TITAN

Transparency solutions for transforming the food system

Deliverable 9.7 – Practice Abstracts – Batch 2

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Executive Summary

This deliverable presents the second batch of practice abstracts developed under the Horizon Europe-funded TITAN project, “Transparency solutions for transforming the food system”. It complements the first batch of practice abstracts already prepared under the project and adds seven new, practice-oriented abstracts based on more recent pilot materials and reporting results, while avoiding duplication with topics already covered in Batch 1.

The purpose of these practice abstracts is to translate TITAN results into short, accessible, and application-oriented summaries for end-users. They are intended for farmers, food businesses, processors, retailers, food-service operators, certification and control bodies, public authorities, technology providers, researchers, and other actors interested in practical transparency solutions for healthier, safer, and more sustainable food systems.

The practice abstracts have been prepared in line with the EU CAP Network format for Horizon Europe multi-actor projects. They are designed to make TITAN results easier to understand and use in real operational settings by focusing on concrete problems, practical solutions, business relevance, implementation conditions, and recommendations for practitioners.

This second batch includes seven abstracts covering results from both open-call pilots and more mature TITAN pilot reporting. The topics currently included are: Agri-Cluster, Honey.AI, INKtelliPack, Fish-Tell, TunaTech, blockchain-based carbon certificates in almond production, and the Sus-Health Index. Together, they expand the practical coverage of TITAN across the project’s three core areas: food safety, sustainability, and health.

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Introduction

Practice abstracts are a requirement for Horizon Europe multi-actor projects and are intended to support the transfer of project knowledge into practical settings. They provide concise, actionable summaries of project findings in language that is suitable for non-academic audiences and can be published through the EU CAP Network platform, as well as through project communication and dissemination channels.

In TITAN, practice abstracts are also an important dissemination and exploitation tool. They help translate pilot outcomes into practitioner-oriented knowledge products that can support uptake beyond the consortium, strengthen engagement with external stakeholders, and increase the visibility and usability of TITAN solutions in real food-chain contexts.

This deliverable compiles the second batch of practice abstracts prepared during the later phase of the project. At this stage, the emphasis is on results that are sufficiently mature, practically relevant, and suitable for public dissemination. In line with the need to complement rather than repeat Batch 1, the selection for this batch prioritised pilot topics and outputs not already represented in the first set of TITAN practice abstracts.

1. Methodology for the development of Practice Abstracts

The practice abstracts included in this deliverable were developed from partner-provided draft abstracts, latest project results, and public TITAN dissemination material. The drafting process also considered the content of Batch 1 in order to avoid duplication and ensure that Batch 2 provides additional thematic value.

The development process followed five steps:

- Review of the Batch 1 practice abstracts to identify already-covered topics and avoid repetition.
- Identification of mature results with practical relevance for end-users from recent TITAN pilot materials and reporting.
- Extraction of the key messages, findings, implementation conditions, and business or operational implications from the source documents.
- Re-adaptation of the source material into clear, non-technical language suited to practitioners and aligned with the EU CAP Network structure.
- Editorial review to ensure consistency with the TITAN deliverable style, the practice abstract template, and the needs of the intended end-users.

For this second batch, the selected topics were chosen because they provide clear added value compared with Batch 1 and because they represent a balanced extension of TITAN's practical results across multiple pilot areas.

2. Alignment with the EU CAP Network Practice Abstract Format

Each practice abstract in this deliverable follows the structure commonly used for Horizon Europe multi-actor projects and required for publication through the EU CAP Network platform. This includes:

- A clear and self-explanatory title.
- A summary for practitioners written in non-technical, accessible language.
- A concrete explanation of the challenge addressed, the solution developed, and its practical use.
- Additional dissemination and exploitation materials, including relevant links where available.
- A geographical context.
- Additional information on enabling factors, obstacles, future directions, key lessons, and authorship.

This structure supports later publication and reuse of the abstracts and ensures consistency across TITAN outputs. It also helps position the practice abstracts not as academic summaries, but as practical, end-user-facing dissemination products that can support real uptake.

3. Practice Abstracts – batch 2

3.1 Practice Abstract 1

Practice abstract

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Transparency solutions for transforming the food system

Collaborative DSS for Lower Pesticide Use and Better Farm Transparency in Crop Production

Summary for practitioners

Agri-Cluster addresses a common problem in farming: many growers know that digital decision-support systems can help them reduce pesticide use and improve crop management, but adoption is often slow because the tools seem costly, complex, and difficult to use alone. This is especially true where farmers must also report treatments, respond to changing disease pressure, and show that they are following more sustainable practices.

Agri-Cluster offers a practical alternative. Instead of treating the DSS as an individual farm tool, it works as a collaborative platform where farmers, agronomic consultants, and farmers' associations can share data and learn from one another. The system supports the exchange of field observations, disease-risk information, plant protection product use, and other agronomic data in real time. This helps improve forecasts, reduce repeated trial-and-error, and build more useful recommendations from shared experience.

For practitioners, the main opportunity is to use the platform as a shared service. Farmers can gain access to a more accurate DSS without carrying all infrastructure costs alone. Agronomic consultants can use one system across several farms, making advice more consistent and easier to manage. Farmers' associations can use it to support members, document treatments, and communicate more clearly with public bodies or control organisations.

The practical recommendation is to start with a cluster of farms and a trusted advisory network rather than isolated users. The main costs are training, data entry discipline, and coordination between users. The main benefits are lower pesticide use, better risk prediction, improved compliance records, and stronger first-mile transparency that can later support quality claims and public communication.

Additional dissemination and exploitation materials

- TITAN project website: titanproject.eu
- TITAN on LinkedIn: linkedin.com/company/titanprojecteu
- WiForAgri platform: wiforagri.com
- WiForAgri guide and user resources: wiki.wiforagri.com

Geographical location

The solution was developed in Italy by Primo Principio through the WiForAgri ecosystem and is designed for use in collaborative farming networks, with relevance for European crop-production systems facing tighter sustainability and pesticide-use requirements.

Additional information

An important enabling factor is the social side of adoption. The pilot shows that farmers are more likely to use a DSS when it is embedded in a trusted local network and supported by agronomic advisers. Shared data also helps improve forecasts over time, making the system more useful for each participating farm. The main obstacles are cultural resistance, the learning curve for new users, and the need to keep data complete and consistent. Data-sharing rules also need to be clear so that farmers understand who can see what and for which purpose.

Future work should focus on making the platform easier for non-digital users, expanding access for certification and monitoring bodies, and building clearer communication layers for downstream actors and, where appropriate, consumers.

A key lesson for practitioners is that transparency starts at field level: if crop treatments, disease pressure, and agronomic decisions are better recorded and shared, sustainability claims later in the chain become more credible.

Authors and affiliations: Andrea Galante, Primo Principio / WiForAgri, Italy.

About this practice abstract and TITAN

This practice abstract was elaborated in TITAN project based on the EIP AGRI abstract format.

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Project website: www.titanproject.eu

3.2 Practice Abstract 2

Practice abstract

Transparency solutions for transforming the food system

AI-Powered Pollen Analysis for Faster Honey Fraud Screening and Better Market Transparency

Summary for practitioners

Honey fraud remains a serious problem for beekeepers, packers, traders, importers, and inspection bodies. False claims about floral or geographical origin, dilution with cheap syrups, and practices such as ultrafiltration can damage honest businesses and weaken trust in the market. At present, many authenticity checks depend on specialised laboratories, expert staff, and expensive equipment. This makes testing slow and costly, and results may come too late for day-to-day business decisions.

Honey.AI was developed to make first-line honey screening faster and more accessible. The system uses an automated digital microscope, image analysis, and artificial intelligence to analyse the pollen sediment of honey samples. Because pollen acts as a fingerprint of honey, the system can help users flag suspicious samples, including cases where pollen may have been artificially added or where the sample does not fit the claimed origin. The goal is not to replace reference laboratories, but to give operators a practical on-site screening tool that supports earlier decisions.

For practitioners, this creates a new way to check suspicious batches before purchase, blending, packing, or customs clearance. It can reduce dependence on expensive outsourced analysis, shorten waiting times, and make pollen analysis more repeatable. Honey.AI also opens the door to QR-based communication of product information for buyers and consumers.

The practical recommendation is to use Honey.AI as an early-warning tool at key control points such as reception, import, export, and packing. Suspicious batches can then be escalated to accredited laboratories for confirmatory analysis. The main costs are equipment purchase, sample preparation, and validation within the user's workflow. The main benefits are faster decisions, lower routine testing costs, and stronger protection for authentic honey and responsible beekeepers.

Additional dissemination and exploitation materials

- TITAN project website: titanproject.eu
- TITAN on CORDIS: cordis.europa.eu/project/id/101060739
- Honey.AI platform: honey-ai.com
- Honey.AI pollen-analysis page: honey-ai.com/en/technology/pollen-analysis
- Microfy Systems: microfy.ai

Geographical location

The solution was developed in Barcelona, Spain, and is intended for use across European honey supply chains, including by beekeepers, cooperatives, packers, traders, and inspection actors.

Additional information

One of the strongest enabling elements is that the system simplifies a task that normally requires specialist training. By standardising pollen analysis and reducing human variability, it becomes easier to use microscopy-based information in routine business decisions. The main obstacles are the need to keep training datasets up to date for different honey types and origins, and the need to define clearly how screening results are used in commercial and regulatory settings. Any consumer-facing quality label or QR communication must also be governed carefully so that claims remain credible.

Future work should expand the reference database, strengthen fraud-detection confidence across more honey types, and improve how results are linked to digital product information.

A key message for practitioners is that affordable screening does not remove the need for confirmatory testing, but it can greatly improve control over which samples deserve deeper investigation.

Authors and affiliations: Iratxe Perales, Microfy Systems, Spain.

About this practice abstract and TITAN

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3.3 Practice Abstract 3

Practice abstract

TITAN

Transparency solutions for transforming the food system

Smart QR Labels with Reactive Inks for Safer Packaged Food and Lower Food Waste

Summary for practitioners

Many food businesses still lack practical tools to monitor what is happening inside a pack without opening it or destroying samples. As a result, packaging leaks may go unnoticed, cold-chain failures can be hard to detect, and safe food may be discarded too early because expiry margins are conservative. These problems increase waste, raise costs, and make accountability harder across the supply chain.

INKtelliPack offers a smart-packaging solution designed to tackle these issues. The system combines a QR label with intelligent inks that react to conditions such as CO2 levels and temperature. When the conditions change, the label changes colour. A user can then take a picture with a standard camera, and ColorSensing's image-processing method converts the visual change into usable data. This makes it possible to monitor package integrity and, in the future, freshness and cold-chain performance in a simple and scalable way.

For practitioners, the immediate value is in non-destructive quality control. Instead of opening packs for routine checks, manufacturers and retailers can use the label to identify leaks or other problems more efficiently. This can reduce waste, improve process control, and strengthen traceability. Over

time, the same approach could support freshness monitoring and better management of chilled distribution.

The practical recommendation is to start with use cases where packaging failures or cold-chain incidents are costly and frequent. The main costs are label integration, workflow adaptation, and industrial validation. The main benefits are fewer destructive tests, earlier detection of problems, better product protection, and reduced food waste. The solution is especially relevant for businesses looking for low-friction digital tools that work with existing cameras and routine quality checks.

Additional dissemination and exploitation materials

- TITAN project website: titanproject.eu
- TITAN on LinkedIn: linkedin.com/company/titanprojecteu
- ColorSensing website: color-sensing.com
- ColorSensing applications: color-sensing.com/en/applications
- Video demonstration: youtube.com/watch?v=1eoHdphuDe8

Geographical location

The solution was developed by ColorSensing in Barcelona, Spain, with food-packaging applications relevant to manufacturers and retailers across European supply chains.

Additional information

The main facilitating element is ease of use: the label can be read with a normal camera, while the software corrects for differences in lighting and image conditions. This makes the system easier to integrate than many specialised sensing approaches. The main obstacles are industrial scale-up, validation under real packaging conditions, and the future regulatory route for food-contact and shelf-life related applications. Businesses will also need clear procedures for how staff interpret and act on label changes.

Future work should continue the development of freshness indicators and cold-chain monitoring functions, as well as larger industrial pilots.

A key lesson for practitioners is that smart packaging is most useful when it improves a real operational decision, such as whether a pack is sound, whether a shipment stayed within range, or whether a product can safely stay in circulation longer.

Authors and affiliations: María Eugenia Martín, Miriam Marchena, Isaac Expósito, ColorSensing, Barcelona, Spain.

About this practice abstract and TITAN

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Project website: www.titanproject.eu

3.4 Practice Abstract 4

Practice abstract

TITAN

Transparency solutions for transforming the food system

Rapid Fish Freshness Testing Outside the Lab for Better Seafood Handling and Less Waste

Summary for practitioners

Seafood businesses often have to make quick decisions about product freshness, but the tools available are not always practical. Sensory checks can be subjective, while laboratory tests are slower, more expensive, and usually destructive. This creates a gap for restaurants, retailers, suppliers, and distributors that need fast, objective information to decide whether fish should be sold raw, sold for cooking, or removed from the chain.

Fish-Tell was developed to fill that gap. It is a portable digital solution that gives real-time freshness information by measuring two key parameters, K-value and pH. In practical terms, this means users can check fish freshness outside the lab and make faster handling decisions. The tool is designed to support better stock management, reduce waste, and improve transparency for businesses and consumers.

For practitioners, the most useful entry point is incoming-goods control. A restaurant, wholesaler, or retailer can test seafood at delivery and sort products according to freshness. Higher-quality fish can be reserved for raw or premium uses, while fish with lower freshness but still within safe limits can be redirected to cooked uses. This helps businesses use inventory more intelligently and reduces losses caused by uncertainty.

The main costs are the device, calibration, and staff training on how to interpret results in routine operations. The main benefits are lower waste, better product allocation, more objective decision-making, and stronger consumer confidence. Over time, the same platform may also support additional checks such as nutritional value, contaminants, or species authenticity.

Additional dissemination and exploitation materials

- TITAN project website: titanproject.eu
- TITAN on CORDIS: cordis.europa.eu/project/id/101060739
- Tellspec website: tellspec.com
- Fish-Tell overview via Tellspec: tellspec.com
- Recent Fish-Tell blog post: tellspec.com/tellpec_blog

Geographical location

The solution was developed by Tellspec SAS for seafood applications in European and international supply chains, with relevance for restaurants, retailers, suppliers, and distributors handling fresh fish.

Additional information

One key enabling factor is that Fish-Tell is non-destructive and portable, making it easier to use in real operational settings than many conventional methods. Another is that the technology can evolve through new calibration models without changing the basic hardware. The main obstacles are the need to validate performance across more fish species and operating conditions, and to ensure that users apply thresholds consistently in practice. Businesses also need simple internal rules for what actions to take at different freshness levels.

Future work could expand the system beyond K-value and pH to include nutritional indicators, contaminants, fatty-acid content, or authenticity checks.

A key message for practitioners is that freshness data creates value only when it changes a decision: better testing should lead to better stock rotation, clearer use of raw versus cooked products, and fewer unnecessary discards.

Authors and affiliations: Isabel Hoffmann, Tellspec SAS.

About this practice abstract and TITAN

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3.5 Practice Abstract 5

Practice abstract

Transparency solutions for transforming the food system

AI and Digital Tools for More Efficient, Sustainable, and Traceable Tuna Fishing Operations

Summary for practitioners

Tuna fleets are under pressure to fish more efficiently while also reducing bycatch, improving traceability, and responding to tighter sustainability expectations. For operators, this creates a difficult balance: they need better information at sea, but they also need systems that support compliance and strengthen trust further down the chain.

TunaTech, developed by ZUNIBAL, brings together a set of digital tools to support these needs. The approach combines AI-based prediction, real-time data from buoys and vessels, route optimisation, and traceability functions linked to blockchain-enabled systems. In practice, the system is designed to help fishing crews identify promising fishing zones, improve planning, reduce unnecessary fuel use, and create a more transparent record of activity and product origin.

For practitioners, the value lies in better decision-making before, during, and after fishing operations. Fleets can use the system to improve operational efficiency and reduce avoidable effort. At the same time, traceability features can support buyers, certification schemes, and other downstream actors that need stronger evidence on provenance and sustainability. This can improve both environmental performance and market positioning.

The practical recommendation is to treat the solution as a full operating system rather than a stand-alone gadget. Vessels need compatible devices, crews need training, and companies need to work with partners across the value chain so that traceability data is actually used. The main costs are equipment, data connectivity, training, and integration into current workflows. The main benefits are lower fuel consumption, better route planning, reduced bycatch pressure, stronger traceability, and improved readiness for sustainability-focused markets.

Additional dissemination and exploitation materials

- TITAN project website: titanproject.eu
- TITAN on LinkedIn: linkedin.com/company/titanprojecteu
- ZUNIBAL website: zunibal.com
- ZUNIBAL tuna-fishing solutions: zunibal.com/en/tuna-fishing
- CORDIS project page: cordis.europa.eu/project/id/101060739

Geographical location

The solution was developed by ZUNIBAL in the Basque Country, Spain, for tuna-fishing operations with international application across tuna fleets and seafood supply chains.

Additional information

The strongest enabling factor is the combination of different data sources into one operational decision flow. Instead of relying on isolated information streams, crews can work with a more connected view of fishing zones, vessel activity, and traceability needs. The main obstacles are adoption on vessels, staff training, and the need to align the technology with the expectations of actors beyond the fleet itself, including buyers and certification bodies. The value of traceability also depends on cross-chain cooperation, not only on the fishing technology.

Future work should continue refining AI models with field data and strengthening integration between operational fishing support and verified traceability records.

A key lesson for practitioners is that efficiency and transparency should not be treated as separate goals: better operational data can support both lower environmental impact and stronger market credibility when it is collected and used well.

Authors and affiliations: Iratxe Arraibi, ZUNIBAL, S.L., Spain.

About this practice abstract and TITAN

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Project website: www.titanproject.eu

3.6 Practice Abstract 6

Practice abstract

Transparency solutions for transforming the food system

Blockchain-Based Carbon Certificates for Almond Production: A Traceable Tool for Credible Climate Claims

Summary for practitioners

Almond producers, processors, and buyers increasingly need credible ways to prove environmental claims, especially when talking about carbon removals and low-impact production. In practice, this is difficult because sustainability data is often scattered across paper records, spreadsheets, and disconnected systems. This creates risks of double counting, weak verification, and greenwashing.

TITAN developed a digital framework for almond production that combines field data, a carbon calculator, QR-based lot identification, and blockchain-backed traceability. The aim is to link physical almond lots with verified environmental data so that producers, auditors, buyers, and consumers can see a more trustworthy record of origin and carbon performance. The system was tested in real almond-orchard conditions in Portugal and was designed to support both farm-level data collection and downstream verification.

The platform is operational and that the digital infrastructure, carbon-calculation workflow, and QR-based traceability are all functioning. 487.23 metric tons of almonds had been digitally traced and 85

operations had been recorded in the system. The remaining bottleneck is not the software itself, but the final administrative validation of carbon certification under Portuguese rules.

For practitioners, the main recommendation is to use this kind of system where carbon or environmental claims already matter commercially. Start with clear digital field logs, baseline measurements, and lot-level traceability, then connect these to downstream reporting and buyer communication. The main costs are data entry, field sampling, system onboarding, and compliance work. The main benefits are stronger proof of sustainability claims, better protection against greenwashing, improved buyer trust, and a clearer route toward premium environmental positioning.

Additional dissemination and exploitation materials

Example

- TITAN project website: titanproject.eu
- TITAN pilots for food sustainability: titanproject.eu/pilots-for-food-sustainability
- Agri Marketplace website: agrimp.com
- Crop Tracer platform: crop-tracer.agrimp.com
- CORDIS project page: cordis.europa.eu/project/id/101060739

Geographical location

The pilot was implemented in almond-production contexts in Alentejo, Portugal, with digital development led by Agri Marketplace and pilot validation linked to real orchard and supply-chain data.

Additional information

A key facilitating element was the combination of several functions in one framework: field logging, carbon calculation, lot traceability, and QR-based communication. This makes the system more useful than a stand-alone carbon calculator. Another strength is that the framework was built around auditable records, which is important for buyers and regulators.

The main obstacles were administrative and operational. Final certification was delayed by evolving Portuguese carbon-accounting requirements, and some data still had to be uploaded manually because legacy farm systems lacked open APIs. In addition, difficult weather conditions in the 2025 season reduced almond yield, which also limited the volume available for live tracking.

Future work should focus on completing the official certification process, reducing the data-entry burden for farmers, and improving integration with existing farm and enterprise systems.

A key message for practitioners is that environmental claims become much more credible when they are tied to specific lots, verified data, and traceable records rather than broad corporate statements.

Authors and affiliations: Agri Marketplace pilot team, Agri Marketplace, Portugal; supervision within TITAN by INRAE, France.

About this practice abstract and TITAN

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3.7 Practice Abstract 7

Practice abstract

TITAN

Transparency solutions for transforming the food system

The Sus-Health Index: A Practical Label and Calculator for Healthier and More Sustainable Meal Choices

Summary for practitioners

Food businesses, public-food providers, and policymakers increasingly want to help people choose meals that are both healthier and more sustainable. In practice, these two dimensions are often treated separately, which makes communication harder and limits the usefulness of food labels or menu tools.

TITAN developed the Sus-Health Index, a combined measure that brings together nutritional quality and environmental impact in a single score. The index was co-created with stakeholders and then tested in real-life living labs. TITAN also developed two digital tools around it: a digital living-lab protocol and an online calculator that can be used to estimate Sus-Health scores for meals and foods.

Two living labs were completed, involving 327 participants in total, above the original target of 200. Results were mixed but useful. In the Finnish living lab, the index helped increase healthy and sustainable meal choices by around 10%, while in Manchester the effect was not statistically significant. This suggests that the tool can be valuable, but that its impact depends on the menu context, how intuitive the options already are, and how the information is presented.

For practitioners, the best use is as a decision-support and reformulation tool first, and as a public-facing label second. Restaurants, caterers, retailers, and public-food actors can use the score to review menus, compare meal options, and improve communication with consumers. The main costs are data collection, recipe analysis, environmental-impact data handling, and implementation on menus or packaging. The main benefits are clearer communication, better meal design, and a more practical way to combine health and sustainability in one decision tool.

Additional dissemination and exploitation materials

- TITAN project website: titanproject.eu
- TITAN pilots for health: titanproject.eu/pilots-for-health
- TITAN public deliverables: titanproject.eu/publications/public-deliverables

Geographical location

The pilot was carried out in the United Kingdom and Finland, with living-lab activities in Manchester and Seinajoki, and broader stakeholder work involving partners including Queen's University Belfast, AZTI, and the University of Helsinki.

Additional information

A major enabling factor was the strong co-creation process. Stakeholders from academia, industry, and policy were involved in shaping the index, which helped make it more practical and credible. Another enabling factor was the digitalisation of the living-lab protocol, which made multilingual use easier and lowered operational effort.

The main obstacles were gaps in environmental-impact data and the difficulty of finding suitable local hosts and facilitators for living labs in multiple countries. The pilot also showed that a label alone does not always change behaviour. Where menus are already intuitive, the extra information may have limited added effect.

Future work should focus on improving environmental datasets, testing the tool in more food-service settings, and clarifying where the index works best: consumer choice, meal reformulation, procurement support, or policy experimentation.

A key message for practitioners is that combined health-and-sustainability labels are promising, but they work best when backed by strong data, good design, and real-world testing.

Authors and affiliations**:** Joe Livingstone and Paul Brereton, Queen's University Belfast; Ana Baranda and Elena Santa Cruz, AZTI; University of Helsinki team, Finland.

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4. Conclusion

This deliverable expands TITAN's practice-abstract portfolio through a second batch of seven practitioner-oriented summaries based on newer pilot materials and the latest available reporting results. By complementing rather than repeating Batch 1, it broadens the practical coverage of the project across food safety, sustainability, and health.

The resulting abstracts strengthen TITAN's dissemination and exploitation efforts by making project outcomes easier to access, understand, and apply in operational contexts. They also provide a useful bridge between technical pilot reporting and real-world uptake by external users.

Taken together, Batch 1 and Batch 2 offer a broader and more mature set of TITAN practice abstracts that can support the visibility, usability, and long-term exploitation of project results across Europe.