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A Simple Visual Model to Compare Existing Front-of-pack Nutrient Profiling Schemes

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Authors' contribution

This work was carried out in collaboration between all authors. Author HV initiated and supervised the project. Authors HV, EHMT and SW have written and developed the first project plan at RIVM. Authors DVDB, JVD, MDVM, NLWW, NK and PGR are students at Wageningen University, who performed the research and wrote the initial project report. All authors contributed to and agree with the final version.

Policy Article

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ABSTRACT

Nutrient profiling is an important tool for governments, non-governmental organizations (NGO's) and for the food industry, to help consumers make healthier food choices. Multiple nutrient profiling systems (NPS) have been introduced worldwide. There is, however, no agreement on the use of a single NPS in leading regions like the USA and Europe. In 2008, the Arrow Model of Verhagen and van den Berg was created to illustrate and compare characteristics of existing NPS. Recent developments in nutrient profiling give rise to the need for an updated Model. The present study aims to develop a comprehensive model, which can be used to explain and compare various front-of-pack nutrient profiling systems (FOP-NPSs). An extensive literature research was conducted to obtain an overview of existing FOP-NPS worldwide. Only FOP-NPS that are currently in use, focus on health-related product aspects and target the general population (adults and

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children) were included. The Funnel Model was developed based on the analysis of 40 existing FOP-NPSs and expert interviews. This Model illustrates different FOP-NPS and allows comparison among them. The Funnel Model includes several new characteristics compared to the Arrow Model. Numerous ingredients and four new characteristics were added to the Funnel Model: directivity, type of institution initiating the system, purpose and utilization. Several other characteristics were expanded with new elements. The Funnel Model also has a new visual presentation which is useful to clearly explain and compare FOP-NPS.

Keywords: Nutrient profiling; visual model; funnel model; front-of-pack; labeling.

1. INTRODUCTION

Nutrient profiling has been defined as ‘‘the science of categorizing foods according to their nutritional composition’’ [1,2] and ‘‘categorization of foods for specific purposes on basis of their nutrient composition according to scientific principles’’ [3]. Nutrient profiling is associated with the evaluation of the nutritional quality of single foods. There are many areas in which nutrient profiling plays a crucial role. Nutrient profiling can be done for several purposes such as: 1. the evaluation of the nutritional quality of single foods, 2. to help consumers make a ‘healthy’ food choice, e.g. via the use of logos 3. to regulate the promotion of foods to children, and 4. to identify food products eligible to bear a nutrition or health claim.

As highlighted by Kleef and Dagevos (2011) it is very important to use nutrition labeling in the promotion of healthier food choices. Recently the focus has been directed to front-of-pack (FOP) logos and labels which provide nutrition information in a simplified way for consumers to understand [4]. In this text, we focus on the use of nutritional profiles via the use of FOP logos and labels. Although it is generally agreed that as such, there are no ‘good’ or ‘bad’ foods, and that the ‘overall’ mean nutritional quality of the daily diet, and a balanced food consumption pattern, are the more important determinants of nutritional health, a ‘healthy’ diet requires an informed and healthy food choice by the consumer. As such, ‘healthy eating’ front of pack nutrient profiling systems (FOP-NPSs) logos or symbols on the food package can be viewed as potential tool to assist consumers in making ‘the healthy choice the easy choice’. Adaption of FOP-NPS might also stimulate the food industry to develop products with an improved nutritional composition. It is important to realize that labels and logos are mainly on packaged/processed foods and not on unpackaged/fresh foods.

In the last twenty years, many different FOP-NPSs have been introduced in Europe, North America and Oceania. In the last decade FOP-NPSs have also been introduced in several countries in Asia and South America. The increasing number of FOP-NPSs leads to the confusion of consumers [5]. However, there is no agreement on the use of a single FOP-NPS in leading regions such as the European Union and the United States. There is still debate on which system is the most appropriate and effective [6]. In order to facilitate and help making a more effective debate on the current FOP-NPS, a clear overview of the existing NPS is warranted.

In order to maintain an overview over the many systems available, in 2008 Verhagen and van den Berg [7] developed a simple visual “arrow model” to illustrate the existing FOP-NPS (Fig. 1). In this Model the various choices are indicated and comparison among them can be

made. Various characteristics of NPS are presented in the model, such as: ingredients included, methodological approach and measurement method. Five years later, there are several new developments in FOP-nutrient profiling and there is also a need to include FOP-NPS that were missing in the previous Model. With the updated information provided by this overview it is possible to revise the existent Arrow Model of Verhagen and van den Berg and make the necessary changes to provide a comprehensive model that illustrates and allows comparison of NPS used worldwide.

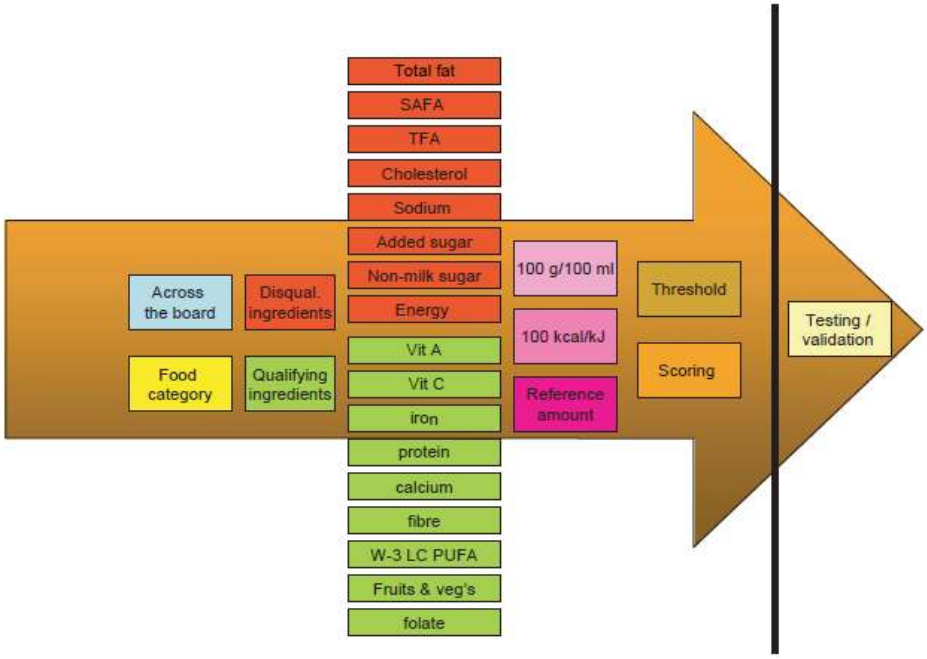


Fig. 1. The arrow model; a simple visual model to compare existing NPS [7]

2. METHODS

Interviews with three experts from the field of nutrient profiling were conducted to acquire more insight in the topic and its recent developments. These experts are working in the food industry, research and in policy and consultancy field. The experts who were interviewed have experience in the field of nutrient profiling. Each interview was conducted by two interviewers. Questions were asked about the experts' view on new developments in nutrient profiling, sources of information and about specific NPS's. Furthermore, the interviewees were asked to check the list of FOP-NPSs for missing systems.

An extensive literature search was conducted to obtain an overview of existing FOP-NPS worldwide. The literature search was based on different continents (North America, South America, Europe, Africa, Asia and Oceania). Electronic databases that were searched include Scopus, Web of Science (WoS), Google Scholar, Google, PubMed and the Global Search on the 'Find & Discover' page on the library of the Wageningen University website. The search terms that were used are: *nutrient profiling system/scheme; food/nutrition labeling; health claims*; *nutrition logo; FOP label; nutrient profiling (overview)*. Each search term was combined with the name of a country or continent, e.g. USA, Australia, Argentina

or Thailand, to get insight in NPS in specific parts of the world. Commercial or governmental websites, reports, (scientific) articles, presentations and other publications were analyzed.

To judge the relevance of the initially found FOP-NPS and to compose an overview of relevant NPS, a selection was made based on inclusion and exclusion criteria listed in Table 1.

Table 1. Inclusion and exclusion criteria used to select relevant FOP-NPS

Inclusion criteria	Exclusion criteria
Systems that are currently in use or are approved to be used in the near future	Systems that are currently not used or have been replaced by other systems
Front-of-pack (FOP-NPS) labels that focus on nutrition-related aspects of products	Front-of-pack labels (FOP-NPS) that are not related to the nutritional aspects of a product (e.g. an organic or fair-trade stamp)
FOP-NPS targeting the general adult population and children	Systems that focus on disease- or allergy-specific target groups

After applying the inclusion and exclusion criteria, the characteristics of all selected NPS were examined by looking up specific information about each system. This was performed by searching on the names of these NPS in electronic searching databases (as described previously) or visiting specific websites of brands, organizations or institutions that initiated the NPS. All FOP-NPSs that met the inclusion criteria were described in an extensive overview, which can be found in Appendix A. Based on this overview an updated model was developed.

2.1 The Funnel Model

The following characteristics are described for each FOP-NPSs:

2.1.1 Country

The country or countries that use(s) (or will start using) the FOP-NPS. Some systems are used internationally, or in more than one continent or country.

2.1.2 Organization name and organization type

FOP-NPSs are initiated by numerous organizations worldwide. A distinction can be made between governmental, commercial, NGO's and academic institutions [8]. The first FOP-NPSs were initiated by NGO's, but in recent years numerous systems from commercial organizations and governments have been introduced as well [9].

2.1.3 Utilization

FOP-NPSs are applied on the basis of a voluntary or a mandatory utilization.

2.1.4 Methodological approach

Two approaches are distinguished: food category specific and across-the-board. For the food category specific approach different risk and benefit criteria are defined for different food categories, whereas for an across-the-board system the same risk and benefit criteria

are used for all foods [10]. Some systems use a combination of both methodological approaches.

2.1.5 Measurement method

To measure the nutritional quality of food, two types of measurement methods are used: scoring (in categories/continuum) and threshold (exceedance or not) [11]. Scoring systems give a nutritional quality score to products based on a measurement method which takes into account qualifying and/or disqualifying risk and benefit criteria [10]. Threshold systems use threshold levels to categorize foods into different levels of nutritional quality [10]. These threshold levels are often based on guidelines such as the Codex Alimentarius or the guidelines from the WHO [11].

2.1.6 Risk and benefit criteria

Within a NPS, qualifying and disqualifying ingredients can be included. Qualifying ingredients represent ingredients that contribute positively to health (benefits, exceeding a threshold is healthy) and disqualifying ingredient have a negative impact on health (risk, exceeding a threshold is unhealthy). In general, organizations, which developed NPS have used energy value as a disqualifying ingredient. Some systems use exclusively qualifying or disqualifying ingredients, while other systems use a combination of both benefits and risks.

2.1.7 Reference unit

The reference unit needs to be taken into account. Some systems use a standard unit such as 100g, 100ml or 100kcal, whereas other systems have a per serving or daily amount approach.

2.1.8 Directivity

A recently published study that is part of Food Labeling to Advance Better Education for life (FLABEL), a project funded by the European Union, presents a classification of NPS based on consumer research [12]. From consumer classifications of FOP nutrition labels three different categories were extracted: directive, semi-directive and non-directive [12]. *Non-directive* NPS provide detailed nutritional information, but give no direction to the choice of the consumer (e.g. Guideline Daily Amounts). *Directive* NPS do not contain nutritional information and give a direction to consumer's choice including simple and graduated health logos (e.g. Key Hole), i. e. the consumer don't need to interpret any information, it is indicated directly that the product is a good option; whereas *semi-directive* category includes traffic lights, hybrid labels and nutrition tables that incorporate traffic lights [12], which are a combination of directive and non-directive labels, provide some information and also symbols that make more easily for the consumer to interpret the information provided.

2.1.9 Purpose

All NPS are originally developed for a specific purpose, e.g., to help consumers to make healthier food choices, to promote reformulation of food products, to stimulate marketing of food products or to focus specifically on foods for children. Some NPS have more than one purpose.

2.1.10 Symbol

Every FOP-NPS is represented by a specific symbol or a logo.

3. RESULTS

3.1 Results Overview

The overview of the current NPS includes 51 systems used worldwide, among which 40 carry a front-of-pack label and meet the risk and benefit criteria. The 11 NPS that were excluded met at least one of the exclusion criteria. The table with the 40 FOP-NPS is provided as supplementary table (Appendix 1).

The percentage of FOP-NPSs having certain characteristics is shown in Table 2. Most systems are initiated in North America (30%) followed by Asia and international organizations. The majority of the systems uses a combination of qualifying and disqualifying risk and benefit criteria, whereas some systems use either qualifying or disqualifying risk and benefit criteria. The reference unit most frequently used is per serving, which is sometimes combined with another reference amount. Of all the systems, 90% uses thresholds values as measurement method, whereas 12.5% uses a scoring measurement method. The majority of the FOP-NPSs are either developed by a commercial organization (45%) or government (37.5%). Only a small percentage of the systems originate from NGO's (15%) or universities (2.5%). According to the information provided by the initiator all the systems aim to help the consumer make healthier food choices, however some systems have additional purposes such as marketing, regulation and aiming specifically to children. Overall, the food category approach and the across-the-board approach are used with an almost equal frequency (48% and 58%, respectively). Some systems use a combination of both approaches. The vast majority of the included systems are voluntary, with exception of "FOP GDA for snacks" in Thailand.

Table 2. Characteristics of 40 FOP-NPSs and prevalence (%)

Country	**Percentage**	**Measurement method**	**Percentage**
North America	30%	Scoring	12.5 %
South America	2.5%	Threshold	90%
Europe	15%	**Risk and benefit criteria**	**Percentage**
South Africa	2.5%	Qualifying	5%
Asia	17.5%	Disqualifying	27.5 %
Oceania	15%	Combination	67.5 %
International	17.5%		
Organization type	**Percentage**	**Reference unit**	**Percentage**
Governmental	37.5 %	100g/100ml	35%
Commercial	45%	100 kcal/kJ	10%
NGO	15%	Per Serving	65%
University	2.5 %		
Utilization	**Percentage**	**Directivity**	**Percentage**
Mandatory	2.5 %	Directive	45%
Voluntary	97.5 %	Semi-directive	35%
Methodological approach	**Percentage**	**Purpose**	**Percentage**
Food Category	47.5 %	Help Consumer	100%
Across-the-Board	57.5 %	Reformulation	12.5 %
		Marketing	5%
		Children	5%

Special attention is paid to the risk and benefit criteria of the FOP-NPS, by which consumers are informed about the nutrient value of the food products. Table 3 presents the most frequently used nutritional information (in percentages) that appears on the 40 FOP-NPSs.

Table 3. Ingredients most often included in the 40 FOP-NPSs and prevalence (%)

Ingredient	Qualifying / Disqualifying	Percentage
Dietary fiber	Qualifying	62.5 %
Protein	Qualifying	35 %
Calcium	Qualifying	30 %
Saturated Fatty Acids (SFA)	Disqualifying	75 %
Total Sugar	Disqualifying	62.5 %
Total Fat	Disqualifying	62.5 %
Sodium	Disqualifying	62.5 %
Energy	Disqualifying	52.5 %
Trans Fatty Acids (TFA)	Disqualifying	37.5 %
Cholesterol	Disqualifying	30 %

Among the ingredients that were most often used in the systems, three are assessed as qualifying and seven are assessed as disqualifying (including energy). Disqualifying ingredients appear to be included more frequently in FOP-NPSs than qualifying ingredients. Saturated fatty acids (SFA), total fat, trans fatty acids (TFA), sugar, sodium, energy and cholesterol are the disqualifying ingredients that are most frequently included. Although energy value, which refers to the calorie content of a product, is not an ingredient by definition, it is one of the most important factors associated with weight gain and obesity [13,14]. Therefore, it is regarded as a disqualifying ingredient. Dietary fiber is the most frequently used qualifying ingredient in FOP-NPS.

3.2 Funnel Model

The Funnel Model, shown in Fig. 2, was developed based on the Arrow Model of Verhagen and van den Berg (2008) and presents the characteristics that were described for all included FOP-NPS [7]. The Funnel Model shows the different characteristics that need to be taken into account when analyzing a FOP-NPS. The Funnel Model includes several new characteristics in comparison to the Arrow Model. Qualifying ingredients that have been added are: carbohydrates, unsaturated fat, MUFA, DHA, EPA, vitamins/minerals, vitamin B1, B2, B6, B9, B12, vitamin D, vitamin E, zinc, magnesium, potassium, antioxidants, linolenic acid, bioflavonoids, phytochemicals, carotenoids, low-fat dairy, lean meats, whole grain and seafood. The newly added disqualifying ingredients are: (a combination of) SFA+TFA, partly hydrogenated fat, salt, added sodium, added sugars, lactose, fructose and alcohol. Other characteristics that were added are: type of organization, utilization, directivity, purpose and more types of reference units.

3.3 Examples of FOP-NPS

To illustrate the application of the Funnel Model, six FOP NPS were selected as they are considered to be representative of the NPS used worldwide; Multiple Traffic Light + Reference Intake, Keyhole, Choices Program, Healthier Choice Symbol, AHA Heart Check and the Health Star Rating. A short description of these systems is given and the Funnel Model is presented for each system.

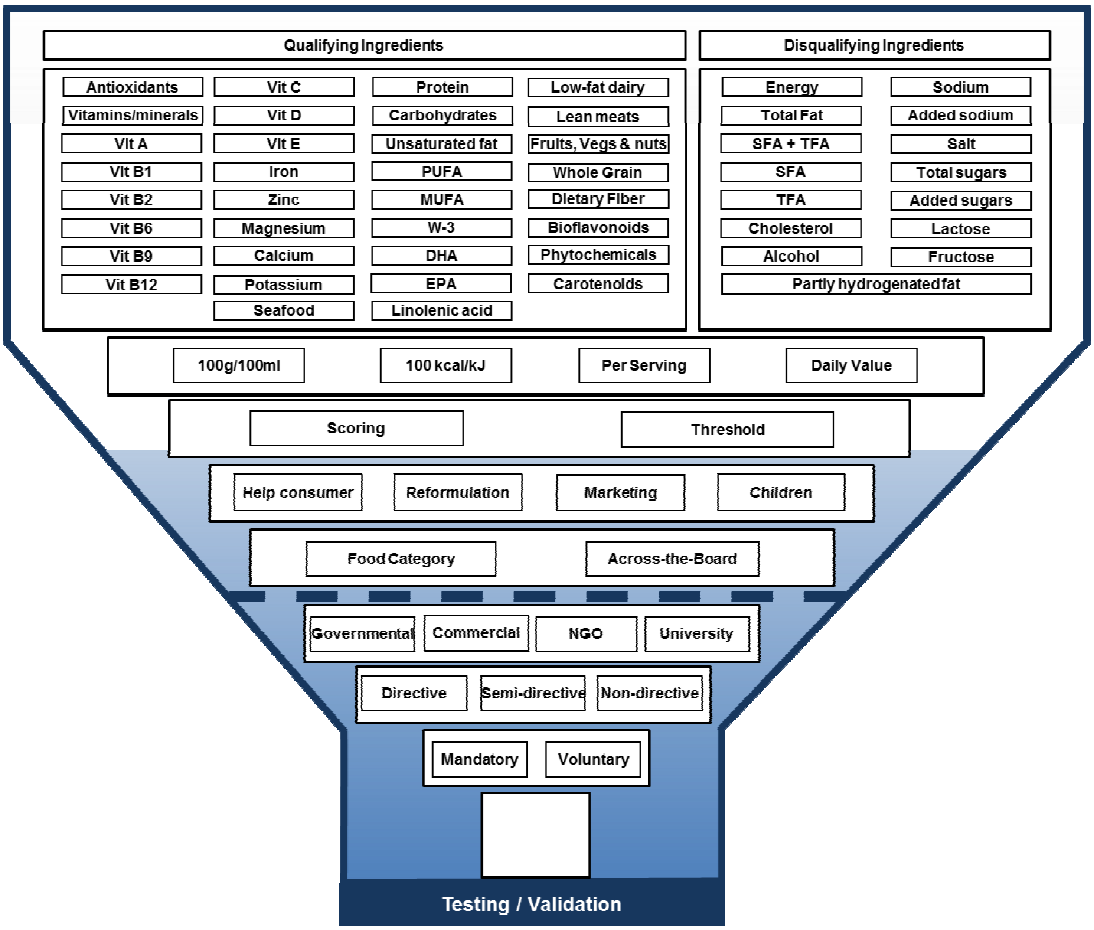


Fig. 2. The funnel model; a simple visual model to compare existing FOP-NPS

3.4 Multiple Traffic Light (MTL) + Reference Intake (RI)–United Kingdom (UK)

In June 2013, a new voluntary traffic light FOP nutrition labelling system has been introduced by the UK Food Standard Agency. This system has been rolled out over UK since June 2013 and will be continued until December 2014.It provides a more consistent alternative to the previous traffic light system. A large part of the foods sold in the UK (60%) show the new system on their packages [15,16]. The MTL system generally aims to help consumers making more informed and healthy choices with regard to their diet. The Funnel model for the MTL system is presented in Fig. 3. The MTL is a semi-directive system that uses an across-the-board approach. It displays traffic light colors to show consumers at a glance whether products contain high (red), medium (amber) or low (green) levels of total fat, SFA, total sugars and salt per serving. In addition, the amount of energy (in kJ and kcal) is presented in a thumbnail with a neutral color, per 100 g/ml and per serving [15]. For consistency on the pack, the current practice of Guideline Daily Amounts (GDA) will be replaced by Reference Intakes (RI).The colors used by the MTL label are based on thresholds for each nutrient [17].

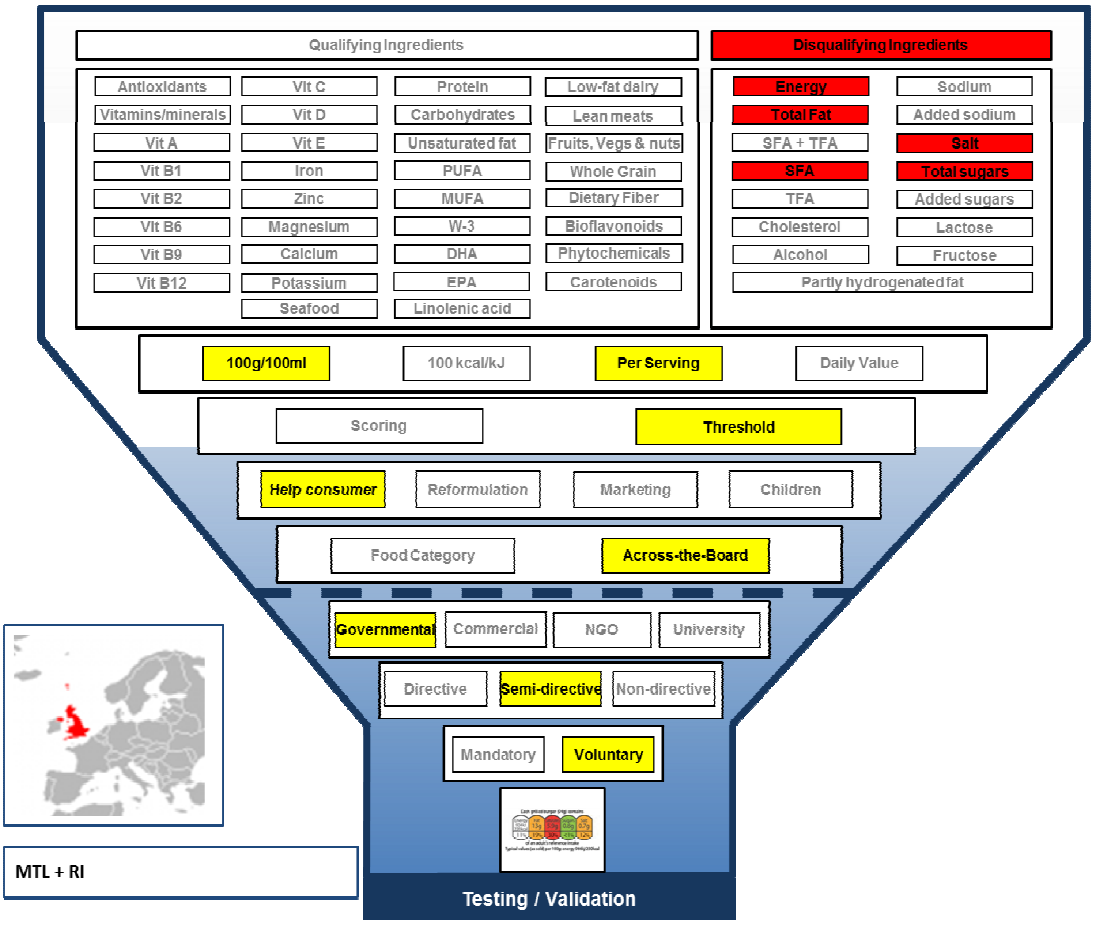


Fig. 3. Funnel Model applied to MTL + RI

3.5 Keyhole – Sweden, Denmark, Norway, Iceland

The Keyhole system is a voluntary FOP label that has been developed in 1989 by the National Food Administration in Sweden. Currently, the label is also used in Norway and Denmark (since 2009), and Iceland (since 2013) [8,18]. It was designed to help consumers make healthier food choices and to promote reformulation and innovation of food products. Fig. 4 shows the Funnel model with the characteristics of the Keyhole system highlighted. The Keyhole system uses a directive type of label. It uses a food category specific approach, distinguishing in total 26 different food categories [8,10]. The ingredients that are taken into account by the Keyhole system include total fat, total sugar, sodium and fiber. For each food category specific risk and benefit criteria are defined that must be met by products within a food category in order to obtain the Keyhole label. This means that for food categories, it is specified how much total fat, total sugar and sodium the product should contain at most, and how much fiber at least. The reference unit used is per 100 g and 100 kcal of the food. The risk and benefit criteria for the food categories are based on consumption data (Eurodiet) and in accordance with specific nutritional recommendations in each Scandinavian country [10,18].

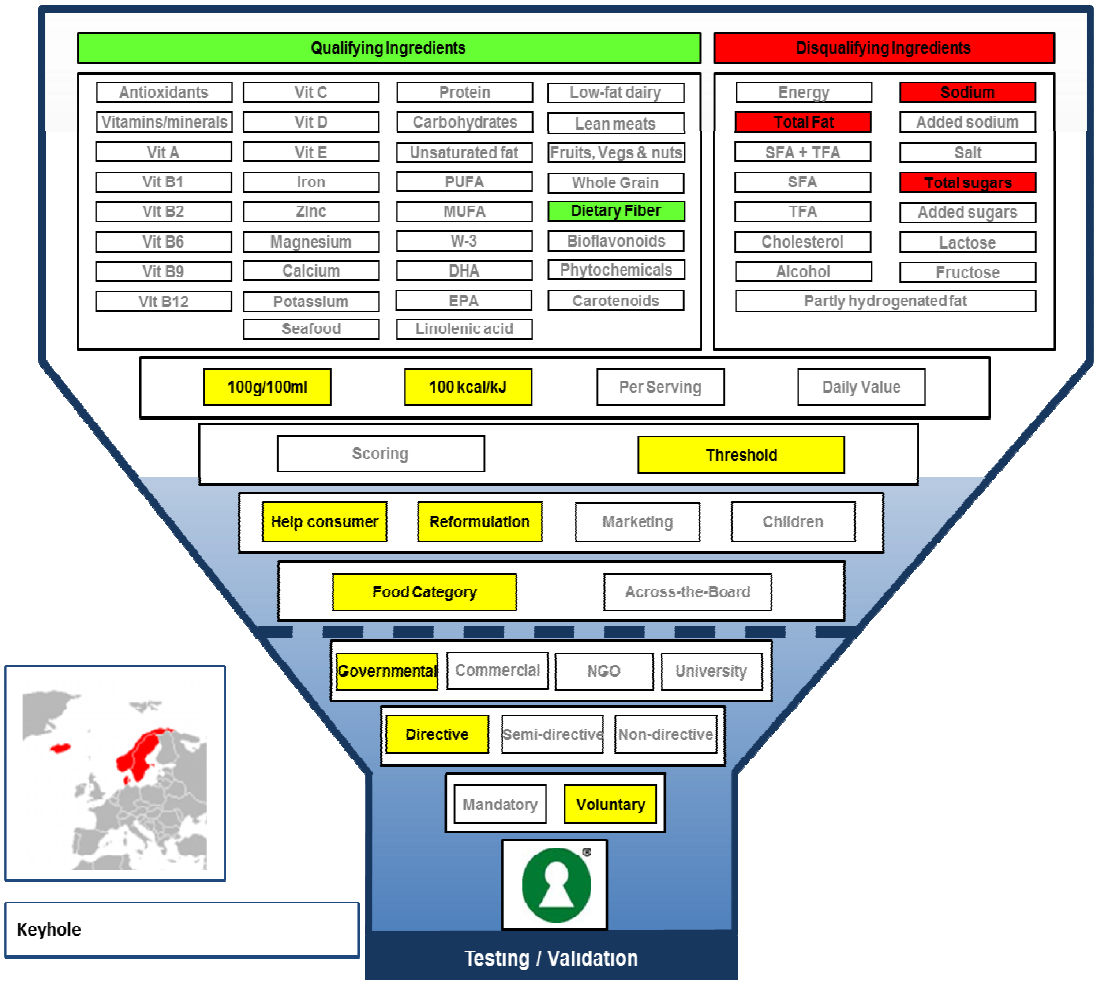


Fig. 4. Funnel model applied to keyhole system

3.6 Choices Program – International

The Choices program is a voluntary, global FOP food information initiative that was introduced in The Netherlands in 2006 [19,20]. The Funnel model filled in for the Choices Program is presented in Fig. 5. The program aims to stimulate the food industry and retailers to encourage healthy product innovation and reformulation and to help consumers make healthier food choices [21]. The Choices program is a directive system that has currently been implemented in approximately 50 countries worldwide, including The Netherlands, France, Czech Republic, Poland and the USA. The nutritional content of foods is evaluated against a set of risk and benefit criteria that have been set by the WHO. These risk and benefit criteria are specified for different food categories, taking into account the energy level of products, total fat, added sugars, SFA, salt and fibre per 100 g/ml and % of Daily Value (DV). Threshold values were defined to determine the eligibility of a food to carry the FOP Choices logo [19-21].

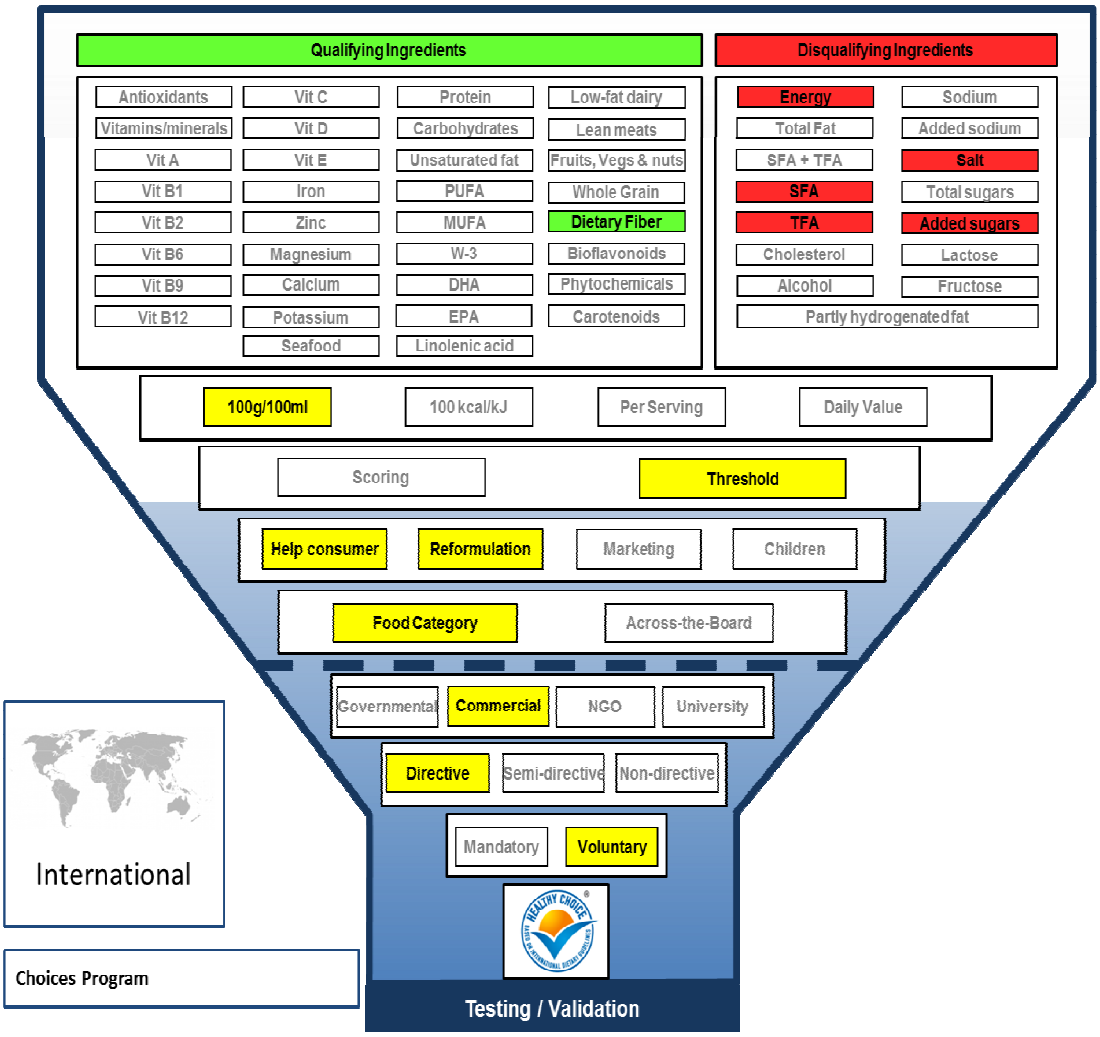


Fig. 5. Funnel model applied the choices program

3.7 Healthier Choice Symbol – Singapore

The Healthier Choice Symbol (HCS) is a voluntary FOP label introduced by the Health Promotion Board of Singapore (HPB), a governmental organization [22]. This label aims to promote healthier food choices in the Singaporean population [22]. It is a directive logo that uses an across-the-board methodological approach. The risk and benefit criteria that are used refer to energy value, carbohydrates, fat, SFA, TFA, protein, cholesterol, sodium and dietary fiber, expressed per serving and per 100g of food [22]. This NPS uses a threshold measurement method. Fig. 6 displays the Funnel Model filled in for the HCS.

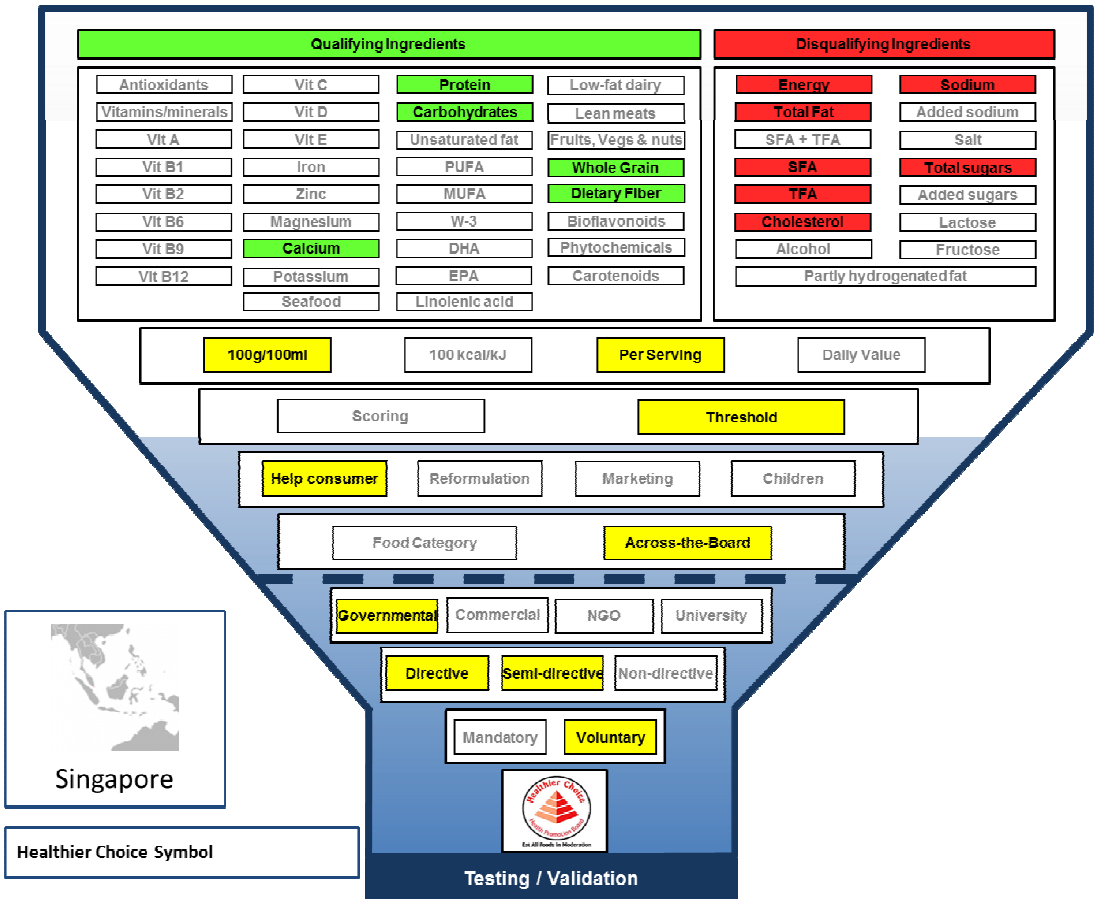


Fig. 6. Funnel model applied to healthier choice symbol

3.8 AHA Heart Check – USA

The AHA Heart Check logo is a voluntary FOP label developed by the American Heart Association (AHA), a NGO. It aims to help consumers make healthier food choices and stimulate reformulation of food products. Fig. 7 displays the Funnel Model with the characteristics of the AHA Heart Check highlighted. To obtain this logo, a product must meet risk and benefit criteria specified by the Food and Drug Administration (FDA) of the USA. Therefore, the Heart Check logo advices consumers on healthy food choices as well as stimulates food manufacturers to reformulate food ingredient content [23]. The Heart Check is a directive label that uses a methodological approach, based on food category. The system takes into account: total fat, SFA, TFA, cholesterol, sodium To achieve certification, foods should contain also at least one of the following beneficial ingredients; vitamin A, vitamin C, iron, calcium, protein or dietary fiber. The specific threshold levels are based on the serving size as specified by the FDA for the individual food (Reference Amount Customarily Consumed or RACC) [23]. The logo is based on a threshold measurement method and its nutrient requirements are per FDA/USDA RACC amounts [24].

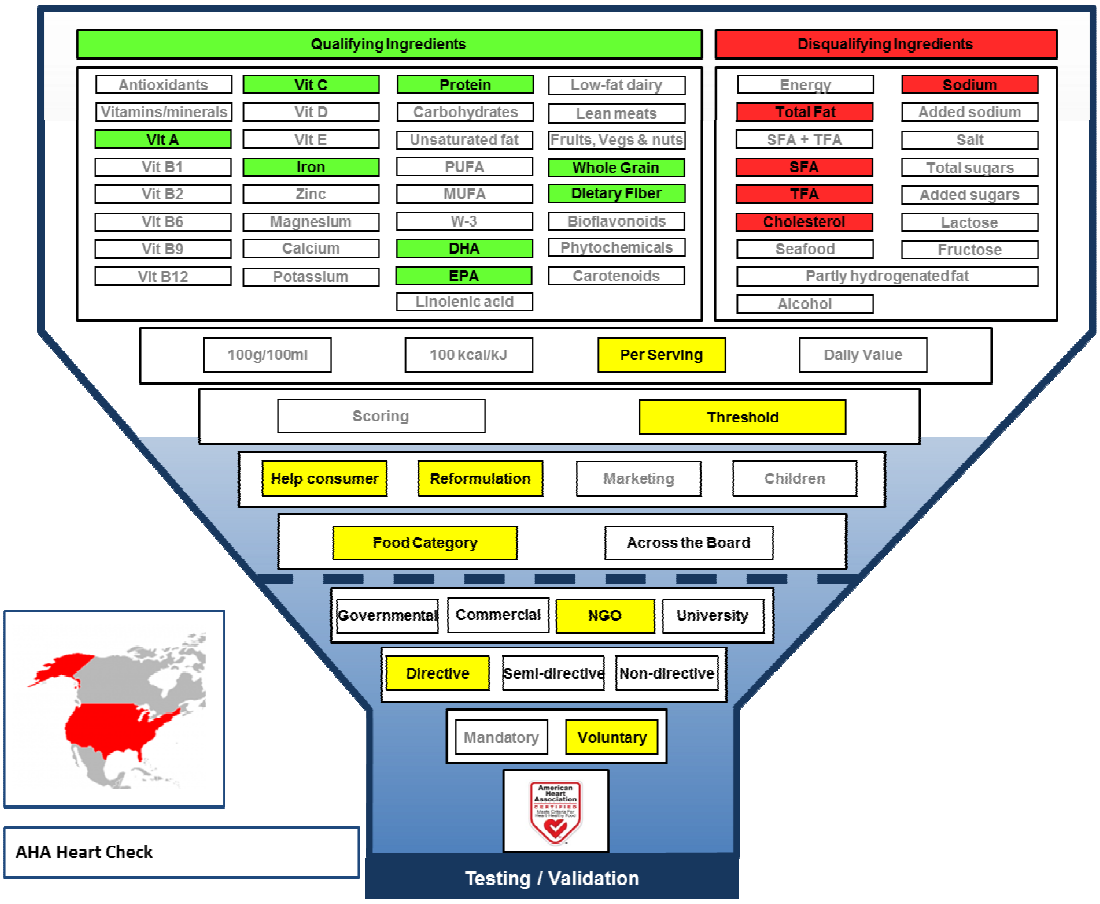


Fig. 7. Funnel model applied to AHA heart check

3.9 Health Star Rating – Australia

Health Star Rating is a voluntary FOP label developed by Food Standards Australia New Zealand (FSANZ). This system provides a simple and easy way to communicate the amount of certain ingredients to consumers. Fig. 8 shows the Funnel Model filled in for the Health Star Rating. This FOP-NPSs uses a semi-directive label and it is an across–the-board system. The ingredients that are taken into account are total fat, sodium, total sugar, energy, calcium and fiber, all expressed in gram, milligrams or kcals per 100g/100ml [25,26]. The system classifies the food items with a star rating ranging between 0.5 and 5 stars. When a product is allotted more stars, this is an indication that it is a better nutritional choice than a product with less stars [25,26]. The Health Star Rating system is both a threshold and scoring system. It is based on the Nutrient Profiling Scoring Criterion (NPSC) that has been developed –and is still under revision- by FSANZ for health claims. The NPSC distinguishes three food categories: 1) beverages, 2) cheeses, butter, margarine and oils, and 3) foods that don't belong to the first two categories. So-called baseline points are calculated to score the nutritional quality of foods within each food category [24,27].

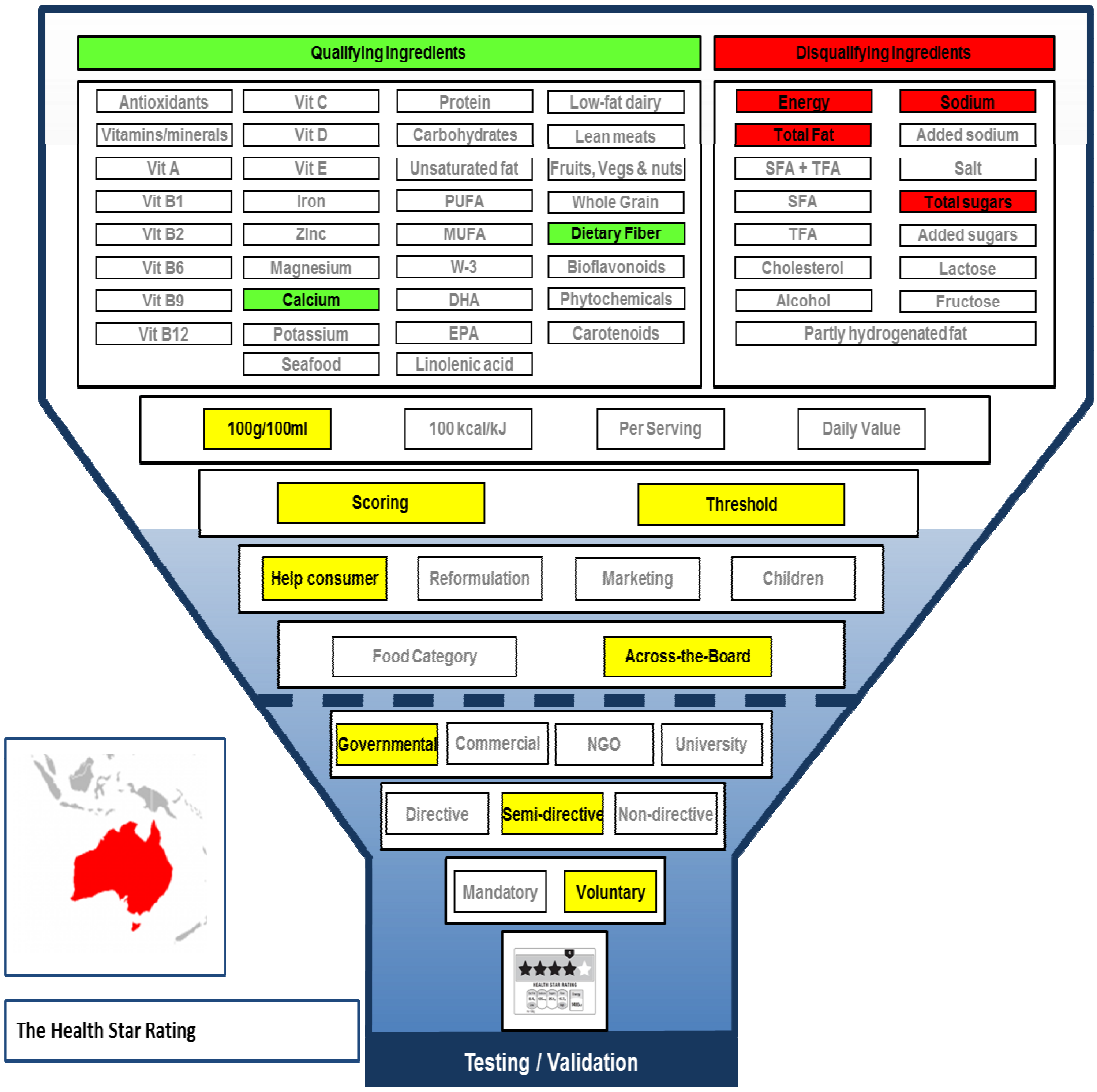
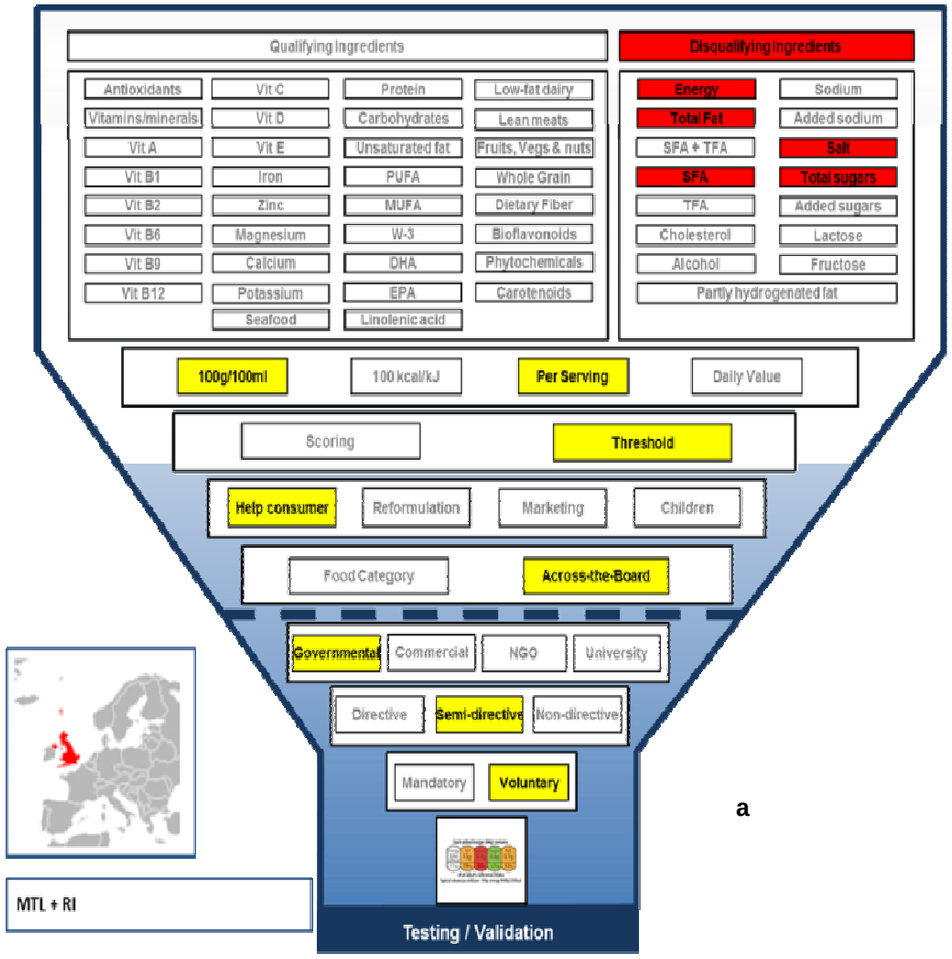


Fig. 8. Funnel model applied to the health star rating

3.10 Overview

To allow for easy comparison, the six NPS described in the previous section are presented here on one page in Fig. 9. This clearly shows the ability of the Funnel Model to compare the different characteristics of NPS.


Qualifying Ingredients
Antioxidants
Vitamins/minerals
Vit A
Vit B1
Vit B2
Vit B6
Vit B9
Vit B12
Vit C
Vit D
Vit E
Iron
Zinc
Magnesium
Calcium
Potassium
Seafood
Protein
Carbohydrates
Unsaturated fat
PUFA
MUFA
W-3
DHA
EPA
Linolenic acid
Low-fat dairy
Lean meats
Fruits, Vegs & nuts
Whole Grain
Dietary Fiber
Bioflavonoids
Phytochemicals
Carotenoids
Disqualifying Ingredients
Energy
Total Fat
SFA + TFA
SFA
TFA
Cholesterol
Alcohol
Sodium
Added sodium
Salt
Total sugars
Added sugars
Lactose
Fructose
Partly hydrogenated fat
100g/100ml
100 kcal/kJ
Per Serving
Daily Value
Scoring
Threshold
Help consumer
Reformulation
Marketing
Children
Food Category
Across-the-Board
Governmental
Commercial
NGO
University
Directive
Semi-directive
Non-directive
Mandatory
Voluntary
MTL + RI
Testing / Validation

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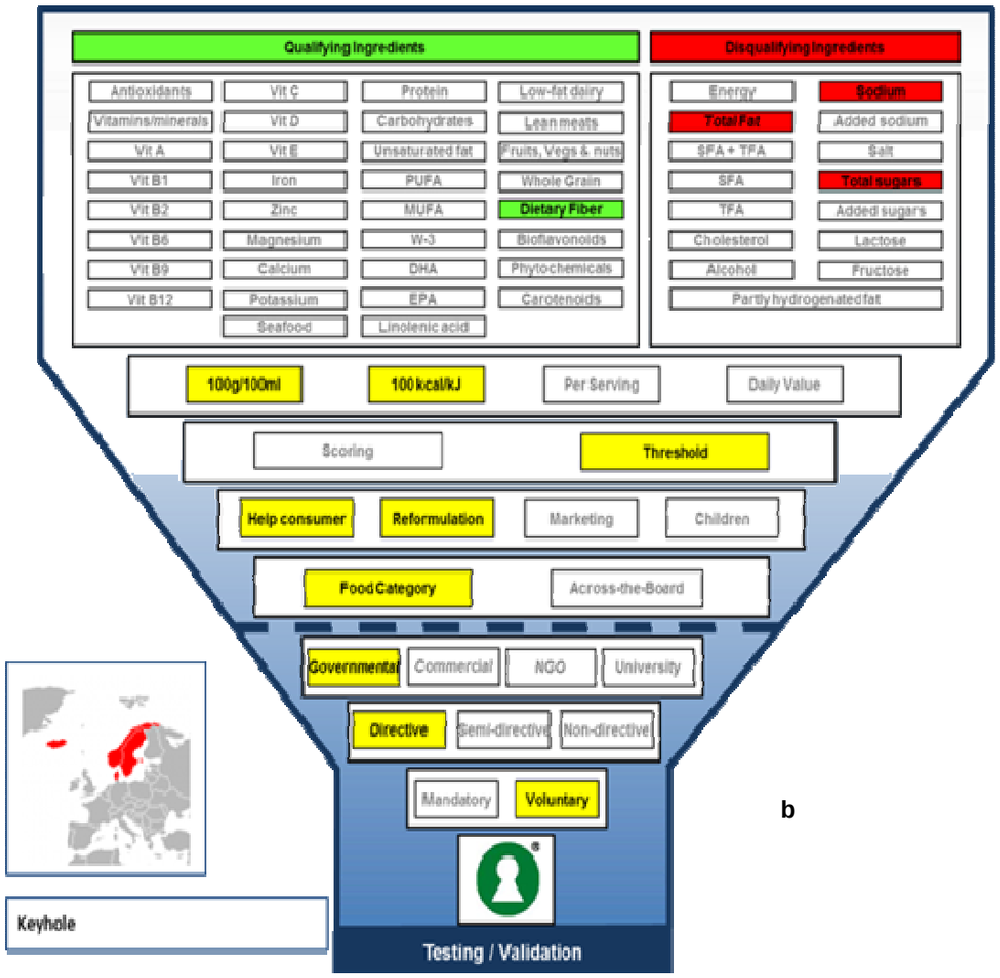
Qualifying Ingredients
Antioxidants
Vitamins/minerals
Vit A
Vit B1
Vit B2
Vit B6
Vit B9
Vit B12
Vit C
Vit D
Vit E
Iron
Zinc
Magnesium
Calcium
Potassium
Seafood
Protein
Carbohydrates
Unsaturated fat
PUFA
MUFA
W-3
DHA
EPA
Linolenic acid
Low-fat dairy
Lean meats
Fruits, Vegs & nuts
Whole Grain
Dietary Fiber
Bioflavonoids
Phyto-chemicals
Carotenoids
Disqualifying Ingredients
Energy
Total Fat
SFA + TFA
SFA
TFA
Cholesterol
Alcohol
Sodium
Added sodium
Salt
Total sugars
Added sugars
Lactose
Fructose
Partly hydrogenated fat
100g/100ml
100 kcal/kJ
Per Serving
Daily Value
Scoring
Threshold
Help consumer
Reformulation
Marketing
Children
Food Category
Across-the-Board
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Non-directive
Mandatory
Voluntary
Keyhole
Testing / Validation

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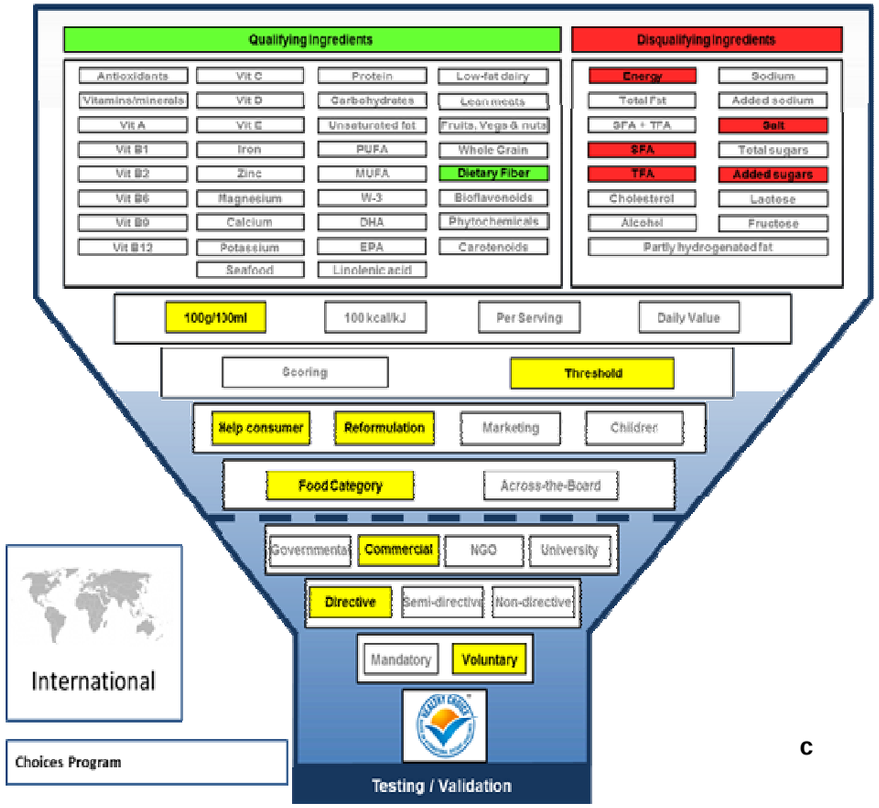
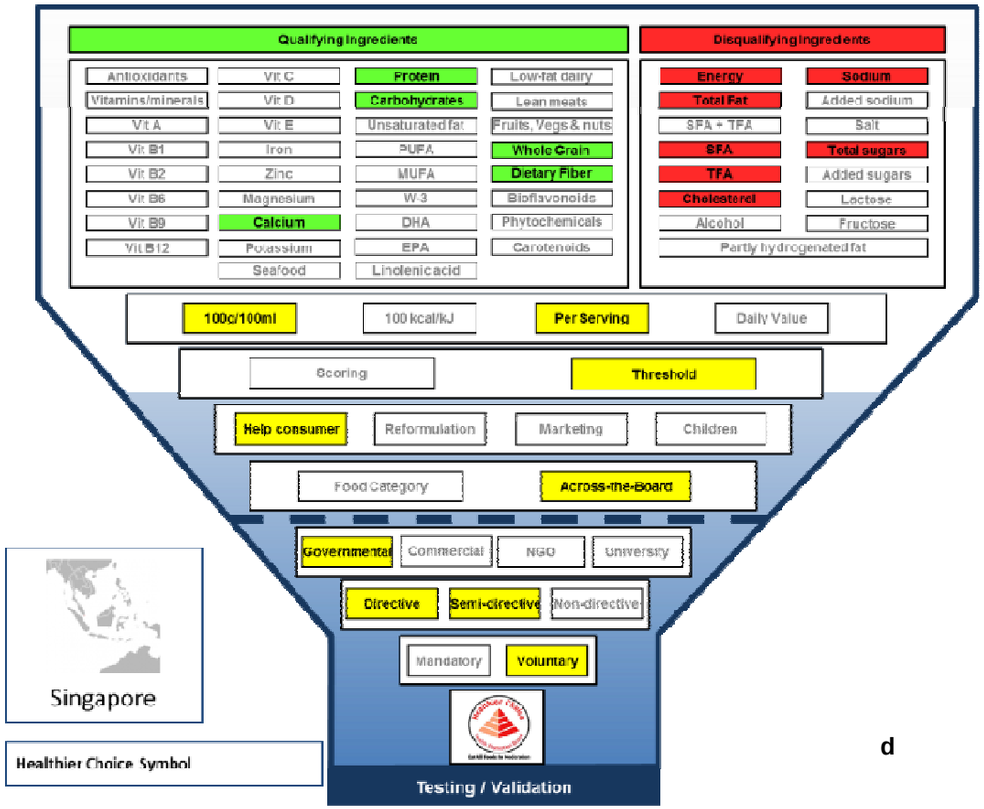

Qualifying Ingredients
Antioxidants
Vitamins/minerals
Vit A
Vit B1
Vit B2
Vit B6
Vit B9
Vit B12
Vit C
Vit D
Vit E
Iron
Zinc
Magnesium
Calcium
Potassium
Seafood
Protein
Carbohydrates
Unsaturated fat
PUFA
MUFA
W-3
DHA
EPA
Linolenic acid
Low-fat dairy
Lean meats
Fruits, Vegs & nuts
Whole Grain
Dietary Fiber
Bioflavonoids
Phytochemicals
Carotenoids
Disqualifying Ingredients
Energy
Total Fat
SFA + TFA
SFA
TFA
Cholesterol
Alcohol
Sodium
Added sodium
Salt
Total sugars
Added sugars
Lactose
Fructose
Partly hydrogenated fat
100g/100ml
100 kcal/kJ
Per Serving
Daily Value
Scoring
Threshold
Help consumer
Reformulation
Marketing
Children
Food Category
Across-the-Board
Governmental
Commercial
NGO
University
Directive
Semi-directive
Non-directive
Mandatory
Voluntary
Testing / Validation
International
Choices Program

c


Qualifying Ingredients
Antioxidants
Vitamins/minerals
Vit A
Vit B1
Vit B2
Vit B6
Vit B9
Vit B12
Vit C
Vit D
Vit E
Iron
Zinc
Magnesium
Calcium
Potassium
Seafood
Protein
Carbohydrates
Unsaturated fat
PUFA
MUFA
W-3
DHA
EPA
Linolenic acid
Low-fat dairy
Lean meats
Fruits, Vegs & nuts
Whole Grain
Dietary Fiber
Bioflavonoids
Phytochemicals
Carotenoids
Disqualifying Ingredients
Energy
Total Fat
SFA + TFA
SFA
TFA
Cholesterol
Alcohol
Sodium
Added sodium
Salt
Total sugars
Added sugars
Lactose
Fructose
Partly hydrogenated fat
100g/100ml
100 kcal/kJ
Per Serving
Daily Value
Scoring
Threshold
Help consumer
Reformulation
Marketing
Children
Food Category
Across-the-Board
Governmental
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Directive
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Non-directive
Mandatory
Voluntary
Testing / Validation
Singapore
Healthier Choice Symbol

d

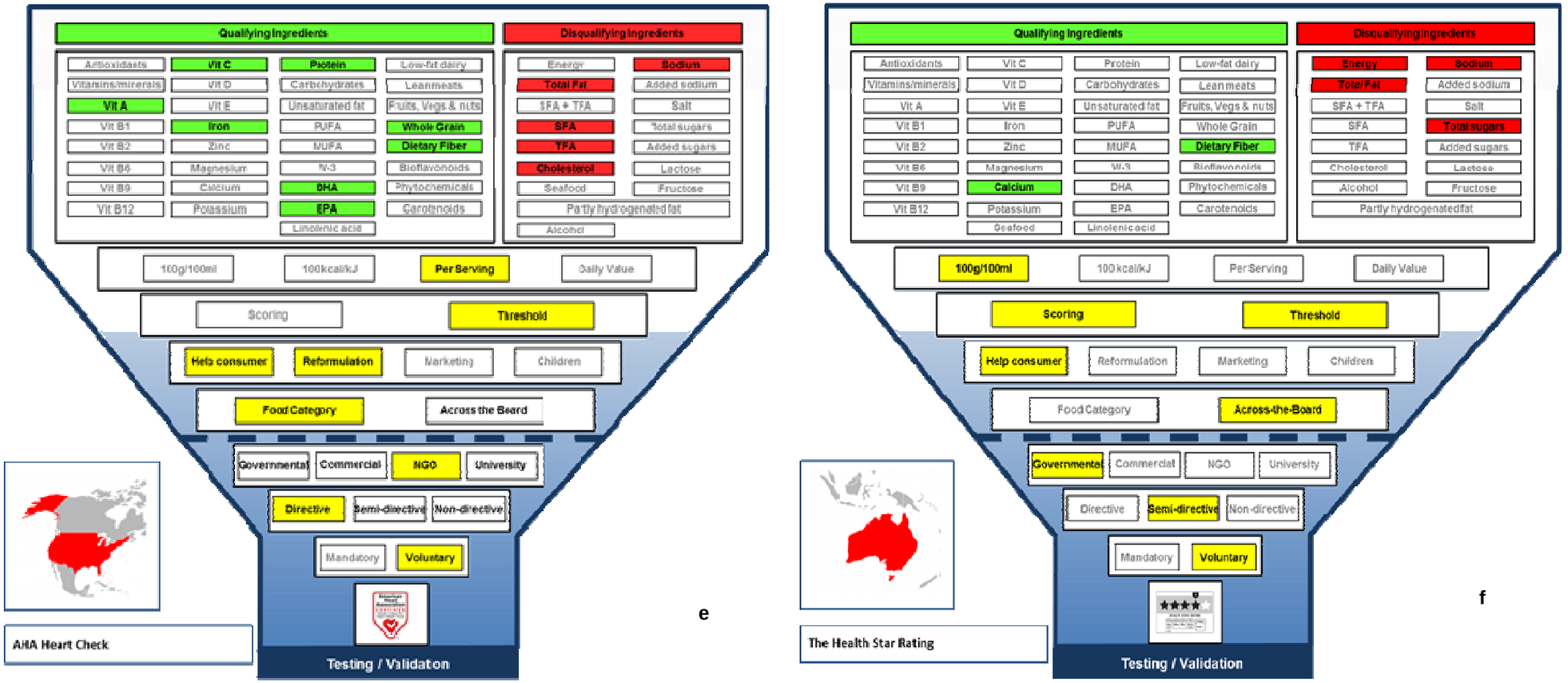

Fig. 9. Funnel Model applied to the: a) MTL + RI; b) Keyhole; c) Choices Program; d) Healthier Choice Symbol; e) AHA Heart Check; f) The Health Star Rating

4. DISCUSSION

In comparison with the Arrow Model, published in 2008, the Funnel Model provides a more complete and up-to-date overview of the characteristics of the existing FOP-NPS, which allows for comparison of the different systems currently in use. Whereas the Arrow Model was constructed based on six FOP-NPSs, the Funnel Model is based on 40 FOP-NPSs. Starting with the Arrow Model as a base, additional qualifying and disqualifying ingredients were included in the Funnel Model. Additional characteristics that were added to the Funnel Model include: directivity, type of institution that developed the system and the purpose of the FOP-NPS. Inclusion of these characteristics allows for a more complete comparison of systems.

A strength of the Funnel Model is that it is based on an overview of FOP-NPS from all over the world which are currently in use or are approved to be used in the near future and are targeted at the general adult population and children. This paper on the Funnel Model only includes FOP-NPS, which could be a restriction for users who would be interested in comparing non FOP-NPS such as for allowing nutrition and health claims under EU Regulation 1924/2006.

Although some systems may not have been found, various experts on nutrient profiling were approached to assess whether important systems were missing. Therefore, it is expected that the Funnel Model is able to represent the characteristics of FOP-NPS in use worldwide. The Funnel Model thus provides an effective way of comparing and explaining different FOP-NPS. The model can therefore be used by different parties in the field of nutrient profiling such as food companies or policy makers. The Funnel Model can be used to explain the concept of FOP-NPS and its use to a new audience or to compare the characteristics of different FOP-NPS.

The analysis of the included NPS shows some interesting similarities and differences. Most of the systems included are either from a governmental or commercial organization. Of the governmental systems included, all except for one system are voluntary. The only mandatory FOP-NPS is from Malaysia (FOP calorie content) for application on popcorn, crisps, crackers and biscuits.

Although systems can differ with respect to the qualifying and disqualifying ingredients included, most systems have a similar approach when analyzing the nutritional content of food products. Most of the included systems use a combination of disqualifying and qualifying ingredients, a per serving reference unit and a threshold measurement method. Directive systems are most used in practice, but semi-directive and non-directive systems are used as well. It would therefore be interesting for future research to investigate what kind of directivity is more effective for helping consumers to make healthy food choices. All FOP NPS have the purpose to help the consumer make more informed food choices. There is however very little empirical evidence that FOP-NPS help consumers to change their diets [4].

The effectiveness of any NPS depends on the consumer understanding of the system and cultural differences. It is thus recommended that further research is conducted to evaluate the effect of consumer understanding and cultural differences on the effectiveness of a NPS.

5. CONCLUSION

The Funnel Model has been developed to describe and compare different FOP-NPS. The Funnel Model is based on an updated overview of FOP-NPS that are currently used worldwide. It includes several new elements compared to the Arrow Model and uses a new visual presentation in order to present the characteristics of different NPS. With the Funnel Model different FOP-NPS can be clearly presented and compared. An overview of all the NPS that were found and a presentation of all FOP systems as described by the Funnel Model are provided as an attachment to this article on the website of the journal. Furthermore a table with the risk and benefit criteria of all the different systems is provided.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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APPENDIX- 1

Overview of the NPS that were used to construct the Funnel Model

Nutrient profile system	Country	Organization type	Organisation	Utilization	Methodological approach	Calculation method	Nutritional criteria	Nutrients included	Reference unit	Directivity	Purpose
Health Check	Canada	NGO	Heart and Stroke Foundation of Canada	Voluntary	Across the board	Threshold	Positive and negative	Protein, total sugar, dietary fiber, total fat, SFA, TFA, sodium, vitamins and other minerals	Per serving	Directive	Help the consumers to make more informed choices
Old Dutch Snack Wise	Canada and USA	Commercial	Old Dutch	Voluntary	Food category	threshold	Negative	Total fat, SFA, TFA, cholesterol, sodium	–	Directive	Help the consumers to make more informed choices
Overall Nutritional Quality Index (ONQI)	USA	University	Yale University School of Medicine	Voluntary	Across the board and food category	Score	Positive and negative	Total sugar, fiber, SFA, TFA, cholesterol,total N-3 fatty acids, vitamin A, vitamin B9, vitamin B6, vitamin B12, vitamin C, vitamin D, vitamin E, total bioflavonoids, total carotenoids, calcium, iron, magnesium, potassium, sodium and zinc	100 kcal	Drective	Research, help the consumers to make more informed choices and develop an algorithm for assessing the overall nutritional quality of foods
AHA Heart Check	USA	NGO	AHA	Voluntary	Food category	Threshold	Positive and negative	Protein, fiber, whole grains, total fat, SFA, TFA, EPA + DHA, cholesterol, vitamin A, vitamin C, iron and sodium	Per serving	Directive	Help the consumers to make more informed choices and product reformulation and inovation
Great for you	USA	Commercial	Wal-Mart	Voluntary	Across the board	Threshold	Positive and negative	Added sugars, fruit, vegetables, nuts, total fat, SFA, TFA, lean meats, low fat dairy and sodium	per serving	Directive	Help the consumers to make more informed choices
Wegmans Wellness Keys	USA	Commercial	Wegmans	Voluntary	Food category	Threshold	Positive and negative	Energy, protein, total carbohydrates, total sugar, lactose, dietary fiber, whole grains, total fat, SFA, TFA, cholesterol, vitamin A, vitamin C, calcium, iron and sodium	Per serving	Semi-directive	Help the consumers to make more informed choices
Healthy elements program	USA	Commercial	SuperValu	Voluntary	Food category	Threshold	Positve and negative	Energy, fiber, whole grains, total fat, cholesterol, calcium and sodium	Per serving	Semi-directive	Help the consumers to make more informed choices
Simple Nutrition self tags	USA	Commercial	Safeway	Voluntary	Across the board	Threshold	Positive and negative	Protein, total sugar, fiber, total fat, SFA, cholesterol, vitamin A, vitamin C, calcium, iron and sodium	Per serving and % Daily Values (2000-calorie diet)	Semi-directive	Help the consumers to make more informed choices
Facts Up Front	USA	Commercial	Food Marketing Institute	Voluntary	Across the board	Threshold	Positive and negative	Energy, protein, total sugar, fiber, SFA, vitamin A, vitamin C, vitamin D, calcium, iron, potassium and sodium	Per serving	Non-directive	Help the consumers to make more informed choices
Guiding Stars	USA	Commercial	Hannaford and Delhaize	Voluntary	Food category and across the board	Threshold	Positive and negative	Added sugars, dietary fiber, whole grains, SFA, TFA, cholesterol, vitamins/minerals and added sodium	Per 100kcal	Directive	Help the consumers to make more informed choices
Clear On Calories	USA	Comercial	America's beverage companies	Voluntary	Across the board	Threshold	Negative	Energy	Per serving	Non-directive	Help the consumers to make more informed choices

Giant Foods Healthy Ideas	USA and Canada	Commercial	Giant Foods	Voluntary	Food category	Threshold	Positive and negative	Protein, total sugar, fiber, total fat, SFA, TFA, cholesterol, vitamin A, vitamin C, calcium, iron and sodium	Per serving	Directive	Help the consumers to make more informed choices
ProDANyS	Argentina	Governmental	Government of the Province of Buenos Aires	Voluntary	Across the board	Threshold	Positive and negative	Total sugar, fiber, total fat and salt	Per 100g	Directive	Help the consumers to make more informed choices and product reformulation and inovation
MTL	UK	Governmental	UK FSA	Voluntary	Across the board	Threshold	Negative	Energy, total sugar, total fat, SFA and salt	Per 100g/ml aand serving	Semi-directive	Help the consumers to make more informed choices
MTL+IR	UK	Governmental	UK FSA	Voluntary	Across the board	Threshold	Negative	Energy, total sugar, total fat and SFA	Per 100g/ml	Semi-directive	Help the consumers to make more informed choices
Sign of Protective Food	Slovenia	NGO	Society of Cardiovascular Health of Slovenia	Voluntary	Across the board	Threshold	Positive and Negative	Energy, added sugar, dietary fiber, SFA, unsaturated fat, cholesterol, salt and alcohol.	Per 100g/ml	Directive	Help the consumers to make more informed choices
Heart Symbol	Finland	NGO	FHA and FDA	Voluntary	Food category	Threshold	Positive and negative	Total sugar, fiber, total fat, SFA, unsaturated fat, cholesterol and sodium	Per 100g	Directive	Help the consumers to make more informed choices
Keyhole	Denmark, Iceland, Norway and Sweden	Governmental	National Food Administration of Sweden	Voluntary	Food category	Threshold	Positive and negative	Total sugar, fiber, total fat and sodium	Per 100g and 100kcal	Directive	Help the consumers to make more informed choices and reformulation and innovation of food products
MC-GDA & CC-GDA	Europe	Commercial	IGD	Voluntary	Across the board	Threshold	Negative	Energy, total sugar, total fat, SFA and sodium	Per serving	Non-directive or Semi-directive	Help the consumers to make more informed choices
Heart Healthy Mark	Zimbabwe	NGO	Heart Foundation of Zimbabwe	Voluntary	Food category	Threshold	Positive and negative	Total sugar, dietary fiber, SFA, TFA, partially hydrogerated fat, cholesterol, calcium, salt, fruit, vegetables and seafood	Per 100g	Directive	Help the consumers to make healthier and heart-safe choices
Healthier Choice Symbol	Singapore	Governmental	Singapore HPB	Voluntary	Across the board	Threshold	Positive and negative	Energy, protein, carbohydrates, total sugar, dietary fiber, whole grains, total fat, SFA, TFA, cholesterol, calcium and sodium	Per 100g and serving	Directive or Semi-directive	Help the consumers to make more informed choices
Healthier Snack Symbol	Singapore	Governmental	Singapore HPB	Voluntary	Food category	Threshold	Positive and negative	Energy, total sugar, dietary fiber, whole grains, total fat, SFA, TFA and sodium	Per 100 g/ml and serving	Directive	Help the consumers to make more informed choices
Healthier Ingredient Symbol	Singapore	Governmental	Singapore HPB	Voluntary	Food category	Threshold	Positive and negative	Whole grains, total fat, SFA, TFA, MUFA, PUFA, potassium and sodium	Per 100 g/ml and serving	Directive	Help the consumers to make more informed choices
FOP Calorie content	Malaysia	Commercial	Federation of Malaysian Manufacturers and Malaysian Food manufacturing Group	Voluntary	Across the board	Threshold	Negative	Energy	Per serving and % DV	Non-directive	Help the consumers to make more informed choices
FOP GDA for Snacks	Thailand	Governmental	Thai FDA	Mandatory	Across the board	Threshold	Negative	Energy, total sugar, total fat and salt	Per serving	Non-directive	Help the consumers to make more informed choices
25% Reduced	Thailand	Governmental	Health Department	Voluntary	Across the board	Threshold	Negative	Total sugar, total fat and sodium	_	Semi-directive	Help the consumers to make more informed choices

Healthier-you	Philippines	Governmental	Philippine's Department of Health	Voluntary	Across the board	Threshold	Positive and negative	Energy, proteins, total carbohydrates and total fat	Per serving and % DV	Directive	Help the consumers to make more informed choices and reformulation and innovation
The Health Star Rating	Australia	Governmental	FSANZ	Voluntary	Across the board	Threshold and Score	Positive and negative	Energy, total sugar, total fat, sodium and other optional positive nutrients as fiber or calcium	Per 100g/ml	Semi-directive	Help the consumers to make more informed choices
eMarks	New Zealand	Governmental	New Zealand Nutrition Foundation	Voluntary	Food category	Score	Negative	Energy	Per serving	Directive	Help the consumers to make more informed choices
Heart Foundation Tick	Australia and New Zealand	NGO	Heart Foundation of New Zealand and Australia	Voluntary	Food category	Threshold	Positive and negative	Energy, fiber, SFA, TFA, calcium and salt	Per serving	Directive	Help the consumers to make more informed choices
Daily Intake Guide (DIG)	Australia and New Zealand	Governmental	FSANZ	Voluntary	Across the board	Threshold	Positive and negative	Energy, protein, carbohydrates, total sugar, total fat, SFA, vitamins/minerals and sodium	Per serving and %DV	Non-directive	Help the consumers to make more informed choices
The Health Eating System	Australia and New Zealand	Commercial	Sanitarium Health & Wellbeing	Voluntary	Food category	Score	Positive and negative	Protein, added sugars, fiber, total fat, SFA and sodium	Per 100g/ml	Semi-directive	Help the consumers to make more informed choices
Whole Foods ANDI Rating System	International	Commercial	Whole Foods Market	Voluntary	Across the board	Score	Positive	Vitamins, minerals, phytochemicals and antioxidant capacitie	_	Directive	Help the consumers to make more informed choices
Whole Grain	International	Governmental	Whole Grain Council	Voluntary	Across the board	Threshold	Positive	Whole grains	Per serving	Semi-directive	Help the consumers to make more informed choices
Nutrition Highlights	International	Commercial	General Mills	Voluntary	Across the board	Threshold	Positive and negative	Energy, total sugar, dietary fiber, SFA, calcium and sodium	Per serving	Non-directive	Help the consumers to make more informed choices
Nutrition Information Initiative	International	Commercial	McDonalds	Voluntary	Across the board	Threshold	Positive and negative	Energy, protein, total carbohydrates, total sugar, fiber, total fat, SFA and salt	Per serving	Non-directive	Help the consumers to make more informed choices Promotion of food - marketing
Kellogg's Global nutrient Criteria	International	Commercial	Kellogg's	Voluntary	Food category	Threshold	Negative	Energy, total sugar, fiber, SFA, vitamine A, vitamin C, vitamin C, calcium, magnesium, potassium and sodium	Per 100kcals and serving	Non-directive	Help the consumers to make more informed choices Promotion of food - marketing
Choices Programme	International	Commercial	Choices International Foundation	Voluntary	Food category	Threshold	Positive and negative	Energy, added sugars, fiber, SFA, TFA and salt	Per 100g and % of 2000kcal	Directive	Help the consumers to make more informed choices and product reformulation and inovation of food products
Fuelled 4 Life	New Zealand	Governmental	Heart Foundation of New Zealand	Voluntary	Food category	Threshold	Positive and negative	Energy, total sugar, fiber, SFA and sodium	100g/ml and serving	Directive	Help the consumers to make more informed choices for children
Mickey Check	International	Commercial	Walt Disney	Voluntary	Food category	Threshold	Negative	Energy, sugar, SFA, TFA and sodium	Per serving	Semi-directive	Help the consumers to make more informed choices for children

INTRODUCTION

This overview describes the NPS that are currently used in North America, South America, Europe, Africa, Asia and Oceania. The different characteristics of a NPS are presented in the Funnel model and, due to its visual simplicity it is very clear what can be chosen [1]. Some of the choices concern the following parameters:

1) **Establish a system based on food categories and/or in foods as a whole** – with the food category system the NPS is based on each food category, e.g. fish and eggs or milk and dairy products. In a system based on foods as a whole, also called a transversal approach, all foods come under a single profile (whether dairy products or fruit), irrespective of food categories. Due to the limitations of each of these two approaches, some systems have tried to combine them.
2) **The risk and benefit criteria taken into account –** a distinction can be made between positive risk and benefit criteria, which are often lacking nutrients in the diet and/or associated with beneficial health effects, like dietary fiber or omega-3 fatty acids, and negative risk and benefit criteria, which are ingredients eaten in excess or implicated in chronic diseases, like fats and sugars.
3) **The measurement method used (score vs. threshold) –** To measure nutritional quality two methods can be used: scoring systems and threshold systems. Scoring systems assign an overall score to the food obtained by combining its negative ingredient score (nutritional weaknesses) and its positive ingredient score (nutritional benefits). With the threshold measurement method for each ingredient a threshold is defined, that results in two or three classes of ingredient content (good/intermediate/bad).
4) **Thresholds of eligibility and how are they defined –** Threshold values are normally obtained through the nutritional recommendations published by public health authorities.
5) **The reference unit –** There are several reference units used by the existing systems like the “100g” unit, the portion unit and the analysis per 100kcal of a product. Some systems even combine several units [1,2].
6) **Directivity –** From consumer classifications of FOP nutrition labels three different categories were extracted: directive, semi-directive and non-directive. Non-directive NPS provide detailed nutritional information, but give no direction to the choice of the consumer, i.e. information whether the food is considered healthy or not. The non-directive category includes GDA systems and standard nutrition tables [3]. The semi-directive category gives more direction to the choice of the consumer and includes traffic lights and nutrition tables that incorporate traffic lights. Directive systems give direction to the choice of a consumer by indicating whether it is a healthy choice or not. The directive category includes simple and graduated health logos such as the Key Hole and Health Star Rating.

After the choices for the several parameters are made, as agreed on by scientists and policy makers, the system of choices needs to be validated and tested.

1. NORTH AMERICA

1.1 Health Check

The Health Check logo was introduced in Canada in 1999 by the Heart and Stroke Foundation of Canada [4]. The logo can be found on both food products in the supermarket and on dishes on the menus of the restaurants [5]. This is the only non-profit front-of-pack (FOP) logo currently being used in Canada [6]. The Health logo is an across-the-board system and it takes the following risk and benefit criteria into account: total fat, saturated fatty acids (SFA), trans fatty acids (TFA), fiber, sodium, sugar, protein, vitamins and other minerals [5].

Companies can apply at the Canadian Heart and Stroke Foundation to get approval for their products to carry this logo and they have to pay a fee for carrying the logo on their products. For the ingredients that are used as criteria for this logo threshold levels are set [6].

Fig. 1. Health check logo [8]

These threshold levels are based on Canada's Food Guide to Healthy Eating. The reference unit that is used is per serving of the food product or meal [4]. The logo that that is displayed on food products and menu cards for the Health Check is shown in Fig. 1 and it is a directive label type.

1.2 Old Dutch Snack Wise

This FOP label is exclusively displayed on the packages of snacks of the company 'Old Dutch', from Canada and USA. Is a system that uses a food-category based summary indicator, so it has a directive approach and a threshold measurement method. It highlights each product's benefits, such as:

- 0g TFA;
- 0g SFA;
- 0g cholesterol;
- Low fat;
- No MSG (Monosodium Glutamate);
- Low sodium [7].

Fig. 2. Old Dutch label [10]

This label, which can be seen in Fig. 2, has a directive approach.

1.3 Naturally Nutrient Rich Score

The Naturally Nutrient Rich Score (NNR) was developed by the university of Washington-Seattle and it is a measure of nutrient density (nutrients-to-calories ratio) [8]. The score is calculated based on mean percentage daily values (DVs) for 14 ingredients in 2000kcal of the food. This system uses an across-the-board approach and the ingredients included are: protein, monounsaturated fat, calcium, iron, potassium, zinc, thiamine, folate, and vitamins: A, C, B2, B12, D, E. The measurement method used by this system is threshold.

The NNR score is the average of %DVs for the 14 key ingredients:

- NNR = $\Sigma\%DV_{2000\ kcal}$ /14 and its reference unit is per 100kcals [9].

1.4 Overall Nutritional Quality Index (ONQI) NUVAL

The ONQI was developed by a multidisciplinary group of scientists that are active in the field of nutrition and public health, independent of food industry interests. It ranks foods based on its nutritional value (across-the-board and within food groups) and hence it helps consumers make more informed food choices [10]. The ONQI is a score on a scale from 0-100 which is used in the USA [11].

This nutritional scoring system considers more than 30 ingredients and nutritional factors in order to develop the raking system. The simplest version of how the ONQI is calculated can be seen in the Fig. 3 [12].

Fig. 3. ONQI measurement method [15]

Qualifying ingredients are placed in the numerator: fiber, folate, vitamin A, C, D, E, B12, B6, potassium, calcium, zinc, n-3 fatty acids, total bioflavonoids, total carotenoids, magnesium and iron. Disqualifying ingredients are placed in the denominator: SFA, TFA, sodium, sugar and cholesterol [10].

The ONQI system also takes into account other factors in order to measure the quality and density of nutrients in the foods. It is also included the strength of association between these ingredients and some specific health problems [12].

For instance, and taken TFA as an example: this type of fat is strongly associated with heart disease. Taking this into account, the ONQI define a “weighting coefficient” to TFA what produces a reduction in the score of the food containing this fat. The weighting coefficients are defined considering the prevalence, severity and strength of association with the health problems [12].

Fig. 4. NuVal symbol [14]

The quality of the macronutrients, (fat quality, protein quality or carbohydrate quality) can also produce and increase or decrease in the score [12].

This score is calculatied per kcal and its reference unit is per serving [10]. The symbol of NuVal is displayed in Fig. 4 and it has a directive label type.

1.5 AHA Heart Check

The Heart Check logo, shown in Fig. 5 [13], was created by the American Heart Association, a NGO, and it is used in the USA with the purpose of helping consumers to make healthier food choices and to certify food products. To achieve certification, a product must meet the risk and benefit criteria as specified by the Food and Drug Administration (FDA), based on a single serving size (Reference Amount Customarily Consumed or RACC) [14].

Fig. 5. Hearth Check logo [16]

The Heart Check uses a methodological approach based on food

categories, a threshold system and its nutrient requirements are per RACC amounts as specified by the FDA and USDA [15]. This system uses a directive label type.

1.6 Great for You

The Wal-Mart produced and launched in February 2012 a new seal, the “Great for you”. The criteria for receiving this seal it is the most rigorous until now and follows the recommendations from 2010 Dietary Guidelines for Americans, FDA, U.S. Department of Agriculture (USDA) and Institute of Medicine (IOM). Besides the packaged foods, this symbol also appears on fresh fruit and vegetables, in the USA. The “Great for You” was developed with the collaboration of food and nutrition experts from public and private organizations and health organizations. The symbol of “ Great for you” is presented in Fig. 6 and it represents a transparent way to increase the confidence and trust of the consumers about the products of the company [16].

The icon has as purpose to help people to make changes in their diet by indicating nutritious and healthier food choices and also promote food fortification and health claims. The risk and benefit criteria of this system are composed by two steps:

1. Step one: encourage consumers to increase consumption of fruits, vegetables, fiber-rich whole grains, low-fat dairy, nuts and seeds and lean meats.
2. Step two: limit the amount of total TFA and SFA, sodium and added sugars in foods. The criteria for this step are:

    - **Total Fat:** each serving less than 35% of total energy;
    - **Trans Fat:** 0g labeled and no “partially hydrogenated ” fats or oils present per serving;
    - **Saturated Fat:** less than 10% of total energy per serving;
    - **Sodium:** each serving of single food items contains 380mg or less, a meal or mixed dish contains 600mg or less
    - **Added Sugars:** in each serving 25% or less of total energy is provided by added sugars [16].

Fig. 6. Great for you icon [19]

The symbol uses an across-the-board methodological approach and a threshold measurement method. The reference unit used is per serving. As can be seen in Fig. 6, this symbol is an example of directive NPS.

1.7 Wegmans Wellness Keys

The American Wegmans food markets present the Wegmans Wellness Keys in their products. This system consists in dots, that can be easily recognize by the consumers and show the foods that fit in a healthy lifestyle and wellness planning. Each one of the dots shown in Fig. 7 provides important nutritional information. All the messages transmitted by these dots follow the USA government regulations [17].

This NPS uses a food category methodological approach and a threshold measurement method. The reference unit used is per serving. This system uses a semi-directive label type. Additional specific ingredients taken into account are protein, total carbohydrates, SFA, TFA, cholesterol, vitamin A, vitamin C and iron.

Fig. 7. Wegmans wellness keys [20]

1.8 Healthy Elements Program

In June 2009, SuperValu, a grocery industry leader that serves customers in several stores across the USA, introduced the Healthy Elements program for its independent retail partners to help their stores identify products that meet FDA guidelines. The aim of this label is to provide a quick, simple and convenient way for costumers to make healthier decisions about food products [18].

The label, shown in Fig. 8, is carried by grocery, frozen and dairy products. Each item is labeled with a green shelf tag that lists up to four attributes. The nine Healthy Elements attributes were reviewed by dietary experts and are based on top health issues such as heart disease, cancer, stroke and diabetes. These nine elements are:

- Gluten Free;
- Good Source of Calcium;
- Good Source of Fiber;
- Low Calorie;
- Low Cholesterol;
- Low Fat;
- Low Sodium;
- Organic;
- Whole Grain [18].

Fig. 8. Healthy elements program logo [21]

The Healthy Elements Program uses a food category methodological approach, a threshold measurement method and the reference unit used is per serving [18]. This system uses a semi-directive label type.

1.9 Simple Nutrition Shelf Tags

In February 2011 Safeway announced Simple Nutrition shelf tags with the purpose of helping consumers to make healthier choices about food products. The teal boarded tags have color-coded labels for 22 benefits regarding nutrition and ingredients, including gluten free, organic, whole grain and fat free to cover both dietary of lifestyle needs, and specific nutrition of ingredient concerns. An example of these tags is shown in Fig. 9. In general, products with a nutrition benefit message such as "Good Source of Fiber" or "Low in Fat" have to meet one or more of the following risk and benefit criteria:

- **Total Fat:** Each serving contains 13g or less.
- **Saturated Fat:** Each serving contains 2g or less.
- **Cholesterol:** Each serving contains 60mg or less.
- **Sodium:** Each serving contains 480mg or less for individual products and 600mg or less for meals and main dish products.
- **Beneficial ingredients:** Each serving contains 10% or more of the DV for vitamin A, vitamin C, calcium, iron, protein or fiber.
- **Sugars:** Naturally occurring sugars in foods such as grains, milk, fruits and vegetables are allowed. The total amount of sugars that is allowed in a specific product category is calculated with a formula [19].

Simple Nutrition shelf-tags uses an across-the-board system and a threshold measurement method. The reference unit is per serving and the % daily values are based on a 2000kcal diet. Multiple Simple Nutrition shelf-tags have been designed to limit the consumption of foods that contain ingredients that might negatively affect health (total fat, SFA, cholesterol, sodium and sugars) and to encourage the consumption of products that contain ingredients that contribute to a healthy diet (vitamin A, vitamin C, calcium, iron, protein or fiber) [19].

Fig. 9. Simple nutrition shelf tags [22]

The Simple Nutrition criteria are based on the latest published health guidelines provided by the USDA, the US Department of Health and Human Services (DHHS), the IOM and food labeling guidelines from the FDA. Certified food products are also evaluated on the RACC. Product categories that have small RACCs (≤ 30g/2 Tablespoons) are also evaluated per 50g [19]. This system uses a semi-directive label type.

1.10 Facts Up Front

The Facts Up Front is a commercial profiling system created by the Food Marketing Institute for the U.S. food and beverage manufacturers and retailers [20,21]. This NPS clearly summarizes important nutrient information from the Nutrition Facts Panel. Facts Up Front was created to provide American consumers an easy way to help consumers make more informed choices on food products [21].

The basic Facts Up Front label, shown in Fig. 10, includes four icons with information about calories, SFA, sodium and sugars, which are the ingredients to limit, as identified by the Dietary Guidelines for Americans [21]. The specific serving size is the same as the Nutrition Facts Panel [21]. The optional icons consist of up to two additional icons, representing specific additional ingredients declared in nutrition labeling, that are “Nutrients to Encourage” (potassium, fiber, protein, vitamin A, vitamin C, vitamin D, calcium or iron) [20,21]. These ingredients are all shortfall ingredients or are required to be on the Nutrition Facts Panel. The product must contain 10% or more of the DV of these ingredients and be a “good source” to be featured on the Facts Up Front label [21].

Information is included about calories, SFA, sodium, sugars and of up to two of the possible eight ingredients to encourage, that manufacturers can opt to include [20].

Fig. 10. Facts up front label [24]

This system uses an across-the-board approach, a threshold measurement method and its reference unit is per serving [21]. This system uses a non-directive label type.

1.11 Food and Drug Administration (FDA) scheme

This NPS was developed by the FDA from the USA and has as purpose to identify products that can obtain a nutrition and health claim in the USA. For this system only products that satisfy the recommendations for the negative criteria and at least one positive criterion can obtain the claim. The negative ingredients are: total fat, SFA, cholesterol and sodium. The positive ingredients are: vitamin A, vitamin C, iron, calcium, protein and fiber. This is an across-the-board and threshold system. The thresholds are established to be lower than 20% of the Daily Reference Value (DRV) for the negative ingredients and higher than 10% of the DRV for the positive ingredients. These DRV's are based on a diet of 2000kcal per day. The reference unit of this system is the portion, which needs to be at least 50g [2,22].

According to the USA Health Claim Scheme, the products cannot have any nutritional weakness and need to have at least one recognized quality to carry a claim. It should also be taken into account that some health claims need to have specific thresholds, for example one product for the hypertension needs to have less sodium than the regular food [2].

1.12 Guiding Stars

This NPS is consistent with the recommendations of the Dietary Guidelines for Americans (DGA) and related authoritative dietary recommendations at point of purchase (POP). This program is implemented storewide, provided on the shelf (it is not present on the package) and is applied to all edible food products and beverages independently of the brand [23]. This system was developed to be implemented in the Hannaford and Delhaize stores, and is used in the USA [23]. Nowadays it is widely spread and can be found in a range of different stores, hospitals, products from grocery companies, etc. [24].

The Guiding Stars program categorizes the food and beverage products as a combination of a food-group and transversal approaches resulting in two broad categories of foods and beverages and additional categories for meats, poultry, seafood, dairy and nuts. This system includes as ingredients to limit: TFA, SFA, cholesterol, added sugars and added sodium. As nutritional factors to encourage are considered: dietary fiber, vitamins/minerals and whole grain bonus.

This label uses a scoring measurement method to determine the number of stars a product can carry. It considers a maximum and a minimum threshold value for each ingredients included in the Guiding Stars algorithm based on ingredient ratio to the 100kcal energy referent, i.e., equivalent to 5% of energy intake based on a 2000kcal diet. Following the DGA the food and beverage products should have at least 5% of the DV of the ingredients to

encourage and no more than 5% of the DV of those to limit. The thresholds assigned for the ingredients included in the system that have DV (SFA, cholesterol, sodium, vitamins/minerals and fiber) are 5% or multiples. The thresholds for the others that do not have DVs were derived using dietary guidelines from authoritative scientific bodies. For the added sugars the cut-off points were calculated based on the ideal of no added sugars, ≤10% of kcal (based on WHO recommendations), and ≤25% of kcal (based on IOM recommendations) [23].

Fig. 11. Guiding stars logo [26]

With the objective of not penalizing foods that naturally contain sugar or sodium, debit for added sugars and added sodium content was analyzed by evaluating the presence of certain words in the ingredient list and then calculated based on the Nutrition Facts Label (NFL) value. After analyzing each ingredient a sum of all positive and negative attribute scores is made. Only foods with a score above 0 receive stars. Foods with a score between 1 and 2 receive 1 star. Foods classified between 3 and 4 points receive 2 stars and 3 stars will be assigned to foods with 5 to 7 points [23]. The logo of the Guiding Stars systems is displayed in Fig. 11 and it is a directive label type.

Guiding Stars provide the information by 100kcal and its aim is to help the consumers to make more informed decisions about food products [23].

1.13 Clear on Calories

The Clear on Calories is a voluntary label commitment of America's beverage companies (Coca-Cola Company, Cott Beverages, Dr Pepper Snapple Group, Honest Tea, Nestlé Waters North America, PepsiCo, and Sunny D) with the aim of providing consumers the number of calories in their products in a clear way [25,26]. The label, which is of the semi-directive type is shown in Fig. 12.

Fig. 12. Clear on calories label for containers 20 fl oz or less [28]

"The Clear on Calories Initiative" was launched in 2010. This label displays the calorie content in the front of every can, bottle or pack. This label shows the total calories per container on beverages of 20 ounces or smaller. Containers larger than 20 ounces, label calories per 12 ounces, except for 100% juices and juice beverages, these are labeled per 8 ounce [25]. The Clear on Calories is a threshold system that provide consumers information in a directive way, and it uses an across-the-board approach.

In addition to the Clear on Calories label, America's beverage companies are also developing The Calories Count Vending Program, which was launched in municipal buildings in the cities of Chicago and San Antonio in the beginning of 2013, and is now being made available to consumers nationwide. The Calories Count Vending Program offers information about calories to the consumers, with the aim of encouraging lower-calorie beverage choices. Calories Count can be seen on the front of vending machines, as it is shown in Fig. 13, and its signs include one of the following messages: "Check Then Choose" or "Try a Low–Calorie Beverage." The selection buttons also show total calorie counts per container [25,26].

Fig. 13. Calories count vending program [28]

1.14 Giant Foods Healthy Ideas

The Healthy Ideas nutritional shelf labeling is used in the USA with the purpose of helping consumers to make healthier food choices. In order for a food to carry the Healthy Ideas symbol it should meet the FDA criteria. FDA criteria considers as "healthy" foods limited in sodium, sugar, total fat, SFA and cholesterol. Furthermore, foods that carry the Healthy Ideas symbol afford at least 10% of the daily values for vitamin A and C, iron, calcium, protein or fiber [27].

This system uses an across-the-board approach with a threshold measurement method and the reference amount used is per serving. Fig. 14 shows the Healthy Ideas logo, which is a directive label type.

Fig. 14. Healthy ideas logo [30]

2. SOUTH AMERICA

2.1 ProDANyS – Argentina's version of the Choices Programme

ProDANyS (Program for the Development of Foods, Nutrition and Health) is part of the Choices Program (see page 34) and hence it shares the same bases and methodologies of it. This program was implemented by the government of the Province of Buenos Aires. The Program is still in the development phase but it is expected to be launched soon [28,29].

Fig. 15. ProDANyS symbol [31]

ProDANyS has as purpose to make healthier choices easier for the consumers. Products that meet the Choices criteria are allowed to carry ProDANys FOP logo [28,29]. The symbol of ProDANyS is displayed in Fig. 15 and it is a directive label type. ProDANyS uses a threshold and across-the-board approach, taking into account the following ingredients: total sugar, fiber, total fat and salt, per 100g. This system uses an across-the-board approach and a threshold calculation system, with a reference unit of per 100g.

3. EUROPE

3.1 MTL

The Multiple Traffic Light label (MTL) is a voluntary labeling system that was developed and adopted by the United Kingdom Food Safety Agency (UK FSA), that is used in UK [30].

Fig. 16. MTL system [33]

The system uses colors (green, amber, red) to indicate whether there are low, medium or high quantities of energy, total fat, SFA, total sugar and salt in a food product. MTLs can have different appearances. The label may display only the three colors red, green and amber, without any additional information on amounts of ingredients. However, the label can also be displayed as CC-GDA (colored coded Guideline Daily Allowance), containing more detailed information on amounts and % of GDA, either per 100g, 100ml or per serving of the food. In addition, a grey or white icon that contains information on the amount of calories in the food may be added [30,31]. In the Fig. 16 is presented an example of a MTL logo. This system consists in a color code that is based in the GDA information. This system is a threshold and an across-the-board system. The MTL has as purpose to help the consumers to make more informed choices. The label of this system, in the way that is shown in Fig. 16, is of the semi-directive type.

3.2 MTL+RI

There has been a continuous debate about the MTL system in the UK because it is considered that it was not consistent and often perceived as confusing by consumers, caused by the using of different variations utilized by different retailers. As a result, one consistent traffic light FOP nutrition labeling system has been introduced by the UK FSA in June 2013. This system will expectedly be rolled out in the UK until December of 2014. The food companies that signed up for this new system and will start to use it are the most influent in the UK, which means that a large part of the foods sold in the UK (60%) will show the new system on their packages [32,33].

The new labels combine the GDA scores and MTL colors to indicate the amount of total fat, SFA, total sugar and salt. The energy will be shown in a neutral color [32]. The updated label uses an across-the-board and threshold approach and will display nutritional information and traffic light colors (red, amber, green) to show consumers at a glance if products are healthy or not. For consistency on pack, the current practice of GDA will change and only Reference Intakes (RI) should be used by retailers. All thumbnails will show their contents per 100g/ml and per serving. Further, the % RI will also be displayed for all five key items. The energy content will be displayed exclusively when e.g. the package is small or when the package uses several languages [34].

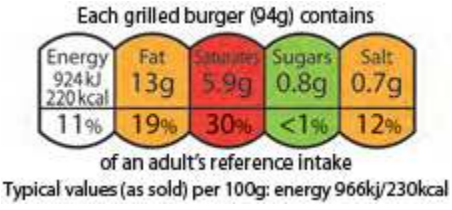

Fig. 17. Combination of GDA and MTL systems [36]

Products with more green scores are healthier; therefore consumers should choose the products that have more green marks. The amber color indicate the food products that can be ingested most of the times and the red color indicate that the product should be avoided because they contain high levels of fat or sugar [32]. The purpose of this system is to help consumers to make healthier choices easier [32]. This system has a semi-directive label type that can be seen in Fig. 17.

3.3 SAIN/LIM

This system from France takes into account the European regulations from 20 December 2006 about the nutritional allegations for health. The NPS SAIN/LIM, shown in Fig. 18, has as main objective the restriction to allergens in foods and also implies a value judgment about them. It is an across-the-board system composed of 2 indicators of quality of the foods, the SAIN and LIM.

- SAIN:
  - Analyze the favorable aspects of foods;
  - It is a score of individual adequacy to the nutritional recommendations;
  - It is expressed per 100kcal;
  - Measure the average adherence to the nutritional recommendations;
  - Analyses 15 different ingredients: proteins, fibers, vit. C, vit. E, thiamin, vitamin B2, vitamin B6, vitamin B9, calcium, iron, magnesium, zinc, potassium, linolenic acid, DHA;
  - Take into account the daily recommended intake (DRI) [35].
- LIM:
  - Analyze the unfavorable aspects of foods;
  - It is a score for the ingredients to limit in the diet;
  - Is expressed per 100g;
  - Measure the excess over the maximum recommended values;
  - Analyses 3 different ingredients: sodium, SFA and added sugars [35].

Fig. 18. SAIN/LIM system [38]

3.4 Tripartite Classification Model

The Tripartite Classification model was developed in 1993 by the Dutch Food Information Bureau and is applied in the Netherlands. In 2005 it was updated having as main objective to help the consumers to make dietary choices and in order to do that, the system provides information about the dietary quality of the products [2,8]. This profile is a food category specific system and takes into account 14 categories (8 basic and 6 optional). The categories are:

- Basic: Potatoes, rice, pasta, pulses; Bread, bread substitutes, breakfast cereals; Vegetables, fruit and fruit juices; Milk and milk products; Cheese; Meat, prepared meat products, chicken, eggs; Fish; Spread and cooking fats.
- Other: Snacks, spicy filling; Sauces; Cake, pastry, nuts, savory snacks; Sweets, sweet filling; Cream; Evaporated milk [8].

The risk and benefit criteria analyzed are:

- SFA;
- Added sugars;
- Omega 3;
- Fiber;
- Vit. C;
- Vit. B9 [2].

This system is based on thresholds that are devised for negative ingredients (SFA and added sugars) and/or positive ingredients (Omega 3, fiber, vitamin C, vitamin B9). The reference values and the ingredients depend on the food group. The system has also defined two more thresholds values for each food group. With these additional thresholds the food can be classified as “optimal choice”, “intermediate choice” or “occasional choice”. This classification allows for distinguishing between foods within the same group. The definition of these thresholds is based on the Dutch national recommendations (Dutch Health Council) [2].The reference unit used is per 100g [2].

3.5 Sign of Protective Food

The Society of Cardiovascular Health of Slovenia developed a sign of protective food in order to help consumers choose the healthiest food products. The products that meet the criteria, having the recommended amount of these ingredients, carry the symbol of protective food, shown in Fig. 19 [36], along with the words “Health is protected”. The criteria that the food products must meet in order to carry the logo are:

- Low in SFA, or more unsaturated;
- Low cholesterol;
- High in dietary fiber;
- No added sugar;
- Little or no salt;
- Little or no alcohol;
- Minimal chemical additives, nor by excessive concentrations of essential vitamins;
- Low energy value [37].

A commission of experts from the Institute of Hygiene and Faculty of Medicine, determine whether the food meets the conditions to carry the logo. Official laboratories verify the decisions made on the basis of the declaration of the contents of ingredients in foods. Furthermore, the Commission may require additional verification [37].

Fig. 19. Sign of protective food [39]

The Sign of protective food is an across-the-board system with a threshold measurement method and it utilizes as reference unit per 100g or per 100ml of the food product content [37]. This system has a directive label type.

3.6 Heart Symbol (Finland)

In 2002, the Finnish Heart Association (FHA) and Finnish Diabetes Association (FDA) introduced the Heart Symbol with the primary goal to construct a NPS that fits with the Finnish food culture and which promotes public health [38].

Fig. 20. Heart symbol [43]

The Heart Symbol informs consumers that a product is a better choice in its product group regarding fat and sodium. The symbol is a food category system and it is used for nine different product groups: Milk and dairy; edible fats; meat products; bread and cereals; convenience foods; spices and seasoning sauces; vegetables, fruits, berries, beans, soya products, nut and seeds; meat; fish. The criteria for the symbol are based on the Finnish nutrition recommendations [38,39].

The risk and benefit criteria for granting the symbol are: quantity and quality of fat (total fat and proportion of SFA and unsaturated fat, total sodium, cholesterol, sugars (in some product groups) and fiber (in some product groups). Criteria differ per product group. The amount of ingredients are described per 100g [40,41]. The label, which is shown in Fig. 20, is of the directive type.

3.7 Key Hole

The Key Hole is a Swedish NPS that is used since 1989 and was developed by the National Food Administration. The foods that meet the criteria for this system can use a green key hole. This way the consumers can more easily identify the healthiest foods in shops and restaurants and make better nutritional choices. This measure has in part as objective reduce obesity, cardiovascular diseases, type II diabetes and certain types of cancer [2].

Fig. 21. Key hole logo [45]

It is a food category specific system and takes into account 26 different categories of which the characteristics are taken into account [2,8].The risk and benefit criteria analyzed are: fat, sugars, sodium and fiber. The threshold values for these ingredients are based on consumption data (Eurodiet) and in accordance with nutritional recommendations for the Scandinavian countries [2].

This system is very strict, for example in the dairy products only products that are low-fat or sugar-free are included. This system also has very low discriminatory power, for instance, continuing with the same example, in this group there is only one threshold at 1.5g/100g. This doesn't allow to distinguish between products with, for instance, 1.6g of fat and with 3g [2]. The reference unit varies according to the food group and is 100g or 100kcal [2,8].

This system is also used in Norway and Denmark since 2009 since both countries have the same regulations as Sweden, and the same applies to Iceland from 2013 forwards [42]. This label, shown in Fig. 21, is of the directive type.

3.8 MC-GDA and CC-GDA

Since the Food Drink Europe (CIAA) promoted a voluntary nutrition labeling system based on the GDAs, GDA labels are used and widely recognized in several European countries since 2006 [43]. GDA's can be displayed at Back-of-Pack (BOP) labels or FOP labels. The GDA label uses an across-the-board and threshold approach and provides information on the amount (in grams) of four ingredients (fat, sugar, SFA, sodium) and the amount of calories, per portion of a beverage or food product [43,44]. In addition, for every ingredient, the label displays the %GDA. There are several ways in which the GDA label can be displayed or configured. Some companies provide the %GDA together with the four ingredients and calorie content on the front of their package, whereas other companies only show the calorie content and %GDA on the front, dependent on e.g. country, space on the package and focus of the company [44,45]. The reference unit of these systems is per serving [46].

GDAs serve as guides about how much energy and key nutrients the average healthy person needs in order to have a balanced diet. The ingredients indicated are: energy, total fat, SFA, total sugar and salt. To make it easier, the GDAs used for most foods are for an average woman with a healthy weight and average physical activity [47].

The GDA labels appear on the front of packages in several European countries among which, The Netherlands, Germany, UK, France and Belgium.

Different visual systems can be distinguished: MC-GDA, a monochrome label based on GDA; and CC-GDA, a (traffic light) color coded label based on GDA. In case the ingredient amounts are highlighted with different colors, the GDA FOP label is called a color-coded GDA label. Different types of color codes are used, including the colors that represent the traffic light system (red, amber, green). In this case, the GDA label falls into the category of MTL [48].

The basic GDAs are monochromatic and the organization responsible for its first establishment was the Institute of Grocery Distribution (IGD) of UK, with the collaboration of the UK Government, food industry and consumer organizations, based on scientific recommendations [47].

The Figs. 22 and 23 show examples of MC-GDA and CC-GDA. These labels are of the non-directive and semi-directive type.

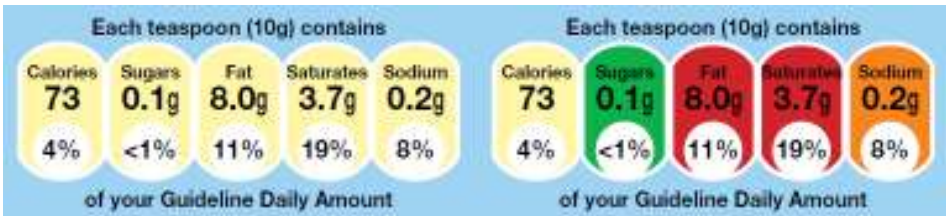

Fig. 22. Example of monochrome GDA label and example of color-coded GDA label [33]

Fig. 23. Example of coloured code GDA label [33]

3.9 Nutrimap

The Nutrimap system has as objective to evaluate the overall nutritional quality of the food or meal based on its potential for rebalancing or unbalancing the diet. This NPS is based on the national and international nutritional recommendations of WHO and the actual trends of consumers [2]. Nutrimap is used in Europe and it is a commercial profiling system developed by the Bio Intelligence Service in 2006 [2]. The Nutrimap has as purpose to be used to research and to help the consumers to make healthier choices [8]. This profiling system is a food category specific system that considers 7 different categories. The food categories are:

- Cereals, legumes, potatoes, derived products;
- Milk, dairy products, cheeses;
- Meat, fish, eggs;
- Vegetal and animal fats, oily seeds;
- Fruits, vegetables and derived products;
- Composed dishes;
- Sugar-rich foods [49].

The risk and benefit criteria taken into account were based on several reports from WHO, Eurodiet task force, and in France from PNNS (National Program for Nutrition and Health). The Nutrimap uses 15 risk and benefit criteria, chosen because of their importance to health. For lipids are considered both the quality (SFA) and the quantity (% of energy from lipids). Carbohydrates are also considered taking into account quality and quantity (% of sugars and % of energy from carbohydrates respectively). Fiber, vitamins (vitamin B9, C, D, E), iron, calcium and magnesium were considered because the intake in France is below the recommendations. Sodium is taken into account because the consumption by the French population is excessive [49].

The measurement method used is scoring. For each criterion a score is allocated between -1 and +1. The score allocated depends on the amount of the ingredient present in 100kcal of the product. For a negative ingredients (an ingredients whose consumption should be limited), the score will be -1 if the amount is more than the current French intake. The score will be +1 if the amount is less than the maximum recommended. For a positive ingredients (an ingredients whose consumption should be promoted) the idea is the opposite. After that, the scores are standardized to a scale of 0-100, corresponding of the theoretical maximum positive or negative score in the food group considered and a graph is constructed [8]. This system uses 2 thresholds for each ingredient: the French intake and the recommended intake. The thresholds are both based on the French adult population but can also be changed to be applied to children or other age groups. The reference unit for this system is 100kcal [49].

3.10 Food Profiler

The Food profiler is a simplified tool that was developed using the scientific basis of another NPS, the Nutrimap. Is has as objective to produce health claims [8]. This NPS was developed by the BIO Intelligence Service in 2006, and it is used in Europe [2]. Food Profiler is a food category system that considers 7 different categories. The food categories are:

- Meat and eggs;
- Fish;
- Oils and oleaginous plants;
- Dairy products;
- Cereals;
- Fruits and vegetables;
- Sugar products and others [2,50].

The risk and benefit criteria taken in to account are based on several reports from WHO, Eurodiet task force, and in France from PNNS. The Food Profiler uses eight risk and benefit criteria, chosen because of their importance to health [50]. This NPS takes into account 4 negative ingredients and 1 positive ingredient for each group of foods. The negative ingredients are equal for all food categories and are: total fat, SFA+TFA, added sugars and added sodium. The positive ingredients depend on the food category:

- Meat and eggs: iron;
- Fish and oils and oleaginous plants: polyunsaturated fatty acids;
- Dairy products: calcium;
- Cereals and fruits and vegetables: dietary fiber;
- Sugar products and others: none [2].

This system is based on a score and threshold. The score system is equal to the one described for the Nutrimap nutrition profiling system (see page 18) [50]. According to it, in order to be eligible to have a health claim, a food must have less than 50% nutritional weaknesses (negative nutrient score <2.5) and it must have more than 50% nutritional qualities (positive nutrient score >2.5). The threshold considers that only foods containing no more than 12.5g of added sugars per portion can be scored by this system. The unit of reference is 100kcal and portion (for added sugars) [2].

4. AFRICA

4.1 The Heart Healthy Mark

The Heart Healthy Mark or the Heart Mark is a visual illustration but also a program that allows consumers to identify healthier and heart safe foods more readily when they do their shopping and also when they eat out. The aim of the program is to identify those food products which are already within the dietary guidelines recommended by the Heart Foundation of Zimbabwe and also to encourage appropriate options related to cardiovascular diseases. This system takes into account the following nutritional factors: SFA, TFA, partially hydrogenated fat, cholesterol, salt, sugar, dietary fiber and calcium. The Heart Healthy Mark also considers the percentage of some ingredients of fruits,

Fig. 24. Heart healthy mark [54]

vegetables and seafood. Therefore, products which carries the Heart Healthy Mark can be regarded as a healthier food choice [51].

Heart Healthy Mark products, as reported by Heart Foundation of Zimbabwe, can be found in each of the following food groups:

- Grain products (bread, cereal, rice, pasta, etc.);
- Processed vegetables and fruits;
- Meat and alternatives (poultry, fish, mutton);
- Legumes, nuts and seeds;
- Vegetarian Products;
- Milk and dairy products;
- Fats, oils and related products.

The Heart foundation established a system that is based on food category nutritional analysis. To measure nutritional quality the threshold measurement method is used.

The Heart Healthy Mark is a health logo that implies that the product that carries it has been tested and therefore meets the Mark's strict nutrition criteria. It promotes cardiovascular health and awareness on blood pressure, cholesterol and diabetes. This symbol is a directive logo that can be seen in Fig. 24 [51].

5. ASIA

5.1 Healthier Choice Symbol

The Health Promotion Board of Singapore (HPB) uses the Healthier Choice Symbol (HCS), which is a front-of-pack label for packaged food products, to promote healthier food choices in the Singaporean population. The HCS symbol is a pyramid which has the meaning of a "Healthy Diet Pyramid" and is a useful guide for planning meals from the food groups: rice and alternatives, vegetables, meat and alternatives and fruit. The tag line "Eat all foods in moderation" gives advice for consumers to eat, in moderation, a variety of foods from each food group. Hence, this label, which is shown in Fig. 25, helps consumers identifying the products that are healthier than similar types of products and this guides consumers in making informed food choices when grocery shopping [52-54].

Fig. 25. Healthier choice symbol [55]

The HCS is an across-the-board system that utilizes a threshold measurement method of calculation and the logo must be complemented by the recommended nutrition panel of Singapore. This panel shows the contents and energy value, expressed as per serving and per 100g of food, of the following ingredients: carbohydrate, fat, SFA, TFA, protein, cholesterol, sodium and dietary fiber [54].

The HPB introduced enhanced versions of the Healthier Choice Symbol, in order to make nutrition labeling more consumer-friendly, each of which focuses on a particular nutritional aspect of the product, as shown in Fig. 26. Besides the original logo there are a total of six nutrient specific claims: Higher in Calcium, Higher in Whole-grains, Lower in Sugar, Lower in Sodium, Lower in Saturated Fats, and Trans Fat Free. Each product carries one of the six

logos and some products may carry two claims, appropriate to the product should it satisfy the nutritional guidelines [52]. This system has a directive or semi-directive label.

Fig. 26. Nutrient specific claims of the healthier choice symbol [55]

5.2 Healthier Snack Symbol

After introducing the Healthier Choice Symbol the Singapore Health Promotion Board introduced the Healthier Snack Symbol in 2007 with the objective of helping consumers to make more informed choices about snacks [55]. At the moment this system is only being used in Singapore. It is a government initiative and companies can apply at the Singapore Health Promotion Board to get this FOP logo on their snacks. This logo can only be used in combination with a nutrient information panel that displays the ingredients per serving size that reflects the weight of an individual wrapped packet [56].

It is a food category specific NPS that applies to plain biscuits, cookies, crisps, ice-cream and plain cakes [55]. Crisps that are eligible to bear this logo should be lower in energy, fat, TFA and sodium. Ice-cream should be lower in energy, fat, TFA and total sugar. Biscuits and cookies should be lower in energy, fat, SFA, TFA, sodium and total sugar and higher in whole grains. Cakes should be lower in fat, TFA, sodium, total sugar and higher in dietary fiber and whole grains. A threshold level is used for all these nutritional components [57].

Fig. 27. Healthier snack symbol [59]

The threshold levels were developed by the Singapore Health Promotion Board, but it is not clear what they are exactly based on. The reference unit is kcal/serving for energy, grams or milligrams/100g for other ingredients and percentage of total weight for the whole grains. The logo that is used for the Healthier Snack Symbol is shown in Fig. 27 and it is a directive label type.

5.3 Healthier Ingredient Symbol

The Healthier Ingredient Symbol has recently been introduced in Singapore by the Singapore Health Promotion Board. It is a logo that can only be used for ingredients for food service establishments. This symbol is also related to the Healthier Hawkers Program that encourages hawkers (stalls selling meals) to use healthier ingredients in their meals [58, 59]. This logo is a government initiative to help consumers make more informed choices and companies can apply at the Singapore Health Promotion Board to obtain the right to use this logo on their products [56].

Fig. 28. Healthier ingedient symbol [59]

The Healthier Ingredient Symbol can be used for the following food categories: oil, table salt, oriental noodles, brown rice, bee hoon, soups and broth. The Guidelines for healthier ingredients referred to these categories are set for the following ingredients: SFA,TFA, monounsaturated fatty acids (MUFA), polyunsaturated fatty acids (PUFA), potassium, sodium, total fat and whole grains [56].

A threshold level is used for the ingredients that are relevant for every food category. The threshold levels are defined by the Singapore Health Promotion Board, but it is not clear on the basis of what these threshold levels are set. The reference unit is per 100g/ml and per serving. The logo that is used for the Healthier Ingredient Symbol is shown in Fig. 28 and it is a directive label type.

5.4 FOP Calorie Content

In 2012 a voluntary FOP calorie content logo was introduced in Malaysia to help consumers making more informed choices [60]. This was a joint initiative of the Federation of Malaysian Manufacturers and the Malaysian Food Manufacturing Group and it is supported by Malaysia's Ministry of Health [61,62]. It is not food category specific, but used for all foods of these manufacturers. It is supported by big manufacturers active in Malaysia such as Coca-Cola, Nestlé and Unilever [61].

The only nutritional criterion that is taken into account is the energy content. This profile system uses a threshold system in which the percentage is given that a serving of the food provides of the daily recommended intake. For this a reference level of 2000kcal is used [61]. The way this is displayed on the package can be seen in Fig. 29 and it is a non-directive label type. The calorie content of the serving is given, the percentage of the recommended daily intake and the reference amount.

Fig. 29. Malaysian FOP calorie content [63]

5.5 FOP GDA Labels for Snacks

FOP GDA labels have been adopted in 2011, by the FDA in Thailand with the purpose of helping consumers to make healthier food choices. It is a ingredient-specific food label targeted at special groups such as children and elderly. It is mandatory for five types of snacks: potato crisps, popcorn, biscuits, crackers and cream-filled wafers. The ingredients included in this system are energy, carbohydrates, fat, SFA, cholesterol, dietary fiber, sugar, calcium, iron, vitamin A and vitamin C. This NPS uses a threshold approach and influences consumers by showing the percentage of recommended daily amounts (RDA) per serving (% Daily Value (DV), plus the absolute amount per serving. The threshold values are based on the Thai NRVs. In the future, it is likely that the Thai GDA label will be applied to all snacks, chilled and frozen ready-to-eat products [63]. The FOP GDA Label for Snacks has a non-directive label type.

5.6 25% Reduced Label

In 2009 a voluntary label was introduced in Thailand for snacks, baked foods and sweets which had a 25% reduced content of fat, sodium or sugar. This label, which uses a threshold system, can be carried by products that have been certified by the Health Department [63]. It is thus an across-the-board system for which only fat, sodium and sugar are included as ingredients. Due to the fact that only fat, sodium and sugar reduction are labeled, as a percentage of the total, this system is regarded as semi -directive. Further information on this system could not be found.

5.7 Healthier-you Logo

In 2010 the Philippines' Department of Health introduced the Good-for-You logo that can be given to products that have a healthier nutrient composition [64]. Soon after, this profiling scheme had to be renamed to Healthier You due to trademark issues [63]. The Healthier You certification is a collaboration between the WHO, Philippines' Department of Health and the Nutritionist-Dietitians' Association of the Philippines (NDAP) [65]. The logo can both be carried on food products in supermarkets as well as on menu cards for certified dishes [64].

Fig. 29. Healthier you logo [70]

It is a governmental initiative which has as aim to help consumers make healthier food choices. Companies can apply for certification at the NDAP to carry the logo on their products. The profiling system is an across-the-board system. The ingredients included in this system are energy, fat, carbohydrates and protein [66]. This system uses a threshold measurement method and the reference unit used is the per serving or the % of DV [67]. The logo that is being used for the Healthier You certification is shown in Fig. 29 [68]. This logo is of the directive type.

6. OCEANIA

6.1 Health Star Rating

This year, 2013, the Australian Government agreed with the introduction of a new voluntary system for labeling packaged foods with a ‘health star rating’, that is showed in Fig. 30 [69]. The typology of the label of this NPS is semi-directive.

Fig. 30. Health start rating system [71]

This new system, developed by Food Standards Agency Australia New Zealand, provides a simple and easy way to communicate the amount of total fat, sodium, total sugar and energy of the packaged food item. It is an across-the-board system with a threshold and scoring system and is based on the nutrient profiling scoring system developed by FSANZ for health claims [69-71]. This NPS will classify the foods with a star rating ranging between 0.5 and 5 stars [69,70].

Besides the stars, the FOP also includes information about the amount of energy, SFA, total sugar, sodium as well as positive ingredients such as calcium or fiber [70]. The word “high” will be assigned to products containing high amounts of a certain positive ingredients, whereas the word “low” is associated to negative ingredients [72]. The reference unit is 100g/100ml [73].

This new system is intended to assist consumers in understanding the nutritional value of packaged foods and it is applied to most packaged foods, with the exception of soft drinks and confectionary, which will present only the energy [69,70].

For now the system is applied voluntarily by the industry, but the government indicated that the system will be evaluated for two years to investigate whether it should be mandatory [69]. Although it is already accepted by the Australian Government, this NPS appears on the packages in the middle of 2014 [70].

6.2 eMark

The “eMark” is a symbol developed by the New Zealand Nutrition Foundation in partnership with the New Zealand Crop and Food Research’s Lifestyle Foods for Energy Balance program. This system is a food classification and labeling system that classifies foods as a whole, providing information about the amount of energy, energy density, (indicated by the number in the symbol), the rate at which the energy provided will be available to be used by the human body (color of the symbol) and how much of this food should be eaten[63, 74]. The Ministry of Health Food and Nutrition Guidelines and Nutrient Reference Values for Australia and New Zealand are the basis for the development of the system.

The eMark is constituted by:

- A number: between 1 and 5, which indicates the quantity of energy in kJ, that the food contains, (1: very low energy density; 5: very high energy density).
- A color: the blue, green and yellow colour indicate the time that a food or drink needs to be converted into glucose and hence be released in the bloodstream. A blue colour is assigned to foods that release their energy slowly. The green is present in foods where the release of energy is moderate. The yellow colour is assigned to foods which release their energy quickly.

Except for elite athletes, who have higher energy needs, the recommended foods to be eaten contain the eMark with the numbers 1, 2 or 3 and colors blue or green [74].

Fig. 31. eMark label [77]

The eMark system groups foods according to the similarity of ingredients. The main groups are: vegetables, fruit, breads and cereals, milk, yogurt, cheese and meat and alternatives. This system uses servings that are standardized for each food group, based on the energy per serving. As mentioned before, the numbers of eMarks provide information about the energy of the food, increasing the energy as the increasing of the numbers. At the same time that the numbers increase the serving size will decrease [74].

The eMark is a directive, food category specific NPS that is based on a scoring system that uses a reference unit per serving. In the Fig. 31 is shown an example of this system [75],

which has a label of the semi-directive type. The purpose of this system is to help the consumers to make healthier food choices.

6.4 Heart Foundation Tick (Australia, New Zealand)

The Heart Foundation Tick is an initiative of the Heart Foundation of New Zealand and Australia [76]. This logo was introduced in 1991 as part of the *Pick the Tick* program [77]. It is thus a NGO initiative and it has food category specific criteria with at the moment more than 55 food categories defined [78]. Companies can apply at the national Heart Foundation to get approval for a Tick logo on their products.

Fig. 32. Heart foundation tick [80]

Depending on the food category several of the following ingredients are taken into account when judging whether products are eligible to carry the Tick logo: saturated fat, trans fat, energy, salt, fiber and calcium [79]. For these ingredients a threshold level is used that differs per food category. These threshold levels are continuously evaluated and updated to challenge producers to produce healthier products [76]. The reference levels are mostly based on regulatory definitions [80], but can be different if needed. According to the Australian Heart Foundation "the main underlying principles are that criteria have to: reflect the nutritional objectives for the category, be challenging and be achievable" [79].

The reference unit that is used is per serving [80]. The logo of the Heart Foundation Tick program is shown in Fig. 32. The main purpose of this system is to help consumers make healthier choices and to encourage product reformulation [79]. This system, according to the typology of the label, is directive.

6.5 Daily Intake Guide (DIG) – Australia & New Zealand

The voluntary Daily Intake Guide (DIG) system was adopted by the Food Standards Agency of Australia and New Zealand (FSANZ). The label appears since 2006 on the front of food packages in Australia and New Zealand in addition to the Nutrition Information Panel on the back of packages. The purpose of the label is to stimulate consumers to make easy and smart choices with regard to their diet [81].

The label is an across-the-board system and uses a threshold approach, that is in line with the Food Standards Code (FSC) and the daily intakes presented on the label are based on those for an average adult diet of 8700 kJ (approximately 2000kcal). The ingredients that are presented by the label can be both 'positive' or 'negative' and may include energy, total fat, SFA, total sugar, sodium, protein, carbohydrate and vitamins and minerals per serving and % of DV. The label can be presented using six different types of configurations:

- Energy + 4 core ingredients: energy, total fat, SFA, total sugar and sodium.
- Energy + 6 core ingredients: companies may choose to present two thumbnails in addition to those four ingredients, i.e. carbohydrates and protein.
- Energy alone: the labeling space is restricted to the extent that it is impractical to present either the four or six thumbnails, or the amount of core ingredients in the

food or drink is so low, that it makes little sense to present all of them on the front of the package.

- Energy alone + other ingredients: this configuration is only used when the space on the package is restricted. The ingredients that appears next to the energy thumbnail should not be one of the six core ingredients (total fat, saturated fat, sugar, protein, carbohydrates and sodium)[81, 82].

The DIG label is show in the Fig. 33. This label is of the non-directive type.

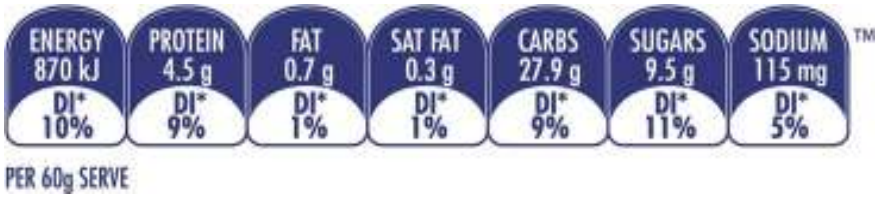

Fig. 33. DIG label with energy + 6 core nutrients [84]

6.6 The Health Eating System

The Health Eating System is a traffic light labeling system that was launched in 2011 by Sanitarium Health & Wellbeing and has launched in 2011 its own traffic light labeling systems that is used in Australia and New Zealand. The Health Eating System goes beyond basic traffic light labels and includes highlights of positive or negative ingredients and frequency of consumption. This NPS is based on the nutrient profiling criteria developed by the Food Standards Agency Australia New Zealand (FSANZ) to define whether foods can carry health claims or not. It is consistent with the current Australia/New Zealand public health policy initiatives [83].

The aim of this system is to provide to the consumers a simple and understandable overview about food value and provide guidance about the frequency of ingestion [83].

Fig. 34. Health eating system [85]

It is a food category specific system that uses a scoring system that takes into account the ingredients: fiber, total fat, SFA, protein, added sugars and sodium [83].

This system also includes the amount of whole foods, such as fruits and nuts, as defined by FSANZ. The reference unit is 100g/ 100 ml [83]. The foods are scored according to the classification by the amount of the specific ingredients and relation to diseases. This results in 3 dietary categories consistent with the Australian Dietary Guidelines: 'Eat Often', 'Eat Occasionally', or 'Eat Sparingly' [83].

The Fig. 34 shows the three types of Healthy Eating Systems according the classification of dietary categories. This is a label of semi-directive type.

7. INTERNATIONAL

7.1 Ratio of Recommended to Restricted Food Components (RRR)

The ratio of recommended to restricted (RRR) food score was developed in 2004 by the State University of New York and it is based on energy and the ingredients listed on the food label. The RRR is a voluntary, across-the-board, scoring based system with the purpose of helping consumers to make healthier choices but also with a research objective associated to it.

The RRR food score calculates a ratio of the qualifying and disqualifying ingredients to the energy content of the food. This system classifies fiber, vitamin A and C, calcium, iron and protein as desirable and cholesterol, sugar, energy, saturated fat and sodium are defined as undesirable [84]. With this ratio, the aim was for consumers to have a more comprehensive index to use for the comparison of the whole nutritional quality of food items [85].

The scoring system of this model classifies foods to a higher nutrient value when their scores are higher than 1. 2 groups, the recommended and the restricted ingredients, are defined to divide the 11 food components. Based on a 2000 calorie diet, for each ingredients the % of the Daily Value delivered by a food is calculated. Afterwards, the mean of the % DVs is calculated. By dividing the mean % DV for the recommended ingredients by the mean % DV for the restricted ingredients the ratio is calculated [84]. The reference unit used is per serving. The formula for the calculation of the RRR is indicated below [85]:

$$RRR=\frac{(\%DV\ protein + \%DV\ dietary\ fiber + \%DV\ calcium + \%DV\ iron + \%DV\ vitamin\ A + \%DV\ vitamin\ C)/6}{(\%DV\ calories + \%DV\ sugars + \%DV\ cholesterol + \%DV\ saturated\ fat + \%DV\ sodium)/5}$$

7.2 Whole Foods ANDI Rating System

The ANDI rating system was launched by Whole Foods Market in the USA and the UK with the purpose of helping consumers to make more informed choices on food products and select the products with more ingredients per calorie. Whole Foods Market is the world's leading natural and organic grocer. ANDI stands for "Aggregate Nutrient Density Index''. It scores the nutrient density of a food on a scale from 1 to 1000 based on nutrient content [86].

Fig. 35. ANDI rating system label [89]

ANDI scores are calculated by evaluating an extensive range of micronutrients, including vitamins, minerals, phytochemicals and antioxidant capacities. The ANDI scores are based on calories, not volume or weight of food. Therefore, lower-calorie foods score higher than calorie-dense foods with similar favorable nutrient content [86].

The ANDI rating system is a voluntary, across-the-board system with a scoring measurement method and it uses a directive label type. An example of this label is shown in Fig. 35 [87].

7.3 Whole Grain Council Whole Grain Stamp

The Whole Grain Stamps have an eye-catching design that makes it easy to spot on food packages. There are two variations of the Stamp: the Basic Stamp and the 100% Stamp. These stamps can be found internationally, since they are used by several companies based in 19 countries [88].

In order for a product to achieve the 100% Stamp all its grain ingredients need to be whole grains. In order for a product to use the 100% Stamp it must contain at least 16g of whole grain per serving. The Basic Stamp can be carried by products that have at least 8g of whole grain, but they might also contain some refined grain. Even when a product has bigger amounts of whole grain or if it contains additionally extra germ, bran or refined flour it will carry the Basic Stamp. Moreover each stamp also gives information about how many grams of whole grain ingredients are in a serving of the product, as it is shown in Fig. 36 [88].

The Whole Grain Stamp aims to help consumers to meet the recommended three servings of whole grains or more per day, through advising people to eat three whole grain food products labeled "100% Whole Grain" or to eat six products that carry any Whole Grain Stamp [88].

Fig. 36. Whole grain stamp USA [90]

In Canada, in 2008, a bilingual Whole Grain Stamp was launched to provide Canadian consumers with an easy way to identify products that have significant amounts of whole grain. Each Stamp shows in grams, for each serving, the amount of whole grains, as can be seen in Fig. 37. Products made only with whole grain can have a banner saying "100%" to the basic Stamp. To carry the Whole Grain Stamp, Canadian products must have at least 8g of whole grain per serving. The use of the Basic Stamp has the same requirements for the USA and Canada [89].

Fig. 37. Whole grain stamp Canada [91]

The 100% Stamp in Canada, can only be used on products where 100% of the ingredients (by contrast, in the USA the requirement is for 100% of the grain content of the product to be whole grain) are whole grain [89]. This system uses an across-the-board methodological approach, a threshold measurement method and the reference unit is per serving. This system has a semi-directive label type.

7.4 Nutrition Highlights

The Nutrition Highlights system was developed in 2007 by the American food manufacturer General Mills, with the aim of helping consumers to make more informed food choices. The system was adopted to replace the Goodness Corner system that was initiated by the company in 2004. Nutritional Highlights focuses on specific ingredient categories, uses an across-the-board approach and a threshold measurement method based on the US FDA % Daily Reference Values (DRV) [90].

This system uses a threshold measurement method and the reference unit is per serving. The system displays six icons, as displayed in Fig. 38. The Fig. 38, shows the % Daily Value (DV) and the absolute amount per serving is presented for four 'negative' ingredients: calories, saturated fat, sodium and sugars (no % DV) and two 'positive' ingredients: fiber and calcium [90,91]. This system uses a non-directive label type.

Fig. 38. Nutrition highlights system [92]

7.5 Nestlé NPS (NNPS)

The NNPS is a food category system that uses specific risk and benefit criteria for categories of foods and beverages. The level defined for each risk and benefit criteria also depends on the target population (for example the values are different for children and adults). The risk and benefit criteria taken into account by this nutrient profile are:

- Energy (calories);
- Sodium;
- Added sugars;
- Fructose;
- TFA;
- SFA.

The values for these risk and benefit criteria are based the dietary intake recommendations of important authorities such as WHO (2003) and US Institute of Medicine (2006). For some countries the values may take into account local recommendations for labeling may prevail [92].

The NNPS also defines specific criteria for some ingredients that are of high importance for specific types of food or beverage products. For example, for calcium a criteria is defined for products that are rich in this ingredient as well as a minimum level of dietary fiber or whole grain is defined for cereal based products. In these cases the levels are based in official dietary guidelines which specify minimum levels of consumption that are recommended [92,93].

This system uses a threshold measurement method, using maximum and minimum thresholds that are associated with ingredients that may be consumed excessively or insufficiently, respectively. The establishment of these values takes into account the target consumer population, the main way of use, and how the product is reconstituted more frequently (e.g. with milk or water). The reference unit is per serving [92]. For the following categories of products are used different approaches:

- Products with high regulation, such as infant formulas;
- Products which the target population have special needs, such as the ones for healthcare nutrition, baby foods and performance nutrition categories [92].

7.6 Nutrition Information Initiative (NII)

McDonald's officially launched the Nutrition Information Initiative (NII) based on Guideline Daily Amounts (GDAs) in Torino, Italy, home of the 2006 Olympic Winter Games. Throughout

2006, McDonald's continued the worldwide introduction of updated product packaging, which displays nutrition information using a new and easy to understand icon and bar chart format which aims to help consumers to make more informed choices on food products [8,94].

McDonald's uses the Guideline Daily Amounts (GDAs). GDAs can be used as a guideline to help consumers to see how a particular food contributes to their daily diet. Both nutritional values and GDA information can be found on product packaging, as it can be seen in Fig. 39. There are several risk and benefit criteria taken into account: energy, protein, total fat, SFA, carbohydrates, sugars, fiber and salt [8,94].

The nutrition information is calculated for women between 20 and 30 years old with reduced levels of physical activity. Some of the McDonald's products also provide data for children, which are based on girls between 4 and 7 years old with moderate levels of physical activity. McDonald's GDA Nutrition Chart is an across-the-board system that uses a threshold measurement method [8,94]. This system uses a non-directive label type.

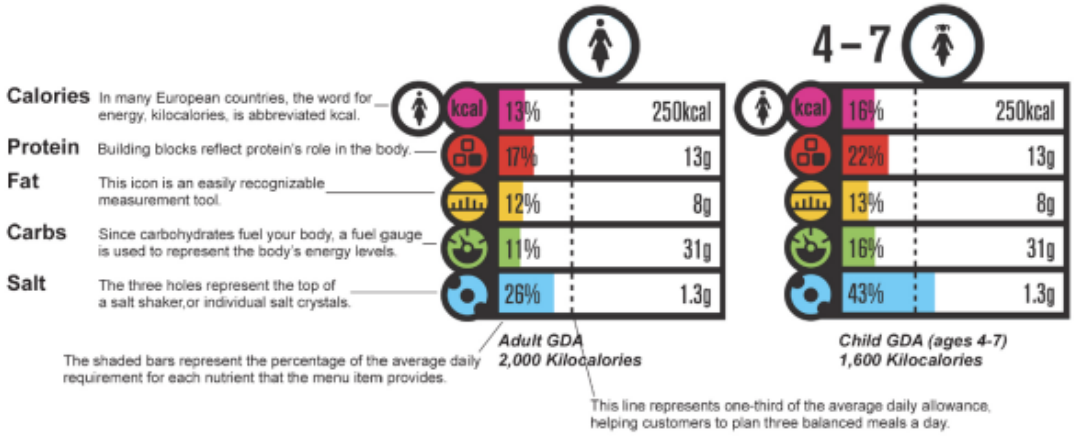

Fig. 39. McDonald's GDA nutrition chart [96]

7.7 Kellogg's Global Nutrient Criteria

This across-the-board NPS developed by Kellogg's aims to help consumers to make more informed choices about food products. Kellogg's uses a "Get the Facts" label, shown in Fig. 40, in the back of the pack in combination with a GDA panel on the front of the pack [95].

Fig. 40. Get the facts label [97]

"Get the Facts" is an easy-to-read labeling system that identifies the percentages of calories based on an average 2000 calorie diet for: total fat, sodium and total sugars per serving. The Kellogg Global Nutrient Criteria are based on the scientific reports of the Institute of Medicine [95].

While the Nutrition Facts panel is a way to help the consumers to determine the overall nutritional values of certain foods, the GDAs, shown in Fig. 41, provide a quick and simple way for the consumers to have information of the most important ingredients found in each Kellogg's cereal boxes [95].

Calories, saturated fat, sodium and sugar are the ingredients that appear on every cereal package. Besides this, each product gives information about up to two additional ingredients of which intakes are too low in the Americans diet: fiber, calcium, magnesium, potassium and vitamins A, C or E [95].

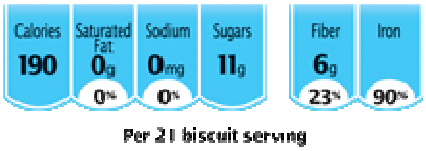

Fig. 41. Kellogg's GDA panel [97]

Kellogg's uses per serving as a reference unit and a threshold measurement method. This system has a non-directive label type.

7.8 The Nutrition Score – Nutrition Enhancement Program (NEP)

This NPS is a commercial system developed by Unilever that aims to evaluate and improve the nutritional composition of Unilever's products [2, 96], having labeling purposes as final goal [97]. This system led to the development of the "My choices" system [8].

Because Unilever is an international company this NPS is used internationally. This system analyses food categories and takes into account ingredients that are related to adverse health effects (negative ingredients) [2]. The included food categories are: cheese, soups, meal sauces, dressings, spreads, meal replacements and edible ice [8]. The considered ingredients are: TFA, SFA, sodium and sugars. The selection was based on the recommendations of the WHO from 2003 [2,96-98].

NEP is a threshold system [2]. This system has three classes that have been defined for its 4 criteria: the border between the first two classes is based upon the WHO nutritional recommendations [98] and the division between the other two classes is based on a synthesis of national recommendations within European countries. According to this, each food product is classified in one of three classes based on each of these four ingredients. The NEP is based upon a transversal analysis of foods which means that the selected thresholds are the same independently of the individual foods. However, having in mind the specific characteristics of some foods, Unilever created specific categories and thresholds for such foods [2].

Food category declination is across-the-board [97]. The reference units of analysis are 100g and 100kcal [2].

7.9 Choices Programme

The Choices Program, which was developed by the Choices International Foundation, is an international, front-of-pack food information initiative [99].

This system was introduced in The Netherlands in 2006 in response to the World Health Organization's request for the food industry to make part of the combat to obesity and other diseases related to diet in an active way worldwide [100,101]. The Fig. 42 shows the symbol of the Choices Program which uses a directive label type.

The Choices Program merges food industry, retail and catering to promote healthy products innovation and reformulation. This system also has as purpose to help consumers in making healthier food choices. Companies can join the project by applying their existent or reformulated products to the criteria of the system. The criteria used have as base

international dietary guidelines from WHO and are revised periodically by an independent International Scientific Committee. To obtain the Choices logo the products should fulfill stipulated values for the following risk and benefit criteria: energy, SFA, TFA, total sugar, salt and dietary fiber. This NPS helps consumers to identify easily the healthy product options [99-101].

The following products are excluded from the evaluation by this system: alcoholic beverages, supplements, products for use under medical supervision and foods for children under the age of 1 year [100,101].

The Choices programme is a food category and threshold system, which uses specific criteria for different food categories.

In some product categories the generic criteria for saturated fats, trans fats, sodium and added sugars cannot be applied due to technological and sensory/taste reasons. For these categories, specific values were then developed. The reference units are 100g and % of DV (2000kcal) [99, 101, 102].

Fig. 42. Healthy choices logo [103]

In the Choices programme, a distinction is made between main foods and supplemental foods. Main Foods are defined as the ones that are the basis of a healthy diet and contribute to the daily intake of essential or beneficial ingredients. In comparison, the supplemental foods normally provide less essential ingredients then the main foods. For the last ones the criteria are less stricter [101].

In the last update the Choices logo was found on approximately 7000 food and beverage products of more than 120 companies. The Choices programme is implemented in 20 countries, all over the world. These numbers continue to grow, turning the Choices Programme a really global initiative. According to the local language, the logo has different names, but all are expressions of a healthy easy choice such as “Eat Smart”, “Bewusst Wählen”, “Choix et Nutrition”, “Ik Kies Bewust”, “Vim co Jim” [101].

7.10 International Fruit and Vegetable Alliance (IFAVA)

The International Fruit and Vegetable Alliance has as main goal to increase the consumption of fruits and vegetables at a global level [103].
A variety of programs promote the consumption of fruit and vegetables all over the world. The programs vary nationally and regionally according to the organization (public, private, NGO, Public/NGO or private partnerships) that develops and delivers the program or intervention in each country. Although the organizations that provide the program may differ by country, the same strategies are applied in each country to modify behavior and hence increase the consumption of fruits and vegetables. Some of the successful programmes implemented based on the IFAVA membership are:

- Canada: Fruits and Veggies - Mix it up!
- Denmark: 6 a day, Denmark
- France: APRIFEL
- New Zealand: The 5+ A Day Charitable Trust
- United States: 5 a Day for Better Health
- United States: Fruits & Veggies More Matters

- United States: United Fresh Produce Association
- Argentina: 5 AL DIA
- Australia: Go for 2&5®
- South Africa: Five a Day for Better Health Trust
- Spain: Asociación "5 al día" [103].

8. NPSs DIRECTED TO CHILDREN

Although there aren't regulations about the advertisement of foods for children worldwide, there are voluntary agreements between food industries in Europe, USA and Canada [104].

In the USA, in November 2006, the Council of Better Business Bureaus (BBB) and ten leading Food and Beverage companies initiated the voluntary Children's Food and Beverage Advertising Initiative (CFBAI). The initiative aims to promote healthy dietary choices and healthy lifestyles. At the moment, in total 17 companies participate in the CFBAI, covering 80% of child-directed TV food advertising. The CFBAI has developed category-specific uniform nutrition criteria that will go into effect on December 31, 2013. The participating companies should take these criteria into account when advertising their products to children under 12 years old. The CFBAI distinguishes 10 product categories, for which different risk and benefit criteria have been developed:

- Juices;
- Dairy products;
- Grain, fruit and vegetable products, and items not in other categories;
- Soups and meal sauces;
- Seeds, nuts, nut butters and spreads;
- Meat, fish and poultry products;
- Mixed dishes;
- Main dishes and entrees;
- Small meals;
- Meals (entrée and other items including a beverage) [105].

The criteria developed by CFBAI do not apply to:

- Sugar-free mints and gum;
- Fruit products without added sugars;
- Vegetable products without added fats and which meet FDA regulations for "very low sodium;"
- Beverages, including bottled waters, that meet FDA regulations for "low calorie" and "very low sodium" (diet sodas are excluded from this exemption) [104].

In Canada the initiative have the name of 'The Canadian Children's Food and Beverage Advertising Initiative' (Children's Advertising Initiative) and is a voluntary initiative that includes the Canada's leading food and beverage companies. This initiate started in April 2007, when the companies announced their commitment to promote and support healthy dietary choices and lifestyles to children with less than 12 years old [104].

The basis of this initiative lies on the commitment of the adherent companies to change their advertisements and marketing for children with products that follow the nutritional recommendations. The advertisements are then made with foods and beverages that have

low content in calories, fat, salt and added sugars and which are rich in ingredients important for the public health. This Initiative is regulated by the Advertising Standards Canada, to ensure its transparency [105].

The EU has developed a voluntary initiative lead by food and beverage companies, which was established in 2007, to influence food and beverage advertising to children under the age of 12, using TV, print and Internet in the EU. This initiative is designated EU Pledge. These member companies have to respect certain criteria formulated by the EU Pledge initiative: they should not advertise products to children under 12 years old, unless products fulfill specific risk and benefit criteria based on accepted scientific evidence and/or applicable national and international dietary guidelines. In addition, there should not be any communication related to products in primary schools, only when the school administration has specifically requested or agreed on this, e.g. for educational purposes. For the EU Pledge members who choose to advertise their products also to children under 12, common criteria have been developed. These criteria exclusively have the purpose to define better-for-you options in the context of food and beverage product advertising to children under 12 years of age. With regard to ingredients, the EU Pledge Working Group agreed on a reference unit of 'per 100 g/ml' and decided to use a category-based and a threshold-based approach, guided by recommendations of European Food Safety Agency (EFSA). Further, nine different food categories are distinguished by the EU Pledge Working Group:

- Vegetable oils, butter and spreadable fats & emulsion-based sauces (e.g. mayonnaise);
- Fruits, vegetables15 and seeds16 and their products except oil;
- Meat based products;
- Fishery products;
- Dairy products;
- Cereal based products;
- Soups, composite dishes, main courses and filled sandwiches;
- Meals;
- Edible ices [106].

Also, all EU Pledge member companies have committed not to advertise sugar and sugar-based products (including chocolate, jam, sugar, honey, syrup or other sugar products) and soft drinks to children under 12 years [106].
The EU Pledge Working Group recommends emphasizing on both qualifying and disqualifying ingredients. According to the EU Pledge Working Group, the main ingredients to limit are:

- Sodium;
- Saturated fat;
- Total sugars.

The main ingredients to encourage were chosen based on food category, i.e. they focus on the positive ingredients or components that naturally occur and are most relevant in each food category. The values for each ingredient in each food category are based on international dietary guidelines referring to nutrient intake (e.g. WHO) and the contribution of different foods to children's overall diet. Energy values are calculated as a percentage of reference intake values. Since there are no officially approved or EU-endorsed daily

reference values for children available in Europe currently, the EU Pledge based their values on existing reference intake in the USA and some European countries [106].

8.1 FSA Scoring System for Children

The FSA scoring system was developed by the UK FSA and is used in the UK [8]. The FSA score is a quantitative estimate of how unhealthy a food is. It is an across-the-board and scoring system. Seven nutritional parameters determine the food's score. This is a “simple scoring” system, where points are awarded for the content of eight ingredients /food groups in 100g of the food. The ingredients and food groups taken into account are consistent with the priorities of public health in the UK. The UK government encourages the ingestion of protein, fiber, fruit, vegetables and nuts. At the same time it is recommended to restrict the consumption of foods hyper caloric, rich in sugars, salt and SFA. A maximum of ten points can be awarded for each nutrient/food group rated positively and a maximum of five points can be awarded for each nutrient/food group rated negatively. By this score the foods are rated positively for energy density, saturated fat, sodium and sugar and negatively for protein, fiber and fruit, vegetables and nuts. After the classification for the positive or negative nutrition criteria, the points will be subtracted. Foods scoring 4 or more points and drinks scoring 1 or more points are considered unhealthy [2,107,108].

The main purpose of this system is to provide a scientific basis for the creation of rules about television advertising targeted to children and adolescents. Although this system can also be applied to all persons over the age of years [2].

8.2 ‘Fuelled 4 life’

‘Fuelled 4 life’ is the commercial name of the Food and Beverage Classification system (FBCS), and it is a voluntary, collaborative initiative involving the education, health and food industry that work together, that is managed by the Heart Foundation of New Zealand. Fuelled 4 life offers a free practical tool to make it easier to provide healthier foods in schools and Early Childhood Education (ECE) services; it was specifically designed for foods and beverages that children commonly consume in an educational setting [109].

Fig. 43. Fuelled 4 life label [112]

As the food and beverages of the food companies involved in the initiative are classified according to their, they can be evaluated on their healthiness by consumers, using the ‘Fuelled 4 life’ label. The label, which is shown in Fig. 43 uses a directive approach, informing the consumer about the healthiness of certain foods or beverages: products that are labeled with ‘everyday’ should be promoted and encouraged and foods labeled with ‘sometimes’ should not dominate the choices available. In addition, there are also some foods that have to be limited, those should be eaten ‘occasional’. ‘Fuelled 4 life’ has a food categorical

approach, distinguishing several product categories, to which different ingredient criteria apply:

- Beverages;
- Vegetables and fruit;
- Breads and cereals;
- Milk and milk products;
- Meat, fish, seafood, poultry and meat alternatives;
- Mixed meal dishes;
- Snack items;
- Fat and oil products.

The criteria are based on the Ministry of Health's Food and Nutrition Guidelines, which identify healthy eating for children and young people, using a threshold system. The Fuelled 4 life system has formulated different risk and benefit criteria for school children and ECE children (1-5 years old) and focuses mainly on the following ingredients: energy (measured in kJ), total fat, saturated fat, total sugar and sodium. In addition, for some product groups, there is also a focus on fiber. In some cases, it is also defined what the minimum or maximum package size of a food product should be in order to bear one of the labels [109,110].

There are some products that fall automatically in the 'occasional' category, since these foods or beverages are too high in energy and/or saturated fat and/or added sugar and/or sodium and those provide minimal nutritional value. In addition, there are some foods and beverages that are not recommended for sale or provision in schools or ECE's. Those are labelled with 'not recommended for children' or as 'dietary supplement'. The reference unit for this system is per 100g or ml and per serving [109,110].

8.3 Mickey Check

In 2006, Walt Disney Company established nutrition guidelines regarding children's diet, trying to provide more nutritionally balanced foods. In September 2010, Disney launched Disney Magic of Healthy Living, a national multi-media initiative to make healthy living fun for kids and families. Additionally, it implemented the new guidelines for infants and toddlers, which among the other requirements based on the needs of these ages, includes also the regulation for no artificial colors, preservatives and additives. By 2015, all advertising, promotions, and sponsorships on Disney Channel, Disney XD, Disney Junior, Radio Disney, and relevant Disney-owned online experiences will meet the Company's updated nutrition guidelines [111-113].

Fig. 44. Mickey check label [116]

The Mickey Check is a new tool that communicates more readily nutritious choices. The Mickey Check label, which is shown in Fig. 44, can be found on Disney-licensed food products, on Disney recipes and at Walt Disney World® and Disneyland® Resorts [111].

The Disney Nutrition Guideline Criteria were developed based on the federal Dietary Guidelines for Americans and assess a food according to its contribution to a child's nutritious diet (i.e. fruits, vegetables, whole grains, low fat dairy, or lean protein), the energy

intake and the limitation of “ingredients to avoid” (i.e. sodium, sugar, saturated fat, trans fat). Moreover, Disney intends to further reduce sugar and sodium in all licensed foods [111].

The nutrition guideline criteria are based on different food categories (as defined by Disney) per portion (portion varies among food categories) under a defined threshold for each ingredient [112].

The characteristics that are taken into account and meet the guidelines are: calories (cal), SAFA (g), sugar (g), sodium (mg), added TFA (g). Overall, Mickey Check is a visual representation of a new NPS for children, with a semi-directive label. It is uses thresholds as measurement method. The purpose is not only to provide nutrient-balanced choices to children and their parents but also to improve its marketing. Disney intends to continue reformulating some of its recipes [113]. This system uses a semi-directive type of label.

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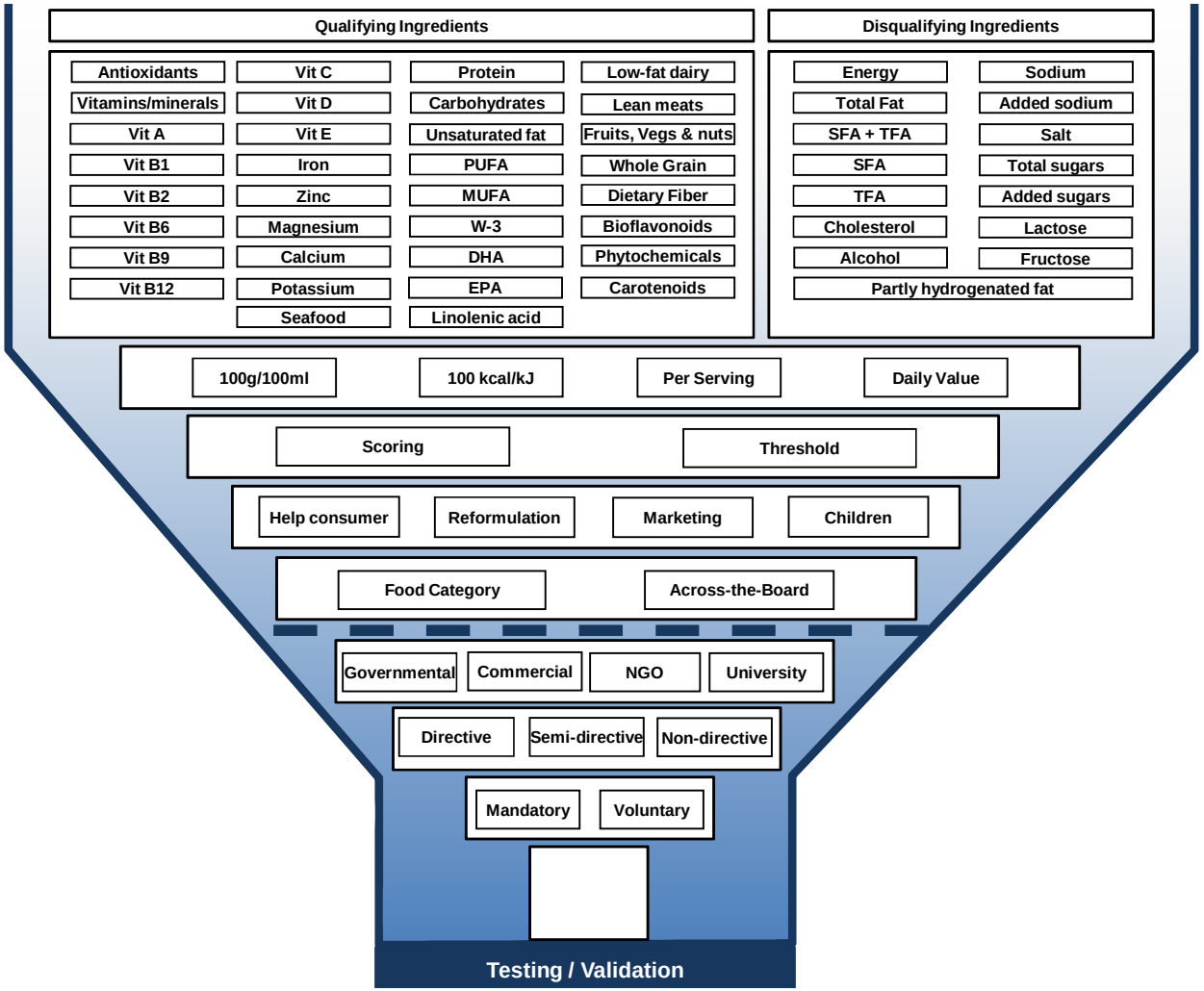
APPENDIX – 2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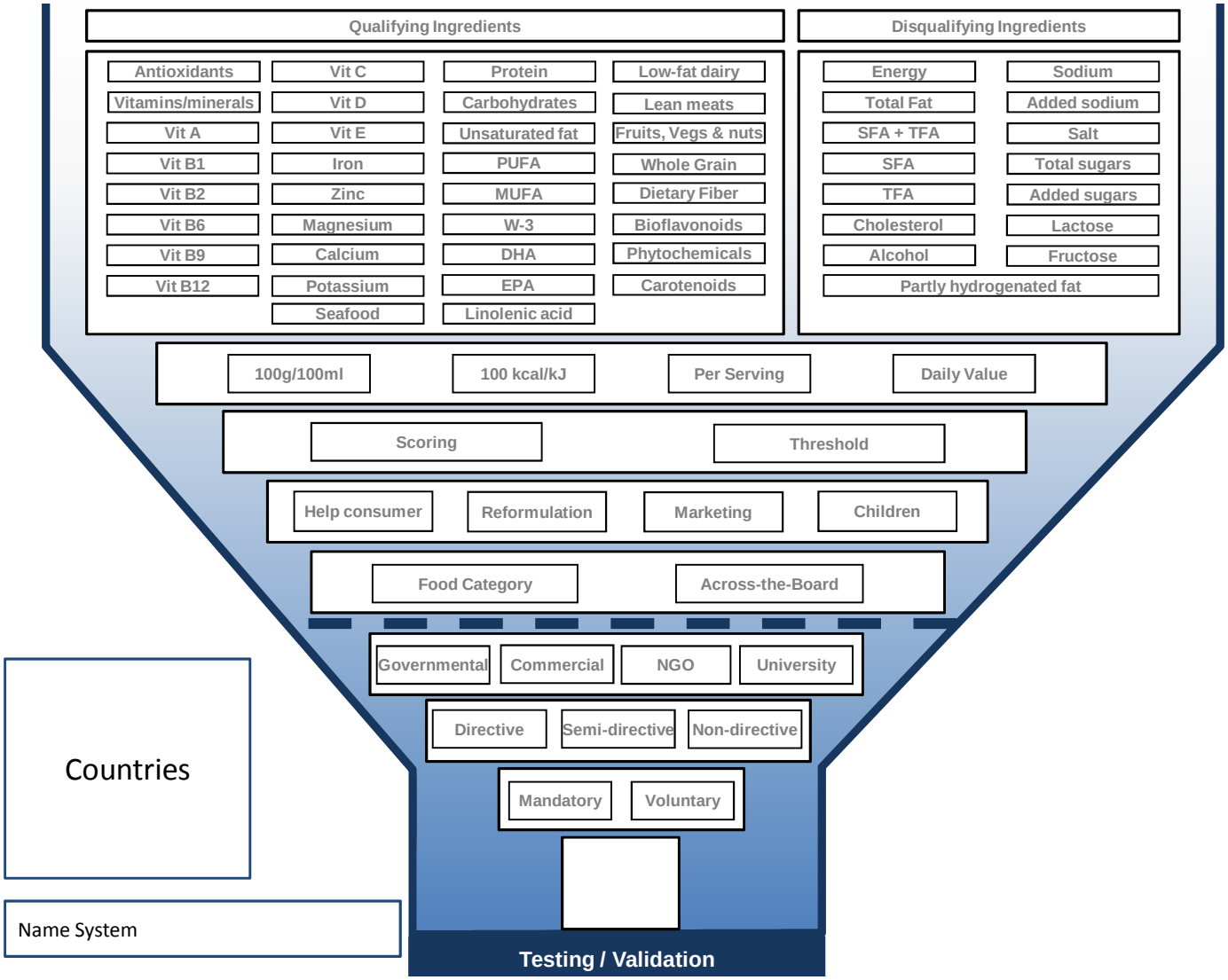
Vit B1
Vit B2
Vit B6
Vit B9
Vit B12
Vit C
Vit D
Vit E
Iron
Zinc
Magnesium
Calcium
Potassium
Seafood
Protein
Carbohydrates
Unsaturated fat
PUFA
MUFA
W-3
DHA
EPA
Linolenic acid
Low-fat dairy
Lean meats
Fruits, Vegs & nuts
Whole Grain
Dietary Fiber
Bioflavonoids
Phytochemicals
Carotenoids
Disqualifying Ingredients
Energy
Total Fat
SFA + TFA
SFA
TFA
Cholesterol
Alcohol
Sodium
Added sodium
Salt
Total sugars
Added sugars
Lactose
Fructose
Partly hydrogenated fat
100g/100ml
100 kcal/kJ
Per Serving
Daily Value
Scoring
Threshold
Help consumer
Reformulation
Marketing
Children
Food Category
Across-the-Board
Governmental
Commercial
NGO
University
Directive
Semi-directive
Non-directive
Mandatory
Voluntary
Testing / Validation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Vitamins/minerals
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Vit B1
Vit B2
Vit B6
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Vit C
Vit D
Vit E
Iron
Zinc
Magnesium
Calcium
Potassium
Seafood
Protein
Carbohydrates
Unsaturated fat
PUFA
MUFA
W-3
DHA
EPA
Linolenic acid
Low-fat dairy
Lean meats
Fruits, Vegs & nuts
Whole Grain
Dietary Fiber
Bioflavonoids
Phytochemicals
Carotenoids
Disqualifying Ingredients
Energy
Total Fat
SFA + TFA
SFA
TFA
Cholesterol
Alcohol
Sodium
Added sodium
Salt
Total sugars
Added sugars
Lactose
Fructose
Partly hydrogenated fat
100g/100ml
100 kcal/kJ
Per Serving
Daily Value
Scoring
Threshold
Help consumer
Reformulation
Marketing
Children
Food Category
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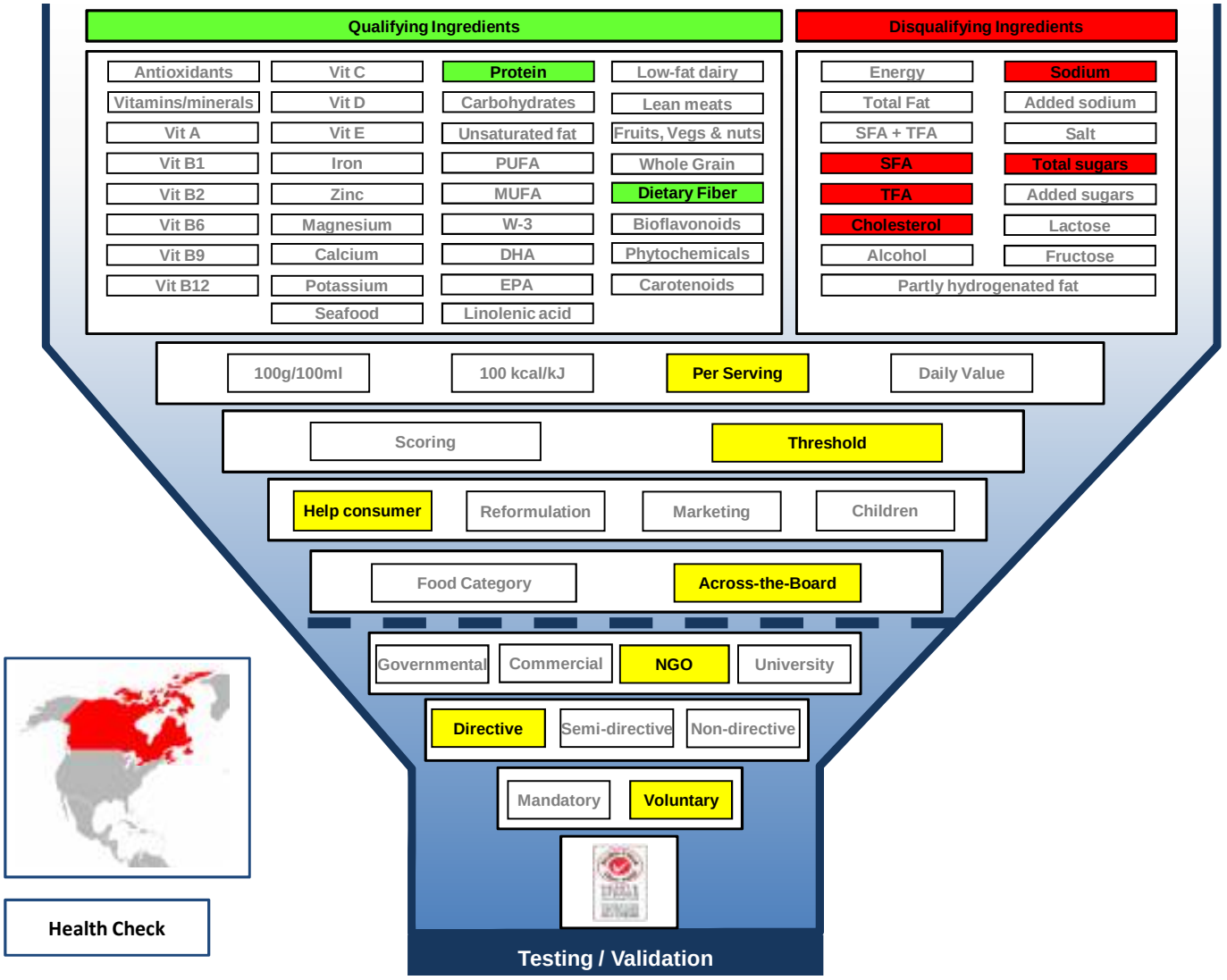
Voluntary
Countries
Name System
Testing / Validation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Vitamins/minerals
Vit D
Carbohydrates
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Vit E
Unsaturated fat
Fruits, Vegs & nuts
Vit B1
Iron
PUFA
Whole Grain
Vit B2
Zinc
MUFA
Dietary Fiber
Vit B6
Magnesium
W-3
Bioflavonoids
Vit B9
Calcium
DHA
Phytochemicals
Vit B12
Potassium
EPA
Carotenoids
Seafood
Linolenic acid
Disqualifying Ingredients
Energy
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Total Fat
Added sodium
SFA + TFA
Salt
SFA
Total sugars
TFA
Added sugars
Cholesterol
Lactose
Alcohol
Fructose
Partly hydrogenated fat
100g/100ml
100 kcal/kJ
Per Serving
Daily Value
Scoring
Threshold
Help consumer
Reformulation
Marketing
Children
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Directive
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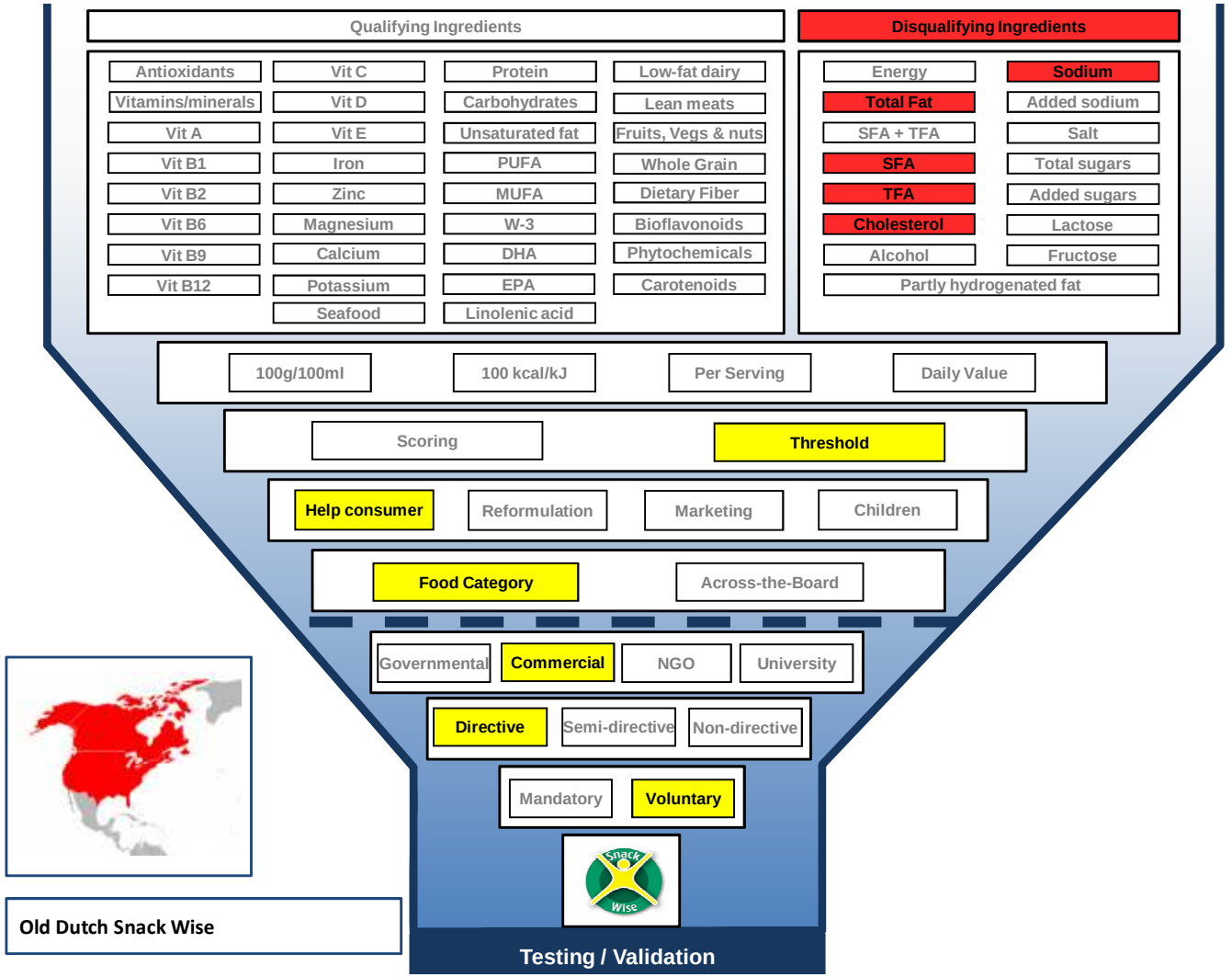
Non-directive
Mandatory
Voluntary
Testing / Validation
Health Check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Vit C
Protein
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Vitamins/minerals
Vit D
Carbohydrates
Lean meats
Vit A
Vit E
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Vit B1
Iron
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Whole Grain
Vit B2
Zinc
MUFA
Dietary Fiber
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Magnesium
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Bioflavonoids
Vit B9
Calcium
DHA
Phytochemicals
Vit B12
Potassium
EPA
Carotenoids
Seafood
Linolenic acid
Disqualifying Ingredients
Energy
Sodium
Total Fat
Added sodium
SFA + TFA
Salt
SFA
Total sugars
TFA
Added sugars
Cholesterol
Lactose
Alcohol
Fructose
Partly hydrogenated fat
100g/100ml
100 kcal/kJ
Per Serving
Daily Value
Scoring
Threshold
Help consumer
Reformulation
Marketing
Children
Food Category
Across-the-Board
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Non-directive
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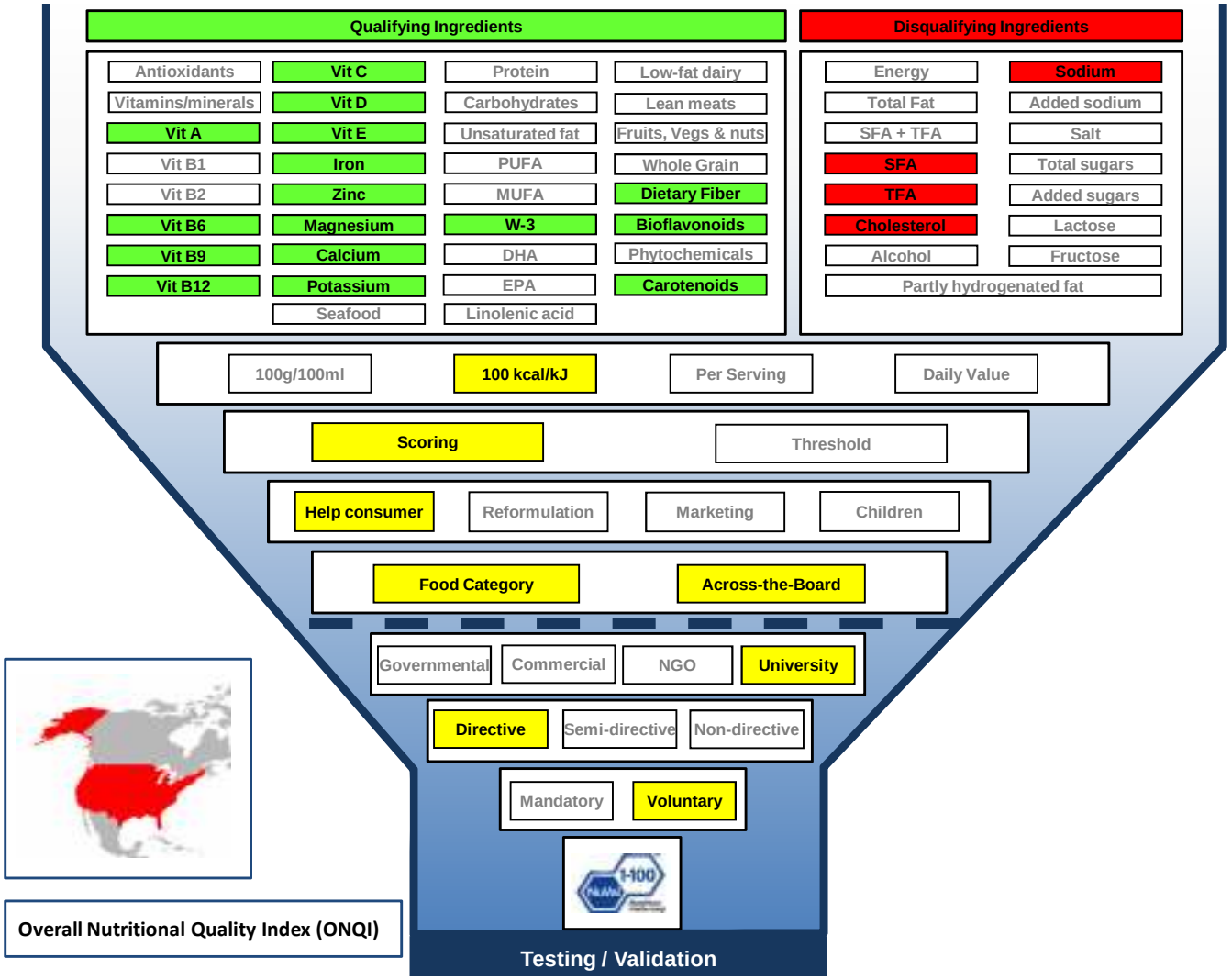
Voluntary
Snack Wise
Testing / Validation
Old Dutch Snack Wise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Vit C
Vit D
Vit E
Iron
Zinc
Magnesium
Calcium
Potassium
Seafood
Protein
Carbohydrates
Unsaturated fat
PUFA
MUFA
W-3
DHA
EPA
Linolenic acid
Low-fat dairy
Lean meats
Fruits, Vegs & nuts
Whole Grain
Dietary Fiber
Bioflavonoids
Phytochemicals
Carotenoids
Disqualifying Ingredients
Energy
Total Fat
SFA + TFA
SFA
TFA
Cholesterol
Alcohol
Sodium
Added sodium
Salt
Total sugars
Added sugars
Lactose
Fructose
Partly hydrogenated fat
100g/100ml
100 kcal/kJ
Per Serving
Daily Value
Scoring
Threshold
Help consumer
Reformulation
Marketing
Children
Food Category
Across-the-Board
Governmental
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NGO
University
Directive
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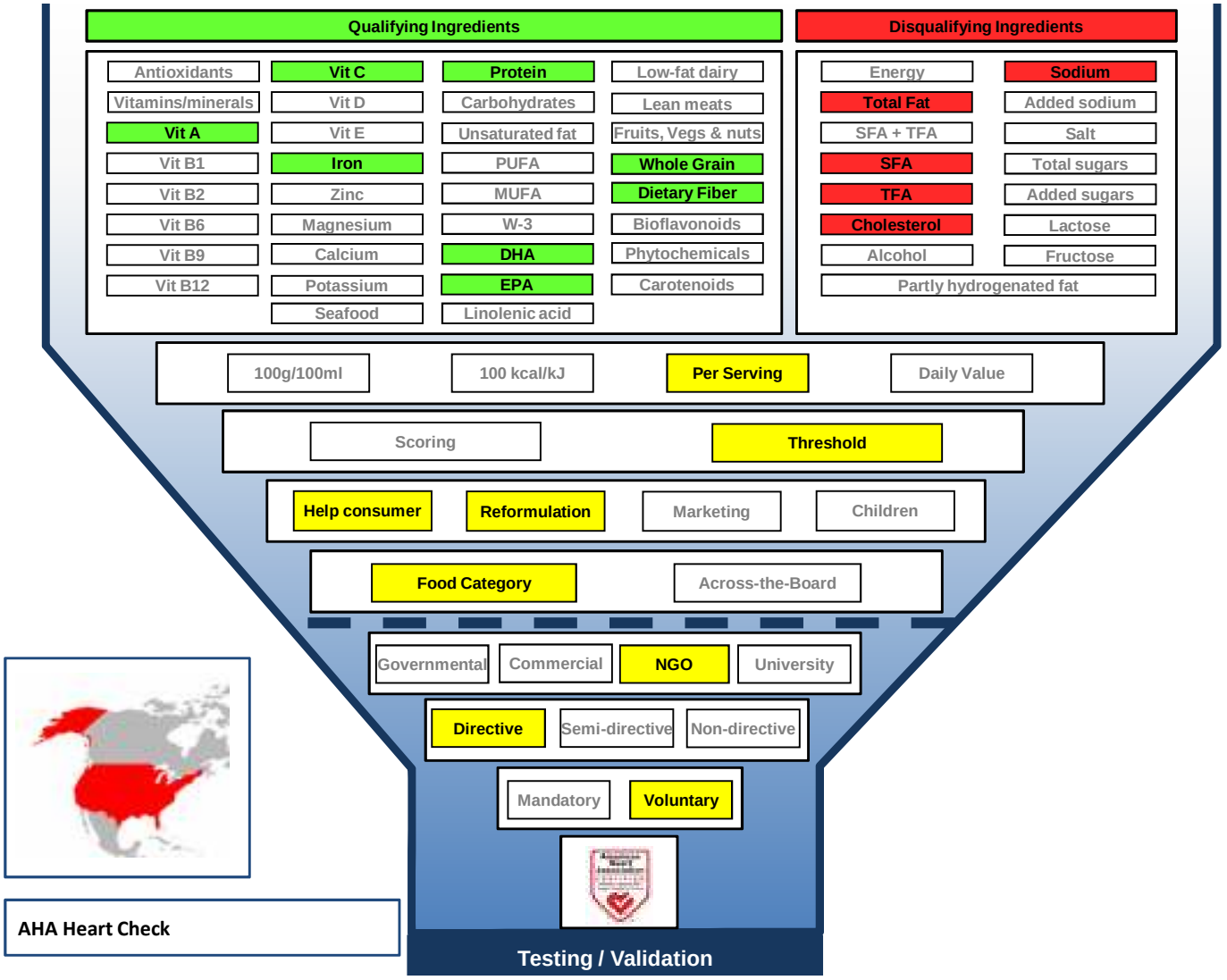
Non-directive
Mandatory
Voluntary
Overall Nutritional Quality Index (ONQI)
Testing / Validation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Vitamins/minerals
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Vit B2
Vit B6
Vit B9
Vit B12
Vit C
Vit D
Vit E
Iron
Zinc
Magnesium
Calcium
Potassium
Seafood
Protein
Carbohydrates
Unsaturated fat
PUFA
MUFA
W-3
DHA
EPA
Linolenic acid
Low-fat dairy
Lean meats
Fruits, Vegs & nuts
Whole Grain
Dietary Fiber
Bioflavonoids
Phytochemicals
Carotenoids
Disqualifying Ingredients
Energy
Total Fat
SFA + TFA
SFA
TFA
Cholesterol
Alcohol
Sodium
Added sodium
Salt
Total sugars
Added sugars
Lactose
Fructose
Partly hydrogenated fat
100g/100ml
100 kcal/kJ
Per Serving
Daily Value
Scoring
Threshold
Help consumer
Reformulation
Marketing
Children
Food Category
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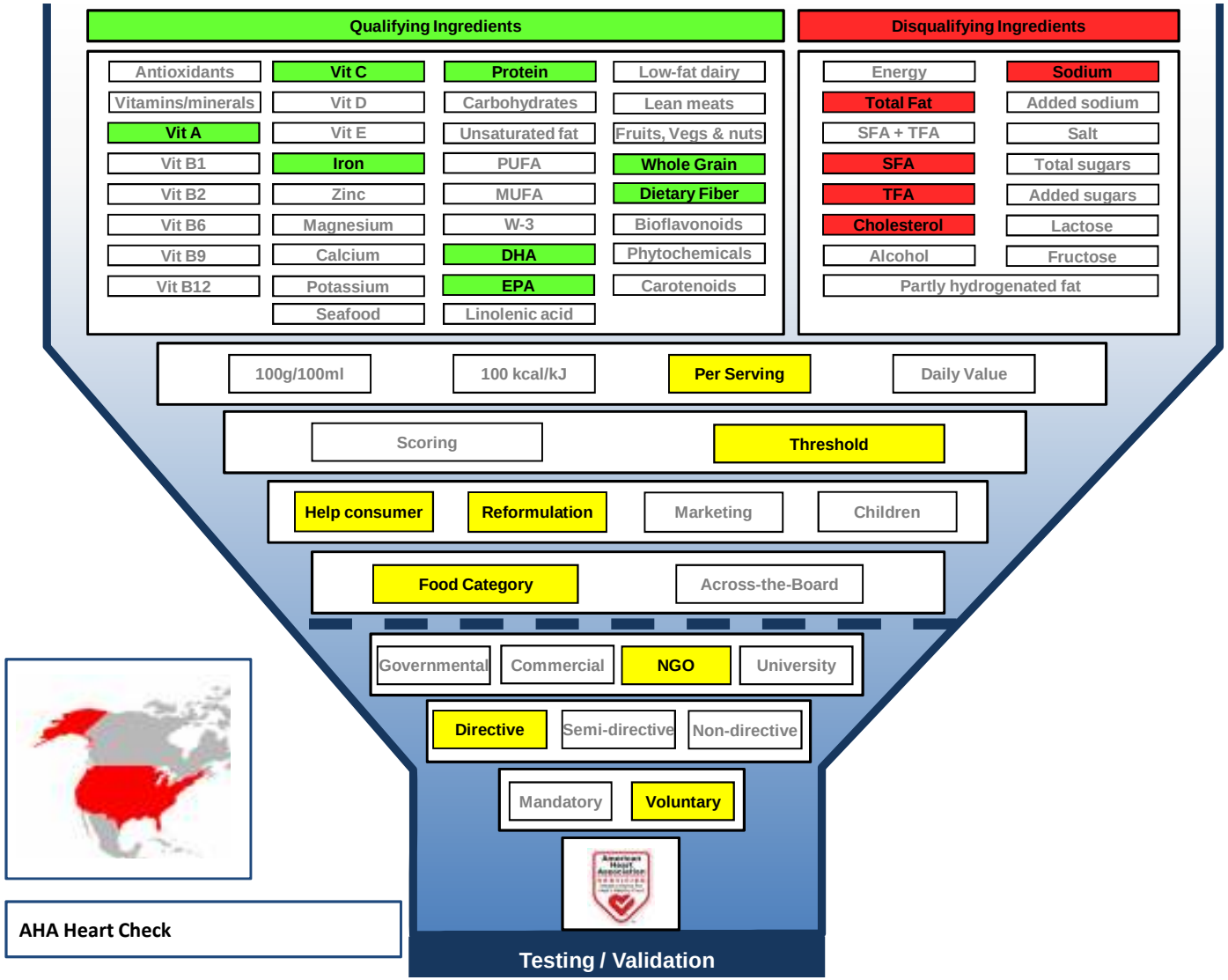
Voluntary
AHA Heart Check
Testing / Validation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Vit C
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Vitamins/minerals
Vit D
Carbohydrates
Lean meats
Vit A
Vit E
Unsaturated fat
Fruits, Vegs & nuts
Vit B1
Iron
PUFA
Whole Grain
Vit B2
Zinc
MUFA
Dietary Fiber
Vit B6
Magnesium
W-3
Bioflavonoids
Vit B9
Calcium
DHA
Phytochemicals
Vit B12
Potassium
EPA
Carotenoids
Seafood
Linolenic acid
Disqualifying Ingredients
Energy
Sodium
Total Fat
Added sodium
SFA + TFA
Salt
SFA
Total sugars
TFA
Added sugars
Cholesterol
Lactose
Alcohol
Fructose
Partly hydrogenated fat
100g/100ml
100 kcal/kJ
Per Serving
Daily Value
Scoring
Threshold
Help consumer
Reformulation
Marketing
Children
Food Category
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Non-directive
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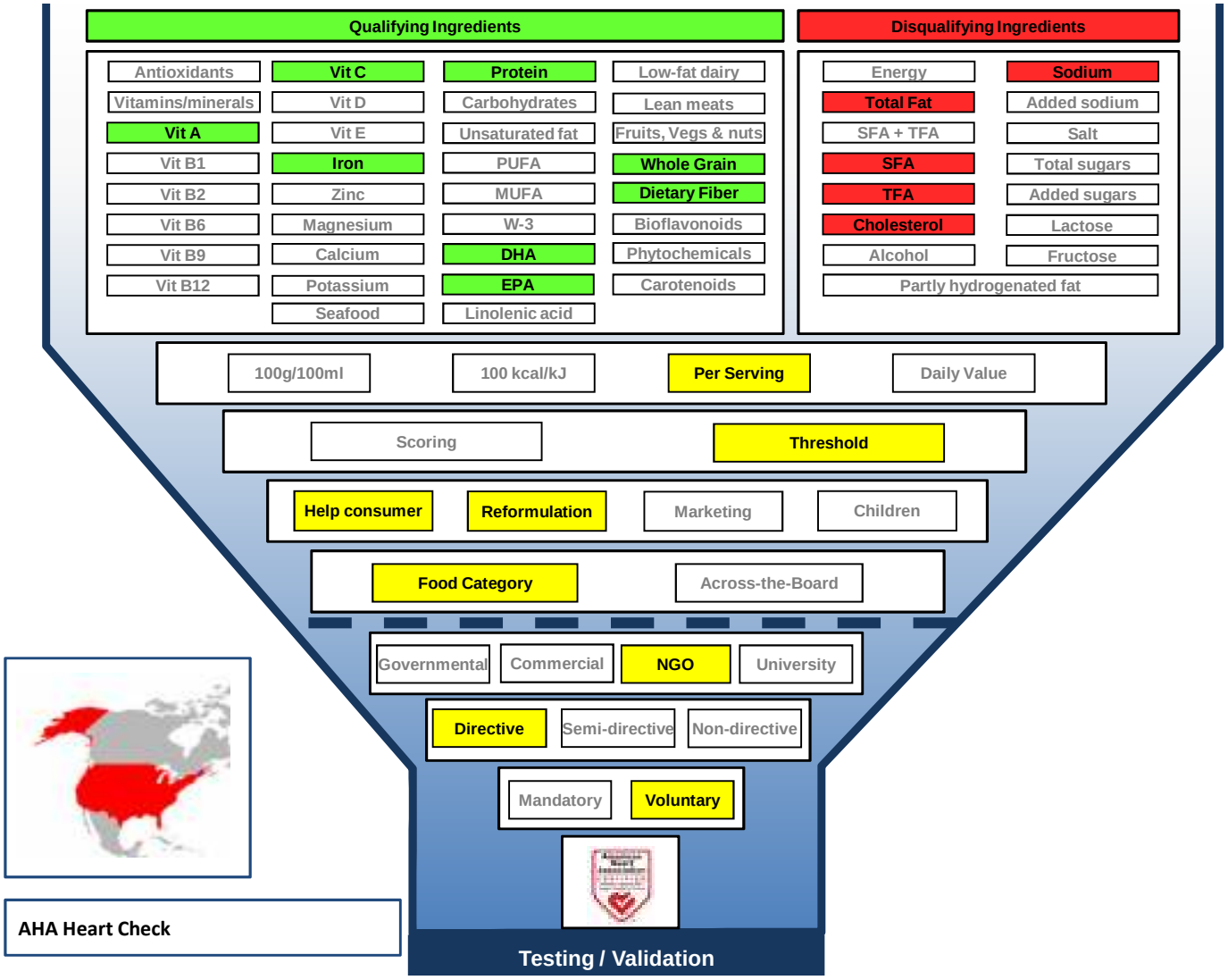
AHA Heart Check
Testing / Validation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Vit B2
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Vit C
Vit D
Vit E
Iron
Zinc
Magnesium
Calcium
Potassium
Seafood
Protein
Carbohydrates
Unsaturated fat
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DHA
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Low-fat dairy
Lean meats
Fruits, Vegs & nuts
Whole Grain
Dietary Fiber
Bioflavonoids
Phytochemicals
Carotenoids
Disqualifying Ingredients
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SFA + TFA
SFA
TFA
Cholesterol
Alcohol
Sodium
Added sodium
Salt
Total sugars
Added sugars
Lactose
Fructose
Partly hydrogenated fat
100g/100ml
100 kcal/kJ
Per Serving
Daily Value
Scoring
Threshold
Help consumer
Reformulation
Marketing
Children
Food Category
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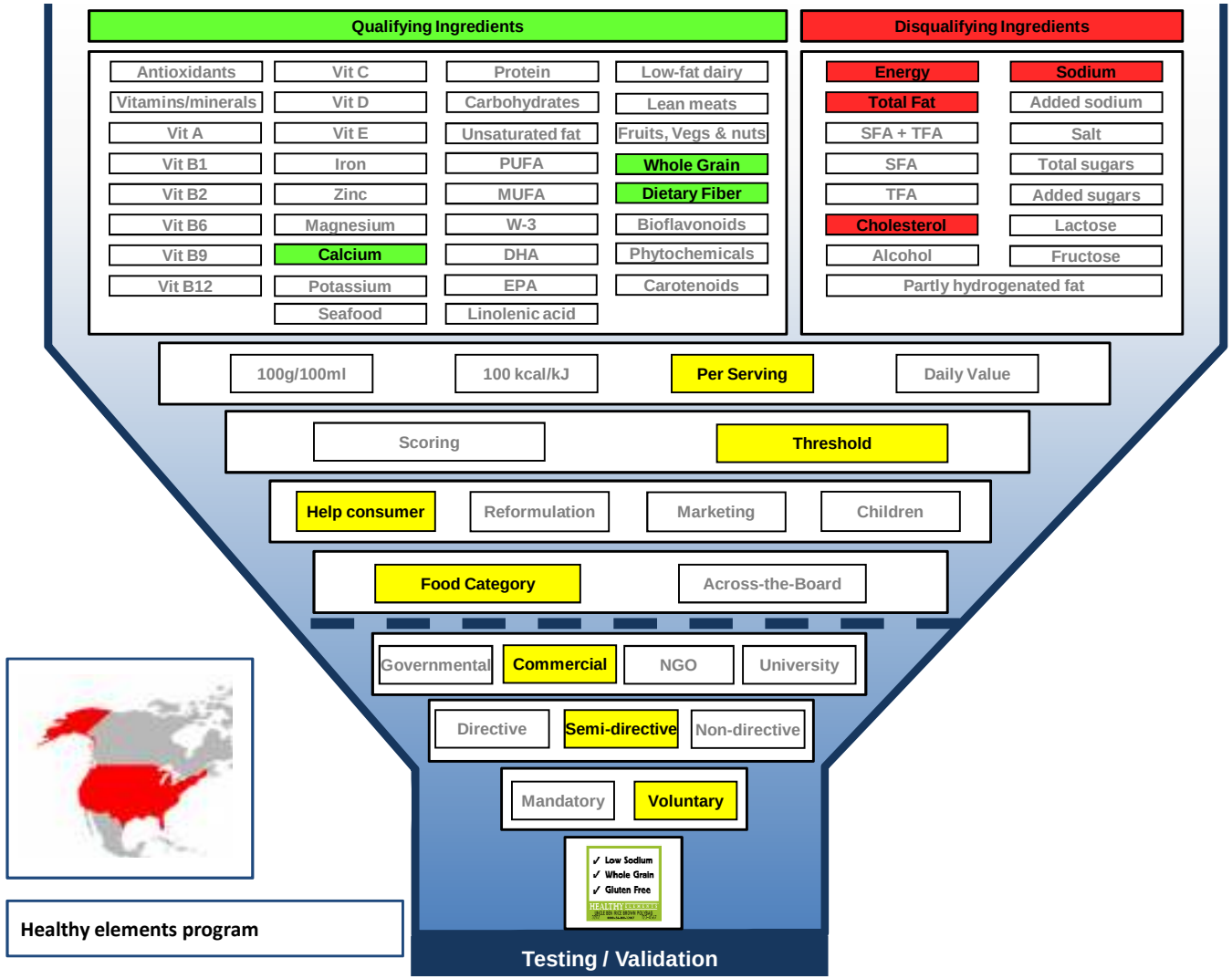
AHA Heart Check
Testing / Validation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Vit B2
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Vit B12
Vit C
Vit D
Vit E
Iron
Zinc
Magnesium
Calcium
Potassium
Seafood
Protein
Carbohydrates
Unsaturated fat
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MUFA
W-3
DHA
EPA
Linolenic acid
Low-fat dairy
Lean meats
Fruits, Vegs & nuts
Whole Grain
Dietary Fiber
Bioflavonoids
Phytochemicals
Carotenoids
Disqualifying Ingredients
Energy
Total Fat
SFA + TFA
SFA
TFA
Cholesterol
Alcohol
Sodium
Added sodium
Salt
Total sugars
Added sugars
Lactose
Fructose
Partly hydrogenated fat
100g/100ml
100 kcal/kJ
Per Serving
Daily Value
Scoring
Threshold
Help consumer
Reformulation
Marketing
Children
Food Category
Across-the-Board
Governmental
Commercial
NGO
University
Directive
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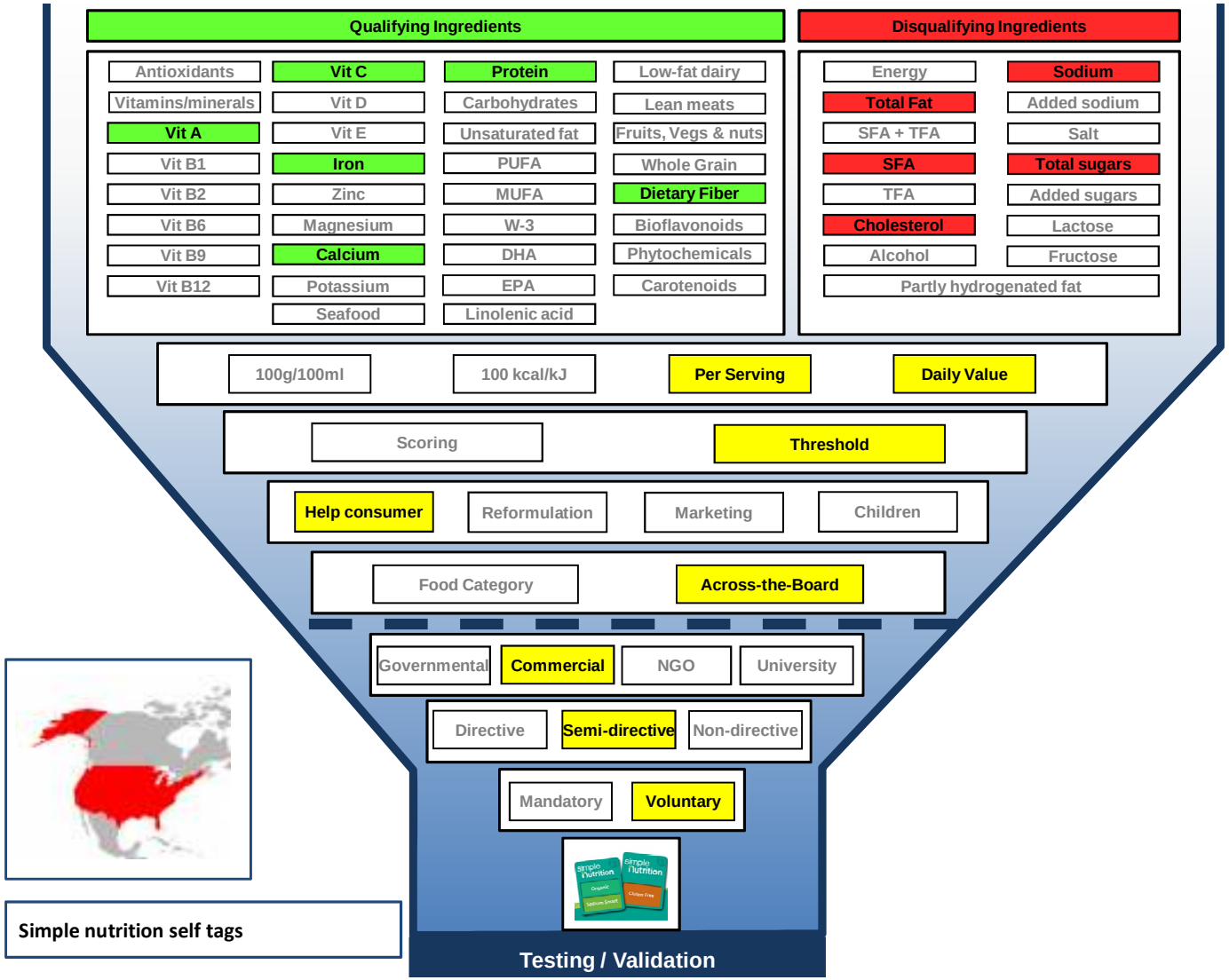
Mandatory
Voluntary
✓ Low Sodium
✓ Whole Grain
✓ Gluten Free
Testing / Validation
Healthy elements program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Vit E
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Fruits, Vegs & nuts
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PUFA
Whole Grain
Vit B2
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Dietary Fiber
Vit B6
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SFA + TFA
Salt
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TFA
Added sugars
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Alcohol
Fructose
Partly hydrogenated fat
100g/100ml
100 kcal/kJ
Per Serving
Daily Value
Scoring
Threshold
Help consumer
Reformulation
Marketing
Children
Food Category
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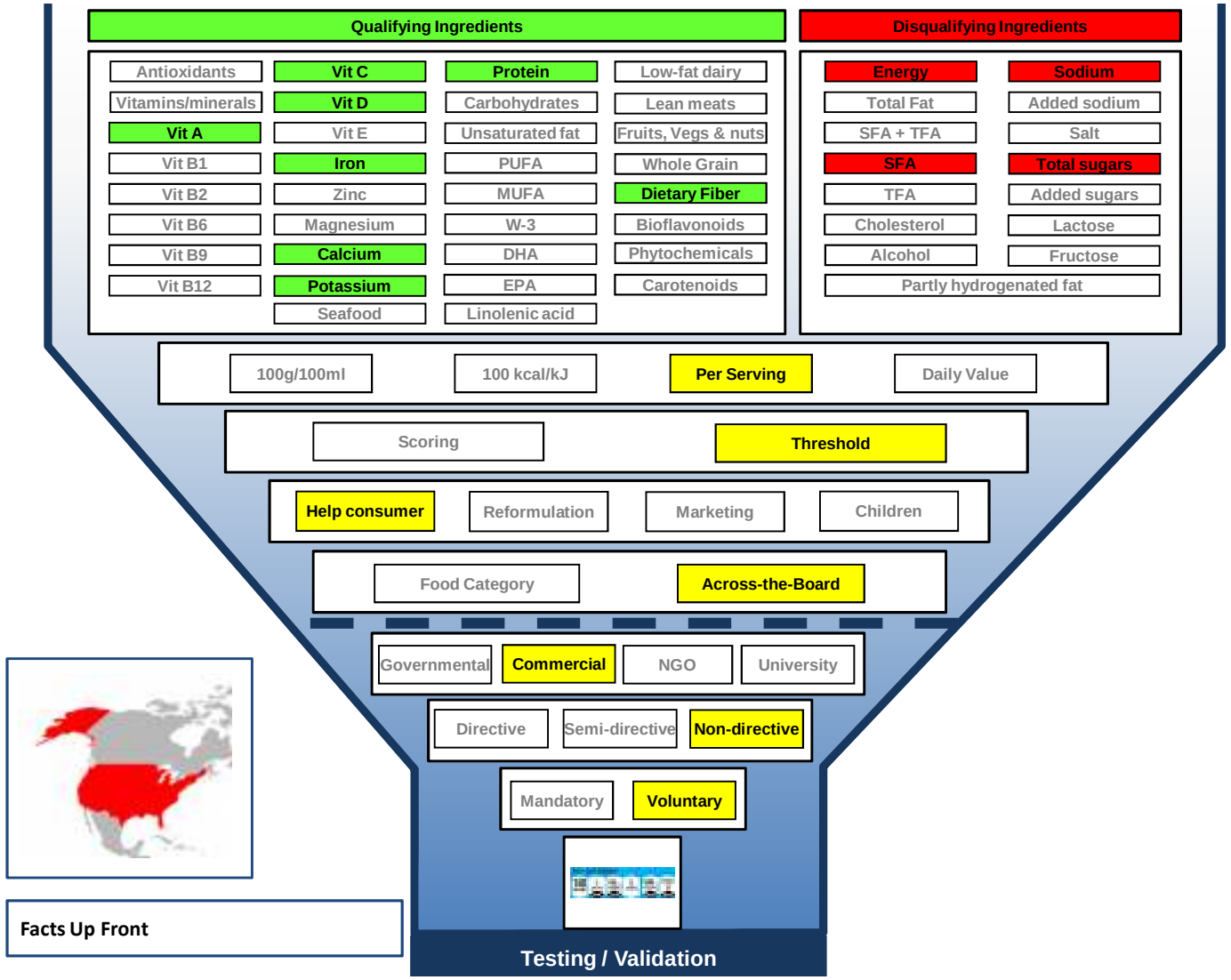
NGO
University
Directive
Semi-directive
Non-directive
Mandatory
Voluntary
Testing / Validation
Simple nutrition self tags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Vit A
Vit E
Unsaturated fat
Fruits, Vegs & nuts
Vit B1
Iron
PUFA
Whole Grain
Vit B2
Zinc
MUFA
Dietary Fiber
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Scoring
Threshold
Help consumer
Reformulation
Marketing
Children
Food Category
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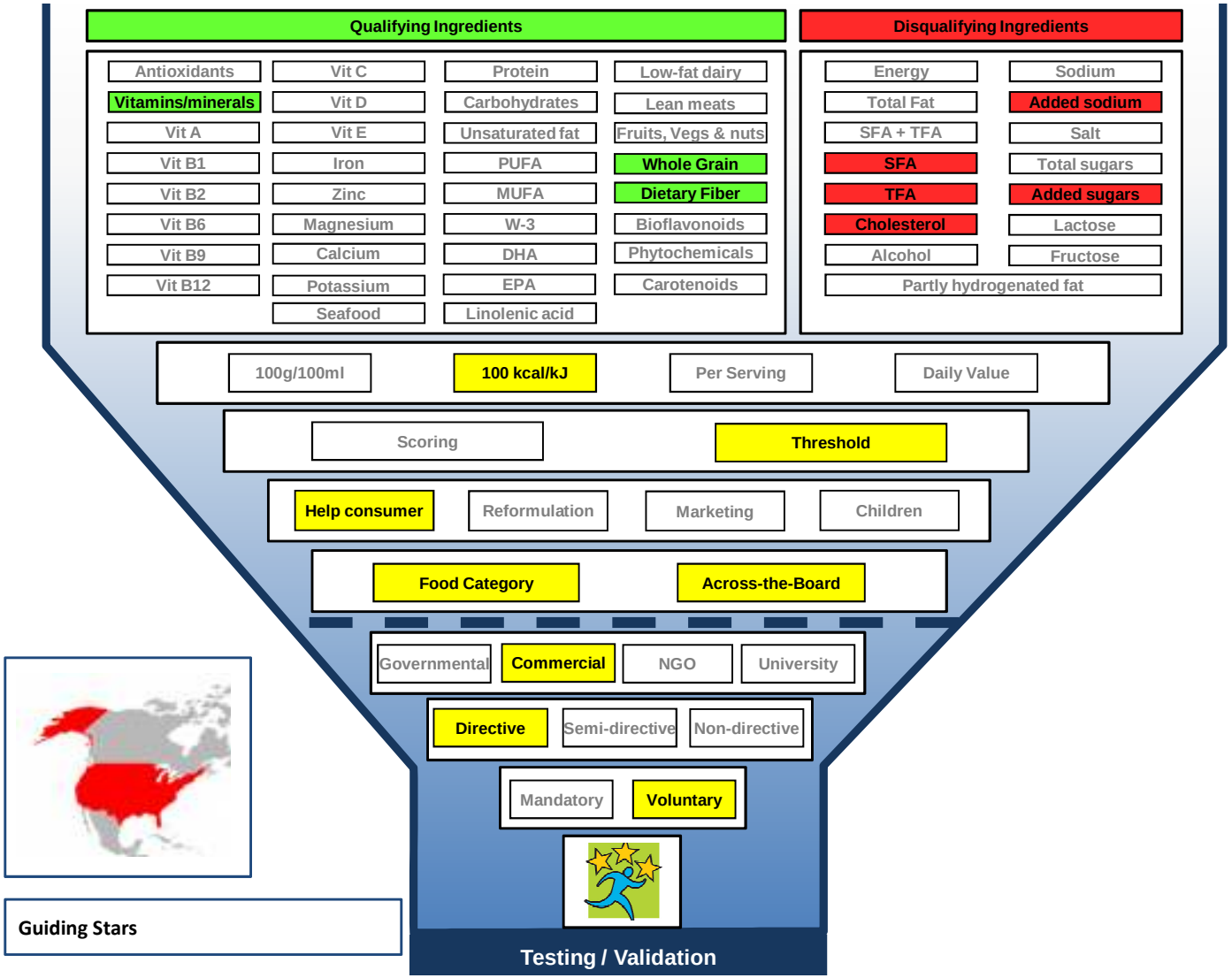
Facts Up Front
Testing / Validation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Vit E
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Fruits, Vegs & nuts
Vit B1
Iron
PUFA
Whole Grain
Vit B2
Zinc
MUFA
Dietary Fiber
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Magnesium
W-3
Bioflavonoids
Vit B9
Calcium
DHA
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Carotenoids
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Linolenic acid
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Total sugars
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Alcohol
Fructose
Partly hydrogenated fat
100g/100ml
100 kcal/kJ
Per Serving
Daily Value
Scoring
Threshold
Help consumer
Reformulation
Marketing
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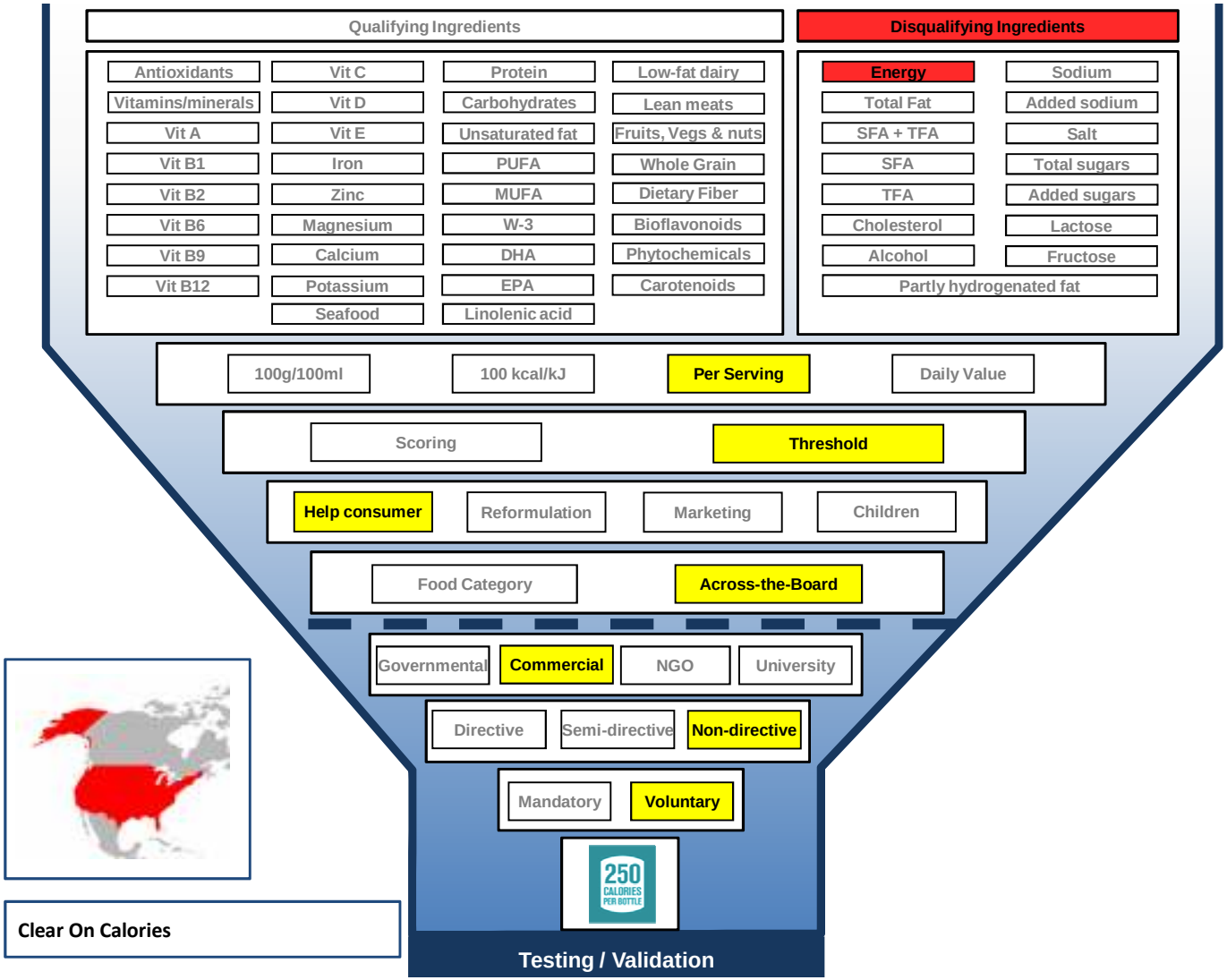
Guiding Stars
Testing / Validation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Vit E
Unsaturated fat
Fruits, Vegs & nuts
Vit B1
Iron
PUFA
Whole Grain
Vit B2
Zinc
MUFA
Dietary Fiber
Vit B6
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Calcium
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Carotenoids
Seafood
Linolenic acid
Disqualifying Ingredients
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Total sugars
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Fructose
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100g/100ml
100 kcal/kJ
Per Serving
Daily Value
Scoring
Threshold
Help consumer
Reformulation
Marketing
Children
Food Category
Across-the-Board
Governmental
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Mandatory
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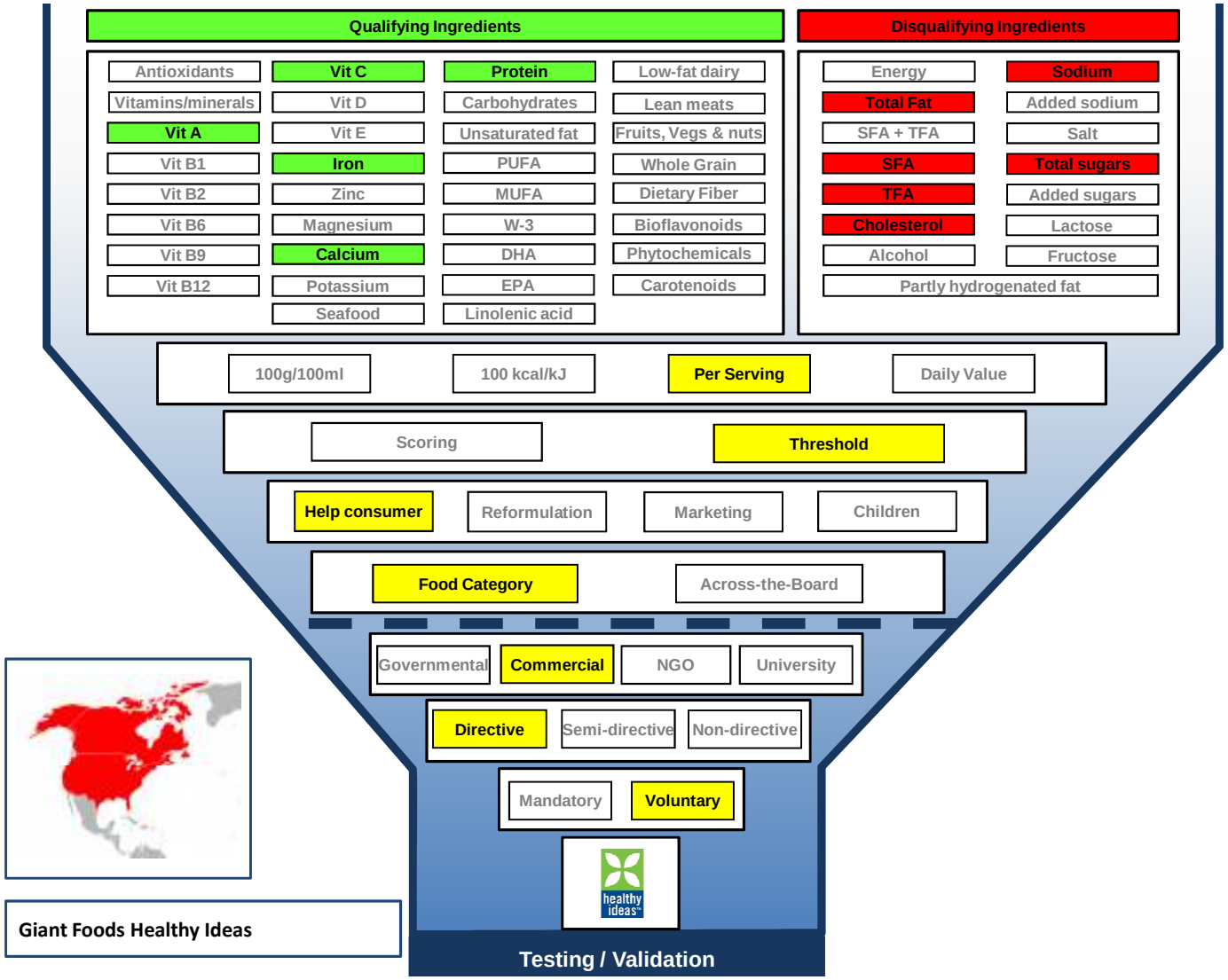
250
CALORIES PER BOTTLE
Testing / Validation
Clear On Calories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Vit D
Carbohydrates
Lean meats
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Vit E
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Vit B1
Iron
PUFA
Whole Grain
Vit B2
Zinc
MUFA
Dietary Fiber
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Bioflavonoids
Vit B9
Calcium
DHA
Phytochemicals
Vit B12
Potassium
EPA
Carotenoids
Seafood
Linolenic acid
Disqualifying Ingredients
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Cholesterol
Lactose
Alcohol
Fructose
Partly hydrogenated fat
100g/100ml
100 kcal/kJ
Per Serving
Daily Value
Scoring
Threshold
Help consumer
Reformulation
Marketing
Children
Food Category
Across-the-Board
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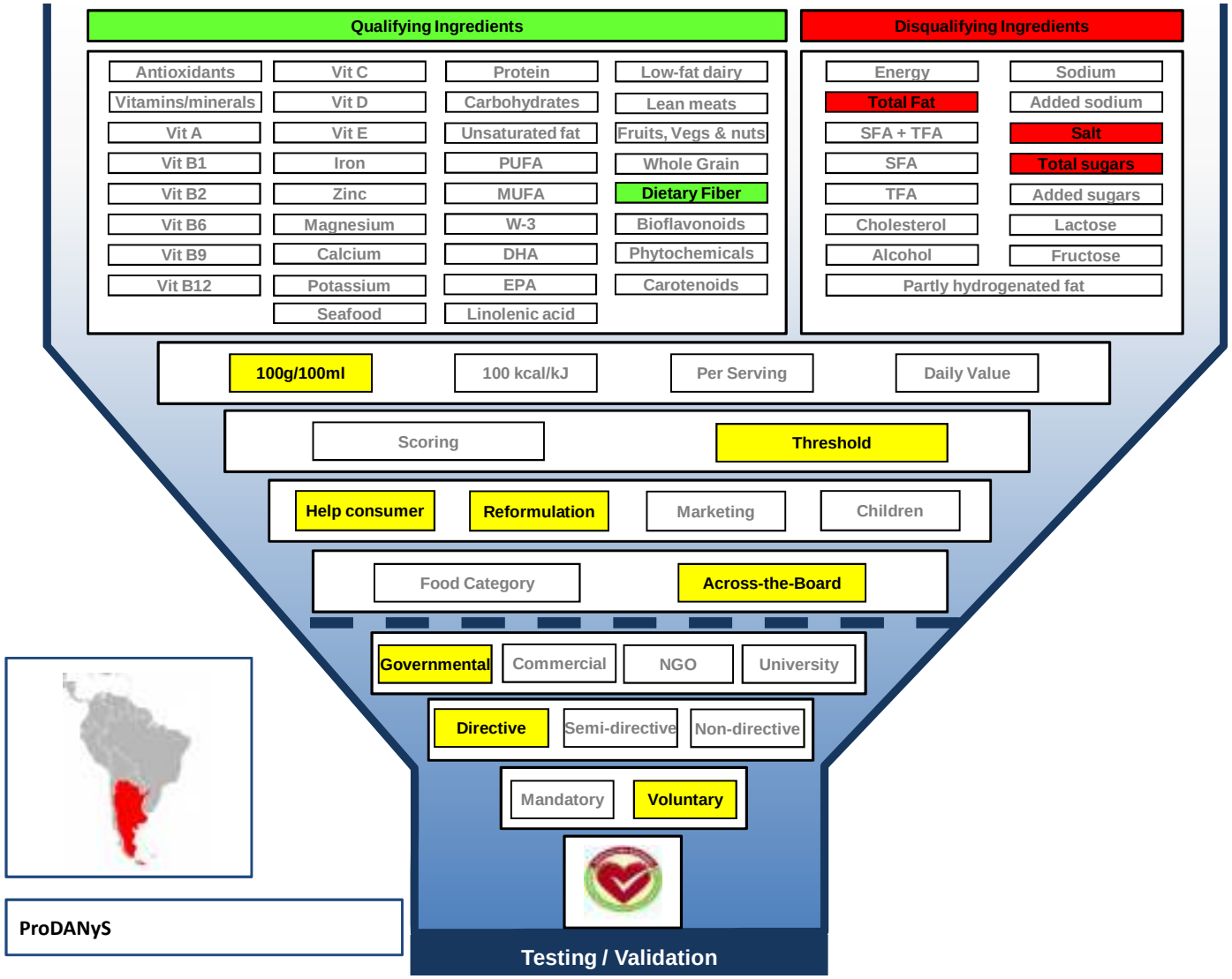
Non-directive
Mandatory
Voluntary
healthy ideas
Testing / Validation
Giant Foods Healthy Ideas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Vit D
Carbohydrates
Lean meats
Vit A
Vit E
Unsaturated fat
Fruits, Vegs & nuts
Vit B1
Iron
PUFA
Whole Grain
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Zinc
MUFA
Dietary Fiber
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Magnesium
W-3
Bioflavonoids
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DHA
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Carotenoids
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Linolenic acid
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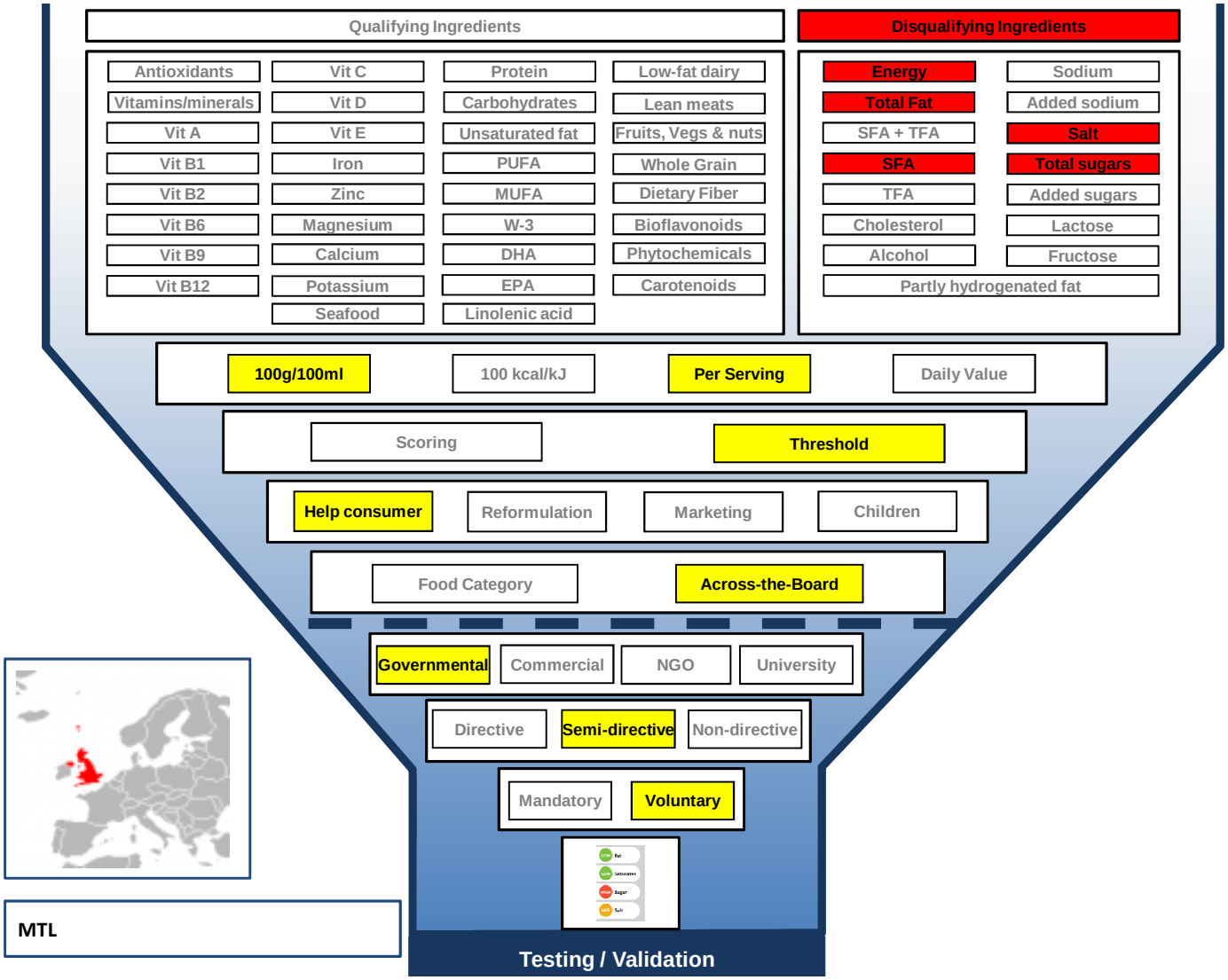
Total sugars
TFA
Added sugars
Cholesterol
Lactose
Alcohol
Fructose
Partly hydrogenated fat
100g/100ml
100 kcal/kJ
Per Serving
Daily Value
Scoring
Threshold
Help consumer
Reformulation
Marketing
Children
Food Category
Across-the-Board
Governmental
Commercial
NGO
University
Directive
Semi-directive
Non-directive
Mandatory
Voluntary
ProDANyS
Testing / Validation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Vit B9
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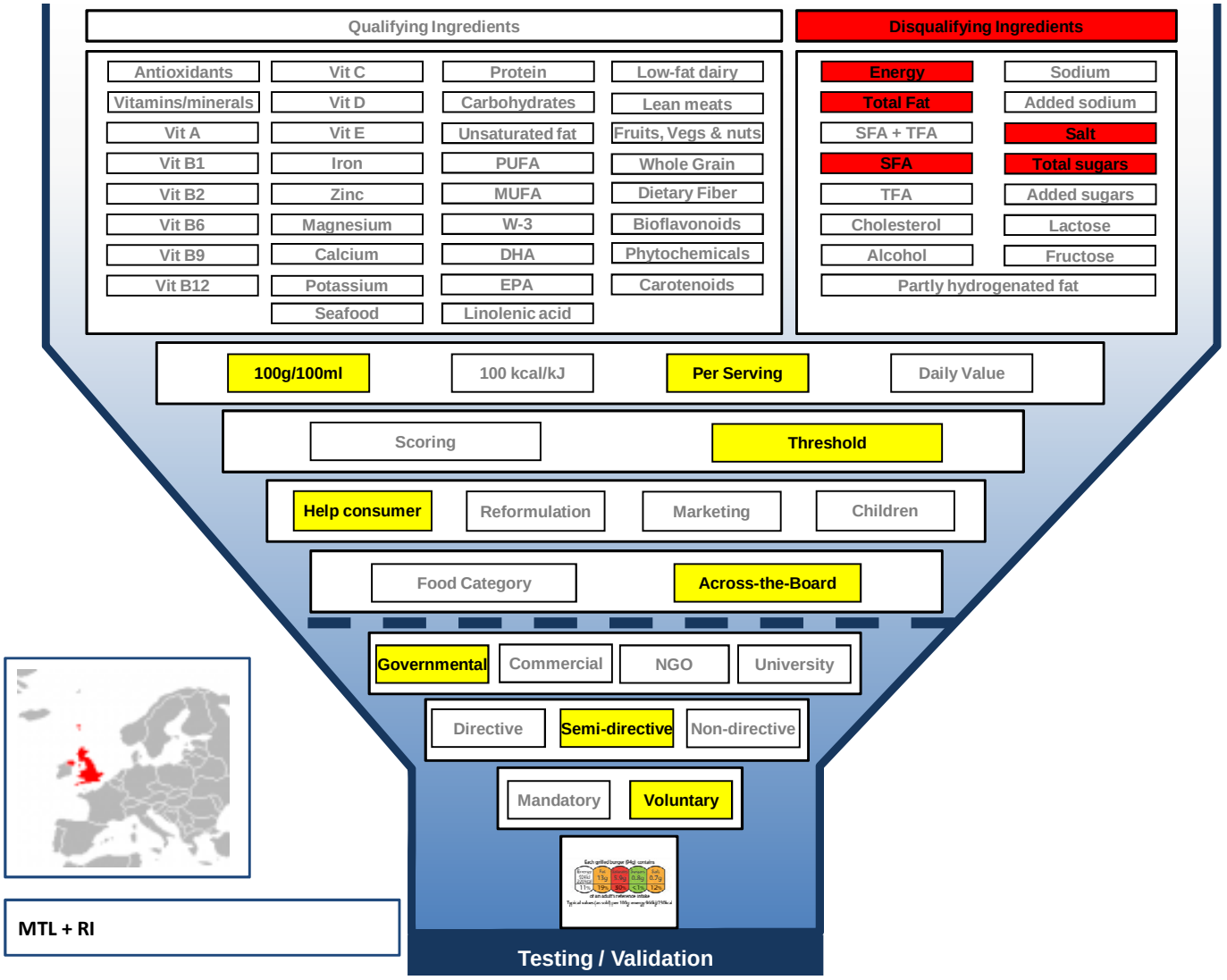
Vit C
Vit D
Vit E
Iron
Zinc
Magnesium
Calcium
Potassium
Seafood
Protein
Carbohydrates
Unsaturated fat
PUFA
MUFA
W-3
DHA
EPA
Linolenic acid
Low-fat dairy
Lean meats
Fruits, Vegs & nuts
Whole Grain
Dietary Fiber
Bioflavonoids
Phytochemicals
Carotenoids
Disqualifying Ingredients
Energy
Total Fat
SFA + TFA
SFA
TFA
Cholesterol
Alcohol
Sodium
Added sodium
Salt
Total sugars
Added sugars
Lactose
Fructose
Partly hydrogenated fat
100g/100ml
100 kcal/kJ
Per Serving
Daily Value
Scoring
Threshold
Help consumer
Reformulation
Marketing
Children
Food Category
Across-the-Board
Governmental
Commercial
NGO
University
Directive
Semi-directive
Non-directive
Mandatory
Voluntary
MTL
Testing / Validation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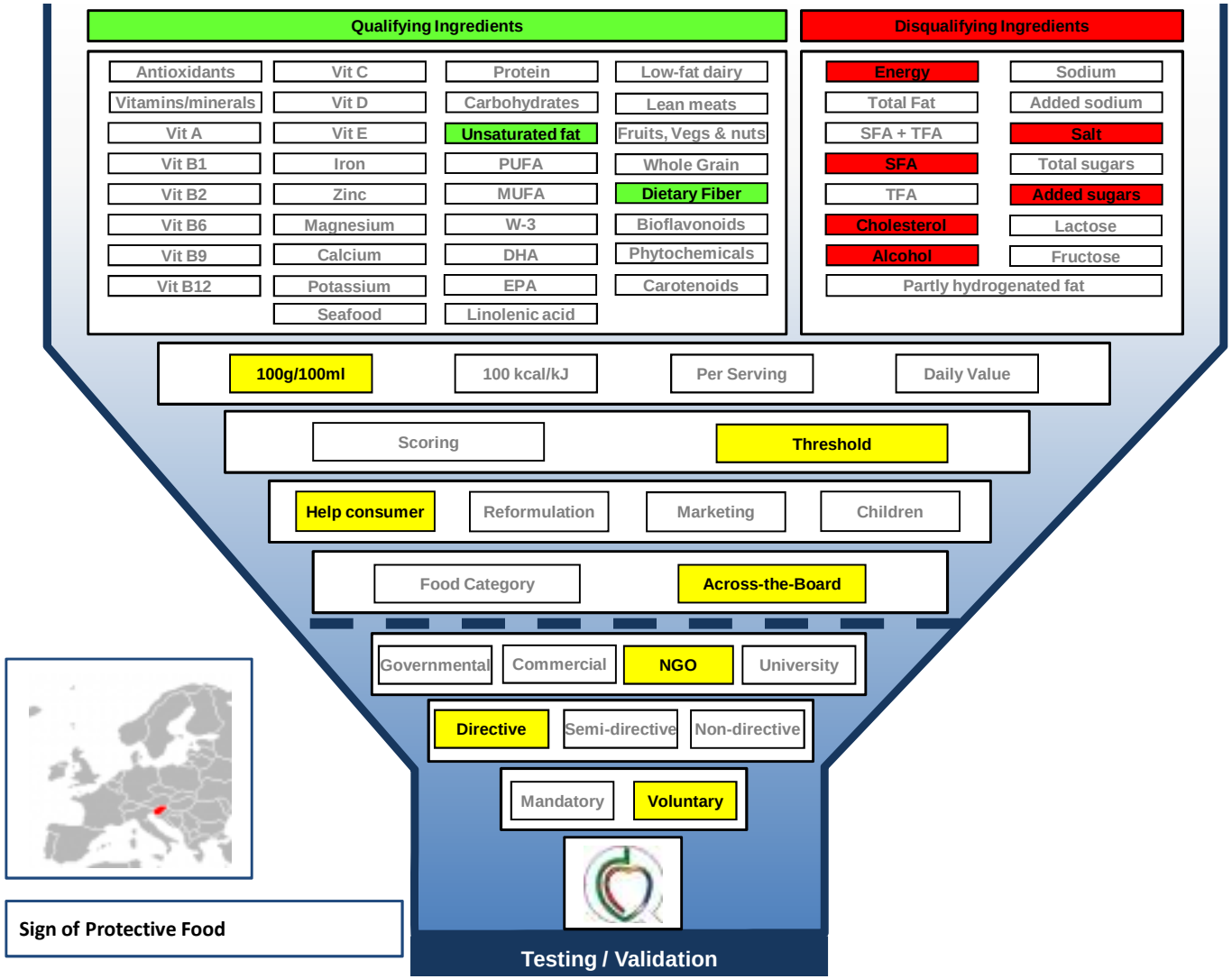
Antioxidants
Vit C
Protein
Low-fat dairy
Vitamins/minerals
Vit D
Carbohydrates
Lean meats
Vit A
Vit E
Unsaturated fat
Fruits, Vegs & nuts
Vit B1
Iron
PUFA
Whole Grain
Vit B2
Zinc
MUFA
Dietary Fiber
Vit B6
Magnesium
W-3
Bioflavonoids
Vit B9
Calcium
DHA
Phytochemicals
Vit B12
Potassium
EPA
Carotenoids
Seafood
Linolenic acid
Disqualifying Ingredients
Energy
Sodium
Total Fat
Added sodium
SFA + TFA
Salt
SFA
Total sugars
TFA
Added sugars
Cholesterol
Lactose
Alcohol
Fructose
Partly hydrogenated fat
100g/100ml
100 kcal/kJ
Per Serving
Daily Value
Scoring
Threshold
Help consumer
Reformulation
Marketing
Children
Food Category
Across-the-Board
Governmental
Commercial
NGO
University
Directive
Semi-directive
Non-directive
Mandatory
Voluntary
MTL + RI
Testing / Validation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Protein
Low-fat dairy
Vitamins/minerals
Vit D
Carbohydrates
Lean meats
Vit A
Vit E
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Fruits, Vegs & nuts
Vit B1
Iron
PUFA
Whole Grain
Vit B2
Zinc
MUFA
Dietary Fiber
Vit B6
Magnesium
W-3
Bioflavonoids
Vit B9
Calcium
DHA
Phytochemicals
Vit B12
Potassium
EPA
Carotenoids
Seafood
Linolenic acid
Disqualifying Ingredients
Energy
Sodium
Total Fat
Added sodium
SFA + TFA
Salt
SFA
Total sugars
TFA
Added sugars
Cholesterol
Lactose
Alcohol
Fructose
Partly hydrogenated fat
100g/100ml
100 kcal/kJ
Per Serving
Daily Value
Scoring
Threshold
Help consumer
Reformulation
Marketing
Children
Food Category
Across-the-Board
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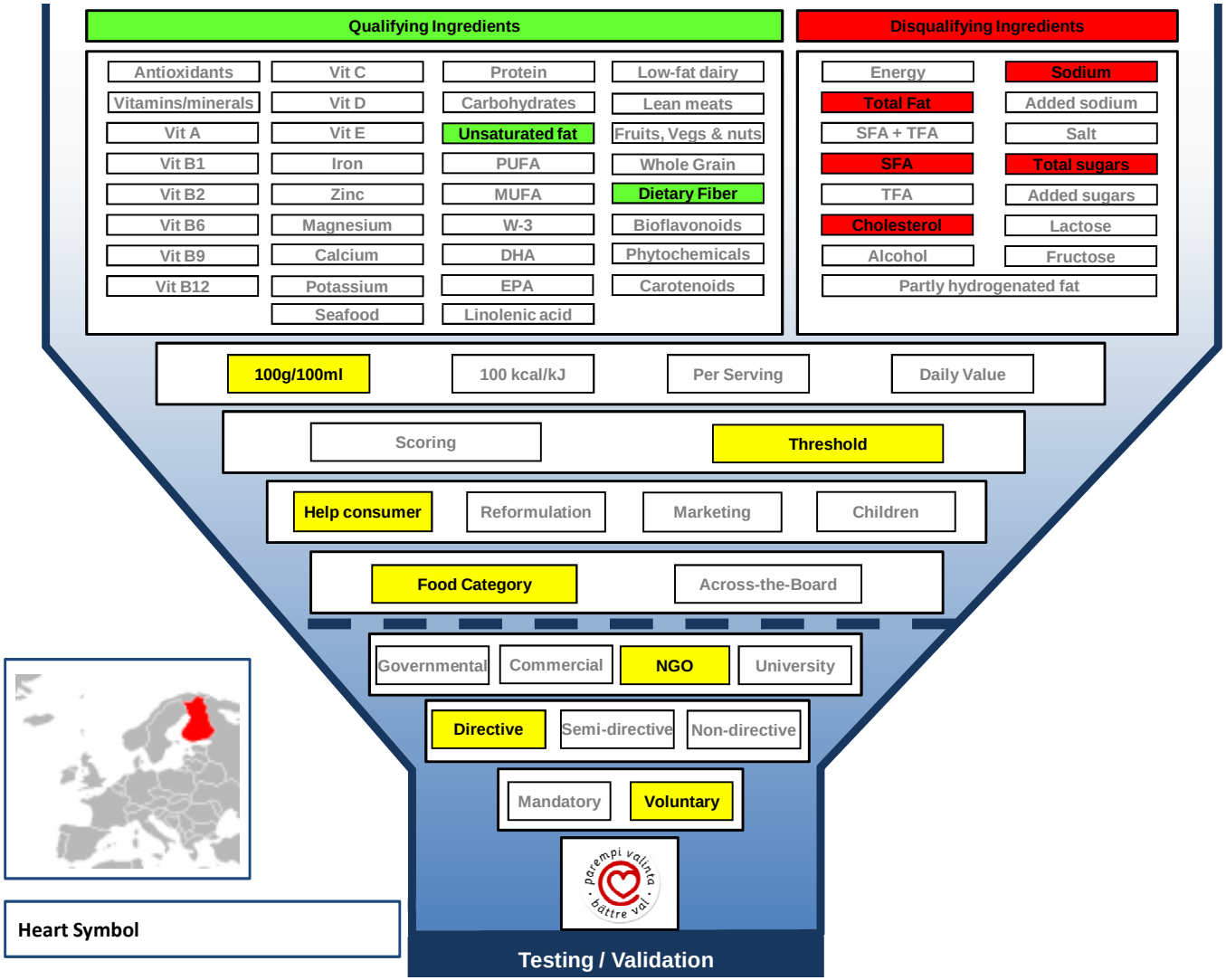
Non-directive
Mandatory
Voluntary
Testing / Validation
Sign of Protective Food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Vit C
Protein
Low-fat dairy
Vitamins/minerals
Vit D
Carbohydrates
Lean meats
Vit A
Vit E
Unsaturated fat
Fruits, Vegs & nuts
Vit B1
Iron
PUFA
Whole Grain
Vit B2
Zinc
MUFA
Dietary Fiber
Vit B6
Magnesium
W-3
Bioflavonoids
Vit B9
Calcium
DHA
Phytochemicals
Vit B12
Potassium
EPA
Carotenoids
Seafood
Linolenic acid
Disqualifying Ingredients
Energy
Sodium
Total Fat
Added sodium
SFA + TFA
Salt
SFA
Total sugars
TFA
Added sugars
Cholesterol
Lactose
Alcohol
Fructose
Partly hydrogenated fat
100g/100ml
100 kcal/kJ
Per Serving
Daily Value
Scoring
Threshold
Help consumer
Reformulation
Marketing
Children
Food Category
Across-the-Board
Governmental
Commercial
NGO
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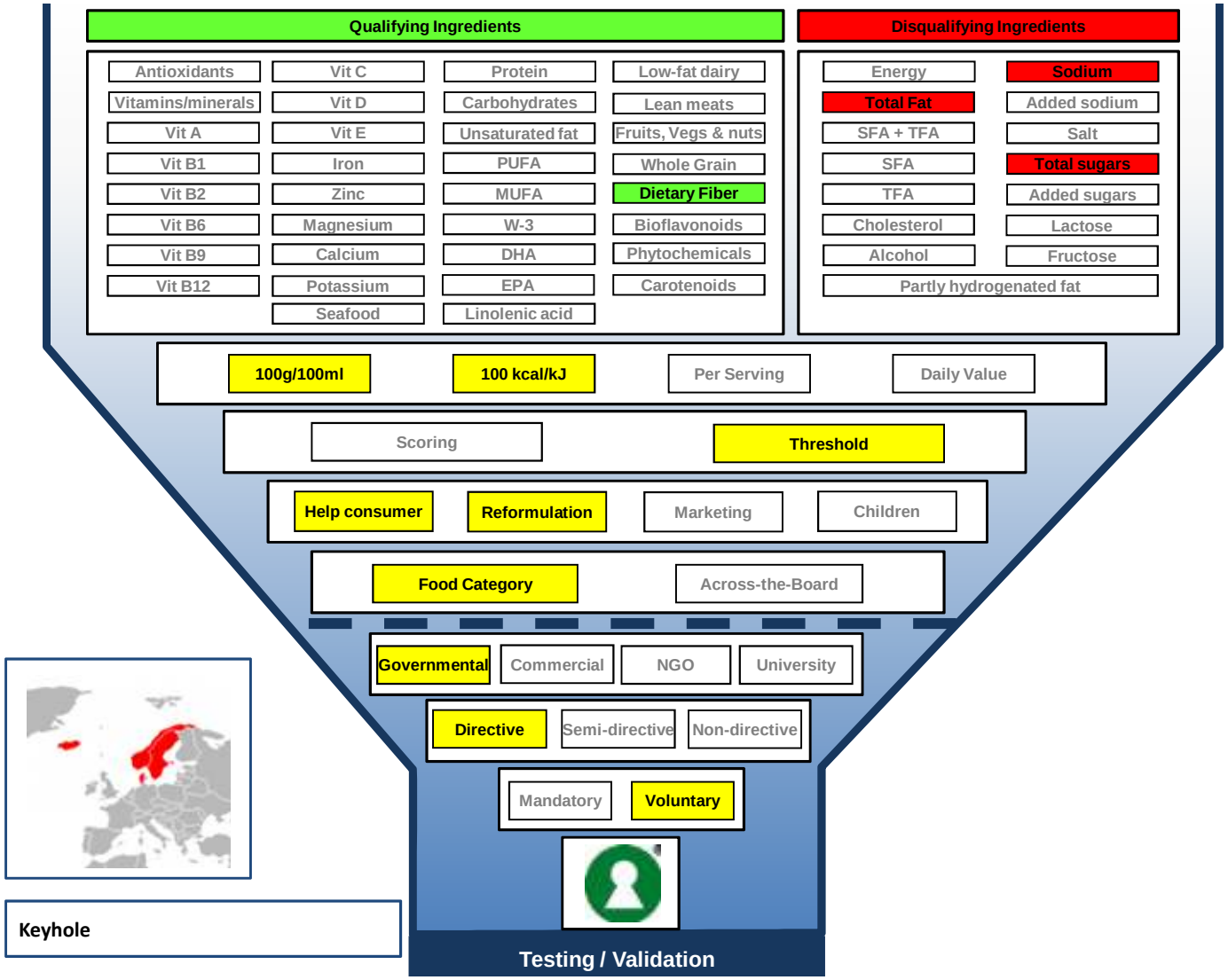
Directive
Semi-directive
Non-directive
Mandatory
Voluntary
parempi valinta
battre val
Testing / Validation
Heart Symbol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Vit C
Protein
Low-fat dairy
Vitamins/minerals
Vit D
Carbohydrates
Lean meats
Vit A
Vit E
Unsaturated fat
Fruits, Vegs & nuts
Vit B1
Iron
PUFA
Whole Grain
Vit B2
Zinc
MUFA
Dietary Fiber
Vit B6
Magnesium
W-3
Bioflavonoids
Vit B9
Calcium
DHA
Phytochemicals
Vit B12
Potassium
EPA
Carotenoids
Seafood
Linolenic acid
Disqualifying Ingredients
Energy
Sodium
Total Fat
Added sodium
SFA + TFA
Salt
SFA
Total sugars
TFA
Added sugars
Cholesterol
Lactose
Alcohol
Fructose
Partly hydrogenated fat
100g/100ml
100 kcal/kJ
Per Serving
Daily Value
Scoring
Threshold
Help consumer
Reformulation
Marketing
Children
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Non-directive
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Voluntary
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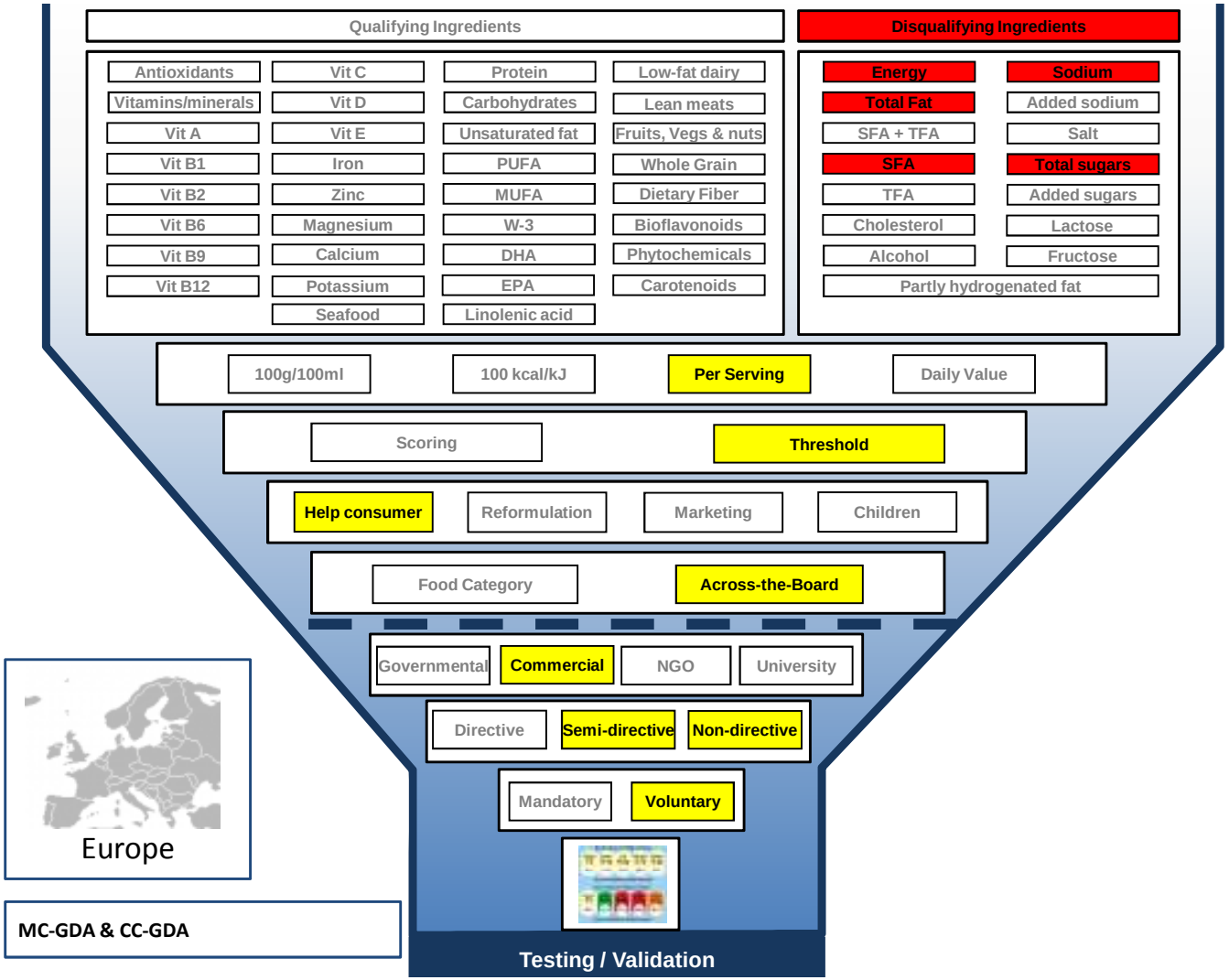
Testing / Validation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Antioxidants
Vitamins/minerals
Vit A
Vit B1
Vit B2
Vit B6
Vit B9
Vit B12
Vit C
Vit D
Vit E
Iron
Zinc
Magnesium
Calcium
Potassium
Seafood
Protein
Carbohydrates
Unsaturated fat
PUFA
MUFA
W-3
DHA
EPA
Linolenic acid
Low-fat dairy
Lean meats
Fruits, Vegs & nuts
Whole Grain
Dietary Fiber
Bioflavonoids
Phytochemicals
Carotenoids
Disqualifying Ingredients
Energy
Total Fat
SFA + TFA
SFA
TFA
Cholesterol
Alcohol
Sodium
Added sodium
Salt
Total sugars
Added sugars
Lactose
Fructose
Partly hydrogenated fat
100g/100ml
100 kcal/kJ
Per Serving
Daily Value
Scoring
Threshold
Help consumer
Reformulation
Marketing
Children
Food Category
Across-the-Board
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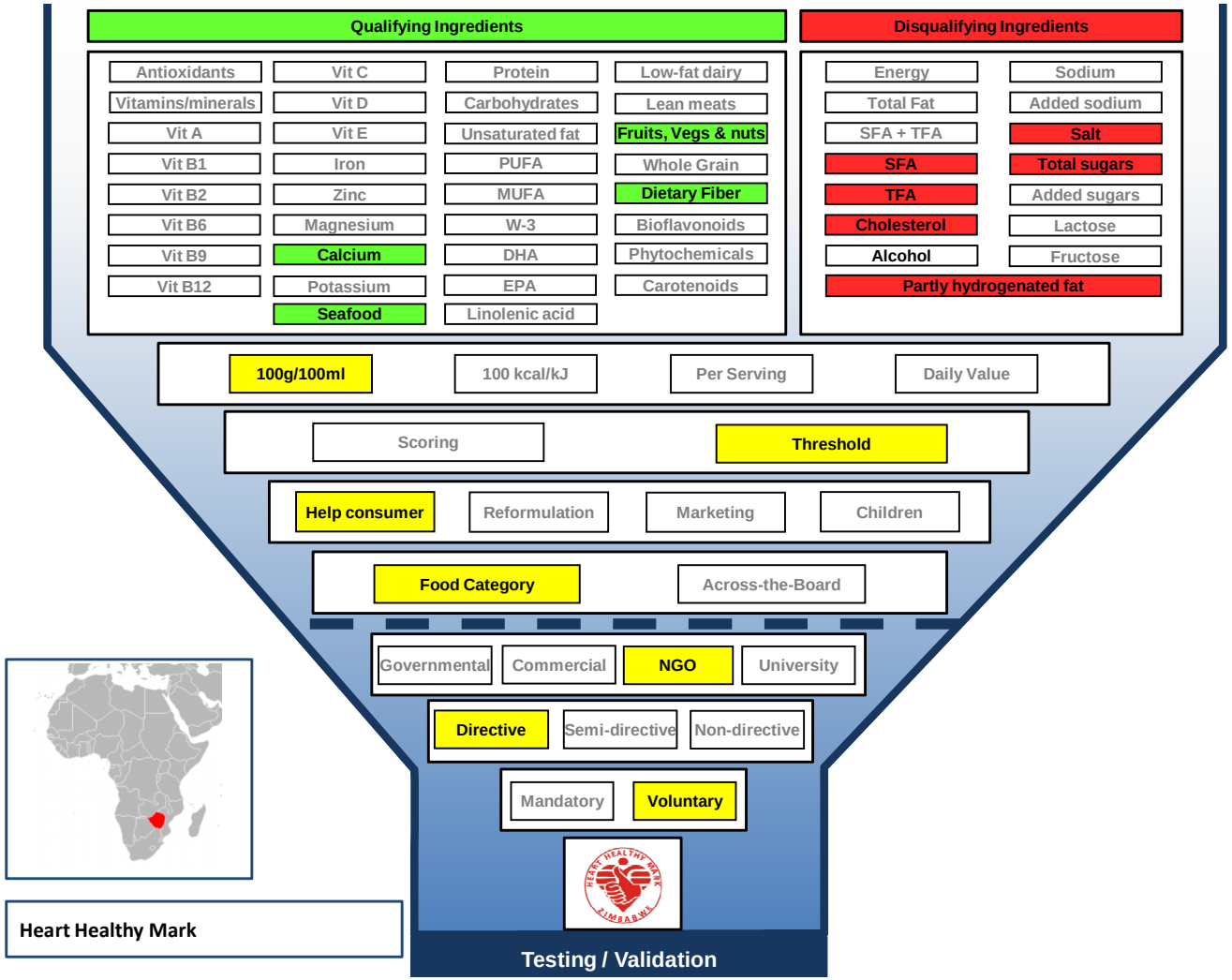
Non-directive
Mandatory
Voluntary
Testing / Validation
Europe
MC-GDA & CC-GDA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Antioxidants
Vitamins/minerals
Vit A
Vit B1
Vit B2
Vit B6
Vit B9
Vit B12
Vit C
Vit D
Vit E
Iron
Zinc
Magnesium
Calcium
Potassium
Seafood
Protein
Carbohydrates
Unsaturated fat
PUFA
MUFA
W-3
DHA
EPA
Linolenic acid
Low-fat dairy
Lean meats
Fruits, Vegs & nuts
Whole Grain
Dietary Fiber
Bioflavonoids
Phytochemicals
Carotenoids
Disqualifying Ingredients
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Total Fat
SFA + TFA
SFA
TFA
Cholesterol
Alcohol
Sodium
Added sodium
Salt
Total sugars
Added sugars
Lactose
Fructose
Partly hydrogenated fat
100g/100ml
100 kcal/kJ
Per Serving
Daily Value
Scoring
Threshold
Help consumer
Reformulation
Marketing
Children
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Directive
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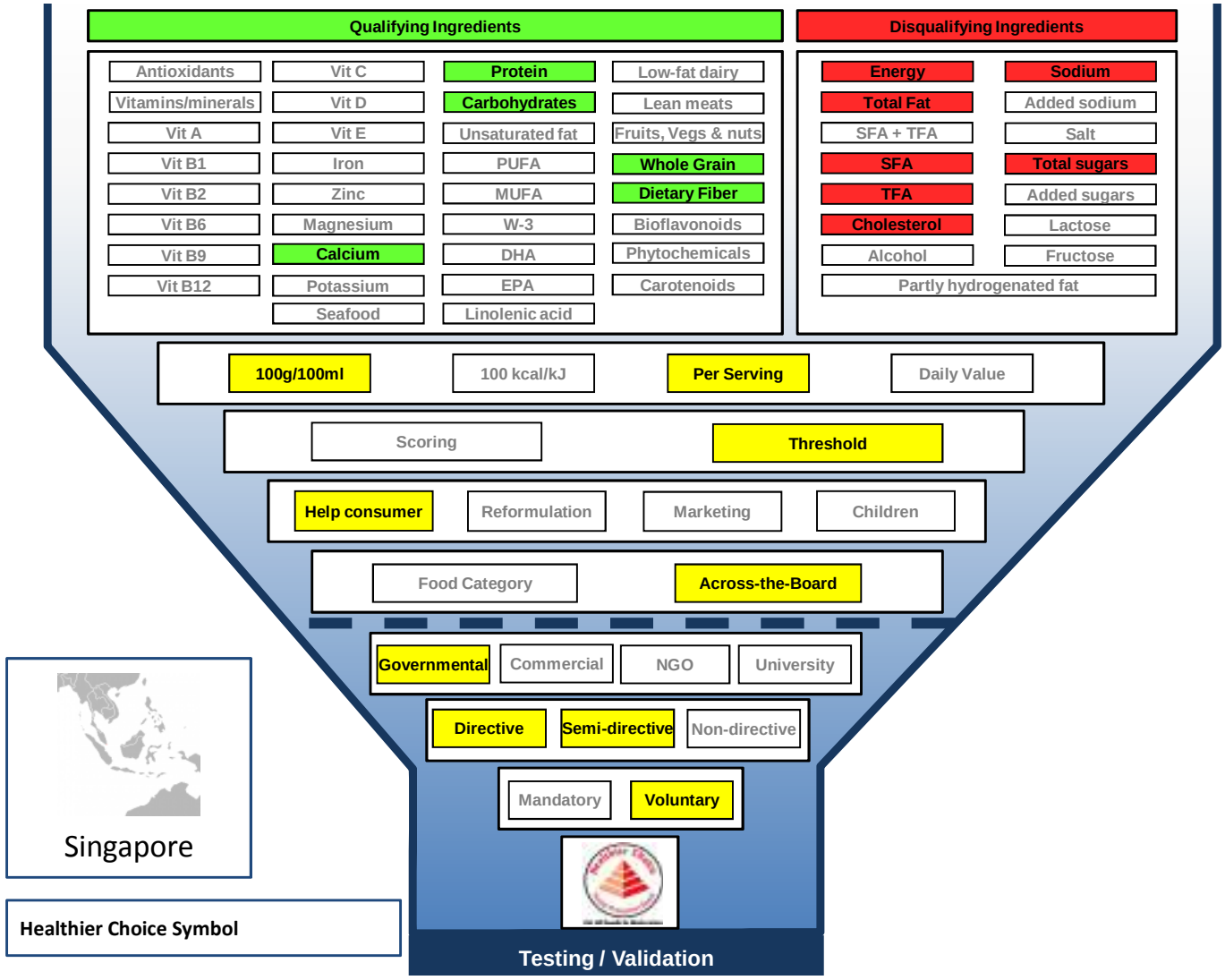
Non-directive
Mandatory
Voluntary
Heart Healthy Mark
Testing / Validation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Vit B12
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Vit D
Vit E
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Zinc
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Calcium
Potassium
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Carbohydrates
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MUFA
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Fruits, Vegs & nuts
Whole Grain
Dietary Fiber
Bioflavonoids
Phytochemicals
Carotenoids
Disqualifying Ingredients
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TFA
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Alcohol
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Added sugars
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Fructose
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100 kcal/kJ
Per Serving
Daily Value
Scoring
Threshold
Help consumer
Reformulation
Marketing
Children
Food Category
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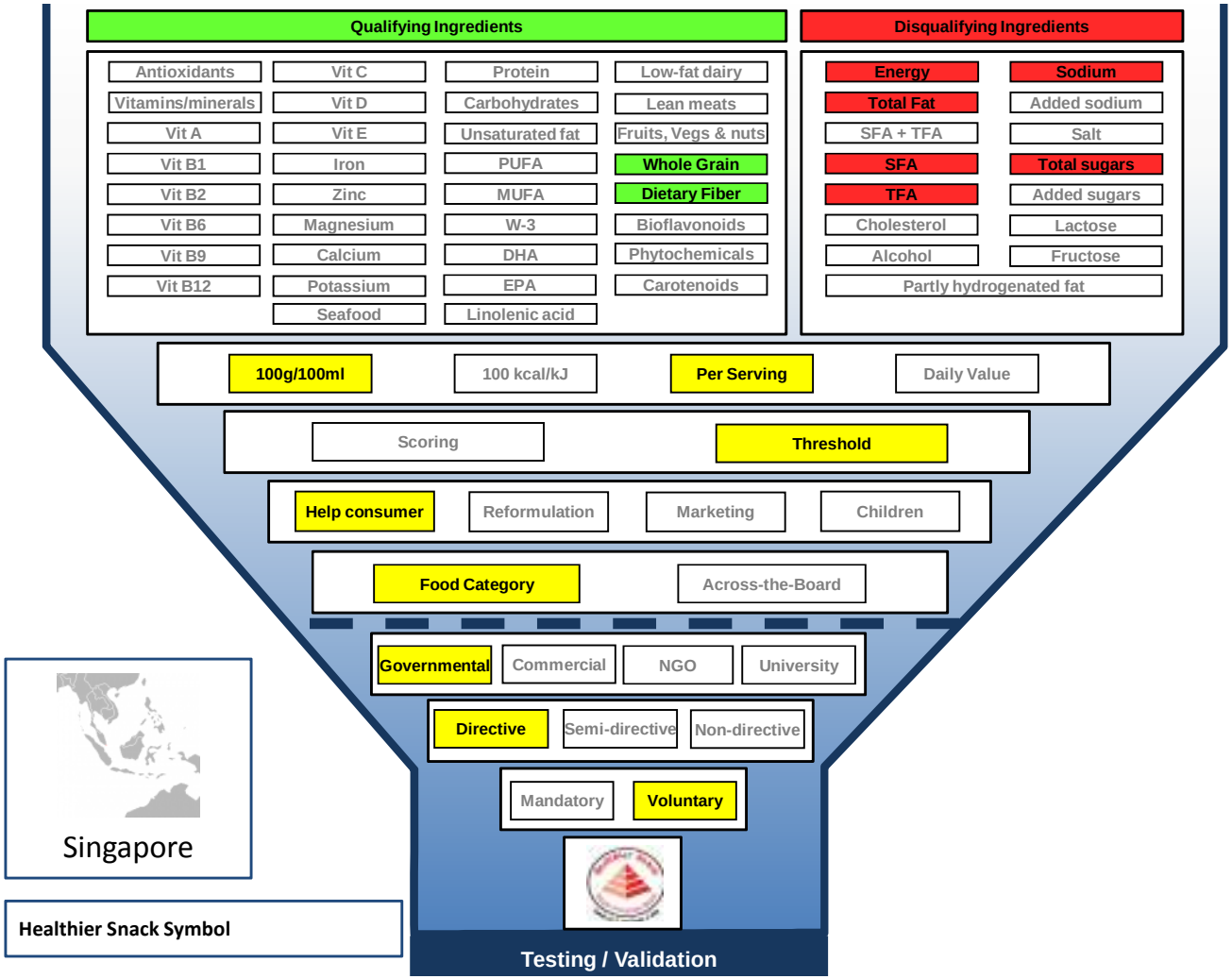
Non-directive
Mandatory
Voluntary
Testing / Validation
Singapore
Healthier Choice Symbol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Protein
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Vit E
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PUFA
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Vit B2
Zinc
MUFA
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Vit B9
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Vit B12
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Salt
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Added sugars
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Alcohol
Fructose
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Per Serving
Daily Value
Scoring
Threshold
Help consumer
Reformulation
Marketing
Children
Food Category
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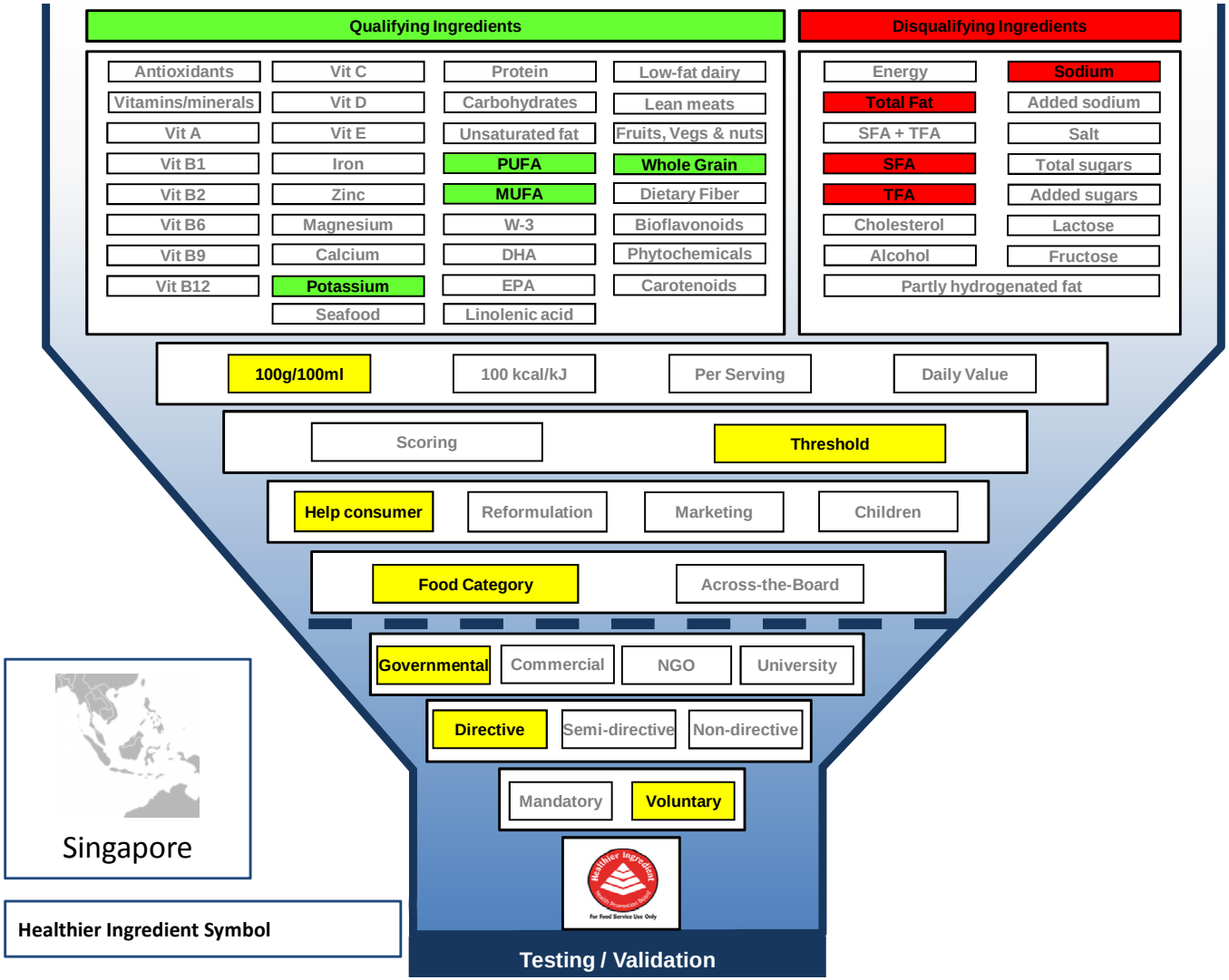
Singapore
Healthier Snack Symbol
Testing / Validation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Vitamins/minerals
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Carbohydrates
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PUFA
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Zinc
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Dietary Fiber
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TFA
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Fructose
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Daily Value
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Threshold
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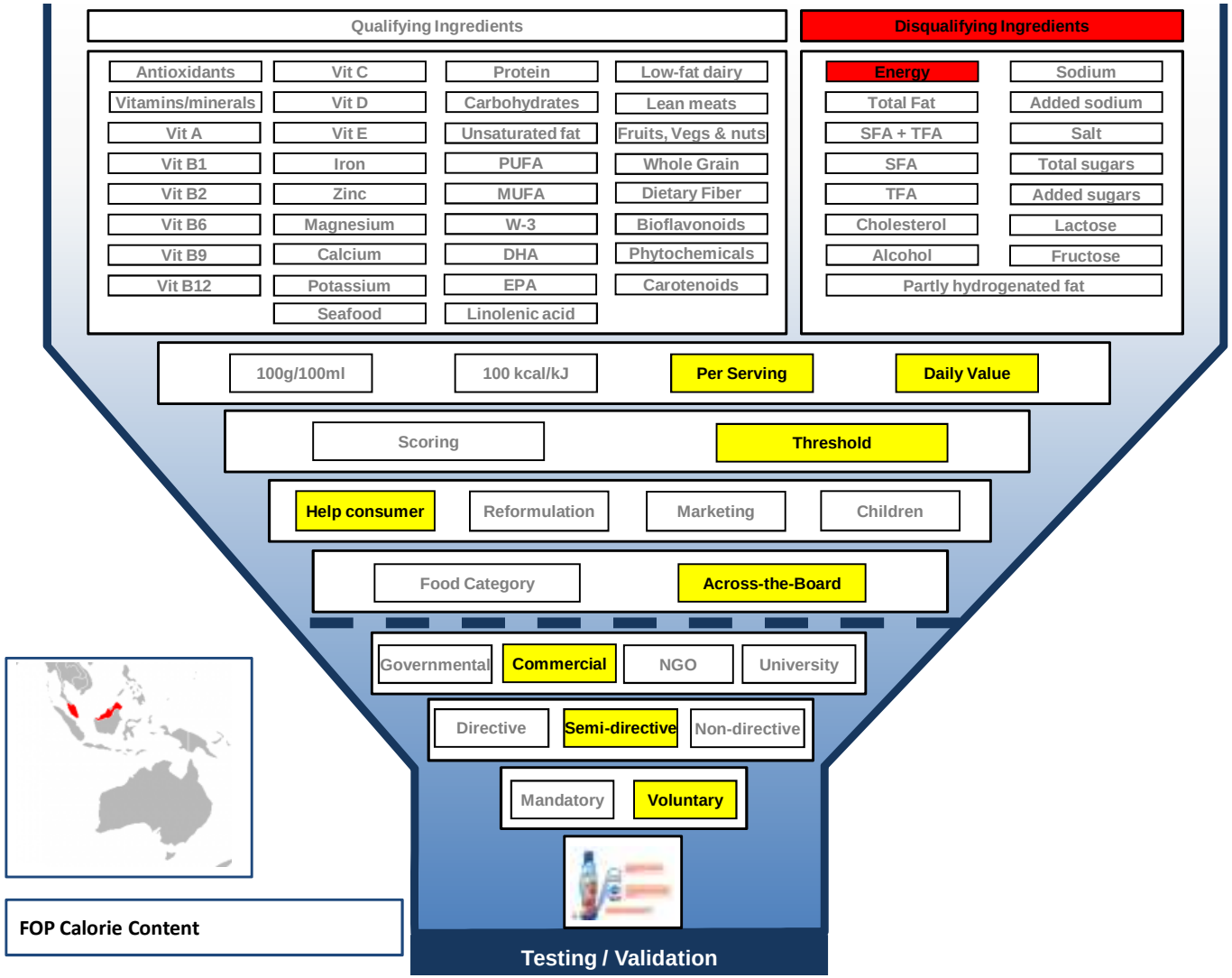
Healthier Ingredient Symbol
Testing / Validation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Vit D
Vit E
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Potassium
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Carbohydrates
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MUFA
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DHA
EPA
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Fruits, Vegs & nuts
Whole Grain
Dietary Fiber
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Phytochemicals
Carotenoids
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TFA
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Added sugars
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Fructose
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100g/100ml
100 kcal/kJ
Per Serving
Daily Value
Scoring
Threshold
Help consumer
Reformulation
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Mandatory
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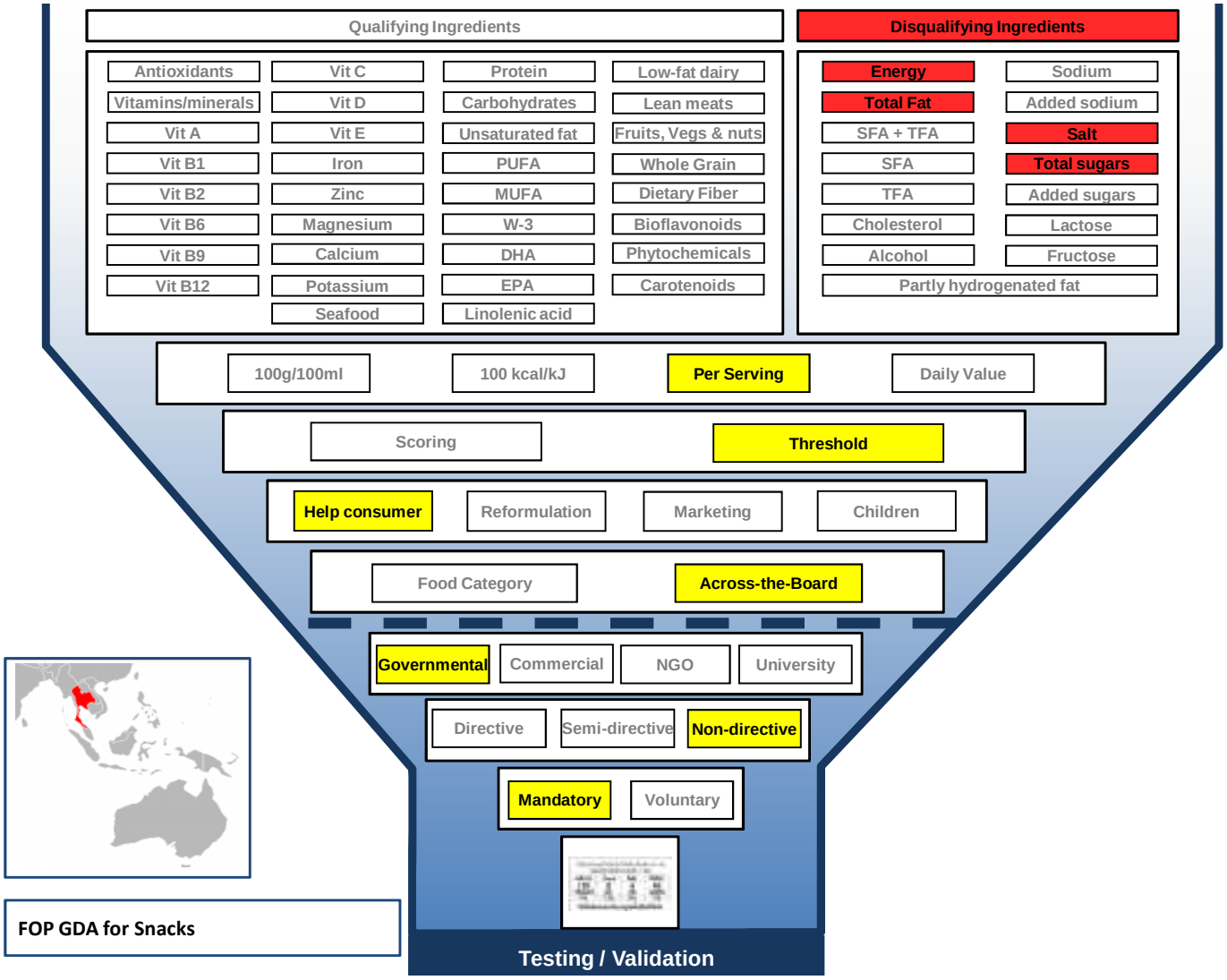
Testing / Validation
FOP Calorie Content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Protein
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Vitamins/minerals
Vit D
Carbohydrates
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Vit A
Vit E
Unsaturated fat
Fruits, Vegs & nuts
Vit B1
Iron
PUFA
Whole Grain
Vit B2
Zinc
MUFA
Dietary Fiber
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Bioflavonoids
Vit B9
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Vit B12
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Carotenoids
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Linolenic acid
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Salt
SFA
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TFA
Added sugars
Cholesterol
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Alcohol
Fructose
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100 kcal/kJ
Per Serving
Daily Value
Scoring
Threshold
Help consumer
Reformulation
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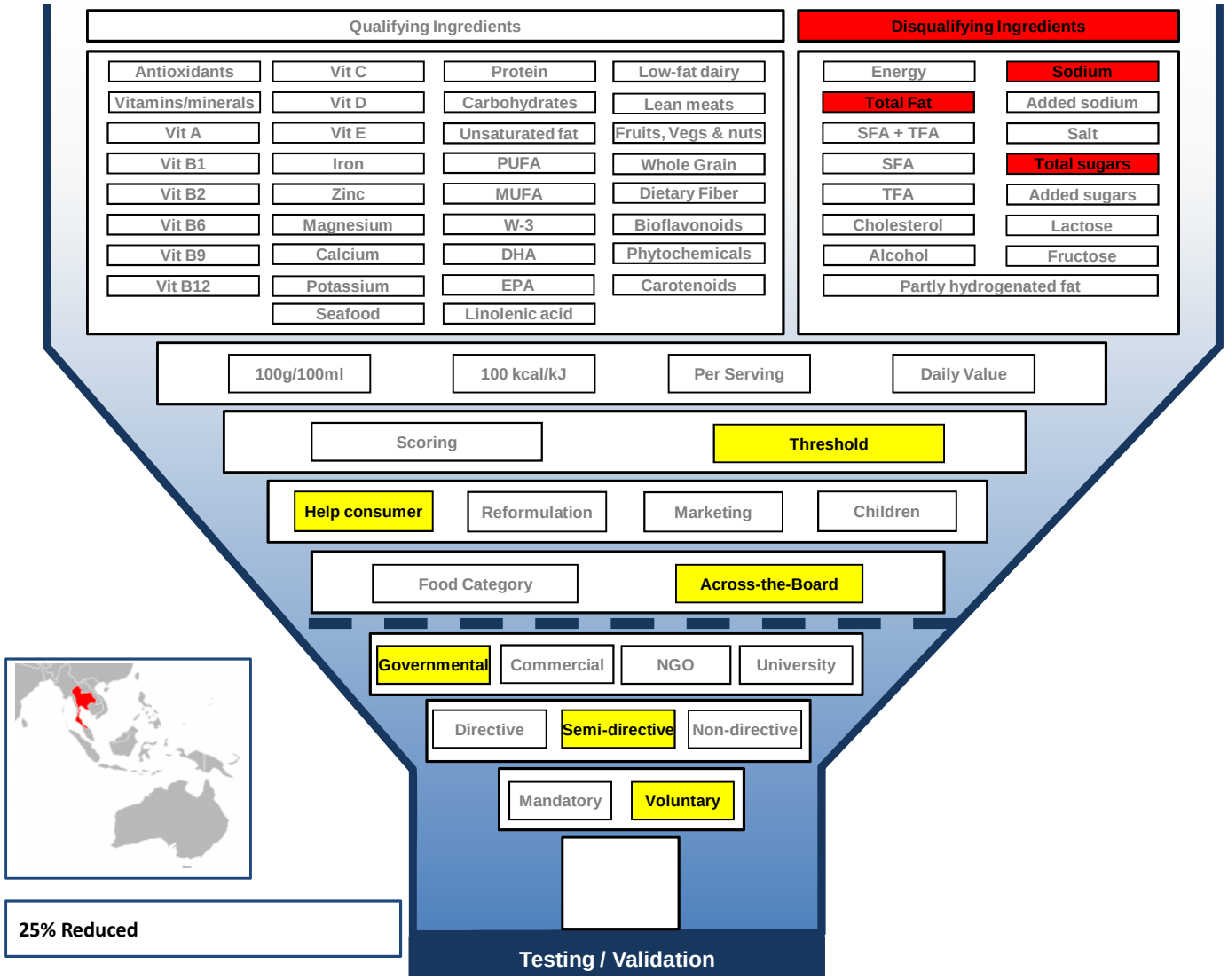
Mandatory
Voluntary
Testing / Validation
FOP GDA for Snacks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Vitamins/minerals
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Vit B6
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Vit D
Vit E
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Zinc
Magnesium
Calcium
Potassium
Seafood
Protein
Carbohydrates
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MUFA
W-3
DHA
EPA
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Fruits, Vegs & nuts
Whole Grain
Dietary Fiber
Bioflavonoids
Phytochemicals
Carotenoids
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TFA
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Fructose
100g/100ml
100 kcal/kJ
Per Serving
Daily Value
Scoring
Threshold
Help consumer
Reformulation
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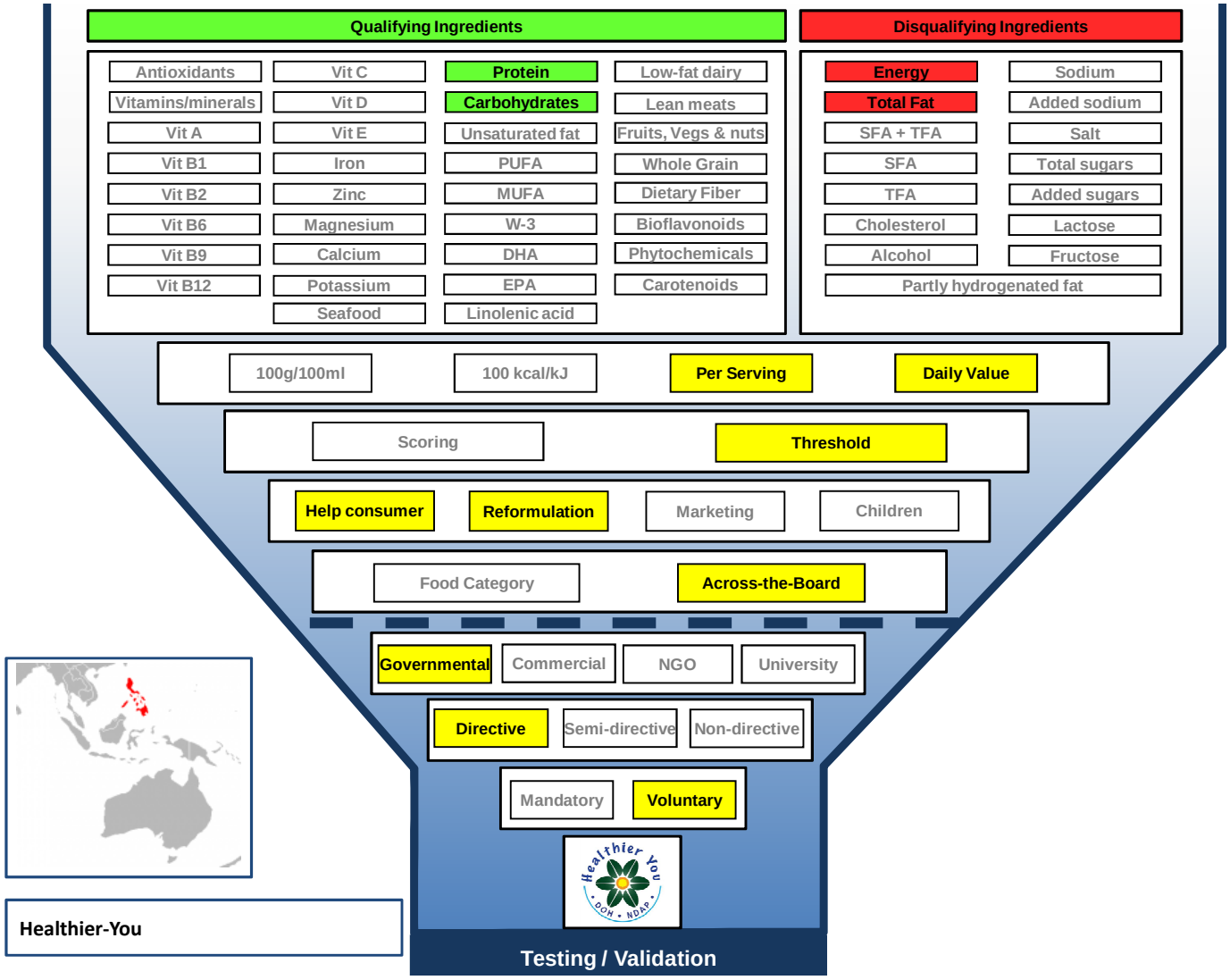
Testing / Validation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Vit C
Protein
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Vitamins/minerals
Vit D
Carbohydrates
Lean meats
Vit A
Vit E
Unsaturated fat
Fruits, Vegs & nuts
Vit B1
Iron
PUFA
Whole Grain
Vit B2
Zinc
MUFA
Dietary Fiber
Vit B6
Magnesium
W-3
Bioflavonoids
Vit B9
Calcium
DHA
Phytochemicals
Vit B12
Potassium
EPA
Carotenoids
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Disqualifying Ingredients
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Total Fat
Added sodium
SFA + TFA
Salt
SFA
Total sugars
TFA
Added sugars
Cholesterol
Lactose
Alcohol
Fructose
Partly hydrogenated fat
100g/100ml
100 kcal/kJ
Per Serving
Daily Value
Scoring
Threshold
Help consumer
Reformulation
Marketing
Children
Food Category
Across-the-Board
Governmental
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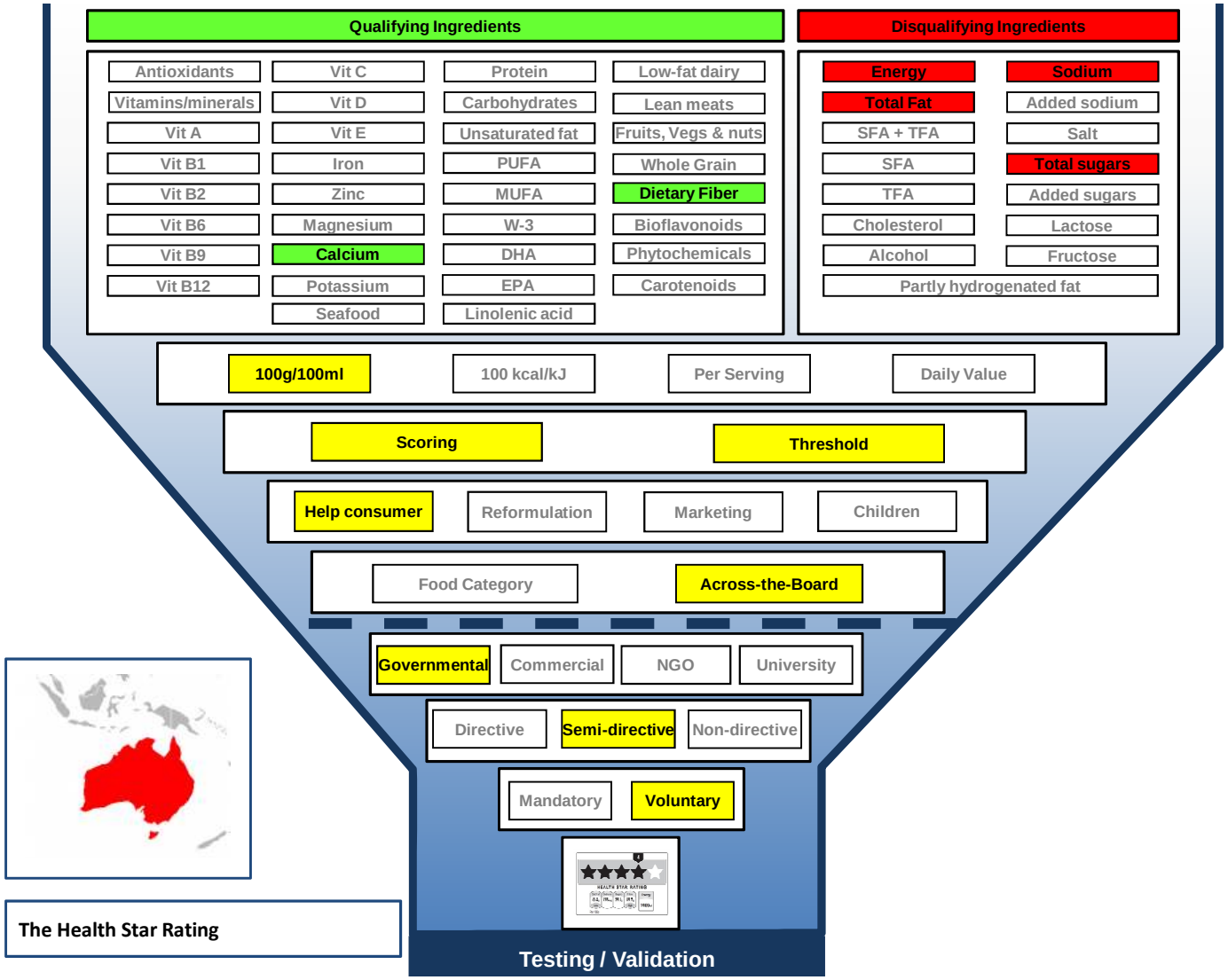
Healthier You
DOH • NDAP
Testing / Validation
Healthier-You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Vitamins/minerals
Vit D
Carbohydrates
Lean meats
Vit A
Vit E
Unsaturated fat
Fruits, Vegs & nuts
Vit B1
Iron
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Whole Grain
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Zinc
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Bioflavonoids
Vit B9
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Vit B12
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Carotenoids
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Disqualifying Ingredients
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Total Fat
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TFA
Added sugars
Cholesterol
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Alcohol
Fructose
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100g/100ml
100 kcal/kJ
Per Serving
Daily Value
Scoring
Threshold
Help consumer
Reformulation
Marketing
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Food Category
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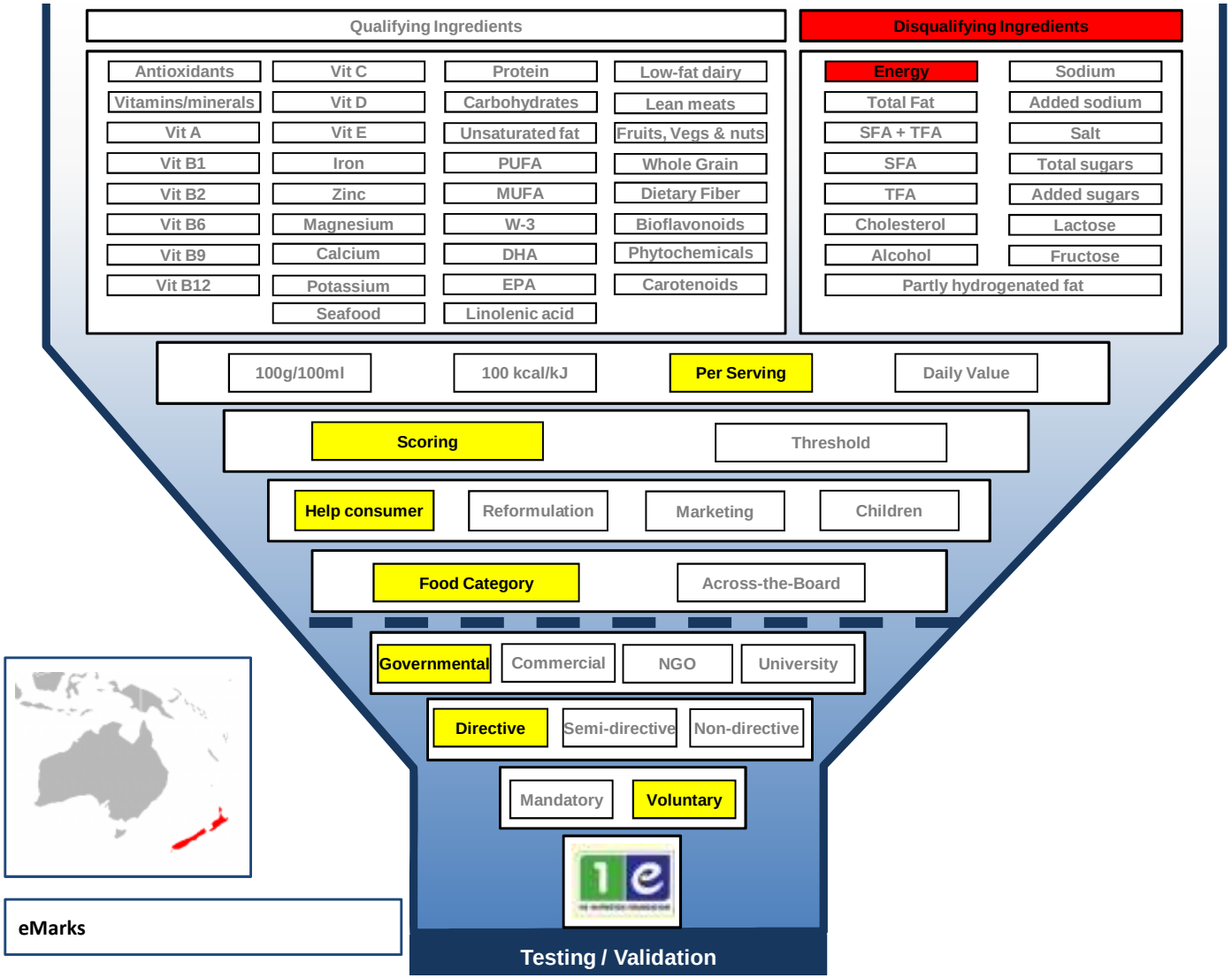
Mandatory
Voluntary
Testing / Validation
The Health Star Rating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Vitamins/minerals
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Vit B2
Vit B6
Vit B9
Vit B12
Vit C
Vit D
Vit E
Iron
Zinc
Magnesium
Calcium
Potassium
Seafood
Protein
Carbohydrates
Unsaturated fat
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MUFA
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DHA
EPA
Linolenic acid
Low-fat dairy
Lean meats
Fruits, Vegs & nuts
Whole Grain
Dietary Fiber
Bioflavonoids
Phytochemicals
Carotenoids
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Added sugars
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Fructose
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Per Serving
Daily Value
Scoring
Threshold
Help consumer
Reformulation
Marketing
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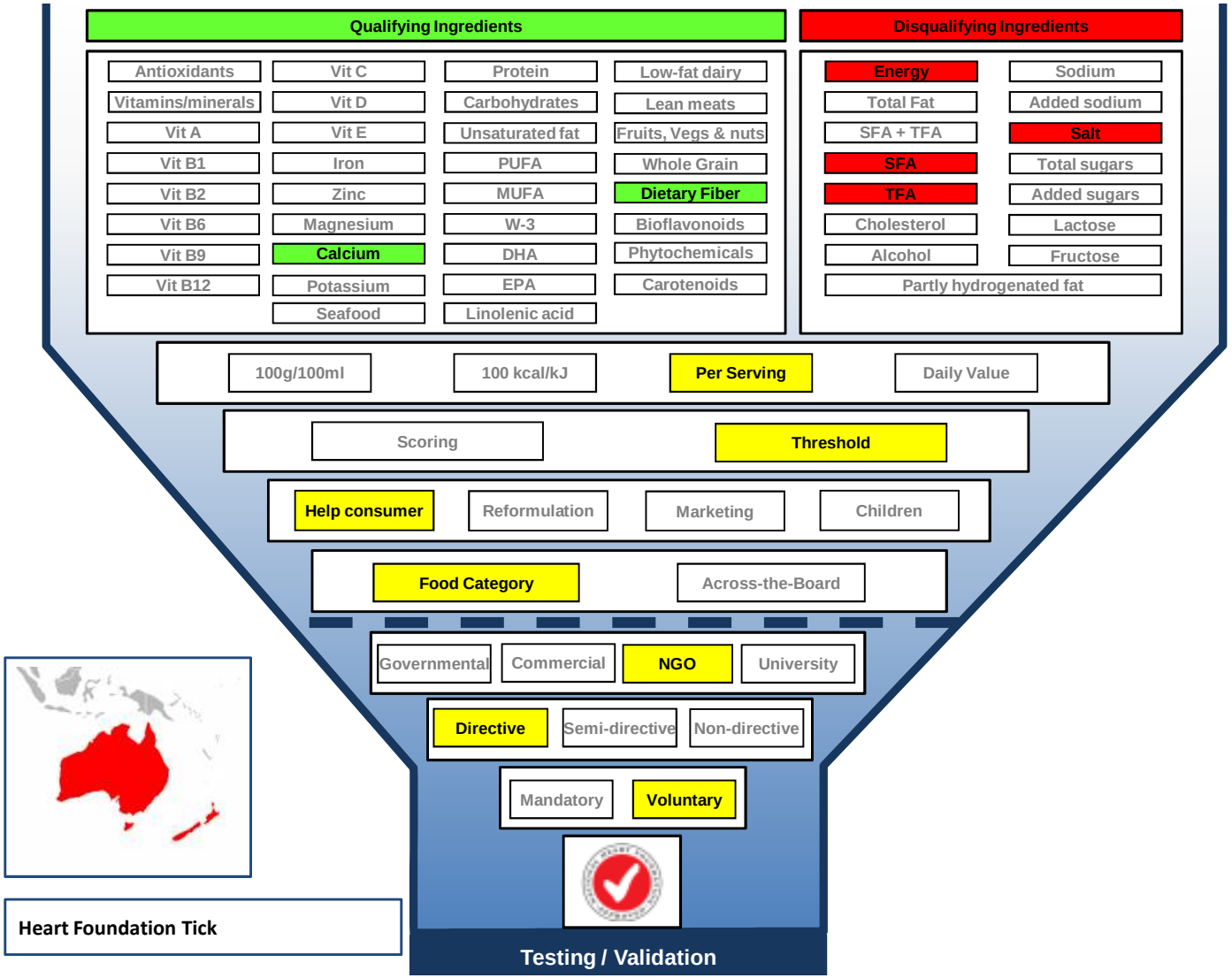
Testing / Validation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Antioxidants
Vitamins/minerals
Vit A
Vit B1
Vit B2
Vit B6
Vit B9
Vit B12
Vit C
Vit D
Vit E
Iron
Zinc
Magnesium
Calcium
Potassium
Seafood
Protein
Carbohydrates
Unsaturated fat
PUFA
MUFA
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DHA
EPA
Linolenic acid
Low-fat dairy
Lean meats
Fruits, Vegs & nuts
Whole Grain
Dietary Fiber
Bioflavonoids
Phytochemicals
Carotenoids
Disqualifying Ingredients
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TFA
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Alcohol
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Salt
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Added sugars
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Fructose
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100g/100ml
100 kcal/kJ
Per Serving
Daily Value
Scoring
Threshold
Help consumer
Reformulation
Marketing
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Food Category
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Directive
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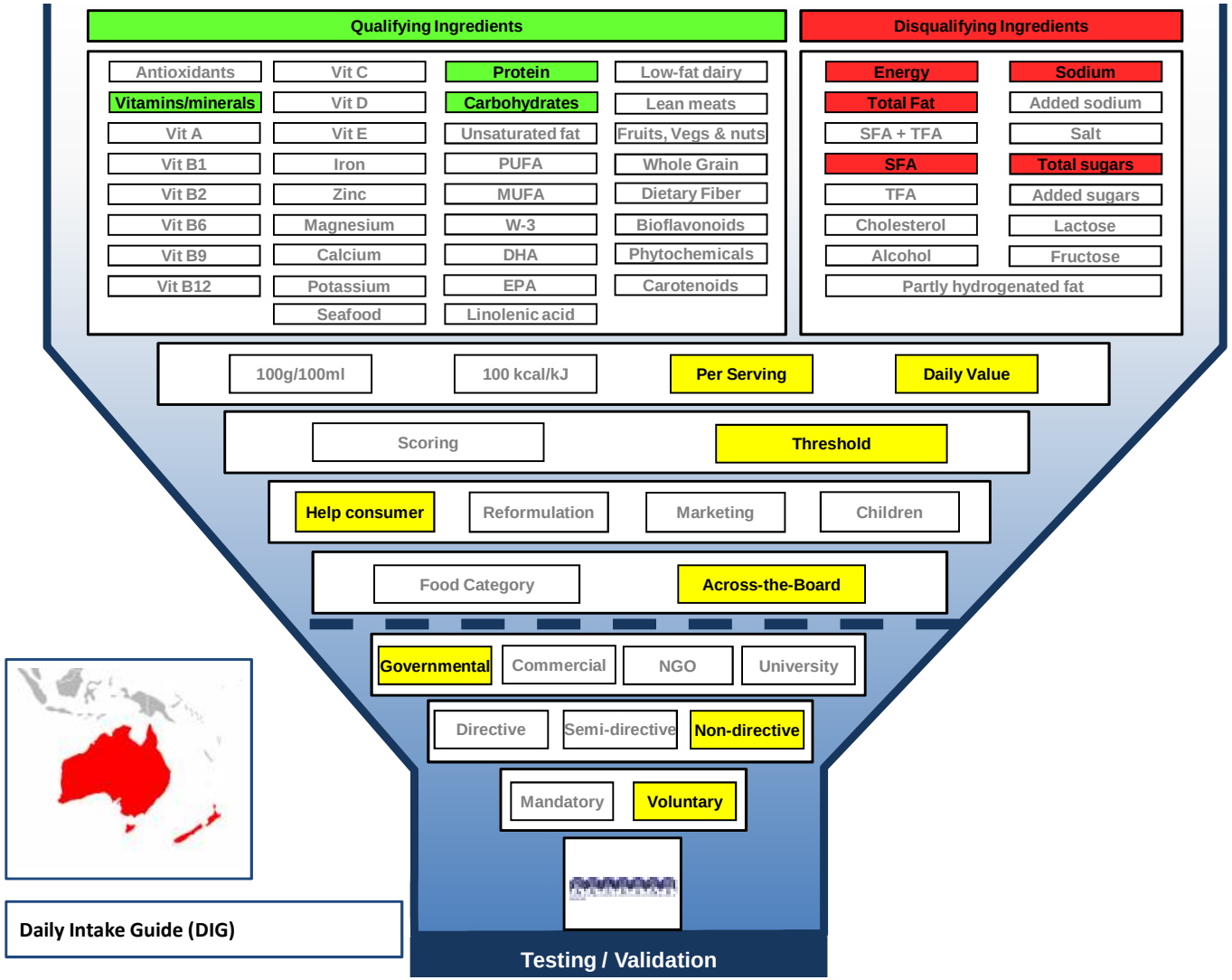
Mandatory
Voluntary
Testing / Validation
Heart Foundation Tick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Vitamins/minerals
Vit A
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Vit B2
Vit B6
Vit B9
Vit B12
Vit C
Vit D
Vit E
Iron
Zinc
Magnesium
Calcium
Potassium
Seafood
Protein
Carbohydrates
Unsaturated fat
PUFA
MUFA
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DHA
EPA
Linolenic acid
Low-fat dairy
Lean meats
Fruits, Vegs & nuts
Whole Grain
Dietary Fiber
Bioflavonoids
Phytochemicals
Carotenoids
Disqualifying Ingredients
Energy
Total Fat
SFA + TFA
SFA
TFA
Cholesterol
Alcohol
Sodium
Added sodium
Salt
Total sugars
Added sugars
Lactose
Fructose
Partly hydrogenated fat
100g/100ml
100 kcal/kJ
Per Serving
Daily Value
Scoring
Threshold
Help consumer
Reformulation
Marketing
Children
Food Category
Across-the-Board
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NGO
University
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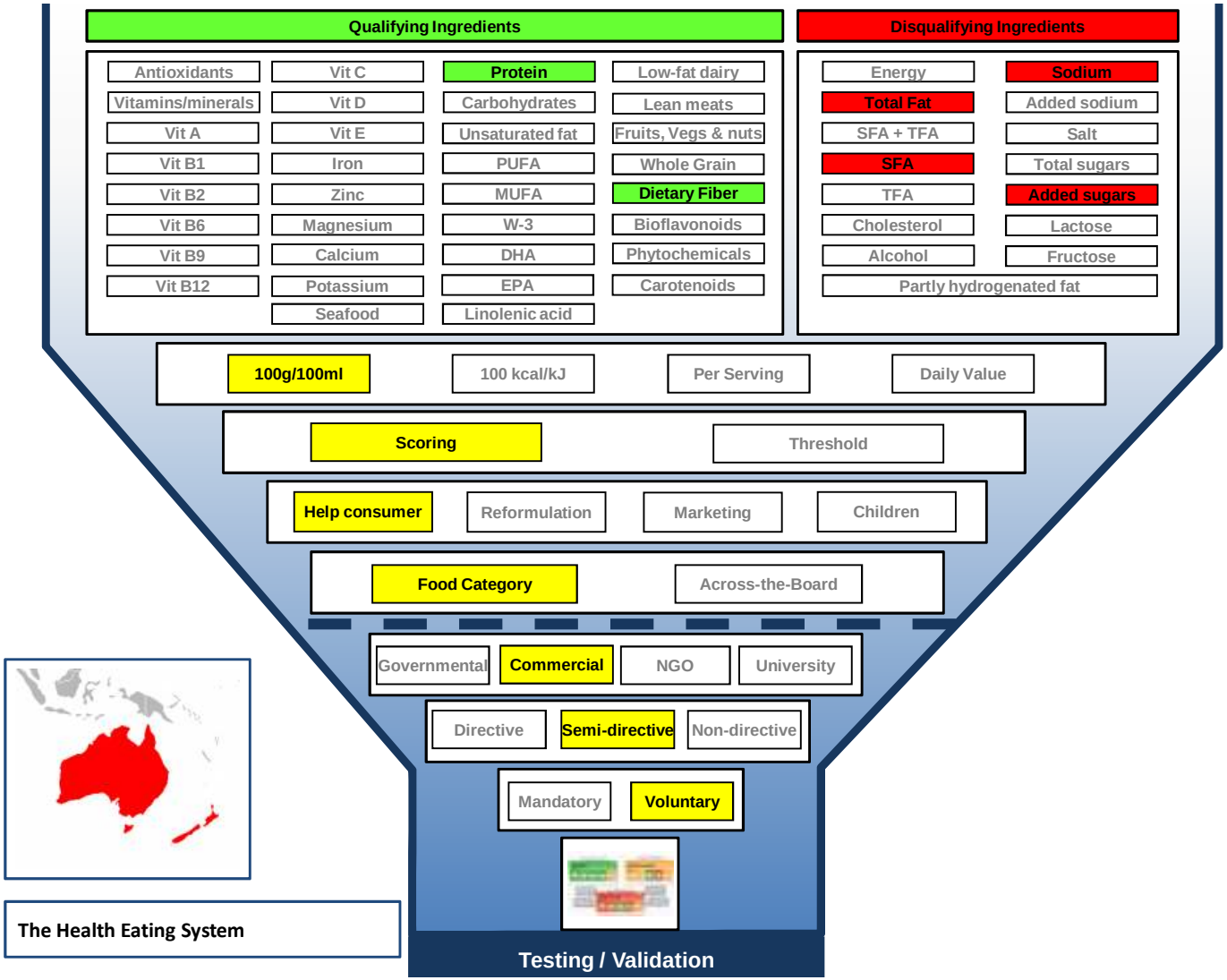
Semi-directive
Non-directive
Mandatory
Voluntary
Daily Intake Guide (DIG)
Testing / Validation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Vit C
Protein
Low-fat dairy
Vitamins/minerals
Vit D
Carbohydrates
Lean meats
Vit A
Vit E
Unsaturated fat
Fruits, Vegs & nuts
Vit B1
Iron
PUFA
Whole Grain
Vit B2
Zinc
MUFA
Dietary Fiber
Vit B6
Magnesium
W-3
Bioflavonoids
Vit B9
Calcium
DHA
Phytochemicals
Vit B12
Potassium
EPA
Carotenoids
Seafood
Linolenic acid
Disqualifying Ingredients
Energy
Sodium
Total Fat
Added sodium
SFA + TFA
Salt
SFA
Total sugars
TFA
Added sugars
Cholesterol
Lactose
Alcohol
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Partly hydrogenated fat
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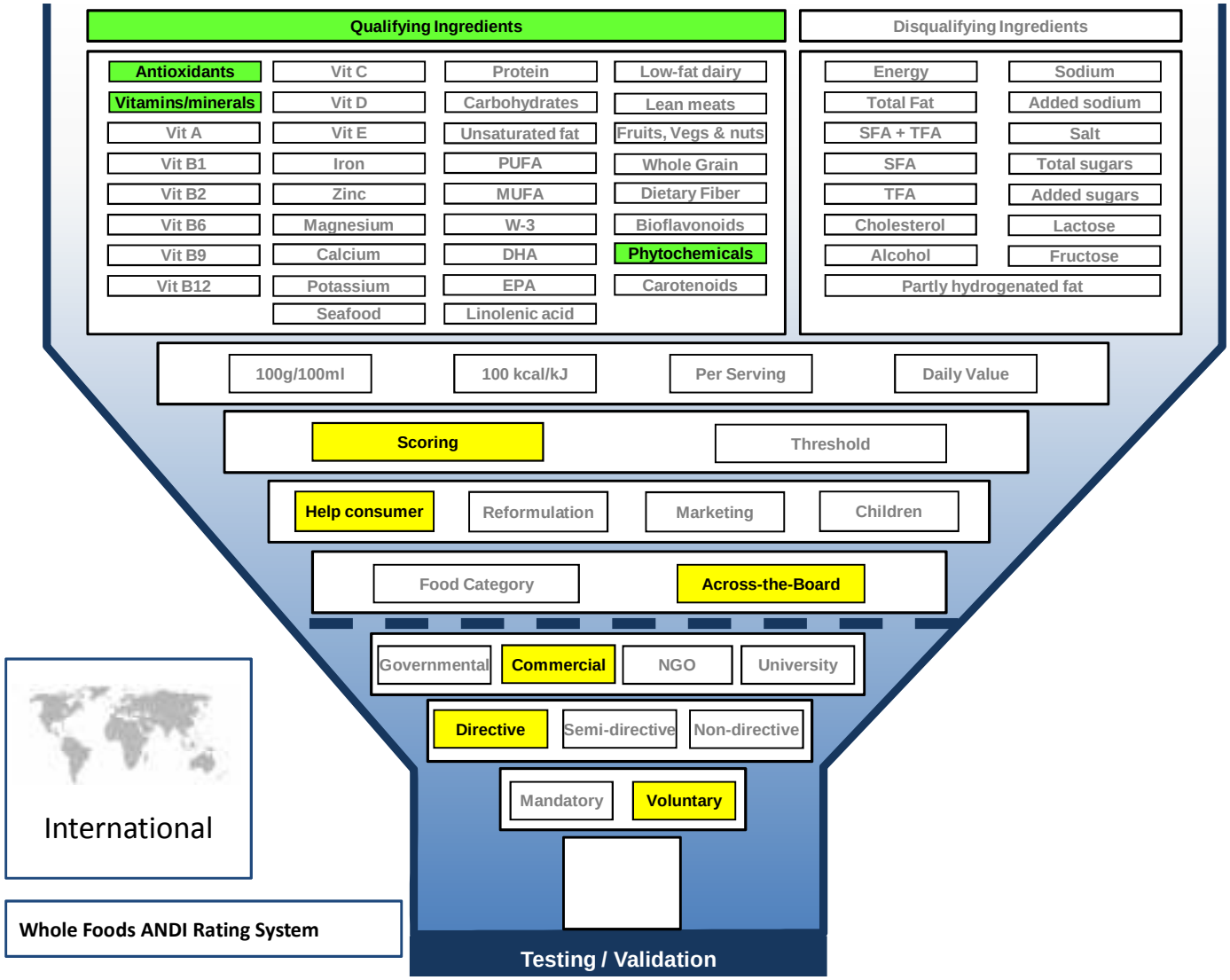
Testing / Validation
The Health Eating System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Vit B6
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Vit C
Vit D
Vit E
Iron
Zinc
Magnesium
Calcium
Potassium
Seafood
Protein
Carbohydrates
Unsaturated fat
PUFA
MUFA
W-3
DHA
EPA
Linolenic acid
Low-fat dairy
Lean meats
Fruits, Vegs & nuts
Whole Grain
Dietary Fiber
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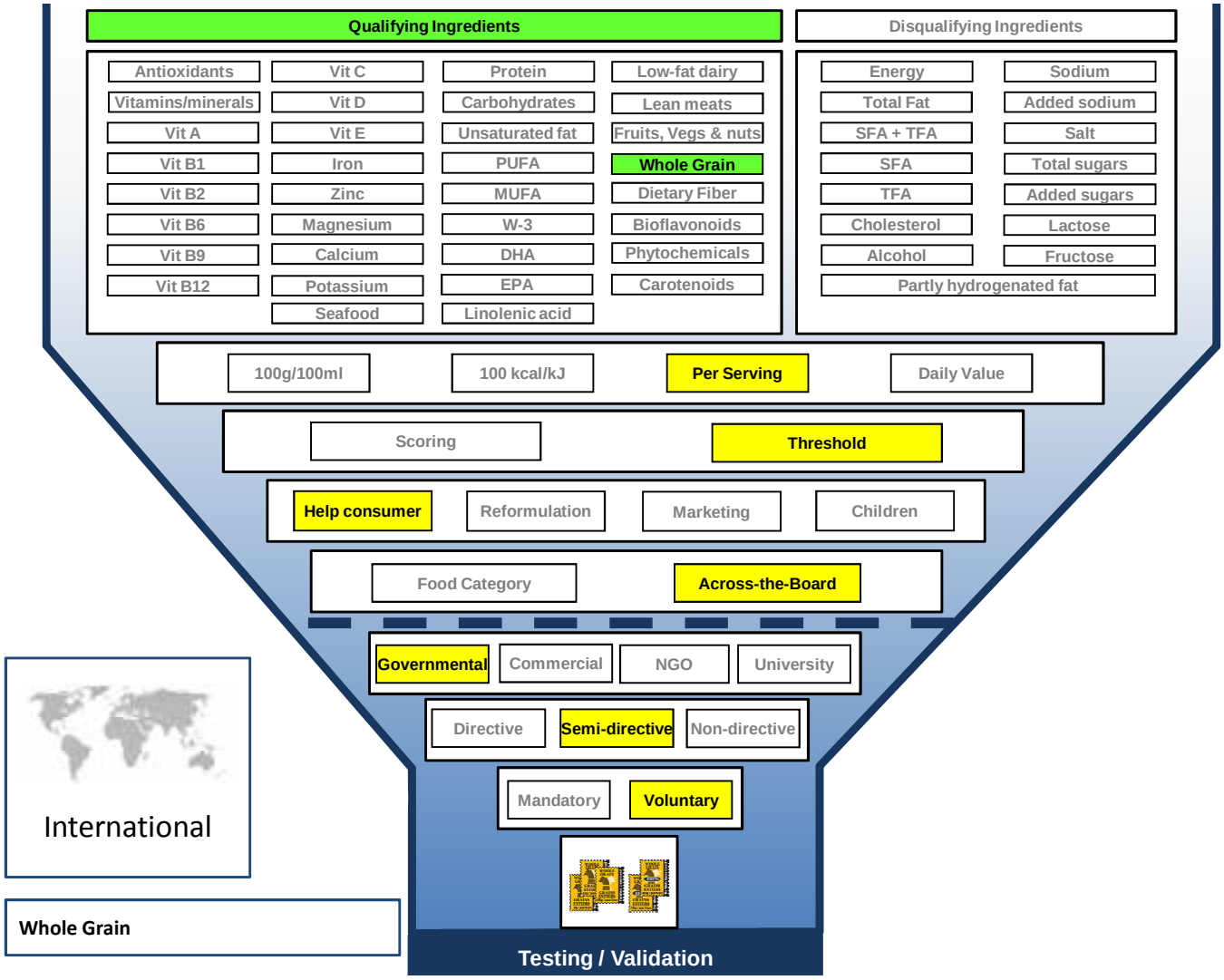
International
Whole Foods ANDI Rating System
Testing / Validation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Vitamins/minerals
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SFA + TFA
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Alcohol
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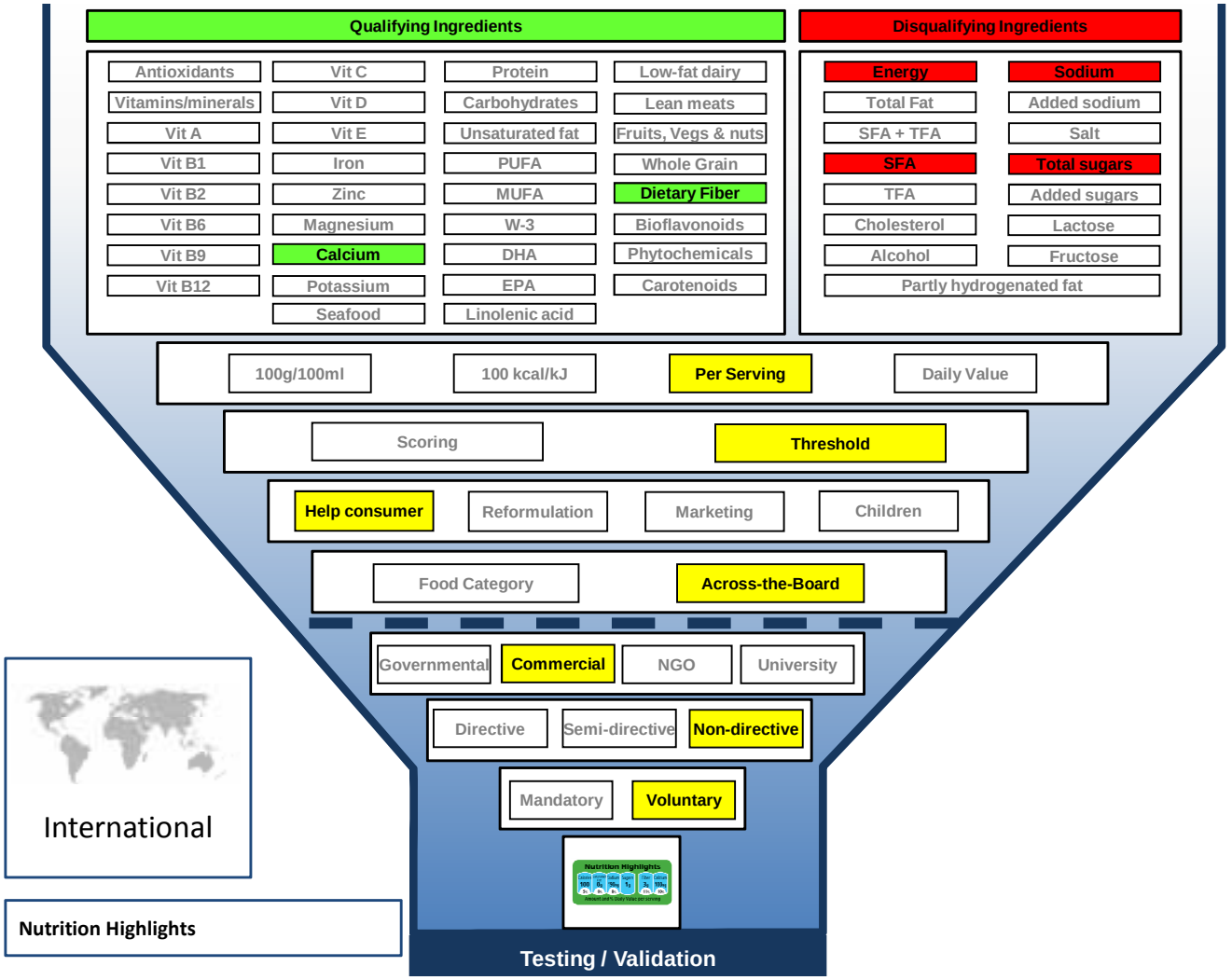
Testing / Validation
International
Whole Grain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Antioxidants
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Lean meats
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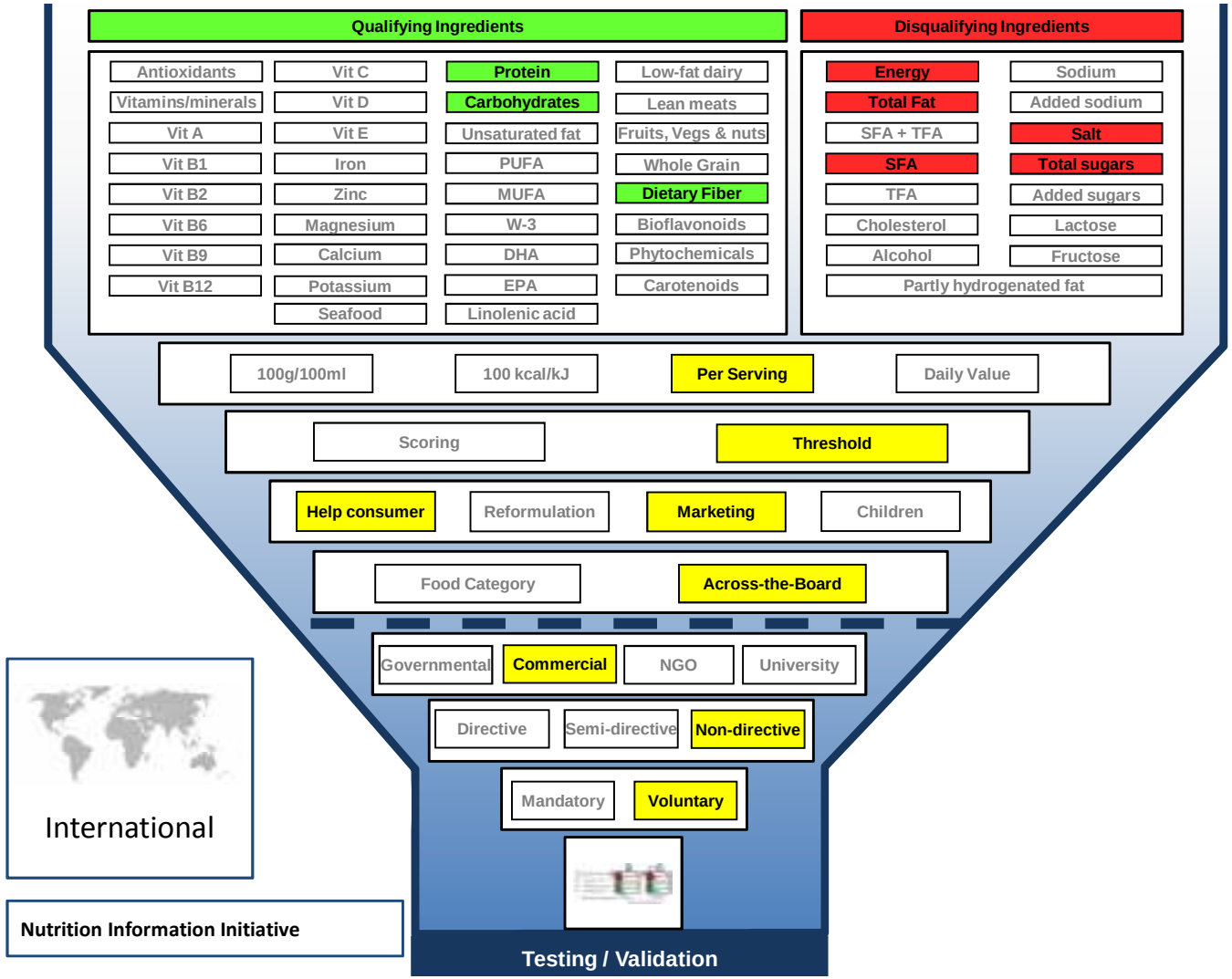
Nutrition Highlights
Testing / Validation
International
Nutrition Highlights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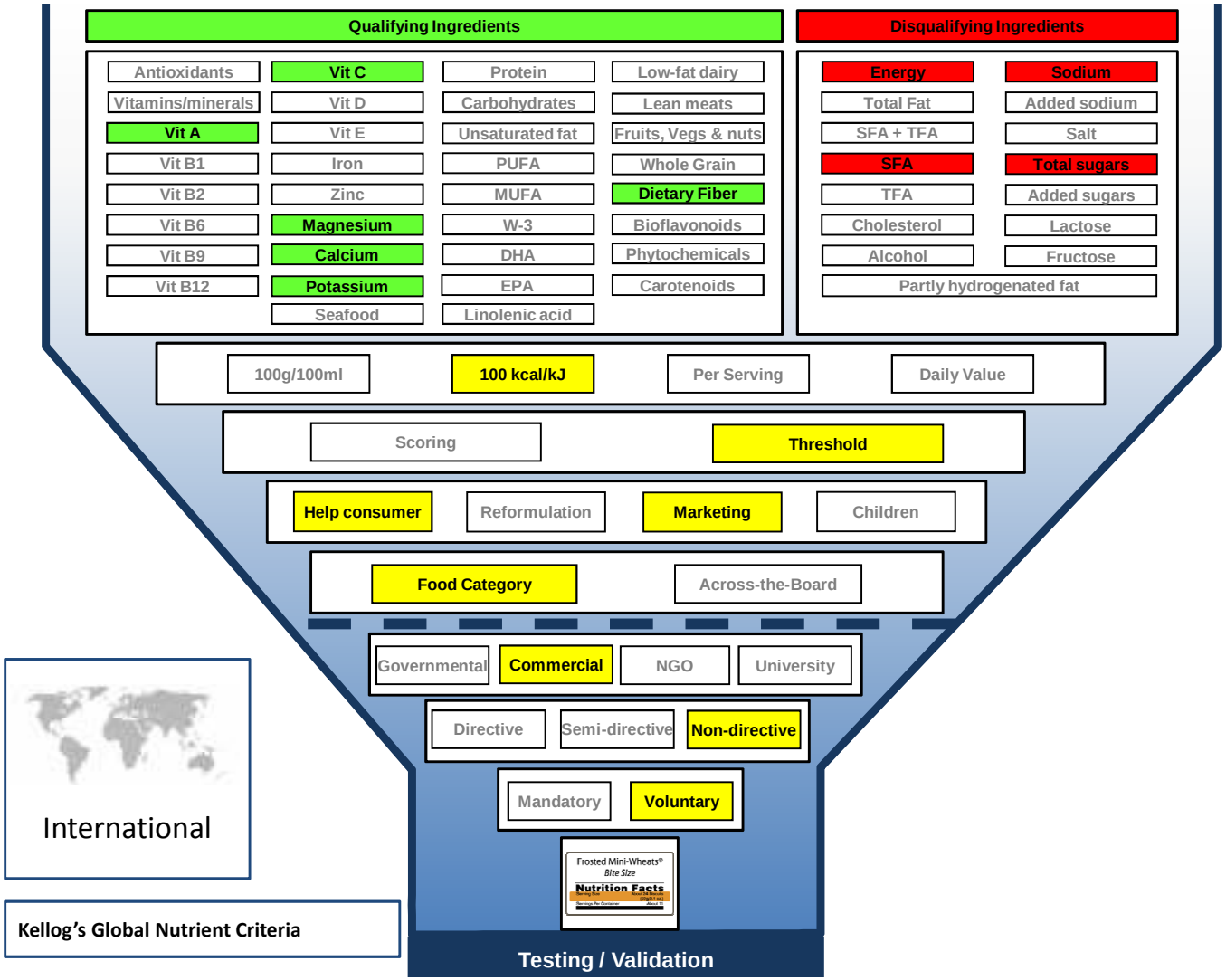
Testing / Validation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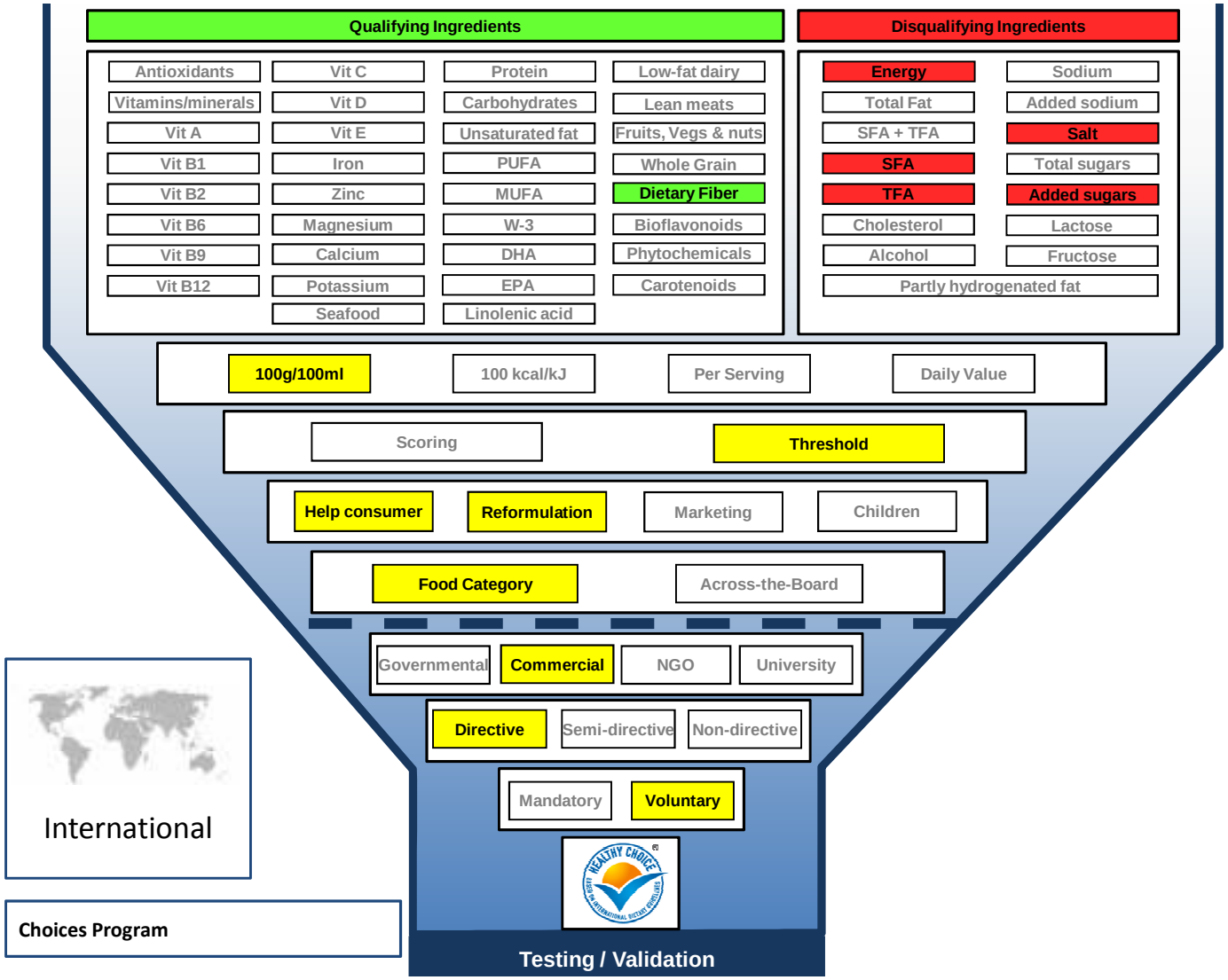
Frosted Mini-Wheats®
Bite Size
Nutrition Facts
Testing / Validation
International
Kellog's Global Nutrient Criteria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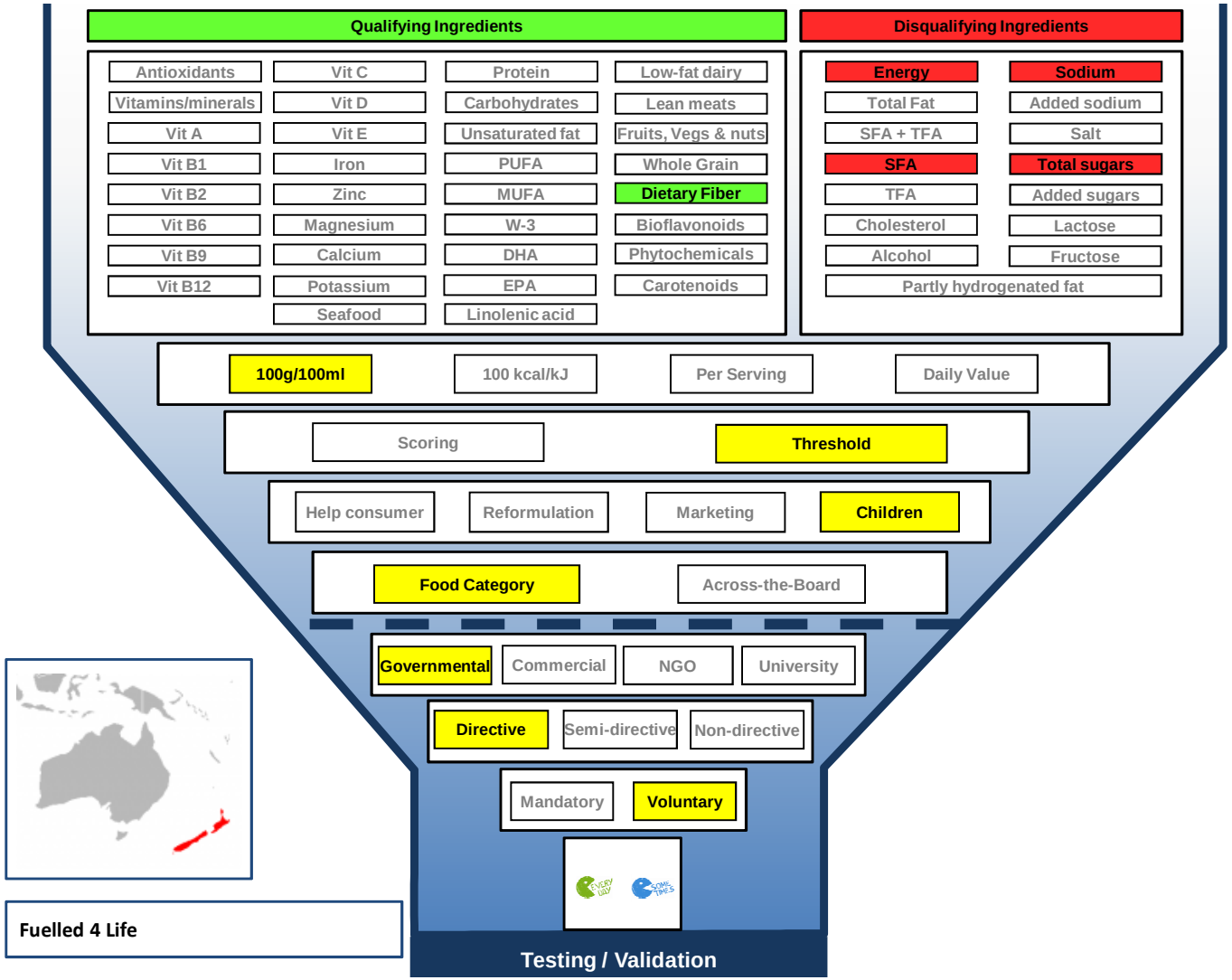
HEALTHY CHOICE
Testing / Validation
International
Choices Program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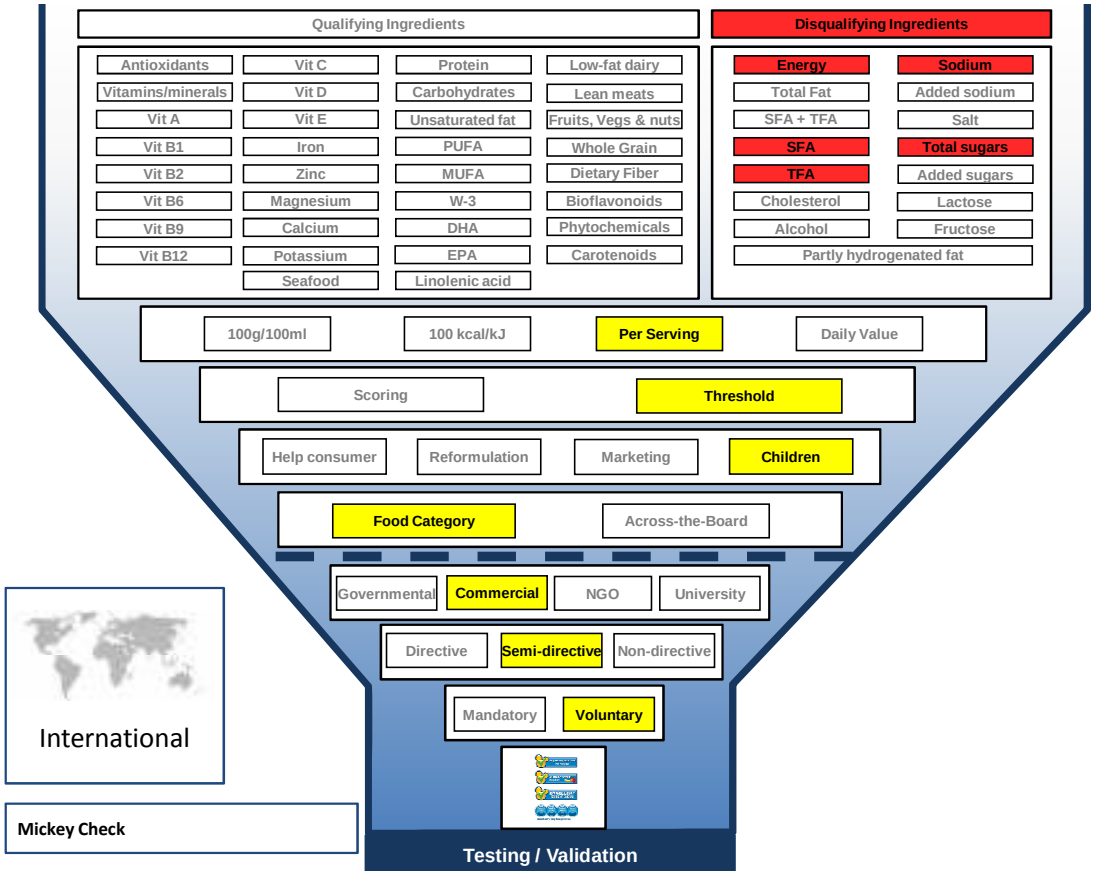
Testing / Validation
Fuelled 4 Life



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