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Societal Readiness Plan



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Table of Abbreviations and Acronyms

Abbreviation	Meaning
SR	Societal Readiness
SRL	Societal Readiness Level
RRI	Responsible Research and Innovation
CSA	Coordination and Support Action

1. Executive Summary

This document presents the Societal Readiness Plan for the **Horizon Europe funded Coordination and Support Action project Robotics4EU (2020-2023)**. The plan includes both project-internal and stakeholder-external frameworks for ensuring that: (1) a **Responsible Research and Innovation (RRI) framework** is being developed, implemented and followed throughout the project; and (2) a **Social Readiness Level (SRL) framework** is put into action, both as a tool within the project for a Maturity Assessment Model, and for external evaluations of robotics-technologies. The goal of both RRI- and SRL-tools is to ensure that the project **meets its impact goals** of better integrating robotics-technologies into the European society.

2. Introduction

Research, innovation and coordination projects are situated in disciplines, internal practices and norms – and have external impact on different sectors and societal stakeholders. Effective societal integration of project results is an essential component of ensuring that the project has maximum impact. This can be aided by proactively considering societal readiness from the beginning of projects and how the knowledge developed can be integrated into society throughout the entire project lifecycle. A Societal Readiness Plan (SRP) is a framework for how the project can engage in this reflection. As such, this document has two principal purposes:

- To develop a plan for how principles of **Responsible Research and Innovation (RRI)** will be integrated into the activities of the Robotics4EU project ([see chapter 3](#)).
- To provide guidelines of how to assess whether the project activities have increased the **Societal Readiness Level (SRL)** of the general public for robots in the four sectors examined by Robotics4EU ([see chapter 4](#)).

2.1. About Robotics4EU

The Robotics4EU (2021-2023) project aims to ensure a more widespread adoption of (AI-based) robots in healthcare, inspection and maintenance of infrastructure, agri-food, and agile production. It will be reached through the implementation of the responsible robotics principles among the robotics community that results in societal acceptance of the robotics solutions in application areas. Robotics4EU will create and empower the EU-wide responsible robotics community representing robotics innovators from companies and academia in the fields of healthcare, inspection and maintenance of infrastructure, agri-food, and agile production as well as citizens/users and policy/decision makers by rising awareness about non-technological aspects of robotics (ethics, legal, socioeconomic, data, privacy, gender) by organising community building and co-creation events bringing together robotics community and citizens, advocating for the responsible robotics among all stakeholder groups, incl. policy makers, developing a responsible robotics maturity assessment model and bringing the project results to the standardization bodies.

Robotics4EU will implement the following set of activities: 1) assessing the needs and developing a responsible robotics maturity assessment model that is a practical tool for the robotics developers and helps them to strategically plan and the uptake of the legal, societal and ethical aspects of robotics; 2) empowering the robotics community by organising capacity building events in healthcare, agri-food, agile production and infrastructure; 3) ensure citizen acceptance of robotics (via citizen consultations) and assessing robotics ideas and applications provided by the industry with end-users (via online consultation and co-creation workshops); 4) reaching out to the policy makers by

compiling a responsible robotics advocacy report, organising a high-level policy debate and transferring the results to the standardization bodies¹.

3. Responsible Research and Innovation (RRI) strategy

Research and innovation are not created in a vacuum. The technologies developed in R&I processes can have a large impact on society and transform it in a positive way, but they can also have potentially far-reaching, uncertain, and unpredictable social consequences. As such, researchers and project participants have important responsibilities of working in ethical and responsible ways with their topics of inquiry. In this chapter we describe how RRI can do just that, and operationalize it for the project.

3.1. What is RRI?

In addition to being a scholarly field in itself, Responsible Research and Innovation (RRI) is a policy and self-regulation strategy that engages policy-makers, industry, experts, stakeholders and researchers. Various definitions of RRI have been given in the literature; we here report the ones that were most influential in policy-making. According to Rene von Schomberg (2011:9), RRI is “a transparent, interactive process by which societal actors and innovators become *mutually responsive to each other* with a view to the *(ethical) acceptability, sustainability and societal desirability* of the innovation process and its marketable products (in order to allow a proper embedding of scientific and technological advances in our society)” (our italics). This is echoed by the European Union’s Horizon 2020 programme, which defines RRI as: “an inclusive approach to research and innovation (R&I), to ensure that societal actors work together during the whole research and innovation process. It aims to better align both the process and outcomes of R&I, with the values, needs and expectations of European society².” There are two major RRI models in Europe: **the European Commission six policy agendas** and **the 4-sectors Nordic model**. The European Commission has provided concrete normative orientation for RRI in the form of six policy keys³:

1. **ethics**, focusing on (a) research integrity (prevention of unacceptable research and research practices) and (b) science and society: the ethical acceptability of scientific and technological development;
2. **gender equality**, which is about promoting gender-balanced teams and decision-making bodies and considering the gender dimension in the content of R&I;

¹ Project information from CORDIS: <https://cordis.europa.eu/project/id/101017283>

² From the European Commission’s “Public Engagement and Responsible Research and Innovation” <https://ec.europa.eu/programmes/horizon2020/en/h2020-section/public-engagement-responsible-research-and-innovation>

³ From the European Commission’s “Responsible Research and Innovation” <https://ec.europa.eu/programmes/horizon2020/en/h2020-section/responsible-research-innovation>

3. **governance**, meaning that in order to lead to acceptable and desirable futures, arrangements have to be (a) robust and adaptable to the unpredictable development of R&I; (b) familiar enough to align with existing practices in R&I; (c) share responsibility and accountability among all actors and (d) provide governance instruments to actually foster this shared responsibility;
4. **open-access**, of research and dissemination;
5. **public engagement**, which refers to fostering R&I processes that are collaborative and multi-actor and
6. **science education**, that focuses on (a) enhancing the current education process to better equip citizens with the necessary knowledge and skills so they can participate in R&I debates and (b) promote scientific vocations.

Numerous tools have been created through European projects, such as **rri-tools.eu** and **newhorizon.eu/thinking-tool**.

Conversely, **the 4-sector Nordic RRI model** conceptualized by Stilgoe et al. (2013) describes RRI as consisting of four dimensions: **anticipation, inclusion, reflexivity** and **responsiveness**. The Nordic RRI model is more abstract in its conceptualization as it has been developed by RRI researchers, but it has been translated into concrete tools: notably, the STS (Science and Technology Studies) community at the University of Vienna has developed a card-based method called **“Imagine RRI”**, a set of activities to directly engage researchers in reflecting on RRI in their own research practice (Felt et al. 2018) and available under the Creative Commons License at phaidra.univie.ac.at/view/o:690945. We will draw on all these for our RRI activities.

3.2. End-user engagement

“The engagement of end-users and society (the public and civil society stakeholders), is a necessary path towards the implementation of RRI, making innovation with and for end-users and society more effective, ethical and socially desirable” (Cavallaro et al., 2014, p.4). **End-users and citizen engagement** are among the drivers of innovation in the **“Quadruple Helix Innovation Model”** as stated in the 2013 Dublin Declaration⁴, along with the government and public sector, business and private sector, and higher education. In a nutshell, socially responsible innovation allows societal groups to become innovators (through engagement in product development) and beneficiaries (end-users) at the same time. Inclusive innovation allows marginalized groups to be both recipients and co-creators.

Therefore, developing an extensive, inclusive framework for end-user engagement throughout all aspects of the Robotics4EU project will be an essential component for realizing RRI principles in our work.

The ‘upstream’, inclusive, and transparent engagement of all societal actors, researchers, industry, policy-makers and civil society in science governance decision-

⁴ <https://ec.europa.eu/digital-single-market/en/news/-dublin-innovation-declaration-manifesto-ten-point-declaration-create-more-wealth-better>

making is one of the key action points in the RRI framework for EU innovation. It is important to note that there is a difference between being **engaged** and *involved* in the innovation process. Engagement reaches deeper than involvement, as it is “**a mutually beneficial interaction** that results in participants feeling valued for their unique contribution” (Cavallaro et al. 2014; our italics).

Cavallaro et al. (2014) put forward the following models summarizing **the multiple modes of user-led innovation**, modified after Wise and Høgenhaven (2008):

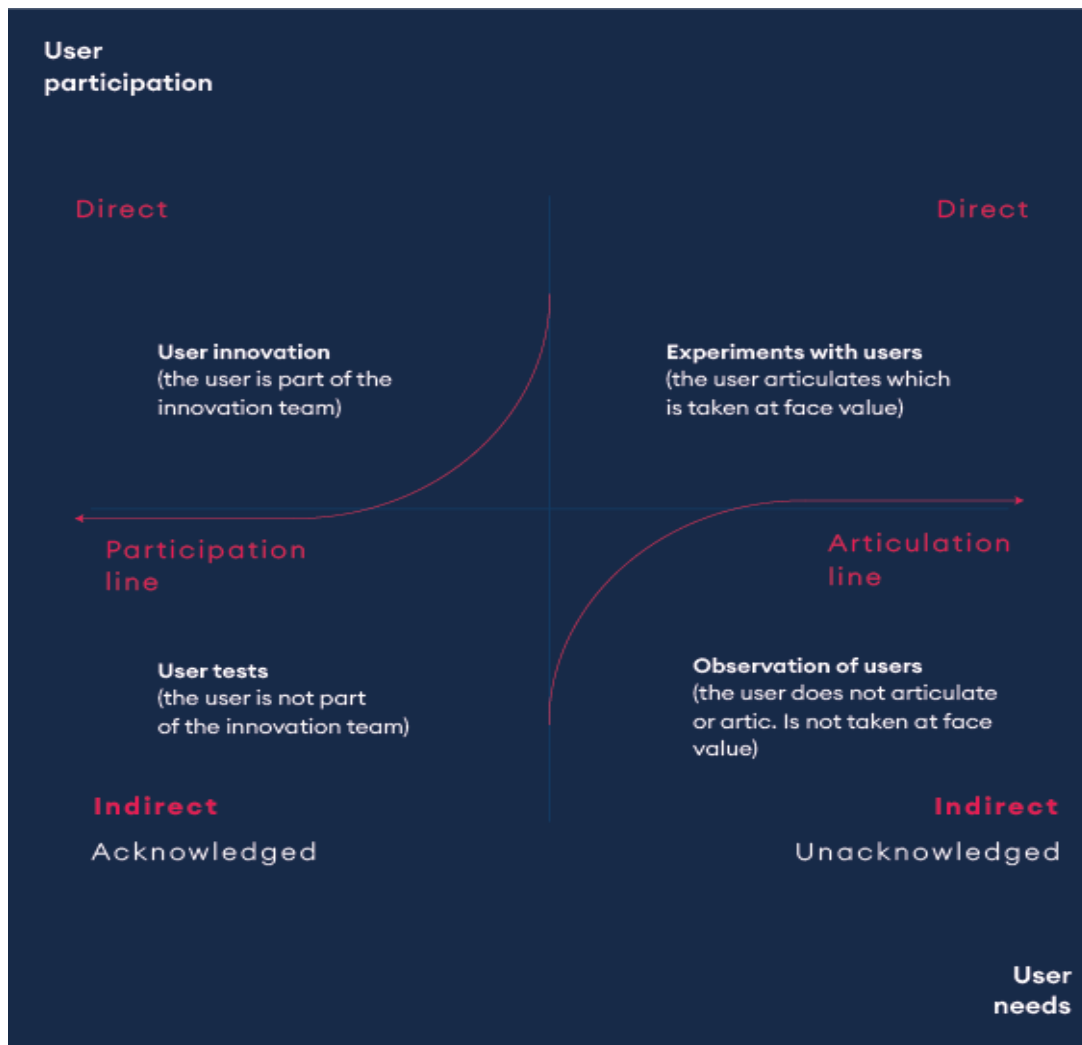


Figure 1 from Cavallaro et al. (2014, p. 16) (modified after Wise and Høgenhaven (2008)): The multiple modes of user-led innovation.

The left side of the figure represents activities of conceptualization, prototyping, testing and implementation. “User innovation” means that users are members of the innovation team; “user test” means that they are not, and user-test activities include for example focus groups. In the area above the “participation line” in the figure, users are part of the innovation team. In the remaining three quadrants, user knowledge is accessed by asking, observing or experimenting with users.

Citizens are no longer considered passive recipients of science; through participatory learning and training they become “**co-creators of innovation**” (Sutcliffe, 2013) and “**makers of knowledge**” (MacMillan and Benton, 2014). Diversity in employee demographics can be in itself a factor in end-user engagement, and in particular gender seems to be a key factor. Two large-scale surveys among European researchers carried out by Bühner and Wroblewski (2019) reveal significant differences between women and men researchers regarding their practice and perceptions of RRI. Particularly, women researchers are more involved in end-user engagement activities and dissemination of research.

3.3 Implementing RRI in Robotics4EU

Our RRI activities are a hybrid of the two RRI models (the EC and the Nordic). We created a model **tailored for responsible robotics** for the Robotics4EU project. Primarily, we will use questions and inquiries based on the two sets of RRI tools described above: the “Imagine RRI”-cards and the RRI self-reflection tools included in the RRI-tools and NewHoRRizon projects. Specifically, we will do the following steps:

1. **Develop a “Robotics-RRI” questionnaire for gathering responses from all project participants** (in practice we will use an online survey tool which will allow us to collect responses in an orderly and efficient manner). It is important that each partner has most (ideally all) of their staff working on the Robotics4EU projects respond to the questionnaire. We will draw key questions from the above-mentioned tools and add additional reflective questions that are key for the project. This will generate responses that take all opinions, thoughts and considerations into account on these issues. We envision that the questionnaire would take 20 minutes to fill out – and it will be an important activity in *self-reflection* for project participants.
2. Based on the answers, we will then hold an **internal project workshop** where selected reflective questions will form the basis for discussions that are specifically important for the consortium, with groups of circa zoom breakout-rooms. The suggested duration of this workshop is two hours (including a 15 minutes break). This workshop will take place in May 2021 (M5 of the project). Similar workshops will be held annually in this three-year project, and will be done three times in total (beginning, midway and towards the end of the project) to ensure a continuum in reflective thinking. Ideally, one of these should be done in person, connected to in-person project consortium meetings if possible). These are called Societal Readiness workshops (**SR workshops**).

Our chosen method for ensuring good RRI and SRL development and self-reflection for the Robotics4EU project is to engage with project internal workshops, in addition to the aforementioned survey.

Societal Readiness Workshops (2 hours each)			
Number	When	RRI focus (1st hour)	SRL focus (2nd hour)
1	May 2021	Anticipation & inclusion	Steps 1-3
2	February 2022	Reflexivity	Steps 4-6
3	August 2023	Responsiveness	Steps 7-9

The responses to our “Robotics-RRI” questionnaire along with the discussion output from the internal workshop will be used to **direct future tasks of the project and their associated deliverables**. We will develop a procedure to regularly report to the consortium partners on the results of the internal RRI workshops, and assess whether these conclusions have been appropriately implemented.

4. Societal Readiness Level (SRL) strategy

Through the practical SRL strategy detailed below, we will nudge project participants into reflecting on the societal appropriateness of their work multiple times, at **critical stages in the project life-cycle**. The SRL-strategy will be connected to the RRI-strategy above, offering guidance for the consortium on the **concrete implementation** of the principles of RRI in their innovation work. Our inclusive approach will consider social, cultural and gender aspects.

4.1 What is SRL?

One of the key goals of the RRI responsibility frameworks is to better **align research and innovation with broader societal needs and expectations** (Pellé and Reber 2015). Through RRI, “societal actors and innovators become *mutually responsive* to each other” (Schomberg 2011, our italics). Among other aspects, this *responsivity-responsibility* invests “the societal desirability of the innovation process and its marketable products... to allow a proper embedding of scientific and technological advances in our society” (Schomberg 2011). **Societal Readiness Level (SRL)** is “a way of assessing *the level of societal adaptation* of... a particular social project, a technology, a product, a process, or an innovation” that must be “integrated into society” (Innovation Fund Denmark; our italics). Low SRL means, in essence, that society is not quite ready for a particular innovation. The social adaptation of the innovation will then require a well thought-through transition plan: “the lower the SRL, the better the plan for the transition must be” (Innovation Fund Denmark).

We base our conceptualization on the **nine-stage SRL model** developed by Innovation Fund Denmark, as described below⁵:

⁵ “Societal Readiness Levels (SRL) defined according to Innovation Fund Denmark”
https://innovationsfonden.dk/sites/default/files/2019-03/societal_readiness_levels_-_srl.pdf

- **SRL 1** – Identifying the problem and identifying societal readiness
- **SRL 2** – Formulation of the problem, proposed solution(s) and potential impact, expected societal readiness; identifying relevant stakeholders for the project
- **SRL 3** – Initial testing of proposed solution(s) together with relevant stakeholders
- **SRL 4** – problem validated through pilot testing in relevant environment to substantiate proposed impact and societal readiness
- **SRL 5** – proposed solution(s) validated, now by relevant stakeholders in the area
- **SRL 6** – solution(s) demonstrated in relevant environment and in co-operation with relevant stakeholders to gain initial feedback on potential impact
- **SRL 7** – refinement of project and/or solution and, if needed, retesting in relevant environment with relevant stakeholders
- **SRL 8** – proposed solution(s) as well as a plan for societal adaptation complete and qualified
- **SRL 9** – actual project solution(s) proven in relevant environment.



Figure 2 Relation between RRI influence level and SRL (taken from Wullum Nielsen et al., 2018, p. 11; inspired by Figure 9.1 in Lettice et al., 2017).

The rectangular boxes are modelled after a familiar process of technical development where the corresponding societal readiness levels of the solution can also increase. The first box represents SRL 1–3 where the problem is initially defined and a plan of action developed. The second two boxes represent the successive steps where the solution is formulated, tested, evaluated, and modified in an iterative fashion, and the final box represents a high level of SRL, e.g. 6–9, where the solution is ready to be deployed.

The triangles represent opportunities to engage in RRI reflections of the project such that the iterative design process has RRI principles intentionally and holistically integrated into it. A big component of these reflections will be the annual SR workshops outlined in Section 2.3. These workshops will prompt the research team to engage in reflection on how RRI principles are integrated into our own research. Thus, they will not assess whether the SRLs have been achieved, but they will ensure that the activities we engage in to reach successive SRLs outlined below take RRI principles into account in terms of their recruitment of participants, how they are carried out and how the data is analyzed.

4.2 Formulating Expected SRL throughout Robotics4EU

Robotics4EU will develop a **Maturity Assessment Model** to assess the societal readiness of a given robotic solution. The goal of this Model is for companies, policymakers, regulatory bodies, or other interested stakeholders to assess different aspects of a robotic system to arrive at a measurement of that solution's societal readiness. Robotics4EU is *also* facilitating citizen consultations in parallel to these industry events, some of which will involve companies presenting actual business plans or robotic solutions.

These two parallel aspects have defined SRL goals to be reached at the conclusion of Robotics4EU:

- The Maturity Assessment Model is expected to be at SRL 6–9
- Business plans and robotic solutions are expected to be at SRL 4–6

For the Maturity Assessment Model to reach a high SRL it:

1. Must be easy for stakeholders to use and have their buy-in as to the accuracy of its results.
2. Must assess technology using criteria that will determine its acceptance by society.

The 1st aspect can be developed, tested, refined, and validated during a series of engagements with relevant stakeholders in the robotics communities. These engagements will take the form of surveys, interviews, online consultations, or workshops that cover topics such as legal, ethical, privacy, security, and socio-economic factors that are important both when implementing RRI principles and for achieving high levels of societal readiness.

The 2nd aspect can be tested/evaluated/refined during a series of consultations with citizens and end-users where they can comment on issues that are important to them. These will take the form of facilitated discussions and co-creation workshops where citizens can present their concerns in an open-ended fashion as well as ones where they respond to specific robotic systems or business plans for their implementation. The events primarily focus on helping business plans and robotic solutions reach successive SRL goals outlined above, but they can be useful for thinking about the Model as well. The Model will not be presented during the events but, following the events, we can evaluate whether the aspects of the Model measuring societal acceptance align with that citizens and end-users themselves raise as important considerations that drive their acceptance of robots.

The Model will be continuously revised throughout the project, responding to feedback from the stakeholders who will use the Model regarding its robustness and usability. The Model can also be evaluated in light of the citizen consultations.

5. Assessing RRI integration and SRLs

This document has provided guidelines for the integration of RRI principles into Robotics4EU activities as well as specific SRL goals for the Maturity Assessment Model and robot solutions and business plans. We here provide guidelines for assessing whether those goals have been achieved.

5.1 How to assess RRI integration

The project contains many levels of consultations with experts and stakeholders in the robotics community as well as average citizens. Integrating RRI into our activities will depend on **who** is engaged and **how** are they engaged during these consultations. We must ensure that these groups are meaningfully diverse and that the events themselves include meaningful participation from people of diverse backgrounds (Anticipation & Inclusion). We must also be open to changing our assumptions and practices based on issues raised during the consultations (Reflexivity & Responsiveness).

When assessing **who** is engaged and **how** they are engaged, both in consultations with stakeholders outside the project and within our own implementation activities in the project consortium, we can consider Søråa et al.'s (2020) recommendations for diversifying research projects as an example. This was originally developed for evaluating gender engagement in a different H2020 CSA project. We can reframe the questions to encompass diversity more broadly which, in addition to gender, includes race/ethnicity, age, ability, sexual orientation, or level of seniority in an organization. *“By implementing these questions, an inclusive engagement of multiple key stakeholders that represent key societal groups can be included and engaged. This can be done prior, during- and post discussions of a chosen topic by providing agency and autonomy both in the owning of problems, and the development of solutions”* (Søråa et al., 2020):

1. Is the value of diversity perspectives highlighted?

There are deliverables that focus on gender and diversity issues in specific, and we can ensure that this is thematized in the project's expert group.

2. Are diversity goals translated to the project's participants and stakeholders in a coherent manner?

It is important that we as a consortium build a culture of diversity and inclusion that reach within and outward the consortium and having three workshops specifically on RRI will help ensure this.

3. Are there allocated research tools and training opportunities on diversity issues?

Diversity questions will be thematized through the SR workshops within the project, where we will develop key choices for how to include widely throughout and outward from the project.

4. Are linguistic problems with representation of diversity issues taken into account?

Robotics4EU consists of a wide variety of nationalities and cultures and draws on stakeholders across Europe and beyond – therefore ensuring that the language we use is gender-inclusive and free of bias is important. Having gender-neutral titles included in questionnaires is one example, and using a wide variety of examples of stakeholders e.g. with different nationalities, gender, age, age and abilities.

5. Are diversity perspectives understood in intersectional contexts?

It is important that stakeholders are not tokenized and included “just because they are a person who is [diversity criteria]. Likewise, intersectional inclusive clustering of e.g. having people of colour, women, abilities etc. be all held by one or few people is not really diverse if the rest consists of white male able bodied men.

When project activities undergo formal evaluations (for example, the workshops with sector-specific stakeholders will each have an internal Impact Assessment), such assessments will include questions similar to these. Additionally, the annual SR workshops will provide an opportunity for reflection on other events with external stakeholders as well as internal project activities in regard to RRI principles. Such workshops may result in including other questions for RRI assessment. The results of these workshops will be formally reported to the consortium so that RRI principles remain part of the project conversation throughout its entire duration.

Such questions will also be asked about large project activities in addition to individual consultation events. For example:

- The Maturity Assessment Model is developed largely through consultation with a wide variety of stakeholders. Were the views of diverse stakeholders taken into account as the Model was created? Were there noticeable differences in these views and concerns between different groups of stakeholders? How were these differences accounted for in the Model? How does the Model prompt stakeholders to explicitly include diverse constituencies in their evaluation of their solution?
- Are Dissemination and Communication activities targeted to reach and engage a diverse audience?

5.2 How to assess Societal Readiness Level

Societal Readiness Levels as conceived by Innovation Fund Denmark are essentially about the solution being evaluated by increasingly large potential user-groups in increasingly broader settings. At each step along the way we can ask:

1. Does the solution solve the identified problem by delivering the envisioned impact?
2. Will the solution be broadly accepted by society?
3. What aspects of the solution might hinder its societal acceptance, and does the solution address these concerns?
4. Are there any unforeseen societal consequences that are created by the solution?

These general questions, especially the 3rd, can have very different implications in different contexts. Different solutions might have widely differing aspects that must be addressed to ensure societal acceptance. For robots in the four Robotics4EU sectors we have identified the following areas that should be addressed: legal, ethical, cyber-security, data-protection, socioeconomic issues, privacy, and diversity and inclusion. This may not be an exhaustive list, and our citizen consultations may indeed identify other areas that need to be addressed when assessing SRL.

Additionally, the incorporation of RRI principles into the development and evaluation process is essential for it to achieve a high SRL. This is true for our own project activities as well as for the development of any other technology that will measure itself on the SRL scale. If the above questions can be meaningfully answered for a diverse constituency, then the SRL level is likely to be high for a broad cross-section of society. If it is limited, the SRL determination is likely to be less reliable. Therefore, the following general question can be asked when assessing an SRL:

- How might the solution effect diverse constituencies differently? How are the concerns of diverse constituencies incorporated into the solution?

There are two aspects of Robotics4EU that have defined SRL goals: The Maturity Assessment Model and specific robotic solutions and business plans. To assess these SRLs we can continually ask, in relation to the questions outlined above:

Assessment of Maturity Assessment Model

- Does the Maturity Assessment Model lead to an accurate assessment of whether a robotic solution will be accepted by society?
- Do the societal acceptance dimensions measured by the Model correspond to what issues citizen groups identify as importance when determining their acceptance?
- Is the Model easy to use by stakeholders such that it can be widely implemented?

Assessment of robotic solutions and business plans

- Do citizen groups accept the robots that are presented to them?

When assessing SRL the integration of RRI principles is key; if we are answering these questions only in relation to a narrow selection of stakeholders, we will not get an accurate assessment as to society's acceptance in all its diversity.

Additionally, SRLs are modelled closely after the more familiar Technology Readiness Levels (TRLs). It uses language about “demonstration” “validated” and “proven”. When assessing a technology from a technical perspective this terminology is much easier to quantify and define. A piece of technology either works or it doesn't and, if it doesn't, understanding why it doesn't is a straightforward (although still difficult) technical exercise. Therefore, using such language suggests SRLs can be measured using quantitative means. This does have some precedence in European approaches towards addressing equity and diversity, two aspects that are important for RRI activities and SRL assessment; several Horizon 2020 and FP7 projects⁶ have put forth tools that are quantitative in nature, e.g., how many women are in management positions or have won staff awards.⁷ However, these projects also acknowledge that “progress towards gender equality in research is difficult to monitor” (Sekula & Pustułka 2016, p. 13). Our focus on SRLs differs in two main ways: we are dealing with even more diffuse categories like “ethics” or “privacy” and we are focusing on the results of projects, not merely how institutions structure themselves.

Given these differences, such quantitative language becomes more difficult to employ (Gianni 2020; Jasanoff 2016; Horckheimer & Adorno 2002). Indeed, the use of quantitative measures when qualitative assessment is more appropriate is a known difficulty in the field (Von Schonberg 2013, 2014; Wickson & Forsberg 2015) and can lead to a “bureaucratization of thought” that does not allow for nuance: “the risks stemming from the bureaucratization of thought and the supremacy of technique over

⁶ Some examples are PLOTINA (<https://www.plotina.eu/plotina-formative-toolkit/>); GenderTime (<https://gendertime.org/Toolbox>); CASPER (<https://www.caspergender.eu>); EFFORTI (<https://efforti.eu>); and GEDII (<https://www.gedii.eu/self-assessment-tool/>).

⁷ <https://gendertime.org/node/233>

politics urge us to focus on humanistic and social ends” (Gianni 2020, pp. 12–13). No matter how diverse a group of stakeholders we engage, there is likely never going to be perfect agreement about what “privacy” is or how a robot can perfectly address it. Therefore, the division between SRLs is likely to be much fuzzier than TRLs. Through the SR workshops and other project discussions, the Robotics4EU project team will continually evaluate how best to measure these intangible parameters throughout the duration of the project, and we hope to provide a useful resource to other projects.

6. Conclusion: Key insights

This Societal Readiness Plan for the **Horizon Europe funded Coordination and Support Action project Robotics4EU (2020-2023)** includes both project-internal and stakeholder-external frameworks for RRI and SRL. This first deliverable of the project describes how a **Responsible Research and Innovation (RRI) framework** will be developed, implemented and followed throughout the project. It also describes how a **Social Readiness Level (SRL) framework** is put into action, both as a tool within the project for a Maturity Assessment Calculator, and for external evaluations of robotics-technologies. We provide practical insight for how the project can ensure that it follows good RRI practices, ensuring that the project **meets its impact goals** of better integrating robotics-technologies into the European society.

7. References

- Bührer, S., & Wroblewski, A. (2019). The practice and perceptions of RRI—A gender perspective. *Evaluation and Program Planning*, 77, 101717. <https://doi.org/https://doi.org/10.1016/j.evalprogplan.2019.101717>
- Cavallaro, F., Obach, M., Schroeder, D., Chennells, R., Snyders, L., Steenkamp, A., Bierwirth, A., & Kumar, A. (2014). *Responsible Research and Innovation and End-Users: Report for FP7 Project “ProGReSS”*. https://www.progressproject.eu/wp-content/uploads/2014/11/PROGRESS-D4_2-RRI-and-End-users.pdf
- Felt, U., Fochler, M., & Sigl, L. (2018). IMAGINE RRI. A card-based method for reflecting on responsibility in life science research. *Journal of Responsible Innovation*, 5(2), 201-224. <https://doi.org/10.1080/23299460.2018.1457402>
- Jasanoff, S. (2016). *The Ethics of Invention: Technology and the Human Future*. Norton.
- Gianni, R. (2020). Scientific and democratic relevance of RRI: Dimensions and relations. In E. Yaghmaei & I. van de Poel (Eds.), *Assessment of Responsible Innovation: Methods and Practices* (pp. 11–41). Routledge. <https://doi.org/10.4324/9780429298998>
- Horkheimer, M. & Adorno, T. W. (2002 [1947]). *Dialectic of Enlightenment*. Stanford University Press.
- Lettice, F., Rogers, H., Yaghmaei, E., & Pawar, K. S. (2017). Responsible Research and Innovation Revisited: Aligning Product Development Processes with the Corporate Responsibility Agenda. In A. Brem & E. Viardot (Eds.), *Revolution of Innovation Management: Volume 2 Internationalization and Business Models* (pp. 247-269). Palgrave Macmillan UK. https://doi.org/10.1057/978-1-349-95123-9_9
- MacMillan, T. & Benton, T.G. (2014) Agriculture: Engaging farmers in research, *Nature*, 509(7498), 25 <https://www.doi.org/10.1038/509025a>
- Pellé, S., & Reber, B. (2015). Responsible Innovation in the Light of Moral Responsibility. *Journal on Chain and Network Science*, 15(2), 107 - 117. <https://hal.archives-ouvertes.fr/hal-01418017>
- Sekula, P., & Pustulka, P. (2016). *Successful gender equality measures and conditions for improving research environment in the fields linked to physics: Report for the Horizon 2020 project “GENERA”*. https://genera-project.com/dl_assets/WorkingPaper1.pdf
- Stahl, B. C., Obach, M., Yaghmaei, E., Ikonen, V., Chatfield, K., & Brem, A. (2017). The Responsible Research and Innovation (RRI) Maturity Model: Linking Theory and Practice. *Sustainability*, 9(6), 1036. <https://www.mdpi.com/2071-1050/9/6/1036>

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

<https://doi.org/https://doi.org/10.1016/j.respol.2013.05.008>

Sutcliffe, H. (2013). *A report on Responsible Research & Innovation*. DG Research and Innovation, European Commission. Available from:

http://ec.europa.eu/public_opinion/archives/ebs/ebs_401_en.pdf

Søraa, R. A., Anfinssen, M., Foulds, C., Korsnes, M., Lagesen, V., Robison, R., & Ryghaug, M. (2020). Diversifying diversity: Inclusive engagement, intersectionality, and gender identity in a European Social Sciences and Humanities Energy research project. *Energy Research & Social Science*, 62, 101380. <https://doi.org/https://doi.org/10.1016/j.erss.2019.101380>

von Schomberg, R. (2013). *Towards Responsible Research and Innovation in the Information and Communication Technologies and Security Technologies Fields*. European Commission-DG Research and Innovation.

<https://ssrn.com/abstract=2436399>.

von Schomberg, R. (2014). The Quest for the 'Right' Impacts of Science and Technology: A Framework for Responsible Research and Innovation. In J. van den Hoven, N. Doorn, T. Swierstra, B.-J. Koops, & H. Romijn (Eds.), *Responsible Innovation 1: Innovative Solutions for Global Issues* (pp. 33-50). Springer Netherlands. https://doi.org/10.1007/978-94-017-8956-1_3

Wickson, F., & Forsberg, E.-M. (2015). Standardising Responsibility? The Significance of Interstitial Spaces. *Science and Engineering Ethics*, 21(5), 1159-1180. <https://doi.org/10.1007/s11948-014-9602-4>

Wise, E. and Høgenhaven, C. (eds.) (2008) *User-Driven Innovation - Context and Cases in the Nordic Region*. Nordic Innovation Center.

<https://lucris.lub.lu.se/ws/files/5921072/1303961.pdf>

Wullum Nielsen, M, Mejlgard, N, Alnor, E, Griessler, E, Meijer I (2018). *Ensuring societal readiness: A thinking tool*.

https://www.thinkingtool.eu/Deliverable_6.1_Final_April%2030_THINKING_TOOL.pdf

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