



TWIN TRANSITION AND CHANGING PATTERNS OF SPATIAL MOBILITY: A REGIONAL APPROACH

MOBI-TWIN D4.1 ALIGNMENT OF MOBI-TWIN WITH RRI PRINCIPLES - FIRST

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Abstract	<p>This report presents the ways in which the MOBI-TWIN scope and aims will be aligned with the values, needs and expectations of society by incorporating the RRI principles (science education, gender equality, governance, open access, public engagement and ethics) throughout the project processes. It will map all the elements of the project that need to be aligned with the RRI principles and develop a set of KPIs that will be used to monitor the overall RRI dimension of the project.</p>
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EXECUTIVE SUMMARY

The report presents a conceptual and operational framework to assure the systemic acknowledgment and embedment of the Responsible Research and Innovation dimensions (anticipation, reflexivity, inclusion and responsiveness) and principles (science education, gender equality, governance, open science, public engagement, and integrity and ethics) in all the MOBI-TWIN activities from management through research and innovation to impact generation.

The framework builds on the systemic in-depth analysis of the nature of the MOBI-TWIN project and its workflow, and goes beyond the descriptions of entry points that were already identified at the proposal stage as follows:

- (i) meaningful investigation of citizens' perceptions and trade-offs in relation to spatial mobility and twin transition to encompass the ethical acceptability of technological and green developments;
- (ii) gender dimension and balance in all research activities of MOBI-TWIN (survey, workshops, analysis and impact assessment);
- (iii) collaborative and multi-actor participation (researchers, citizens, policymakers, industry, educators, etc.) for scenario building and policy recommendations;
- (iv) tailored communication and dissemination of project activities for better equipping citizens with the necessary knowledge to participate in research and innovation debates referring to spatial mobility and digital transition;
- (v) open-access to project results for addressing issues of accessibility to and ownership of scientific information (all activities); and
- (vi) acceptable and desirable research and innovation practices that are robust and adaptable to existing governance instruments,
- (vii) defining a monitoring approach to follow the embedment process with close engagement with the project partners and the application of specific Key Performance Indicators (KPIs).

This report will be updated at the end of the project (D4.2; M36) with the collection of experiences and results implementation of the framework and its impact.,

TABLE OF CONTENTS

1.	List of terms and abbreviations	7
1	Introduction.....	8
1.1	Document structure.....	9
2	Analysis of MOBI-TWIN through the RRI lens.....	10
2.1	Background.....	10
2.1.1	RRI principles and dimensions.....	10
2.1.2	Operationalisation of RRI in MOBI-TWIN.....	12
2.2	Structure of the analysis.....	12
2.2.1	Preliminary identification of project activities.....	12
2.2.2	Bilateral meetings with MOBI-TWIN partners.....	13
2.3	Main Learnings	14
2.3.1	RRI perceived as valuable	14
2.3.2	Awareness raising is necessary.....	14
2.3.3	Shifting the evaluation focus to the process.....	14
3	Conceptual and operational framework.....	16
3.1	Awareness raising.....	16
3.2	Discursive engagement with partners.....	17
3.3	Evaluation.....	18
4	Conclusions and Next Steps.....	20
5	References	21



LIST OF TABLES

Table 1: Mapping of projects activities and relevant RRI pillars	13
Table 2: Planned RRI informative sessions for the MOBI-TWIN consortium	16
Table 3: Bi-annual meetings' schedule	18
Table 4: Responsible Research and Innovation KPIs	18



1. LIST OF TERMS AND ABBREVIATIONS

EC	European Commission
DoA	Description of the Action
GA	Grant Agreement
GE	Gender Equality
KPIs	Key Performance Indicators
R&I	Research and Innovation
RRI	Responsible Research and Innovation

1 INTRODUCTION

According to the European Commission, Responsible Research and Innovation (RRI) "means that societal actors work together during the whole research and innovation process in order to better align both the process and its outcomes, with the values, needs and expectations of European society"[1] .

As of the original definition RRI has six pillars:

- inclusive citizen engagement,
- gender equality,
- ethics and integrity,
- open access (open science),
- science education and governance,

and four dimensions:

- anticipation (to ask 'what if' early enough), (trans-disciplinary and inclusive),
- reflexivity (holding a mirror up to one's own activities, commitments and assumptions, being aware of the limits of knowledge),
- inclusion (there should also be room to question the framing assumptions of the participation processes themselves),
- responsiveness (a capacity to change shape or direction in response to stakeholder and public values and changing circumstances),

These four dimensions sometimes are extended to six dimensions, complementing the complex with the concept of

- openness and transparency (making involved interests and the framing more explicit) and
- accountability (for decisions).

Research and innovation actors have to anticipate and assess the potential consequences and implications regarding their R&I, aligning the scientific and technical development with the values and needs of society, the concept of RRI is applied to encourage researchers and innovators to think about the public benefits of science- and technology-based research.

It is a continuously evolving concept with ongoing debates about its impactful implementation e.g.: operationalisation.

RRI offers to face challenges by engaging all actors from researchers and innovators to governments and citizens through inclusive and participatory methodologies. In order to ensure the highest level of efficiency, participation takes place at all stages of the process and at all levels of R&I governance from programme planning, through design, implementation, and evaluation. This way research and innovation processes address societal challenges aligned with the values, needs and expectations of the general public. This is not simply an ethical or societal issue, but it improves scientific production, diversifying research programmes, and considers the complexities of the real world.

MOBI-TWIN is dedicated to applying the RRI concept in its entirety throughout the whole project to ensure contribution for solving actual societal problems.

1.1 DOCUMENT STRUCTURE

This deliverable (D4.1) outlines the framework for embedding RRI into MOBI-TWIN's activities as part of Task 4.1 - "Align MOBI-TWIN's scope and aims with the values, needs and expectations of society using RRI principles". As this task has a horizontal presence across the project for the effective embedment of the RRI principles, the scope of this deliverable spans over all the work packages.

The deliverable is divided into four sections:

- Section 1: introduces the concept of RRI and elucidates the benefits of its integration into the R&I process.
- Section 2: describes the background of the RRI analysis within MOBI-TWIN, detailing the chosen methodological approach and highlighting the main learnings.
- Section 3: articulates the conceptual and operational framework devised for aligning the integration of RRI into the project's activities.
- Section 4: outlines the main conclusions and next steps of task 4.1.

2 ANALYSIS OF MOBI-TWIN THROUGH THE RRI LENS

2.1 BACKGROUND

Spatial mobility is a grand societal challenge. As all societal challenges, it will have a better chance of being tackled if all societal actors at least as of the quadruple, but optimally the quintuple helix formulation are engaged in the definition of its driving forces, the factors that shape its flows and its consequences.

In this view, MOBI-TWIN puts the societal dimension of spatial mobility at the core of its research activities, and thus, it invests on aligning project's activities with all the RRI principles for achieving a higher and more meaningful stakeholder engagement throughout its stages and outputs, outcomes and impacts that respond as much as possible with the needs of society. In order to achieve this, RRI needs to be systemically embedded in all project activities through a concerted mainstreaming of all RRI dimensions and principles via the project (governance) structure, driven by the dedicated WP4 task and action lines, though a flexible framework that allows the continuous adjustment of the concept to the outcomes and conclusions of the regular discursive engagement of all the project actors.

2.1.1 RRI PRINCIPLES AND DIMENSIONS

Research and innovation (R&I) address societal challenges, therefore has to be aligned with the values, needs and expectations of society. *Responsible* Research and Innovation is an approach that helps to better align the goals and outcomes of research with the *needs of society and to address societal challenges in a sensible way*. The 5 + 1 pillars defined to provide a framework to assure these much-needed alignments are as follows:

2.1.1.1 GENDER EQUALITY

R&I ecosystems are characterized by diverse structural barriers to gender equality and specific actions are needed to overcome persisting gender gaps and inequalities.

The goal is to improve the European research and innovation system, create gender-equal working environments where all talents can thrive and better integrate the gender dimension in projects to improve research quality as well as the relevance of the knowledge, technologies and innovations produced to society.

As of the newest developments, however, gender+ approaches are more appropriate to provide for complex societal needs and can provide an important starting point for further broadening the scope of gender equality actions. According to the recommendations of the European Commission's DG RTD [2], developing inclusive approaches to gender equality in R&I settings is an opportunity to recognise the interrelationship between different forms of discrimination that may stem from the intersection of gender with race and ethnicity, sexual orientation, disability, as well as socio-economic background.

2.1.1.2 RESEARCH ETHICS AND INTEGRITY

Research ethics is a vital issue in R&I ecosystems. Research offers endless and unquestionable benefits when it is conducted in an honest and reputable manner: it advances scientific knowledge, thereby contributing to social improvement and/or wellbeing. It is therefore of paramount importance to promote a scientific culture based on integrity or an honest scientific culture that guides both individual and collective actions. Research ethics and the governance of ethics, particularly the implementation of instruments such as codes of good practices or ethics committees, are especially important in this context [3].

2.1.1.3 PUBLIC/CITIZEN ENGAGEMENT

Public/Citizen engagement encourages 'partnerships' fostering shared responsibility within the context of a human-centric approach to R&I as developing solutions to problems by involving the human perspective in all development stages.

The European Commission (2020) argues that 'Public Engagement is about co-creating the future with the public and civil society organisations, and also bringing on board the widest possible diversity of people that would not normally interact on matters of science and technology [4].

2.1.1.4 SCIENCE EDUCATION

Research and innovation are powerful tools to shape the future and change society. Science education, therefore, has an important role to show what scientists do, how they work, how they innovate and make decisions. It is especially important that R&I goals are aligned with the values, needs and expectations of society, which cannot function without the establishment communication pathways to inform societal actors about scientific advances and their lack, along with all positive and potentially negative attributes, stimulating their engagement in R&I ecosystems and decisions with the potential of shaping their own future.

2.1.1.5 OPEN SCIENCE

Open science is a policy priority for the European Commission and the standard method of working under its research and innovation funding programmes as it improves the quality, efficiency and responsiveness of research.

When researchers share knowledge and data as early as possible in the research process with all relevant actors it helps diffuse the latest knowledge. And when partners from across academia, industry, public authorities and citizen groups are invited to participate in the research and innovation process, creativity and trust in science increases [5].

2.1.1.6 GOVERNANCE

In the context of RRI, governance refers to any form of coordination designed to foster and mainstream RRI in any system, structure and/or in the interaction with other stakeholders [6]. Governance of RRI is based on 4 (+2) dimensions [7]:

- **Anticipation** refers to the capacity of envisioning the outcomes of the processes of research and innovation and understanding how current dynamics help design the future in order to prevent risks and to lead research to desirable impacts.
- **Reflexivity** is mainly seen as the capacity of the research system to keep control of its own activities and assumptions, to be aware of the limits of the knowledge produced as well as to reflect on values and beliefs connected with research and innovation. Reflexivity is linked to public dialogue and collaborative approaches in science.
- **Inclusion** mainly refers to the engagement of different stakeholders from the early stages of research and innovation to give voice to all the concerned interests, values, needs, and beliefs.
- **Responsiveness** concerns the capacity to develop proactive management of new technologies so as to identify risks and develop an ethically adequate response. Responsiveness also relates to transparency (responses should be open to public debate) and accessibility (scientific results about risks and responses should be openly accessible to everyone).

and **Openness and transparency** and **Accountability** that speak for themselves.

2.1.2 OPERATIONALISATION OF RRI IN MOBI-TWIN

RRI is not just about better science from a scientist's point of view, but the process of embedding the responsibility of science to society into all processes of research and innovation actions. In addition to working along its pillars, it concerns a continuous effort to engage diverse societal actors in the research process through meaningful conversations.

2.2 STRUCTURE OF THE ANALYSIS

The RRI analysis of the MOBI-TWIN project consisted of two main steps: 1, the preliminary identification of project activities that may be considered as entry points based on the GA, specifically part (pg. 24-25) , and as of setting the foundation of a continuous discursive engagement with all the partners, WP and tasks leads in the project; 2., bilateral meetings with the MOBI-TWIN partners that primarily served as eye opener about the RRI principles and dimensions, why they are important for the project and some ideas how to systemically hook them to the project impact vision and correspondingly to the concrete steps in the MOBI-TWIN workplan.

These steps are further described below.

2.2.1 PRELIMINARY IDENTIFICATION OF PROJECT ACTIVITIES

An in-depth analysis of the MOBI-TWIN Grant Agreement (DoA), and the presentation of the partners at the KoM, and following project meetings were conducted in order to pre-

identify the RRI principles and dimensions (or some correlated features/attributes which are not the entire pillars and dimensions) potentially suitable to be integrated into WPs, tasks and activities.

Consequently, the project activities were reorganised into eight clusters based on similar characteristics conducive to the incorporation of RRI dimensions. Table 1 summarises this categorisation and depicts the RRI dimensions relevant for each cluster.

Table 1: Mapping of projects activities and relevant RRI pillars

Type of activities	Tasks	Relevant RRI pillars
Mapping	T1.1; T2.1; T2.2; T4.2	Public engagement; Ethics; Gender Equality; Open Science
Data gathering and analysis	T1.2; T1.3; T1.4	Public engagement; Ethics; Gender Equality; Open Science
Development typologies & index	T2.3; T2.4	Gender Equality; Open Science
Modelling and scenario development	T3.1; T3.2; T3.3; T3.4	Gender Equality; Open Science
Stakeholder engagement and policy recommendations	T4.3; T4.4; T5.1	Public engagement; Ethics; Gender Equality; Open Science
Communication and dissemination	All WP5 tasks;	Gender Equality; Public Engagement; Open Science
Data management and Ethics	T5.4; T6.2; T6.5; All WP7 tasks	Ethics; Open Science
Project management	All WP6 tasks	Gender Equality; Open Science; Governance

This table served as a base for the preparation of the bilateral meetings held with each project partner as described in the subsequent section.

2.2.2 BILATERAL MEETINGS WITH MOBI-TWIN PARTNERS

In order to gain a comprehensive understanding of the complexities of the activities of each partner and jointly assess the opportunities for integrating RRI principles into their design, bilateral meetings were organised with MOBI-TWIN partners during M5 and 6 of the project. During these meetings, the project tasks were discussed in terms of their aims,

organisation, link to other tasks and their impact potential, along with the provision of eye-opening examples and theoretical background information related to the RRI principles and dimensions. These meetings also served to validate the preliminary identification of RRI dimensions and understand better the viable approaches for their gradual embedment. The key insights of these two steps are summarised in the next section "Main learnings".

2.3 MAIN LEARNINGS

The RRI analysis led to three key insights:

2.3.1 RRI PERCEIVED AS VALUABLE

Consistent with the proposal preparation stage, MOBI-TWIN partners demonstrated keen interest and commitment to the in-depth understanding and the systemic embedment of RRI principles in MOBI-TWIN. More specifically, RRI was recognised to added value to the research process especially in the interface of science and society and in terms of responsibility of science to society that is one of the main impact potentials of the MOBI-TWIN project and, as a consequence, the importance of its systemic accommodation in all project process and outputs and outcomes was naturally acknowledged. **This general overarching acceptance of RRI shall facilitate the integration of the dimensions into various facets of the project:** spanning from task activities and project management to the ways of working of the consortium members.

2.3.2 AWARENESS RAISING IS NECESSARY

Despite the general acceptance outlined earlier, **a gap between the theoretical comprehension of the RRI principles and dimensions and the ability to translate this understanding into feasible steps of implementation remains a visible challenge.** In order to tackle this gap, the following steps need to be made:

- regular discussions with the support of concrete examples,
- the continuous assisted analysis of the project processes for potential entry points in the research and related activities,
- systematic awareness-raising activities within the RRI framework.

2.3.3 SHIFTING THE EVALUATION FOCUS TO THE PROCESS

The discursive engagement with MOBI-TWIN partners is key for the mutual understanding of the practical application of the RRI principles within the project activities. This collaborative approach, considered very relevant during task preparation, will continue throughout task implementation and assessment. This does not only enhance the contextualisation of the actions, a critical factor for effective transformative change, but it also leverages the knowledge and experiences from the tasks leaders while fostering a sense of ownership.



Therefore, the monitoring approach necessitates a shift in the focus of evaluation, moving away from the traditional emphasis on measuring outcomes through KPIs, to including activities that facilitate the exchange with the MOBI-TWIN partners. This dual approach aims to track progress with objective indicators while providing an opportunity to establish a platform for articulating values and their underlying rationale with the MOBI-TWIN partners.

3 CONCEPTUAL AND OPERATIONAL FRAMEWORK

Mainstreaming RRI in the MOBI-TWIN project will not only entail that the RRI pillars will be embedded in the project activities, but also that the ways of working in the project will follow the RRI dimensions of inclusiveness, transparency, reflexivity, and adaptability.

Operationally, the framework is based on three main action lines that will run in parallel:

1. Raising awareness for MOBI-TWIN consortium and beyond
2. Monitoring the process through discursive engagement with project partners
3. Formative and summative evaluation through narratives and tailored KPIs

3.1 AWARENESS RAISING

The main objective of this action line is to equip participants with the knowledge and skills necessary to incorporate RRI principles effectively to their tasks. This will be ensured by the organisation of brief informative sessions at the project meetings and/or additional short webinars.

Cornerstone topics will be identified to begin with, which may then be complemented by additional points if further needs are identified (see Table 2). These informative sessions will provide a solid background knowledge on the specific topic and promote a guided discussion within the partners about concrete and practical implications for their tasks, as a way of mutually learning and consolidating the learnings.

In addition, other complementary resources will be provided to the partners, such as: guidelines, checklists, videos, or repositories.

Regular assessment of the effectiveness of the awareness-raising activities will be done through the collection of partners' feedback collected at the Consortium monthly meetings. The planning of future activities will be based on the insights gained to ensure continuous improvement and alignment with the evolving needs of the MOBI-TWIN project consortium.

Table 2: Planned RRI informative sessions for the MOBI-TWIN consortium

Theme	Topics	Estimated date & format
Gender and Intersectional analysis	<p>Main concepts of Gender Equality and Intersectionality</p> <p>Intersectionality in surveys: from survey design to data analysis</p>	14-15 Dec 2023 (M7) – in person in the frame of the Semester meeting at Groningen
Public Engagement	<p>Inclusive stakeholder engagement definition</p> <p>Identifying and engaging vulnerable groups</p> <p>Citizen Science (CS) as a research methodology and types of approaches</p>	M12-M14 – in person in the frame of the Semester meeting
Research Ethics	To be defined in collaboration with WP7	M18-M20 – in person in the frame of the Semester meeting
Open Science & Science education	To be defined in collaboration with WP5	M24-M26 – in person in the frame of the Semester meeting
Governance	To be defined in collaboration with WP6	M30-M32 – in person in the frame of the Semester meeting

3.2 DISCURSIVE ENGAGEMENT WITH PARTNERS

Discursive engagement goes beyond one-time interactions; it embraces an iterative process that supports continuous improvement and adaptability of the RRI framework. This action line aims to cultivate an environment of open exchange among MOBI-TWIN partners, encouraging partners to share their plans, experiences, ideas and concerns in the integration of RRI into their activities. The discursive engagement serves as the linchpin of the implementation and monitoring strategies within the framework, providing a detailed narrative that elucidates the process of embedding RRI principles and dimensions in the project.

Towards this objective, bi-annual meetings will be held with the consortium partners to provide specific and practical guidance on the integration of RRI into their activities and to

collect feedback on the process (Table 3). In addition, these meetings will serve for evaluation purposes (see formative evaluation in section 3.3), and whenever needed, will also contribute to the development of specific KPIs covering the new activities. After each of the bi-annual meetings, a brief report will be produced summarising the main topics discussed and future actions,

Further, additional meetings and conversations may be organised in response to emerging challenges and needs.

Table 3: Bi-annual meetings' schedule

Meeting #	Date	Format
1	Oct-Nov 2023 (M5-6)	Online
2	Apr-May 2024 (M11-12)	Online
3	Oct-Nov 2024 (M17-M18)	Online
4	Apr-May 2025 (M23-M24)	Online
5	Oct-Nov 2025 (M29-M30)	Online
6	Mar-Apr 2026 (M34-M35)	Online

3.3 EVALUATION

The evaluation of the embedment of RRI principles and dimensions in the MOBI-TWIN process is inspired by the complex of formative and summative evaluation, therefore will be effectively carried out by the regular collection of KPIs complemented by the narratives based on discursive engagement with the partners (as described in section 3.2).

The formative part of the evaluation will provide regular feedback (narrative) and data for the already identified KPIs along the project implementation to further finetune the MOBI-TWIN RRI framework to ensure the achievement of the intended objective. The summative part of the evaluation will then provide feedback on the overall effectiveness of the framework implementation at the end of the project in the frame of Deliverable 4.2.

In the context of RRI, KPIs refer to measurable criteria used to assess the effectiveness and progress of integrating RRI principles and dimensions into research and innovation activities. The collaborative efforts of the EU-funded RRI project SUPER MoRRI and its Evaluation ecosystem resulted in the creation of a comprehensive and updated monitoring system for RRI inbuilding the evaluation experience of a plethora of RRI projects. Leveraging these results, KPIs were identified to monitor the outcomes of embedding the RRI principles within the eight clusters of activities identified in Section 2.

Table 4: Responsible Research and Innovation KPIs

Type of activities	Indicators:
Mapping	<ul style="list-style-type: none"> ● Intersectional variables considered when mapping mobility flows ● Vulnerable populations and gender considered when mapping EU policies
Data gathering and analysis	<ul style="list-style-type: none"> ● Intersectional variables added to the survey ● Gender disaggregated data of the respondents ● Number of views of the open dataset
Modelling and scenario development	<ul style="list-style-type: none"> ● Number of views of the model (open repository) ● Intersectional variables considered for the model ● Inclusive engagement of stakeholders
Stakeholder engagement	<ul style="list-style-type: none"> ● Identification of actors / stakeholders who should be informed about the results / outcomes of the project ● Intersectional dimensions taken into consideration when inviting stakeholders ● Communication strategy / dissemination plan to brief involved actors/stakeholders meaningfully (catered to needs and characteristics) about results/outcomes. ● Stakeholder engagement experiences transformed into input relevant for future engagement activities
Communication and dissemination	<ul style="list-style-type: none"> ● Communication strategy / dissemination plan to brief involved actors/stakeholders meaningfully (catered to needs and characteristics) about results/outcomes. ● Number of open access publications ● Communicate outcomes in gender-sensitive (non-stereotype-reinforcing) manner. ● Factsheets with project results addressing general public
Data management and Ethics	<ul style="list-style-type: none"> ● Number of consultations received by the Ethics Advisor ● Privacy policy included when gathering personal data
Project management	<ul style="list-style-type: none"> ● Number of institutions with a GEP ● GEP repository ● Gender disaggregated information of the MOBI-TWIN teams

4 CONCLUSIONS AND NEXT STEPS

In conclusion, this deliverable outlines a comprehensive approach to align the MOBI-TWIN project with the RRI principles and dimensions, ensuring that its scope and aims are in harmony with the values, needs, and expectations of society. The report serves as a dynamic guide for the project partners, emphasizing the importance of ongoing dialogue, adaptability, and a shared commitment to responsible and inclusive research and innovation.

The analysis of MOBI-TWIN through the RRI lens reveals key insights, including the perceived value of RRI, the need for awareness-raising among partners, and the importance of shifting the evaluation focus to the process.

The proposed framework for mainstreaming RRI in MOBI-TWIN involves three main action lines: awareness raising, discursive engagement with partners, and monitoring outcomes through formative and summative evaluation and KPIs. This structured approach aims to ensure that RRI is not just embedded in project activities but also becomes an integral part of the project's ways of working.

The planned informative sessions on gender, public engagement, research ethics, open science, and governance further underscore the commitment to continuous learning and improvement. The use of KPIs, tailored to specific activities, will provide a measurable way to assess the effectiveness and progress of RRI integration.

As MOBI-TWIN progresses, this framework will be refined and updated based on the experiences and results obtained during the implementation of RRI principles.

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