

**Biosciences in
changing societies.
Moving towards a
mutual learning
approach.**

Deliverable 8.6



Deliverable description

This document contains the ResBios Policy Brief No1 “Biosciences in changing societies. Moving towards a mutual learning approach” (original name in DoA: “Biosciences in changing society”). It is a communication product about some mutual learning activities carried out in the framework of WP7 in the first phase of the project.

To be quoted as:

Mezzana D. (in collaboration with the members of the ResBios project), 2021. “Biosciences in changing societies. Moving towards a mutual learning approach”.

Deliverable	8.6. Biosciences in changing societies. Moving towards a mutual learning approach
Work Package	WP8 Communication dissemination and exploitation
Due of Deliverable	Month 15
Lead beneficiary of this deliverable	EUSEA
Version	V. 1
Author(s) and Institution(s)	Daniele Mezzana, UNITOV
Submission Date	April 27 2021
Reviewers	ResBios partners

PU	Public	X
CO	Confidential, only for members of the consortium (including the Commission Services)	
CI	Classified, as referred to in Commission Decision 2001/844/EC	

Document Revision History

Version	Date	Author/Editor/Contributor/Reviewer	Action
0.1	11/04/2021	Daniele Mezzana (UNITOV)	First draft
0.2	23/04/2021	Carla Montesano (UNITOV), Elena Buzan (UP), Luciano d'Andrea and Andrea Declich (K&I), Evanthia K. Schmidt (AU), Janire Salazar (CSIC), Christopher Styles and Andrea Troncoso (EUSEA)	Internal review
1.0	26/04/2021	Daniele Mezzana (UNITOV)	Final version

The information, documentation and figures in this deliverable are written by the ResBios project consortium under EC grant agreement No 872146 and reflect only the authors' views and the agency is not responsible for any use that may be made of the information it contains.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 872146.



This project has received funding from the European Union's Horizon 2020 research and innovation programme under the grant agreement N° 872146



This project has received funding from the European Union's Horizon 2020 Research and Innovation Programme under the Grant Agreement N°872146

Policy brief No1

“Biosciences in changing societies. Moving towards a mutual learning approach”

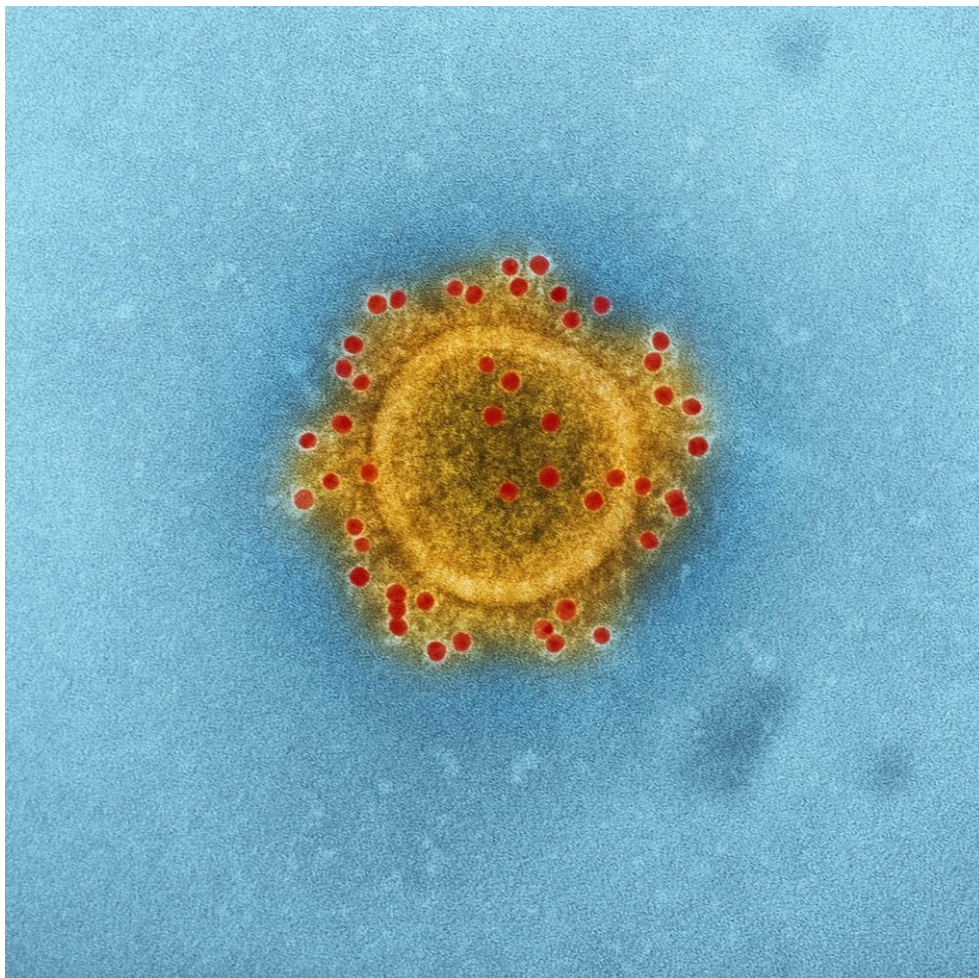


Photo: CDC

Table of contents

Executive summary

1. The changing relationship between science and society
2. The RRI institutional changes
3. Mutual learning and the challenge of complexity
4. Some policy recommendations

Main references

Executive summary

In a period of profound and complex transformations in the relationship between science and society, it is important to adopt a mutual learning approach, to better understand the existing problems and prepare solutions. The H2020 ResBios project, hope to take this approach to implement long-term institutional changes within a number of research organizations in the field of Biosciences, inspired by the principles of Responsible Research and Innovation (RRI). Based on the initial reflections and experiences of the project, some key recommendations were written and presented to research institution directors and managers, to their networks, and more generally to all researchers and stakeholders interested in these topics. These recommendations called for: the production and dissemination of knowledge on the science/society relationship and RRI institutional change; the exchange of knowledge and experience between research bodies, and between them and the Quadruple Helix actors; the strengthening of the exchange structures between research bodies and external actors; the development of the multi-, inter- and trans-disciplinary dialogue; the use of scientific knowledge in decision-making; the achievement of RRI impacts assessments and progress in the various contexts; and the scaling-up of knowledge and experience.

Under the ResBios Project, two policy briefs are planned as a way for the reflections and experience of the project partners to be utilized fully. Another document will be delivered by the end of the project. The first policy brief focuses on the importance of mutual learning during a period of profound and complex transformations in the relationship between science and society. Particular attention is attributed to mutual learning aimed at implementing Responsible Research & Innovation (RRI), or similar approaches, in the field of biosciences. The text is directed above all to research institution directors and managers, to their networks, and more generally to all researchers and stakeholders interested in reflecting on these topics, which have a strong impact on the meaning and effectiveness of their work.

1. The changing relationship between science and society

In contemporary societies we are witnessing a **decrease in the social prestige** of all institutions, which does not only concern political or religious ones but also affects **science**. This has led to a decline in people's trust, which in the case of science facilitates, the emergence of phenomena such as that of the anti-vax movements, misconceptions about Covid-19 or climate change scepticism. At the same time, the significance of science in social and economic life is paradoxically increasing, thanks to cutting-edge research affecting vital issues, such as those that address environmental, climate, food, or health issues that are currently being experienced in this period of global pandemics.

The paradox: decrease in social prestige of science and its increasing weight in society and economy

All this while **scientific research is affected by profound changes** impacting its structure and functioning (see box 1). These changes, which are leading to critical situations, difficulties and/or new opportunities, **are largely overlooked and poorly governed**. This lack of governance further affects the relationship between science and society of which it is an integral part.

Some ongoing transformations within science and in its relations with society

Box 1 - Some changes inside science

The **ongoing transformations** affecting science are not only changing its relations with other sectors of society but are also modifying its most basic and **intimate mechanisms**, related to the very production of "scientific knowledge". This is manifested through **phenomena** of different types and at times contradictory and co-present, such as for example: increasingly uncertain access to public resources and support, and a related hyper-competition; increasing effort in applied research while basic research is not funded adequately; fragmentation of science internal mechanisms;

the trend towards the "openness" of science, including also the implantation of citizen science practices; the increasing relevance of inter- and trans-disciplinarity; the tendency to favour stakeholder participation in research; weakening of the internal and external boundaries; high costs for publications and difficulties in fostering open access; unbalanced evaluation mechanisms paying attention to the number of publications; weakness to acknowledge the contribution of a number of scientific actors (especially young people), greater diffusion of scientific cooperation practices, etc.

Biosciences, due to their distinct characteristics, covers many topics that are of interest to much of society (from pandemics to the environmental crisis). The evolution of these subjects and their political, economic and social impact are **at the heart of the dynamics of change**. Genetics/genomics, agro-food, plant science, zoology, nature conservation, epidemiology, biochemistry or -technology, just to mention a few, are all fields where new legal, ethical, and social questions are constantly being raised. In general, continuously questioning all these issues often increases citizens' mistrust in science as they are subject to discussion in the public debate.

Biosciences are at the heart of this dynamics of change

2. The RRI institutional changes

In recent decades, various strategies have been developed on an international and European scale to manage these changes, such as Broader Impact, Smart specialization, Open science, and the Responsible Research & Innovation (RRI) approach, and all could **play a pivotal role in governing these dynamics**. RRI, in particular, regardless of any possible interpretation of it, is mainly a **governance approach** providing orientations for introducing new institutional solutions allowing research organizations to better face the changes (see box 2).

The governance of these changes and the RRI

Box 2 - The RRI approach in short

RRI can be interpreted as an **overarching policy strategy** to radically increase the intensity and quality of the interactions between scientific research and society. RRI aims to achieve a better alignment of **research and innovation** with the values, needs, and expectations of **society**. At the level of research institutions, RRI can activate structural processes able to profoundly modify their culture, values, rules and procedures in six **key areas**:

The RRI as a policy strategy

The RRI keys

- **Public engagement:** promoting the engagement of all societal actors within the research and innovation process, involving the researchers, citizens, policymakers, persons involved in business and industry (the so-called "Quadruple Helix");
- **Gender:** advancing gender equality within research institutions as well as within the design and content itself of research and innovation, to improve the quality of scientific research;
- **Education:** enhancing current educational strategies to provide future researchers and other societal actors with new capacities for taking responsibility in the research and innovation process and attracting children and youth to science;
- **Open Access:** making research and innovation transparent, free of charge and easily accessible online, without restriction;

- **Ethics:** ensuring that research and innovation respects fundamental rights and ethical standards, and shifting the view of research ethics away from a process of constraint to one of supporting high-quality research results.

Research **governance** is a further key area, in a certain sense transversal to the others: it is related to how the scientific community participates in the policymaking process, developing adequate RRI models which integrate all its keys.

RRI also implies a new *modus operandi*, that is characterized by **four dimensions**:

- **Anticipation** (envisioning the future development of research and innovation, including risks and opportunities)
- **Reflexivity** (capacity to keep control of their activities and knowledge)
- **Inclusiveness** (engagement of different stakeholders)
- **Responsiveness** (reaction and management of economic, environmental or societal consequences involved in new technologies/innovations).

The RRI dimensions

As witnessed by the several **RRI-oriented projects** carried out under the Horizon 2020 program, to better promote the principles of RRI with the current challenges, risks, and opportunities, it is essential to encourage RRI embedded **institutional changes** within research organizations as well as to improve the relationships between research actors and other political, business and civil society stakeholders. Simultaneous this has to happen within a broader societal context, where numerous geopolitical, historical, cultural and environmental factors play a part.

The RRI institutional changes within the research organizations and in their relations with other social actors

The **ResBios project** is also confronting this complex set of issues and their contexts (see box 3).

Box 3 - The ResBios Project

ResBios is embedding Responsible Research and Innovation-RRI- practices within four universities and research institutions in the field of Biosciences in four European countries (Croatia, Greece, Spain, Ukraine). This takes place through the implementation of 15 **RRI Grounding Actions**, to achieve sustainable institutional changes.

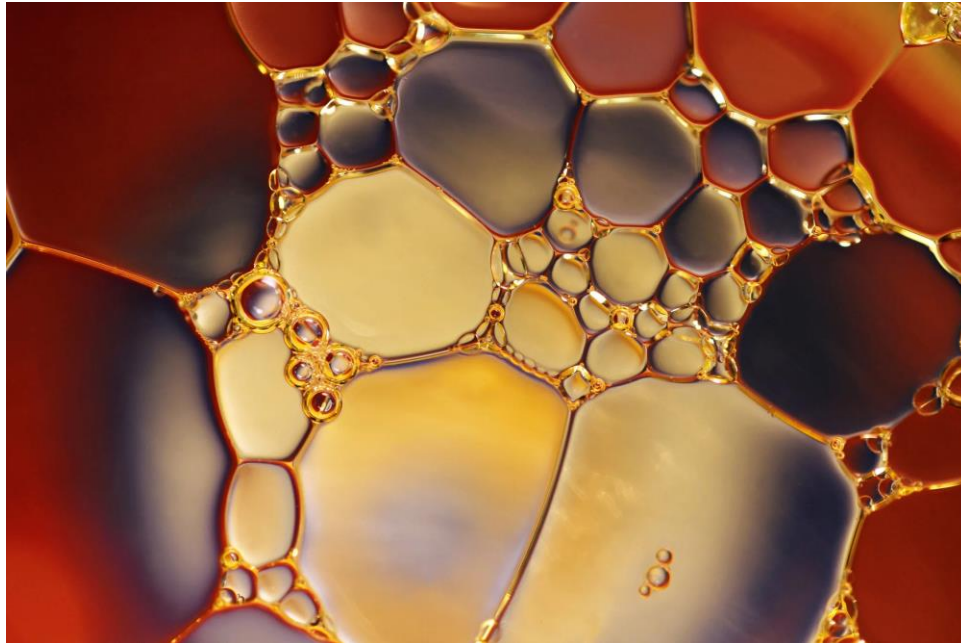
The Grounding Actions (GAs) are related to RRI keys and take into consideration the MoRRI indicators while being aligned with the Sustainable Development Goals. The project is focused on **biosciences**, which are one of the crossroads in the relationship between science and society.

The GAs have as their objects: experimenting and establishing informal education activities; promoting lifelong learning programmes; capacity building on RRI for university students and researchers; establishing cooperation and networks with schools; setting up a system of support for ethical principles in the biological investigation; developing open access and open innovation policies; setting up a system for fighting plagiarism and promoting ethical publishing behaviours; redefining research ethics, procedures and codes on biosciences emerging needs; assessing the current situation about gender at the university level; enhancing gender equality commitment within the research organization; promoting citizens engagement programs and citizen's empowerment in neighbourhoods.

The ResBios project in short

A further sui generis GA is the constitution of an **International network of responsible biosciences**.

In the ResBios' approach, the **four RRI dimensions** are both a tool to support the Grounding Actions and tools for governing the changing science /society relationship.



3. Mutual learning and the challenge of complexity

It is now well known that in the face of large and complex societal problems, it is necessary to **combine knowledge and energies of various kinds** and from various sources. This applies to major environmental (see global warming), energy, health or any other type of issues. For example, everyone can see the great enterprises of producing vaccines against COVID-19 within an extremely short time, making use of and openly sharing, on a global scale, the results of scientific research in this field. On this occasion, the need to regain trust in science among a large part of the population, and to find a new way of collaboration and knowledge exchange (not taken for granted, as we have seen) between scientists and decision-makers emerged in an equally evident way.

All that challenges researchers, decision-makers and stakeholders to find out new, faster and more effective ways to cooperate and co-create new solutions, thus making the most of the “**collective intelligence**” available. This implies a **continuous and shared understanding** of reality:

The need of a continuous and shared understanding of the complex problems

- “**continuous**” because everything changes rapidly and new phenomena always emerge, which are poorly understood and hence poorly managed;
- “**shared**” because no decision-maker, no single type of actor and no discipline can address the challenges alone.

In such a context, **mutual learning process is crucial**. The mutual learning approach is a response to the need to capitalize on existing knowledge and wisdom in the “**knowledge society**”, to address **complex problems** on a global and local scale.

The notion of **mutual learning** has been the subject of study and application in the scientific, political and organizational fields for several decades. It was therefore formalized and operationalized in different ways. In general terms, it can be viewed as an approach based on the **exchange of information and experiences** on a specific problem or set of problems, aimed at improving the capacity and quality of **response** of the involved actors. This requires an effort of **sharing, receptivity and internalization** on the part of the participants.

Mutual learning has a **problem-solving approach** and a specific multi-, inter- and **trans-disciplinary** characterization. For this reason, it has a strong **Open science** imprint and aims to integrate knowledge and experience produced in different **contexts**: within individual scientific disciplines, among disciplines and research actors and political, entrepreneurial, and civil society actors. It is also one of the ways in which European institutions promote the exchange and dissemination of information and good practices on certain issues to develop more relevant policies.

Mutual learning as a problem-solving, trans-disciplinary, open approach

When “mutual learning” is applied to projects which, like ResBios, deal with **RRI institutional change**, especially in a particularly sensitive and dynamic field such as that of **biosciences**, the key question is how to encourage exchange between the various scientific organizations, with a gradual involvement in the transformational process, of the “**Quadruple Helix**” actors (research actors, decision-makers, business and civil society organizations) in a process of **co-creation**.

Mutual learning as co-creation about RRI institutional change involving Quadruple Helix actors

To make this exchange more relevant and effective, mutual learning can:

- favour the **selection** of the vast amount of “global information” existing on the relationship between science and society and RRI institutional change;
- facilitate the **exchange** of knowledge and experience between the various stakeholders involved;
- support the actors involved, especially research organizations, to re-elaborate this global information and such knowledge and experiences, to transform it into **local “knowledge”**, which can persist over time.

Mutual learning, in this context, could mean to learn:

- how to **understand** a reality that changes in an often-elusive way;
- how to **share knowledge**;
- how to **guide choices**;
- how to produce a coordinated **impact**.

In this context, the **ResBios project**, still in progress, **aims to configure itself as a mutual learning environment**, including the four partners implementing Grounding Actions (GAs) as “RRI beginners”, supported and fostered by “RRI mentors”, that is research organizations having already promoted RRI institutional changes in the past. It is a real “**community of practice**”, which also includes the partners who carry out coordination, support, evaluation and dissemination activities and, gradually, the internal interlocutors of the various research institutions of the ResBios consortium, as well as the external stakeholders (i.e. those of the “Quadruple Helix”) (see box 4).

ResBios as a mutual learning environment

Box 4 - ResBios as a mutual learning environment

The GAs promoted by ResBios have a **transformative character**, connected with ongoing social dynamics (the relationship between science and society), and involve a **continuous process** of action, dialogue, discovery, reflection, learning, re-action and re-learning.

In this context, the **mentors** have the function of fostering a better understanding of RRI and institutional change to the “beginner” partners by presenting research and experiences at the European and international level. This will help the “beginners” to better identify risks and opportunities, formalize acquisitions together with them and to identify operational solutions.

Mutual Learning is carried out through the creation of permanent **working groups** on the RRI keys, a blog, three mutual learning workshops that mark the main steps of the project, internal evaluation activities, and other ad hoc initiatives.

Mutual learning is a tool to gradually promote greater **awareness** of the issues related to the implementation of RRI GAs, **empowerment** of the ResBios partners, a **reflection on the role of the researcher** within the relationship between science and society today.

Under the ResBios project, a plan to launch an International network for sustaining responsible biosciences will be developed, to help partner organisations continue and enhance their engagement with RRI.



Photo: ResBios project – First mutual learning workshop, October 2020

4. Some policy recommendations

The experience that has been gained throughout the ResBios project so far has given the project partners an opportunity to identify some policy recommendations for implementing RRI institutional change (in Biosciences and beyond). To be addressed to research institution directors and managers, as well as their networks. These recommendations request to **encourage and support**:

Policies to encourage and support...

- the production of **knowledge** on the current changes in science/society relationships and on the preconditions and functioning of the RRI institutional change at various levels (internal and external to research organizations);
- the **exchange** of knowledge, information and experiences between researchers and research organizations, in continuous interaction with the other actors of the Quadruple Helix;
- the **strengthening** of all internal and external structures of research organizations (library and information services, offices for international research, offices for relations with the territory, structures for technology transfer, science parks, museums, etc.) that can favour the accumulation and circulation of knowledge and information and the collaboration between research actors and other stakeholders, both on the local level and elsewhere;
- the promotion of **interdisciplinary, multidisciplinary and transdisciplinary dialogue**, to provide a foundation for mutual learning between actors from different disciplines or between the latter and those who in their extra-scientific environment have acquired different knowledge and skills;
- the identification of mechanisms for better production and use of knowledge for political **decision-making**;

knowledge

exchange

strengthening of structures

multi- and trans-disciplinary dialogue

decision-making

- the debate (above all on a European level) on how - and at what levels and in which contexts - to produce coordinated and common **impact and progress**, which are at the same time compatible to the different local realities; **RRI impacts**
- foster the **scaling-up** of experiences and knowledge through dissemination, networking, and scientific meetings at various levels. **scaling-up**

Main references

Argote, L. & Miron-Spektor, E. (2011). Organizational learning: From experience to knowledge, in *Organization Science*, Vol. 22 No. 5, pp. 1123-1137.

Bijker, W.E. & d'Andrea, L. (eds.) (2009). *Handbook on the Socialisation of Scientific and Technological Research, Social Sciences and European Research Capacities*, Rome: River Press Group.

d'Andrea L. & Marta F. (2020). *Starting the process. FIT4RRI Guidelines on governance settings for responsible and open science*, Project FIT4RRI, at: <https://fit4rri.eu/guidelines/> (accessed on: 12/4/2021)

Declich, A. & STARBIOS2 project partners (2020). *RRI implementation in bioscience organisations. Guidelines from the STARBIOS2 project*. Uppsala: Uppsala University (2020). Available at: <http://uu.diva-portal.org/smash/get/diva2:1396179/FULLTEXT01.pdf> (accessed: 12/4/2021)

de Jesus Ginja Antunes, H. & Gonçalves Pinheiro P. (2020), Linking knowledge management, organizational learning and memory, in *Journal of Innovation & Knowledge* 5, pp. 140-149.

Available at:

<https://reader.elsevier.com/reader/sd/pii/S2444569X19300319?token=014376C09626CCF11625B7B5D3D656784DCC6745DF27C2A735501B19F1FFEE549640C2AAA0B2A31767A34A73D5D33B4B&originRegion=eu-west-1&originCreation=20210414105055> (accessed: 14/4/2021)

Delaney, N. & Iagher, R. (2020), Institutional changes towards responsible research and innovation, EU Directorate-General for Research and Innovation. Available at:

<https://op.europa.eu/en/publication-detail/-/publication/582ef256-cbcc-11ea-adf7-01aa75ed71a1> (accessed: 12/4/2021)

European Commission, Directorate-General for Research and Innovation (2016). *Open innovation, open science, open to the world. A vision for Europe*. Available at: <https://op.europa.eu/en/publication-detail/-/publication/3213b335-1cbc-11e6-ba9a-01aa75ed71a1/language-en/format-PDF/source-141340199> (accessed: 14/4/2021)

Hansen, J.Ø., Jensen, A. & Nguyen, N. (2020). The responsible learning organization: can Senge (1990) teach organizations how to become responsible innovators?. *The Learning Organization*, Vol. 27, No. 1, pp. 65-74, DOI10.1108/TLO-11-2019-0164

Nowotny, H., Scott, P., Gibbons, M., & Scott, P.B. (2001). *Re-thinking science: Knowledge and the public in an age of uncertainty*. Cambridge: Polity.

Scholz, R.W. (2000). Mutual learning as a basic principle of transdisciplinarity. In: Scholz RW, Häberli R, Bill A, Welti W (eds) *Transdisciplinarity: Joint problem-solving among science, technology and society*. Workbook II: Mutual learning sessions. Zürich: Haffmans Sachbuch, pp. 13–17. Available at: https://www.researchgate.net/publication/258820049_Mutual_Learning_as_a_Basic_Principle_of_Transdisciplinarity_Transdisciplinarity_Joint_Problem-Solving_among_Science_Technology_and_Society (accessed: 14/4/2021)

Stilgoe, J., Owen, R., & Macnaghten, P. (2013). Developing a framework for responsible innovation. *Research Policy*, 42(9), pp. 1568-1580

von Schomberg, R. (2011). *Towards responsible research and innovation in the information and communication technologies and security technologies fields*. Brussels: European Commission, Directorate General for Research and Innovation

This document was written by Daniele Mezzana, in collaboration with the other members of the Coordination Team of the ResBios project (University of Rome - Tor Vergata), and the other Consortium partners: Aarhus University (Denmark), Agrobiointitute (Bulgaria), Consejo Superior de Investigaciones Científicas (Spain), Democritus University of Thrace - Department of Molecular Biology and Genetics (Greece), European Science Engagement Association (Germany), Knowledge & Innovation Srls (Italy), University of Lviv - Department of Biochemistry (Ukraine), University of Bremen (Germany), Univerza na Primorsken – Università del Litorale (Slovenia), Zagreb University - Faculty of Agriculture (Croatia), University of Gdansk (Poland)

Thanks to the ResBios advisors for the support and the feedback provided: Luiz Carlos Junior Alcantara, Wiebe E. Bijker, Ahmed Fahmi, Roman Gladyshevskii, Vasiliki Kiparaglou, Pavel Ovseiko, Maria S. Salvato, Luiz Zerbini.

For more information on the ResBios project: <https://www.resbios.eu/>

The information, documentation and figures in this deliverable are written by the ResBios project Consortium under EC grant agreement No 872146 and reflect only the authors' views and the agency is not responsible for any use that may be made of the information it contains.