Design and development of
REAlistic food
Models with well-characterised micro- and macro-structure and composition

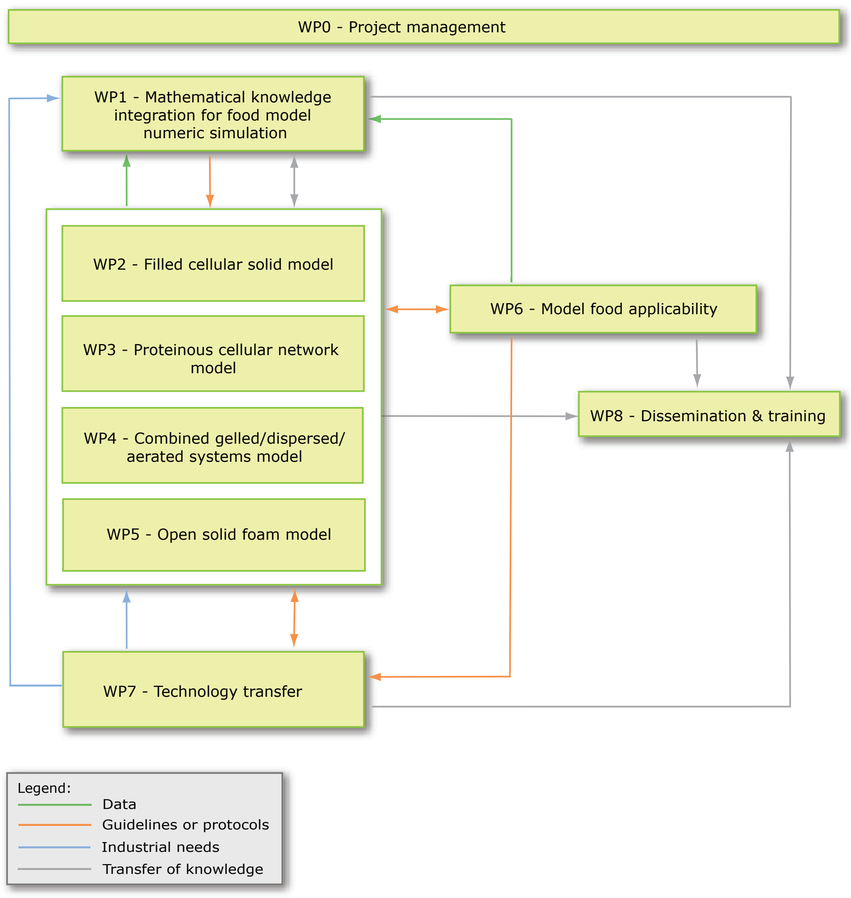
Introduction

DREAM – Design and development of REAlistic food Models with well-characterised micro- and macro-structure and composition, is an EU-funded Research & Technology Development Project lead by the INRA (Institut National de la Recherche Agronomique), France. The DREAM is trans-disciplinary project that involves two multinationals and nine countries.

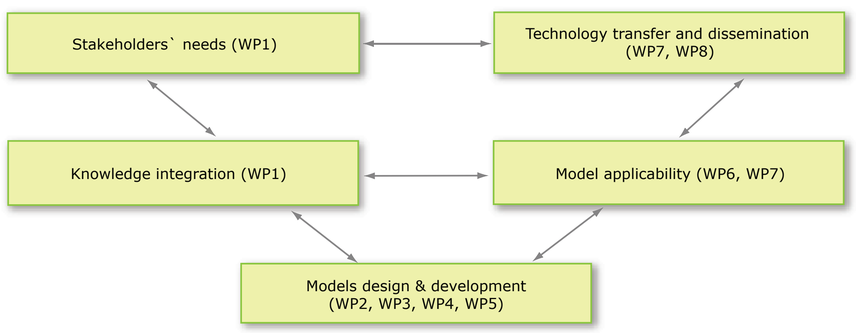
The overall goal of DREAM is to develop realistic, physical and mathematical food models to be used as tools that can be exploited across all major food categories with the purpose to facilitate development of common approaches to risk assessment and nutritional quality for food research and industry.

Methodology and Associated Work Plan

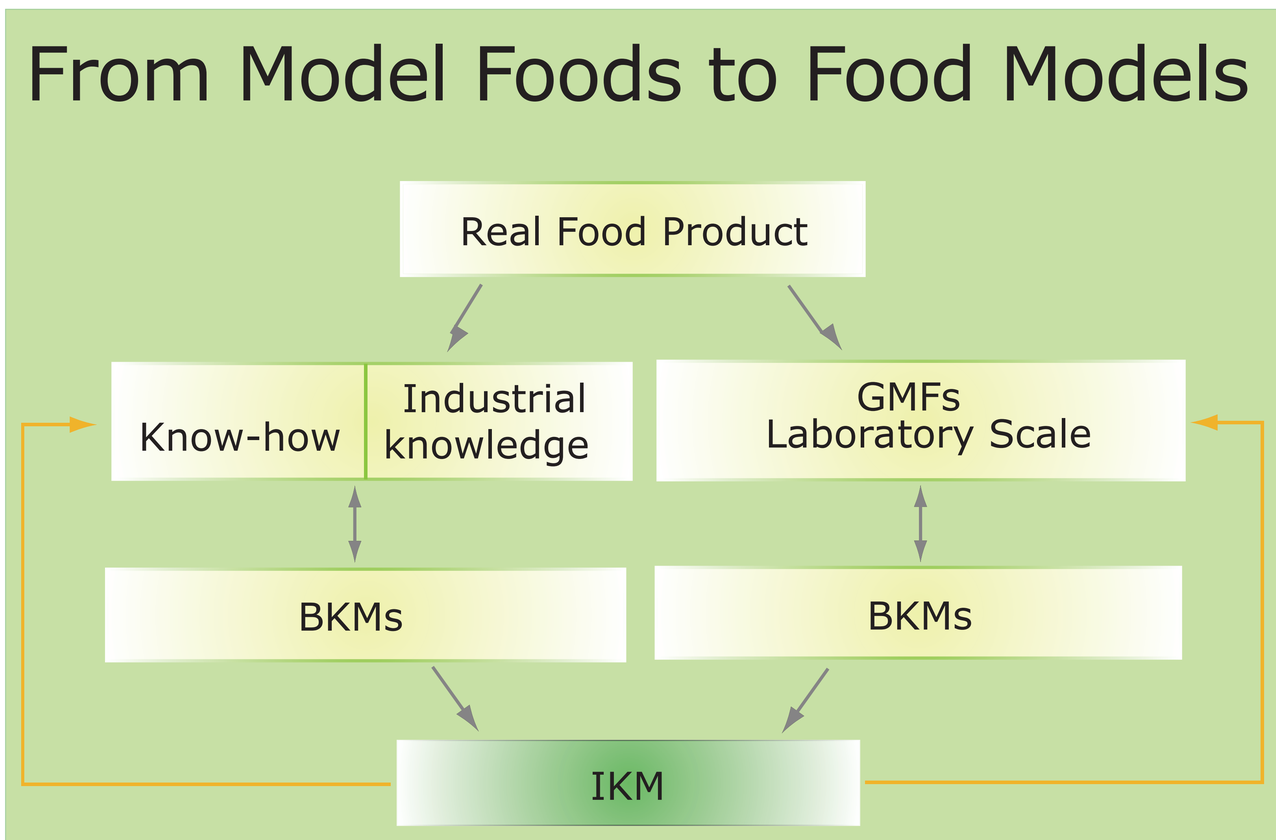
The concept areas addressed by the project objectives were developed in a series of workpackages, which focus on the development of food models, project management and dissemination of expected project outcomes.



To enable specification and validation of the developed models by stakeholders, DREAM follows sort of V-cycle strategy.



From Model Foods to Food Models



GMFs
Generic Model Foods

GMFs are realistic physical models in which several parameters can be varied, leading to a series of well defined samples for each given type of foods; GMF fabrication protocols will be established; GMFs' structure and chemical composition will be determined and relationships between structure and chemical composition and functional properties will be characterized.

BKMs
Basic Knowledge Models

BKMs are elementary food models describing specific aspects of GMFs, through heuristic or mathematical approaches; for example, BKMs describe the role played by temperature, pressure, chemical composition, etc. in a GMF's structure and resulting material properties.

IKMs
Integrated Knowledge Models

IKMs are dynamic networks - software systems - integrating the operating rules of BKMs, technical expert knowledge, food properties and food processing data from the GMFs. Results from initial experiments and simulations will be used to improve IKMs' mathematical models to reveal key parameters and material behavior and help refine GMFs: this iterative approach will optimize the food model concept prior to the pilot stage.

Expected Results

Industry

- Decision-support systems allowing realization of tailored mcrostructure in the food industry through a reversed engineering approach aimed at facilitating innovation and more efficient production.
- Protocols to produce operating procedures to standardize model foods and practical guidelines on the use of models to be transferred to industry, food agencies, legislation authorities, and other relevant bodies.

Technology

- Realistic and easily reproducible in laboratory food models encompassing large structure variations (30 GMFs).
- Optimised methods to characterise relevant structural, chemical and biological characteristics and follow their changes during processing.
- Critical assessment of the relevance of the developed models to determine relationships between matrix microstructure, biological and chemical composition, and activity, delivery and transfer of bioactive compounds during static and dynamic conditions.
- Critical assessment of the relevance of the developed models to evaluate the impact of environmental changes on the microbial population of real products and conversely, the effect of microbial populations on food structures.

Science

- Mathematical models linking food formulation, processing, resulting matrix structure and material properties.
- Cognitive mapping of technical know-how involved in construction of food matrices.
- Unified integrated knowledge description of each selected food matrix.
- Description of the relationships linking molecular and macroscopic structures to functionality.

Expected Impact

Food Science

Progress in knowledge on food processing a relationship, food structure-function relationships, food safety and bioavailability.

Food Modeling

Progress in numerical modeling and in realistic model foods.

Technology Transfer

Progress in technology transfer

Consortium

INRA - Institut National de la Recherche Agronomique; France
ADRIA - ADRIA Développement; France
Campden BRI - Campden BRI; United Kingdom
CC HU - Campden BRI Magyarország Nonprofit Kft; Hungary
CNRS - Centre National de la Recherche Scientifique; France
CNR-ISPA - Consiglio Nazionale delle Ricerche; Italy
IT - INRA Transfert; France
IRTA - Institut de Recerca y Tecnologia Agroalimentàries; Spain
ACTILAIT - Technical Institute for Dairy Products; France
IFR - Institute of Food Research; United Kingdom
KEKI - Central Food Research Institue; Hungary
Teagasc - Agriculture and Food Development Authority; Ireland
TIFN - Top Institute Food and Nutrition; The Netherlands
SOREDAB - Société de recherches et de développement alimentaire Bongrain; France
UB - United Biscuits (UK) Limited; United Kingdom
UL - University of Ljubljana; Slovenia
VTT - Technical Research Centre of Finland; Finland
WUR - Wageningen University; The Netherlands

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