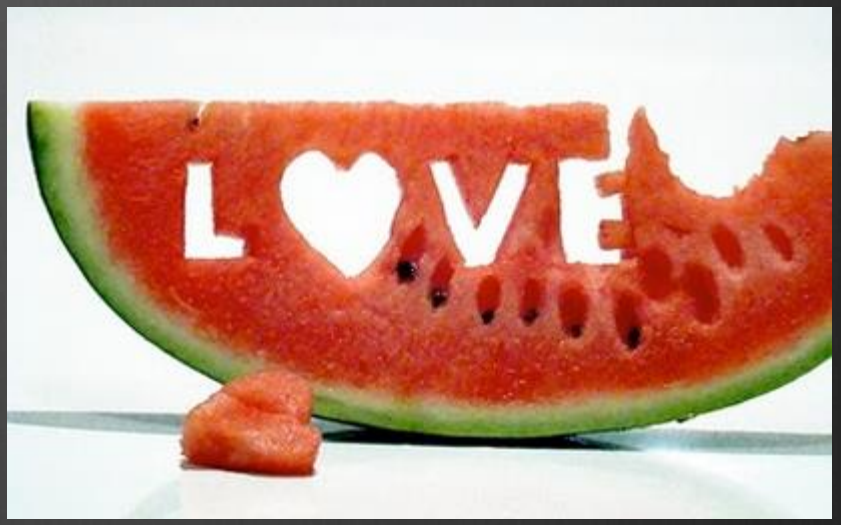
Development of novel flavored ice creams

FIND THE RIGHT BALANCE!!!!

MNIFT

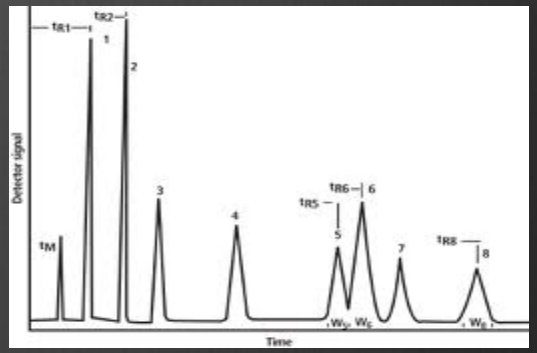

STAND UP FOR REAL FOOD!
DOWNLOAD THE FOOD REVOLUTION GIVING ASSISTANT

Neophobic and Neophilic behaviours




Consumer Research Done Right
6 59874 5 63258 6

Product Development approach



Molecular Gastronomy = science (producing knowledge)

Culinary Technology = looks for improvement of cooking, in particular through applying new knowledge.

Cooking = technique (molecular cooking and other trends)

(Valverde, 2011)

Culinology® 4.0

Bridging the Research Gap

Science

Culinary

Product Development

Transfer of information and knowledge

Cheng, M. (2012): Evaluation of the RCA Culinology® Degree Competencies

2001 — 101 graduates identified from nine programs — 2007

81 graduates surveyed

Surveys

29 employers surveyed

Explanatory Sequential Strategy

6 graduates interviewed

Interviews

2 employers interviewed

Experience

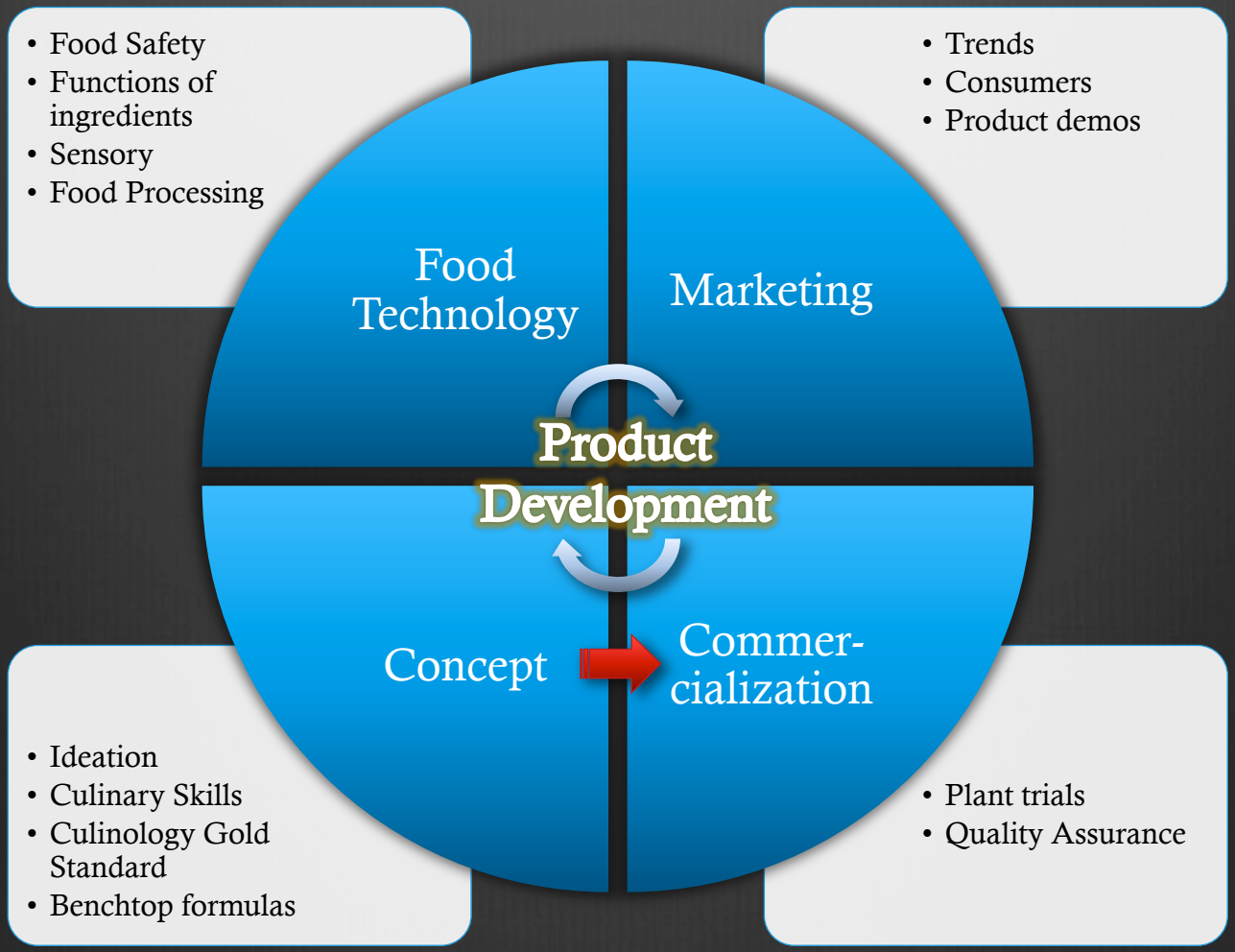
SELECTION CRITERIA

> 30 years experience


PRODUCT DEVELOPMENT
CULINARY APPLICATIONS
FOOD PROCESSING
CULINARY SKILLS
SENSORY EVALUATION
FOOD CHEMISTRY
FOOD TRENDS
FOOD SAFETY
FOODSERVICE OPERATIONS
FOOD REGULATIONS
NUTRITION
BAKING
OUTCOMES
LEVEL
RELATED
VARIOUS
TRENDS
KNOWLEDGE
COMPOSITION
ANALYSIS
TASTE
STANDARD
CULINARY
USE
STAGES
IDENTIFICATION
BASIC
FOOD
APPLICATION
BENCH
NPD
INGREDIENTS
PREPARATION
BASELINE
LEARNING
TECHNIQUES
COOKING
SKILLS
CHEMISTRY
MARKET
PROPER
NEEDED
FUNCTIONAL
ADVANCED
ABILITY
FOODSERVICE
ENCOMPASSES
NUTRITION
DISTINGUISH
MANUFACTURING
1. Internships
2. More Practical Application of Theories
3. Networking
4. Presentation and Communication Skills

The Advent of the Culinologist

Culinology 4.0



Where are our Culinology graduates employed at?

- General Mills, Inc.
- Kerry Ingredients
- The Schwan Food Company
- Frito Lay
- Kajun Kettle
- Curly's BBQ
- Monogram Food Solutions
- Eatem Foods Company
- Unipro Foodservice
- Flagstone Foods
- Michael Foods
- ConAgra Foods


Applying Culinology 4.0

- Develop a frozen hand-held appetizer using high protein soy flour and chicken for local retail
- Develop a refrigerated version of Thai-style mangoes and sticky rice with a minimum projected shelf life of 45 days for retail export
- Develop a unique frozen dessert with a minimum of 50% ice cream and 25% cake, targeting the luxurious and indulgent consumer for global distribution

The Advent of the Culinologist

Culinology 4.0

Project Assignment

- To develop a frozen hand-held appetizer using high protein soy flour and chicken for local retail

ChicKone Components

Topping

Crispy Chicken Mousse Ball

Sauce

Smoked Red Pepper Sauce

Filling

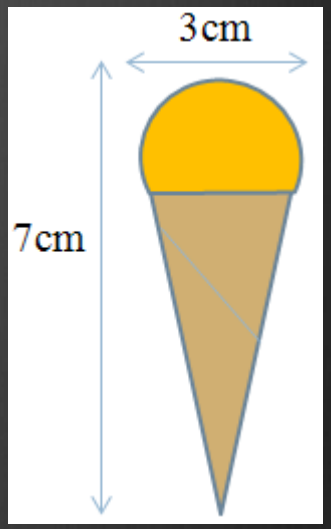
Russet & Sweet Potato

Cone

Cone Pastry

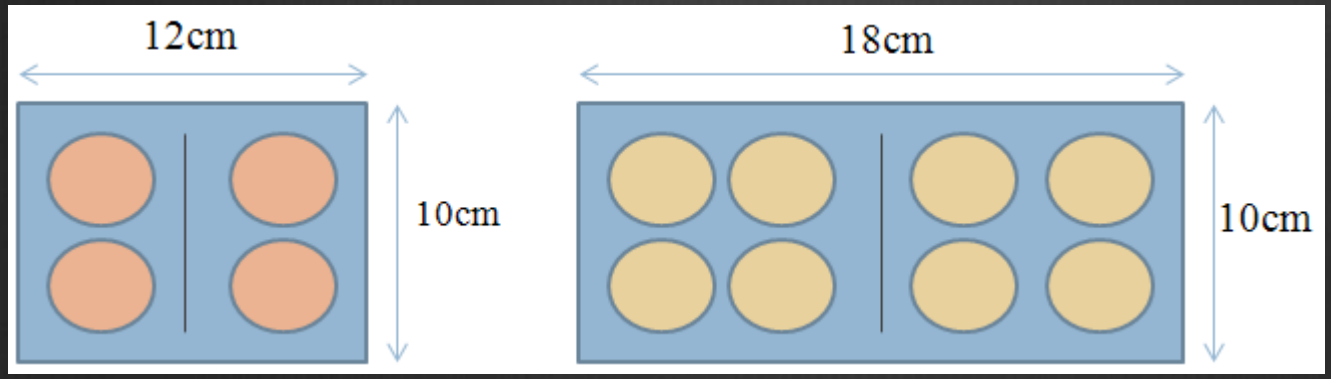
- **Can be reheated in microwave**
- **Hand held**
- **Portable**
- **Easy to consume**
- **Convenient**

ChicKone Descriptions



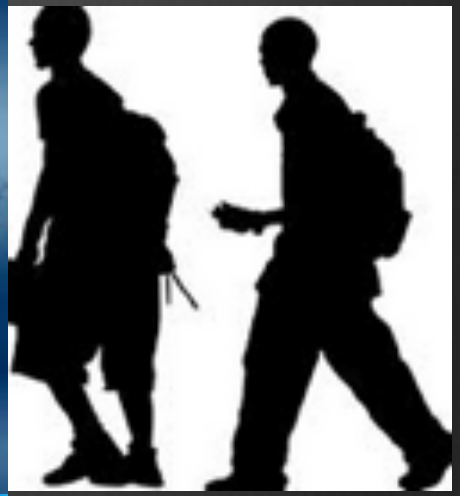
Total weight : 120g/cone
Serving size : 2 cones
Packaging size : 4 cones or 8 cones

- Box with individual segmented cone
- Able to stand on it's own.
- The cone will be wrapped to maintain the shape and the texture.
- Packaging from recycled materials.



Target Market

- Business Professionals
- Families
- Caterers
- Students
- Convenient stores
- Cafés
- Supermarkets
- Restaurants

Technical Ingredients

- Xanthan gum (TIC GUMS)
  - Binding agent & stabilizer
- Agar-agar (TIC GUMS)
  - Thickening and gelling agent

- High-Protein Soy flour (Soon Soon Companies)
  - Gives slight nutty flavor
  - Lowers cholesterol

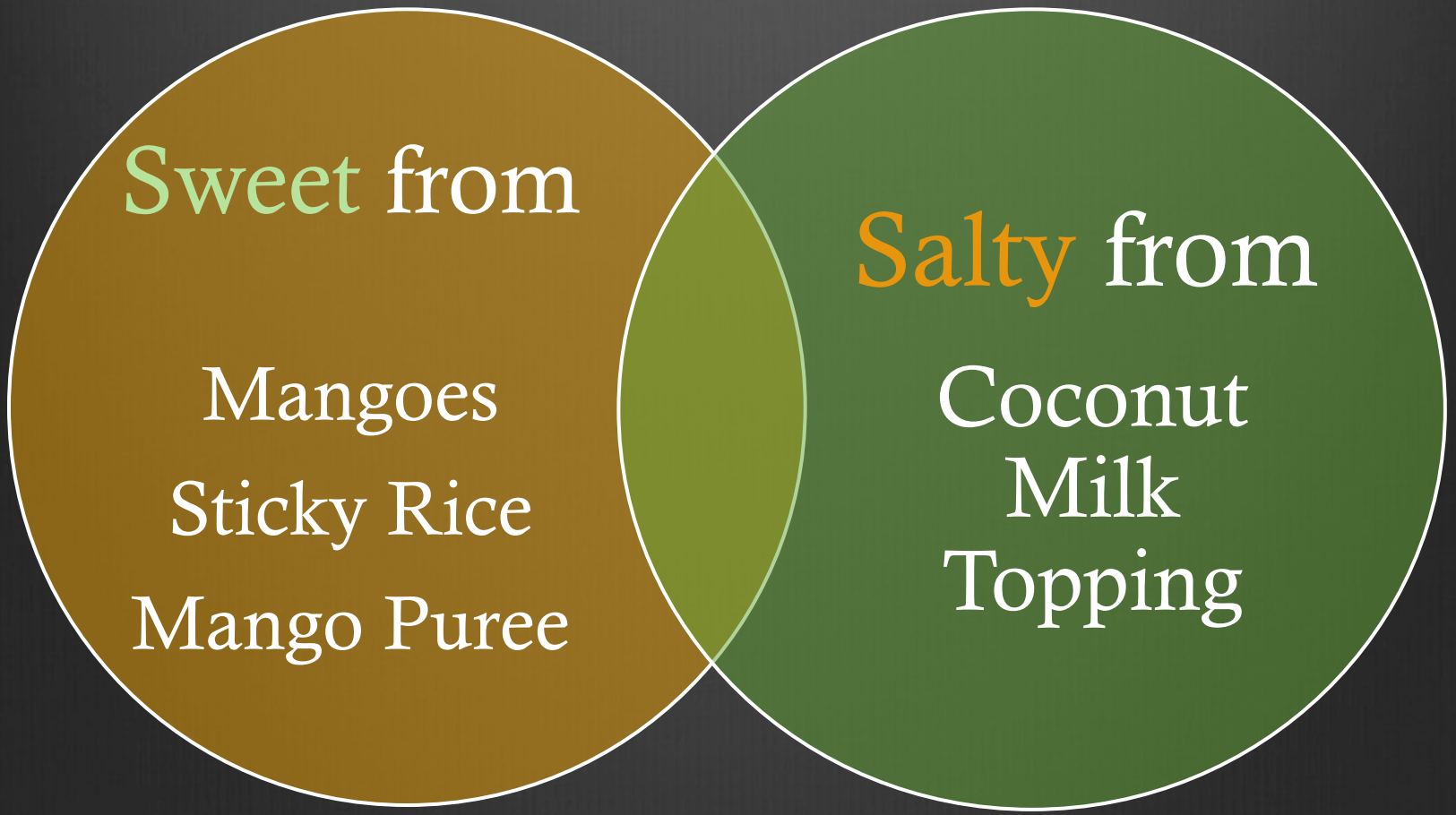
Project Assignment

- To develop a refrigerated version of Thai-style mangoes and sticky rice with a minimum projected shelf life of 45 days for retail export

Tropical Lava
“Mango Sticky Rice”

Inspiration

Sensory Elements



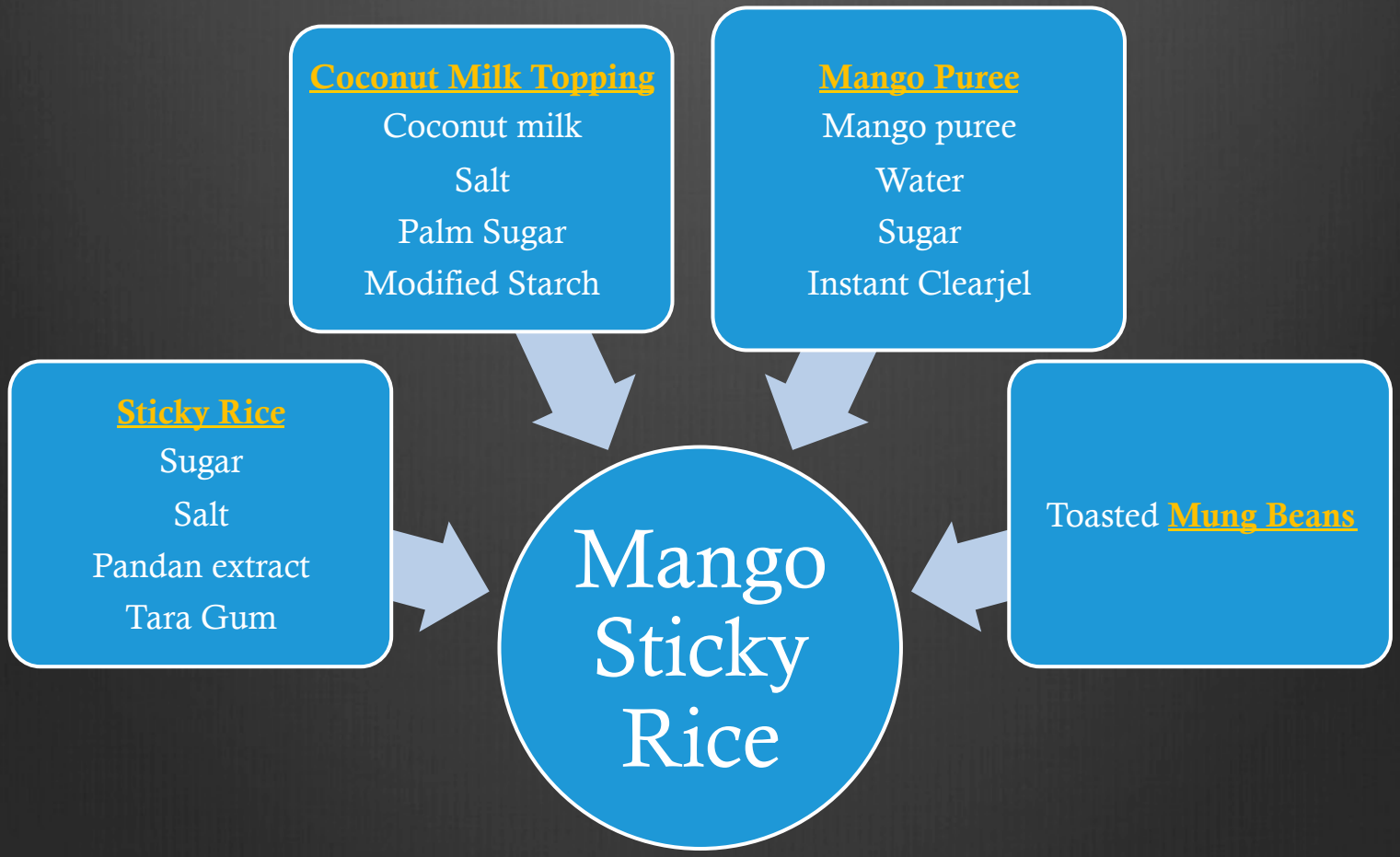
Product Features

- Pandan flavored sticky rice
- Mango puree filling
- Coconut milk topping
- IQF diced mangoes
- Toasted mung beans

Product Description

- Retail & Food Service
- Hot & Cold Concept
- Refrigerated product
- Microwavable packaging
- 180g serving per portion

Components of Mango Sticky Rice



Technical ingredients

Tara Gum

- Used in sticky rice seasoning.

  - Excellent freeze/thaw properties for the product .

  - Impart smooth creamy mouth feel.

Technical Ingredients (cont.)

2**. National Frigex™**

❖ Used in coconut milk topping.

- Substitute for rice flour in coconut milk topping.

- Thickening & stabilizing agent for water based food.

- Maintain flavor quality

- Stable in high & low temperatures.

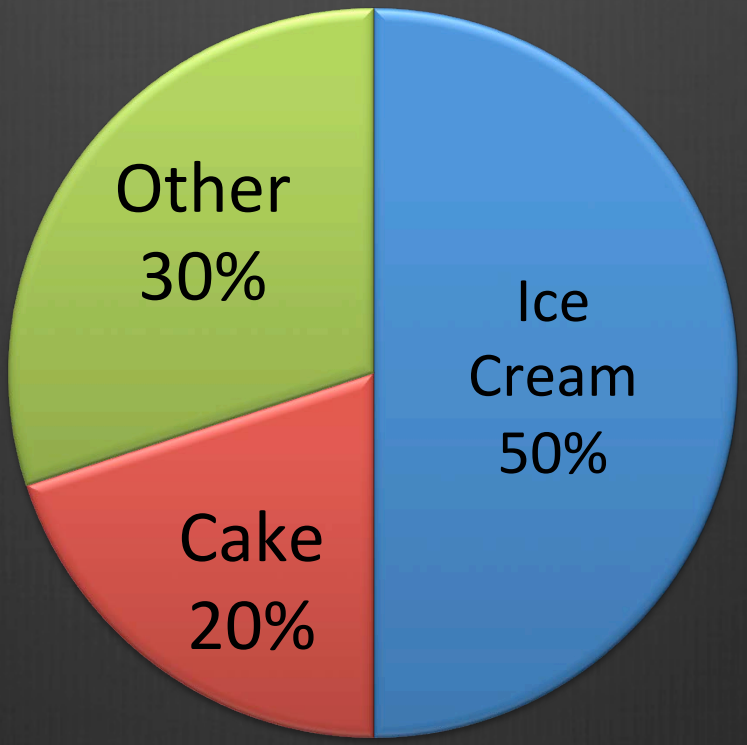
Technical Ingredients (cont.)

3. **Instant ClearJel™**

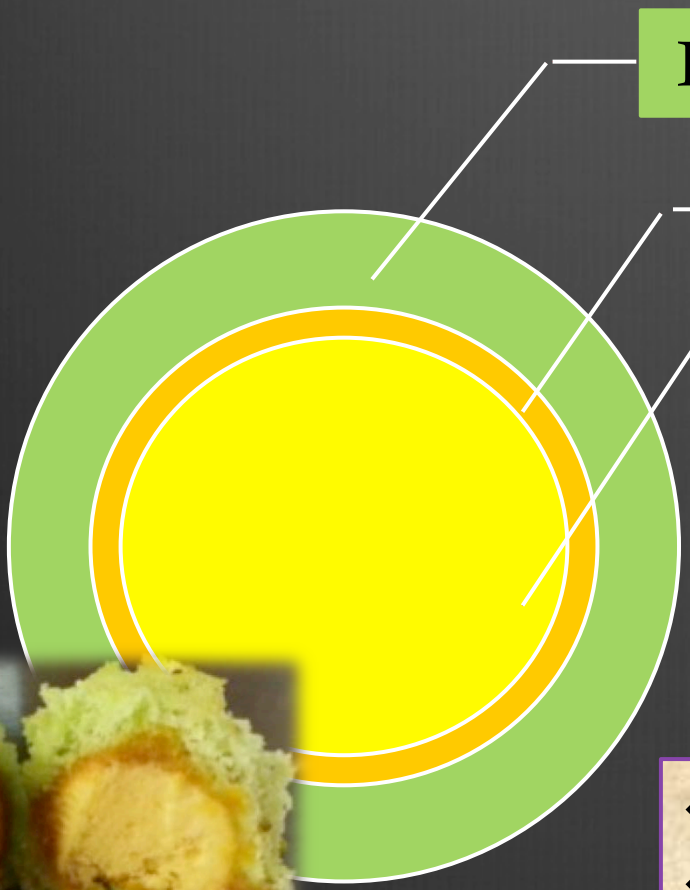
- Used in mango puree filling.
  - Impart smooth texture when fully hydrated .
  - Increase viscosity upon heating.
  - Excellent heat and acid resistance.
  - Good cold temperature storage stability, well suited for refrigerated or frozen foods.

Project Assignment

- To create an indulgent dessert made of
  - 20% cake , 50% ice cream



Product Features and Selling Points



- Inspired by indulgent desserts
- Portable
- Refreshing & New

Product Description

Portion Size

- Length : 4cm
- Diameter : 3.5cm

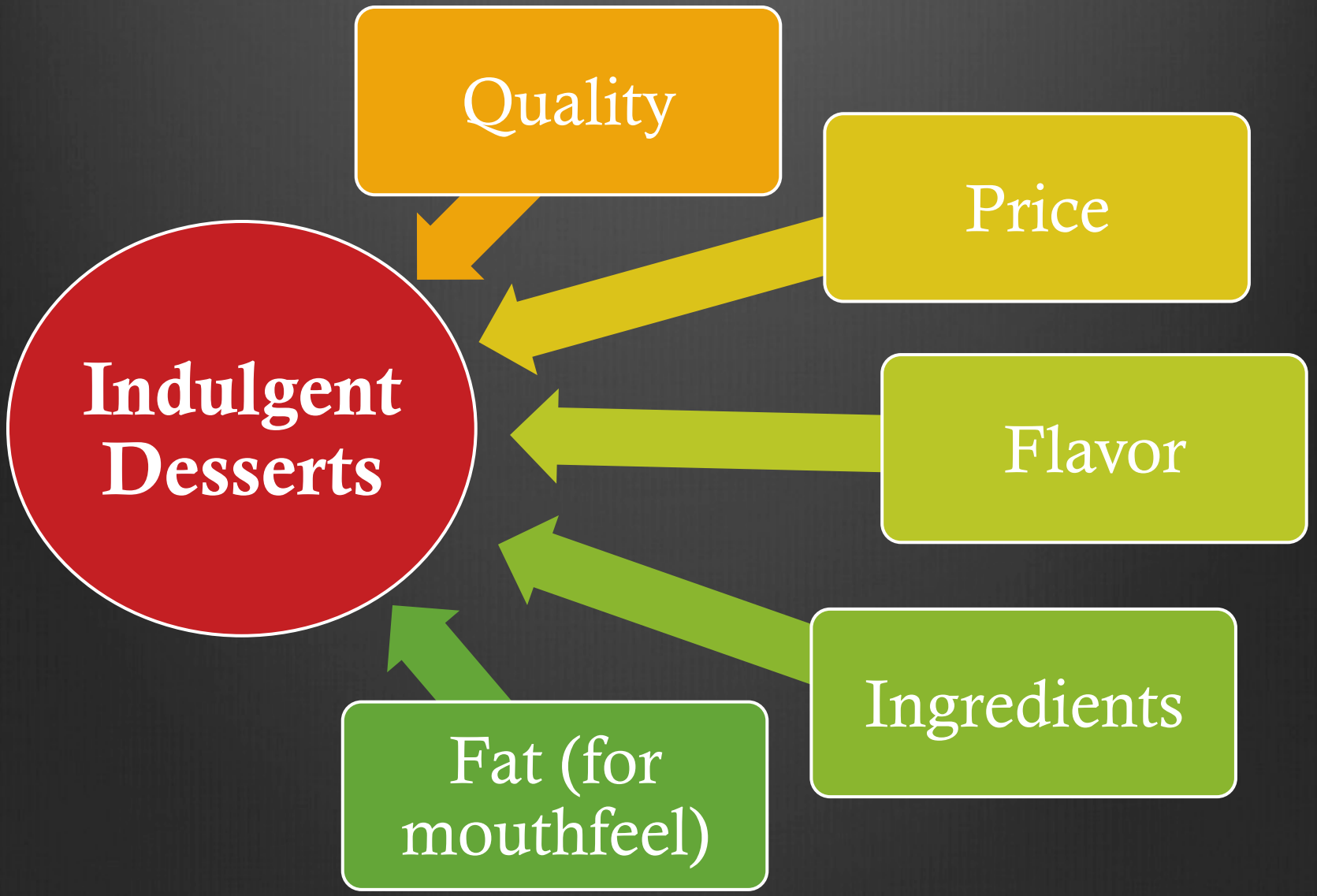
Serving Size

- 30 gms per serving

Packaging

- Variety of sizes
  - Individual
  - Pack of 6pcs
  - Pack of 100pcs
- Eco-friendly

Trends & Consumer Demands



Technical Ingredients

- Ingredion™ - Instant ClearJel™
  - Used as a starch
  - Thicken mango puree
  - No heat required
  - Give smooth jelly texture

- Gum Technology - Coyote Brand Pectin LM50
  - Used as a stabilizer
  - Give elasticity to genoise sponge

Gum Technology
Hydrocolloids & Stabilizing Systems


RCA
Annual Conference
& Culinology® Expo
PORTLAND, OREGON
MARCH 11-14, 2014