DRG4FOOD

DIGITAL RESPONSIBILITY

REPORT 2023/2024

2nd edition, developed for
DRG4FOOD, a Horizon Europe project

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EXECUTIVE SUMMARY:

The **DRG4FOOD Digital Responsibility Report** presents findings from the €4 million Horizon Europe project focused on building trust in data-driven food systems.

Through two Open Calls distributing €1.9 million, the project functions as a **responsible technology incubator** that supported eight winning consortia developing applications ranging from **personalised nutrition tools** to **food tracking systems**.

This report specifically aims to provide an overview of implementation efforts by those open call participants, identifying **common themes and challenges** in digital responsibility implementation.

Key findings reveal that common implementation outcomes are focused around **enhanced security measures, prioritised user transparency** through features like control panels and **algorithmic explanations**, and adopted **open development practices**.

Common implementation challenges included **data quality issues, resource constraints, and balancing security with user experience**.

A dedicated section shines a spotlight on the consortia projects **GENIE** and **NutriSight** which show, among other things, best practices in user data control, privacy protection and transparent software development.

Moving forward, the project proposes generalisation through a **tiered maturity model, quantifiable metrics, and context-specific evaluation criteria**.

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Visit our project website at drg4food.eu

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INTRODUCTION

WHY THIS REPORT?

The “Digital Responsibility Goals for Food” (DRG4FOOD) research project (total funding: €4 million) kicked off in December 2022 under the EU’s Horizon Europe Programme. Its mission is to foster a data-driven food system that inspires trust throughout the food chain. To achieve this mission DRG4FOOD launched two Open Calls for funding - one in September 2023 and a second in spring 2024, for a total of €1.9 million. The funding was available to third parties interested in developing digital applications for the food sector, adhering to a framework based on IDENTITY VALLEY’s Digital Responsibility Goals (DRGs), seven guiding principles for creating responsible digital technology.

To validate the effectiveness of the project’s efforts relating to Digital Responsibility DRG4FOOD publishes regular reports detailing how the project contributed to Digital Responsibility and the creation of responsible technology, including recommendations for further progress.

Digital Responsibility Goals (DRGs)

In the period covered by this report, third party participants of the first Open Call have fully taken up their work and the second cohort has just started. Hence, this iteration of the Digital Responsibility Report, covering the time period from the kick-off of the first cohort in March 2023 until the end of 2024, will focus its reporting on the validation of DRG4FOOD's implementation approach by analysing the activities of the teams developing applications from both of DRG4FOOD's Open Calls, resulting in a discussion of general findings, challenges and the way forward until the end of the project.

This report is the second iteration of a dynamic process with the goal to develop a reporting structure for Digital Responsibility which could be used not only for digitally responsible software development but more generally as a stepping stone towards a corporate reporting blueprint for the Digital Responsibility of organisations in general.

DRG4FOOD Reporting Timeline

WHAT IS DIGITAL RESPONSIBILITY?

Digital Responsibility encompasses the responsible design, provision and use of digital technology to enable a digital transformation prioritising human flourishing and well-being. It involves, among other things, protecting privacy, ensuring data security, fostering fairness, and promoting inclusivity, transparency and personal autonomy. For example, an organisation practicing digital responsibility might voluntarily implement strong data protection measures beyond legal requirements, regularly audit its algorithms for accuracy, and clearly and transparently communicate its data usage policies.

By upholding principles of Digital Responsibility, organisations are consciously addressing the societal and personal implications of their digital actions, aiming for a positive influence on a more sustainable and trustworthy digital ecosystem with the human at its center.

DRG4FOOD CONSORTIUM

The DRG4Food consortium includes research institutions like the **Italian National Agency for New Technologies, Energy and Sustainable Economic Development (ENEA)** and non-profit organisations like the **European Food Information Council (EUFIC)**, responsible technology experts like **Identity Valley**, privacy experts like **Privanova**, food software experts from **Premotec**, and technology startups like **TWINDS Foundation** and the innovation consultancy **Inosens**.

The consortium's mission is to accelerate the development and adoption of data-driven business models in the food industry while prioritising trustworthiness of digital solutions. By leveraging their collective expertise and networks, the consortium is collaborating with various stakeholders, including open-source innovators, academic groups, startups, SMEs, and civil society. Through collaboration with entrepreneurial ecosystems and accelerator programs, the consortium aims to co-create a vision and develop practical solutions for a digitally enhanced, sovereign, fair, and trustworthy food system in Europe and beyond.

IMPLEMENTING DIGITAL RESPONSIBILITY

RESPONSIBLE TECHNOLOGY INCUBATOR

DRG4FOOD implements digital responsibility through a strategic funding mechanism that prioritiseds innovation beyond conventional development practices in the data-driven food sector. By establishing digital responsibility as a key selection criterion—based on the Digital Responsibility Goals framework—the project ensures that only proposals by consortia demonstrating commitment to responsible technology development receive support.

Teams with successful proposals receive practical support in the form of coaching as well as access to the DRG4FOOD toolbox containing responsible technology enablers. At the time of writing, the project teams work on their initially proposed digital responsibility features, processes, and methodologies—with the understanding that incorporating these elements would lead to end products that naturally embed digital responsibility principles rather than treating them as afterthoughts.

Through this structured approach, DRG4FOOD effectively functions as a responsible technology incubator, creating an environment where digital responsibility is more actively integrated into development processes.

The results of this selection process

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accross two separate Open Calls (OC) can be seen here. While in the first call 74 eligible proposals were submitted, the second call gathered even more interest, totalling at 90 proposals submitted.

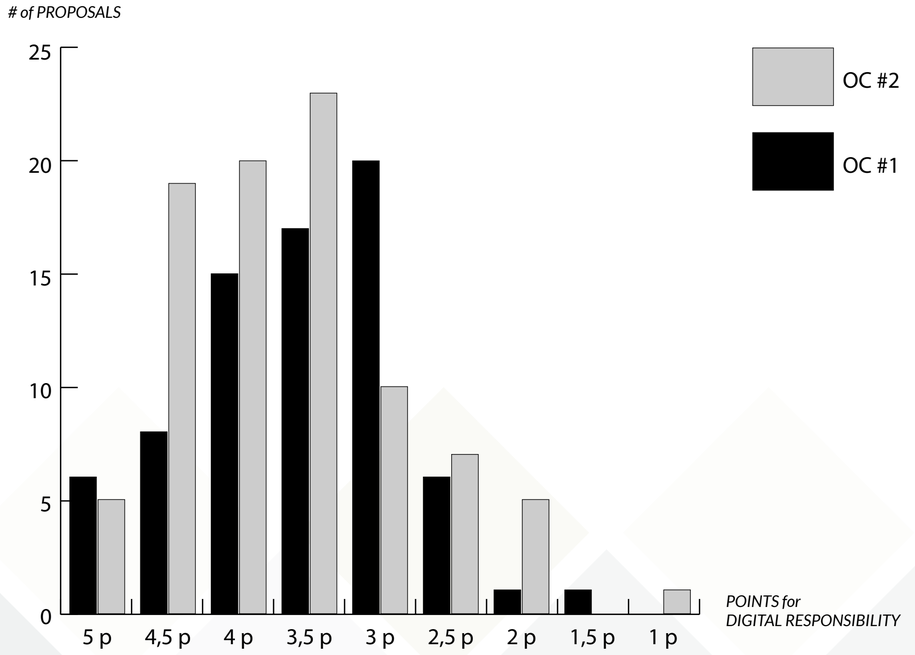
Evaluators for the proposals had to score proposals in different categories, one of which was “Digital Responsibility”. The scoring of both calls is detailed in the graphs on the right. The average score for Digital Responsibility was relatively consistent across both calls at 3,6 points (OC#1) and 3,7 points (OC#2) respectively.

It follows a presentation of all 8 winning consortia and their projects.

Open Call #1	
Score	**Number of Projects**
5.0	6
4.5	8
4.0	15
3.5	17
3.0	20
2.5	6
2.0	1
1.5	1
Total	**74**

Open Call #2	
Score	**Number of Projects**
5.0	5
4.5	19
4.0	20
3.5	23
3.0	10
2.5	7
2.0	5
1.0	1
Total	**90**

Table of proposals scoring for “Digital Responsibility”



Point distribution for “Digital Responsibility” criteria accross two Open Calls (OC)

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ATTESTED

"Rather than automating away the entire workplace, we intentionally involve workers and users, recognizing the invaluable role of human touch and intuition in agricultural practices."

The ATTESTED (*Affordable and eThical TracEability SysTEms to support proDucer-consumer relationships in small and medium supply chains*) project aims to develop a comprehensive, interoperable set of technologies to improve the efficacy of agricultural and food production, focusing on small producers and alternative distribution systems. The project will create a "toolbox" of technologies such as RFID, GPS, IoT, and portable sensors to form a traceability and monitoring system covering the entire farm-to-fork journey. The system will empower both producers and consumers by increasing transparency, efficiency, and sustainability. The project will also collect, process and present data to consumers about the food they buy, allowing them to know the full story of their food. The project will involve producers and consumers in the development process, and ensure the system is accessible and easy to use. The project will be piloted with the Valdibella cooperative, with the aim of extending to other small producers and cooperatives in the future.

commons | lab

CommonsLab is a Social Cooperative Enterprise dedicated to providing accessible process automation and IoT solutions with embedded systems. CommonsLab produces digital circuits and electronic devices that meet demanding requirements and challenging operating environments with the ultimate goal to go from prototype to the market.

FiBL

FiBL (Forschungsinstitut für Biologischen Landbau Stiftung) is a leading research institute on organic agriculture. It has conducted applied and participatory research on digital innovation in the agri-food system. FiBL has worked on social dimensions of food authentication technologies and has experience in methods of collaborative research with producers and consumers to develop and assess digital innovations and traceability systems.

Valdibella

Cooperativa Agricola Valdibella is a cooperative of organic farmers founded in 1998 in Camporeale, Sicily. The cooperative promotes social projects and inclusion. Its growing support community is currently represented by citizens and solidarity purchasing groups who choose to purchase in advance. Valdibella supports the consortium with the implementation of the system by liaising with the actors of the supply chain.

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NutriWell

"Dedicated to comfort living for all"

The NutriWell (Nutrition AI for Well-being and Social Inclusion) project aims to develop five AI-based building blocks (enablers) related to targeted nutrition. The primary focus will be on elderly individuals (65+), but the solution will be expanded to other groups. The enablers include a Nutrition Data Space for food/nutrition-related data, a personal data wallet adapter for storing health and medical profiles, an AI nutrition plan generator, an AI cuisine allocator for generating menus based on nutrition plans and cuisine preferences, and a social cooking organiser to connect users with similar plans and menus. The project will use a Living Labs methodology for co-creation with user groups and stakeholders. The project intends to address the challenges of engaging elderly users with smart devices and providing personalised nutrition advice in a GDPR compliant way. The project also seeks to combat social isolation of elderly individuals by connecting people with similar nutrition needs. The NutriWell system will be tested by integrating it into the Active@Home platform in Bulgaria.

Innova Living

IL(Innova Living ltd) is a software and business consulting SME in Bulgaria specialised in smart services for elderly people (65+). It will provide expertise in software development, service design, Big Data, AI and ICT-based solutions.

Institute of Technology and Development

ITD (Institute of Technology and Development) is a non-profit NGO, established as a spin-off of Centre of IST, Sofia University. It does applied research and innovation in a digitally enhanced ecosystem. It will provide expertise in AI and ICT-based solutions for the food and nutrition sector.

sofia development association sda

SDA (Sofia Development Assosciation) is a Sofia Municipality NGO hosting SofiaLab, member of the European Network of Living Labs (ENoLL). SDA will provide capacity in user needs analysis, social innovation, living lab methodology, access to users and a living lab facility for piloting the services.

SafeNutriKids

The SafeNutriKids (*Safe Nutrition for Kids*) project is a human-centred initiative that aims to develop an AI-driven personalised nutrition education app for children aged 6-12, combining scientific research with interactive learning. The project is a collaboration between experts from Estonia, Bulgaria and Turkey, with the goal of enhancing children's dietary habits, digital skills, and responsible digital citizenship. The platform will provide interactive educational content covering at least 50 key nutritional topics, and it will generate over 10,000 personalised nutrition plans using an AI system. The project also includes innovative

"We help children, their parents and educators find a smart and easy way to healthy personalized nutrition."

zero-knowledge proof technologies to protect user data privacy, and will be designed to be inclusive and accessible to children from different cultural backgrounds, dietary needs and lifestyles, taking into consideration religious and other cultural factors.

Phasegrowth's extensive collaborations with universities, public authorities, and companies throughout Estonia and Europe enrich its expertise in delivering AI-driven educational technologies. In SafeNutriKids, we channel this wealth of experience towards developing an AI-enhanced platform for personalized nutrition education, specifically designed for children aged 6-12.

The **Trakia University BUSINESS E-INCUBATOR GO-UP** supports transdisciplinary research and facilitation services in the domains of cooperativism, social entrepreneurship, impact investment, youth agri-preneurship and venture-building across the whole agri-food value chain; creating smart, green jobs and intelligent employment opportunities for youth.

The **Sabri Ülker Foundation,** established in 2009 has a steadfast commitment to enhancing public health in Türkiye and internationally. Our involvement in SafeNutriKids is a reflection of our three core pillars: education, research, and communication, through which we promote healthy living, support scientific inquiry, and disseminate valuable knowledge in food and nutrition.

NutriSight

The NutriSight project aims to develop a tool that can automatically extract nutritional information from food product packaging photos using deep learning techniques. This tool will include a machine learning model and an API that can operate in a multilingual context, extracting data from photos across different countries and languages. The project will also focus on presenting the information in a user-friendly format, such as the Nutri-Score system. The tool will be integrated into the Open Food Facts mobile app and website and is intended to significantly accelerate the collection of nutritional data, while improving its accuracy. The project aims to address the "Consumers' Food Choices" challenge by empowering consumers to make more informed and sustainable dietary choices.

"Nutritional information is crucial in assessing the quality of food products."

Cacao-Tech

"Cacao-Tech improves cacao quality, introduces a tracking system and valorises additional products from cacao pods, while reducing waste."

The Cacao-Tech project aims to transform the cacao value chain by enhancing transparency and quality through the use of Near-Infrared (NIR) technology and automated whole pod processing. This project will develop a circular model that uses the entire cacao pod, including the pulp and husks, which are currently often discarded. The project will initially focus on detecting key quality parameters like sugar content in cacao pulp and fatty acids in the beans using NIR technology, which will be combined with traceability systems to link quality data with time and geo-location. This data will be securely stored and can be used to advise on smart farming practices using AI. Cacao-Tech intends to pilot these technologies in three major cacao-producing regions with the potential for global scaling through an open-source licensing model. This technology will provide medium-sized buyers, chocolate manufacturers, farmers, cooperatives and consumers with better quality control and traceability.

Czech University of Life Sciences Prague

Czech Republic University (CZU) has a long-lasting expertise building and innovating commercial cyber-secure data management systems for industries, government, and academia. CZU team has the working expertice of sensors-based technologies used in plant-research and commercial applications and is up to the speed with modern data analytics including trustworthy, ethical utilisation of AI to robustify data systems.

Pacha de Cacao

Pacha de Cacao is a female-founded start-up in Amsterdam that creates drinks from cacao pulp in Ecuador. It has built its own sustainable supply chain for cacao pulp and is specialised in product commercialisation and research-driven product innovation. With over a decade's experience across the cacao value chain, its founder has close connections with cacao and chocolate companies in Ecuador, and globally.

WAGENINGEN UNIVERSITY & RESEARCH

Wageningen Research (WR), as part of Wageningen University, provides integrated multidisciplinary solutions based on state-of-the-art research projects with excellence in cacao. WR carries out applied scientific research for government bodies, companies and other types of organisations. With its mission, WR addresses SDG challenges and bridges the digital divide with its innovation network and living labs established within multiple projects.

GENIE

The GENIE (*Genomic Evaluation and Nutritional Integration Experience*) project aims to revolutionise the grocery shopping experience by offering ultra-personalised nutritional recommendations based on advanced genetic, gut microbiota, and biochemical blood tests, as well as consumer preferences. The project plans to develop a shopping list/recipe recommender system that integrates this data to provide users with tailored dietary advice, empowering them to make healthier and more informed food choices. This system will be integrated into a supermarket's online store and validated through a pilot test with 1,000 clients, and will assess the impact of personalised recommendations on the gut microbiota. The project also includes a user-friendly platform for managing personal data, ensuring full General Data Protection Regulation (GDPR) compliance. The ultimate goal of the project is to promote healthier lifestyles and sustainable dietary choices.

"GENIE aims to revolutionize grocery shopping by offering ultra-personalized nutritional recommendations."

GUNDO is an innovative startup dedicated to revolutionizing the shopping experience through personalized nutritional recommendations. The company integrates advanced algorithms and AI into its platform.

ADN Institut is a health center and genetic laboratory specialising in personalized medical and genetic diagnostics. The institute plays a crucial role in providing nutrigenetic and microbiota tests and ensures the actionable application of genetic results to improve users' quality of life.

i3S is a non-profit biomedical research unit focusing on critical health challenges such as cancer and infectious diseases. The institute provides the advanced genomic and microbiome analysis necessary for the GENIE project, contributing to the scientific validation and development of personalized dietary recommendations.

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PINACLE

The PINACLE (*Personalized Individualized Nutrition using Available Community LeftOvers*) project aims to create a digital tool that provides personalised, AI-driven nutritional recommendations to recipients of donated food, addressing the challenge of food waste and promoting healthy eating. It focuses on using technology to match available food donations with the dietary needs of recipients, including those with health issues or specific requirements, while also respecting data privacy. The project includes the development of a mobile application for users to manage their dietary profiles and a cloud application for food banks to manage inventory and distribution. PINACLE will use blockchain and verifiable credentials to ensure secure data management, user control and transparency, aligning with Digital Responsibility Goals. The project will be validated in real-world scenarios with actual food donation recipients, with a goal to streamline food distribution and promote sustainable food management.

"Promoting personalized nutrition and health awareness, by matching food donations with recipient needs."

Konnecta is an IT consulting SME specialising in Connected Intelligence Application Systems and Digital Transformation Solutions. A key aspect of Konnecta's commercial vision is the use of cutting-edge technologies such as DLTs, Artificial Intelligence (AI), Extended Reality (XR) and Digital Twins, which help organizations connect, creating digital ecosystems, optimizing their operations.

Co2gether participates as a foodbank and as a food recipient. Co2gether brings expertise for the development of solutions for tackling the needs of vulnerable populations. In addition, Co2gether will leverage the established cooperations with municipalities of the Region of Western Greece (currently 6 signed MoUs), charity and municipality social organizations of the region.

The **Sapienza University** in Rome provides evidence in the fields of (1) malnutrition, (2) obesity and metabolism, (3) eating behavior, (4) sustainability of Mediterranean Diet (nutritional indicators of sustainability), (5) food nutritional labels (front-of-pack nutritional labels). Particular research involves mechanisms (incl. AI/ML or similar) for the nutritional assessment of food, diet creation etc.

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DISH

DISH is a personalised recipe application designed to tackle unhealthy eating habits, reduced cooking capacity, and food waste. It uses machine learning and AI to tailor recipes to individual user needs, preferences, and dietary restrictions. DISH prioritises the use of local and sustainable ingredients, and allows for easy ingredient replacement, considering factors like allergies, intolerances, health conditions, and lifestyle choices. The app focuses on user privacy, with profiles stored on personal devices and data exchange using disposable identities. It aims for transparency, explaining how recipes are generated, and ensures data protection while promoting healthy and sustainable cooking habits. DISH will incorporate recipes from chefs, bloggers, and AI, scoring recipes for culinary and nutritional value, to provide a user-friendly and trustworthy experience.

"Nutritional information alone is not sufficient to cook a delicious meal and meet the needs of the consumer."

synamic TECHNOLOGIES

Synamic Technologies was founded in 2018 as a startup with the aim of automating processes in the field of cybersecurity. The company specialises in semantic technologies and expert systems. Their Cyber Security Knowledge Graph incorporates expertise in vulnerability and threat management.

DiSE

The **German Institute for Sports Nutrition** (DiSE e.V.), offers a comprehensive range of services for both businesses and individuals. Offerings include personalized nutrition consulting, sports nutrition coaching, speakers for presentations and educational events, interview partners, and observational studies.

Bulduru Tehnikums

Bulduri Technical School offers specialised education in horticulture, forestry, tourism, hospitality, and catering. The institution doubles as a business incubator, providing students hands-on experience with innovative technologies that prepares them to become industry specialists or entrepreneurs.

RESULTS & VALIDATION

RESULTS & VALIDATION:

GENERAL FINDINGS

All of DRG4FOOD's Open Call participants completed surveys detailing a) the state of play regarding implementation of Digital Responsibility features outlined in their initial proposals b) discussing challenges and hurdles along the way. As the first cohort of Open Call participants have already been further into their development process than the newer cohort, the depth of details naturally differed. In aggregate, however, the following common themes and valuable insights have been identified so far.

Security & Data Protection

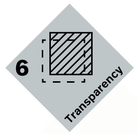
Open call participants have implemented various security measures for their projects. Most utilise industry-standard approaches like HTTPS/SSL for data in transit and standard encryption for data at rest.

Some participants have made more deliberate security decisions based on specific project requirements. One team implemented "asymmetric encryption (public-key cryptography)" while another chose "the Elliptic Curve Digital Signature Algorithm (ECDSA)" citing its "smaller key sizes compared to traditional encryption methods." These choices demonstrate an intentional approach to security rather than simply adopting default options. Another approach uses advanced cryptographic techniques like "Zero-

Knowledge-Proofs" (ZKP) to enable users to "prove eligibility without disclosing sensitive information," effectively balancing authentication needs with privacy protection.

Transparency & User Empowerment

A notable trend across projects is the emphasis on transparency integrated directly into the user experience, providing users with information and control.



One project created "Info Points" within their interface, "providing detailed explanations about the specific block" including "insights into algorithms, their sources, and the scientific foundations behind them, along with direct links to relevant scientific publications." Another project provides a "Why this recommendation?" feature that clarifies decisions in simple terms. This contextual information helps users understand how the system works.

Another participant implemented a "data control panel, where [users] can manage their preferences and opt out of data sharing if desired." This feature goes beyond basic consent mechanisms to give users more granular control over their information.

One team made transparency a core principle, stating that "transparency is in [our] DNA," and noting that "all the data we collect, refine or produce in any manner is published in real time." This level of data transparency demonstrates a commitment to openness that exceeds typical practices in many digital products.

In terms of inclusivity a project emphasised accessibility by following "WCAG standards, making the app usable for children with visual or cognitive impairments" and providing "multi-language support" to ensure inclusivity across different user groups.

Open Development Practices

Many participants have implemented robust open development approaches that strengthen their digital responsibility commitments. One participant has created a particularly comprehensive open process, stating that “everything we develop is published as it happens in an open source repository” under open licenses, where “anyone can participate and suggest improvements to the code” and “every contribution is sourced and contributors are valued.” This real-time transparency helps build trust with users and the wider developer community.

Some participants extend their open approach beyond code to include hardware elements, with one “releasing the electronics schematics under Creative Commons license in an accessible open standard” and “releasing the 3D-design files for the case under Creative Commons license.” This comprehensive approach to openness enables greater scrutiny and improvement across the entire technology stack.

Bias Mitigation & Data Quality

Participants have implemented notable approaches to ensuring data quality and addressing potential bias. Some

have developed structured validation processes, with one project requiring that data “had to go through the validation of two annotators” and “problematic [entries] were manually reviewed.” This multi-reviewer approach helps identify and address potential issues before they affect system outputs.

Other participants have adopted sophisticated methods for bias evaluation. One described a comprehensive framework including “Exploratory Data Analysis (EDA) for Bias Detection,” “Fairness Metrics for Model Evaluation,” and “Counterfactual Fairness Testing.” This structured approach to fairness assessment

demonstrates a commitment to ethical considerations in algorithm development beyond basic accuracy measures.

Use of Digital Responsibility Toolbox

Participants have engaged with the DRG4FOOD toolbox in ways that complement their existing practices. One described it as “a valuable resource” that “contains a lot of well targeted projects,” noting that the toolbox is “really well curated”.

Several participants have found specific resources from the toolbox beneficial to their work, with one utilizing tools like “Cyber Essentials” for cybersecurity self-assessment, “Datawrapper” for data visualization, and IEEE standards for ethical system design. The toolbox appears to serve both as a validation of existing good practices and as a source of additional resources for teams seeking to enhance their digital responsibility approaches.

Innovative Approaches

Some participants have implemented approaches that focus on user engagement and participatory design. One participant incorporated “user empowerment through education” into their platform, aiming to improve digital literacy alongside the primary functionality.

Another participant emphasized a “participatory approach = co-design and co-development of the tools with the users,” noting that they “actively involve market leaders and innovators in the development process, gathering continuous feedback and integrating diverse user perspectives.” While participatory design has been practiced in software development, its application specifically to ethical aspects of technology is less common and represents a thoughtful approach to stakeholder inclusion.

RESULTS & VALIDATION:

CHALLENGES & HURDLES

Specifically asked about the challenges and hurdles of implementing digital responsibility features and practices the following common themes were identified.

Data Quality & Balance was frequently mentioned across projects. Open call participants encountered practical challenges with data availability and representation. Some worked toward achieving “sufficiently good balance” in their datasets despite regional bias, while others pointed out inconsistencies in data structuring from public sources. Several participants

Common Themes Across Projects

Theme	Description
Data Quality & Balance	Challenges with data availability, quality, consistency, or (cultural) bias
Resource Constraints	Limited time, budget, or workforce to implement all desired digital responsibility measures
Technical Integration	Difficulties integrating technologies, platforms, or systems
Security Implementation	Challenges related to implementing comprehensive security measures
Multidisciplinary Coordination	Difficulty coordinating teams with diverse expertise
User Experience vs. Security	Balancing robust security with good user experience
Cultural & Regional Differences	Challenges with different regional practices, data policies, or cultural approaches
Regulatory Compliance	Complexities with adhering to regulations
User Trust	Addressing skepticism about technology

Table: Overview of issues mentioned by at least 2 or more procject participants

worked to formalize data in traditionally relationship-based industries where systematic documentation was less common.

Resource Constraints influenced how teams prioritized digital responsibility measures. One participant mentioned they still had “a few months for improvements” regarding security audits, acknowledging this was mainly a matter of time and workforce allocation. Another adapted their approach to work within budget limitations, focusing on the most essential elements first.

Technical Integration required flexibility from project teams. One participant successfully adapted when they didn’t initially anticipate certain registration requirements, finding alternative solutions using existing platform tools. Another identified opportunities to build APIs between existing collection systems to avoid duplication of effort, making their solution more practical for end users.

Security Implementation presented ongoing considerations rather than insurmountable obstacles. One project noted that “cyber security is always a complex argument,” but highlighted that their team was “doing great progress every year.” Another viewed their security audit as postponed rather than problematic, planning to address it after some code clean-up.

Multidisciplinary Coordination was described by one participant as an “intense and rewarding journey” that was “both challenging and enriching,” ultimately bringing “valuable knowledge and significant progress.” Bringing together experts from technical domains to subject matter specialists required careful management but resulted in more comprehensive solutions.

User Experience vs. Security required thoughtful balancing, with one team focusing on “designing a clear and intuitive user experience” while still

conveying important information about personal data use. They viewed this as an opportunity for an improved approach rather than a compromise.

Cultural and Regional Differences added complexity for projects operating across borders, with one participant noting these challenges were “not insurmountable.” They could be addressed through “careful communication” and by “demonstrating how data ownership frameworks can empower” stakeholders rather than creating additional burdens.

Regulatory Compliance posed hurdles for some projects when navigating GDPR requirements for e.g. sensitive personal data. Managing consent, implementing data deletion capabilities, and ensuring protection while maintaining functionality requires specialised legal knowledge, causing unexpected delays.

User Trust presented a challenge for one team with users being potentially skeptical of algorithmic decisions impacting sensitive domains, creating adoption barriers.

These common themes reflect the practical realities of implementing digital responsibility in diverse contexts. While challenges exist, open call participants generally reported making steady progress and finding workable solutions. Understanding these patterns helps inform more practical approaches to digital responsibility implementation in future initiatives.

Specific Challenges
• Country bias in datasets • Cybersecurity implementation
• Mastering nutrition algorithms • Acquiring a large recipe database • Coordinating multidisciplinary teams • Ensuring teamwide platform understanding • Adhering to strict schedules • Developing robust ontology
• Lack of thorough security audit • Handling erroneous weather or user readings • Difficulties in measuring digital responsibility qualitatively vs. quantitatively
• Budget constraints affecting full implementation • Data quality issues • Inconsistent data structuring in public/open data sources
• Balancing security and compliance with user experience • Ensuring transparency without overwhelming users • Limited external security audits due to rapid development pace • Postponement of algorithm transparency module
• Understanding data rights/ownership in traditional industries • Working between countries with different data policies • Duplications in data collection across systems • Integrating digital responsibility with informal industry practices
•Delays in real-time data synchronization due to encryption protocols • GDPR compliance complexities around data deletion and consent management • Computational efficiency challenges from implementing Privacy-Enhancing Technologies •Balancing personalization with privacy •Maintaining transparency without overwhelming users

Table: Specific issues mentioned by procject participants

RESULTS & VALIDATION:

SPOTLIGHT GENIE & NUTRISIGHT

GENIE Project Analysis:

Project Overview

GENIE aims to revolutionize grocery shopping through ultra-personalized nutritional recommendations based on genetic, gut microbiota, and blood test data. The system will be validated through a pilot with 1,000 users and emphasizes GDPR compliance while promoting healthier lifestyle choices.

User-Centered Data Control

GENIE stands out for its comprehensive approach to user data sovereignty. The implementation of a dedicated data control panel allows users to manage preferences, access test results, and opt out of data sharing at any point. This goes beyond basic compliance by actively empowering users through practical tools.

Multi-Stage Validation Process

The project employs an exemplary feedback cycle that incorporates diverse stakeholders:

- Initial internal testing by the tech team
- Product team validation
- Review by consortium members including the supermarket partner

- Testing with 86 recruited employees from Phase 1
- Large-scale testing with 1,000 participants selected from 3,000 applicants

This structured approach ensures continuous refinement while incorporating diverse perspectives, reducing algorithmic bias before launch.

Integration of Privacy-by-Design

GENIE demonstrates advanced implementation of privacy principles by separating personal identifiers from analytical datasets. This architectural approach to privacy protection shows a commitment to data minimization and purpose limitation that surpasses standard industry practices

Measurement Approach

GENIE has established several practical metrics for digital responsibility:

- 100% informed consent rate among 3,000 registered pilot users
- Regular user comprehension surveys to verify understanding of data usage
- Security breach monitoring with defined response protocols
- Bi-weekly user surveys on transparency perceptions

The project's commitment to ongoing measurement through bi-weekly feedback cycles provides a framework for continuous improvement in digital responsibility that could serve as a model for other DRG4FOOD initiatives.

Alignment with DRG4FOOD Vision

GENIE exemplifies DRG4FOOD's objective of building trust in data-driven food systems through its focus on user education and transparency. The project's ethical approach to personalized nutrition demonstrates how data-intensive applications can maintain user trust while delivering innovative services in the food sector.

NutriSight Project Analysis:

Project Overview

NutriSight aims to develop a tool that automatically extracts nutritional information from food product packaging photos using deep learning techniques.

The multilingual tool will be integrated into the Open Food Facts platform to accelerate nutritional data collection while improving accuracy, supporting consumers in making more informed and sustainable dietary choices.

Privacy-First Approach

NutriSight demonstrates exceptional digital responsibility through its complete elimination of personal data collection. Their robust metadata removal process uses ImageMagick to strip all EXIF data from uploaded images immediately upon server receipt.

This approach effectively prevents any personal information from being stored while still enabling the core functionality of nutritional information extraction.

Open Development Philosophy

The project exemplifies transparency through comprehensive open development practices:

- All code is published in real-time on GitHub under open licenses
- Models are publicly available on HuggingFace
- Development includes open issue trackers and contribution guidelines
- A formal code of conduct establishes collaborative principles

This approach extends beyond the technical aspects, as Open Food Facts also maintains transparency in governance and financial operations, creating a fully open ecosystem.

Multi-level Data Quality Assurance

NutriSight employs a rigorous validation system that combines both human oversight and technical measures:

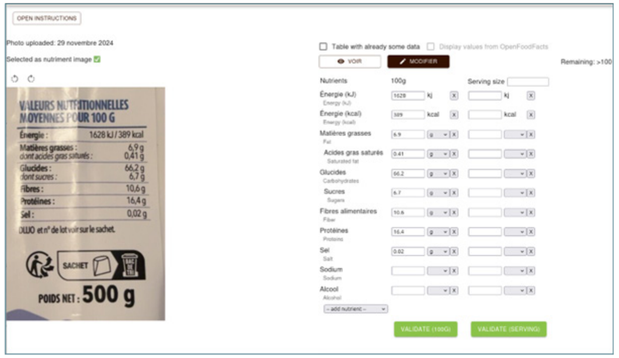
- Two-stage professional annotation process for each image
- Final review of problematic images identified by the model
- User-enabled flagging system for invalid images
- Contributor verification of all algorithmic outputs before database integration

This multi-layered quality control framework ensures high data integrity while maintaining human oversight of algorithmic decisions.

Geographic Bias Mitigation

The project shows notable commitment to algorithmic fairness by actively addressing geographic and language representation biases. Efforts include:

- Identifying and correcting over-representation from countries like France and USA
- Monitoring model performance across different languages
- Creating a balanced dataset to ensure equitable service quality worldwide



Screenshot "NutriSight"

Environmental Responsibility

Beyond digital ethics, NutriSight demonstrates additional responsibility by considering environmental impacts of computation. The team optimizes model selection based on both performance and resource consumption, while implementing

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RESULTS & VALIDATION

storage of computational results to avoid redundant processing—directly reducing the project's carbon footprint.

Alignment with DRG4FOOD Vision

NutriSight's approach aligns strongly with DRG4FOOD's objectives through its commitment to transparency, open governance, and supporting informed consumer food choices. The project's integration with Open Food Facts creates an accessible ecosystem where nutritional data becomes a public good rather than proprietary information, furthering DRG4FOOD's vision of a trustworthy data-driven food system.

Screenshot OpenFoodFacts / "NutriSight"

RESULTS & VALIDATION:

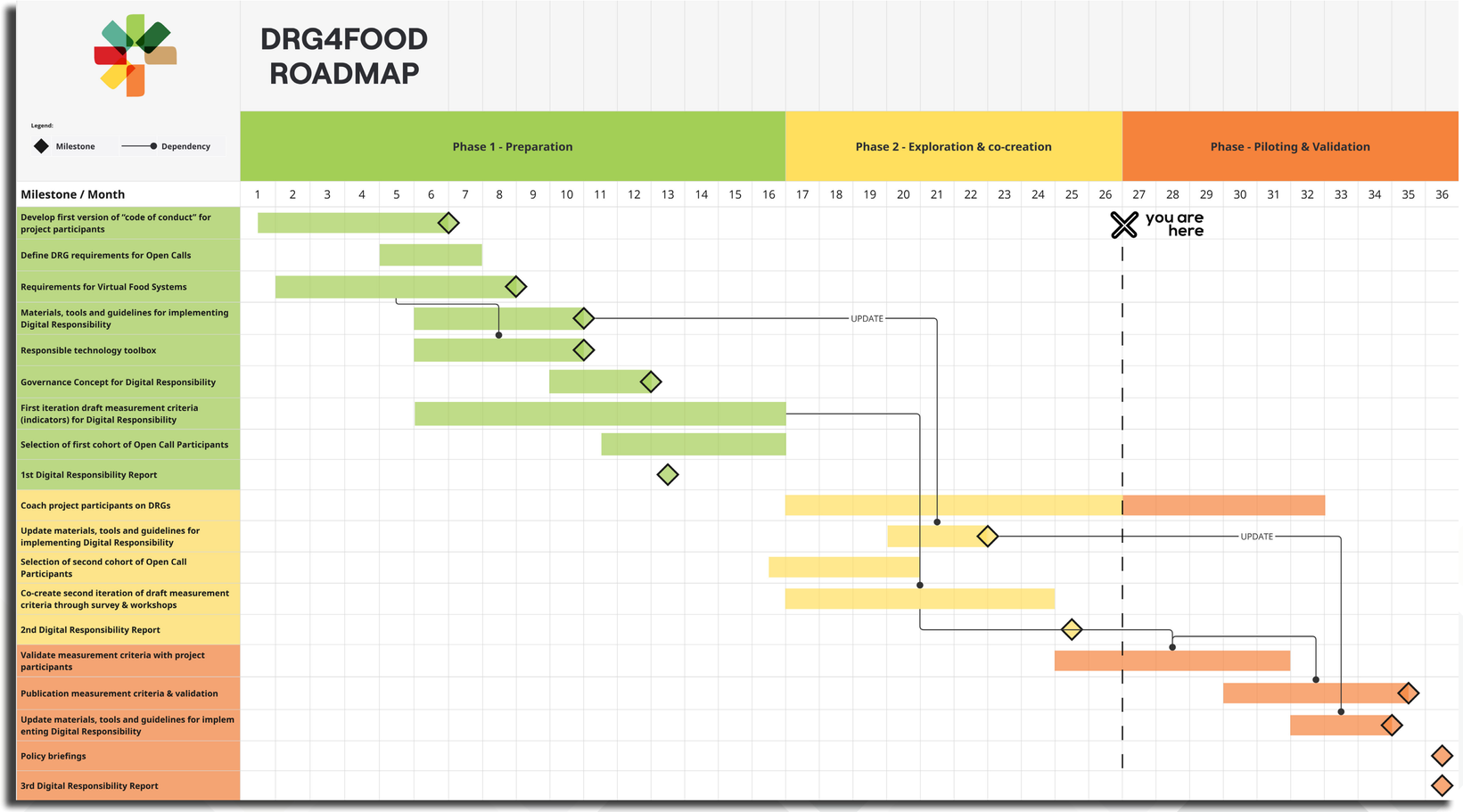
CONCLUSION

The DRG4FOOD project's first Open Call reveals that Digital Responsibility manifests differently across projects but follows discernible patterns. Approaches range from advanced security measures (asymmetric encryption, Zero-Knowledge-Proofs) to user-centric transparency features ("Info Points", algorithm explanations), showing Digital Responsibility as contextual rather than uniform.

Projects demonstrate varying maturity levels, with spotlight cases GENIE and NUTRISIGHT exemplifying advanced practices like user data control panels, multi-stage validation processes, and sophisticated bias mitigation strategies. Most participants face similar challenges—resource constraints, data quality issues, and technical complexity—yet find workable solutions, proving Digital Responsibility is achievable even with limited resources.

Open development approaches strongly correlate with comprehensive Digital Responsibility implementation. Projects publishing code in real-time and enabling community contributions demonstrated stronger overall responsibility practices. Most importantly, this exercise demonstrates that responsibility and innovation can be mutually reinforcing rather than in tension, as participants successfully balanced ethical considerations with functional requirements.

WAY FORWARD



DRG4FOOD Roadmap to Digital Responsibility

HOW TO GENERALISE FINDINGS & APPLY MORE UNIFORM CRITERIA?

To standardise the assessment on the basis of Digital Responsibility while accommodating diverse technological contexts, we propose three key strategies:

1. Tiered Maturity Model

Implement a four-level framework (Fundamental, Intermediate, Advanced, Leading) to evaluate Digital Responsibility implementation across key dimensions, allowing consistent assessment while acknowledging different maturity stages. Foundational level would include basic compliance with regulations, while Leading level would recognise innovative approaches that advance the field.

2. Quantifiable Metrics

Develop standardised measurements e.g. for:

- Security implementation completeness (percentage of recommended measures implemented)
- Transparency and explanation quality (accessibility and comprehensibility of information)
- Bias detection and mitigation effectiveness (percentage of potential

bias factors addressed)

- User control and data sovereignty (checking user ability to access, modify, and delete data)

3. Context/sector-specifity

Distinguish between essential Digital Responsibility elements required for all projects and context dependent elements, for example, when processing sensitive data or using automated decision-making.

These strategies would enable more consistent evaluation across diverse projects while providing participants with clearer guidance on expectations, ultimately advancing responsible digital innovation in the food sector.

Outlook: Research Paper on Measurement Criteria

Building on the experiences and insights gained from the DRG4FOOD project so far, a research paper is in development that aims to distill and generalise common measurement criteria for digital responsibility in data-driven food applications. This upcoming work will analyse patterns across successful implementations, identify key performance indicators for responsible technology, and discuss a standardised framework for evaluating digital responsibility. By establishing these generalisable measurement criteria, we hope to provide not only the broader food sector with practical tools to assess and enhance digital responsibility in their technological innovations, but also provide inspiration for digital technologies at large.

GLOSSARY

API (Application Programming Interface): A set of defined protocols, routines, and tools that serve as bridges between different systems, allowing for seamless interoperability.

Bias Mitigation: Strategies and techniques used to identify and reduce prejudice in data and algorithms.

Digital Responsibility Goals (DRGs): Seven guiding principles developed by IDENTITY VALLEY for creating responsible digital technology.

ECDSA (Elliptic Curve Digital Signature Algorithm): A cryptographic algorithm used for digital signatures providing security with smaller key sizes.

EXIF Data: Metadata embedded in image files that can include location, device information, and timestamps.

Nutri-Score: A nutrition label system that converts the nutritional value of products into a single score on a 5-point scale (A to E).

Open Source: Software with source code (often freely) available for modification and redistribution.

Privacy-by-Design: An approach to systems engineering that incorporates privacy protections throughout the entire development process.

Verifiable Credentials: Digital proof of qualifications or characteristics that can be electronically confirmed as authentic without revealing unnecessary personal information.

WCAG (Web Content Accessibility Guidelines): Standards for making web content more accessible to people with disabilities.

Zero-Knowledge-Proofs (ZKP): Cryptographic methods allowing one party to prove to another that a statement is true without revealing any sensitive information.