RELIANCE

Report on Synergies with Relevant Initiatives, Projects and Programmes

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SMART RESPONSE SELF-DISINFECTED BIOBASED NANOCOATED SURFACES FOR HEALTHIER ENVIRONMENTS

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RELIANCE project aims to design and develop smart response self-disinfectant antimicrobial nanocoatings based on a new range of smart antimicrobial nanoparticles. They will consist of mesoporous silica nanoparticles with metallic copper in their structure, modified with biobased bioactive compounds: Antimicrobial peptides (AMP's) based on protein containing waste streams, and essential oils (EOs) coming from non-edible plants. The antibacterial action of these additives will be adjusted to the specific application, according to the dosages and durability requirements. In this way, two alternatives to incorporate the bioactive compounds will be considered:

- The incorporation of the biobased EO into the porous substrate, to allow a controlled release (T or pH) of the bioactive compounds to the environment,

- The attachment of the AMP to the nanoparticles surface, to allow a long-term action of the bioactive compound to the environment. RELIANCE project combines contact killing and leachable antibacterial actions ascribed to the additive with the non-sticking action due to the coatings' formulation, thus providing an integral holistic solution to antimicrobial problems on different surfaces.

The nature of the coatings, their characteristics (hydrophobicity and surface roughness) and their application methods (direct deposition by cold-atmospheric plasma, high throughput spraying or selective digital printing) will be specifically designed to allow not only the microbial repelling action, but also the adhesion of the coatings to different substrates commonly found in our living environments, such as metals, plastics or textiles, and to maximize their durability (in terms of performance and antibacterial properties). Beyond the present-day possibilities of conventional chemicals, sustainability and eco design criteria will be considered in the selection of the bioactives, and in the development of the nanocoatings.

The project runs from June 2022 to May 2026. It involves 15 partners from 8 EU and 2 non-EU countries, and is coordinated by Fundacion Tekniker, Spain.

More information about the project can be found at: http://reliance-he.eu

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EXECUTIVE SUMMARY

The Report on Synergies, Relevant Initiatives, Projects and Programmes (D9.3) supports two of the main objectives of the Communication, Dissemination and Exploitation work package, namely:

- link RELIANCE with existing networks, projects and initiatives to promote knowledge transfer,
- integrate stakeholders' engagement.

The document renders an outline of similar or complementary local, national, or international EU funded projects and initiatives under the same call, in particular but also subject-matter associated projects under previous Horizon calls or other relevant EU ventures. Upon their identification, links with the key stakeholders will be established though contacting them to explore opportunities for cross-communication, joint dissemination or joint participation as speakers to events, co-organization of workshops, cross-project demonstrations, organization of conferences, webinars and other events, cross fertilization and eventually, co-funding and setting up of new projects.

At this early stage of the project, the current deliverable constitutes mostly a general framework of the initial actions, featuring a Synergy Action Plan at its core, mapping out possible activities per synergy actor in an effort to establish a robust and efficient network of platforms, clusters, projects and collaborations that will ensure a lasting socio-economic impact of RELIANCE but also, will enhance the visibility of its performance and the importance of the achieved outcomes.

The Report on Synergies is interrelated and co-exists with the Plan for Communication and Dissemination (D9.2) due to its importance for knowledge and technology transfer, best practices exchange and capacity to improve the scale of dissemination activities by developing cross-communication strategies, thus reaching a larger audience.

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D9.3 REPORT ON SYNERGIES, RELEVANT INITIATIVES, PROJECTS AND PROGRAMMES

1. INTRODUCTION

The project aims to establish a network for collaborations with current and past projects, initiatives, networks and relevant stakeholders, in order to amplify impact, knowledge transfer and capacity building for design and development of high performance and sustainable nanocoatings with enhanced antimicrobial, antiviral and antifungal properties that are to be used in a wider range of applications.

This Synergy Report and Action Plan summarizes the planning and monitoring of activities liaising the RELIANCE consortium with current or past projects, or related initiatives in the field of smart response antimicrobial nanoparticles and nanocoatings. It is linked to task **T9.4** which runs through the entire duration of the project and is dedicated to developing synergies and clustering with relevant projects on sustainable antimicrobial nanocoatings. This first version of the Synergy Report is subject to regular revisions during management meetings held every 6 months so that it reflects the evolvement of the proposed activities during each year of project's implementation, identifies whether the objectives have been reached, and undertakes adjustments when needed.

1.1. Context

Networking with relevant projects, platforms, networks, associations and other initiatives generally supports the achievement of project objectives and maximizes the added value for achieving a continuing and long-term impact of project's results.

On the one hand, fruitful synergies stem from setting up and maintaining relationships with similar ongoing projects that are developing resources under a collaborative dimension, in which case an adequate and agreed by all participating parties plan should be built. Furthermore, these relations should not be limited only to projects but may also be applied to platforms, clusters, associations and European initiatives considered relevant to RELIANCE's activities. On the other hand, building upon the existing outcomes of past or close to completion projects seems to be contributing to a sustainable use of resources under a synergistic process by leaning on previous experience regarding results' testing and exploitation.

Both synergies and networking aid an enhanced dissemination of the project's outcomes to a broader audience and foster learning from, and building upon other projects' findings and experiences.

1.2. Vision

EUROPROJECT EP, with the support of the Coordinator and all partners will research and assess the potential for productive cooperation with current and completed, or close to be ended projects based on their mission and objectives, and will make recommendations where cooperation is feasible. Partners already participate or have participated in a variety of projects and their existing links will be utilized for the implementation of successful collaborative mechanism and knowledge exchange.

1.3. Objectives

The key objective of task **T9.4** is to optimize the use of RELIANCE consortium's resources by establishing synergies with existing projects, programs and initiatives that are able to provide experiences and best practices in the field of antimicrobial and antiviral surfaces, smart response biobased nanocoatings, contact killing and advanced materials engineering such as nanomaterials and nanocoatings that could assist in the achieving of RELIANCE goals.

An Action Plan will be developed to structure the necessary steps for growing and building capacity in the ecosystem of nanomaterials and nanocoatings. Links will be established within different types of projects, platform, networks.

Ultimately, synergy and clustering activities will support the project in improving its communication and information campaigns, as a result of the following commitments based on the acquired knowledge, experience, best practices, and guidelines:

- Identification of national and European projects, platforms and networks funded under various programs and initiatives, or other kind of initiatives working on the project's themes followed by creating a network and ensuring cooperation in order to share challenges, problems and visions,
- Organisation of joint-discussions and dissemination of results among a larger audience,
- Invitation to joint-events, consortium meetings, coordinators' days in Brussels,
- Brainstorming on the full-spectrum potential of smart response self-disinfected antimicrobial nanocoatings.

The above is a concise description of the activities to be performed, which are to be regularly reviewed and updated.

2. COOPERATION NETWORK

RELIANCE works for healthier and safer environments while taking care of the aspect of sustainability in all the phases of the value chain: from the innovative additive conception using bioactive compounds (EOs and AMPs) coming from renewable resources, up to the obtaining and application of the nanocoatings, by using reactants coming from renewable sources for binders, fluorine free formulations or organic solvent-free

application techniques. Given these objectives, RELIANCE will seek to interact not only with projects funded under the same call topic but with such that fit in the concept of circular economy as contributing to the reliance of today's societies.

Figure 1. Overview of the targeted actors in the synergy strategy.

2.1. EU-funded projects under the same call

In view of the above context, several projects with similar or related to RELIANCE scope have been identified to ensure maximizing the impact of the EU funding on the topics of technology and innovation, advance materials, and circular economy by joining forces with them for cross-communication, information, dissemination and potentially, knowledge transfer events. Some interactional exchanges are planned to be conducted either as coordinators' discussions or through the WP Communication & Dissemination leaders.

The table below (Table 1) lists the ongoing projects that have been identified as possible areas for cooperation under the topic of HORIZON-CL4-2021-RESILIENCE-01-20 – Antimicrobial, Antiviral and Antifungal Nanocoatings (RIA), which RELIANCE received funding from:

SUSAAN	**Sustainable Antimicrobial and Antiviral Nanocoating**
Coordinated by:	L'UREDERRA, FUNDACION PARA EL DESARROLLO TECNOLOGICO Y SOCIAL, Spain
Grant agreement ID:	101057988
Duration:	June 2022 – November 2025
Project Description:	Development of new sustainable antiviral and antimicrobial coatings for textiles and high traffic objects made of plastics and metal, involving textile, bathrooms and switches manufacture industries. In this context, it can be stated that most of the common hand-touch sites and/or objects are covered by the project so final impact would be extensive after the successful project execution. The final outcome of SUSAAN project is the validation of the new sustainable antimicrobial/antiviral nanocoating in different final products: high traffic objects (plastic and metallic) and textiles. Technical advantages and comparative results to current solutions will be used to present SUSAAN solutions to potential clients.
Relevancy and potential synergy:	Perhaps the closest to RELIANCE project as far as research, development and validating focus is concerned. An email has been sent to the Coordinator of the project (Marta Mateo García de Galdiano, from Lurederra) with an invitation to set up a joint meeting in order to map our potential areas for cooperation. The meeting will he hold in January, after the 6 months consortium meeting of each project. ➢ User case studies, joint demonstrator events, collaboration on uptake by the industry and ideas exchange on the development of an exploitation plan; joint publications
STOP	**Surface Transfer of Pathogens**
Coordinated by:	BUNDESANSTALT FUER MATERIALFORSCHUNG UND -PRUEFUNG, Germany
Grant agreement ID :	101057961
Duration :	September 2022 – August 2026
Project Description :	Development of antimicrobial and antiviral nanocoatings that can be flexibly or permanently applied to high-touch surfaces. These nanocoatings will be derived from a combination of inorganic nanoparticles, antimicrobial peptides and nanoscale laser surface patterning. The nanocoatings will be thoroughly characterized for their efficacy, using both existing international standards and improved testing methods developed within the project (the new testing methods will be proposed to standards agencies for adoption). Several different active substances will be explored (i) to allow formulation in highly flexible, sprayable, and long-lasting coatings, (ii) provide broad spectrum antimicrobial antiviral activity, and iii) reduce the chances of the development of resistance. To this end, the mode-of-action, and the risk of

	selection for antimicrobial resistance in bacteria and viruses will be assessed. The flexible nanocoatings will provide a long-lasting (30 days) reduction in bioburden that resembles standards set for microbial colonization of surfaces in hospitals, which can only be reached after intense surface disinfection or permanent introduction of known antimicrobial material such as copper. This effect will be studied in a real-life intervention trail and with epidemiological models. The developed nanocoatings are expected to lead to significant reductions in infectious diseases transmitted from high-touch surfaces, healthcare cost savings, reduction in environmental pollution by disinfectants, and increased preparedness of the EU public health system to future pandemics. The safety of the nanomaterials will be backed up by human and environmental toxicity studies and life cycle analyses. From the beginning, attention will be paid to end-user acceptance, manufacturing scalability, and short-term exploitation by SMEs
Relevancy and potential synergy:	Areas for knowledge and best practices exchange appear to be the antimicrobial killing action of copper and the broader focus on microbial colonization in high touch surfaces. Potential cooperation with regard to exploitation when results are available. ➢ User case studies, joint demonstrator events, collaboration on uptake by the industry and ideas exchange on the development of an exploitation plan; joint publications
NOVA	**Next Generation Bioactive Nanocoatings**
Coordinated by:	DECHEMA GESELLSCHAFT FUR CHEMISCHETECHNIK UND BIOTECHNOLOGIE, Germany
Grant agreement ID:	101058554
Duration:	September 2022 – August 2026
Project Description:	NOVA aims to provide a comprehensive approach to antimicrobial coating development by creating an effective feedback loop between coating design, end use and functional/safety testing. This consists of combinatorial optimisation of 4 coating technologies: i) light activated based on: UV up-converters, nanoscale photocatalysts and hydrophobic carbon-based Quantum Dots and ii) contact killing biopolymers (chain-length controlled supramolecular assemblies of polypeptides and polysaccharides). The coatings will be adjusted in a use case driven specifications for having the capacity to coat different substrates in the same environment such as hospitals. In order to guarantee safety for citizens and environment, the coatings will be developed with a Safe and Sustainable by Design (SSbD) approach taking into account the environmental risks. NOVA will develop advanced tissue tests and immunotoxicity tests optimized for coatings to provide tools for the regulatory bodies an in-depth analysis of future coatings. For demonstrating practical efficacy, real-life

	mimicking, innovative antimicrobial tests will be developed. The validated coatings will be developed for commercial exploitation by upscaling using the capacities of the industrial partners. For easier adoption specific coating application devices will be designed within the project. Finally, the experimental data generated within the project together with the historical data of coating developers of the consortium will be used for developing predictive models using machine learning methodologies for expedited coating development methodologies in the future. NOVA aims to bring high efficiency, eco-friendly, stable coatings demonstrated within the project in 4 main use cases (textiles, paints, tactile electronics and frequently touched hard surfaces with high hygienical relevance like e.g. in hospitals and common hygienical relevance in public spaces) which can be then expanded for more widespread utilization.
Relevancy and potential synergy:	Synergy testing, validation and exploitation. User case studies and joint demonstrator events.
MIRIA	**Development of antimicrobial, antiviral, and antifungal nanocoatings for everyday surfaces**
Coordinated by:	RINA CONSULTING - CENTRO SVILUPPO MATERIALI SPA, Italy
Grant agreement ID :	101058751
Duration :	June 2022 – May 2026
Project Description :	Development of wide-range-antimicrobial nanocoatings to be used in hospitals and other environments where cross-contamination and contagion risk are significant issues. In the wake of the Covid outbreak, there has been large concern about infection spread of pathogens (i.e. bacteria, fungi, virus, and specifically SARS-CoV-2) via high traffic surfaces (i.e. medical equipment). State of the art and commercial products coating solutions that both target a range of mixed pathogens and different surfaces (e.g. glass, metal, textile) are unfortunately scant. MIRIA solutions aim to fill this void, impacting on Europeans' health, both directly (by creating public safe environments) and indirectly (by reducing COVID spreading and decreasing ill-related work absences and psychological pathologies). A reduction of the work absence of at least 5% with respect to the 2020 value (15M in EU) is expected. MIRIA main challenging ambition is to develop nanocoatings with a 99.99% effectiveness against a wide range of pathogens, especially SARS-CoV-2. This will be based on a four pieces puzzle: the knowledge in anti-microbial materials, nanopowders, nanocoating and pilot plant conduction. These nanocoatings will be brought to pilot scale (TRL6) and, within 3 years after the end of the project, they are foreseen to enter the market (TRL9). The exploitation of MIRIA outputs deeply involves SMEs and the dissemination plan will follow a spill-over strategy in order to involve public and private stakeholders.

Relevancy and potential synergy:	Approach using antimcrobial coatings as RELIANCE but different materials. Consortium partner Millidyne Oy participates in it. Potential cooperation in the area of socio-economic impact of the newly developed coatings. Synergy on nanocoatings' testing and validation, joint demonstrator events, stakeholder engagement strategy.
Triple-A-Coat	**Sustainable Development of a Safe and Biobased Antimicrobial, Antifungal and Antiviral Nanocoating Platform**
Coordinated by:	KATHOLIEKE UNIVERSITEIT LEUVEN, Belgium
Grant agreement ID :	101057992
Duration :	September 2022 – August 2026
Project Description :	Human pathogens can persist on textiles and high-traffic surfaces for hours, days or even longer when protected in biofilms, increasing risk of infection spreading. Conventional cleaning has no lasting effect as contamination can re-occur almost immediately. Available antimicrobial coatings are based mainly on the release of silver ions and other biocides that present risks for resistance development and environmental damage. Inorganic nanoparticles are also a concern for human health. Nanocellulose is a versatile nanomaterial obtained from wood pulp or biotechnological methods, which has excellent physical properties for coatings, enabling controllable and standardised application of antimicrobial functionalities. In Triple-A-COAT the 3 forms of nanocellulose will be augmented for antimicrobial/antiviral activity through grafting/adsorption of novel, resistance-proof compounds with excellent activities against bacteria, fungi and/or viruses, and nanopatterning to create bio-inspired antimicrobial surfaces. Spray coating and thin film applications will be developed, optimising adherence to plastic, metal, textiles and glass. The most effective coatings will be evaluated for antimicrobial/antiviral activity, durability and non-toxicity using ISO standard tests, and in a simulation of a bus environment over 6 months to reach TRL6. A life cycle assessment of the platform will also be completed. The project consortium involves companies, academic and SME partners with leading expertise in novel antimicrobial and antiviral technology, nanocellulose production and functionalisation, coatings development and characterisation, as well as a bus manufacturer and an external User Committee. Within 5-10 years after the end of the project, the results will be commercialized for impact in the transportation and healthcare sectors, contributing to the better control of infectious disease, and boosting the competitiveness and research leadership of EU industry including SMEs.

Relevancy and potential synergy:	Collaboration on knowledge exchange regarding the uses of different bioactives in the two projects – while RELIANCE employs antimicrobial peptides from waste streams, Triple-A-Coat uses nanocellulose derived from woodpulp. Synergies are also possible in cross dissemination, industry, policy and public engagement for uptake of the results once new coatings have been validated.

Table 1. Linked Projects similar to RELIANCE

Potential barriers to collaboration could be lack of interest on behalf of contacted projects, insufficient budget for joint workshops, some possible IPR issues among partners.

Although these projects have been identified as relevant and close in research and expected outcome nature to RELIANCE, the project will continue to monitor future calls in the field of new biocidal, environmentally friendly and durable multifunctional coatings and will adapt the above table in accordance with the emerging new opportunities for synergy events.

2.2. Other EU projects

2.2.1. Ongoing projects

One area of related research linked with RELIANCE's goal for **modifying the smart antimicrobial nanoparticles with bioactive compounds** is the work proposed about the extraction, purification and use of keratin-based antimicrobial peptides (AMPs) obtained from poultry feathers featured in the BBI EU project **UNLOCK - Unlocking a feather bioeconomy for keratin-based agricultural products**, which started in May 2021. It aims at conducting large scale steam explosion processing of poultry feathers that is to be applied in the development of seed trays, nonwoven geotextiles, mulch films and hydroponic foams.

Project's website: www.unlock-project.eu

Additional projects that have been identified as related to RELIANCE's activities are as follows:

DECOAT - Recycling of coated and painted textile and plastic materials - strategies that can be used to delaminate and recycle coatings obtained in the H2020 project DECOAT, where CTB is the coordinator could be used in RELIANCE to enable elimination of organic biobased coatings from substrates, as it will be done for example in the textile user case. The EU-funded DECOAT project will develop a solution to ensure the circular use of textiles and plastic parts with (multilayer) coatings. Specifically, it will investigate triggerable smart polymer material systems and appropriate recycling processes. The triggerable solutions will be based on smart additives like microcapsules or microwave triggered additives.

Project's website: https://decoat.eu

PERFECOAT - High Performance Bio-based Functional Coatings for Wood and Decorative Application – the objectives of this project are situated in the same field of science as RELIANCE, namely, coatings and films. The crossing point for potential interactions appears to be the development of high

performance new advanced bio-based binders, fillers and additives in coatings, starting from a proof of concept (TRL3) to demonstrator validation (TRL5).

Project's website: https://perfecoat-project.eu/

VIOBOND – sustainable binder: Upscaling new lignin-phenol-formaldehyde resin production with wood-based biorefinery lignin – both projects are looking in the direction of circular economy and the utilization of sustainable binders while aiming to decrease the dependency on fossil based raw materials. The EU-funded VIOBOND project will create the first commercially viable resin plant, producing phenolic resins that will partially substitute the fossil-based phenol and formaldehyde with lignin-derived raw materials. Another prolific area for cooperation would be brainstorming or experience sharing on the development of a business model for valorizing and gaining both industry and governing bodies' interest into the implementation of innovative scientific solutions.

Project's website: https://viobond.eu/

2.2.2. Past projects

Although appearing on the surface as static and lacking lively dialogue with consortium partners, synergies with past projects release possibilities for building upon already available outcomes, which seems to be contributing to a sustainable use and re-use of resources under a cooperative process that leans on previous experience. It regards both taking advantage of previous research that has been done in the field but also, gaining from the accumulated knowledge pertaining to results' testing, validation and business plan development for exploitation. Below follows RELIANCE's reasoning on related past projects it can interact with. They are deemed relevant since partners of RELIANCE had participated in their consortiums.

The **synthesis of mesoporous silica nanoparticles** was studied in VERDI – a completed EU research project, which used these NPs as platform for multifunctional nanosystems to heal complex bone diseases. The **synthesis of triggered released strategies** to allow dosage of compound from mesoporous matrices were studied in MOZAR, HYMADE or SMARTCOAT and ENERCAPSULE. The **protocols on controlled synthesis of NPs, adsorption of molecules and smart release strategies** obtained as result of these projects will be complemented with the previous involvement of project partners in projects such as NANOPYGMY, BIOSMART, SETNANOMETRO, EIROS or NANOPCM. The use of **feather waste** to obtaining high added value products, explored by the BBI EU project KARMA (Industrial Feather Waste Valorisation for Sustainable KeRatin-based Materials) could be studied within the context of obtaining biobased antimicrobial peptides.

The developments in RELIANCE are seen as complementary to the **antimicrobial coatings** derived from the past EU project PROTECT, which evaluated several **bioactives to avoid bacterial biofilm formation** and several nanocoating methods (R2R applied by sonochemical, bath and spray coating) and the results of the project seem to be useful for benchmarking the results obtained by the fully innovative smart nanocoatings obtained in RELIANCE where the novel Cu-SMIN will allow the obtaining of long-lasting antimicrobial effect nanocoatings, as dosage of bioactives will be adjusted to the application. Furthermore, the results of BIOAMICOFITEX (Cornet collective research network Germany-Belgium), DURATEX (Interreg FR-WA-VL), BIOCOAT or BioPU (Cornet collective research network Germany-Belgium) projects can serve as the **basis**

for organic nanocoating development proposal, as different (partially) biobased organic binders were developed for textiles which will be optimized and nanostructured in RELIANCE. The development of **nanostructured inorganic sol-gel coatings** in RELIANCE will use the previous expertise obtained by POLYRISE in Eurostar's Project ROSÉ-FILTER in obtaining high performance hybrid UV curable coatings able to adhere to PE coated glass or in the FP7 project NANOPOLYTOX developing nanostructured coatings. RELIANCE partner HEFR developed methodologies in BIOSMART to allow a one-step process for **binding bio-actives to the surface** by using CAP, will be used as starting point to optimize the attachment of the novel Cu-SMIN.

Finally, the nanotoxicological study carried out in RELIANCE will use also previous evaluation protocols and guides for working at laboratory and industrial scale with nanomaterials obtained in other projects, such as NANOREG.

2.3. EU initiatives

The European Commission has been at the forefront of supporting research and innovation in it strive for promoting European way of life through coordinated European and global research efforts. Through its research and innovation framework program Horizon Europe, it continues to invest in research and innovation to tackle infectious diseases, to include the spread of coronavirus.

At the same time, European Commission (EC) has put significant effort in sustaining an active ecosystem of public-private partnerships and initiatives relating circular economy and biobased products in general and advance materials, in particular. Some of these supporting structures, such as the European Technology Platforms (ETP) and Joint Undertaking (JU) have been created to attend to specific policy-relevant topics, with the goal of coordinating and maximizing the impact of public investments through collaborations and identifying a fast-track of scientific breakthroughs to the market. Below are the initiatives considered germane to RELIANCE for synergies and cross-communication and cross-dissemination activities:

2.3.1. CBE JU

The Circular Bio-based Europe Joint Undertaking (CBE JU) is a €2 billion partnership between the European Union and the Bio-based Industries Consortium (BIC) that funds projects advancing competitive circular bio-based industries in Europe. CBE JU is operating under the rules of Horizon Europe, the EU's research and innovation programme for the 2021-2027 period. The partnership is building on the success of its predecessor, the Bio-based Industries Joint Undertaking (BBI JU), while addressing the current challenges facing the industry.

CBE JU's mission is to implement the Strategic Research and Innovation Agenda (SRIA) by launching annual calls for proposals to fund projects in research, demonstration, and industrial deployment. RELIANCE aligns with all three objectives of the partnership:

- Accelerate the innovation process and development of bio-based innovative solutions
- Accelerate market deployment of the existing mature and innovative bio-based solutions

- Ensure a high level of environmental performance of bio-based industrial systems

2.3.2. EuMat and Alliance for Materials

The European Advanced Engineering Materials and Technologies Platform (EuMaT) is a European Technology Platform (ETP) established as a public-private partnership to ensure optimal involvement of industry and other important stakeholders in the process of establishing R&D priorities in the area of advanced engineering materials and technologies. Its main goal is to improve the coherence in existing and forthcoming EU projects, in the field of materials research and development. Additionally, it promotes *A4M (Alliance for Materials)* - a joint initiative of technology platforms, academia, research institutes, and industry, representing the largest materials research, development and innovation community of Europe, promoting the leading global position and competitiveness of the European technology in the area of Advanced Engineering Materials. Its ambition, similarly to RELIANCE, is to bring forth why investing in materials research is key to finding solutions for the big societal challenges of today and tomorrow, and to promote the consolidated and unified R&D&I European policy in this area.

2.3.3. SusChem and the Advanced Materials 2030 Initiative

SusChem is the European Technology Platform (ETP) for Sustainable Chemistry. It is a forum that brings together industry, academia, policy makers and the wider society for a competitive and innovative Europe where sustainable chemistry and biotechnology together provide solutions for future generations. Its mission to initiate and inspire European chemical and biochemical innovation to respond effectively to societal challenges by providing sustainable solutions corresponds with RELIANCEs main objective to provide healthier and safer environments in the wake of Covid-19 pandemic.

SusChem is also a network of national platforms as the European vision needs to be firmly rooted in the national strategies. The national platforms work on initiatives within their own countries and also in joint NTP initiatives through the network organization, thus fostering cooperation and organizing activities focused on knowledge transfer and best practices to elevate innovative solutions and improve competitiveness.

The platform is steering the Advanced Materials 2030 Initiative. Driven by Europe's green and digital transitions, it is addressing advanced materials discovery and development, associated manufacturing and processing technologies, integration into components and products and life-cycle management towards a circular economy. RELIANCE project's main goal and expected developments resonate in harmony with the objectives of the initiative:

- Drive cross-sectoral industrial innovation by supporting new applications across all industry sectors
- Pave the way for the engagement of all advanced materials stakeholders
- Foster the collaboration based on common grounds between stakeholders – The "Materials Commons "– to create more sustainable products through material-based technology

2.3.4. European Center for Disease Prevention and Control (ECDC)

The European Centre for Disease Prevention and Control (ECDC) is an EU agency aimed at strengthening Europe's defences against infectious diseases. To achieve its mission, ECDC works in partnership with national health protection bodies and experts throughout Europe to strengthen and develop continent-wide disease surveillance and early warning systems. RELIANCE can contribute to its mission too through bringing awareness towards project's goal and ambition, communicate results and ensure that the coating testing methods used in the project are relevant for the healthcare/public sector.

2.4. Specialized Platforms and Clusters in Europe

Among the benefits of joining clusters are the networking opportunities through various events organized for the members, access to webinars and workshops on current topics in the relevant industry (for e.g., digitalisation, sustainability), opportunities for participation in the development of collaborative projects between industrial and academic partners and more. In addition, this type of synergies aids an enhanced dissemination of the project's results to a broader interest groups' audience, increase the visibility of the members and foster learning from, and building upon, other projects' findings and experiences. Hereunder follows a list with clusters and platforms RELIANCE sees as beneficial for cooperative work and extended dissemination of its outcomes:

2.4.1. EU NanoSafety Cluster

The EU NanoSafety Cluster (NSC) is a high-profile platform for the coordination of nanosafety research in Europe. It provides strategic direction for the EU and member states, enhances synergies among ongoing and newly starting projects, preserves the outputs and data from ended projects and promotes FAIR data. The NSC integrates and synthesizes the existing and produced nanosafety knowledge to provide a unified message to stakeholders including academics, regulators, industry and civil society. It represents an suitable medium for RELIANCE due to it addressing the European health and safety of materials and technologies enabled by the use of nanoforms and nanotechnology. The studied aspects include toxicology, ecotoxicology, exposure assessment, mechanisms of interaction, risk assessment and standardisation.

2.4.2. Swiss Plastics Cluster

The Swiss Plastics Cluster is an association active since 2005 whose ambition is to create synergies between players in the plastics industry. The cluster has more than 100 members spread across Switzerland and around the world and the leader of WP8 in RELIANCE, The School of Engineering and Architecture (HEIA-FR) is already a member.

2.4.3. Plastics for Zero Emission

A Swiss Innovation Booster with a community network of research organizations, seeking action and ideas promoting the avoidance of CO2 emissions and development of negative emission technologies. Taking into consideration RELAINCE's ambitious objective to shift from harmful chemicals to a novel class of coatings through a new range of antimicrobial copper doped mesoporous silica nanoparticles (Cu-SMIN) that will be modified with non-toxic bioactive compounds, the project will make a good fit in the mission of the NTN Innovation Booster – Plastics for Zero Emission.

What is more, RELIANCE supports the transition to a circular economy through employing green synthesis of sustainable binder formulations for nanocoatings, reduced emissions of heavy metals and persistent chemicals in wastewater streams, and providing for recycling possibilities for the antimicrobial organic coatings to the treated surfaces.

2.4.4. HygTech Alliance

A cluster of Finnish companies which goal is to reduce the number of touch-based infections. They are looking towards providing a holistic line of defence that is based on silver or copper's inherent antimicrobial activity. RELIANCE could approach them to introduce the solutions it works on, i.e. a new range of antimicrobial copper doped mesoporous silica nanoparticles, and keep them informed about the progress of the project. Linking with this cluster holds possibilities for result's dissemination and greater visibility though some additional to the project demonstrations and also, potential for utilization of the product outcomes by the business.

2.4.5. SITY – Finnish Association for the Prevention of Infections

The Finnish Association for the Prevention of Infections brings together specialists who work in infection control or are interested in it. It is multi-professional and organizes annual training days, publishes the Infection control magazine, and issues statements regarding infection control. Linking RELIANCE with them would first, create awareness of the antimicrobial nanocoatings the project is designing and developing, and second, would lay the ground for the future dissemination activities and greater proliferation of our results.

3. ACTION PLAN

The Synergy Action Plan summarizes the planning and monitoring of the synergies to be developed with the partners and projects identified above. These synergies include regular exchange of information, joint participation in relevant conferences and policy events, alignment of dissemination activities and social media campaigns, joint preparation of policy briefs or exchange and consolidation of results for related case studies. Synergy activities also seek to contribute to the identification of relevant good practices, methods and technologies for the design and development of sustainable bio-based, safe and non-toxic antimicrobial nanocoatings, to be integrated in the knowledge-based toolkit of RELIANCE.

3.1. Overview of the Action Plan

The Synergy Action Plan is based on 5 specific activities to be developed during the project. Additional opportunities might emerge from the development of these actions.

3.1.1. Exchange of information on project progress and results

Several projects have been identified, as stated above, for developing exchange of information on project outcomes. Especially, all the projects aiming at i) developing and testing of the performance the antimicrobial nanocoatings ii) providing accurate knowledge and test on the safety, non-toxicity and life cycle of the nanocoatings and iii) developing sustainable coating methods correlated with differentiation of the biocidal effects with nanoparticle surface morphology as well as the selection of promising essential oils and amino peptides from a list of several candidates as potential additives in the new formulations. The upcoming interactions are targeted for aligning objectives and performing strong brainstorming sessions to understand how to reciprocally benefit from the projects' results. If cross-activities of this kind, including co-development of application trials and co-generation of results would happen during the projects' lifetime or beyond, discussions will be opened on the possibility to develop joint-papers in scientific journals or joint-presentation of the results during specific symposium and scientific conferences. Such activities will highly prove the efficiency of the synergy strategies at the EU level.

3.1.2. Participation to Project Meetings and/or External Advisory Board meetings of other projects

Whenever feasible, cross-attendance of Project Progress meetings of the above-mentioned consortia (and potentially new ones to be funded during the RELIANCE lifetime) could be arranged. This will enable active and regular follow-up of each projects' evolution. In addition, each partner will inform the coordinator and WP9 leader in case they are invited to join a new project External Advisory Board to identify potential synergies with RELIANCE. Eventually, regular online meetings with specific projects (especially the ones identified as closest in nature to RELIANCE's field of research) will be organized either by WP leaders to discuss technical results, or by Tekniker and Europroject EP, respectively, to exchange about the overall synergy actions.

3.1.3. Invitations to national dissemination events (NDE)

As part of the Communication and Dissemination Plan, national dissemination events could be set up by partners, one event per partner throughout the project's duration, to serve as knowledge-exchange forums among relevant stakeholders. Participants in these events could be representatives of government healthcare institutions, advisory services, medical professionals' unions and representatives from the industry and NGOs, securing large scale dissemination all relevant stakeholders and establishing strong communication channels for dialogue and mutual inspiration.

These national dissemination events could be a powerful tool to launch and enhance synergies at national scale as they will target a large community of various stakeholders, thus bringing into the project a diverse set of recommendations and points of view. This richness contributes to the gathered knowledge and practices by RELIANCE partners. Moreover, the national dissemination events constitute the perfect environment to network and cluster with less prominent projects, for example such funded through national or local programs. There is usually a large number of such projects and they can bring relevant results with specific development tailored to local specificities of the health environment as far as spreading of infections is concerned. They can also connect the project with the final end-users more easily than the EU projects that have a stronger impact on the research community. Hence, a specific focus will be put on each NDE to invite: i) representatives from the EU projects identified above but also ii) local project coordinators and iii) end-users.

3.1.4. Joint participation in workshops, conferences, and other events to promote the visibility and outputs of the projects

WP9 leader is regularly communicating with the Communication WP leaders of the identified projects quoted above. The interaction will be focused on synching actions in terms of event participation, which would require the identification of common conferences and workshops to meet, discuss and promote each other's results. Other local opportunities may present themselves and will be explored accordingly, depending on the available projects results. At this stage, the following is proposed as a non-exhaustive list of events with high potential for synergies and cross-cooperation on increasing the visibility of the project and its results:

a. **Trends in Nanotechnology Conference** - this high-level scientific meeting series aims to present a broad range of current research in Nanoscience and Nanotechnology worldwide as well as related policies (European Commission, etc.) and initiatives (iNANO, IEEE, GDR-E, FinNano, etc.). TNT events have demonstrated that they are particularly effective in transmitting information and establishing contacts among workers in this field. TNT conferences provide an ideal venue for industrial, academic and governmental organizations to share common objectives and drive the commercialization of nanotechnology discoveries. https://tntconf.org/conf/index.php

b. **International Conference on Sol-Gel Science and Technologies, November 18-19, 2023 in London, United Kingdom -** aims to bring together leading academic scientists, researchers and research scholars to exchange and share their experiences and research results on all aspects of Sol-Gel Science and Technologies. It also provides a premier interdisciplinary platform for researchers, practitioners and educators to present and discuss the most recent innovations, trends, and concerns as well as practical challenges encountered and solutions adopted in the fields of Sol-Gel Science and Technologies. https://waset.org/sol-gel-science-and-technologies-conference-in-november-2023-in-london

c. **Swiss Plastics Expo, 17-19 Jan 2023, Luzern** https://www.swissplastics-expo.ch/fr

d. **17th European Bioplastics Conference -** The European Bioplastics Conference is Europe's leading business and discussion forum within the global bioplastics sector. More and more brands and manufacturers are embracing the potential of biopolymers, and policy makers are increasingly streamlining their efforts to create frameworks that benefit the growth of sustainable bio-industries. https://www.european-bioplastics.org/events/eubp-conference/

e. **Macro 2024, the 50th world polymer congress, 1-4 July 2024 / Warwick university / United Kingdom**

f. **The European Network of Living Labs (ENoLL)** is the international, non-profit, independent association of benchmarked Living Labs. Living Labs are real-life test and experimentation environments that foster co-creation and open innovation among the main actors of the Quadruple Helix Model, namely: Citizens, Government, Industry, Academia. ENoLL facilitates knowledge exchange, joint actions and project partnerships between its historically labelled +480 members in Europe and worldwide. Its aim is to promote the Living Labs concept in order to influence EU policies, enhance Living Labs and enable their implementation at a global level. https://enoll.org/about-us/

g. **European Bioplastics Conference** - Europe's leading business and discussion forum within the global bioplastics sector. More and more brands and manufacturers are embracing the potential of biopolymers, and policy makers are increasingly streamlining their efforts to create frameworks that benefit the growth of sustainable bio-industries. https://www.european-bioplastics.org/events/eubp-conference/

3.1.5. Alignment of other communication and dissemination activities

Besides the specific activities identified above, WP9 leader, in cooperation with the sister-projects' communication leaders, will identify day-to-day joint-communication activities like the ones listed below:

- Cross LinkedIn, Twitter and other social media campaigns – most of the identified projects are active on Twitter, LinkedIn and/or Facebook. Specific joint campaigns around key project results or events could be regularly executed in order to improve all projects' visibility.
- Specific page or section on the website dedicated to the network projects of RELIANCE
- Organisation of joint project's presentations at conferences or organization of joint webinars, participations in podcasts and others.

3.2. Action Plan per Stakeholder Group

The following table shows the proposed strategies to be applied for the synergies with the identified stakeholder groups.

Actor	Activities
EU-funded projects under the same call	– Exchange of knowledge produced – Participation to physical and/or online meetings to brainstorm on development of technical co-activities – Regular exchange of information with regard to project results and events – Participation, where possible and relevant, in partner events – Invitation to participate to RELIANCE meetings and events – Potential joint publication, organisation and participation to joint events, joint presentations – Dissemination of RELIANCE events, newsletter and other materials, and vice versa – Cross-dissemination on social networks
Other EU projects	– Regular exchange of information with regard to project results and events – Dissemination of RELIANCE events, newsletter and other materials, and vice versa – Cross-dissemination/communication on social networks – Exchange of knowledge produced by RELIANCE – Guest-participation to physical and/or online meetings to brainstorm on RELIANCE activities and collect additional inputs – Regular exchange of information with regard to project results and events – Invitation for participation at RELIANCE meetings and events
EU Initiatives	– Regular information update on RELIANCE project during events, brokerage sessions, workshops – Specific communication towards the members of the focus groups identified as relevant to RELIANCE project – Participation in CBE JU events, cooperation with CBE JU, ETP, ECDC projects
Specialised platforms and clusters in Europe	– Subscription to cluster and platforms' newsletters – Contribution to the content of the newsletters, magazines – Dissemination of RELIANCE newsletter, publications, workshop/conference announcements, etc. – Support social media campaigns – Publication of RELIANCE outputs in relevant resources sites – Mutual exchange of information (research projects) – Access to the network of projects – Invitation to participate in RELIANCE meetings, events – Participation in events organized by these clusters – Promotion of RELIANCE events and other promotional materials, and vice versa – Cross-dissemination on social networks
National projects	– Exchange of knowledge produced – Regular exchange of information with regard to project results and events – Invitation to participate in the organized by RELIANCE national dissemination events – Promotion of RELIANCE events, and vice versa – Dissemination of RELIANCE newsletter and other promotional materials, and vice versa – Cross-communication on social networks

Table 2. Action Plan per Stakeholder Group

3.3. Monitoring of Action Plan outcomes

Synergy exploitation will be monitored and evaluated against the Key Performance Indicators **at least 5 related projects, 2 Networks/Working groups** set out in the Grant Agreement of RELIANCE) and by the criteria listed in the table below by the project coordinator (Tekniker) and WP9 leader (Europroject EP). The adopted metrics and the periodicity will vary according to specific synergy and actors identified.

Synergy outcomes	Stakeholders	Indicators	Key actions for success
KNOWLEDGE CO-CREATION – *Exchange of produced knowledge;* – *Participation to physical and/or online meetings to brainstorm on the development of technical co-activities;* – *Regular exchange of information with regard to project results and events;* – *Participation in working groups;*	– EU projects with similar scope – CBE JU, ETP, Advanced Materials Initiative, ECDC	– Number of effective contacts established; – Number and types of information exchange channels; – Number of brainstorming sessions organised; – Number of contacts included in the focus groups of the various initiatives; – Number of participations to stakeholders' events; – Number of meetings attended and diversity of working groups;	– Early identification of key partners and key people in the different initiatives; – Early initial contacts to be made by all partners; – Remind the partners to provide information regarding the other projects they are involved in;
PROJECT OFFICIAL MEETINGS – *Participation, where possible and relevant, in partner meetings;* – *Invitation to participate in RELIANCE meetings and events;*	– EU projects with similar scope	– Number of attended meetings;	– Remind the coordinator to plan attending consortium meetings of related projects upon invitation;
JOINT PUBLICATIONS AND OTHER JOINT ACTIVITIES – *Potential joint publications,* – *organisation and participation in joint events,* – *joint presentations;*	– EU projects with similar scope	– Joint papers on used methods and obtained results; Number of papers published; – Joint presentations of results; – Number of events;	– Ensuring IPR rules are respected.

CROSS-DISSEMINATION CAMPAIGNS – *Regular updates of the RELIANCE results within the communication materials of linked initiatives, clusters and projects.*	– All stakeholders with a special focus on NanoSafety Cluster, SusChem and Swiss Plastics Cluster information materials to reinforce visibility	– Views, visits and/or downloads of RELIANCE information on these diverse platforms; – Number of articles/mentions about RELIANCE published in the clusters' newsletters/magazines; – Number of participations to events.	– Reminding the partners to actively participate in the clusters and attend the relevant meetings; – Send accurate and relevant publications about project outcomes, in time to be published in the clusters' newsletters. –
PARTICIPATION TO EVENTS – *International conferences, events of the EC, etc.*	– EU Initiatives, ECDC, Clusters, Platforms	– Number of events	– Early identification of key events; Coordinate participation of RELIANCE partners
CROSS-COMMUNICATION ON SOCIAL NETWORKS	– All stakeholders	– Analysis of the impacts of the campaigns (users reached, shares, number of followers, engagement rate, etc.) and published posts by RELIANCE and the posts published on RELIANCE, or tagged RELIANCE, by the network.	– Regularly remind partners to actively participate in the campaigns with their official accounts as provider of content or share the information created by the WP9 leader.

Table 3 - Monitoring of synergy outcomes

4. CONCLUSION

The exploration of synergies and interaction with other related organizations, networks, initiatives and EU-funded projects will continue throughout the entire duration of RELIANCE. What is more, the intent of the project is to expand the established synergies even beyond its length so that a long-term stakeholder community is set up, with entities interested in up-taking RELIANCE antimicrobial solutions and scaling up to be applied in industry settings. Additional benefits stemming from these joint interactions could be the identification of common funding applications or future technological collaborations as well as joint proposal applications for new projects in the nanocoating field and/or in antimicrobial, antifungal and antiviral solutions which will expand on the approaches, technologies and outcomes of RELIANCE.

This report investigated the possible synergies and links that could be developed with related EU projects, programs and initiatives, ensuring an increase in the outreach to potential stakeholders by organizing joint events, knowledge and experience exchanges, best practices showcase and stimulating discussions among key players. Two updated versions will follow in M24 and at the end of the project, in M48, to report on the networking activities that were performed but also to adjust it accordingly to newly emerging opportunities. It is important to highlight that this report is not complete without the Communication and Dissemination Plan (D9.2) and the Exploitation Plan (D9.5) since the outlined activities in all of these three documents are tightly interrelated and therefore, mutually influence, one way or another, their final outcomes, impact and ultimately, successful accomplishment.