DietWise
SYSTEMIC CHANGES | EMPOWERED CITIZENS

Deliverable D 4.4.

The overall framework

Author: Siegfried Dewitte, Ebo Botchway (KUL)

https://www.dietwise.eu

Funded by the European Union

This project is funded by the European Union's *Horizon 2020 program* under grant agreement No. 101181692

This work is dedicated to the memory of Justina Baršytė, author of the DietWise project idea, whose vision and commitment were invaluable to this project.

Project information

Program:	Horizon Europe
Topic:	HORIZON-CL6-2024-FARM2FORK-01-5
Type of action:	HORIZON-RIA HORIZON Research and Innovation Actions
Grant Agreement #:	101181692
Project title:	Systemic Solutions to Enhance Healthy and Sustainable Food Provision and Cooking at Home
Project Name:	DietWise
Project Start Date:	2024-11-01
Project End Date:	2027-10-31

Document information

Document name:	The overall framework
Related Work Package:	WP 4
Related Task:	Task 4.4 “The overall framework of DietWise”
Related Deliverables:	D 4.4
Author(s):	Siegfried Dewitte, Ebo Botchway (KUL)
Reviewer(s):	Rosaly Severijns (KUL), Jugnė Jūnė Jonušaitė (PHB)
Submission date:	2026-02-28
Dissemination level:	Public

Document history

Version	Date	Changes	Responsible partner
v0.1	2026-02-16	First draft of the document	KU Leuven
v0.2	2026-02-20	Major changes have been made regarding a chapter on framework	KU Leuven
v0.3	2026-02-23	Minor changes have been changed regarding formatting	PHB
v0.4	2026-02-27	Final version of the report	KU Leuven

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or European Research Executive Agency (REA). Neither the European Union nor the granting authority can be held responsible for them.

Abbreviations

Abbreviation	Full Form
GBD	Global Burden of Disease
LLM	Large Language Models
RCA	Responsible Cooking Alliance
RW	RecipeWatch
SUS	System Usability Scale
WP	Work Programme
WP#	WP followed by a single digit number refers to a specific Work Package

Table of Content

List of Tables

List of Figures

1. Executive summary

This report presents the conceptual, methodological, and strategic foundation of DietWise, an integrated project designed to support healthier and more sustainable eating practices among citizens while engaging food influencers through a voluntary governance model. The report consolidates criteria, behavioural evidence, stakeholder insights, and risk assessments into a coherent framework that guides the development, implementation, and validation of the RecipeWatch mobile application and the Responsible Cooking Alliance (RCA) browser-based add-on tool.

The framework synthesises four interconnected pillars of work: (1) the operational and technical criteria underpinning both tools; (2) behavioural evidence from a systematic programme of pilot studies and a large-scale megastudy; (3) stakeholders, influencers and citizen insights that shape adoption, engagement, and governance; and (4) a risk management strategy with defined monitoring indicators. Together, these pillars establish a coherent pathway from scientific evidence to practical implementation and real-life validation and constitute a transferable mode applicable to any initiative supporting dietary behaviour change through digital means.

At the core of DietWise is a dual approach targeting both citizens and influencers. RecipeWatch analyses online recipes and proposes evidence-aligned ingredient substitutions to improve nutritional and sustainability profiles without altering a dish's core identity. Its logic is grounded in structured scoring criteria, demographic-based personalisation using the Global Burden of Disease framework, and participatory feedback mechanisms. In parallel, the RCA supports influencers in aligning content with nutritional and sustainability principles while preserving editorial autonomy, offering constructive, non-binding guidance through differentiated participation tiers ranging from low-commitment supporter to ambassador roles.

The behavioural evidence, which is drawn from three pilot studies and a large-scale megastudy of 2,297 participants, shows that intervention effectiveness is highly context-dependent, moderated by demographic characteristics, food-related values (seasonality, cultural orientation, regionality), and economic sensitivity. Rather than assuming universal effectiveness, the framework combines universally applicable, low-reactance messages (e.g., "Healthiness guaranteed") with value-aligned, identity-affirming interventions tailored to specific subgroups. This segmentation logic maximises effectiveness while minimising backfire risk. Complementary evidence on food waste and sustainable delivery highlights practical skill-building, leftover reuse routines, and cost-sensitive framing as the most effective behavioural pathways.

Stakeholder and citizen consultations across Belgium, Greece, and Lithuania confirm that adoption depends on convenience, affordability, trust, cultural sensitivity, and low cognitive burden. Vulnerable citizens prioritise immediate practical value and respectful, non-paternalistic communication. Influencers are motivated by purpose, credibility, and visibility, but only when participation is low-effort and creative autonomy is preserved. These insights directly shape governance mechanisms, incentive structures, and dissemination strategies for both tools.

Key risks for both tools including low initial uptake, rapid disengagement, lack of representativeness, superficial compliance, and credibility erosion, are mapped to targeted mitigation strategies and monitoring indicators. A dual-track evaluation framework combines quantitative reach and engagement metrics with qualitative assessments of usability, satisfaction, and behavioural impact.

Overall, the DietWise framework offers an evidence-based, adaptable, and scalable model that integrates behavioural science, digital tool development, stakeholder governance, and risk management. By aligning scientific robustness with practical usability and contextual sensitivity, it provides a structured pathway toward measurable improvements in healthier and more sustainable eating, with replication potential across pilot countries and relevance for policymakers, public health agencies, and technology developers beyond the project itself.

2. Introduction

2.1 Project background

DietWise advances the state-of-the-art of applications to foster healthy and sustainable food consumption by proposing systemic changes, a focus on inclusion, and open social innovations with the aim of developing solutions that streamline existing tools and applications. Its aim is to make cooking, eating, and treating of food at home the most attractive choice for all stakeholders. Using disruptive approaches and voluntary self-regulation, our activities will help to dampen nutritional noise and merge cultural and commercial practices with a healthier and sustainable food consumption pattern.

The project also aims at empowering citizens with novel, citizen science-based solutions that shift the role citizens play – away from passive actors influenced by the food environment to citizens as active participants influencing their decisions and helping to create better digital food environments.

As a result, our methodological and empirical advancements will provide a deeper understanding of how various external system-level environmental factors shape attitudes and beliefs towards healthy and sustainable food provision and cooking, how to motivate consumers to follow nutrition guidelines, how to include the ones who are in greatest need, and how to help citizens shape digital food environments.

In today's complex digital environment, consumers are constantly exposed to a vast array of food-related information, which is often mediated by online influencers. Food influencers have significant power to shape dietary choices and food-related attitudes, particularly among younger audiences and those active on social media. Understanding and leveraging this influence in a responsible, evidence-based manner is critical to the success of nutrition communication strategies.

Within this context, mapping and engaging key actors, such as influencers and citizens, including vulnerable ones, is a strategically important activity. Influencers are not only powerful content creators but also trusted intermediaries between public messages and personal choices. Identifying the most relevant influencers is crucial to understanding their key drivers and beliefs, as well as their alignment with national nutrition guidelines. This is particularly relevant for DietWise, which aims to create tools and environments that support citizens in making better food choices while promoting integrity and transparency in food communication.

2.2 Purpose of the report

The purpose of this report is to develop an integrated and operational framework for DietWise by systematically connecting insights on citizens' and influencers' needs, perceived barriers, and behavioural drivers related to healthier and more sustainable eating practices. Building on the defined criteria for the RecipeWatch application and the Responsible Cooking Alliance (RCA) add-on tool, the report seeks to consolidate knowledge generated across the relevant work packages (WP2, WP3, and WP4 (Task 4.1 and Task 4.2)) into a coherent structure that guides the design, implementation, and governance of the initiative.

Specifically, the report aims to define and refine the mechanism of the voluntary RCA initiative, including how it should be organised, managed, and implemented across different contexts. It intends to establish clear operational, methodological, and participation-related criteria for the RecipeWatch application and the RCA add-on tool, ensuring alignment with evidence-based nutritional standards, sustainability objectives, transparency requirements, and user-centred design principles. In addition, the report will examine differentiated participation levels for influencers, identify and compare behavioural intervention strategies for promoting healthier and more sustainable recipe choices, and outline recommended measures for motivating key stakeholders, including citizens, influencers and vulnerable citizens.

The report further seeks to assess contextual differences across pilot countries, benchmark potential approaches, and document the adaptability and replication potential of selected interventions. It will integrate statistical, managerial, and implementation criteria to support the selection of efficient and scalable solutions. Finally, the

report aims to identify potential risks, mitigation strategies, and pathways for contextual adaptation, thereby ensuring that the DietWise framework is robust, inclusive, and suitable for broader application beyond the initial pilot settings.

3. The DietWise Framework and how the pillars connect

The DietWise framework is built on the premise that effective digital nutrition tools cannot be designed in isolation. They must integrate scientific research with practical usability, and user-centred design with population-level evidence. Table 1 captures how the four pillars connect to each other and ultimately feed into the development and validation of RecipeWatch and the RCA. The details of the four pillars are described in the next chapters.

Table 1 The DietWise framework

PILLAR 1: Criteria and Tool Design	PILLAR 2: Behavioural Evidence	PILLAR 3: Stakeholder Insights	PILLAR 4: Risk Management
RecipeWatch App • GBD-based scoring • Demographic personalisation • Dual-score approach RCA Browser Add-on • Non-punitive feedback • Influencer participation tiers • Editorial autonomy	Online pilots + Megastudy • 20 interventions tested • Segment-specific effects • Gender, values, economics Food Waste & Delivery • Leftover reuse routines • Competence-driven change • Sustainable delivery defaults	Citizen Workshops • Convenience & affordability • Cultural sensitivity • Trust and tone Influencer Consultations • Purpose alignment • Credibility & visibility • Low-barrier participation	RecipeWatch Risks • Adoption & engagement • Representativeness • Credibility and trust RCA Risks • Value misalignment • Creative freedom • Governance and integrity
↓ All four pillars feed into ↓			
RecipeWatch App and RCA tool development, validation and iteration			
↓ ↓			
Field studies for real-life validation (WP7) → scale-up → replication across pilot countries			

The project started from app ideas and criteria (Pillar 1), that formed the basis for quantitative research (Pillar 2) and qualitative research (Pillar 3-4). These research efforts feed into the development and validation of the actual tools. The four pillars are deliberately interconnected, with insights from each shaping the direction of the others:

- The criteria for RecipeWatch and the RCA (Pillar 1) establish what the tools need to do, translated from nutritional standards and user-centred design principles developed in WP4 and is summarised in chapter 4.
- The behavioural evidence (Pillar 2) tells us how to deliver those functions most effectively, which interventions work for which segments, under what conditions, and with what risks of backfire. This comes from WP3 and is summarised in chapter 5.
- Stakeholder and citizen insights (Pillar 3) reveal what adoption actually depends on in practice, such as convenience, trust, affordability, cultural relevance, going beyond what behavioural experiments can capture. This also comes from WP4 and summarised in chapter 6.
- The risk framework (Pillar 4) synthesises potential failure modes identified by all stakeholders and links them to monitoring strategies, ensuring the framework is robust and adaptive over time. This is summarised in chapter 7.

The connecting logic is deliberate: Pillars 2 and 3 together generate evidence that directly shapes the design decisions captured in Pillar 1, while Pillar 4 ensures that the overall initiative remains credible, inclusive, and adaptive. This is why the report is structured to move from criteria, to evidence, to stakeholder insights, to risk, before concluding with how these connect to next steps. In subsequent steps after these four pillars and app development, the apps will be tested in field settings (WP7), which may lead to further improvements. The results of the four pillars are presented in this deliverable.

4. Tool design criteria: RecipeWatch and the RCA

This chapter defines the criteria governing the design, functionality, and implementation of the RecipeWatch (RW) mobile application and the RCA add-on tool. It establishes the operational, methodological, technical, and participation-related principles that ensure both tools align with evidence-based nutritional standards, sustainability objectives, transparency requirements, and user-centred design values.

The chapter is structured into two main sections. Section 4.1 outlines the criteria for the RecipeWatch application, including its core functionality, accessibility framework, user workflow, personalization logic based on the Global Burden of Disease (GBD) framework, and its structured scoring mechanism. Particular emphasis is placed on scientific robustness, demographic-based personalization, transparency in recommendations, and the dual-score approach that shifts the focus from judgment to improvement potential.

Section 4.2 presents the criteria for the Responsible Cooking Alliance (RCA) browser add-on. It details the principles guiding its accessibility, non-punitive feedback model, technical architecture, and flexible participation structure for influencers. RCA prioritizes supportive guidance over evaluative scoring, ensuring editorial autonomy and fostering constructive engagement. The section further defines a differentiated and progressive participation framework designed to accommodate varying levels of commitment while promoting long-term involvement in advancing healthier and more sustainable recipe content.

4.1 Criteria for the RecipeWatch application

This chapter defines the operational, methodological, and technical criteria governing the development and implementation of the RecipeWatch (RW) application. The criteria establish the functional scope, personalization logic, scoring methodology, and user interaction principles that ensure alignment with evidence-based nutritional standards, transparency requirements, and user-centred design principles.

RecipeWatch has been developed as a digital solution aiming to support citizens in making healthier and more sustainable dietary choices. The system integrates scientific evidence, demographic-based personalization, and participatory user feedback mechanisms. The following sections describe the core criteria underpinning the application's design and operation.

4.1.1 Overview and core functionality

RecipeWatch (RW) is a standalone mobile application designed to support citizens in making healthier and more sustainable nutritional decisions. The primary goal is the provision of evidence-based ingredient substitutions that improve the nutritional and environmental profile of recipes without altering their core identity.

Given a recipe link, the application analyses its ingredients and proposes targeted substitutions aimed at enhancing health value and sustainability. Explanations would be provided on demand on how the proposed substitutions improve nutritional values. For example, if whole-grain pasta is suggested instead of regular pasta, the user would receive the optoin to read a note explaining that this substitution increases fiber intake. In addition, users actively participate in the adaptation process by reviewing each proposed substitution, choosing whether to accept or reject it.. This participatory mechanism ensures user agency, transparency, and iterative system improvement.

Registered users benefit from personalized recommendations based on demographic parameters, specifically age and gender. Furthermore, RW promotes transparency by displaying aggregated statistics that show how frequently each substitution has been accepted or declined by other users for the same recipe. This collective feedback contributes to the development of a statistical knowledge base that may be leveraged in future iterations to refine recommendations and improve personalization accuracy.

4.1.2 Accessibility and user registration

RecipeWatch would be available for download on both Android and iOS platforms. A key design criterion is inclusivity as the application would allow for both anonymous and registered usage. Users may enter recipes without creating an account, ensuring low entry barriers. To create an account, users provide minimal personal information to preserve privacy and foster trust. Authentication is handled via email and password. While the user's name is optional, date of birth and gender (male, female, other) are mandatory (when individuals are making an account), as they form the basis for personalized recommendations.

Registered users can manage their account settings, including:

- Updating their password for security purposes
- Modifying personal information (name, date of birth, gender) in case of wrong initial input or change of data.
- Selecting their preferred language of operation

These features will ensure usability, adaptability, and data accuracy over time.

4.1.3 User experience and workflow

The RecipeWatch user workflow is structured to ensure simplicity, clarity, and transparency. The operational sequence is defined as follows:

i. The user identifies a recipe online and inserts the URL into the application interface.
ii. The system extracts and cleans the recipe content, isolating ingredients and preparation instructions.
iii. A Large Language Model (LLM) is invoked to generate evidence-aligned ingredient substitution suggestions.
iv. The extracted recipe and the proposed substitutions are displayed to the user so that the user can easily review both before making decisions.
v. For each substitution, aggregated acceptance/rejection statistics from other users are presented.
vi. The user selects which substitutions to adopt or decline.
vii. The final, modified recipe is displayed, with applied changes clearly highlighted.

This workflow is summarized in Figure 1.

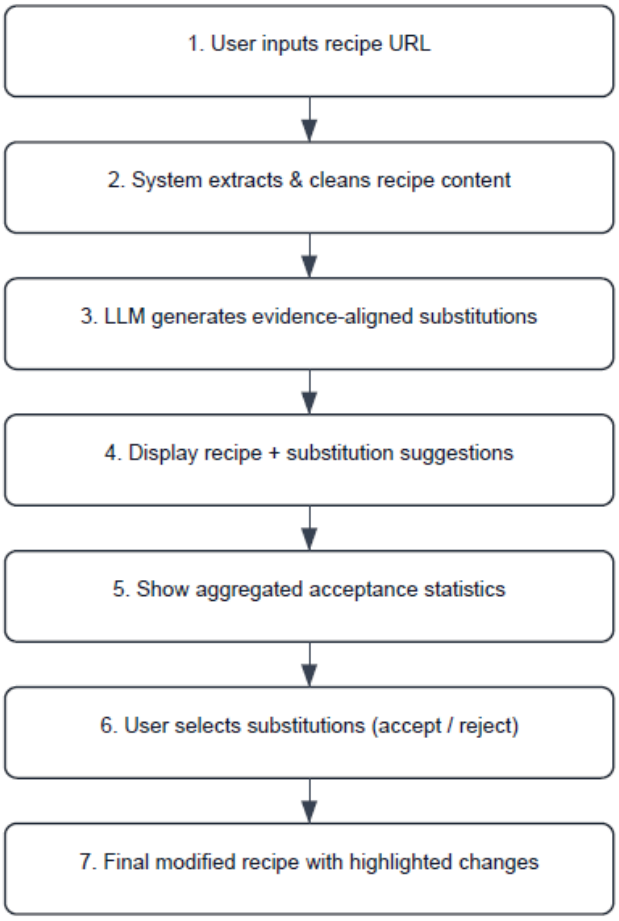

Figure 1 RecipeWatch user workflow

A strict functional criterion is that recommendations are limited exclusively to ingredient substitutions. The system does not modify preparation steps or fundamentally alter the structure of the recipe. All substitutions are designed to result in healthier and/or more sustainable alternatives. User responses (acceptance or rejection of suggestions)

constitute explicit feedback and may be stored, in anonymized and aggregated form, to improve recommendation quality and personalization mechanisms in future system iterations.

4.1.4 Personalization

The personalization engine of RecipeWatch is grounded in a data-driven and evidence-based framework derived from the Global Burden of Disease (GBD) study (Institute for Health Metrics and Evaluation, 2025). The GBD framework provides dietary risk exposure estimates that explicitly account for age and gender differences, recognizing that nutritional requirements and associated health risks vary across demographic groups. The study defines age- and gender-specific theoretical minimum risk exposure levels for multiple dietary factors. By structuring the application's nutritional rules according to this framework, RecipeWatch ensures that recommendations are aligned with population-specific health evidence rather than applying uniform intake thresholds. Therefore, personalization is achieved by segmenting users according to gender and three predefined age groups.

The system applies a rules-based logic that maps each demographic profile to a set of prioritized dietary components (e.g., fruits, legumes, processed meats, sodium). When a recipe contains ingredients associated with dietary risk factors, substitution rules are triggered to improve alignment with established guidelines. This structured approach ensures scientific robustness, transparency, and reproducibility in the personalization process.

4.1.5 Scoring mechanism

To provide actionable insights and support informed dietary choices, RecipeWatch implements a structured scoring mechanism designed to assess the nutritional quality of recipes in a transparent and evidence-based manner. The scoring framework serves as a decision-support tool, enabling users to understand how a recipe aligns with established dietary risk factors and how proposed modifications may improve its nutritional profile.

The scoring system is grounded in 15 dietary components derived from the Global Burden of Disease (GBD) dietary risk framework. These components correspond to food groups or nutrients that are either encouraged (e.g., fruits, legumes, whole grains) or recommended to be limited (e.g., sodium, processed meat). Each recipe is evaluated against these components using predefined criteria.

For encouraged components, points are assigned when the relevant food group or nutrient is present in the recipe. For components that should be limited, points are awarded when the respective ingredient is absent or remains below a defined threshold (for example, low salt content or the absence of processed meat). If a recipe does not include encouraged components, no points are granted for those categories. The individual component scores are aggregated to produce a composite raw score (maximum 15 points), with normalisation applied (e.g., adjusting for the number of ingredients) to ensure that simpler recipes are not unfairly penalised. This score may be presented in its original format or scaled for user-friendly visualization within the application interface. The resulting value reflects the extent to which a recipe aligns with evidence-based nutritional recommendations and contributes to mitigating specific dietary risks, such as diets low in beneficial food groups or high in harmful components. As such, the score functions as an integrated indicator of overall nutritional alignment.

Recognizing that recipe rating systems may raise methodological and ethical concerns, particularly with regard to implicit classification or "labelling" of foods, RecipeWatch adopts a dual-score approach. For each recipe, two scores are displayed, with one representing the original recipe as submitted by the user, and one representing the potential outcome following the adoption of AI-generated ingredient substitutions. This approach does not compare different recipes to one another, but instead, it compares the original recipe only with the app's suggested modified version, focussing on how the proposed changes may improve its nutritional profile while still respecting culinary diversity and traditional food practices.

4.2 Criteria for the RCA add-on

The Responsible Cooking Alliance (RCA) is designed as a browser-based support tool aimed at assisting food influencers in aligning their online recipe content with established nutritional and sustainability guidelines. The core criteria underpinning RCA focus on accessibility, user autonomy, non-punitive guidance, technical feasibility, and responsible content enhancement.

4.2.1 Accessibility and ease of use

A fundamental criterion of RCA is accessibility. The system is primarily delivered through a browser extension that integrates seamlessly into influencers' existing workflows. Rather than requiring users to upload content to a separate platform, RCA interacts directly with cooking-related webpages. By reading and analysing the active recipe page, the plugin extracts key components, such as ingredients and preparation instructions, and processes them through DietWise's infrastructure to generate tailored feedback.

In addition to the browser extension, RCA provides a dedicated website for account registration and management. This ensures that users can securely create and maintain their profiles independently of the extension interface. The registration process follows a minimal-data principle, as influencers are required to provide only an email address and a preferred password. This approach supports privacy, lowers the barrier to entry, and encourages adoption.

Once registered, users can manage their account settings, including updating personal information, changing their password for security purposes, and selecting their preferred language. These features reflect RCA's criterion of usability and data minimization, ensuring the system remains straightforward, secure, and adaptable to user needs.

4.2.2 Supportive and non-punitive feedback mechanism

Another central criterion of RCA is its commitment to constructive, non-punitive guidance. When registered influencers browse their own websites, they can activate RCA through a dedicated browser button located in the top-right corner of the interface. Upon activation, a side-panel popup displays the feedback generated for the specific recipe under review.

The plugin analyses the extracted recipe content and presents it alongside structured recommendations. These recommendations include:

- General nutritional and sustainability advice
- Suggestions for ingredient substitutions
- Improvements that enhance alignment with recognized dietary guidelines

Importantly, RCA does not automatically modify or overwrite the original content. Influencers retain full editorial control. The system merely provides recommendations, leaving the decision to implement changes entirely to the user. This preserves creative autonomy while promoting responsible cooking practices as suggested by influencers in co-creation and co-development workshops.

A defining criterion of RCA is the deliberate avoidance of explicit scoring or ranking of recipes. This decision is based on both strategic and technical considerations. Strategically, publishing rankings could position RCA as a source of negative publicity for content creators. Such an approach might discourage adoption, reduce engagement, and create reputational risks for influencers whose recipes receive lower evaluations. By focusing on improvement rather than judgment, RCA fosters collaboration instead of criticism.

From a technical standpoint, online recipe content is frequently edited and updated. Maintaining accurate, real-time rankings would require continuous monitoring and recalculation, introducing significant complexity and potential inconsistencies. By refraining from numerical scoring systems, RCA maintains technical flexibility and scalability, enabling future expansion of functionalities without being constrained by ranking infrastructures.

4.2.3 Flexibility and broader applicability

RCA is designed not only for reviewing content creators' own recipes but also for analysing third-party recipes encountered during browsing. Because it does not publicly label or rank content, the tool can be used privately and constructively across multiple contexts. This broad applicability supports its overarching criterion of responsible guidance without public exposure or reputational impact. By embedding feedback within the natural browsing environment and avoiding external publication of assessments, RCA promotes responsible content development while maintaining trust, discretion, and professional integrity.

4.2.4 Differentiated and progressive participation structure

An additional criterion of RCA is the implementation of differentiated participation levels for influencers. A flexible structure is considered essential to lower entry barriers for individuals who are new to the topic of nutrition and

sustainability, while also accommodating the diverse capacities, motivations, and professional commitments within the influencer community. Such an approach enables progressive engagement, allowing participants to deepen their involvement over time according to their interests and resources. Therefore, the planned participation levels for influencers are:

- A **Supporter** level may involve low-commitment activities, such as responding to surveys, subscribing to updates, or symbolically endorsing the initiative.
- A **Contributor** level may include medium-commitment engagement, such as participating in workshops, testing features, or providing structured feedback on content and tools.
- An **Ambassador** level may entail high-commitment involvement, including co-creation of materials, advocacy activities, or public representation of the initiative.

While badges or certificates may be used to reflect these different forms of engagement, they are not intended to signal differing standards of credibility, authority, or validation. Instead, they serve as recognition of commitment and participation intensity.

Underpinning this structure is the importance of clear behavioural and normative incentives. Each participation level offers meaningful value, framed within a compelling narrative that highlights the influencer's potential impact on public health and environmental sustainability. For example, opportunities to publicly identify as "part of the solution" can enhance reputational benefits and intrinsic motivation. Additionally, light-touch self-regulation mechanisms, such as voluntary certification potentially supported by public authorities, can reinforce credibility and sustain meaningful engagement across all participation levels. Through this differentiated and incentive-based structure, RCA seeks to foster long-term commitment while remaining inclusive, adaptable, and supportive of influencers at varying stages of awareness and engagement.

5. Most efficient behavioural interventions

This chapter synthesises the empirical backbone of the DietWise framework, the systematic programme of behavioural research conducted under WP3. Its purpose within the framework is to answer a specific design question, which is when RecipeWatch presents an ingredient substitution to a user, what message, if any, should accompany that recommendation to maximise acceptance without triggering resistance? This question matters because the criteria established in Chapter 4 specify what substitutions to suggest, but not how to frame them. The behavioural evidence fills that gap. It directly informs which messages are embedded in RecipeWatch (and tested in real-life validation in WP7), and also provides a model of how to conduct this kind of evidence generation that other projects can replicate.

5.1 The behavioural evidence generation process

WP3 followed a four-stage process: (1) structured literature review and expert screening of over 150 candidate interventions; (2) expert selection of 20 interventions across three families, social norms (4 interventions), Alpha (approach-oriented focusing on moving toward positive outcomes) (8 interventions), and Omega (resistance-reducing) (8 interventions); (3) three sequential pilot studies to calibrate stimuli and identify ceiling effects; and (4) a large-scale megastudy comparing all 20 interventions simultaneously under identical conditions in a UK sample of 2,297 participants. Importantly, the interventions were not stand-alone behaviour change campaigns, but they were short messages (≤12 words) accompanying an ingredient swap recommendation. This makes the findings directly applicable to the RecipeWatch interface. The setup was deliberately designed to mirror how RecipeWatch will present substitutions to users.

5.2 Lessons from the three pilot studies

Prior to the main megastudy, three sequential pilot studies were conducted to optimise the experimental conditions, refine the recipes and intervention wording, and ensure sufficient statistical sensitivity. A key methodological concern throughout was the risk of ceiling effects: if baseline acceptance of a recipe recommendation is already too high, even effective interventions cannot produce measurable change. The pilots were therefore designed to carefully calibrate both the recipe recommendation and the interventions (social norms, alpha, and omega), before testing 20 interventions simultaneously.

The first pilot evaluated six recipes in a laboratory setting, selecting those with baseline acceptance rates between 20% and 60% as optimal for detecting intervention effects. Four recipes met this criterion (Chicken Potato Casserole, Spaghetti Bolognese, Carrot Pancakes, and Frittata), while Banana Bread and Vegetable Soup were excluded due to ceiling effects. The second pilot compared the three persuasion strategies across these four recipes using a within-subjects design. A notable finding was that the type of recipe had a stronger influence on acceptance than the intervention itself. Omega and social norms interventions showed modest positive effects, while alpha interventions occasionally backfired, triggering psychological resistance rather than motivation. Crucially, the effectiveness of each strategy varied substantially across recipes, confirming the context-sensitive nature of food-related interventions.

The third pilot refined the interventions and outcome measures ahead of the megastudy. Most intervention effects were statistically negligible, with one notable exception. The omega intervention applied to carrot pancakes produced a backfire effect, reducing rather than increasing acceptance likelihood, possibly due to the recipe's relative unfamiliarity. Spaghetti Bolognese, by contrast, showed consistently high and stable acceptance across all conditions, suggesting that culturally familiar recipes provide a more receptive foundation for interventions. Frittata was excluded from the megastudy because its control condition already exhibited very high acceptance, limiting room for measurable improvement.

Taken together, the pilots established that intervention effects are highly context-dependent, that baseline acceptance levels must be carefully managed, and that certain interventions can produce unintended negative effects when misaligned with the food or audience. These findings directly shaped the megastudy design, motivating a broader and more systematic evaluation across diverse recipes to better capture heterogeneous intervention effects.

5.3 Megastudy: Comparative effectiveness of 20 interventions

Building on the methodological refinement achieved through the three pilot studies, the megastudy constituted the central empirical test of WP3. Its purpose was not only to determine whether behavioural interventions work, but to identify which specific interventions are comparatively most effective when tested simultaneously under identical conditions. The megastudy included 20 theoretically grounded behavioural interventions drawn from social norms, alpha (approach-oriented), and omega (resistance-reducing) frameworks, plus a control condition without persuasive messaging. A survey collected 2,500 responses from crowdsourcing platform Prolific from the United Kingdom. A total of 203 responses were dropped due to incomplete responses and attention check failures, resulting in 2,297 valid responses for the analysis. Participants were exposed to a recipe accompanied by a healthier and more sustainable ingredient substitution. Depending on random assignment, this recommendation was either paired with one of the 20 behavioural interventions or presented without any additional persuasive framing. This design allowed for the precise estimation of the relative effectiveness of each intervention compared to control, the comparative performance of the strategies, the identification of the strongest-performing message overall and the robustness of effects across recipes and demographic segments.

5.3.1 Overall effects

When analysing the full sample, most behavioural interventions did not significantly outperform the control condition. A key explanation for this pattern is the relatively high baseline acceptance rate of 71% observed in the control group. This indicates that a majority of participants were already willing to accept healthier and more sustainable substitutions even without persuasive framing.

Such a ceiling effect reduces the available margin for improvement and makes it statistically more difficult for additional messaging to generate detectable gains. In other words, when acceptance is already high, interventions must produce comparatively stronger effects to reach statistical significance. Despite this constraint, one intervention demonstrated a statistically significant positive effect across the entire sample:

Omega 3: “Healthiness guaranteed”

This message increased participants’ likelihood of accepting the recipe improvement recommendation compared to the control condition.

5.3.2 Gender-Specific effectiveness

Because overall effects were constrained by ceiling levels, subgroup analyses were conducted among men, who exhibited lower baseline acceptance and therefore provided greater sensitivity for detecting intervention effects. Among this group, multiple interventions proved effective:

Social Norms

- Norm 1: “Join the 75% who accept this recommendation.”

Alpha interventions

- Alpha 1: “We’re doing our part for better diets. Can we count on you?”
- Alpha 2: “Free pro tip for you: swap this one ingredient.”
- Alpha 3: “Step up and make the switch to better food ingredients today.”
- Alpha 6: “Recommended by RecipeWatch healthy diet experts.”
- Alpha 7: “Kudos for cooking at home! You are going to love this suggestion!”
- Alpha 8: “This is our users’ favourite recommendation.”

Omega interventions

- Omega 1: “Why not go for the better option?”
- Omega 2: “Your future self will thank you…”
- Omega 4: “It’s a little different, but give it a shot!”
- Omega 7: “As someone who cares about great food choice, you’ll appreciate this smart swap”
- Omega 8: “You might feel hesitant to replace familiar ingredients. But you might like it.”

Men, who are generally less receptive, tend to respond more strongly to interventions that incorporate positive identity affirmation, expert endorsement, social proof, and resistance-reducing language. These elements appear to mitigate scepticism and increase engagement by aligning messages with valued identities, credible authority, and perceived social norms. Consequently, the most effective strategy is not a universal approach applied uniformly across audiences, but rather one that is optimised for specific segments based on their distinct behavioural responses.

5.3.3 Effectiveness moderated by food-related values

A major innovation of WP3 is the integration of value-based food orientations, which include specifically seasonality, cultural orientation, and regionality (locavorism), into the modelling of intervention effectiveness. Rather than assuming that interventions work uniformly across all consumers, this approach recognizes that the efficacy of behavioural messages is conditional on the pre-existing values and beliefs that individuals hold about food. The findings consistently demonstrate that value-message congruence, which is the alignment between a consumer's food-related values and the framing of an intervention, substantially increases the likelihood of acceptance of healthier and more sustainable recipe recommendations. Conversely, the absence of such alignment yields null or even backfiring effects.

5.3.3.1 Seasonality

Seasonality refers to the importance consumers attach to eating foods that are in season, based on beliefs about superior taste, freshness, and alignment with natural cycles. This orientation was measured using a four-item scale capturing both perceptual (e.g., seasonal vegetables taste better) and behavioural (e.g., eating seasonally is important to my diet) dimensions. The results show that higher seasonal orientation significantly increased baseline acceptance of recipe recommendations, indicating that consumers who already value seasonality are inherently more receptive to dietary changes, regardless of the specific intervention presented. Moderation analysis showed that seasonal orientation did not merely elevate baseline acceptance, it selectively amplified the effectiveness of specific interventions, which include:

- Omega 1: “Why not go for the better option?”
- Alpha 5: “This suggestion is made by doctor/ nutritionist (famous in the country)”
- Alpha 7: “Kudos for cooking at home! You are going to love this suggestion!”

These findings suggest that seasonally oriented consumers respond particularly well to interventions that emphasize improvement ("better option") and positive reinforcement ("kudos").

5.3.3.2 Cultural orientation

Cultural orientation captures the extent to which food is embedded in cultural traditions, practices, and cross-cultural exchange. Consumers scoring high on this dimension view food as connected to heritage, identity, and social meaning. Cultural orientation was also found to be a strong positive predictor of acceptance, suggesting that individuals who already engage with food as a cultural artifact are more open to modifying their cooking practices in line with recommendations. Moderation analysis also revealed that cultural orientation selectively enhanced responsiveness to particular interventions, indicating that culturally engaged consumers are not uniformly receptive but respond to specific framings. Among the enhanced interventions are:

- Norm 2: “Acceptance to this recommendation has been increasing over time”
- Omega 5: “You are worth a better version.”
- Omega 7: “As someone who cares about great food choice, you’ll appreciate this smart swap”

5.3.3.3 Regionality (Locavorism)

Regionality, or locavorism, reflects a preference for locally produced food. This orientation was measured using two complementary dimensions, which include a composite measure capturing perceived quality and nutritional benefits of local food (e.g., taste, freshness, nutrition), and a single-item measure capturing environmental benefits (e.g., reduced transport emissions). Both the quality/nutrition dimension and environmental dimension of regionality were strongly associated with the acceptance of recipe recommendations.

Consumers who value local food for quality and nutritional reasons showed enhanced responsiveness to 5 out of the 20 interventions:

- Norm 3: “Most RecipeWatch users accept this recommendation. Choose a better ingredient!”
- Alpha 4: “A tiny tweak for a better meal - why not start with this small switch?”
- Alpha 5: “This suggestion is made by doctor/ nutritionist (famous in the country)”
- Alpha 7: “Kudos for cooking at home! You are going to love this suggestion!”
- Omega 1: “Why not go for the better option?”

In addition, consumers motivated by the environmental benefits of local food responded more strongly to:

- Norm 3: Most RecipeWatch users accept this recommendation. Choose a better ingredient!
- Alpha 2: "Free pro tip for you: swap this one ingredient."
- Omega 7: "As someone who cares about great food choices, you'll appreciate this smart swap!"

The findings from this analysis showed that behavioural change is not driven by interventions alone, but by the alignment between the intervention and the value system of the recipient. This has profound implications for the design of digital nutrition tools.

A key implication is that segmentation is essential as a one-size-fits-all approach to messaging will invariably underperform relative to strategies that tailor interventions based on consumers' value orientations. This value-based targeting enhances efficiency by directing specific interventions to consumer segments. By doing so, the cost-effectiveness and impact of behavioural interventions can be maximized.

To facilitate this, the measurement of food values should be integrated into user profiling. Apps and platforms should consider incorporating brief measures of seasonality, cultural orientation, and locavorism during onboarding to enable dynamic, personalized intervention delivery. Furthermore, null or negative effects in aggregate data should not be mistaken for failure, as they often signal misalignment. The absence of significant effects for many interventions in the full sample, coupled with strong effects among value-aligned subgroups, underscores that apparent failures may reflect mismatches between interventions and audience rather than inherent weaknesses of the intervention itself.

5.3.4 Effectiveness moderated by economic sensitivity

Effectiveness must include accessibility. An effective intervention package cannot be evaluated solely on average treatment effects, it must also consider how different population segments respond. Two particularly important findings concern vulnerable consumers defined by price sensitivity and financial constraints.

5.3.4.1 Price consciousness

Price consciousness, measured using a two-item scale capturing price-focused food purchasing, showed a positive main effect on acceptance. Higher price consciousness was associated with an approximately 11% increase in the odds of accepting recipe recommendations per unit increase. This suggests that price-sensitive consumers may be particularly receptive to recipe optimisation, potentially because such recommendations are perceived as cost-effective or value-enhancing. However, moderation analyses revealed selective backfire effects. Higher price consciousness significantly reduced acceptance under two specific interventions:

- Alpha 7: "Kudos for cooking at home! You are going to love this suggestion!"
- Omega 2: "Your future self will thank you for this simple swap - why not start now?"

These findings indicate that certain positively framed, aspirational messages may conflict with the cost-saving priorities of highly price-conscious consumers, leading to reduced rather than increased acceptance.

5.3.4.2 Financial constraints

Financial constraints, measured using a four-item scale capturing food-related financial hardship over the past 12 months (Cronbach's $\alpha = .92$), also showed a positive association with acceptance. Greater financial hardship was associated with an approximately 9% increase in the odds of acceptance per unit increase. This pattern suggests that individuals facing greater economic pressure may be particularly open to practical, resource-efficient recipe recommendations.

Notably, interaction analyses showed no moderation by financial constraints. Unlike price consciousness, financial hardship did not interact with specific intervention types; acceptance among financially constrained participants

increased at baseline regardless of the intervention. This suggests that economic necessity creates a general receptiveness to practical recommendations rather than selective responsiveness to particular interventions.

Furthermore, financial constraints emerged as a strong predictor of app engagement, measured as a composite of willingness to use the app, perceived usefulness, necessity, informativeness, and willingness to share it with others. Each unit increase in financial hardship was associated with approximately a 14% increase in engagement. This suggests that economically constrained individuals may view the RecipeWatch app as a particularly valuable support tool for managing food resources effectively.

5.3.4.2 Implications for intervention design

These findings carry clear implications for designing effective and accessible interventions for economically vulnerable groups. For example, interventions that rely on congratulatory language ("Kudos for cooking at home!") or abstract future rewards ("Your future self will thank you") may backfire among price-conscious consumers, who prioritize immediate cost savings over identity affirmation or delayed benefits. In addition, emphasising practical, resource-efficient benefits as the positive main effects for both price consciousness and financial constraints indicate that economically vulnerable consumers are receptive to recipe recommendations when these are perceived as aligned with their need to stretch limited resources. Finally, maintain affordability cues implicitly. While overt price messaging was not tested, the pattern of results suggests that interventions should signal practical value without triggering resistance to seemingly irrelevant or premium-oriented appeals. Simple, direct recommendations paired with efficiency cues are likely to be most effective. Thus, efficient interventions for vulnerable groups must be grounded in practical utility, avoid identity-focused or aspirational framings that may conflict with economic priorities, and recognise that financial hardship increases baseline receptiveness to resource-saving suggestions.

5.3.5 Synthesis: Most effective interventions

Across the United Kingdom megastudy, the evidence reveals that intervention effectiveness is nuanced, varying by demographic subgroup, food-related values, and contextual factors. Rather than a one-size-fits-all solution, the findings point to four distinct categories of interventions that demonstrate efficiency under specific conditions. The following synthesis integrates both main effects and moderated effects documented in WP3 (Deliverable 3.1).

5.3.5.1 Category 1: Guarantee-based omega intervention

Intervention Text: "Healthiness guaranteed."

This intervention emerged as the only intervention demonstrating a significant full-sample effect in the megastudy (see Figure 3, Section 4.4.2 of Deliverable 3.1). Across all respondents, this brief, declarative message increased acceptance of recipe recommendations relative to the control condition. Its efficiency lies in its simplicity and low cognitive load, as it offers a direct assurance of quality without requiring elaboration or persuasion. The intervention is highly scalable, suitable for broad deployment across diverse user groups, and carries minimal risk of psychological reactance or backfiring. Given its universal appeal, this intervention serves as a robust baseline strategy for any dissemination effort.

4.3.5.2 Category 2: Social proof (norm-based) interventions

Intervention Text: "Join the 75% who accept this recommendation."

Social proof interventions, grounded in descriptive norms, demonstrated efficiency primarily among subgroups with lower baseline acceptance (in this case men) and among consumers with strong food-related values. While not significant in the full-sample analysis, this intervention gained traction when examined through moderation analyses. This includes:

- Cultural orientation significantly amplified the effectiveness of norm 2 (Acceptance of this recommendation has been increasing over time.), indicating that individuals who view food as embedded in cultural traditions are more responsive to normative cues.
- Regional food values (locavorism) amplified acceptance under norm 3 (Most RecipeWatch users accept this recommendation. Choose a better ingredient!).

These findings suggest that social proof interventions are not universally effective but become highly efficient when targeted at value-aligned segments. Their scalability and low implementation cost make them attractive for population-level strategies that can be tailored to regional or cultural contexts.

5.3.5.3 Category 3: Effective omega interventions (beyond guarantee)

Several additional omega interventions demonstrated effectiveness, particularly in moderation analyses and subgroup applications. These interventions share a gentle, low-pressure approach that reduces resistance to change.

Effective intervention texts from this category include:

- Omega 1: "Why not go for the better option?"
- Omega 5: “You are worth a better version.”
- Omega 7: "As someone who cares about great food choices, you'll appreciate this smart swap!"

The evidence demonstrates that omega interventions, characterized by their low coerciveness and respect for user autonomy, show distinct patterns of effectiveness across different consumer segments. Omega 1 exhibited significant amplification among consumers with strong seasonal food orientation and among those with strong regional food values. The rhetorical question format appears to reduce perceived pressure while inviting consideration, making it particularly suitable for consumers who may resist more directive approaches. Omega 5 amplified consumers with strong cultural orientation and omega 7 was amplified among consumers with strong cultural orientation and environmental locavorism. The identity-affirming opening (e.g.,"As someone who cares...") creates alignment with existing values, making the recommendation feel like a natural extension of the user's self-concept rather than an external imposition.

These Omega interventions share a common mechanism: they work not by commanding or directing, but by suggesting, inviting, and validating. This makes them particularly effective for consumers who may be resistant to more authoritative or prescriptive messages. By preserving user autonomy while gently encouraging consideration, they lower the psychological barriers to behaviour change.

5.3.5.4 Category 4: Identity-affirming and expert-endorsed alpha messages

This category encompasses multiple intervention types that share a common mechanism. They affirm the user's identity, provide expert validation, or foster a sense of community belonging. Efficiency is observed particularly among men and value-driven consumers.

Effective interventions from this category include:

- Alpha 1: "We're doing our part for better diets. Can we count on you?"
- Alpha 2: "Free pro tip for you: swap this one ingredient."
- Alpha 3: "Step up and make the switch to better food ingredients today."
- Alpha 4: “A tiny tweak for a better meal - why not start with this small switch?”
- Alpha 5: “This suggestion is made by doctor/ nutritionist (famous in the country)”
- Alpha 6: "Recommended by RecipeWatch healthy diet experts."
- Alpha 7: "Kudos for cooking at home! You are going to love this suggestion!"
- Alpha 8: "This is our users' favourite recommendation."

The evidence shows that men, who were consistently less likely than women to accept recommendations, showed increased responsiveness to identity-affirming interventions. Specifically, men who felt more confident in their knowledge of sustainable cooking were more likely to accept recommendations, suggesting that messages reinforcing competence and agency resonate with this subgroup. With respect to value congruence, moderation analyses revealed that alpha 5 (“This suggestion is made by doctor/ nutritionist (famous in the country)”) and alpha 7 were amplified among consumers with strong seasonal food orientation. Similarly, alpha 4, alpha 5, and alpha 7 were amplified among consumers with strong regional food values. However, alpha 7 was found to have a backfire effect on vulnerable citizens who are concern with prices. The expert-endorsed message (Alpha 6) appears in the list of effective interventions also provides credibility cues that may be particularly influential among consumers who lack confidence or seek authoritative guidance.

These strategies are efficient when tailored to specific profiles: men, confident cooks, and consumers whose food choices are guided by seasonal, regional, or cultural values. They require minimal additional resources for implementation but depend on accurate audience segmentation.

5.4 Most effective food waste and delivery approaches

Beyond recipe acceptance, WP3 also examined food waste reduction and sustainable delivery preferences — two topics directly relevant to RecipeWatch's potential feature set. These findings are included in the framework because they define which complementary features are worth developing and how to frame them. A two-stage methodological design was implemented. First, a structured literature review was conducted to identify behaviours linked to food waste reduction and food delivery choices within the nutritional domain. Second, two empirical studies (Pilot 2 and the megastudy) were carried out to examine these relationships in practice. Pilot 2 investigated the interrelations between consumers' intentions and behaviours concerning food waste, plastic waste, delivery preferences, and their willingness to adopt a sustainability-oriented digital application. Building on this, the megastudy analysed how food delivery preferences relate to consumer motivations, sustainability orientations, and the adoption of digital tools. The objective was to identify the most effective behavioural pathways that can inform scalable interventions in WP7.

Results show that overall self-reported household food waste is relatively low, with the majority of respondents reporting wasting less than 10% of food weekly. However, important differences across product categories reveal clear intervention opportunities. Waste is lowest for higher-value items such as meat, fish, and dairy products, while fresh fruits, vegetables, and bakery products are more frequently discarded. This suggests that food waste interventions should prioritise perishable produce and bread products rather than focusing on categories where waste is already minimal.

One of the strongest and most consistent predictors of lower food waste is the presence of structured leftover reuse routines. Households that regularly store and reuse leftovers report significantly lower waste levels. However, while storing and reheating leftovers is common, creatively transforming leftovers into new meals is far less frequent. This gap represents a key behavioural leverage point. Strengthening practical leftover transformation skills, through meal planning tools, recipe suggestions based on available ingredients, and simple behavioural prompts, appears to be one of the most effective strategies for reducing household food waste. Importantly, food waste reduction is closely linked to cooking competence and food-specific routines rather than to a broad environmental orientation. Thus, practical skill-building and knowledge enhancement are likely to be more effective than abstract sustainability messaging.

In contrast, plastic waste reduction and sustainable delivery preferences form a distinct behavioural cluster. Individuals who report reducing plastic use are also more likely to prefer climate-friendly delivery options and to express stronger intentions to use the RecipeWatch app. Sustainable cooking knowledge acts as a cross-cutting enabler, positively associated with lower food waste, reduced plastic use, and environmentally oriented delivery choices. This indicates that improving sustainability knowledge can generate spillover effects across multiple domains.

Regarding delivery options, climate-friendly delivery (e.g., bicycle, electric vehicle, or walking courier) emerges as the most broadly preferred option overall, followed closely by self-pick-up, while conventional car-based delivery is least preferred. However, motivations differ substantially across consumer segments. Those preferring climate-friendly delivery display the strongest environmental motivation, the highest confidence in sustainable cooking knowledge, and the highest intention to use the RecipeWatch app. This group represents the most sustainability-oriented and innovation-ready segment. In contrast, individuals preferring self-pick-up are primarily motivated by cost avoidance and convenience rather than environmental concerns. For this segment, framing pick-up as a way to save money and avoid delivery fees is likely to be more effective than purely environmental messaging. Consumers preferring conventional car-based delivery show lower environmental motivation, higher ambivalence toward sustainable cooking changes, and lower app adoption intentions, suggesting greater behavioural resistance. Overall, these findings demonstrate that behaviour change pathways are domain-specific: food waste reduction is driven primarily by strengthening food management competence and leftover reuse routines, whereas sustainable delivery aligns more closely with environmental motivation and plastic reduction behaviours.

5.5 Strategic implications for WP7 real-life validation

5.5.1 Interventions

The evidence synthesized above provides a clear roadmap for selecting at least three high-impact interventions for real-life validation in WP7, in accordance with KPI-7. The proposed combination balances universal appeal, targeted effectiveness, and practical scalability while minimizing the risk of backfiring effects documented in moderation analyses (e.g., price consciousness reducing acceptance under alpha 7 and omega 2).

Table 2 Recommended intervention package for WP7 real-life validation

Strategy category	Intervention text	Rationale
Universal strategy (Omega 3)	Healthiness guaranteed	The only intervention with significant full-sample effects. Robust, simple, and scalable across all user segments. Minimal backfire risk.
Social proof strategy (Norm 1)	Join the 75% who accept this recommendation.	Strong evidence of effectiveness among value-driven subgroups (men and culturally and regionally oriented consumers). Highly scalable and low-cost. Complements universal strategy by reaching segments responsive to normative cues.
Low pressure omega strategy (Omega 1 or Omega 7)	"Why not go for the better option?" OR "As someone who cares about great food choices, you'll appreciate this smart swap!"	Leverages the effectiveness of Omega messages beyond the guarantee. Omega 1 is broadly amplified by seasonal and regional values. Omega 7 explicitly affirms user identity and is amplified by cultural and environmental values. Both carry low risk of reactance.
Identity-affirming alpha strategy (Alpha 6 or Alpha 7)	"Recommended by RecipeWatch healthy diet experts." OR "Kudos for cooking at home! You are going to love this suggestion!"	Addresses the gender gap by engaging men. Amplified among consumers with seasonal, regional, and cultural food values. Expert endorsement version provides credibility and affirmation version fosters positive affect and agency. Both align with intrinsic motivations.

The proposed intervention package operationalizes the core objective of WP3, which is delivering a set of novel, motivationally matched behavioural interventions that boost citizens' motivation to use nutrition guidelines in everyday cooking. By combining a universally effective guaranteed message, a socially validated norm-based strategy, and a selection from the empirically supported omega and alpha families, the package addresses both the full population and key subgroups (men, culturally oriented consumers, regionally oriented consumers, and those with seasonal food values). This selection maximizes the likelihood of observing measurable improvements in motivation to cook sustainably (KPI-9) and compliance with recipe corrections (KPI-22) during real-life validation. These conclusions are provisional: We plan to collect additional data in the three pilot countries to test robustness and generalizability of these findings.

5.5.2 Food waste and delivery approaches

For real-life validation in WP7, food waste interventions should focus on embedding leftover-based recipe suggestions that help users transform perishable produce and bakery items into new meals, thereby enhancing sustainable cooking knowledge through practical transformation ideas rather than relying solely on storage reminders. For sustainable delivery, the most effective pathway involves defaulting to climate-friendly delivery options where available, while promoting self-pick-up through messaging that emphasizes cost savings and convenience. Sustainability-oriented consumers represent the most receptive early adopter segment for these delivery interventions.

6. Recommended measures for motivating stakeholders

6.1 Motivation for adoption and sustained engagement of RecipeWatch

This section synthesises insights from stakeholder consultations and citizen workshops to examine the key drivers of adoption, dissemination, and long-term engagement with the RecipeWatch app. While stakeholders primarily addressed strategic and dissemination-related considerations, citizen perspectives provide grounded confirmation of what motivates everyday use in real cooking contexts. Overall, there is strong alignment between both groups, particularly regarding the importance of convenience, clear value propositions, respectful communication, and integration into existing routines.

6.1.1 Stakeholder perspectives on adoption, dissemination, and engagement

Stakeholders identified clear communication of both personal and societal benefits as the primary driver for initial adoption. The decision to download RecipeWatch is expected to be influenced by how effectively the app communicates its relevance to everyday life, such as supporting sustainable eating habits, reducing food waste, and simplifying decision-making, while also contributing to broader societal goals.

Broader uptake is supported through visibility and trust-building measures. Stakeholders highlighted the role of social media campaigns, competitions, and endorsements from trusted organisations in raising awareness and legitimising the app. These mechanisms were seen as essential for overcoming initial hesitation and positioning RecipeWatch as a credible and useful tool rather than an abstract sustainability initiative.

For sustained engagement, stakeholders consistently emphasised the need to deliver ongoing, practical value. This includes accessible resources such as sustainable meal plans, cooking guidelines, and tools that support everyday use, as well as learning-oriented content like free workshops, lectures, or expert talks made available through the app. Framing RecipeWatch as both a practical and educational resource was seen as key to maintaining long-term relevance.

Regarding dissemination, partnerships were identified as critical. Stakeholders particularly stressed collaboration with universities, student communities, research networks, and organisations with sustainability or public engagement mandates. These trusted intermediaries are seen as effective channels for reaching relevant user groups and reinforcing credibility, an assumption that is strongly supported by citizen responses regarding trust and information acceptance.

6.1.2 Citizen perspectives on motivation and everyday engagement

Across all three pilot countries, convenience emerged as the decisive factor influencing both recipe selection and acceptance of suggested alternatives. Citizens consistently evaluated RecipeWatch through the lens of time, effort, and cost, with these constraints varying by household type. This directly confirms stakeholder assumptions that adoption depends on clear, immediate personal value rather than abstract benefits alone.

Households with children highlighted an additional layer of complexity. Participants stressed the importance of child-friendly recipe options to avoid preparing separate meals. This insight reinforces the stakeholder emphasis on ongoing value provision and suggests that adoption among families is contingent on the app's ability to accommodate real household dynamics.

Citizens made it clear that engagement will only be sustained if RecipeWatch saves time, reduces planning effort, and fits seamlessly into existing cooking routines. Personalisation options were repeatedly identified as critical, allowing the tool to adapt automatically to preferences and constraints. Conversely, any feature perceived as an "extra checkpoint" or evaluative hurdle was seen as a strong deterrent and likely to lead to disengagement or rejection. This confirms stakeholder concerns around low-friction design and sustained engagement.

Language and tone were also identified as functional requirements rather than cosmetic choices. Belgian participants, for instance, explicitly rejected paternalistic or prescriptive language, a sentiment echoed across all pilot countries (Greece and Lithuania). Citizens want guidance that feels optional, practical, and respectful, allowing them to retain freedom of choice even when presented with healthier or more sustainable alternatives.

Importantly, citizens do not naturally frame cooking decisions through formal dietary guidelines. In Greece and Lithuania in particular, "healthy" eating was described in terms of personal experience, ingredient quality, and

general beliefs rather than structured nutritional rules. This insight challenges assumption-driven design and confirms stakeholder warnings that guideline-heavy framing risks disengagement. RecipeWatch must therefore translate guidelines into intuitive, everyday prompts and practical substitutions without relying on technical terminology.

Finally, trust in ingredients and provenance emerged as a decisive factor, especially in Lithuania. For some citizens, the main barrier is not recipe choice but confidence in food quality and scepticism toward claims such as "organic." This reinforces stakeholder emphasis on transparency and highlights the need for plain-language explanations to support sustainability and health messaging.

6.1.3 Implications for DietWise and RecipeWatch tool development

Taken together, citizen feedback strongly validates and operationalises stakeholder expectations. The following recommendations reflect this convergence and outline concrete implications for tool development:

1. Design for minimal-effort cooking support.
   Features must actively remove steps from an already demanding cooking process. Highly requested functionalities, such as recipe scaling, leftover-based suggestions, and a hands-on cooking mode, should be embedded directly into the cooking flow rather than introduced as separate evaluation layers. This directly supports stakeholder calls for ongoing value and low-friction engagement.

2. Build personalisation as a core system layer.
   Citizens overwhelmingly prefer adaptive tools over prescriptive guidance. Personalisation should cover allergies, dislikes, dietary preferences, and health-related needs, influencing recommendations automatically. This is particularly important given Lithuanian participants' focus on individual nutritional concerns and confirms stakeholder views on sustained relevance.

3. Prioritise practical benefits, such as taste, ease, and cost.
   Taste, simplicity, and affordability are non-negotiable adoption drivers. These should be prioritised in design and communication, with additional information offered only as optional layers. This aligns closely with Belgian concerns about tone and information overload, as well as Greek participants' emphasis on time efficiency and household practicality.

4. Treat cost and waste reduction as core value propositions.
   Citizens consistently assessed recipes based on price, portioning, and leftovers. Features such as meal prep guidance, freezing suitability labels, and "use what you have" suggestions should be positioned as fundamental benefits rather than secondary sustainability add-ons, thus reinforcing stakeholder narratives around tangible, everyday value.

5. Adopt prototype-led testing before scaling claims.
   Many citizen recommendations depend on interface behaviour, notification timing, and the realism of substitutions. Stakeholders' emphasis on sustained engagement is reinforced by the finding that perceived usefulness does not guarantee continued use without hands-on testing. Iterative prototyping is therefore essential before making broad impact claims.

6.2 Vulnerable citizens' motivation for adoption of RecipeWatch app

The workshops with vulnerable citizens across Belgium, Greece, and Lithuania (D4.1) show that motivation to join and use RecipeWatch app is fundamentally practical, emotionally grounded, and shaped by structural constraints rather than abstract sustainability goals. Participants were generally open to the concept of the tool, but only under clear conditions: it must provide immediate value, reduce effort, respect lived realities, and avoid adding stress or judgement.

Across all countries, the strongest motivator was immediate, tangible usefulness in everyday cooking. Participants were not looking for abstract nutrition education or detailed guideline explanations. Instead, they wanted quick, concrete suggestions that make familiar meals slightly healthier or more efficient without changing their identity or complexity. The app must "give more than it asks." If users are required to complete long onboarding processes,

weigh ingredients, or transcribe entire recipes before seeing any benefit, they are likely to abandon it. Saving time, reducing planning effort, and simplifying decision-making are therefore central drivers of adoption.

Affordability is another decisive motivation, especially in Belgium and Greece, and remains relevant in Lithuania. Participants repeatedly evaluated recipes through the lens of price, portioning, reusability of ingredients, and food waste. They were motivated by features that suggest cheaper alternatives, avoid niche or expensive ingredients, and help them cook with what they already have at home. In Greece in particular, sustainability messaging became compelling only when framed in terms of cost savings and waste reduction rather than environmental responsibility. Protecting the household budget is therefore a primary incentive for engagement.

Cultural and religious respect also strongly shapes motivation. In Belgium, halal compliance and the automatic exclusion of forbidden ingredients were described as non-negotiable. Participants were motivated by the idea that the app could improve traditional dishes without replacing them or challenging cultural food habits. The suggestion that users could upload their own recipes and receive small, realistic health improvements was especially appealing because it preserves comfort, familiarity, and identity. This reflects a broader insight across pilots: “healthier” is acceptable when framed as incremental improvement to known dishes, not as a replacement of culture or comfort.

Health benefits were a particularly strong motivator among Lithuanian participants. They prioritised ingredient composition and long-term health impacts, but required clear, scientifically grounded explanations in an expert tone. In a context marked by distrust toward the food industry, credibility becomes essential. Participants were willing to reduce salt, sugar, and fat or adapt cooking methods, but only when the reasoning was transparent and persuasive. Where a change felt obvious or already common knowledge, the perceived added value of the app diminished. This suggests that motivation increases when the tool helps navigate uncertainty rather than repeating well-known advice.

Across all countries, acceptance of changes depends heavily on preserving taste, texture, and recipe success. Participants were open to small adjustments, such as reducing salt or switching from frying to baking, but became resistant when substitutions threatened sensory quality, as illustrated by hesitation around whole-grain flour. The motivation to engage therefore rests on a “success guarantee” principle: improvements must not risk meal failure.

Reducing cognitive load and stress is equally critical. Particularly in Belgium, participants with lived experience of poverty described how financial insecurity and chronic stress reduce the capacity to plan ahead or manage complex steps. Food was framed not only as nutrition but also as comfort and emotional stability. Under such conditions, an app that introduces additional tasks or complexity risks exclusion. Participants were motivated by short videos, brief explanations, voice input options, and intuitive interfaces. Any feature that feels like extra work can quickly become a deletion trigger.

Personalisation and user control also emerged as strong motivational factors. Participants welcomed tailored recommendations based on allergies, religious rules, taste preferences, health needs, or practical priorities such as saving time or reducing cost. Importantly, they did not strongly resist data sharing in the workshop context, provided the benefits were clear. However, they wanted transparency about why suggestions were made and the freedom to ignore or adapt them. Motivation increases when the tool feels supportive rather than prescriptive.

Trust is built differently across contexts but is universally important. Belgian participants emphasised plain language and a non-moralising “expert friend” tone. Greek participants focused on practical reliability, recommendations must work in real cooking conditions. Lithuanian participants required scientifically grounded explanations. Advertising and technical performance issues were repeatedly identified as likely reasons for rejecting or deleting the app, especially in vulnerable contexts where tolerance for frustration is low.

Overall, vulnerable citizens are motivated to use the RecipeWatch app when it functions as a practical companion that makes small improvements easy, affordable, culturally safe, and credible. They are not driven by abstract sustainability narratives or rigid dietary frameworks. Adoption depends on whether the tool respects financial constraints, emotional relationships with food, cultural identity, and limited cognitive bandwidth. When these realities are acknowledged and embedded in the design, RecipeWatch has the potential to be perceived not as an external evaluator, but as a supportive, trustworthy aid in everyday cooking.

6.3 Motivating influencers to join RCA

This section synthesises insights from expert stakeholders and influencers on how to effectively motivate influencers to participate in the Responsible Content Alliance (RCA). While the interviewed influencers from the pilot countries (D4.1) are not statistically representative, their perspectives provide valuable, practice-oriented confirmation and nuance to the expert views. Overall, there is a strong convergence between stakeholder expectations and influencer recommendations, particularly around value alignment, reputational benefits, visibility, and low-barrier participation.

6.3.1 Stakeholder perspectives on influencer motivation

Stakeholders consistently emphasised that influencers are most likely to engage with the RCA when participation aligns with their core values, enhances their professional credibility, and offers tangible benefits while requiring minimal additional effort. Motivation was described as multifaceted, combining intrinsic drivers with pragmatic incentives.

A primary motivator is a sense of impact and purpose. Experts argued that influencers are attracted by opportunities to contribute to broader societal goals, such as promoting healthier and more sustainable diets and supporting planetary health. This framing allows them to position their participation as an expression of social responsibility and reinforces their role as trusted intermediaries shaping public behaviour. Influencers interviewed in the pilot countries echoed this motivation, particularly when the RCA was presented as enabling them to make a positive contribution without undermining their creative autonomy.

Closely linked to purpose is the desire for enhanced reputation and credibility. Stakeholders highlighted the importance of formal recognition mechanisms, including certificates, badges, public acknowledgements, or awards. These forms of validation provide influencers with visible proof of expertise and responsibility, which can be leveraged with audiences and commercial partners. Influencer feedback strongly confirms this point as concerns about reputational risk were recurrent, and credible validation and transparency were repeatedly identified as prerequisites for adoption.

Increased visibility and publicity were also identified as strong motivators. Stakeholders noted that featuring influencers across the DietWise and RCA ecosystem, such as within the app, through social media spotlights, newsletters, or interviews, offers meaningful exposure. Influencers from Greece, in particular, confirmed that promotion through consortium channels and featured accounts would significantly increase their willingness to participate (See D4.1). This visibility is closely tied to networking and career advancement opportunities, including access to national and international networks, collaborative projects, and participation in broader EU-funded innovation ecosystems.

Critically, stakeholders stressed that all incentives must be underpinned by low-barrier engagement mechanisms. The initial commitment must be simple and easily integrated into existing workflows, such as publishing a single social media post, joining a pre-designed challenge, or participating in a baton-passing campaign. In addition, suggested engagement mechanisms favour intrinsic and recognition-based incentives over purely financial rewards. These include non-monetary incentives like badges, certificates, and public acknowledgement for participation, as well as competitions with limited prizes. Influencers reinforced this view by emphasising the need for flexibility, configurability, and control over how tools are used. Securing a flagship endorsement from a high-profile “mega influencer” was also highlighted by stakeholders as a powerful catalyst to reduce perceived risk and lower the barrier to entry for others.

6.3.2 Influencer recommendations and implications for RCA design

Across the influencer workshops conducted in the pilot countries (D4.1), several concrete recommendations emerged that directly support and operationalise the motivations identified by stakeholders. First, influencers strongly recommended positioning the RCA as an enabling layer rather than a competing platform. This concern was particularly pronounced among Belgian media and institutional actors, who are sensitive to brand dilution, traffic loss, and mandate protection. This aligns with stakeholder calls for low-effort participation and confirms that seamless integration into existing systems should be treated as a core requirement rather than a future enhancement.

Second, influencers emphasised the need for a clear validation and transparency dossier designed for non-technical users. This document should explain how outputs are generated, what has been validated, where uncertainties

remain, and how accountability is shared between DietWise and content owners. This recommendation directly confirms stakeholder emphasis on reputational credibility and formal recognition as without transparency, adoption, especially among high-exposure influencers, will remain cautious.

Third, influencers called for configurability within optimisation logic. Partners should be able to define priorities and levels of strictness, such as opting for incremental recipe improvements rather than full compliance with nutritional guidelines, and setting constraints related to local products or seasonality. This recommendation supports stakeholder concerns about lowering participation barriers and avoiding rigid systems that deter engagement. It also responds to Belgian stakeholders' specific sensitivities and reduces the risk of repetitive or one-directional suggestions that frustrate both creators and audiences.

Fourth, influencers stressed that culinary feasibility must be treated as a primary quality criterion. Substitution guidance should be tested against real cooking outcomes, especially in baking, where small changes can significantly affect texture and performance. While stakeholders generally accept AI-assisted processes, influencers clearly argued for a "human-in-the-loop" approach. This does not imply blanket manual review, but rather targeted human oversight for high-risk substitutions, reinforcing both credibility and operational realism.

Fifth, influencers recommended redesigning scoring and labelling systems to support nuance rather than simplification. Resistance in Lithuania to points-based scoring confirms stakeholder concerns that overly reductive metrics may reduce engagement and increase defensiveness. A more effective approach would combine private, creator-facing feedback with optional public labels that are carefully defined and potentially category-based rather than binary.

Finally, influencers highlighted the importance of offering utilities and participation incentives that are directly relevant to their professional practice. In Lithuania, tools such as calculators and shopping lists were valued for their potential to be commodified and generate revenue. In Greece, motivation was strongly tied to visibility, promotion, and recognition. These insights reinforce stakeholder views that incentives should not be treated as peripheral add-ons but as integral components of a viable and attractive participation model.

Taken together, stakeholder and influencer perspectives strongly converge. Influencers are motivated by purpose, credibility, visibility, and career value, but only when participation is low-effort, transparent, and respectful of their autonomy and professional realities. Influencer recommendations largely confirm stakeholder assumptions while adding practical guidance on how these motivations can be translated into concrete design and engagement choices for the RCA.

7. Possible risk mitigation strategies

7.1 RecipeWatch

7.1.1 Risk identification for RecipeWatch

Through expert stakeholder dialogue about the RecipeWatch app, five primary risk areas were consistently identified as critical challenges that could hinder the app's success. These risks span the entire user journey, from initial discovery to long-term commitment, and highlight concerns about visibility, value proposition, equity, and foundational trust. Below are the risks that stakeholders envisaged:

1. *Low initial uptake: Risk of low initial adoption due to poor visibility or relevance*
   Stakeholders identified the launch phase as particularly vulnerable. Participants cautioned that an abstract value proposition (e.g., "contributing to research") may not be sufficiently compelling on its own. As one participant noted, the immediate personal benefit must be clear. The primary concern is that without targeted marketing and messaging that translates the app's purpose into tangible user benefits, such as saving money, eating healthier, or gaining new cooking skills, the app will fail to attract a critical mass of users. The consequence, as stakeholders warned, is a project that stalls with statistically insignificant data and an app that may develop a "ghost town" reputation, making recovery exceptionally difficult.

2. *Declining engagement: Risk of rapid user disengagement after download*
   A predominant theme was the challenge of retaining users after the initial download. Stakeholders emphasised that the app must provide continuous value to become part of a user's routine. They observed that if the app is perceived merely as a data collection tool without offering regular insights, personalised feedback, or fresh educational content, users will quickly lose motivation. Poor user experience or technical issues would accelerate this decline. The consequence of this attrition, stakeholders highlighted, is the erosion of long-term data quality and the loss of any community dynamics essential for social proof and sustained impact.

3. *Limited target reach: Risk of failing to reach a diverse and representative audience*
   Stakeholders expressed strong concerns about equity and data bias. They pointed out that default dissemination strategies often inadvertently target a narrow, tech-savvy demographic. If outreach relies too heavily on channels like university partnerships alone, the resulting user base will be skewed and unrepresentative of the broader public. The significant consequence is that the app would fail in its public engagement mission of attracting vulnerable groups, potentially exacerbating the socioeconomic divide.

4. *Incentive-only engagement: Risk of superficial engagement driven solely by incentives*
   The use of incentives was a point of nuanced discussion. While seen as useful, stakeholders warned of an over-reliance on extrinsic rewards like cash prizes or one-off badges. They cautioned that this strategy could attract users whose primary goal is the reward, not the app's mission, leading to poor-quality, rushed interactions. The critical insight was that once these incentives are exhausted, this user segment will disengage entirely because no deeper, intrinsic motivation was ever fostered, resulting in a volatile user base and compromised data integrity.

5. *Lack of credibility: Risk of undermining trust and credibility from the outset*
   Perhaps the most fundamental risk identified was to the app's credibility. Stakeholders unanimously agreed that trust is a non-negotiable foundation. They cited unclear data privacy policies, a lack of transparent branding from reputable institutions, or a poorly designed interface as fatal flaws that would raise immediate red flags for potential users. The consensus was that without this trust, all other strategies fail; users will simply refuse to download the app or will abandon it quickly, directly compounding the first two risks of uptake and retention.

7.1.2 Risk-mitigation mapping for RecipeWatch

Beyond the identified risk, the expert stakeholders were also asked how these risks can be mitigated to improve the success of the RecipeWatch app. The various risks and their mitigation strategies are presented in Table 3.

Table 3 Risk-mitigation mapping for RecipeWatch

Risk	Description	Priority	Mitigation measures
R1	Low initial uptake	High	This risk can be mitigated by adopting social media campaigns, running competitions, and forming institutional partnerships. For example, social media campaigns create shareable buzz online, and running competitions with prizes leverages gamification to drive immediate downloads. In addition, forming institutional partnerships with trusted entities like universities or NGOs provides a critical endorsement that lowers psychological barriers and encourages users to try the app.
R2	Declining engagement over time	High	This requires a focus on delivering continuous value to transform the app into a habitual resource. For example, continuous content updates, such as new features or recipes, prevent the experience from becoming stale. Providing practical tools like sustainable meal plans offers structured utility for daily life.
R3	Limited target reach	Medium	To ensure a diverse and relevant user base, a networked dissemination approach is key. Actively collaborating with schools, vulnerable groups and research networks provides direct access to large, often motivated participant pools like students and vulnerable households. Partnering with aligned organisations, such as environmental or public health groups, allows the app to be introduced to their pre-existing communities, which already have a confirmed interest in the app's core sustainability mission.
R4	Incentive-only engagement	Medium	The strategy is to shift from extrinsic to intrinsic motivation. Implementing badges and certificates recognizes participation and achievement in a shareable way, tapping into users' desire for status and acknowledgment.
R5	Lack of credibility	Medium	Building institutional trust is foundational. Securing academic involvement (e.g., having a reputable university as project lead) provides authoritative backing. Obtaining endorsements from recognized experts in nutrition or sustainability lends subject-matter credibility. Clearly communicating the app's research integration, how user data contributes to genuine studies, validates its purpose and creates transparency, assuring users their participation is meaningful and their data is used responsibly.

Based on the risk and mitigation strategies presented above, we argue that R1 and R2 represent the most critical risks for the RecipeWatch app, as they combine high likelihood with high or medium impact on project outcomes. R3 poses a structural risk to representativeness if not mitigated through partnerships. Finally, R4 and R5 are manageable through appropriate design choices and governance.

7.1.3 Metrics and KPIs for monitoring RecipeWatch app success

Following the risk-mitigation analysis, defining clear success metrics is essential for evaluating the effectiveness of our strategies. Based on stakeholder consultations, a balanced framework for measuring the RecipeWatch app's performance has been developed, focusing on both quantitative reach and qualitative impact. In general, stakeholder responses converge on a dual-track approach, distinguishing between the quantity of adoption and the quality of user experience and behavioural impact. The recommended metrics are summarized in Table 4.

Table 4 Metrics for measuring RecipeWatch app success

Measuring dimension	Primary metrics	Data collection method
Quantitative reach and engagement	• Download Numbers: Total and weekly rate, segmented by country (if available).	• Automated analytics integrated into the app backend. • Weekly performance dashboards.

	• Active User Base: Number of weekly/monthly active users. • User Engagement: Session frequency, average time in-app, and interaction rates (e.g., accept/reject of recommendations).	
Qualitative user experience and impact	• Usability Score: Standardized rating via the System Usability Scale (SUS). • User Satisfaction: Direct feedback on app experience and perceived value. • Behavioural Impact: Self-reported changes in nutritional awareness or sustainable cooking habits.	• In-app micro-surveys and periodic longer-form questionnaires. • Integration of the SUS at key user journey points.
Comparative and casual analysis	• Campaign Effectiveness: Change in download/engagement rates before and after specific mitigation actions (e.g., a new partnership launch). • Benchmarking: Informal comparison of engagement KPIs with similar citizen-science or lifestyle apps.	• A/B testing of marketing channels and features. • Analysis of performance trends correlated with project milestones.

7.2 Responsible Cooking Alliance (RCA)

7.2.1 Risk identification for RCA

Based on discussions with stakeholders, a range of interrelated risks were identified that may affect the adoption, sustained engagement, and long-term credibility of the RCA. These risks span strategic alignment, influencer engagement, governance, credibility, and evaluation. The stakeholder insight into perceived risks that will affect the RCA are presented below:

1. *Value misalignment between RCA principles and influencer values.*
   Stakeholders identified this as a foundational strategic risk. Food influencers build their audiences around specific culinary identities, such as indulgent comfort food, fast and convenient meals, traditional cuisine, or visually appealing food. If the principles promoted by the RCA, such as healthier cooking practices or sustainability-oriented ingredient choices, are perceived as incompatible with an influencer's established food identity or audience expectations, participation may be rejected. For example, a food influencer known for rich desserts or indulgent street food may perceive responsible cooking guidelines as limiting their creative freedom or diluting their brand appeal. The implication of this is the reduction in the pool of potential influencer, particularly in popular and high-reach niches, limiting early adoption and overall reach of the RCA.

2. *Low engagement or high drop-out rates*
   This risk relates to participation and retention over time. Stakeholders noted that while influencers may initially join the RCA, sustained engagement can be difficult if requirements are perceived as time-consuming or disruptive to their content production routines. In addition, if the requirements are 'too' low or uninteresting, people may just forget about it. Recipe adaptation, ingredient substitution, or compliance checks may be seen as additional unpaid work, particularly for influencers who post frequently. The consequence of high drop-out rate is weak credibility. For example, an RCA community with many inactive influencers' risks being perceived as symbolic rather than impactful, reducing the effectiveness of the app as a driver of sustained behavioural change.

3. *Lack of critical mass and network effect*
   Stakeholders emphasised that food influencers are more likely to engage if the Responsible Cooking Alliance is perceived as a mainstream and visible movement within the food content ecosystem. Participation is more attractive when peers, especially well-known chefs or popular recipe creators, are visibly involved. Without a critical mass of food influencers, the RCA may appear niche or experimental.

This limits social proof and creates a self-reinforcing cycle in which low participation discourages further adoption.

4. *Concerns over creative freedom and authenticity*
   A central concern raised relates to creative autonomy in recipe development and food storytelling. Influencers may fear that RCA participation could lead to prescriptive rules about ingredients, portion sizes, or cooking methods, making their recipes feel constrained or didactic. They may also worry that audiences may react negatively to content perceived as overly instructional or moralising. In effect, influencers whose success depends on originality, aesthetics, and personal voice may avoid engagement or produce less engaging content, reducing the impact of RCA-aligned messaging.

5. *Gaming or superficial compliance with RCA guidelines*
   Stakeholders identified an integrity risk whereby food influencers may comply with RCA requirements only at a surface level. Examples include making minor ingredient substitutions in one recipe to qualify for recognition while continuing to promote highly processed or unsustainable dishes elsewhere or displaying RCA badges without meaningful changes to cooking practices. Such behaviour risks eroding public trust and may lead to perceptions of "health-washing" or "sustainability-washing," undermining the credibility of the Responsible Cooking Alliance and its app.

6. *Loss of credibility due to weak governance or excessive compromises*
   This risk concerns governance and enforcement within the RCA. Stakeholders warned that, in efforts to attract high-profile food influencers or celebrity chefs, standards might be relaxed or inconsistently applied. If well-known participants visibly contradict RCA principles without consequence, the Alliance's standards may appear negotiable. Weak regulation damages trust among citizens, public health stakeholders, and committed food influencers, repositioning the RCA as a promotional label rather than a credible responsible cooking initiative.

7. *Limited added value for nutrition- or culinary-trained food influencers*
   A specific engagement risk relates to influencers with formal training, such as registered dietitians, nutritionists, or professionally trained chefs. Stakeholders noted that a generic responsible cooking framework may offer limited added value to this group, who already apply evidence-based or sustainability-oriented practices in their content. Therefore, limited participation from these expert influencers may reduce the technical and nutritional credibility of the RCA and weakens its authority in evidence-based food communication.

8. *Unclear or contested rating and validation systems*
   Transparency around how recipes or cooking content are assessed was highlighted as a critical concern. Influencers may question how "healthy" or "sustainable" a recipe is scored, particularly when trade-offs exist (e.g., traditional recipes, cultural food practices, or taste versus nutrition). Disagreement over ratings or methodologies may lead to disengagement, public criticism, or reputational risks, undermining confidence in the RCA app and discouraging participation.

9. *Difficulty measuring food influencer engagement and impact*
   Finally, stakeholders identified a monitoring and evaluation risk. Measuring meaningful engagement, such as how consistently influencers apply RCA principles across their content, and downstream impact on audience cooking behaviour is complex. Metrics such as likes or views may not reflect real dietary change. In effect, without robust and credible indicators, the RCA risks being unable to demonstrate effectiveness, refine its approach, or justify continued support from funders and stakeholders.

7.2.2 Risk-mitigation mapping for RCA

Beyond the identified risk, stakeholders were also asked how these risks can be mitigated to improve the success of the RCA. The various risks and their mitigation strategies are presented in Table 5.

Table 5 Risk-mitigation mapping for RCA

Risk	Description	Priority	Mitigation measures
R1	Value misalignment (*Between RCA principles and influencer values*)	High	Clear purpose framing, voluntary participation, and flexible commitments. This approach ensures alignment from the outset. Publicly articulating a clear, compelling purpose attracts influencers whose personal brand already resonates with the mission. Making participation voluntary and offering flexible commitments (e.g., campaign-based rather than indefinite) respects influencer autonomy and business models, preventing forced partnerships that could lead to public inconsistency and accusations of hypocrisy.
R2	Low engagement / Drop-outs (*High attrition rates among participants*)	Medium	Low-barrier entry levels, gamification, and regular communication. This strategy combats attrition by nurturing involvement and motivation. Introducing low-barrier entry levels (e.g., one-off actions) allows influencers to trial the alliance with minimal risk. Incorporating gamification (like points, badges, or progress trackers) and maintaining regular communication (newsletters, impact updates) provides ongoing feedback, recognition, and a sense of progression, transforming participation into an engaging journey rather than a static, easily forgotten membership.
R3	Lack of critical mass and network effects (*Too few participants, reducing perceived benefit*)	High	Flagship influencers, social media challenges, and visibility mechanisms. This builds momentum through social proof. Recruiting respected flagship influencers lends immediate credibility and attracts their followers. Launching branded social media challenges creates a participatory wave that encourages public joining. Enhanced visibility mechanisms (e.g., a "Featured Member" spotlight) reward participation with exposure, making membership tangibly beneficial and helping to reach a critical mass that generates network effects.
R4	Loss of Creative Freedom (*Concerns over rigid guidelines stifling authenticity*)	High	Optional adaptations, choice of recipes, and flexible guidelines. This mitigates the fear of rigidity by empowering creative choice. Instead of prescriptive rules, providing optional adaptations, a curated choice of recipes to promote, and flexible guidelines allows influencers to integrate RCA principles in a way that feels authentic to their unique style and audience. This preserves the creative freedom essential to their profession and content quality.
R5	Gaming the system (*Superficial compliance with guidelines*)	Medium	Clear standards, external validation, and feedback mechanisms. This ensures substantive compliance and integrity. Establishing clear, public standards defines what constitutes good-faith participation. External validation (e.g., periodic reviews by a panel or partner institution) adds a layer of accountability. Implementing feedback mechanisms allows for the correction of unintentional missteps, collectively discouraging influencers from seeking shortcuts or engaging in tokenistic, box-ticking compliance.
R6	Loss of credibility (*Due to excessive compromises or weak self-regulation*)	High	Code of conduct, transparent logic, and limited compromises. This protects the alliance's reputation through transparency and strong boundaries. A public code of conduct sets non-negotiable ethical standards. Transparent logic behind decisions (e.g., why an influencer is featured or removed) builds trust with the public. A firm policy of limited compromises ensures that growth and partnerships never come at the cost of the RCA's core principles, safeguarding its long-term integrity.
R7	Low value for experts	Low	Advanced roles, peer learning, and expert recognition. This creates a tiered value proposition for professional influencers. Offering advanced roles (e.g., as mentors, content reviewers, or

	(*Limited added value for nutrition-trained influencers*)		advisory board members) provides meaningful challenge and leadership opportunities. Facilitating peer learning networks and offering formal expert recognition (e.g., certifications, "RCA Expert" titles) caters to professional development and status needs, providing value that justifies participation for highly skilled individuals.
R8	Disputed rating systems (*Unclear or contested validation methods*)	Medium	Optional publication, co-design, and third-party confirmation. This builds legitimacy and buy-in for evaluation systems. Allowing optional publication of scores or ratings respects influencer privacy and control. Co-designing rating criteria with a group of influencers ensures the system is perceived as fair, relevant, and practical. Seeking third-party confirmation or auditing from a trusted, neutral institution adds objective authority, preventing the system from being seen as arbitrary or biased.
R9	Measurement challenges (Difficulty tracking involvement and impact)	Medium	Clear KPIs, defined participation criteria, and monitoring tools. This tackles ambiguity with data-driven clarity and evidence. Establishing clear Key Performance Indicators (KPIs) (e.g., reach of themed content, engagement rates, self-reported behaviour change) defines what success looks like. Having defined, objective participation criteria clarify what counts as "involvement." Implementing shared monitoring tools or dashboards provides transparent evidence of both individual contribution and collective impact, enabling evaluation, reporting, and strategic improvement.

7.2.3 Measuring RCA web application success

Measuring the success of the web application requires a multi-dimensional framework that captures not just usage, but also user satisfaction and tangible impact. The proposed metrics by stakeholders can be synthesized into four interconnected categories.

1. *User Engagement and Adoption (The "If" and "How Often")*
   This dimension uses quantitative, behavioural data to track actual usage. Core suggestions include monitoring logins, return visits, time spent in the app, and specific interaction rates, such as how often users accept or reject recommendations. These metrics serve as foundational Key Performance Indicators (KPIs). To be meaningful, a key action (e.g., saving a recipe or rating content) must be explicitly defined as "engagement." Regular (e.g., weekly) tracking of these metrics is advised to identify trends in adoption and habitual use.

2. *User Experience & Perception (The "Why")*
   This dimension seeks to understand the qualitative reasons behind the quantitative data, by understanding user experience, satisfaction, and perceived value. Stakeholders recommend gathering direct user feedback, implementing standardized tools like the System Usability Scale (SUS) survey, and establishing in-app channels for users to comment on recommendations. While the SUS provides a benchmark score for ease of use, direct feedback yields rich insights into the app's perceived usefulness and pain points. The specific request for feedback on recommendations highlights a need to measure the perceived quality and relevance of the app's core functionality.

3. *Impact on Behaviour & Content Quality (The "So What")*
   A significant theme involves using influencers as a specific proxy for measuring the app's impact on professional practice. Suggestions involve surveying influencers about changes in their content creation and conducting a quantitative analysis to see if their recipes better align with dietary guidelines after using the app. This is an outcome-oriented approach that assesses whether the app successfully influences professional behaviour. Implementing this requires establishing a baseline (pre-app recipe analysis) and a method for objective nutritional assessment.

4. *Implementation Strategy: A Mixed-Methods Dashboard*
   Stakeholders also highlighted important processes for measurement by regularly tracking metrics and using a parallel approach (e.g., combining usage data with SUS scores). This underscores the need for a systematic, mixed-methods monitoring framework. In effect, success should not be reduced to a single metric but viewed through an integrated dashboard that combines behavioural data (usage), attitudinal data (feedback), and outcome data (impact).

The responses are summarized in the Table 6:

Table 6 Metrics for measuring RCA web success

Dimension of success	What to measure (examples from responses)	Method/Tool
Adoption and engagement	Login frequency, return rate, time spent, defined engagement actions.	In-app analytics, dashboard tracking.
Usability and satisfaction	Perceived ease of use and satisfaction.	System Usability Scale (SUS), direct feedback channels.
Perceived Value & Quality	Usefulness of recommendations, general feedback.	In-app feedback prompts, qualitative user interviews/surveys.
Behavioural impact (primary)	User interaction with recommendations (accept/reject rates).	In-app event tracking.
Behavioural impact (secondary)	Changes in professional practices and recipe quality among influencer users.	Pre-/post-app influencer surveys and quantitative recipe analysis.

8. Next steps: How this evidence feeds forward

This chapter addresses a key question: now that the four pillars of the DietWise framework are established, how do they translate into concrete next actions? The framework is not a static deliverable, but it is a living structure that feeds directly into WP7 real-life validation and the longer-term development trajectory of both the RecipeWatch app and RCA add-on tool.

8.1 Field experiments for real-life validation (WP7)

As shown in the DietWise Framework (Table 1), the next step after the four pillars is to validate the app's effectiveness in real-life settings through field experiments. WP3's behavioural evidence will feed into the intervention package to be tested in the field studies. Next to testing the overall effectiveness of the tools, some high-impact interventions from WP3 may be tested combining a universally effective strategy ("Healthiness guaranteed"), a social proof approach ("Join the 75% who accept this recommendation"), and a low-pressure omega message ("Why not go for the better option?") or an identity-affirming alpha message ("Recommended by RecipeWatch healthy diet experts"). In addition, the segmentation logic developed in WP3, particularly around gender, food-related values, and economic vulnerability, should be embedded in the real-life validation protocol to enable subgroup-level evaluation. The food waste findings also point to specific features for real-life testing, which include leftover-based recipe suggestions, perishable produce focus, and sustainable delivery default settings. Additional data collection in the three pilot countries (Belgium, Greece, Lithuania) will test the robustness and generalisability of the UK megastudy findings before the intervention package is finalised for WP7.

8.2 Citizen and stakeholder insights

The WP4 findings have five direct implications for RecipeWatch development ahead of real-life validation. These include:

- Minimal-effort design: Features that add steps to cooking workflows will reduce engagement. It is recommended that hands-on cooking mode, recipe scaling, and leftover suggestions are embedded in the core flow.
- Personalisation as a system layer: Stakeholders recommend allergy filters, dietary preferences, and household size adjustments to drive recommendations automatically, not requiring explicit user action each session.
- Practical benefit prioritisation: Taste, ease, and cost would be good as the primary communication focus. Sustainability and nutritional benefits could be available as optional layers, not mandatory framing.
- Prototype testing before scaling: Perceived usefulness in workshops does not guarantee continued use without hands-on experience. Iterative prototyping and user testing are essential before broad deployment.
- Culturally adaptive content: Recipe substitutions must be validated against the culinary traditions and ingredient availability of each pilot country before deployment.

The advice will be passed on to the app development team. Due to time and resource constraints, it is unlikely that the team can implement all recommendations in the first demo version of the apps, but the stakeholder recommendations will regularly be reviewed in iterative versions and improvements of the apps at later times.

8.3 Longer-Term Replication

The DietWise framework offers a replication pathway for any initiative seeking to promote dietary behaviour change through digital tools. The transferable elements from the framework presented in Table 1 are:

- The evidence generation model: A structured programme of literature review, expert screening, pilots large-scale comparative study provides a rigorous basis for intervention selection. The 8Bs accessibility framework used to screen interventions ensures that evidence generation accounts for equity from the outset[1].
- The stakeholder integration model: Combining citizen workshops, influencer consultations, and expert stakeholder sessions across multiple national contexts provides the multi-level insight needed to design tools that work in practice, not just in experimental conditions.
- The risk-governance model: Mapping risks to mitigation strategies and monitoring indicators before launch, rather than in response to failure, is a transferable practice for any app-based public health initiative.

[1] https://www.gezondleven.be/files/Kind-Gezin/bijlage-9-stap-4-8-Bs.pdf

- The voluntary self-regulation model: The RCA's governance structure, which is non-punitive, differentiated, credibility-building, and professionally valuable, provides a template for responsible content initiatives in other sectors and countries.

Future projects and app builders can use our framework to inform tool development and improvements.

9. Conclusion

This report presents a comprehensive, evidence-based framework for promoting healthier and more sustainable cooking practices through the integrated development of the RecipeWatch application and the Responsible Cooking Alliance (RCA) add-on, supported by extensive behavioural research and stakeholder engagement. At its core, the report demonstrates that digital nutrition tools can be both scientifically robust and practically relevant when they combine transparent scoring systems, demographic personalization, behavioural insights, and real-world usability considerations.

RecipeWatch is designed as a user-centred mobile application that supports citizens in improving the nutritional and environmental profile of recipes through targeted ingredient substitutions. Its foundation will be built on the Global Burden of Disease framework, ensuring that recommendations and scoring mechanisms are grounded in internationally recognized dietary risk evidence, while age- and gender-based segmentation enables scientifically justified personalization. The dual-score approach represents a key conceptual innovation, meaning that instead of judging recipes as "good" or "bad," the app visualizes improvement potential, shifting the emphasis from evaluation to empowerment. Transparency is further reinforced through aggregated acceptance statistics and participatory feedback loops, allowing users to actively shape the refinement of recommendations over time. Together, these elements position RecipeWatch not merely as a calculator of dietary quality, but as a supportive decision aid embedded in everyday cooking routines.

The RCA add-on complements this citizen-facing tool by targeting influencers and content creators. Unlike RecipeWatch, RCA deliberately avoids public scoring and instead provides private, non-punitive guidance that respects editorial autonomy. By integrating directly into existing browsing environments and offering constructive feedback without overwriting content, RCA lowers participation barriers and reduces reputational risk. Its differentiated participation structure, which ranges from low-commitment supporters to highly engaged ambassadors, creates a flexible pathway for long-term involvement. This design acknowledges that sustained transformation in digital food environments depends not only on technical solutions but also on trust, professional incentives, and alignment with creators' identities and workflows.

The behavioural research conducted under WP3 provides the empirical backbone for both tools. Through three pilot studies and a large-scale megastudy involving over 2,000 participants in the United Kingdom, the project systematically identified which behavioural interventions most effectively increase acceptance of healthier and more sustainable recipe recommendations. A central insight is that intervention effectiveness is highly context-dependent. High baseline acceptance rates create ceiling effects that mask potential improvements, and the same intervention can produce positive, neutral, or even negative effects depending on recipe type, demographic subgroup, and value orientation. This underscores that behavioural nudges are not universally transferable, as their impact depends on alignment with pre-existing beliefs, motivations, and constraints.

Despite these complexities, several intervention categories emerged as particularly efficient. A guarantee-based omega message ("Healthiness guaranteed") demonstrated the only significant full-sample effect, indicating that simple, low-pressure assurances can work across broad audiences. Social proof interventions proved effective in specific subgroups, especially among men and value-driven consumers, highlighting the power of normative cues when carefully targeted. Additional omega strategies that gently invite consideration without coercion were amplified among consumers with strong seasonal, cultural, or regional food values, suggesting that autonomy-preserving language reduces resistance. Identity-affirming and expert-endorsed alpha messages showed particular promise among men and consumers seeking credibility and affirmation. Collectively, these findings demonstrate that segmentation and value congruence are essential for maximizing efficiency. A one-size-fits-all communication strategy will underperform relative to tailored approaches that match interventions to users' demographic characteristics, food-related values, and motivational profiles.

Importantly, the report also demonstrates that accessibility and inclusivity must be central evaluation criteria. Economically vulnerable consumers were not less receptive. On the contrary, financial constraints and price consciousness were positively associated with acceptance and app engagement. However, aspirational or abstract future-oriented framings occasionally backfired among price-conscious individuals. Practical utility, cost-effectiveness, and resource efficiency therefore emerge as crucial design principles. Behavioural change in food contexts is driven less by moral appeals and more by perceived usefulness in managing limited resources. This

insight directly informs the strategic direction for WP7 real-life validation, where a balanced package of universally effective and subgroup-targeted interventions is recommended.

Beyond recipe acceptance, the analysis of food waste and sustainable delivery behaviours reveals domain-specific pathways. Reducing household food waste is strongly associated with structured leftover reuse routines and cooking competence rather than general environmental concern. In contrast, climate-friendly delivery preferences cluster with environmental motivation and plastic reduction behaviours. These findings indicate that sustainability interventions must differentiate between competence-driven and value-driven domains, tailoring messaging and features accordingly. Embedding leftover-based recipe suggestions and defaulting to climate-friendly delivery options, while framing self-pick-up in terms of cost savings, reflects this nuanced understanding.

Stakeholder consultations and citizen workshops further reinforce that long-term adoption depends on perceived everyday value, minimal friction, and trust. Users are motivated by time savings, affordability, cultural respect, and preservation of taste rather than by abstract guideline compliance. Vulnerable citizens in particular emphasized that tools must reduce cognitive load, avoid paternalistic tones, and function as supportive companions rather than evaluators. Similarly, influencers highlighted the importance of transparency, configurability, culinary feasibility, and reputational safeguards. Across all groups, credibility, simplicity, and respect for autonomy consistently emerged as non-negotiable foundations.

The identified risks, which include low adoption, rapid disengagement, unrepresentative reach, superficial incentive-driven participation, and erosion of trust, underscore that technical excellence alone is insufficient. Effective dissemination requires clear communication of personal benefits, trusted partnerships, careful incentive design, and iterative prototyping to ensure real-life usability. Trust, in particular, is a key factor connecting uptake, retention, and data quality. Without it, neither behavioural insights nor personalization algorithms can generate meaningful impact.

In conclusion, the report demonstrates that promoting healthier and more sustainable cooking is feasible when digital tools integrate scientific evidence, behavioural segmentation, participatory design, and contextual sensitivity. The evidence shows that behavioural interventions can increase acceptance of healthier substitutions, but only when aligned with user values, economic realities, and cultural identities. RecipeWatch and RCA together represent a complementary ecosystem, with one empowering citizens in private decision-making, the other supporting influencers in shaping public food environments. Their combined potential lies in translating complex nutritional and sustainability guidelines into intuitive, respectful, and practically useful support embedded in everyday life. If implemented with careful attention to segmentation, accessibility, and trust-building, these tools can contribute meaningfully to long-term dietary improvement and environmental sustainability without imposing judgment or compromising culinary diversity.

10. References

Institute for Health Metrics and Evaluation. (2025). *Global Burden of Disease 2023: Findings from the GBD 2023 Study*. https://www.healthdata.org/sites/default/files/2025-10/GBD_2023_Booklet_Final_2025.10.17.pdf