Mainstreaming Integrated Assessment Models by embedding behavioural change and actor heterogeneity, and increasing their outreach to citizens, communities and industrial actors

CHOICE D2.2 Design framework for the CHOICE campaigns, interventions and messages

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1.0	29/08/2024	Giannis Adamos – ATHENA	Final submitted version

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Glossary of terms

Term	Description
Food Value Chain	The food value chain refers to the full range of activities and processes involved in the production, processing, distribution, and consumption of food.
Quintuple Helix	The Quintuple Helix model is a conceptual framework that classifies stakeholders across five broad categories, namely Industry, Public Sector, Academia/Research, Civil Society and NGOs.

List of abbreviations and acronyms

Abbreviation	Meaning
AMUCC	Association of Women Coffee Growers of Cauca
FVC	Food Value Chain
FAO	Food and Agriculture Organization of the United Nations
GHG	Greenhouse Gas
IPCC	Intergovernmental Panel on Climate Change
KPI	Key Performance Indicator
MOOC	Massive Open Online Courses
NGO	Non-Governmental Organization
SFVCD	Sustainable Food Value Chain Development
WEFE	Water-Energy-Food-Ecosystems

1. Executive Summary

The goal of D2.2 is to establish a coherent framework for the design, implementation and evaluation of the CHOICE campaigns, interventions and messages, based on good practices identified in the literature. This framework follows a 6-step methodology, acknowledging the project's vision, ambition, objectives, tools and the specific challenges and targets of the five pilot demonstrations to be realized in Austria, Spain, Greece, Colombia and South Africa.

The work is fed by the findings of the work already completed in two deliverables, specifically: D2.1, including the stakeholders mapping framework and list, and the identification of strategic factors affecting users' food habits, and D4.1, which provided an extensive list of the most appropriate digital tools to be applied in this project.

The proposed framework is structured according to seven parameters thus scope, target groups, objectives and activities (*attributes*), along with a priori knowledge, evaluation budget and stakeholders (*aspects of the campaign/intervention environment*).

The deliverable collects and analyses the required information and knowledge needed for setting up the framework that can be applied during the lifecycle of CHOICE. A comprehensive Gantt chart is also provided.

2. Introduction

Background

Drawing from the European Green Deal, the "Farm to Fork Strategy" aims to reveal "*the challenges of sustainable food systems*" and to recognize "*the inextricable links between healthy people, healthy societies and a healthy planet*" (European Commission, 2020). Attaining the agenda of the Climate Law, "Farm to Fork" mobilizes food systems to partake in this endeavour, while stressing the importance of altering food habits towards sustainable ones to reduce food waste.

A critical question would be "*How possible is it to provide a healthy diet to 10 billion of people within planetary boundaries*?". The EAT-Lancet Commission on Food, Planet and Health[1], points out that this vision can be achieved, still we need to transform eating habits, improve food production and reduce food waste.

Reports published by the Food and Agriculture Organization of the United Nations (FAO) on the Sustainable Food Value Chain Development (SFVCD) highlight that effective ***interventions*** in the FVC should set goals, follow an action plan and monitor their performance through constant ***evaluation***. This strategy should also involve relevant ***stakeholders*** to gage their capacity for change and their incentives, to provide them with learning opportunities to co-create a shared vision (FAO, 2014).

At the same time, building ***resilience*** seems to be an imperative approach to deal with the rapid and severe changes that communities and ecosystems face all around the world, resulting from the **climate crisis and uncertainty**. The message from the Intergovernmental Panel on Climate Change (IPCC) Special Report on 1.5 degrees Celsius (°C) is clear:

> *Behaviour change and demand-side management can significantly reduce emissions, substantially limiting the reliance on Carbon Dioxide Removal (CDR) to limit warming to 1.5°C. Behaviour- and lifestyle- related measures and demand-side management have already led to emission reductions around the world and can enable significant future reduction. Social innovation through bottom-up initiatives can result in greater participation in the governance of systems transitions and increase support for technologies, practices and policies (de Coninck et al., 2018).*

To this end, among the objectives of CHOICE is to establish a **new generation of citizens, communities and industry actors**, who are ***informed*** based on scientifically sound evidence, ***sensitized*** and ***aware of*** climate change and the impacts on society, economy, health, Water-Food-Energy-Ecosystems (WEFE) Nexus, transportation and supply chain, soil, land uses and urban-interurban planning.

Purpose and scope

This report (D2.2) is the 2nd Deliverable of WP2, associated with the work of T2.3: "Design and coordination of engagement campaigns for citizens and CHOICE stakeholders". The purpose is to establish a **coherent framework** for the design, implementation and evaluation of the CHOICE campaigns, interventions and messages, adopting innovative methods, namely the Systems Innovation Approach, which facilitates the -highly recommended- bottom-up approach, engaging the involved stakeholders in the co-design of the strategy and the selection of the

[1] https://eatforum.org/eat-lancet-commission/

appropriate tools and messages to be adopted and distributed, respectively. Towards this direction, D2.2 will:

- Go beyond traditional approaches that lack of meaningful dialogue (Escobar, 2011) or co-creation exercises, and will seek for techniques that efficiently engage people in the necessary processes for the understanding of the "problem", the means to mitigate the severity of the impacts or adapt to new prevention actions, the solutions to be selected, the implementation and assessment of the success of the solutions and, hopefully behavioural change.
- Set the ground for politicians, authorities, producers, consumers and actors (users) to **shift their mindsets** towards the taglines that "***engagement needs action, behavioural change needs engagement***" and "***acting locally, impacting globally***".
- Shortlist the most appropriate (digital) tools to be adopted by the five **CHOICE pilot demonstrations**, based on the goals set, the target audience, the cultural and socioeconomic characteristics and other parameters.
- Link the tools with the stakeholders' behavioural science analysis and, lastly
- establish the strategy for the design, implementation and evaluation of the CHOICE engagement campaigns, interventions and messages.

Approach

Designing a holistic concept

Mass media or communication campaigns, when and if properly designed, are recognized as successful means to persuade users to shift their mindsets towards a desirable behaviour, especially when they are accompanied by other supportive activities, such as education, training, law enforcement and rewards (Adamos & Nathanail, 2011).

In general terms, communication campaigns aim at a) increasing knowledge and awareness with regards to new and emerging trends, b) providing information extracted from new legislation, policies or recommendations of the European Commission, b) changing the parameters that have been scientifically proven to affect behaviour, and d) attempting to change "inappropriate" behaviour. *Public* communication campaigns may use paid or unpaid media coverage and advertising, reflecting the needs and expectations of the target audience and considering the availability of resources. The evaluation of the effectiveness of the campaigns, addressing the exposure of the messages to the audience, the recognition and appreciation of the concept (type of content, means of communication), along with the recording of the potential changes in users' behaviour, is also an important stage in the overall design of campaigns and other interventions (Delhomme et al., 2009).

Towards this direction, D2.2 will develop a holistic framework for the design, implementation and evaluation of the CHOICE engagement campaigns, interventions and messages, acknowledging the project's **vision**, **ambition**, **objectives**, **tools** and the specific **challenges** and **targets** of the five pilot demonstrations, considering also the vital requirement to create a **new-thinking generation** of citizens, policy makers, producers, retailers and consumers.

Link with other CHOICE WPs, Tasks and Deliverables

D2.2 is expected to provide and receive input from the work done in the rest WPs of the project, as well as from the outcomes already documented in completed deliverables, or deliverables which are due to the forthcoming months. This interaction is summarized to the following:

- **WP1 - Project coordination:**
  - Task 1.1 – Administration and financial coordination (ongoing)
    - Organization of meetings, events, etc.
  - Task 1.3 – Quality and risk management (ongoing)
    - Monitoring of Key Performance Indicators (KPIs)
    - Management of potential risks in achieving KPIs
  - Task 1.4 – Data management to FAIR principles (ongoing)
    - Access to data owned by pilot demonstrations
  - Task 1.5 – Delivering an ethical, secure, data-privacy complaint project (ongoing)
    - Safeguarding personal data related to the project's participatory activities and campaigns
    - Preparing the necessary forms based on GDPR rules, ethics, gender and other requirements
- **WP2 – Modelling and promoting behaviour change around food towards IPCC goals:**
  - D2.1 – Stakeholders mapping framework and list (completed, feeds D2.2)
    - Categorization of the Food Value Chain
    - Strategic factors affecting food habits
    - Types of consumers based on their food preferences
    - Categorization of stakeholders' groups and roles
    - Target group characteristics
    - Long and short lists of stakeholders per pilot demonstration
  - T2.4 – Randomized controlled trials implementation and user behavioural tracking (ongoing)
    - Identification of conversion goals, which will be in line with the communication messages and behavioural shift goals
    - Monitoring of the navigation behaviour, engagement and interaction of the users for the optimization of the core campaign messages and their delivery
- **WP3 – Mainstreaming IAM modelling:**
  - D3.3 – Report documenting methodology for improved representation of multi-actor heterogeneity in GLOBIOM (M25)
    - D2.2 will feed D3.3 with the appropriate interventions to change the behaviour of different consumers' categories
  - T3.4 – Developing improved IAM interfaces for optimizing user engagement (ongoing)
    - D2.2 will provide guidance on the implementation of co-design practices, such as interviews and stakeholder workshops

- **WP4 – Immersive digital tools to support behavioural change and action on food mitigation measures:**
  - D4.1 – Review of digital tools for promoting food mitigation measures (M8)
    - D4.1 feeds D2.2 with a shortlist of digital tools to be used
  - T4.2 – Development and customization of immersive digital tools to support mitigation measures, linking them to IAM model outputs (ongoing)
    - D2.2 feeds Inoqo's platform with key messages and interventions
  - T4.3 – Serious games to achieve wider impact in behaviour change around food (ongoing)
    - Activities to be included in the overall engagement strategy, i.e. targeted interviews and questionnaires
  - T4.4 – Engaging data storytelling visualizations (ongoing)
    - D2.2 will feed this Task with the messages to be distributed
- **WP6 – European and international demonstrations to support demand-side measures in food production, consumption and transport chain:**
  - Close collaboration with all Tasks of this WP in terms of implementing the campaigns in the five pilot demonstrations in Austria, Spain, Greece, Colombia and South Africa
- **WP7 – Impact creation, outreach and exploitation of CHOICE**
  - T7.3 – Awareness creation and training activities (ongoing)
    - D2.2 addresses the needs of this Task

3. Establishing the ground of the CHOICE campaigns, interventions and messages design

Attributes and aspects

The fundamental idea of the proposed framework is that the design, implementation and evaluation of the engagement campaigns, interventions and messages are activated by the identification of the problem to be addressed based on reports, statistics, etc., the decision to act and engage the appropriate stakeholders, the measures to apply, the timing of the actions to be taken, the selection of the most suitable concept to gain the interest of the wide audience, the setup of the evaluation procedure and the reporting of the outcomes (Adamos & Nathanail, 2016). This process is facilitated by seven parameters, as shown in Figure 1.

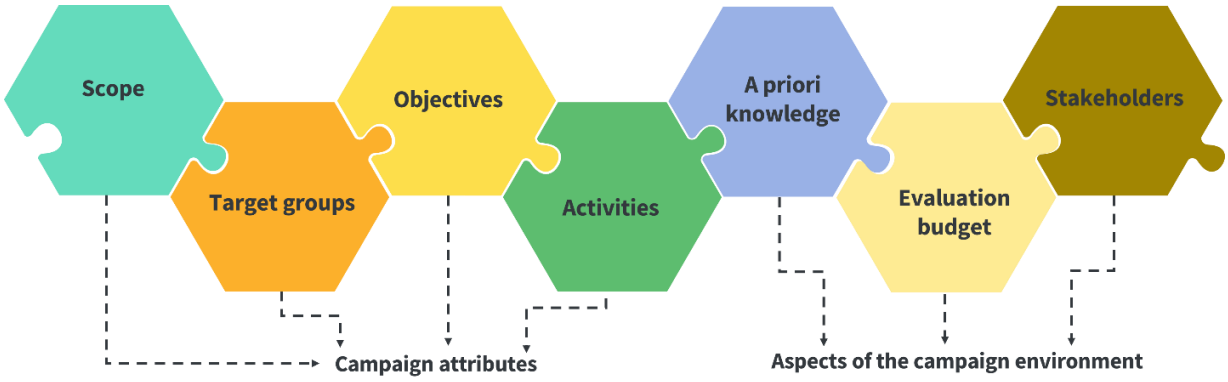

Figure 1: Attributes and aspects in the design (based on Boulanger et al., 2009)

The former four parameters are indicated as the attributes of the campaigns, interventions and messages, while the rest three as the relevant environmental aspects.

Scope refers to the "coverage" of the implementation and the most common categories are national, regional, local and urban (Delhomme et al., 1999). The ***target group*** can be the whole population or a specific audience, which is defined by the goals and the topic of the intervention, or specific challenges that a community of people or a group of professionals (i.e. retailers) face. Regardless the general aim of an intervention, it is recommended that the ***objectives*** should be as accurate as possible, and easily converted to measurement variables, i.e. Key Performance Indicators (KPIs). An intervention's effectiveness can be further supported by other parallel ***activities***, such as education, training and enforcement. Similarly, the three environmental aspects shape the design, implementation and evaluation of the interventions. The availability and access to ***a-priori information*** affects the completeness of the situation analysis, e.g. statistics, findings from other interventions, and defines the overall strategy of the design and evaluation. The available budget (own resources, state/regional financial support, sponsoring) and the active involvement of stakeholders from the beginning of the process (bottom-up approach, co-creation) seem to be catalytic enablers of the interventions' success (Adamos & Nathanail, 2016).

Focusing on the evaluation of the interventions, three crucial components are suggested by literature (Boulanger et al., 2007):

- **Measurement variables:**
  - *Self-reported measures*, such as reach, recognition, recall, comprehension and likeability of the intervention, social cognitive variables (i.e. attitudes, intentions, subjective norms) and behaviour
  - *Observed behaviour* (on site or in virtual reality environments)
  - *Changes in statistics*
- **Research designs** – the need for random sampling imposes the choice of the appropriate research design; in general, three broad categories are recognized in literature (Trochin, 2006):
  - *Experimental* designs, using random assignment of subjects into multiple groups
  - *Quasi experimental* designs, which are not based on random assignment, but they use either multiple groups or multiple measurements
  - When there are not multiple measurements or control groups, then the design is *non-experimental*, assumed to be the weakest design when testing internal validity or causal assessment
- **Data collection methods and techniques:**
  - *Method of asking*, relying on the communication between the researcher and the subjects
    - Interviews
    - Questionnaire surveys
    - Focus groups
    - Expert opinion
  - *Method of observing*, referring to the observation of an attitude, behaviour or phenomenon at a regular basis
  - *Method of document analysis*, focusing on the extraction of the most useful for the needs of the intervention information from several documents, policies and previous analyses (i.e. meta-analysis)

Six-step methodology

This section presents the 6-step methodology that will be applied for the design, implementation and evaluation of the CHOICE campaigns, interventions and messages. These steps are illustrated in Figure 2, and shortly described in the following paragraph, based on the work of Delhomme et al., 2009:

- **Step 1**: Getting started, addressing the main "problem" to deal with, such as the context analysis, the available resources
- **Step 2**: Analyzing the situation, considering the audience segmentation, the understanding and determination of specific objectives
- **Step 3**: Designing the campaign, interventions and messages along with the evaluation, including the strategy details, the selection of media, the selection of the most appropriate evaluation design and sample
- **Step 4**: Conducting the before-period evaluation and launching the campaign, referring to the production of the campaign materials, the campaign implementation, etc.
- **Step 5**: Completing the evaluation and drawing conclusions, addressing the processing and analysis of the collected data and the drawing of conclusions
- **Step 6**: Drafting the final report that responds to questions like "Why did the campaign and or intervention take place?", "Which attributes of the campaign/intervention/message were effective, and which were not?"

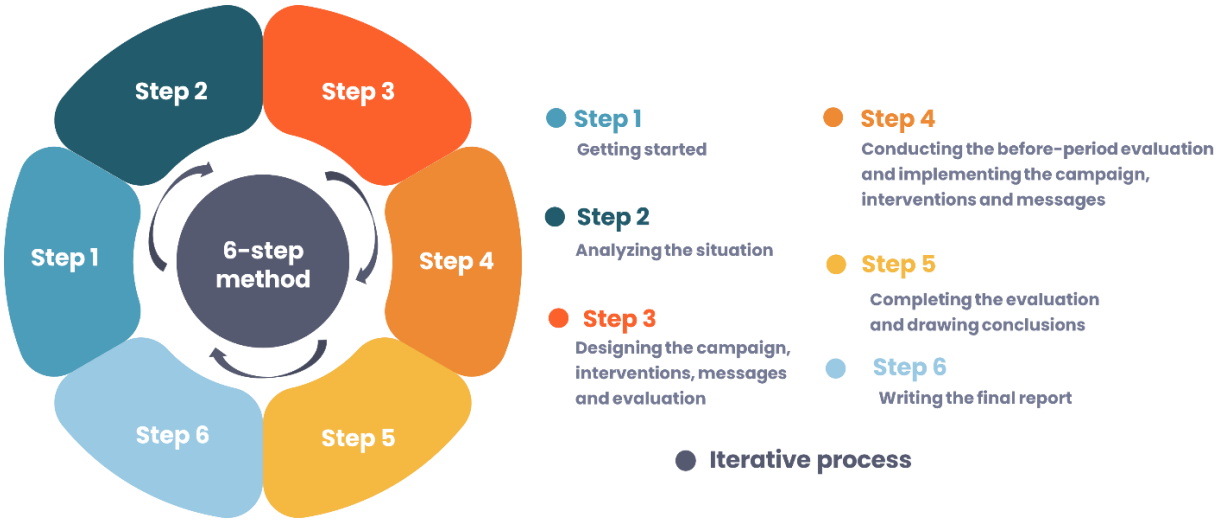

Figure 2: Six-step method (based on Boulanger et al., 2009)

4. Design framework for the CHOICE campaigns, interventions and messages design

Getting started

Identifying and defining the problem

The rapid and often out-of-control technological progress results to high energy consumption, environmental pollution, ecosystems collapse, water scarcity and other impacts, which reinforce the demand that food production and consumption processes should be more green, healthy and fair (Hoang, 2021).

This problem is validated by statistics, demonstrating that food and agriculture are the largest industries worldwide, with a turnover of one billion people and an annual revenue of 1.15 trillion Euros[2]. Reports from the "Food and Agriculture Organization of the United Nations (FAO)", reveal that the livestock sector alone is responsible for 18% of all Greenhouse Gas (GHG) production and the total food system for one third of total anthropogenic GHG emissions.

To this end, it's crucial to develop new approaches and apply measures to change behaviour and re-design demand-side management, which can significantly reduce emissions, substantially limiting the reliance on Carbon Dioxide Removal (CDR) to limit warming to 1.5°C (de Coninck et al., 2018).

Analysing the situation

Current and emerging trends, barriers and challenges

The IPCC Special Report: Global Warming of 1.5 ºC in Chapter 4: "*Strengthening and implementing the global response*", highlights that (de Coninck et al., 2018):

- Advances in food production can substantially reduce agricultural emissions and land pressures and strengthen the security of food chain and the dynamics of mitigation in the following years.
- Sustainable dietary choices can reduce food loss and waste, which in turn may result in mitigation and adaptation of emissions and land pressures.
- Changes in lifestyle and consequently behavioural change of producers, retailers and consumers seem to be the key component to a climate-conscious transition in the food chain.

At the same time, interesting findings are revealed from the literature, pointing out that:

- To preserve longer-term engagement with behaviour change, it's recommended to put into action **social support** and set the ground for **environment-prompted habits**, which seem to be more sustainable (Yardley et al., 2020).
- The last years, consumers seek to be informed about the negative externalities of the food systems at a global scale, indicating their **willingness to formulate new food consumption patterns**, such as to be directly connected to producers (i.e. farmers), support local communities to purchase products, set their minds towards healthier food and eventually contribute to the protection of the environment (Hoang, 2021).

[2] https://www.worldwildlife.org/industries/sustainable-agriculture

- **Digital interventions** contribute to change the way that individuals decide/choose to eat. A key recommendation is that these interventions should be "personalized", addressing the needs of consumers, and applying the most appropriate techniques towards achieving long-term adherence to sustainable food choices and perceptions (Chen et al., 2020).
- Establishing health promotion campaigns on social media is proven to be an efficient way to reach the wider audience and successfully communicate messages for the improvement of their daily lives, addressing topics such as climate change impacts on health, etc. The findings of a survey conducted by Edney at al. (2018) sharing 509 posts on Facebook, Twitter, and Instagram, showed that the latter is the most promising platform to distribute engaging health messaging.
- The COVID-19 pandemic, along with other natural disasters, such as floods, droughts, heatwaves, etc. revealed that national, regional and local governments are not prepared to deal with such socks, resulting in the disruption of the infrastructure and the operation of systems/industries and the supply chain in general.

From the literature review conducted in CHOICE D2.1, significant barriers were observed, which seem to affect or even hinder the desirable behavioural changes. A list of these barriers is presented below, classified into seven main sectors (CHOICE D2.1):

- **Economic barriers:**
  - Cost of healthy foods, preventing consumers from purchasing them
  - Economic instability, affecting income
- **Social barriers:**
  - Peer pressure, i.e. social environment may influence resistance to change
  - Cultural resistance, such as traditions that oppose to dietary modifications
- **Environmental barriers:**
  - Food deserts, blocking access to fresh and healthy food options
  - Infrastructure, i.e. lack of adequate appliances to cook and store healthy foods
- **Psychological barriers:**
  - Habits and preferences
  - Fear of change
- **Knowledge and awareness:**
  - Lack of information
  - Misinformation, i.e. conflicting dietary advice
- **Time constraints:**
  - Busy schedules
  - Convenience, driving to quick, easy-to-prepare meals
- **Policy and regulatory barriers:**
  - Inadequate policies to promote healthy food consumption
  - Subsidies on non-sustainable food

In addition to the work done in D2.1 (literature review), we went a step further and we developed an initial list of specific barriers per pilot demonstration, which was circulated among the leaders of the pilots to receive their feedback. This exercise resulted in the determination of barriers for each of the five pilot demonstrations, which should certainly be considered, when designing the

messages and actions to be promoted via the campaigns and the other interventions. They will also help us recognize actual difficulties that the target groups face in each country, and re-consider, if needed, the targets of our initiatives.

Table 1: Austria pilot demonstration specific barriers

Pilot	Barriers
Austria	*Regulatory constraints*: Austria has stringent food safety and environmental regulations. While these are beneficial for health and sustainability, they can also create barriers for small producers and innovators trying to enter the market.
	High cost of organic foods: Organic and sustainably produced foods tend to be more expensive, which can be a barrier for consumers despite high environmental awareness.
	Consumer scepticism: There can be scepticism towards new food technologies and changes in traditional farming practices, influenced by a strong cultural preference for traditional foods and methods.
	Conservative rural communities: Rural communities in Austria may be resistant to change and new agricultural practices due to a conservative outlook and reliance on traditional methods.
	Bureaucratic complexity: Most retailers in Austria are owned by parent companies in other countries which makes it difficult to secure someone in Austria. For example, the parent company would usually prefer to pilot in their Headquarters country (e.g. Germany) which introduces longer bureaucratic decision-making and complexity.

Table 2: Spain pilot demonstration specific barriers

Pilot	Barriers
Spain	*Economic disparities*: Spain faces economic disparities between regions, with rural areas often having lower incomes and less access to diverse food options than urban centres.
	Water Scarcity in certain regions of Spain, especially in the south, impacts agricultural productivity and can limit the availability of certain foods, influencing dietary habits.
	Tourism impact: High levels of tourism can affect local food systems, leading to an emphasis on foods that cater to tourists rather than the local population's needs.
	Regional autonomy issues: Spain's autonomous regions have varying regulations and policies, which can complicate the coordination of national food sustainability initiatives.
	The high competition that exists in Spain with food products imported from third countries, especially Morocco.

Table 3: Greece pilot demonstration specific barriers

Pilot	Barriers
Greece	*Economic instability*: Greece has faced significant economic challenges over the past decade, including a severe debt crisis. Financial instability can lead to reduced purchasing power, making it harder for consumers to afford healthier food options and adopt sustainable practices.
	Abandonment of cultural food preferences: Despite the traditional Mediterranean diet being amongst the healthiest and most sustainable, unhealthy dietary patterns persist.
	Urbanization and infrastructure: In urban areas like Athens, the infrastructure for sustainable food practices, such as farmers' markets and local food systems, may be underdeveloped, limiting access to fresh and local produce.
	Limited research and innovation: Investment in agricultural research and innovation is limited, slowing down the development and implementation of sustainable food production methods.
	Everyday life: Long working hours and time-consuming commuting in big cities shifting dietary habits towards convenience foods. In addition, long working hours may lead also to depression or other mental issues that seem to make it more difficult for people to eat healthy.

Table 4: Colombia pilot demonstration specific barriers

Pilot	Barriers
Colombia	*Political instability and conflict*: Colombia has experienced internal conflict and political instability, which can disrupt food supply chains and hinder efforts to implement sustainable agricultural practices.
	Infrastructure challenges: Rural areas may lack adequate infrastructure for transportation and distribution, leading to food access issues and higher costs for fresh produce.
	Economic inequality: Significant economic disparities exist, with many people unable to afford nutritious and sustainably produced foods.
	Lack of education and awareness: Limited education and awareness about sustainable practices and the long-term benefits of healthy diets can hinder behavioural change.
	Imbalances in the coffee value chain: Increase in coffee consumption capacity and low incentive for coffee farmers to produce the product, reducing production and generating instability between supply and demand. Increase in agrochemicals and agroinputs for crop production, increasing production costs, increasing dependence on extractive agriculture.
	Climatic vulnerability, low harvest quantity in the face of long periods of drought or rain, progressively deteriorating the volume and quality of the harvests.
	Absence of sectoral policies that contribute to working jointly (public - private) to mitigate climate variability and its effects on the reduction in productive capacity.

Table 5: South Africa pilot demonstration specific barriers

Pilot	Barriers
South Africa	*Economic inequality*: South Africa has one of the highest levels of economic inequality worldwide, greatly affecting access to healthy and affordable food.
	Urban-rural divide: There is a stark contrast between urban and rural areas in terms of infrastructure, access to markets, and availability of diverse food options.
	Food security issues: High levels of poverty and food insecurity make it difficult for large segments of the population to prioritize sustainable food choices over immediate food needs.
	Lack of market access: Small farmers often lack access to larger markets due to poor infrastructure, which limits their ability to sell their produce and invest in sustainable practices.
	Political and policy instability: Fluctuating political and policy landscapes can create uncertainty and disrupt long-term investments in sustainable food systems and infrastructure development.

Deciding whether to segment the audience

The usual practice when designing a campaign or intervention framework is to segment the audience to better address any different requirements, characteristics, habits of subgroups, formulated according to their lifestyle, culture and other factors. Sometimes is also useful to define the *primary* audience and particular *subgroups* (Boulanger et al., 2009).

Towards this direction, from the very beginning of CHOICE, to safeguard a coherent stakeholder mapping, we broke down the Food Value Chain (FVC) into seven categories, and we also incorporated the Quintuple Helix Categorization to better understand the complexity and inclusiveness of several involved stakeholders into the appropriate group/sector. In addition, a very detailed literature review revealed the strategic factors that seem to affect food habits, resulting eventually in the stakeholders' mapping "rules", according to which the long list and the short list of the most "powerful" and "interested" actors in the five pilot demonstrations of CHOICE were created. All the details of this analysis are documented in CHOICE D2.1.

Defining specific objectives of the campaigns, interventions and messages

This step of the method refers to breaking down the general goal(s) of the campaigns, interventions and messages into specific objectives: a) primary objectives, determining which behaviour we aim to be adopted by the target audience and b) secondary objectives, such as increase of knowledge, change of intentions and norms, which will facilitate the primary objective, i.e. behavioural change (Boulanger et al., 2009).

Gathering information from past campaigns, interventions and other actions

Even though the design of an intervention in the Food Value Chain (FVC) sets the basis for change, its adoption from the demand-side requires sustained behavioural changes. Reisch (2021) mapped previous research listing several guides, methodologies and tactics to induce change through civic activities or personal exploration (Beshears and Kosowsky, 2020; Knittle et al., 2020; Michie et al., 2013). Adding in the equation the intention-behaviour gap, choice editing, choice expansion and choice environment emerge as retailer-side strategies to promote sustained behavioural change in the FVC that can foster good practices.

The VALUMICS project[3] with their project partner REWE International AG has been active in all abovementioned strategies, namely choice editing, choice expansion and choice environment emerge. In their first case study, choice editing was achieved by imbuing the FVC with social sustainability standards. By catering for the ethical treatment of workers during short work-intensive periods in the production cycle, REWE International AG achieved a two-fold goal. They set standards to which they had to abide to, to qualify as a partner, while sorting out products and producers whose practices were deemed unacceptable and unsustainable by consumers. In their second case study, choice expansion was employed to provide more sustainable packaging options for milk in Austria. Leveraging the general trends regarding ecological and globalization concerns and the "Fridays for Future" movement, they filled a gap in the market while promoting green packaging to reduce waste and provide more sustainable products. This initiative received support from NGOs, which were involved in communication with the public thus, granting it credibility to consumers. In their third case study, choice environment modification was achieved through store greening. The rationale behind this move was the generation of visual cues denoting sustainable practices (conservation of local flora and fauna, etc.) and the fulfillment of customers' demands for store greening. Finally, although no standalone assessment on its efficacy on behavioural change has been elaborated, this initiative has been widely accepted by employees and consumers alike (Dörrich et al., 2021).

Moving from retail-side interventions to large-scale international synergies, the SUN Movement[4] is "*country-driven initiative led by 66 countries… and includes thousands of stakeholders from across society*" founded in 2010 by the United Nations Secretary-General. Through their activities, they strive to "*end malnutrition to empower people to lead sustainable lives and societies*". Among them, good practice case studies have been instrumental in determining their progress and disseminating lessons learnt with the world. Elaborating on the case study of Zimbabwe schools, the objective of the action was to inform the youth on healthy nutrition and sports. ZCSOSUNA operationalized this by affording the youth to participate in the design of interventions of the school nutrition scheme, enabling them to voice their opinions and launch debates regarding a shared vision on sustainable interventions. The action was embraced by the government and led to the co-creation of nutrition guidelines to inspire behavioural change.

These indicative examples reveal that **participatory approaches** inspire all stakeholders to adopt an active stance in the generation and uptake of sustainable food habits ensuring their longevity. Nevertheless, these opportunities rely on the effective design and coordination of a relevant campaign to not only trigger consumers' behavioural change towards a sustainable pathway, but also elicit data validating or disproving the end user engagement strategy.

At the same time, **digital participation tools** emerge as a valuable adjunct to the engagement of stakeholders across the FVC to promote the co-creation and implementation of actions and consequently achieve sustainable change. Digital or e-participation as defined by United Nations: "…*is the process of engaging citizens through ICTs in policy and decision-making in order to make public administration participatory, inclusive, collaborative and deliberative for intrinsic and instrumental ends*"[5].

These tools exist in various modalities, either online or in the form of digital applications for a smart device (computer, smartphone, tablet etc.). Toukola & Ahola (2022) observed that mobile

[3] https://valumics.eu/

[4] https://scalingupnutrition.org/

[5] https://publicadministration.un.org/egovkb/en-us/About/Overview/E-Participation-Index

devices favor citizens' and stakeholders' involvement by generating a network, in which they can exchange information and share their views.

Classifying digital participatory tools may serve as the background for the proper understanding of how they can be leveraged to promote fair and inclusive participation of the stakeholders and the public. In this sense, they offer crucial input on the means and channels to recruit, interact with and maintain the interest of stakeholders. Ultimately, they ensure the co-design of sustainable strategies that are informed by general trends and diverse opinions to promote behavioural change. Numerous digital participation tools have been developed utilizing different technologies and systems exhibiting different scopes and varying degrees of engagement.

Digital participation requires appropriate and accessible collaboration tools. These are software applications or platforms with varying levels of technological sophistication that enable users to work together remotely and effectively in intuitive work environments, i.e. Miro[6]. While the previous tools offer domain-specific digital participation, harnessing the networking capabilities of social media tools can greatly affect their overall public outreach. They offer effective dissemination of information through interaction and can facilitate the organization and coordination of operations.

In line with public outreach endeavors, **digital pedagogy toolkits** constitute valuable additions to the educational processes to achieve better informed producers, consumers and actors in the food, agriculture and land use sectors. Thus, knowledge transfer is key to sustainable change. EPALE is a European, multilingual community of professionals, which aims to promote more and better learning opportunities for all adults. Through the EPALE Resource Centre educational material on best practices, training and open education resources becomes available to the public. Notably, the EPALE Resource Kit - Engage. Skills for democratic life, features green skills as an agent of "active citizenship"[7].

Designing the campaigns, interventions and messages, and evaluation

Strategy

Developing the detailed campaign/intervention strategy will feed the creative brief of the implementation. Following the scope, goals and objectives of CHOICE, this strategy is presented in the following paragraphs.

SCOPE AND TYPE OF CAMPAINGS/INTERVENTIONS

As mentioned in the introductory chapter, among the initiatives of this project to support its vision, is to create a new generation of citizens, communities and industry actors, who will develop and maintain new-thinking approaches towards food production, consumption and less waste. To this end, D2.2 is expected to set the ground for several activities, including:

- Large-scale adoption of CHOICE digital immersive tools, data storytelling and gamification.
- Based on these enables, CHOICE will design and orchestrate large-scale engagement and "green marketing" campaigns and demonstrations in Austria, Spain, Greece, Colombia and South Africa.

[6] https://miro.com/

[7] https://epale.ec.europa.eu/en/resource-kit

- Promotion of specific interventions and the evaluation of their impact across diverse socio-economic profiles and stakeholders through methods such as Randomized Controlled Trials (RCTs).
- Setting up interventions to change the behaviour of different consumers' categories.
- Guidance on the implementation of co-design practices, such as interviews and stakeholder workshops.
- Support the development of messages to feed the engaging data storytelling visualizations.
- Facilitate activities to take place at a pilot demonstrator level, including the participatory sessions for the design of the engagement campaigns and participating actors.
- Support the design of awareness creating and training activities.

TARGET GROUPS

The discussions with the representatives of the five pilot demonstrations resulted in determining the primary target groups of the campaigns and interventions (Table 6).

Table 6: Pilot demonstrations' target groups

Pilot	Target groups
Austria	>1000 consumers and active users of a leading e-commerce retailer in Austria, representing diverse food consumption habits
Spain	291,000 farmers and 659 agriculture cooperatives to evaluate sustainable practices in olive and livestock farming
Greece	200,000 e-Fresh online supermarket users to promote sustainable grocery shopping
Colombia	>450 women coffee producers from 10 municipalities in Colombia, members of the Association of Women Coffee Growers of Cauca (AMUCC)
South Africa	Diverse groups (university students, industry, academia and public authorities) to explore the impact of sustainable diets and waste reduction

OBJECTIVES

CHOICE overarching objectives related to D2.2:

- Create a new generation of climate change-aware citizens, communities and industry actors:
  - Design and implement engaging digital tools and data stories
  - Design and orchestrate large scale engagement campaigns targeting citizens and food supply chain actors
  - Design Randomized Controlled Trials per pilot demonstration including targeted outreach packs
  - Organize participatory sessions at pilot demonstrations
- Demonstrate how small-medium scale mitigation actions in local level, may be upscaled globally.
- Improve IAM's acceptance to non-expert groups:
  - Innovative techniques for their active engagement

Table 7: CHOICE Pilot demonstrations' principal objectives

Pilot	Principal objective
Austria	Adopting more healthy and sustainable food consumption lifestyle choices
Spain	Adopting sustainable farming practices for olives and livestock sector
Greece	Promoting sustainable grocery shopping choices in an online retail store
Colombia	Motivating local women coffee producers to adopt sustainable production practices and reduce vulnerabilities in their communities and ecosystem
South Africa	Adoption of healthier, sustainable diets and reduction of food waste

In addition, based on the analysis conducted in WP2 per country and pilot demonstrator, an initial list of potential solutions was created, based on main barriers, which may feed the content and the means of the campaigns, interventions and messages.

Table 8: CHOICE Pilot demonstrations' potential solutions

Pilot	Potential solutions
Austria	Leverage regulatory frameworks to support small producers and promote the affordability of organic foods.
Spain	Address regional economic disparities and manage water resources efficiently.
Greece	Focus on economic support and culturally sensitive dietary interventions, invest in research and innovation in the agri-food sector, and scaling up nascent practices supporting the social dissemination of healthy dietary patterns such as *Community Gardens*.
Colombia	Improve infrastructure and address political and economic instability to support sustainable food systems.
South Africa	Tackle economic inequality and food security issues with comprehensive social and economic policies.

STAKEHOLDERS

For the needs of CHOICE, a very detailed analysis and mapping of stakeholders has been conducted in the framework of WP2 and the results are documented in CHOICE D2.1. This work is incorporated into the current Deliverable and consequently in the design framework of the campaigns, interventions and messages. The classification of stakeholders that will be adopted from now, based on the Quintuple Helix Categorization is the following (CHOICE D2.1):

- Public/Governance
- Industry/Business
- Academia/Research
- Civil Society
- NGOs

Additionally, D2.1, based on Fanzo et al. (2017), documented the range of actors in the Food Value Chain, namely:

- Land use inputs
- Producers
- Processing
- Distributors
- Retailers
- Consumers
- Recycling

Lastly, based on the solid methodology developed in WP2, D2.1 delivered long lists of stakeholders per pilot demonstrator (Annex 1, D2.1), considering a) stakeholder attributes: name, FVC categorization and helix categorization, b) role in affective food habits and c) target group characteristics. Additionally, after ranking the interest and power of each stakeholder, the short lists of stakeholders per pilot demonstrator are also available in Annex 2 of D2.1.

Content of the messages

The content of the messages to be released is an important parameter, when designing the concept of the campaigns, interventions and the messages themselves. They need to be concrete, creative and understandable, address the specifications of the "problematic" behaviour and be in line with the characteristics of the target audience and the target groups. In CHOICE, it's vital to understand those factors that affect consumers' food habits, and for this reason, we conducted a scoping literature review of 72 scientific papers, and the following key factors are recognized (CHOICE D2.1):

- Intrinsic product characteristics/perception
- Extrinsic product characteristics/expectations
- Biological factors
- Psychological factors
- Situational and environmental factors
- Socio-economic factors (gender, age, income)

Especially focusing on product characteristics, important findings are that consumers prioritize taste and natural content in traditional food products, and they value (low) price and availability. An attempt to classify these patterns by Fandos and Flavian (2006), resulted into three groups:

- *Convenience-focused consumers*, who give emphasis to price and availability, preferring ready-to-eat meals.
- *Concerned consumers*, showing a deep understanding of food, paying attention to both intrinsic and extrinsic food characteristics.
- *Indifferent consumers*, being the less motivated and interested in food.

Based on the above factors, along with specific characteristics that the target groups of each pilot demonstrator have, the content of the messages will be created.

Identifiers and media channels

This category refers to the visual, audio or digital tools to be used to the campaigns, interventions and messages development, providing also the "identity" or the "branding" of the activities. It's obvious that the available **budget** plays a significant role in the set-up of the overall concept and may cause difficulties or restrictions, when trying to reach the wider audience.

In the framework of the project, a very detailed review of digital tools for the promotion of food mitigation measures was conducted and documented in CHOICE D4.1. This analysis of the findings of this work facilitates the selection of the appropriate tools to be used horizontally, as

well as at pilot demonstration level. This section presents in brief the digital tools that have been proven to be effective when promoting food consumption, minimizing food waste and encouraging sustainable and green farming practices (CHOICE D4.1):

- **Mobile applications**, including indicatively:
  - Educational apps, which share information about the nutritional and environmental impact of food choices
  - Grocery shopping apps, enhancing the reduction of food waste
  - Farm management apps, facilitating people to locate farmers markets and local grown production
- **Online platforms and websites**, including indicatively:
  - Sustainability certification platforms that assist consumers to purchase products from farms using sustainable practices
  - Digital eco-labels, providing details on each product's footprint
  - Lifestyle websites
- **Games and gamification**, including indicatively:
  - Mainstream games that can incorporate sustainable farming practices
  - Citizen science
  - Educational and serious games
- **Social media and influencers**, such as:
  - Socia media campaigns promoting sustainable consumption and production
  - Influencers and bloggers sharing with their "followers" sustainable food and farming practices
- **Data visualization and storytelling tools**, such as:
  - Interactive dashboards
  - Graphs and infographics showcasing the impacts of our food choices on the environment
- **Audio and visual tools**, such as:
  - Documentaries
  - Animations
  - Films, series and podcasts
- **Virtual and augmented reality**, including:
  - Virtual reality experiences
  - Augmented reality
  - Mix reality
- **Online learning platforms**, including:
  - Massive Open Online Courses (MOOC) platforms
  - Video tutorials
  - Educational websites and apps
- **Artificial Intelligence (AI) and Machine Learning online learning platforms**, including:
  - AI-powered analytics
  - AI-powered chatbot and add-on

Summarizing the findings of the very detailed review, it can be concluded that digital tools are a substantial means to promote sustainable food practices, and they can contribute to behavioural changes of the consumers, using "smart" marketing approaches, i.e. increase the "visibility" of plant-based food options, and decrease the proportion of discounts on non-sustainable products (CHOICE D4.1).

Development and pre-test of messages and slogans

It is strongly recommended that the development of messages and slogans and the marketing approach in general, follows the principles of co-development and bottom-up approach, to secure the effectiveness of the campaigns and interventions to the pre-defined target groups. Focus groups or other practices can facilitate this process and feed the final concept through pre-testing of the messages, slogans, timing of launching, etc.

Evaluation of campaigns, interventions and messages

It is strongly recommended that the development of messages and slogans and the marketing approach in general, follows the principles of co-development and bottom-up approach, to secure the effectiveness of the campaigns and interventions to the pre-defined target groups. Focus groups or other practices can facilitate this process and feed the final concept through pre-testing of the messages, slogans and timing of launching.

5. Conducting the before-period evaluation and implementing the campaigns and interventions

Structuring the before-period evaluation

Defining measurement variables

This stage of the method is related to the work to done before launching the campaigns, interventions and messages, and needs to be done according to the objectives, the pre-selected evaluation process (i.e. before-after analysis) and the expected outcomes. To this end, it is important to determine those variables to be tested, which will allow to assess whether the goals were met, the messages reached the target groups, and the desirable behavioural changes were recorded. The usual approach is to indicate the appropriate Key Performance Indicators (KPIs), which will enable us to monitor the success (or not) of the interventions and consequently report on the preset **conversion goals**.

In CHOICE, we define "conversions" as specific targets and objectives concerning the desirable behavioural change. For example, a conversion could be that users exposed to a campaign, intervention or message, will (actually) buy the product that has a lower environmental footprint in an application. Another example is that these consumers will share the choice they made in their social media accounts promoting the specific application.

The following Tables present the overarching targets of the project, as well as specific targets to be reached by each pilot demonstrator. In addition, some indicators referring to the implementation of the campaigns, interventions and messages in terms of reach, recognition, etc. are also indicated.

Table 9: CHOICE overarching goals

Expected KPI	Target
Number of representative consumers and actor profiles in the food and agriculture chains for each country	>5 actors for the pilot countries, >3 actors for other countries
Number of food and agriculture actors (farmers, retailers, sustainable brands) that will make use of CHOICE IAMs and accounting tools through their stakeholder-friendly interfaces	>400 actors in Colombia, Greece, South Africa, Spain, Austria mobilized through the pilot leaders and an additional >20 actors from FABLE
Improvements in terms of behavioural aspects of food consumption and production released as open-source code to popular repositories	Updated FELIX IAM; CHOICE ISE and FABLE calculator dashboard and scenario explorer released as opensource for uptake by other researchers or commercial actors
Number of campaigns per pilot demonstration, number of RCTs, number of conversion types explored	>4, >3, >6 for each of the pilots
Number of participants in each pilot country engagement campaigns	>1000 for consumption, >200 for production
Number of participants improving their sustainability in food consumption (plant-based diets and/or food waste reduction)	>50% in each pilot
Number of participatory sessions for the design of the engagement campaigns and participating actors	At least three per pilot country, at least 12 representative actors per country
Number of gamers exposed to CHOICE IAMs results	>100,000 (global level)
Number of food and agriculture organisations (farmers' associations, retailers, sustainable brands) onboarding CHOICE tools to their business plan/strategy for engaging their members or consumers, respectively to assess target market and conversion means	>50 actors in Colombia, Greece, South Africa, Spain, Austria mobilized through the pilot leaders and an additional >10 actors from external countries through the FABLE coalition

Table 10: Austria goals

Expected KPI	Target
Increase the number of consumers who will consume more sustainably	To be determined
Decrease the carbon footprint of users participating in the pilot	~15-20% from an initial baseline over the course of 12 months

Table 11: Spain goals

Expected KPI	Target
Increase number of farmers that will opt for a pro-environmental behaviour using the suggested green farming practices	To be determined
Engage a network of stakeholders with different scenarios of sustainable farming practices	>200 local actors
Organize large-scale campaigns and annual challenges	>3, >4

Table 12: Greece goals

Expected KPI	Target
% of registered users inclined to purchase food items with sustainable impact	10-20%
% of registered users maintain an active involvement in at least 2 large-scale campaigns and 4 monthly challenges for a total duration of at least 12 months	10-20%
Increase users' adoption of the available sustainable food products	>10%
Reduce the aggregated values of user's CF scores in a period of at least 6 months	To be defined
Increase in sales of plant-based, bio-and other sustainable products	To be defined

Table 13: Colombia goals

Expected KPI	Target
Increase number of farmers that will opt for a pro-environmental behaviour using the suggested green farming practices	To be defined
Engage actively women farmers in the project campaigns and workshops, maintaining their participation for at least 12 months, with an increased rate of adopting sustainable farming practices	>200, >30%
Increase in synergies between female coffee producers in production and processing activities, creating a protocol for the co-production of new sustainable coffee specialties	10%
Organize large-scale campaigns and annual challenges	>3, >4

Table 14: South Africa goals

Expected KPI	Target
Increase of the participating youth consumers that will actively adopt more healthy food choices	10-20%
Number of participants actively using the "Shrink your Food Waste" application, reducing their total consumption footprint through rationalizing food waste	>1000, 15%
Engage a network of local decision makers with different scenarios of sustainable consumption habits, interacting with FABLE calculator interfaces and the GLOBIOM spatially explicit tool for biodiversity and health indices;	>20

Table 15: Objective and subjective evaluation of campaigns and interventions (Delhomme et al., 2009)

Exposure	Indicators
Objective	Types of activities carried out
	Total exposure – total number of people exposed to the campaign/intervention
	Number of messages disseminated
	Frequency, duration and timing of messages distributed
Subjective	
Reach	Proportion of users who have noticed some part of the campaign/intervention

Exposure	Indicators
Awareness	Proportion of users in the target audience who are aware of the campaign/intervention theme and message
Recognition	Degree to which the target audience recalls the campaign/intervention
Appreciation	Likeability of the materials
Message takeaway	Users' perception of the nature of the message

Producing the materials

Important steps to be followed and decisions to be made at this stage, include the following (Delhomme et al., 2009):

- **Deciding who handles the material production**
  - Campaigns/interventions initiators
  - Responsible partners of the pilot demonstrations
  - External agencies
  - Other
- **Steps in the material production**
  - Specifications, i.e. number of copies, length of broadcasts, etc.
  - Pre-production phase: sampling, quality proofing, etc.
  - Production phase, ensuring quality-control checking
  - Post-production phase, for potential improvements
  - Approval of the produced material
- **Booking media and people**
  - Interviews, TV/radio presence, etc.
  - Invitations to participants of focus groups, etc.
- **Close collaboration with the CHOICE communication and dissemination team**
  - Promotion
  - Support on the selection of timing, media, etc.
  - Integration of the activities into the next updates of the communication and dissemination plan of the project (D7.3 and D7.4)

Implementing the campaigns and interventions

The timing of the launch of the campaigns, interventions and messages is of high importance, creating the appropriate opportunities to optimize the achievement of the goals. In CHOICE, a pre-defined time plan will be followed, including separate steps, which feed the next ones, etc. A preliminary time schedule of the activities to be realized in the five pilot demonstrations, starting from M10 (August 2023) till the end of the lifecycle of the project (October 2026) is illustrated in Figure 3.

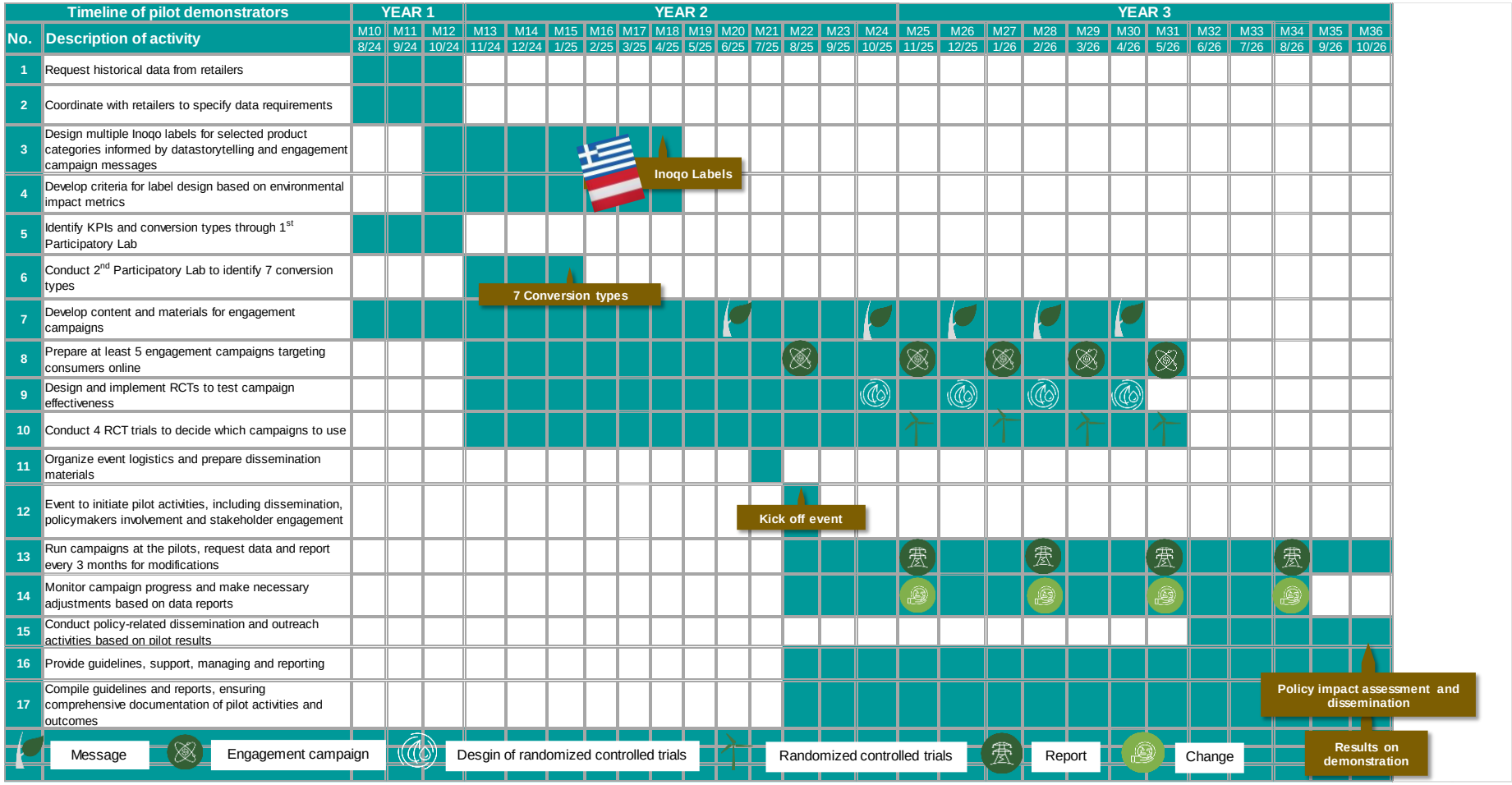

Figure 3: Time plan of the implementation of the CHOICE pilot demonstrations

6. Completing the evaluation and drawing conclusions

Actions

Recommended actions at this stage are:

Table 16: Completing the evaluation and drawing conclusions (Delhomme et al., 2009)

Step	Short description
1	Implementing the selected evaluation method for the during-and/or after-campaigns and interventions periods
2	Processing and analysing the evaluation data
3	Gathering cost and cost-effectiveness information
4	Drafting conclusions about the campaigns and interventions

7. Writing the final report

The last step of the proposed method is to produce a final report, summarizing the design, implementation and evaluation results of the campaigns, interventions and messages creation. The content of such a report may include (Figure 4).

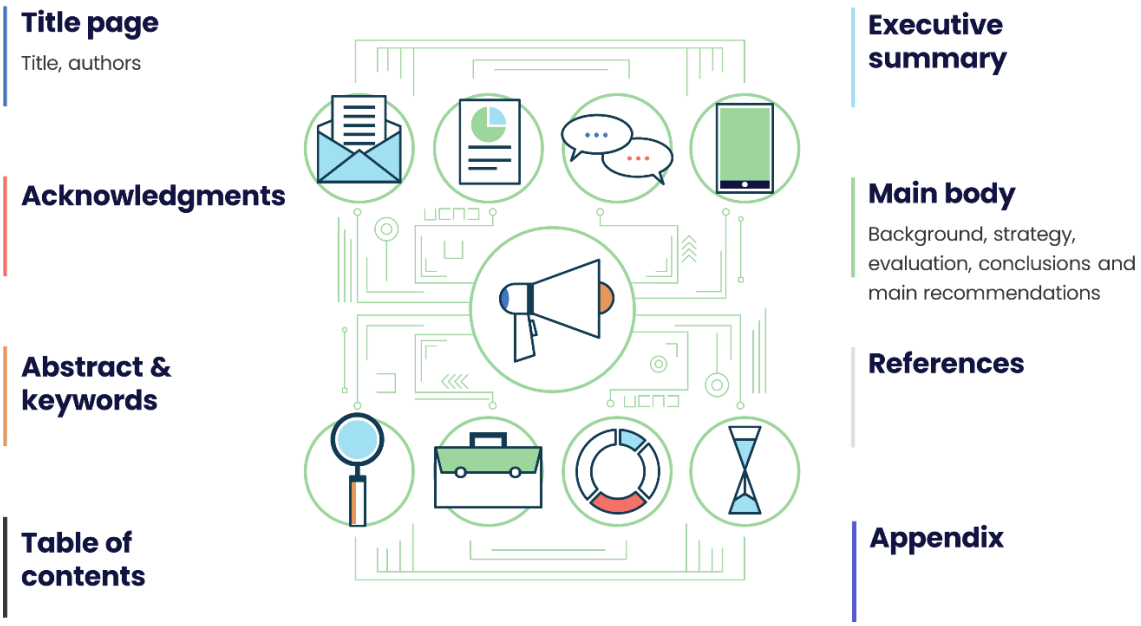

Figure 4: Final report structure (based on Boulanger et al., 2009)

8. Conclusion

Acknowledging the severe impacts in society, economy and supply chain management, resulting from the climate crisis and uncertainty, CHOICE aims at establishing a new generation of citizens, communities and industry actors, who will be willing to change their behaviour towards consuming more sustainable products in their daily life. It's promising that the last years, citizens indicate this willingness to create new food consumption habits and contribute to the protection of the environment. The high cost of this type of food is certainly an obstacle to the wider adoption of such a behaviour.

Mass media, communication, engagement campaigns and interventions, when and if properly designed, can act as successful means to persuade users to shift their mindset towards a desirable behaviour, especially when they are accompanied by other supportive activities, such as education, training, law enforcement, rewards, etc.

In addition, the findings of previous studies reveal that digital interventions pave the way to change in eating behaviour of individuals. It is strongly suggested that we focus on personalization of the interventions, based on the unique requirements of the individuals and applying the most appropriate techniques towards achieving long-term adherence to sustainable food choices and perceptions (Chen et al., 2020).

To this end, CHOICE developed a framework to design, implement and evaluate a series of activities to be realized at the five pilot demonstrations, aiming at achieving the targets of the pilots and increasing knowledge and awareness of citizens, communities and industrial actors that can set the ground for behavioural change. These activities are large-scale engagement and "green marketing" campaigns and demonstrations in Austria, Spain, Greece, Colombia and South Africa, digital immersive tools, data storytelling and gamification, evaluation of their impact across diverse socio-economic profiles and stakeholders through methods such as Randomized Controlled Trials (RCTs), interventions to change the behaviour of different consumers' categories and guidance on the implementation of co-design practices, such as interviews and stakeholder workshops.

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Choice

Mainstreaming Integrated Assessment Models by embedding behavioural change and actor heterogeneity, and increasing their outreach to citizens, communities and industrial actors

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