Routledge
Taylor & Francis Group

Journal of Responsible Innovation

ISSN: (Print) (Online) Journal homepage: www.tandfonline.com/journals/tjri20

The 'urgencies' of implementing an RRI approach in EU-funded law enforcement technology development: between frameworks and practice

Stergios Aidinlis

To cite this article: Stergios Aidinlis (2025) The 'urgencies' of implementing an RRI approach in EU-funded law enforcement technology development: between frameworks and practice, Journal of Responsible Innovation, 12:1, 2390198, DOI: 10.1080/23299460.2024.2390198

To link to this article: https://doi.org/10.1080/23299460.2024.2390198

JOURNAL OF RESPONSIBLE INNOVATION
2025, VOL. 12, NO. 1, 2390198
https://doi.org/10.1080/23299460.2024.2390198

Routledge
Taylor & Francis Group

RESEARCH ARTICLE

OPEN ACCESS Check for updates

The 'urgencies' of implementing an RRI approach in EU-funded law enforcement technology development: between frameworks and practice

Stergios Aidinlis

Durham Law School, Durham University, Durham, UK

ABSTRACT

RRI aspirations are complicated by two kinds of 'urgency' in the field of EU-funded security research: the timeframe and requirements for such technologies often present researchers with 'urgency' due to the sensitive nature of the security domain and it is 'urgent' for building societal trust in security technology that RRI approaches shall be introduced and effectively implemented in the lifecycle of developing such technologies. Drawing on experience from an H2020-multidisciplinary project, this article presents the gap between the top-down formal frameworks and bottom-up practice of designing and implementing RRI approaches under conditions of 'urgency' and time pressure. In the case of EU-funded security research, it is argued, there are still significant practical challenges which hinder the effective implementation of RRI approaches, potentially limiting the extent to which such approaches deliver meaningful impact. The paper reflects on these challenges, as well as on potential strategies to overcome them in the future.

ARTICLE HISTORY
Received 23 May 2023
Accepted 5 August 2024

KEYWORDS
RRI; security; RRI implementation; data-driven research; urgency

Introduction

In December 2021, the General Court of the Court of Justice of the European Union was called to adjudicate upon the lawsuit of a German Member of the European Parliament who claimed that an EU-funded security research project using 'lie detection' technologies for border control purposes breached the fundamental rights of EU citizens (Breyer 2021). The Court held that both the project and the European Commission had not sufficiently considered the 'public interest in the democratic oversight of the development of surveillance and control technologies' (EDRI 2021), ordering them to provide public access to more information about the legal, ethical and societal impacts of the technology. More than a decade ago, in 2010, another security research project using AI technology to identify 'abnormal behaviour' in public spaces triggered intense debates in the European Parliament about the 'secrecy' of EU-funded research

CONTACT Stergios Aidinlis s.aidinlis@keele.ac.uk PCL 132-3, The Palatine Centre, Stockton Rd, Durham DH1 3LE

and the adequacy of its ethics oversight (Galdon-Clavell 2021). Arguably, security research has not provided us with the best success stories for the RRI enterprise.

As we are currently in the midst of the Ninth Framework Programme – Horizon Europe (2021–2027) in the context of EU-funded research (Richard Owen, von Schomberg, and Macnaghten 2021), this paper contributes to the emerging literature on RRI implementation in real-world research environments (Mejlgaard, Bloch, and Madsen 2019; Schuijff and Dijkstra 2020; Tabarés et al. 2022). It starts from the pragmatist premise that the conceptual framework of RRI should be translated in actual, practicable and accessible implementation measures, the effectiveness of which in realising RRI's aims shall be transparent and measurable (Mejlgaard, Bloch, and Madsen 2019). This is by no means an uncontested premise: some of the most influential authors in this field have argued against it, urging us instead to envisage RRI as a 'site for ongoing debate, contestation and negotiation about science, technology, innovation, society and responsibility' with a view to preserving its critical character as a political project (Richard Owen, von Schomberg, and Macnaghten 2021). Yet, the fact remains that RRI practitioners continue to seek guidance for implementing the approach in practice, often being unsure about what it entails and requires from them (Novitzky et al. 2020). Empirical investigation of how RRI is perceived and practiced in real-world environments, however, is still underexplored compared to the conceptual development of the frameworks (Wiarda et al. 2021). Especially narrative accounts by current or former RRI practitioners are missing from the literature.

The paper proceeds from the articulation of RRI in formal research frameworks and presents the difficulties in its institutionalisation in real-world environments according to existing literature findings. Then, it introduces the specific context of security research, unpacking the *two senses of* '*urgency*' that are relevant when it comes to implementing an RRI approach in the development of cutting-edge law enforcement-related technologies. The pressures relate to the sensitive nature of the security domain and the need for RRI due to the lack of transparency regarding the ethical and lawful use of security technologies. Then, the paper draws on the author's personal experience and observations as an RRI practitioner in a Horizon2020 law enforcement technology development research project, i.e. DARLENE ('DARLENE Project' 2022), to take a deep dive into the implementation of RRI in this neglected type of research for RRI literature purposes. In this area, I argue, there is significant distance from principle to practice, that is from the formalised provisions in the Horizon framework to the day-to-day undertaking of research duties under the circumstances of 'urgency' and time pressure in security research projects. While significant steps have been made to formalise key pillars of RRI, there are still significant practical challenges which hinder the effective implementation of RRI approaches in practice. Drawing connections with relevant difficulties faced by researchers in other areas, the DARLENE approach in implementing RRI is presented, and reflections are made on the challenges, as well as on potential strategies to overcome them in the future.

RRI in the formal frameworks: Horizon2020 and Horizon Europe

RRI is relevant and its adoption is significant beyond specific funded schemes. In fact, the aspiration of RRI is to infuse the innovation process to permeate the different stages of

creating and developing innovations in the real world. Nonetheless, the European Commission, through its Framework Programmes, has been the main facilitator of applying RRI in real-world scenarios and 'potentially institutionalising it into our society' (de Saille 2015; Zwart, Landeweerd, and van Rooij 2014).

The background history of RRI has been elaborated upon previously in this journal (Richard Owen, von Schomberg, and Macnaghten 2021), and will be reiterated here in an abridged version. Although the concept has a broader history that traces back to the end of the twentieth century and the research traditions of technology assessment (TA) and ethical, legal, and societal implications of technology (ELSI) (Rodríguez, Fisher, and Schuurbiers 2013), its formal appearance in EU-funded programmes begins from the European Commission's workshop on RRI in 2011. Certain fields of research such as nanoscience and nanotechnologies were among the first ones where RRI approaches were introduced and developed (Rip 2014; Shelley-Egan, Bowman, and Robinson 2018). In 2012, the Danish EU presidency organised a conference on 'Science and Society in Europe' (Richard Owen, von Schomberg, and Macnaghten 2021). In this conference, the then EU Research and Innovation Commissioner Máire Geoghegan-Quinn proclaimed that RRI shall be seen as a cross-cutting concept underpinning the forthcoming at the time Horizon 2020 scheme. A specific part of this scheme, named 'Science with and for Society' (SWafS) (R. Owen, Macnaghten, and Stilgoe 2012), was specifically devoted to funding RRI projects, even if the concept was to infuse the whole of the Horizon scheme. One of the main aims of this scheme has been the deepening of the relationship between science and society, through the active and systematic participation of citizens and civil society organisations (CSOs) in the design and creation of research, the accessibility of scientific knowledge, the promotion of science education and the protection of ethical values and gender equality. Other work programmes included statements like the following to signify adherence to RRI:

> '*The Work Programme is in line with the Horizon 2020 Responsible Research and Innovation (RRI) cross-cutting issue, engaging society, integrating the gender and ethical dimensions, ensuring the access to research outcomes and encouraging formal and informal science education*' (Griessler 2018).

The most significant form of political recognition for the concept of RRI was its inclusion in the European Union's Rome Declaration in 2014. By formally including the concept of RRI in its funding policy as part of H2020, the European Commission sought to 'anticipate and assess' implications and societal expectations regarding research and innovation, seeking to 'foster the design of inclusive and sustainable' research practices (European Commission 2017). Within SWafS, several projects were funded to develop tools, methodologies and recommendations for the adoption and institutionalisation of RRI in different socio-technical contexts. Momentum for RRI triggered similar initiatives beyond the EU. For example, the Norwegian Research Council established RRI as a core underpinning of its Digital Life Programme and launched a project on Responsible Innovation and Corporate Social Responsibility (Richard Owen, von Schomberg, and Macnaghten 2021).

One of the characteristics of RRI is that it is not too prescriptive as a concept in terms of its practical implementation, but rather it articulates a vision of considering the social,

ethical, economic, cultural, and environmental implications of science and technology development during the research and innovation process (Blok and Lemmens 2015). A practical example of realising this aspiration in the Horizon 2020 Research Programme, particularly in the case of security research, was the systematic and rigorous evaluation of proposals and projects from the perspective of research ethics (Breyer 2021). Initially, an ethics 'self-assessment' is required from applicants at the stage of submitting the research proposal. In case the proposal is successful, an 'ethics review' commences, including screening and review exercises performed by independent ethics experts. Finally, 'additional ethics requirements' are often added and executed throughout the research project.

To further boost the momentum of RRI in the currently running (until 2027) Horizon Europe scheme, the European Commission formally included the concept as one of the operational objectives of the Strategic Programme (see article 2, recital 26 of the Regulation for Horizon Europe). Emphasis is laid in the new Horizon Europe framework on the so-called 'three O's agenda', i.e. open innovation, open science and openness to the world (Novitzky et al. 2020). Furthermore, the Commission highlights the significance of meeting the Sustainable Development Goals (SDGs), the introduction of 'mission-oriented' research and the involvement of stakeholders and citizens from the early stages of research (Robinson, Simone, and Mazzonetto 2021). In terms of access to funding, the evaluation of proposals requires an 'open science' element that is assessed as part of the research 'excellence' of proposals, whereas the ethics screening follows a similar structure to the one adopted in Horizon 2020.

That being said, the rhetorical willingness to boost the momentum of RRI is not always matched with practical changes in the relevant EU funding frameworks. For example, the launch of the Horizon Europe programme introduced a fundamental reorientation of ethics evaluations, shifting from a rule – or value-based approach to a risk-based approach. Under this new framework, only projects that raise very serious or complex ethical questions are subject to a more detailed ethics evaluation, while the majority of projects can proceed without specific requirements (European Commission 2021). This change has significant implications for the implementation of RRI principles in EU-funded research projects. On the one hand, the risk-based approach could be seen as pragmatic, focusing limited resources on projects that pose the greatest ethical risks. This targeted approach might help to streamline the ethics assessment process and reduce the administrative burden on researchers. However, it also raises concerns about whether the shift away from a more comprehensive, value-based approach might further weaken the already unstable institutional and legal basis for RRI (Owen, von Schomberg, and Macnaghten 2021). To draw on the example of the DARLENE project, to be discussed below, navigating the ethics assessment posed some challenges, as the complex legal and ethical implications of using AI and AR technologies in law enforcement contexts did not always fit neatly into predefined risk categories. The project team had to proactively identify and address potential ethical risks, going beyond the minimum requirements of the ethics self-assessment. To what extent, then, has the presence of RRI in the formal Horizon frameworks been translated in operationalizable and meaningful applications of RRI in practice?

Difficulties in RRI practice: the literature

Despite the ambition and formalisation of RRI in the Horizon schemes, and the significant resources devoted to its promotion (Breyer 2021), studies have shown that the implementation of RRI is far from uniform and satisfactory across different countries and organisational environments (Tabarés et al. 2022; Wittrock et al. 2021). Both internal European Commission evaluations (European Commission 2017) and scholarly studies (Carrier and Gartzlaff 2020; Christensen et al. 2020; Mejlgaard, Bloch, and Madsen 2019; Novitzky et al. 2020) have shown that implementation of RRI has been 'limited' and 'diffuse' in practice (Tabarés et al. 2022). These studies have found an inconsistent application of RRI across different organisations and EU countries, arguing that there is significant resistance or lack of engagement with RRI in the implementation of scientific projects. Some authors attribute this to a perception that research and innovation are neutral and technical processes that shall not be infused with the value-laden and normative visions of RRI (Papaioannou 2020; van Oudheusden 2014), whereas others claim that technology developers see innovation as an 'economic imperative' that shall not be constrained by 'socio-ethical concerns' (Eizagirre, Rodríguez, and Ibarra 2017; Pfotenhauer and Jasanoff 2017).

An influential categorisation of barriers for RRI implementation across different research projects is the one offered by Wittrock and others into *structural, cultural* and *interchange* barriers (Wittrock et al. 2021). *Structural* barriers refer to such factors as the lack of resources (e.g. money or time), the lack of incentives or the lack of formal structures, frameworks, and policies to support RRI practices. Funding is, indeed, often mentioned as a critical source of concerns for RRI implementation. In Horizon projects, there might be some funding allocated to RRI tasks, but these are often seen as side-tasks for innovators who are keen to tick the box and proceed with their core research interest in developing the technology (Carrier and Gartzlaff 2020). This is because RRI tasks are described as and confined to certain tasks in the work programme, e.g. one task about research ethics management and another task on open data management, rather than diffusing the whole of the workflow. Considering the very strict time pressures in Horizon research, researchers often struggle to find the required time to engage the public and stakeholders. Due to this structure, funding for RRI activities is often temporary for the duration of the project and, even if a project achieves a breakthrough in terms of RRI, it is difficult to sustain this for a longer period of time, or to replicate this in different contexts and environments. The situation might have been different if, outside of the Horizon schemes, there were more available funds for RRI activities. Studies, however, show that the broader research ecosystem does not devote sufficient financial resources for RRI, with publicly funded organisations such as universities, funders and CSOs struggling to promote a well-supported RRI policy (Christensen et al. 2020). Especially in countries where there is no funding to support core aspects and fields of scientific research, 'the basics of the research and innovation system', RRI may be often seen as a luxury (Christensen et al. 2020).

The lack of incentives is another fundamental barrier to the realisation of RRI in real-world research projects. As many researchers are employed by universities or other research enterprises, they often struggle to see the connection between their career progress and the optimal execution of RRI activities, since such progress relies heavily on

their scientific publication record (De Rond and Miller 2005). In the Horizon schemes, researchers are often disincentivised to devote time to developing the RRI elements of their proposals, as they feel that they should rather use the space for 'indicating the excellence of the proposed research' to boost their chances of success (Tabarés et al. 2022). Due to this, RRI dimensions such as ethical compliance and open science are either misinterpreted and referred to without proper understanding, or treated as nothing more than a 'box-ticking exercise' (Novitzky et al. 2020). Related to the lack of incentives and resources is the third type of structural barrier, i.e. the lack of infrastructural support for RRI activities. Researchers often feel that their organisations do not do enough to effectively facilitate the wider adoption of RRI practices (Tabarés et al. 2022). This is also extrapolated to the level of the consortium executing the project, with some partners who are more interested in or responsible for RRI activities feeling that their work is an 'isolated effort' and, as a result, end up 'just doing their own thing' instead of performing educating and monitoring activities that span the whole project (Christensen et al. 2020).

Cultural barriers refer to ideas, beliefs and views that create tension in the smooth implementation of RRI activities. In some cases, it might be a matter of lacking the knowledge and the awareness to promote RRI work. In other cases, it might be a deliberate intention to challenge the normative and political aims of RRI, due to either a negative and autonomy-related view of research freedom, or a conception of innovation as unhindered by constraints emerging from the concept of RRI (Wittrock et al. 2021). For instance, profound scepticism has been registered in the literature about the value of certain RRI practices such as science communication and public engagement. In the view of some industry and academic actors, the general public does not have the knowledge for understanding and steering research projects, as it is assessed as uninformed and even 'irrational and exploitable by special interest groups' (Besley and Nisbet 2013). Under this view, engaging in a sustained dialogue with citizens, per the vision of RRI, would threaten the autonomy of research, which should be unconstrained and even unpopular to lead to unexpected findings and breakthroughs (Carrier and Gartzlaff 2020).

The concept of RRI has also received criticism by researchers and other stakeholders in the research ecosystem as 'weak', 'unclear' and 'hard to operationalise' (Tabarés et al. 2022). These voices have urged for an attempt to develop indicators and measure the application of RRI in practice, with such efforts currently being in their first stages (Strand and Spaapen 2020). In some cases, though, indicators like the ones developed by the MORRI project essentially boil down to measuring the performance of a project in terms of the different RRI dimensions (Richard Owen, von Schomberg, and Macnaghten 2021). This reinforces the tendency to think of RRI as an empty signifier, which results in a failure of the concept of RRI and its more comprehensive vision compared to the individual dimensions such as ethics, gender equality and public engagement (Tabarés et al. 2022). It might be even convenient for organisations who are familiar with the dimensions of RRI not to have to demonstrate how they comply with a new concept, going as far as even becoming defensive when this assumes that their previous practices were not responsible (Christensen et al. 2020). Scepticism results in RRI being perceived as a 'fashionable policy concept with a short life-span' (Carrier and Gartzlaff 2020).

Interchange barriers refer to challenges for RRI practice stemming from the broader environment within which research takes place. A main impediment relates to the lack of clear policies and mandates (Tabarés et al. 2022). Security research is a good example where concepts with a stronger 'bite', e.g. with a clear foundation and mandate in the applicable legal framework, stand out as priorities in respect of RRI. For example, ethics and privacy, in principle broad terms with a foundation in philosophy and social theory, are often interpreted as referring to data protection and human rights law requirements (Tabarés et al. 2022). Translation issues are another source of concern, as the RRI practices of researchers are not always translated in a manner that is appreciated by the citizens. For example, researchers have struggled to include citizens in their engagement practices, preferring to include practitioners, public authorities, and industry representatives as safer choices. Commercial interests are another source of interchange barriers. As it should be expected, industry actors are primarily interested in economic growth and, even if this is not contradictory with responsible practices, trade-offs might emerge between economic goals and RRI tenets such as sustainability, openness, and gender equality (Christensen et al. 2020). In the case of security research, institutionalisation of RRI is further complicated by the particularities of this field.

Difficulties in RRI practice: the 'urgencies' of security research

The application of RRI principles to policing and carceral technologies has led some scholars and activists to argue for the complete elimination of these tools, citing concerns about bias, discrimination, and potential harm to marginalised communities (Benjamin 2019; Brayne 2020). These concerns are valid and important, as there is ample evidence that such technologies can perpetuate and exacerbate existing inequalities in the criminal justice system (Oswald et al. 2018). However, the complete elimination of these technologies may not always be the most appropriate or feasible solution considering the rising sophistication of technologies used by adversaries and criminals, and the current political climate in Europe favouring the technological strengthening of national security and police forces. Instead, a more nuanced approach could involve rigorously assessing the potential benefits and risks of these technologies on a case-by-case basis, implementing robust safeguards and oversight mechanisms to mitigate potential harms, and engaging in ongoing monitoring and evaluation to ensure that these tools are being used in a responsible and equitable manner (Ferguson 2017). There may be cases where the risks of a particular technology outweigh any potential benefits, and in such instances, the responsible course of action may indeed be to refrain from implementing or using the technology altogether. The DARLENE project, discussed below, aimed to strike a balance between leveraging the potential benefits of AR and AI technologies for law enforcement while also proactively addressing RRI concerns to minimise the risks of bias and harm. This involved a continuous, iterative process of assessment, reflection, and adjustment throughout the project lifecycle, in consultation with a diverse range of stakeholders, including civil society organisations and community representatives. While this approach may not entirely eliminate the potential for negative consequences, it represents a good faith effort to navigate the complex ethical terrain of policing technologies in a responsible and accountable manner.

The use of the term 'urgency' in this paper refers to the specific challenges and pressures faced by researchers and practitioners in implementing RRI principles in the context of security research, rather than an inherent or unique urgency of security research itself. It is important to acknowledge that the security industry has sometimes misused claims of urgency to push through projects without proper scrutiny or consideration of RRI principles (Rieker and Riddervold 2022). While the challenges discussed in this paper are particularly salient in the context of security research, the goal is not to prioritise security research over other important research areas, such as climate policy or social inequality. Instead, the aim is to highlight the specific challenges and particularities of implementing RRI in this context and to propose strategies for addressing these challenges effectively. It is crucial to critically examine claims of urgency in security research and to ensure that the importance of RRI principles is not compromised in the face of real – or perceived-time pressures.

In that sense, implementing RRI in law enforcement technology developing research is related to two types of 'urgency': first, it is ''urgent' that RRI implementation observes the time – and security-sensitive requirements of the law enforcement practitioners who are the directly interested end-users of the research; second, due to the lack of transparency, the secrecy and the often challenged trustworthiness of law enforcement agencies in terms of developing and using surveillance technologies in a lawful and ethical manner, it is 'urgent' that RRI approaches are robustly applied. This is even more the case when the developed technologies may have a direct impact on the lives of European citizens. With great power, comes great responsibility.

To start with the first type of 'urgency', well-timed interventions, confidentiality, and willingness to collaborate with law enforcement practitioners are often essential in policing research. Compared to the research process, which may often involve spending years on a single project, policing prioritises *immediate action* (Skogan 2010; Worden, McLean, and Bonner 2014). Police authorities are particularly careful about the number of resources they invest in research projects, considering the increased demands on their time, especially at times of broader health or societal crises (Burkhardt et al. 2017). Crucially, they are also careful about the types of research they engage in – they are interested in research that produces *results* for them, speaking to 'real issues on the ground' and applicable 'in their daily lives' (Burkhardt et al. 2017). Especially in a time of budget cuts (Tribune 2020), collaborative research projects may carry high costs for a law enforcement agency, and may be viewed as a luxury (Iwama, McDevitt, and Bieniecki 2021). These obstacles are all the more present for smaller or mid-size police agencies (Iwama, McDevitt, and Bieniecki 2021). For police agencies, knowledge is valuable insofar as it can be 'put into practice', involving the participation of both researchers and law enforcement practitioners (Tillyer et al. 2014). Hence, measurability and timely identification of problems is of paramount importance while researching in collaboration with law enforcement agencies (Goldstein 1979). This approach is captured in the acronym SARA: Scanning for community problems, Analysing the factors causing them, Responding with some research intervention, and Assessing the effectiveness of the response (Eck and Spelman 1987).

A common repercussion of that is a hostility to critical police studies, also called 'hit and run research' (Burkhardt et al. 2017), in the case of which researchers are often seen as failing to 'provide any useable research for police' (Bradley and Nixon 2009; Tillyer

et al. 2014). This has triggered reluctance in some academics to collaborate with police agencies, fearing that their research may be seen by their academic community as 'too applied' or potentially captured (Buerger 2010; Skogan 2010). Hence, multidisciplinary technology development research needs to position itself as capable of offering a 'win-win' scenario for research organisations and police agencies (Cordner and White 2010). For example, it has been reported that police officers are fearful that research findings might expose them for engaging in e.g. racial profiling, a particularly concerning allegation at a time of increased public scrutiny and calls to defund the police for relevant reasons (Iwama, McDevitt, and Bieniecki 2021). Negative media attention scares police leaders. This complicates the efforts to embed RRI principles in the process of developing law enforcement technologies, also because several different actors need to be included in the process. Technology developers, social science and humanities (SSH) researchers, law enforcement agencies, security industry actors, civil society and academic organisations active in policing and surveillance studies need to be included in the deliberative process embodying the RRI principles. There might even be overlaps between the previous categories: law enforcement agencies might also participate in a technology development capacity within a project (e.g. 'COPKIT Project' 2022). As if the 'urgencies' of law enforcement practice were not enough, multidisciplinary research projects add their own 'urgencies' to the puzzle, such as the obligation to tangibly generate and demonstrate results and policy impacts within very strict deadlines (European Commission 2021).

Due to these characteristics of law enforcement technology development research, it is also "urgent' to infuse it with RRI principles. Examples of research endeavours as the ones mentioned in the introduction demonstrate the sensitivities raised by policing research when it comes to promoting an RRI approach. To refer to the well-known six RRI 'keys', an RRI approach is expected to promote and consider the following: Ethics, Science Education, Gender Equality, Open Access, Governance and Public Engagement (Strand and Spaapen 2020). In the case of policing research, open access and public engagement are impacted by the inherent sensitivity, confidentiality, and secrecy characterising police operations (Galdon-Clavell 2021). The lack of transparency also makes it difficult to assess compliance with ethics, gender equality and governance requirements, whereas the lack of a research culture among law enforcement practitioners makes it unclear whether science education can be promoted by policing research (de Marco 2021). One can observe clearly the tensions with von Schomberg's oft-cited definition of RRI as a '*transparent*, interactive process' (emphasis added) where innovators and social actors become 'mutually *responsive* to each other' (emphasis added) to achieve 'ethical acceptability, sustainability and societal desirability' of innovation (von Schomberg 2013). Law enforcement agents often need to operate in a way that is neither transparent, nor responsive to others, even if there are also cases where the transparency of police decision-making can increase the legitimacy of policing and, thereby, compliance (Engel and Whalen 2010).

Indeed, as a sector which is 'more difficult to engage than others' for researchers (Tabarés et al. 2022), policing deserves "urgent' attention to ensure that RRI principles will not be sidestepped by the practical realities of day-to-day research with law enforcement agents. The previously mentioned action-oriented character of policing research sits at odds with the long-term perspective of the RRI concept and its cross-cutting nature across several dimensions of the research journey. Law enforcement agents

have, arguably, little time to identify the overlaps between sustainability, ethics, integrity, honesty, and responsibility (Wittrock et al. 2021). As a professional bureaucracy, a law enforcement agency demonstrates classical coordination issues that operate as barriers for an RRI approach. These issues are aggravated by the fact that law enforcement practitioners have been found in the literature to be lacking a 'legal', 'ethical' and 'fundamental rights' culture, raising the degree of difficulty for project partners who collaborate with them in assessing and implementing relevant RRI requirements (de Marco 2021). This is not to blame law enforcement agents, who may lack the capability, the expertise and the experience to meaningfully engage and co-create research and innovation in line with the RRI aspirations (Christensen et al. 2020).

Considering the monopoly of legitimate violence exercised by police forces within a state and the increased capacities provided to law enforcement by advanced technologies, it becomes more important that RRI values such as inclusiveness, transparency, societal acceptability, and sustainability underpin security research. Departing from autocratic conceptions of policing, contemporary policing operates as a 'relationship between the law enforcement agency and the community it serves' (Burkhardt et al. 2017). In this sense, it is integral to achieving the aims of policing that the law enforcement agency establishes and sustains the trust of the citizenry in the communities it serves. Some considerations may be more salient than others considering the context in policing. For example, there has been significant concern both in the US and in Europe that algorithmic tools used in the criminal justice system enable discrimination against people of colour and minorities (Oswald et al. 2018). Researchers will have to be particularly careful about the identification of discriminatory practices while proceeding with collaborating with law enforcement practitioners who may have different training, language, priorities, and responses in crises (Iwama, McDevitt, and Bieniecki 2021). How did, then, these senses of 'urgency' impact the adoption of an RRI approach in the DARLENE project?

Difficulties in RRI practice: the view from DARLENE

The author's experience as an RRI practitioner in the DARLENE project, a Horizon 2020 funded initiative, adds a more specific dimension to the three types of barriers to RRI implementation presented above: structural, cultural, and interchange barriers. DARLENE, an acronym for Deep Augmented Reality Law Enforcement Ecosystem, was a three-year project (2020–2023) that aimed to combine and advance Augmented Reality (AR) and Artificial Intelligence (AI) technologies to enhance the situational awareness of law enforcement officers in the field, particularly in time-critical and life-threatening scenarios ('DARLENE Project' 2022). The project brought together a consortium of technology developers, research institutions, and law enforcement agencies from across Europe.

The DARLENE ecosystem consisted of various technological components, with the main ones being: (1) smart glasses worn by police officers, which provide real-time visual overlays and notifications; (2) patrol car processing computer modules, which analyse and relay data from various sensors; and (3) the DARLENE cloud database and server located in police headquarters, which stores and processes data from connected devices ('DARLENE: Concept' 2022). These components exchange information

and run AI algorithms that provide officers in the field with vital pieces of information from different sensors (e.g. CCTV cameras, floor plans of buildings), thus improving their situational awareness and decision-making capabilities.

DARLENE is by no means the first Horizon-funded project that tried to bring RRI principles into praxis. Several other Horizon 2020 projects have also sought to bridge the gap between RRI theory and practice. For example, the SATORI project (Stakeholders Acting Together on the Ethical Impact Assessment of Research and Innovation) developed a comprehensive framework for ethical impact assessment that can be applied across different research and innovation contexts (Shelley-Egan et al. 2017). Similarly, the SIENNA project (Stakeholder-Informed Ethics for New Technologies with High Socio-Economic and Human Rights Impact) has worked to develop ethical frameworks, codes of conduct, and other tools for addressing the societal and human rights implications of emerging technologies such as artificial intelligence, robotics, and human genomics (SIENNA 2021). These projects, among others, demonstrate a growing recognition of the need to translate RRI principles into concrete, actionable guidance that can be applied in real-world settings. The DARLENE project built upon and contributed to this broader landscape of efforts to implement RRI in practice, particularly in the challenging context of law enforcement technology development, where the stakes are high and the potential for unintended consequences is significant.

As an RRI researcher within the DARLENE project (2020–2022), the author's main responsibilities included ensuring that the technology development process aligned with RRI principles, such as stakeholder engagement, ethical, legal, and societal considerations, and transparency. This involved close collaboration with the project's technology partners, law enforcement end-users, and other researchers to identify and address potential risks and concerns related to the development and deployment of the DARLENE system. One key aspect of the author's role was facilitating and co-organising multi-stakeholder workshops to gather input and feedback on the system's design and potential impacts. For example, the author participated in workshops with law enforcement officers from different European countries to understand their needs, expectations, and concerns regarding the use of AR and AI technologies in their work. These workshops helped to identify key requirements for the DARLENE system, such as the importance of ensuring data security and privacy. The author also worked closely with the project's technology partners to conduct ethical and societal impact assessments of the DARLENE technologies. This involved analysing the potential risks and benefits of the system from various perspectives, such as its impact on fundamental rights, data protection, and freedom from discrimination. For instance, the author collaborated with the project's technical partners to develop a fairness-aware approach to training the machine learning algorithms of DARLENE (Pastaltzidis et al. 2022). Another important aspect of the author's role was promoting transparency and public engagement around the DARLENE project. This included contributing to the development of public-facing communication materials, such as the project website and newsletter, to inform a wider audience about the project's objectives, activities, and findings. The author also participated in public events and conferences to present the project's approach to RRI and engage in discussions with other researchers, policymakers, and civil society representatives about the responsible development of AR and AI technologies for law enforcement.

In terms of *structural* barriers, the author observed a lack of alignment between RRI requirements and funding in the DARLENE project. The European Commission tended to view RRI tasks as confined to specific work packages, such as project management or legal/ethical ones, thus allocating resources for these tasks only to a small number of partners who hired RRI practitioners. This led to an underestimation of the effort and contribution required from technical partners and law enforcement end-users in RRI tasks. For example, when developing the project's data management strategy, technical partners were not allocated sufficient budgetary resources, despite their input being crucial. This challenge manifested in day-to-day activities, such as difficulties in scheduling meetings or obtaining timely feedback from technical partners on RRI-related matters, as they prioritised their allocated tasks.

A significant *cultural* barrier encountered in DARLENE was the difficulty in getting technical partners to *own* RRI activities. Driven by incentives that emphasised technological metrics and quantitative Key Performance Indicators (KPIs), technical partners often struggled to allocate time and energy to RRI tasks. Consequently, they tended to view these activities as separate from their core responsibilities and not as an integral part of the innovation process. This manifested in instances where technical partners would treat RRI tasks as mere tick-boxing exercises to satisfy the funder's requirements. For example, during the development of the DARLENE system's ethical and data protection impact assessment, some technical partners initially provided only surface-level input, seeing it as a bureaucratic requirement rather than an opportunity to critically reflect on the technology's potential implications.

Finally, an *interchange* barrier encountered related to the challenges in negotiating the relationship between RRI practitioners and technical partners. As only a few partners were solely responsible for RRI activities, technology developers sometimes perceived them as hindering innovation and imposing burdensome requirements. This manifested in day-to-day interactions, where RRI practitioners had to continuously justify the importance of their work to maintain productive communication with technical partners. For instance, when proposing the integration of privacy-by-design principles into the DARLENE system architecture, the author encountered initial resistance from some technical partners who viewed these principles as constraining their design choices. Overcoming this barrier required ongoing dialogue and negotiation to find mutually agreeable solutions that balanced RRI considerations with technical feasibility. How did DARLENE seek to overcome these barriers?

Overcoming challenges in implementing RRI in security research: the approach in DARLENE

The approach in DARLENE aimed to address the two types of 'urgency' in implementing RRI in the context of law enforcement technology development by engaging with law enforcement end-users early in the project to understand their needs and requirements, ensuring that the technology being developed was responsive to their time-sensitive operational demands (Aidinlis and Gurzawska 2021). It also did so by prioritising transparency and public engagement to build trust in the DARLENE technology, recognising the need for robust RRI practices in a domain often characterised by secrecy and lack of transparency (Pastaltzidis et al. 2022). More specifically, the DARLENE project adopted a

two-pronged approach to overcoming barriers to RRI implementation, focusing on addressing the structural barrier of limited funding for RRI activities and the cultural and interchange barriers arising from the relationship between technology development partners, law enforcement end-users, and researchers leading RRI activities.

To address the structural barrier, the project's overall strategy for implementing RRI principles centred around a multi-layered and systematic oversight framework that followed the entire lifecycle of the DARLENE technology (Aidinlis 2022). This framework was designed to ensure that RRI considerations, such as ethical, legal, and societal implications, were integrated into the project's workflow from start to finish, rather than being treated as isolated tasks confined to specific work packages. The framework facilitated regular communication and collaboration between RRI practitioners, technology developers, and an independent Ethics Advisory Board composed of external experts in the legal and ethical implications of security technologies. This approach allowed for the timely identification and resolution of emerging issues through brainstorming and 'prototyping' solutions (Rowe 1987). To operationalise RRI, the oversight framework included several specific tools and methodologies. For example, the project conducted a comprehensive ethical and data protection impact assessment, which involved analysing the potential risks and benefits of the DARLENE technology from various perspectives, such as its impact on fundamental rights, data protection, and freedom from discrimination.

To address the cultural and interchange barriers, the project RRI practitioners sought to engage with technology developing partners early on in discussions about how common solutions could address both RRI requirements and technical problems faced by consortium partners. This would help in better aligning the incentives of RRI practitioners with the ones of technology developers and improve their mutual relationship. For example, for RRI purposes, one challenge relates to the difficulty to reconcile the data-intensive nature of intelligent law enforcement tools with data protection and minimisation (the idea that data processing should be limited to what is strictly necessary for a purpose) principles. In that sense, it is preferrable from a governance and ethics perspective to process more data on the smart device held by the police officers rather than to further share this data with other nodes of the DARLENE ecosystem. Similarly, it emerged that, from a technical perspective, it simplifies the product architecture if data processing by the smart glasses is mostly *real-time* and *in-situ,* unless some further processing and sharing is strictly necessary for the detection, prevention, or prosecution of terrorist or criminal activity. Hence, this was adopted as the optimal design for the technology architecture since the beginning of the project. Another challenge related to using machine learning (ML) training datasets for violent acts in the context of computer vision that will enable augmented reality. From an RRI perspective, this raised the challenge of *bias,* in the sense that available datasets like RWF-2000 often include individuals that predominantly belong to a specific race and gender, i.e. men of colour. From a technology development perspective, *occlusion* was a challenge, i.e. in some cases the figures of individuals in the dataset pictures were partially or wholly blocked by other individuals or intervening objects. After thorough communication, a common strategy was adopted: *data augmentation,* i.e. the artificial re-balancing of the existing datasets through a machine-learning algorithm that substitutes the place of figures within the images of the dataset to avoid both occlusion problems and mitigate

the risks of bias (e.g. by seeking to produce a final dataset where race percentages are more balanced). Through this technique, the technology development partners were able to construct a fairness-aware technology that even presented improved accuracy in detecting violent behaviour in some cases (Pastaltzidis et al. 2022).

However, there were also limitations to the effectiveness of these strategies. Despite the efforts to engage law enforcement end-users, the project still faced challenges in ensuring their consistent and meaningful participation in RRI activities due to the competing demands on their time and resources. Additionally, while the project made significant efforts to be transparent and engage with the public, the inherent secrecy of the law enforcement domain made it difficult to fully realise the ideal of open and inclusive dialogue.

Several key lessons can be drawn from the DARLENE experience. Firstly, the project demonstrated the value of having a comprehensive and integrated RRI framework that spans the entire project lifecycle, rather than treating RRI as a siloed activity. Secondly, the importance of early and ongoing engagement between RRI practitioners, technology developers, and end-users was highlighted, as this facilitated the identification of mutually beneficial solutions to RRI and technical challenges. However, the project also underscored the need for more flexible and adaptive RRI approaches that can accommodate the unique constraints and demands of the law enforcement context. These lessons have significant transferability to other security research projects. The multi-layered oversight framework and the emphasis on early collaboration between RRI practitioners and technology developers could serve as a model for other projects seeking to integrate RRI principles into their work..

Reflections and improvements: the way forward

As the analysis has shown, there is a discrepancy between the formalised RRI frameworks and RRI implementation in the practice of security research. Barriers that are both well-registered in the literature (e.g. the limited funding for RRI activities) and ones that were illuminated through the DARLENE example (e.g. the lack of ownership of RRI activities in technology development partners) complicate the integration of RRI in 'concrete policies and practices' (Novitzky et al. 2020). The barriers presented here corroborate the previous literature finding that in security research there is no 'meaningful or systematic implementation of RRI', apart from the emphasis on specific RRI keys like data protection (as part of governance) and ethics (Tabarés et al. 2022). This is reflective of the broader criticism that RRI has failed to allocate a central role to the 'localised needs and values of European citizens' (Flink 2020), but has mostly focused on compliance with top-down and high-level frameworks such as EU data protection legislation or high-level ethics frameworks created by expert groups (e.g. High-Level Expert Group 2019). This turns RRI into a 'societal fix' to legitimise research and innovation projects (Frahm, Doezema, and Pfotenhauer 2022), often quite controversial ones in the security domain, rather than as a 'genuine paradigm shift' (Shanley et al. 2022).

Beyond the project-level solutions presented above, there are broader and more systemic changes that need to be considered for RRI implementation to improve in security projects and beyond. Particularly in the case of security research, it should be the funder's responsibility to engage closely with the community of RRI practitioners in EU-funded

security research and survey their practical needs in terms of resources and tools. For example, the substance of RRI needs to be clarified through guidance about potential value conflicts. A main example is the apparent conflict between open science *vis a vis* the classified information requirements in security research. As with freedom of information legislation, there will often need to be some balancing exercise between the objectives of confidentiality for information that might jeopardise public security if publicised and the legitimate public interest in providing open access to the creation of scientific knowledge and information about the operation of technological tools that may be used by police agencies. In the absence of tailored guidance and specific support, or even dedicated training by the European Commission, however, RRI practitioners may struggle to strike the right balance. This proposal for training is in line with literature accounts calling from 'specific work informed by practice' to guide the implementation of the RRI concept in specific research contexts (Fraaije and Flipse 2020; Schuijff and Dijkstra 2020; Wiarda et al. 2021). Crucially, it has been suggested that relevant training should be taking place *before* the beginning of projects, potentially during the grant preparation stage, to ensure that consortium members have the necessary knowledge before the beginning of actual research (de Marco 2021).

Another change of systemic character relates to the culture of research and innovation actors and starts from their very organisational environments. As EU-funded research operates on short term cycles, it is inherently at odds with the 'extensive deliberation processes' that require changes in organisational practices, values or routines brought upon by RRI implementation (Papaioannou 2020; van Oudheusden 2014). Hence, it is very important to design incentives for technology developing organisations to instil RRI considerations as part of their everyday work, regardless of their participation in a specific funding programme. One view in the literature is that the state needs to intervene through legislation instead of solely relying on soft, multi-level governance that relies on complex collaborative networks for policymaking and implementation (Christensen et al. 2020). Under this view, binding regulation shall steer innovation actors towards the incorporation of RRI, becoming more concrete through informal guidelines, meetings, and information dissemination activities (Brandsen and Pestoff 2006). Systemic change would, naturally, benefit significantly from early interventions in the upbringing of technology developers, e.g. through the integration of RRI dimensions within academic curricula and research practices of engineers and data scientists at the stage of education.

As we are now in the third year of operation of Horizon Europe and numerous and multi-fold crises are impacting the ecosystem of research, RRI implementation finds itself at a crossroads. Increasingly, scholarly voices are casting doubts upon the capacity of the concept to withstand 'declining attention' at the international level (Christensen et al. 2020). Through contributing perspectives from a specific research domain, this paper has adopted the proposal that the research and practice of RRI shall not impose a 'particular concept' of responsibility from the top-down but shall rather seek to identify and understand perceptions of responsibility from the bottom-up by mapping perceptions and activities of actors involved in the RRI process and, potentially, the broader publics. Further accounts from specific research domains can provide rich knowledge about the values of stakeholders, and the respective urgencies, or 'urgencies', that characterise their domains, and lead to an increased acceptance of innovation by society

(Boucher 2015). This is consistent with the 'mission-driven' innovation approach in the Horizon Europe framework, envisioning a greater role for citizens and other stakeholders in the development of European research and innovation (Robinson, Simone, and Mazzonetto 2021). Under these conditions, RRI implementation can be a convincing step in the direction of realising the vision of RRI as a 'site for ongoing debate, contestation and negotiation' about science and society, without sacrificing its character as a 'site of *praxis*' (emphasis added), i.e. a practical exercise of scientific responsibility in society (Douglas 2003).

Disclosure statement

No potential conflict of interest was reported by the author(s).

Notes on contributor

Dr Stergios Aidinlis is an Assistant Professor in AI Law at Durham Law School. Previously, he was a Lecturer in Law and the Programme Director of the LLM/MSc in Law, Artificial Intelligence and New Technologies at Keele Law School.

References

Aidinlis. 2022. "Using AI-Powered Immersive Technologies for Improved Situational Awareness of Police Officers: Promise and Challenges." 2022. https://www.techuk.org/resource/using-ai-powered-immersive-technologies-for-improved-situational-awareness-of-police-officers-promise-and-challenges.html.

Aidinlis, Stergios, and Agata Gurzawska. 2021. "Responsible Innovation in Multidisciplinary Research and Innovation Projects: Moving from Principle to Practice," 11.

Benjamin, R. 2019. *Race After Technology: Abolitionist Tools for the new Jim Code*. New Jersey: John Wiley & Sons.

Besley, John C., and Matthew Nisbet. 2013. "How Scientists View the Public, the Media and the Political Process." *Public Understanding of Science* 22 (6): 644–659. https://doi.org/10.1177/0963662511418743.

Blok, Vincent, and Pieter Lemmens. 2015. "The Emerging Concept of Responsible Innovation. Three Reasons Why It Is Questionable and Calls for a Radical Transformation of the Concept of Innovation." In *Responsible Innovation 2: Concepts, Approaches, and Applications*, edited by Bert-Jaap Koops, Ilse Oosterlaken, Henny Romijn, Tsjalling Swierstra, and Jeroen van den Hoven, 19–35. Cham: Springer International Publishing. https://doi.org/10.1007/978-3-319-17308-5_2.

Boucher, Philip. 2015. "Domesticating the Drone: The Demilitarisation of Unmanned Aircraft for Civil Markets." *Science and Engineering Ethics* 21 (6): 1393–1412. https://doi.org/10.1007/s11948-014-9603-3.

Bradley, David, and Christine Nixon. 2009. "Ending the "Dialogue of the Deaf": Evidence and Policing Policies and Practices. An Australian Case Study." *Police Practice and Research* 10 (5–6): 423–435. https://doi.org/10.1080/15614260903378384.

Brandsen, Taco, and Victor Pestoff. 2006. "Co-Production, the Third Sector and the Delivery of Public Services: An Introduction." *Public Management Review* 8 (4): 493–501. https://doi.org/10.1080/14719030601022874.

Brayne, S. 2020. *Predict and Surveil: Data, Discretion, and the Future of Policing*. New York: Oxford University Press.

Breyer. 2021. "EU-Funded Technology Violates Fundamental Rights." *About:Intel* (blog). 22 April 2021. https://aboutintel.eu/transparency-lawsuit-iborderctrl/.

Buerger, Michael E. 2010. "Policing and Research: Two Cultures Separated by an Almost-Common Language." *Police Practice and Research* 11 (2): 135–143. https://doi.org/10.1080/15614261003593187.

Burkhardt, Brett C., Scott Akins, Jon Sassaman, Scott Jackson, Ken Elwer, Charles Lanfear, Mariana Amorim, and Katelyn Stevens. 2017. "University Researcher and Law Enforcement Collaboration: Lessons from a Study of Justice-Involved Persons With Suspected Mental Illness." *International Journal of Offender Therapy and Comparative Criminology* 61 (5): 508–525. https://doi.org/10.1177/0306624X15599393.

Carrier, Martin, and Minea Gartzlaff. 2020. "Responsible Research and Innovation: Hopes and Fears in the Scientific Community in Europe." *Journal of Responsible Innovation* 7 (2): 149–169. https://doi.org/10.1080/23299460.2019.1692571.

Christensen, Malene Vinther, Mika Nieminen, Marlene Altenhofer, Elise Tancoigne, Niels Mejlgaard, Erich Griessler, and Adolf Filacek. 2020. "What's in a Name? Perceptions and Promotion of Responsible Research and Innovation Practices Across Europe." *Science and Public Policy* 47 (3): 360–370. https://doi.org/10.1093/scipol/scaa018.

COPKIT Project. 2022. 2022. https://copkit.eu/.

Cordner, Gary, and Stephen White. 2010. "The Evolving Relationship Between Police Research and Police Practice." *Police Practice and Research* 11 (2): 90–94. https://doi.org/10.1080/15614261003590753.

DARLENE Project. 2022. DARLENE. 2022. https://www.darleneproject.eu/.

DARLENE: Concept. 2022. *DARLENE* (blog). 2022. https://www.darleneproject.eu/concept/.

de Marco. 2021. "Ethics in Surveillance Research: From Theory to Practice." *About:Intel* (blog). 21 October 2021. https://aboutintel.eu/ethics-in-surveillance-research-theory-to-practice/.

De Rond, Mark, and Alan N. Miller. 2005. "Publish or Perish: Bane or Boon of Academic Life?" *Journal of Management Inquiry* 14 (4): 321–329. https://doi.org/10.1177/1056492605276850.

Douglas, Heather E. 2003. "The Moral Responsibilities of Scientists (Tensions Between Autonomy and Responsibility)." *American Philosophical Quarterly* 40 (1): 59–68.

Eck, John E., and William Spelman. 1987. "Who Ya Gonna Call? The Police as Problem-Busters." *Crime & Delinquency* 33 (1): 31–52. https://doi.org/10.1177/0011128787033001003.

EDRI. 2021. "European Court Supports Transparency in Risky EU Border Tech Experiments." European Digital Rights (EDRi). 2021. https://edri.org/our-work/european-court-supports-transparency-in-risky-eu-border-tech-experiments/.

Eizagirre, Andoni, Hannot Rodríguez, and Andoni Ibarra. 2017. "Politicizing Responsible Innovation: Responsibility as Inclusive Governance." *International Journal of Innovation Studies* 1 (1): 20–36.

Engel, Robin S., and James L. Whalen. 2010. "Police–Academic Partnerships: Ending the Dialogue of the Deaf, the Cincinnati Experience." *Police Practice and Research* 11 (2): 105–116. https://doi.org/10.1080/15614261003590803.

European Commission. 2017. "Responsible RESEARCH & Innovation Implementing RRI in Horizon 2020." 2017. https://research-and-innovation.ec.europa.eu/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-2020_en.

European Commission. 2021. "Implementation Strategy for Horizon Europe," 19.

Ferguson, Andrew Guthrie. 2017. *The Rise of Big Data Policing: Surveillance, Race, and the Future of Law Enforcement*. New York, USA: New York University Press.

Flink, Tim. 2020. "The Sensationalist Discourse of Science Diplomacy: A Critical Reflection." *The Hague Journal of Diplomacy* 15 (3): 359–370. https://doi.org/10.1163/1871191X-BJA10032.

Fraaije, Aafke, and Steven M. Flipse. 2020. "Synthesizing an Implementation Framework for Responsible Research and Innovation." *Journal of Responsible Innovation* 7 (1): 113–137. https://doi.org/10.1080/23299460.2019.1676685.

Frahm, Nina, Tess Doezema, and Sebastian Pfotenhauer. 2022. "Fixing Technology with Society: The Coproduction of Democratic Deficits and Responsible Innovation at the OECD and the European Commission." *Science, Technology, & Human Values* 47 (1): 174–216. https://doi.org/10.1177/0162243921999100.

Galdon-Clavell. 2021. "The EU's R&D Process: Unaccountable, Unethical, Even Illegal?" *About: Intel* (blog). 15 April 2021. https://aboutintel.eu/eu-unaccountable-rd-process/.

Goldstein, Herman. 1979. "Improving Policing: A Problem-Oriented Approach." *Crime & Delinquency* 25 (2): 236–258. https://doi.org/10.1177/001112877902500207.

Griessler, Alvarez, Bernstein, and Bierwirth. 2018. "NewHoRRIzon Project D5.1. Diagnosis: RRI in Diversity of Approaches." Deliverable to the European Commission. Grant Agreement No. 741402. European Union.

High-Level Expert Group. 2019. "Ethics Guidelines for Trustworthy AI | Shaping Europe's Digital Future." 2019. https://digital-strategy.ec.europa.eu/en/library/ethics-guidelines-trustworthy-ai.

Iwama, Janice, Jack McDevitt, and Robert Bieniecki. 2021. "Building Bridges between Researchers and Police Practitioners in Small and Midsize Law Enforcement Agencies in the United States." *Journal of Contemporary Criminal Justice* 37 (2): 276–292. https://doi.org/10.1177/1043986221999882.

Mejlgaard, Niels, Carter Bloch, and Emil Bargmann Madsen. 2019. "Responsible Research and Innovation in Europe: A Cross-Country Comparative Analysis." *Science and Public Policy* 46 (2): 198–209. https://doi.org/10.1093/scipol/scy048.

Novitzky, Peter, Michael J. Bernstein, Vincent Blok, Robert Braun, Tung Tung Chan, Wout Lamers, Anne Loeber, Ingeborg Meijer, Ralf Lindner, and Erich Griessler. 2020. "Improve Alignment of Research Policy and Societal Values." *Science* 369 (6499): 39–41. https://doi.org/10.1126/science.abb3415.

Oswald, Marion, Jamie Grace, Sheena Urwin, and Geoffrey C. Barnes. 2018. "Algorithmic Risk Assessment Policing Models: Lessons from the Durham HART Model and "Experimental" Proportionality." *Information & Communications Technology Law* 27 (2): 223–250. https://doi.org/10.1080/13600834.2018.1458455.

van Oudheusden, Michiel. 2014. "Where Are the Politics in Responsible Innovation? European Governance, Technology Assessments, and Beyond." *Journal of Responsible Innovation* 1 (1): 67–86. https://doi.org/10.1080/23299460.2014.882097.

Owen, R., P. Macnaghten, and J. Stilgoe. 2012. "Responsible Research and Innovation: From Science in Society to Science for Society, with Society." *Science and Public Policy* 39 (6): 751–760. https://doi.org/10.1093/scipol/scs093.

Owen, Richard, René von Schomberg, and Phil Macnaghten. 2021. "An Unfinished Journey? Reflections on a Decade of Responsible Research and Innovation." *Journal of Responsible Innovation* 8 (2): 217–233. https://doi.org/10.1080/23299460.2021.1948789.

Papaioannou, Theo. 2020. "Innovation, Value-Neutrality and the Question of Politics: Unmasking the Rhetorical and Ideological Abuse of Evolutionary Theory." *Journal of Responsible Innovation* 7 (2): 238–255. https://doi.org/10.1080/23299460.2019.1605484.

Pastaltzidis, Ioannis, Nikolaos Dimitriou, Katherine Quezada-Tavarez, Stergios Aidinlis, Thomas Marquenie, Agata Gurzawska, and Dimitrios Tzovaras. 2022. "Data Augmentation for Fairness-Aware Machine Learning: Preventing Algorithmic Bias in Law Enforcement Systems." In 2022 ACM Conference on Fairness, Accountability, and Transparency, 2302–14. Seoul Republic of Korea: ACM. https://doi.org/10.1145/3531146.3534644.

Pfotenhauer, Sebastian, and Sheila Jasanoff. 2017. "Traveling imaginaries: the "practice turn" in innovation policy and the global circulation of innovation models." *The Routledge handbook of the political economy of science*, 416–428, Routledge.

Rieker, P., and M. Riddervold. 2022. "Not so Unique After all? Urgency and Norms in EU Foreign and Security Policy." *Journal of European Integration* 44 (4): 459–473.

Rip, Arie. 2014. "The Past and Future of RRI." *Life Sciences, Society and Policy* 10 (1): 17. https://doi.org/10.1186/s40504-014-0017-4.

Robinson, Douglas K. R., Angela Simone, and Marzia Mazzonetto. 2021. "RRI Legacies: Co-Creation for Responsible, Equitable and Fair Innovation in Horizon Europe." *Journal of Responsible Innovation* 8 (2): 209–216. https://doi.org/10.1080/23299460.2020.1842633.

Rodríguez, Hannot, Erik Fisher, and Daan Schuurbiers. 2013. "Integrating Science and Society in European Framework Programmes: Trends in Project-Level Solicitations." *Research Policy* 42 (5): 1126–1137. https://doi.org/10.1016/j.respol.2013.02.006.

Rowe. 1987. "Design Thinking." *MIT Press* (blog). 1987. https://mitpress.mit.edu/9780262680677/design-thinking/.

de Saille, Stevienna. 2015. "Innovating Innovation Policy: The Emergence of "Responsible Research and Innovation"." *Journal of Responsible Innovation* 2 (2): 152–168. https://doi.org/10.1080/23299460.2015.1045280.

von Schomberg, René. 2013. "A Vision of Responsible Research and Innovation." In *Responsible Innovation*, edited by Richard Owen, John Bessant, and Maggy Heintz, 51–74. Chichester, UK: John Wiley & Sons, Ltd. https://doi.org/10.1002/9781118551424.ch3.

Schuijff, Mirjam, and Anne M. Dijkstra. 2020. "Practices of Responsible Research and Innovation: A Review." *Science and Engineering Ethics* 26 (2): 533–574. https://doi.org/10.1007/s11948-019-00167-3.

Shanley, Danielle, Joshua B. Cohen, Nicholas Surber, and Shauna Stack. 2022. "Looking Beyond the "Horizon" of RRI: Moving from Discomforts to Commitments as Early Career Researchers." *Journal of Responsible Innovation* 9 (1): 124–132. https://doi.org/10.1080/23299460.2022.2049506.

Shelley-Egan, Clare, Diana M. Bowman, and Douglas K. R. Robinson. 2018. "Devices of Responsibility: Over a Decade of Responsible Research and Innovation Initiatives for Nanotechnologies." *Science and Engineering Ethics* 24 (6): 1719–1746. https://doi.org/10.1007/s11948-017-9978-z.

Shelley-Egan, C., P. Brey, R. Rodrigues, D. Douglas, A. Gurzawska, L. Bitsch, and D. Wright. 2017. "SATORI: An international framework for ethical impact assessment of research and innovation." Proceedings of the 2017 IEEE European Technology and Engineering Management Summit (E-TEMS), 1-6. https://doi.org/10.1109/E-TEMS.2017.8244198.

SIENNA. 2021. "SIENNA Final Conference: Ethics and Human Rights for Emerging Technologies." https://www.sienna-project.eu/digitalAssets/945/c_945133-l_1-k_sienna_final_conference_report.pdf.

Skogan, Wesley G. 2010. *Police and Community in Chicago: A Tale of Three Cities*. New York: Oxford University Press Inc.

Strand, Roger, and Jack Spaapen. 2020. "Locomotive Breath? Post Festum Reflections on the EC Expert Group on Policy Indicators for Responsible Research and Innovation." In *Assessment of Responsible Innovation*, edited by Emad Yaghmaei and Ibo van de Poel, 42–59. Oxford and New York: Routledge.

Tabarés, Raúl, Anne Loeber, Mika Nieminen, Michael J. Bernstein, Erich Griessler, Vincent Blok, Joshua Cohen, Helmut Hönigmayer, Ulrike Wunderle, and Elisabeth Frankus. 2022. "Challenges in the Implementation of Responsible Research and Innovation Across Horizon 2020." *Journal of Responsible Innovation* 9 (3): 291–314. https://doi.org/10.1080/23299460.2022.2101211.

Tillyer, Rob, Marie Skubak Tillyer, John McCluskey, Jeffrey Cancino, Joseph Todaro, and Layla McKinnon. 2014. "Researcher–Practitioner Partnerships and Crime Analysis: A Case Study in Action Research." *Police Practice and Research* 15 (5): 404–418. https://doi.org/10.1080/15614263.2013.829321.

Tribune, Richard Tsong-Taatarii/Star, and Via Associated Press. 2020. "Support For Defunding The Police Department Is Growing. Here's Why It's Not A Silver Bullet." The Marshall Project. 9 June 2020. https://www.themarshallproject.org/2020/06/09/support-for-defunding-the-police-department-is-growing-here-s-why-it-s-not-a-silver-bullet.

Wiarda, Martijn, Geerten van de Kaa, Emad Yaghmaei, and Neelke Doorn. 2021. "A Comprehensive Appraisal of Responsible Research and Innovation: From Roots to Leaves." *Technological Forecasting and Social Change* 172:121053. https://doi.org/10.1016/j.techfore.2021.121053.

Wittrock, Christian, Ellen-Marie Forsberg, Auke Pols, Philip Macnaghten, and David Ludwig. 2021. *Implementing Responsible Research and Innovation: Organisational and National*

Conditions. SpringerBriefs in Ethics. Cham: Springer International Publishing. https://doi.org/10.1007/978-3-030-54286-3.

Worden, Robert E., Sarah J. McLean, and Heidi S. Bonner. 2014. "Research Partners in Criminal Justice: Notes from Syracuse." *Criminal Justice Studies* 27 (3): 278–293. https://doi.org/10.1080/1478601X.2014.947812.

Zwart, Hub, Laurens Landeweerd, and Arjan van Rooij. 2014. "Adapt or Perish? Assessing the Recent Shift in the European Research Funding Arena from "ELSA" to "RRI"." *Life Sciences, Society and Policy* 10 (1): 11. https://doi.org/10.1186/s40504-014-0011-x.