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## Responsibility-by-design - Guidelines to develop long-term strategies (roadmaps) to innovate responsibly

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## Foreword

This CEN Workshop Agreement (CWA 17796:2021) has been developed in accordance with the CEN-CENELEC Guide 29 “CEN/CENELEC Workshop Agreements – A rapid prototyping to standardization” and with the relevant provisions of CEN/CENELEC Internal Regulations - Part 2. It was approved by a Workshop of representatives of interested parties on 2021-04-21, the constitution of which was supported by CEN following the public call for participation made on 2019-06-27. However, this CEN Workshop Agreement does not necessarily include all relevant stakeholders.

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## Introduction

Responsible research and innovation (RRI) addresses the development of products and processes that are safe, ethically acceptable, and responsive to the needs and expectations of people and society.

The essential difference between RRI and existing practices regarding corporate social responsibility (CSR), responsible business conduct, risk, and quality management is RRI's focus on the research and innovation (R&I) process, from the early stages to prototyping to going to market, and the high degree of societal involvement RRI requires to assess potential (future) ethical and social impacts of innovation. The goal of RRI is to design and develop innovations that have socially desirable outcomes, thus addressing specific ethics and social concerns and providing solutions for acknowledged societal challenges (e.g., sustainable development goals). Some examples are provided in the Annex III.

The ability to translate technological developments into innovations that generate benefits and value for the organization and its shareholders and stakeholders and for society is a core aspect of RRI.

Initiatives to put RRI into practice in industry, for instance in the form of action plans, are still limited, with most being related to cooperative projects within EU framework programmes or national equivalents. Examples include Horizon 2020's SwafS (Science with and for Society) projects such as Responsible Industry, Compass, SMART-map, Liv-In, Orbit, Satori, Sherpa, Sienna, and TechEthos.

However, it's worth noting that principles and approaches related to RRI have elements in common with acknowledged business and innovation management methods and practices, such as theory of change, business model generation, stakeholder management, design-thinking, and agile management.<sup>1</sup>

The guidelines offered here were developed by the PRISMA project,<sup>2</sup> which worked with eight industrial pilot projects dealing with the application of transformative technologies in different sectors. The pilots were used to integrate RRI principles in the participating companies' strategies and actions in order to improve the societal value and overall performances of their R&D (research and development) outcomes and to develop specific "pilot RRI roadmaps".

For an effective RRI uptake, it is essential for companies to identify strategies and practices that fit within the realities and constraints in which they operate. The roadmap described in these guidelines aims to help them do just that. The overall goal is to help strengthen aspects of responsibility all along the research, development, and design process for innovations and thus to support a "responsibility-by-design" approach.

Besides helping to identify a vision, a set of actions, and a timeline (roadmap) for implementing RRI approaches, this guideline also analyses the potential barriers, opportunities, and benefits in pursuing RRI.

Within this guidance, we understand research and innovation as intertwined: research (besides its role of creating knowledge) has an applied character and is oriented towards innovation, with the final goal of generating both economic and societal value.

At the industry level, technology roadmapping is already a quite widely utilized method in strategy planning. A technology roadmap visualizes an organization's strategic aims (vision/development plans) and can be utilized to structure its research, development, and business activities. In recent years, the concept of IPRM (innovation policy roadmapping methodology) has been developed to connect the development of technologies and innovations to a wider societal sphere.<sup>3</sup> A main aspect of IPRM is identifying those societal needs that create a potential demand for new solutions and possibly favour the emergence of new products and markets.

<sup>1</sup> A description of the relevance of these methods for RRI is provided in Dreyer et al., 2017.

<sup>2</sup> The PRISMA project received funding from the EU's Horizon 2020 research and innovation programme (grant agreement No. 710059). More information is available on the PRISMA website: [www.rri-prisma.eu/](http://www.rri-prisma.eu/)

<sup>3</sup> Ahlqvist, T., Valovirta, V., & Loikkanen, T. (2012). Innovation policy roadmapping as a systemic instrument for forward-looking policy design. *Science and Public Policy*, 39(2), 178–190

IPRM integrates a foresight exercise into enabling technologies, applications, products, and markets with analysis of socio-economical and sectorial drivers and policy and regulatory tools and strategies.

The RRI roadmap proposed in this guideline adapts a generic IPRM architecture to the definition of long-term visions and action plans for RRI uptake within the innovation strategies of organizations and others agents (e.g., cooperative projects) active in research and innovation. It provides the methodological and technical conditions to address RRI principles in the context of rapid (and possibly disruptive) scientific and technological developments to ensure such developments are relevant to society.

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## 1 Scope

This document provides guidelines to develop long-term strategies (roadmaps) for innovating responsibly, thereby helping organizations to achieve socially desirable outcomes from their innovation processes.

These roadmaps encourage a “responsibility-by-design” approach that integrates considerations of technical, ethical, social, environmental, and economic aspects all along the research, development, and design process leading to an innovation.

The document aims at all organizations and agents involved in planning and performing research and innovation and technological development.

The focus is on innovation enabled by transformative technologies.

This document has been designed to be consistent with, and to support, as much as possible, existing management system standards and management/governance standards (e.g. EN ISO 9001). Particular attention has been given to social responsibility (i.e. EN ISO 26000).

## 2 Normative references<sup>4</sup>

The existing management standards and normative references used in this document are listed below. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN ISO 26000, Guidance on social responsibility

ISO 31000, Risk management – Guidelines

ISO 45001, Occupational health and safety management systems – Requirements with guidance for use

EN ISO 14001, Environmental management

EN ISO 9001, Quality management systems – Requirements

Series CEN/TS 16555, Innovation management

Series CWA 17145, Ethics assessment for research and innovation

IWA 26 Using ISO 26000:2010, in management systems

UNI/PdR 27, Guidelines for management and processes development for responsible innovation

UNI/PdR 18, Social responsibility in organizations – Guidance to the application of UNI ISO 26000

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<sup>4</sup> These standards and guidelines (in their scope and contents) refer to and can be used to contribute to the UN's Sustainable Development Goals. This document also takes into account the Rome Declaration on Responsible Research and Innovation in Europe (European Union, 2014). In addition, it recognizes the need to consider efforts towards responsibility in research and innovation within the broader framework of corporate sustainability, responsible business, and sustainable finance practices (UN Global Compact: [unglobalcompact.org](http://unglobalcompact.org)), though these aspects are not explicitly addressed within the scope of this guidance.

EN ISO 56000, Innovation management – Fundamentals and vocabulary

EN ISO 56002, Innovation management – Innovation management system – Guidance

### 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

#### 3.1

##### **context of the organization**

combination of internal and external issues that can have an effect on an organization's approach to developing and achieving its objectives.

Note 1 to entry: The organization's objectives can be related to its *products* and *services*, investments and behaviour towards its *interested parties*.

Note 2 to entry: The concept of context of the organization is equally applicable to not-for-profit or public service organizations as it is to those seeking profits.

Note 3 to entry: In English, this concept is often referred to by other terms such as "business environment", "organizational environment", or "ecosystem of an organization".

Note 4 to entry: Understanding the *infrastructure* can help to define the context of the organization.

[SOURCE: ISO 9000:2015 Quality management systems -- Fundamentals and vocabulary]

#### 3.2

##### **corporate social responsibility (CSR)**

a concept whereby companies integrate social and environmental concerns in their business operations and in their interaction with their stakeholders on a voluntary basis", as well as "the responsibility of enterprises for their impacts on society.

[SOURCE: European Commission, 2011].

#### 3.3

##### **documented information**

information required to be controlled and maintained by an organization and the medium on which it is contained.

Note 1 to entry: Documented information can be in any format and media, and from any source.

Note 2 to entry: Documented information can refer to:

- the management system, including related processes;
- information created in order for the organization to operate (documentation);
- evidence of results achieved (records).