



Deliverable 1.2

**Initial workbook on RRI
in start-ups and impact
investment**

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Initial Workbook on RRI in start-ups and impact investment

Executive Summary:

This workbook is the result of the research conducted in the project RRlstart (particularly, the development of our quadruple helix RRI lean start-up impact assessment model in Deliverable 1.1) on responsible start-ups and investment and aims to provide clear worksheets for start-ups aiming to implement responsible behaviours and practices in the workplace. However, it could also be used as a tool by investors to test how responsible an organisation is that they want to invest in. The worksheets provided in this workbook are designed to be used in several specific settings but are intended to work as a way for organisations to identify what they are currently doing right and what they need to improve on. Most of the worksheets have open questions to provide the context, background, and rationale behind an organisation's actions. The worksheets are not intended to provide a 'right/wrong' dichotomy or to scold organisations about their practices, but to work with companies to allow them to self-reflect on their challenges and to also provide some guidance in what can be improved upon.

The workbook is based on our quadruple helix, responsible research and innovation, lean start-up model (QH-RRI-LSA), or as we have termed it 'The Responsible Impact Assessment Model'. The rationale and purpose of this model are to provide start-ups with an approach that will allow them to implement responsible practices within their organisation and to become aware of their societal impacts. During our research, it was shown that while the RRI approach is helpful for start-ups, often it focuses too stringently on the societal impact of companies, which may be quite difficult for a new start-up. On the other hand, the LSA approach provides effective guidance on how start-ups can best approach the running of their business. While both approaches offer something vital for companies aiming to become (or stay) responsible, they need a more balanced alignment. To do this, we propose that RRI and LSA should be framed within the QH approach, which gives equal footing to societal, business, political, and research concerns.

The RRlstart Responsible Impact Assessment Model brings together the more ethically-focused world of RRI with the practically-orientated lean start-up approach. The model culminated in a list of indicators, which were retrieved from extensive research on key indicators found within large RRI projects, the lean start-up framework, and some of the most renowned investment indicators in the area (for example, the industry-standard method for screening for investment criteria, developed by GIIN, was used: *Impact Reporting and Investment Standards* or 'IRIS').

IRIS+ allowed us to identify what some of the most important indicators should be for start-up companies aiming to initiate, implement, and report their responsible research and innovation practices. The IRIS+ method was critically evaluated through the lens of a start-up and what is most relevant for these companies, which typically are dynamic, fast-moving, small in size, and that heavily rely on innovative practices to grow and sustain themselves. It was acknowledged that not all criteria within the very large IRIS+ document are relevant or easy for start-ups to address. Furthermore, many of the points were not relevant for responsible innovation and investment practice. As a result, we initiated several rounds of an internal and external examination of all the retrieved indicators (see D1.1), refining them down to the 24 most important ones for start-ups. These 24 indicators were mapped into the four main strands of the quadruple helix model to give consistent regard and merit for each of the four helixes (political, business, societal, and research).

For this workbook, we identified that while these indicators are clear and work as effective goals and tools for identifying responsible start-up practice, and classifying the four main groups that are significant for a start-up, start-ups still need practical tools to implement them. This can be done through several practical worksheets that help organisations identify, detail, and strive towards the best practices in their companies. This must be done on several levels and can take the form of several types of documents. During our analysis, it became clear that the analysis and many of the indicators found in the RRI grey literature, lean-start up approach, and the IRIS+ model would be suitable for several different workbooks to help start-ups implement responsible practices. During our analysis, many of the indicators related to data would probably be best accommodated in a separate data management plan, rather than spread out amongst many documents. The same applied for indicators specifically related to how employees were treated (questionnaires), indicators specifically related to the companies' products/actions, and so forth.

It must be made clear that our intentions are not to create a box-ticking exercise, as the worksheets are meant as much more than simply yes/no responses. The worksheets provide questions to identify how start-ups are already implementing responsible practices, how they are doing so, areas for improvement, and to develop approaches with the organisations about future best practices. The worksheets are qualitative and should be understood contextually to account for the dynamic, adaptive, and evolving nature of start-ups, rather than a 'checklist' or quantitative list where companies get points for each correct or wrong answer. Investors may also use these worksheets to identify how a start-up replies to each question, what kind of actions have been taken in the start-up, and if they are implementing responsible behaviours in practice.

A traditional checklist-type worksheet is not suitable for the nature of start-ups and may provide misleading and unfair results. Our qualitative indicators provide a more nuanced, clear, and

representative analysis of the start-up, and allow them to engage and report on what they value and how the indicators are relevant for their organisation.

The first version of the worksheets was tested in a workshop held on March 10th 2022 involving representatives of some start-ups of a number of different countries. This feedback was incorporated into this final document.

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1. Introduction

RRIstart is an Horizon2020 Project that responds to the EU efforts to foster impact investment (an investment that delivers social, environmental and economic benefits) by developing an innovative RRI-based model for start-ups, comprising an RRI-based impact investment indicator list in a multi-stakeholder (quadruple helix) context. Through RRIstart, the consortium aims to demonstrate the value of RRI for the STEM entrepreneurship ecosystem. At the moment, start-ups and investors do not adopt existing RRI principles and indicators due partly to the limited compatibility of existing RRI models (tailored mostly for large organizations). Nevertheless, by adopting a lean/agile approach to RRI embedment, RRIstart proposes a novel RRI model for start-ups blended with novel RRI-based impact investment indicators.

This Deliverable emerged from the efforts of the RRIstart consortium, in particular, the work carried out in Deliverable 1.1., which analysed current state-of-the-art research conducted on the topic of socially responsible investment (SRI), responsible research and innovation (RRI), and lean start-up approaches (LSA) (Task 1.1). Deliverable D1.1. also analysed a wide range of indicators retrieved from investment impact assessments (such as GIIN's IRIS+ model) and indicators within large RRI projects (Task 1.2). Finally, we developed our quadruple helix RRI LSA impact investment model (see appendix 1) and its subsequent 24 indicators (see appendix 2) as an approach to guide responsible behaviour for start-ups and to provide information for investors who want to invest in responsible start-ups (Task 1.3).

The proposed workbook is the result of the research conducted in the project RRIstart on responsible start-ups and investment and aims to provide clear worksheets for start-ups aiming to implement responsible behaviours and practices in the workplace. However, it could also be used as a tool by investors to test how responsible an organisation is that they want to invest in. The worksheets are designed to be used in several specific settings but are intended to work as a way for organisations to identify what they are currently doing right and what they need to improve on. Most of the worksheets have open questions to provide the context, background, and rationale behind an organisation's actions. The worksheets are not intended to provide a 'right/wrong' dichotomy or to scold organisations about their practices, but to work with companies to allow them to self-reflect on their challenges and to provide some guidance in what can be improved upon.

The workbook is based on our quadruple helix, responsible research and innovation, lean start-up model (QH-RRI-LSA) (see Appendix 1 for a brief overview of this model). The purpose of this model is to provide start-ups with an approach that will allow them to assess their current standing against RRI, implement responsible practices, and become aware of their societal impacts. During our research, it was shown that while the RRI approach is helpful for start-ups, often it focuses too stringently on the societal impact of companies, which may be quite difficult for a new start-up.

While the LSA approach focuses more on how start-ups can best approach the running of their business. Both approaches offer something vital for start-ups, both need a more balanced alignment. To do this, we propose that RRI and LSA should be framed within the QH approach, which gives equal footing to societal, business, political, and research concerns.

The RRStart Responsible Impact Assessment Model brings together the more ethically-focused world of RRI with the practically-orientated lean start-up approach (LSA) and the equal footing to societal, business, political, and research concerns of the QH approach (QH-RRI-LSA; see Appendix 1 for a brief overview of this model). The model culminated in a list of indicators, which were retrieved from extensive research on key indicators found within large RRI projects, the lean start-up framework, and some of the most renowned investment indicators in the area (for example, the industry-standard method for screening for investment criteria, developed by GIIN, was used: *Impact Reporting and Investment Standards* or 'IRIS').

IRIS+ allowed us to identify the most important indicators for start-ups aiming to initiate, implement, and report their responsible research and innovation practices. The IRIS+ method was critically evaluated through the lens of a start-up and what is most relevant for these companies, which typically are the size of the start-up is generally smaller, the organisation of the start-up is more fluid, there is a high reliance on their network, product uncertainty, and creativity and highly-skilled areas (findings from Deliverable 1.1). It was acknowledged that not all criteria within the very large IRIS+ model were relevant or easy for start-ups to address.

The team also gathered 411 indicators from RRI projects, which was combined with those found in IRIS+ and narrowed down to find the most important and relevant ones. Many of the indicators were not relevant for responsible innovation and investment practice. As a result, we initiated several rounds of an internal examination of all the retrieved indicators, refining them down to the 24 most important ones for start-ups (see Appendix 2). These 24 indicators were mapped into the four main strands of the quadruple helix model to give merit for each of the four helixes (political, business, societal, and research).

For this workbook (containing seven worksheets), we identified that while these indicators are clear and work as effective *goals* and tools for identifying responsible start-up practice, and classifying the four main groups that are significant for a start-up, start-ups still need practical tools to implement them. This can be done through several worksheets that help organisations identify, detail, and strive towards the best responsible practices in their start-ups. A worksheet is an assessment tool that can be used by external parties (e.g., researchers, investors, etc.) to understand a start-up's understanding of specific topics or issues, how they respond to them, the outcome of learning from this process, and the process of learning itself. It can allow start-ups to self-identify and reflect on responsible behaviours and enables them to monitor their progress, as well.

The seven worksheets in this workbook were derived from our analysis of the 24 indicators that we identified in Deliverable 1.1., but also, during our initial analysis of IRIS+’s 685 indicators and 411 indicators from the 12 RRI projects that we analysed. During our analysis of the IRIS+ and RRI project indicators, it became apparent that there were some documents or reports where the questions/indicators would be best suited. For each indicator, they were allocated a specific document where they could be relevant (e.g., ‘do you have a data management plan’ was allocated to a data management report of the company’s activities). All of the indicators were grouped like this and it became evident that there were seven overarching documents where these indicators were most relevant.

During our analysis of the 24 indicators, it was clear that the indicators found in the RRI grey literature, lean-start up approach, and the IRIS+ model would be suitable for several different workbooks to help start-ups implement responsible practices. During our analysis, many of the indicators related to data would probably be best accommodated in a separate data management plan, rather than spread out amongst many documents.

Following a first draft of the worksheets, we held a workshop on March 10th 2022, involving representatives of some start-ups of different countries, to test our documents. Overall, we identified seven key documents that could help start-ups identify and implement responsible practices, following the indicators of the Responsible Impact Assessment Model (see Table 1).

Worksheets
1. Data Management Report
2. Report on the Start-up’s Workforce
3. Self-reflection Report
4. Activity Report
5. Product and Organisational Report
6. Evaluation of Stakeholder Involvement
7. Value Statement and Ethical Training

Table 1 Seven Worksheets

Because of the goal-like and general nature of the indicators, it is more effective to try to examine specific instances, examples, and steps towards achieving these indicators, as will be represented in the seven worksheets.

For example, the business indicator “The start-up should ensure that there is a fair gender distribution of highly skilled employees. They should examine the percentages of men and women involved in the start-up to ensure a fair share of female researchers to the total number of researchers” is very ambitious and if the start-up is simply asked if there is a fair gender distribution

within their organisation, many will be unable to give an accurate answer as to what is fair. This is because it is too difficult to give a numeric value of gender distribution for start-ups because of the very nature of these companies (low number of employees, historically under-represented fields, and hiring challenges). The indicators themselves provide an intuitive ideal that organisations must strive towards (i.e., a more gender-balanced workplace).

However, for implementing the worksheets, they should allow companies to provide qualitative responses, as well as further details to such questions. For instance, the start-up may explain the reason for poor gender balance is out of their control, or they are aware of it and are trying to correct it, or there may be a substantial reason why there is an imbalance. Questions about the same topic comes up several times in the worksheets, as it would be too limiting to allocate a single question. As an example, for a more gender-inclusive organisation, we need to find out the percentages of male to female researchers, efforts being made within the start-up, questioning the gender representation among stakeholder feedback, as well as the gender make-up of companies that they deal with. All of this is important to identify how this indicator is representative of the organisation.

It must be made clear that our intentions are not to create a box-ticking exercise, as the worksheets are meant as much more than simply yes/no responses. The worksheets provide reflection stimuli aiming at identifying how start-ups are already implementing responsible practices, how they are doing so, areas for improvement, and to develop approaches with the organisations about future best practices. The worksheets are qualitative and should be understood contextually to account for the dynamic, adaptive, and evolving nature of start-ups, rather than a 'checklist' or quantitative list where companies get points for each correct or wrong answer.

A traditional checklist-type worksheet is not suitable for the nature of start-ups and may provide misleading and unfair results. Our qualitative indicators provide a more nuanced, clear, and representative analysis of the start-up, and allow them to engage and report on what they value and how the indicators are relevant for their organisation.

The structure of this workbook follows the same outline described in Table 1. The worksheets are intended for use in the pilots in RRlstart and to be integrated by the RRlstart team with these start-up organisations. The worksheets can be integrated at different stages of the process and do not have to be implemented all at once. We recommend that organisations begin by conducting the first three worksheets relatively early, as their data management is important to have right at an early stage of the process, it is vital to receive employee input at the start, and it is important that the start-up self-reflects on their practices at the beginning of the process.

This is not to mean that the start-up should only use these worksheets at the start of the process and then never think about them again. These worksheets can be used several times to get

indications of how the organisation is developing, identify potential issues, and ensure that the steps they implement lead to more responsible business outcomes. Many of the worksheets can be used at different stages or multiple stages throughout the companies' development (in particular, at the pre-investment stage). For example, the product and organisational report can be implemented when the start-up is developing or deploying new products (such new product development could also be achieved by applying the Lean start-up approach through iterative cycles for defining the Minimum Viable Product), while the activity report can be used at regular moments to document the organisation's progress, and the evaluation of stakeholder involvement can be integrated intermittingly to ensure stakeholder participation throughout the R&D developments of the company. The report on the organisation's value statement and ethical training should provide insights on how the organisation is implementing ethics and ethical training.

Ultimately, all of the seven worksheets can be used throughout the life-cycle of the start-up to reiterate, strengthen, and solidify best responsible practices within the organisation. They can be used by an investor at the pre-investment stage to identify how a start-up is implementing, or hoping to implement, responsible behaviour in their start-up. It would allow investors to identify if the start-up is a responsible one that they want to invest in.

Finally, this list of worksheets is meant as a first draft and will be revised throughout the RRiStart project (see Appendix 3 for the link between the indicators and the worksheet questions). The workbook is intended to go through several iterative stages, beginning with a draft version made by the Work Package leader Wageningen University & Research and contributions from all partners involved in RRiStart Project. The entire consortium provides their feedback and amendments in the second stage and the third stage comprises an external workshop with key stakeholders to discuss their implementability and if further changes need to be made. After incorporating this feedback, the workbook will be used throughout the pilots within the RRiStart project and evaluate the effectiveness of the questions, through the responses of the participants, the workbook may be revised further by the end of the project. The answers and insights retrieved from the worksheets, throughout the pilots, will further enable the consortium to build upon, refine, and provide practical examples to the list of 24 indicators to guide start-ups to act responsibly. Thus, the responses from the worksheets provide a feedback loop to the indicators to ensure that they are useful, effective, and implementable for start-ups.

2. Data Management Report

An important aspect of responsible behaviour of a start-up is ensuring that the companies' data is retrieved, stored, and managed ethically. Organisations need to incorporate a data management plan to manage their data, but they also need to implement procedures to use their data for social goods (social goods is broadly construed as being beneficial for the public, the environment, and/or society as a whole). To do this, organisations should have technically sound and robust tools at their disposal, ensure that data is protected, and use this data for social goods. Companies should try to make their data open access, whenever possible, and to benefit the research community with their knowledge and findings. Table 1 provides a data management report worksheet.

Question	Response
Do you have a company-wide data management plan? What methodology do you use to do this?	
How do you share data that can be used for social goods (e.g., environmental, beneficial to the public, or for society)?	
What type of technologies are you using for data protection (employee data, client data etc.)? Are you asking consent to use data?	
How is your R&D process generating useful knowledge that can be used by others in research and innovation?	
How are participants in R&D informed about results regarding the R&D process? Is your data gathering method in any way exclusionary of groups or communities?	
Is the information you provide clear and transparent? Is the information accompanied by clear specifications on data structure and variable descriptions to allow for replications or new research purposes?	
Where will the open-access information be stored and who is responsible for maintenance?	
How do you address potential barriers to open access publishing as a result of R&D?	

Table 2 Data Management Report Worksheet

3. Report on the Start-up's Workforce

All companies need to ensure that their employees are respected, treated fairly, and have room to develop in their positions. Start-ups must ensure that their small workforce has the opportunity to grow within the organisation and to bring their knowledge and skills on board within the structuring and aims of the company. While sometimes it is difficult to ensure diversity within start-ups, because of the relatively small workforce and sometimes homogenous demographic in certain industries (e.g., tech), start-ups must strive to ensure better representation within their companies.

Question	Response
How are employees free to be creative in their work? Do they have an opportunity to grow and develop in their roles?	
What skills, knowledge and experience of staff are taken into account? How are their training needs assessed?	
How do employees implement responsible practices in the workplace? How do they know what they should do to ensure responsible practices? Are there specific roles and duties assigned to ensure responsible practices?	
What are the percentages disaggregated by gender, race, disability, etc. involved in R&I/R&D function/teams in the company?	
What are the average hours of training programs for research employees, disaggregated by gender, race, disability, etc.?	
How do you ensure that discrimination based on gender, race, disability, etc. does not occur?	

Table 3 Report on the Start-up's Workforce

4. Self-reflection Report

It is important for start-ups to self-reflect on their current practices and what they have been doing right and what they need to further improve. This type of self-reflection can be done at any stage of the company's life-cycle and it may also be helpful for the start-up to see their past responses to the same questions and to chart how they have improved on certain issues, or how their responses did not necessarily bring about the changes they desired. The self-reflection report below (Table 4) is aimed to map the organisation's reflection on their practices and to work through with them how they can implement responsible practices within the organisation.

Questions	Responses
What are there clear and effective feedback loops so that the R&D process can be responsive to novel societal values and/or risks?	
How do you ensure stakeholders have sufficient knowledge and power to voice their ideas and concerns?	
How do you ensure diversity at work and in the stakeholders you engage?	
How do you ensure innovation to meet: <ul style="list-style-type: none"> - stakeholders' expectations, - external benchmarks, - positive social, environmental and economic impacts, - the law in force 	
How is the start-up respectful of societal traditions and customs of their target market?	
How is the organizational process affecting public safety? How is the organization reducing safety risks?	
Is the research process intelligible and transparent to the public? Is the language attuned to a diverse array of stakeholders?	
How do you encourage employees to reflect on the company's research and innovation? How do you maintain and enhance reflexivity?	

Table 4 Self-reflection Report

5. Activity Report

Similarly to the self-reflection report, the activity report can be used periodically by the start-up to assess how specific activities are more or less responsible than others. It provides a template for how they can ensure best practices during specific activities and R&D within the company. It focuses more on how certain actions/developments within the start-up should be guided by best ethical practices. While the self-reflection report focuses more on the organisation as a whole, the activity report can be used on a case-by-case basis for the start-up's actions (see Table 5).

Question	Response
How do you define your responsibility during the R&D process? How do you implement it?	
How are you optimally applying risk assessment methods to organizational processes?	
Are you working with an advisory board on ethical issues? What does this work consist of? How did it affect your behaviour?	
Do you provide training/assistance to citizens to participate in your R&D process?	
How do you allocate time and resources for reflection, sharing experiences, consulting experts (e.g., on ethics, gender equality, open access, etc.), for ethics training initiatives?	
How is your organization involved in the scientific community for knowledge exchange and feedback?	
What are the potential/actual impacts (social, political, economic and environmental) at each step of your activities? How do you assess the values created for the start-up and stakeholders?	

Table 5 Activity Report

6. Product and Organisational Report

The product and organisational report focuses on the types of products and/or services provided by a start-up and evaluates how the organisation ensures they are designed, developed, deployed, and used responsibly. This report concentrates on the specific products that the start-up is producing, how they are sourcing materials ethically for these products, how do they ensure they do not harm the environment or have a harmful societal impact as a result. Table 6 illustrates the questions to ask in a product and organisational report.

Question	Response
How do you identify and anticipate legal, regulatory and other requirements related to the product/service?	
Is the R&D output socio-ethically validated by experts in normative approaches to science? (ethics, tech assessment etc.)	
How do you adopt sustainable development criteria in product and service specification (choice of material, quality assessment, recycling, energy management, etc.), choice of suppliers or service providers, and communication activities?	
What are the overall impacts (social, economic and environmental) of a product throughout all phases of its life cycle, design and end of life (short, medium, and long-term impacts)?	
How are you reducing negative impacts and producing positive impacts (health, social, economic and environmental)? Are you conforming to the precautionary principle? Do you use any forms of technology assessment, etc?	
How are you ensuring that your organisation is producing a positive social impact (e.g., environmental, for the common good of society, etc.)?	
What are your charitable endeavours?	

Table 6 Product and Organisational Report

7. Evaluation of Stakeholder Involvement

A very important factor within responsible research and innovation (RRI) is ensuring stakeholder participation, involvement, and input is taken into account. Start-ups aiming to be responsible need to factor in stakeholder views on their organisation, their products, and practices, to ensure best practices. It is in this framework that the techniques connected to the practice of the lean start-up approach (LSA), such as the MVP (Minimum Viable Product) become particularly relevant. The following list of questions (Table 7) identifies what is currently being done within start-ups about stakeholder involvement and allows these companies to identify ways that they can improve upon this area of their business.

Question	Response
How are external experts auditing your activity? How do they investigate societal aspects (e.g., environmental auditing)?	
How are internal/external stakeholders involved from the early stages of product development?	
How are you gathering positive and negative feedback and how does the feedback affect start-up activity?	
List the types of stakeholders you involve, how you involve them, selection methods, and impact of involvement on firm activity? How do you communicate to stakeholders (e.g., through the use of social media)?	

Table 7 Stakeholder Involvement Report

8. Value Statement and Ethical Training

A step in the right direction for start-ups is to outline the company's ethical goals and values in a common code or charter, representing what the organisation stands for and as a template for employees to enact. This code of ethics should focus on how individuals and the organisation aim to be responsible practitioners, how their ethics are implemented in practice, and who they can speak to when they feel a certain product or action is ethically questionable. The following questions provide indications on how the start-up is implementing values within the organisation and steps to improve them (Table 8).

Questions	Responses
Is there an advisory board dedicated to the socio-ethical issues of your R&D activities? Are they present at crucial decision-making points in the organization?	
Is there a common set of values made explicit and agreed upon by employees (Charter, code of conduct, mission statement, etc.)? What is it?	
What has been done to ensure the awareness of employees regarding socio-ethical issues about the organization and its product(s)?	
How do you ensure procedures to prevent harmful impacts of innovation practices on society and the environment?	
How do you describe the values, principles, and standards of behaviour of the start-up? How did you arrive at these? How are these adopted and implemented by employees?	
What training is being provided to employees for research integrity; research management, methods in public engagement; data management, understanding current debates and controversies?	

Table 8 Code on Common Values and Ethical Training

9. Conclusion

As mentioned in the introduction, this workbook is meant as a starting point to evaluate how start-ups view responsibility within their organisations, their products, activities, and workforce. It is not meant as a box-ticking exercise or as a 'right/wrong' exercise because of the nuance and complexity of the questions, issues, and very nature of start-ups themselves. The criteria are designed to allow start-ups self-evaluate or evaluate their behaviour through guided reflection (e.g., during their implementation in the pilots by the RRlstart consortium).

The questions outlined in these worksheets will be refined through several iterative rounds between the consortium partners, external stakeholders (through the form of an online workshop), and the feedback and input received from the pilot cases. The first of which occurred on March 10th 2022, with a group of international stakeholders in an online workshop to test the worksheets and questions herein. The use of the workbook in the pilots is a two-pronged approach: firstly, to allow start-ups to self-evaluate their behaviour and to indicate how they are or are not acting responsibly in contrast to the questions being asked. It provides organisations insights into ways that they can further improve their practices to become more responsible. Secondly, it will be used as a feedback mechanism for the consortium of what is most important to include in the worksheets, but also the 24 indicators outlining best practices for responsible start-ups.

In addition to the use of these worksheets during the pilots and for start-ups to self-evaluate their behaviour, they are also intended for those who want to invest in responsible start-ups. Investors can use these criteria to evaluate organisations with good practices, where they are still developing, and perhaps, how they can also help them to become more responsible in their activities. While the end-user of the workbook is geared towards the internal reflection of start-ups, it can also be used by investors to initiate responsible investment. Investors can use the worksheets to ask start-ups about their current business practices, future aspirations, and responsibility objectives, to determine if they want to invest in the start-up or not.

10. Appendices

10.1. Appendix 1: The Responsible Impact Assessment Model

The Responsible Impact Assessment Model that we propose views innovation as a broad social phenomenon involving a multiplicity of actors and with impacts that go beyond those affecting the parties directly involved in entrepreneurial activity, i.e. firms and customers. In the context of start-ups, they must implement knowledge from the four helices at a very early stage of development to fully and effectively learn from the implementation of the indicators of the four helices. This approach can help steer start-ups towards more responsible practices through the inclusion of a broader range of stakeholders and values (societal, political, business and research). The Responsible Impact Assessment Model can use the research and approaches outlined in RRI and LSA while giving each of the four helices more balanced importance than either approach alone. This model will balance the indicators found during our research of the IRIS+ model, the large RRI projects, and the LSA, into the four helices classified in the QH approach.

Additionally, the Responsible Impact Assessment Model aims to reiterate and demonstrate what a start-up is already doing well. It will function as a tool for both a broad range of evaluative standpoints and is explicitly meant to guide start-ups, and it is designed in this way, which will be demonstrated by our lists of indicators later in this report.

The model aims to provide a framework of how responsible investment can be used by start-ups and implemented within the early life-cycle stage of a company. It is not meant to cover every single aspect that the start-up should consider, but it specifically focuses on how a company can implement responsible practices at this early stage of development in the context of the four helices. While the model is aimed mostly at high-tech start-ups, it could also be used by most start-up companies that want to implement ethical behaviour in their company, ensure that their employees are ethically trained, and have a positive societal impact through their products.

While the model is designed and meant for the pre-investment phase of a start-up life-cycle the principle of a quadruple helix 'check' of practices – the investigation of the Minimum Viable Product (MVP) against the background of the four helices – can be adopted by companies that are further into the business life-cycle, as well. Certainly, not everything would be relevant or applicable to a company post their pre-investment phase, but many of the same recommendations, indicators, and insights would still apply to the Model. A possible result of the implementation of the Model by a start-up could be the identification of some of the impact indicators through which measuring its specific performances. This process would consist of a form of contextualization of the model.

Figure 2 below illustrates the particular pre-investment phase of the start-up life cycle, which we have discussed.

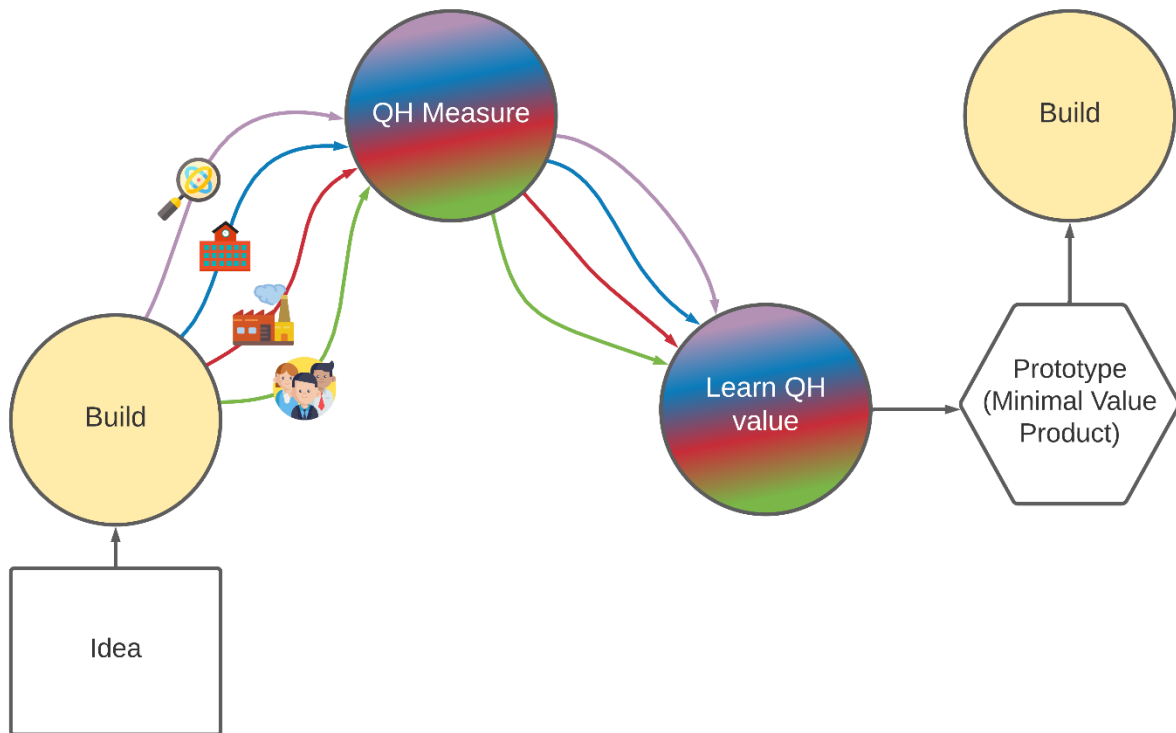


Figure 1 Life-cycle of the Responsible Impact Assessment Model

Figure 2 indicates the life-cycle of the start-up company and where the quadruple helix lean start-up model should be implemented and how it can benefit the company. Once the individual(s), or organisation, come up with an idea and begin to build their MVP, they should then implement the Responsible Impact Assessment Model to identify how they can act responsibly when they begin developing the prototype of their product. The Responsible Impact Assessment Model allows the start-up to evaluate their idea and business model in the context of its impact on society, business, research, and policy. The model could also help to single out the possible stakeholders through which to evaluate the MVP. Of course, the customers will evaluate it from the stance of the particular functionalities they are most interested in. Other stakeholders would assess different aspects of the same MVP (for example, in terms of the impacts on a certain class of people, such as workers). The most practical way of implementing this model is through the models' set of 24 indicators.

To arrive at this list of 24 indicators, we had to identify which ones were relevant for start-ups, bearing in mind the context and applicability to the Responsible Impact Assessment Model outlined in the previous sections. It was noted, based on our research in this report, that certain indicators were more or less relevant for start-ups.

In particular, we use the standard screening method developed by GIIN known as *Impact Reporting and Investment Standards* or 'IRIS', COMPASS, PRISMA, and many other EU responsible innovation projects. We have already provided several criteria (see D.1.1.) on how to evaluate the relevance of the existing indicators for start-ups wishing to engage in responsible research and innovation.

10.2. Appendix 2 – List of 24 indicators

10.2.1. Societal Indicators

All of the below indicators are relevant for both start-ups and their partners:

- Start-ups should implement a company-wide data management plan that uses optimal technologies for data and privacy protection. Data collection and selection methods should cover the full gamut of expected beneficiaries and end-users. Data should also be used for positive social impact (S1).
- Start-ups should reduce negative environmental impact and produce positive environmental impact by using sustainable materials, sustainable water management, using green energy sustainably, and reducing their carbon footprint (S2).
- Start-ups should set up an ethical advisory board that can positively impact the behaviour within the organisation. These boards should ensure reflection on responsibility and how management can implement it throughout the organisation (S3).
- Start-ups should monitor how their company and products positively impact society, how to reduce risks, and how to respond to such challenges (e.g., through the use of the precautionary principle). This can be implemented through external auditing, risk assessments, feedback and stakeholder engagement (S4).
- Relevant stakeholders should be involved in an effective, fair, and participatory way. There should be frequent and efficient stakeholder mapping and engagement exercises, and a real possibility that stakeholder input can affect decision-making practices (even if this is critical) (S5).
- There should be an exchange of knowledge between the start-up and stakeholders, through education and training about the company and its products. Stakeholders should be given sufficient knowledge and power to voice their concerns (S6).
- There should be adequate room for debate, deliberation and disagreement within the start-up and there should be a setting where this can be voiced fairly and respectfully without penalisation to the individual or group (S7).
- The start-up should optimally contribute to charitable causes (S8).

10.2.2. Research Indicators

The research indicators that a start-up should follow are:

- The start-up should ensure a level of openness regarding data generated, ensure that it is not exclusionary of any groups, and one's data gathering is in line with the relevant policy and ethical standards, while always respecting the legislation in the GDPR. One's data management plan should be in line with these standards and ensure optimal data protection methods (R1).
- The start-up's R&D may provide useful knowledge that can be employed by others in research and innovation, as well as the broader scientific community. In this regard, efforts should be made to ensure one's R&D is open access, as long as it does not harm the start-

up's business. The start-up should ensure a strong degree of transparency of research to the public (and language attuned accordingly) (R2).

- A start-up's socio-ethical impact can be facilitated by including both internal and external views in this process. Internal, such as an advisory board that provides input on the socio-ethical impacts of R&D activities. While external can come in the form of validation from experts in normative approaches to science (ethics, technical assessments, etc.) (R3).
- Start-ups should receive input from a wide diversity of people and groups, taking into account a plurality of views, values, and insights on their products and business (R4).
- Participants in the R&D process should be informed about the results of this process. Training/assistance needs to be provided to citizens to participate in the R&D process (R5).
- Before the commencement of an R&D process, the start-up should investigate the socio-ethical impacts, and create effective feedback loops, so they can be responsive to societal values and/or risks. The start-up should establish how they can make a positive socio-ethical impact, while avoiding risks, during each stage of this process (R6).

10.2.3. Political Indicators

The political indicators that a start-up should follow are:

- Start-ups should ensure decency, integrity, and fairness, in the workplace. Employers should ensure that discrimination based on gender, race, disability etc. does not occur. Diversity is something that should be valued and implemented in the workplace (P1).
- Employees should have the opportunity to grow and develop during their participation in the start-up. They should be allowed to be creative in their roles, and also have a healthy work-life balance (P2).
- Start-ups should implement a set of common core values that are made explicit and agreed upon by employees (e.g., a Charter, code of conduct, workshops, etc.). Employees should be trained to be aware of socio-ethical issues about the organisation and its product(s) (P3).
- The start-up should be respectful of societal traditions and customs, sensitive to unwritten conventions and norms, and respect public participation in democratic processes. They should ensure their actions and products do not harm public safety (P4).

10.2.4. Business Indicators

The business indicators that a start-up should follow are:

- The start-up should assess and anticipate legal, regulatory and other requirements related to the product/service. They should assess the presence of partnerships/agreements establishing responsibilities about possible risks, obligations, sharing of information/technology and protection measures of the involved organisations (B1).
- The start-up should assess what are the potential/actual impacts (social, economic and environmental), from design to post-launch, of their activities and products. It should consider its positive and negative impacts on innovation, try to prevent harmful impacts of

the innovation practices on society and the environment, and re-evaluate these impacts at all life-cycle stages (B2).

- The business model should integrate profit with environmental and social benefits by identifying the start-up's customer base, the mode of distribution, resources and key activities needed, innovation capacities, value creation for clients, and risks.
- They should assess the life cycle costs of a product (include short, medium, and long-term impact on externalities) and include their principles in a mission statement or code of conduct.
- The start-up should analyse and treat their impact comprehensively and not restrict it to one criterion, stage or stakeholder (using impact assessment, paying particular attention to environmental and social pillars).
- They should adopt sustainable development criteria into product and service specification (choice of material, quality assessment, recycling, energy management, etc.), their choice of suppliers or service providers, and communication activities.
- Start-ups should carry out innovation in a responsible manner, using objectives for assessing performance (B3), such as:
 - When uncertain of adverse outcomes, they should decide to invest a minimum amount of their annual share of revenue (this could be 1% or 5% based on the products/services for which this principle applies) in independent research and development activities to eliminate, wherever possible, any threats and anticipate the adoption of preventive measures against actual risks.
 - Compliance with standards should be following the stakeholders' expectations, external benchmarks and obligations, the social and environmental impacts, the supply chain, and the law in force.
 - They should periodically review the system of indicators by obtaining appropriate feedback from major stakeholders and follow best practices on how to assess performance. Internal and external stakeholders should be involved from the early stages of product development.
- The start-up should ensure adequate training is provided for its staff by identifying the skills, knowledge, and experience of staff, and their equipment/technology requirements to fulfil their work. Time and economic resources should be given towards reflection, sharing experiences, consulting experts (e.g., on ethics, gender equality, and open access), participation in RRI workshops and training initiatives, and appointing RRI staff experts (B4).
- The start-up should ensure that there is a fair distribution of traditionally disadvantaged groups of highly skilled employees. They should examine the percentages of demographics in the company to ensure a fair share of researchers from different backgrounds, genders, and races (B5).
- The start-up should be reflexive, open to change when confronted with challenges and shifting norms and encourage employees to reflect on the start-up's research and innovation. It should reflect on the start-up's economic sustainability, their ability to handle

the project/product in terms of finances, manpower and material and knowledge of risks (turnover, investment capacity, induced financial savings, cash-flow) (B6).

Appendix 10.3. Worksheets Linked to Indictors

Question	Indicators
Do you have a company-wide data management plan? What methodology do you use to do this?	S1
How do you share data that can be used for social goods (e.g., environmental, beneficial to the public, or for society)?	S1, R1
What type of technologies are you using for data protection (employee data, client data etc.)? Are you asking consent to use data?	S1, R1
How is your R&D process generating useful knowledge that can be used by others in research and innovation?	R2, R3
How are participants in R&D informed about results regarding the R&D process? Is your data gathering method in any way exclusionary of groups or communities?	R4
Is the information you provide clear and transparent? Is the information accompanied by clear specifications on data structure and variable descriptions to allow for replications or new research purposes?	R1, R2, R5
Where will the open-access information be stored and who is responsible for maintenance?	R1

Worksheet 1: Data management plan

Question	Indicators
How are employees free to be creative in their work? Do they have an opportunity to grow and develop in their roles?	P1, P2
What skills, knowledge and experience of staff are taken into account? How are their training needs assessed?	P3, B4
How do employees implement responsible practices in the workplace? How do they know what they should do to ensure responsible practices? Are there specific roles and duties assigned to ensure responsible practices?	S3, P3
What are the percentages disaggregated by gender, race, disability, etc. involved in R&I/R&D function/teams in the company?	B5
What are the average hours of training programs for research employees, disaggregated by gender, race, disability, etc.?	B5
How do you ensure that discrimination based on gender, race, disability, etc. does not occur?	B5

Worksheet 2: Report on the Start-up's Workforce

Question	Indicators
What are the clear and effective feedback loops so that the R&D process can be responsive to novel societal values and/or risks?	S4, R6, B2
How do you ensure stakeholders have sufficient knowledge and power to voice their ideas and concerns?	S5, S6
How do you ensure diversity at work and in the stakeholders you engage?	R4, P1, B5
How do you ensure innovation meets: <ul style="list-style-type: none"> - stakeholders' expectations, - external benchmarks, - positive social, environmental and economic impacts, - the law in force 	B1, B2, B3
How is the start-up respectful of societal traditions and customs of their target market?	P4, B6
How is the organizational process affecting public safety? How is the organization reducing safety risks?	S4, R2, B3
Is the research process intelligible and transparent to the public? Is the language attuned to a diverse array of stakeholders?	R2, B2
How do you encourage employees to reflect on the company's research and innovation? How do you maintain and enhance reflexivity?	P3, B4

Worksheet 3: Self-reflection Report

Question	
How do you define your responsibility during the R&D process? How do you implement it?	R2, R3
How are you optimally applying risk assessment methods to organizational processes?	B2, B6
Are you working with an advisory board on ethical issues? What does this work consist of? How did it affect your behaviour?	R3, R6
Do you provide training/assistance to citizens to participate in your R&D process?	R5
How do you allocate time and resources for reflection, sharing experiences, consulting experts (e.g., on ethics, gender equality, open access, etc.), for ethics training initiatives?	S3, B4
How is your organization involved in the scientific community for knowledge exchange and feedback?	R2
What are the potential/actual impacts (social, political, economic and environmental) at each step of your activities? How do you assess the values created for the start-up and stakeholders?	S2, S4, B2

Worksheet 4: Activity Report

Question	Indicator
How do you identify and anticipate legal, regulatory and other requirements related to the product/service?	R6, B3, B4
Is the R&D output socio-ethically validated by experts in normative approaches to science? (ethics, tech assessment etc.)	R3, B3
How do you adopt sustainable development criteria in product and service specification (choice of material, quality assessment, recycling, energy management, etc.), choice of suppliers or service providers, and communication activities?	R6, B2
What are the overall impacts (social, economic and environmental) of a product throughout all phases of its life cycle, design and end of life (short, medium, and long-term impacts)?	R3, R6, B2
How are you reducing negative impacts and producing positive impacts (health, social, economic and environmental)? Are you conforming to the precautionary principle? Do you use any forms of technology assessment, etc?	S4, R3, B2
How are you ensuring that your organisation is producing a positive social impact (e.g., environmental, for the common good of society, etc.)?	S4, R3, B2
What are your charitable endeavours?	S8, B2

Worksheet 5: Product and Organisational Report

Question	Indicators
How are external experts auditing your activity? How do they investigate societal aspects (e.g., environmental auditing)?	R3, B3
How are internal/external stakeholders involved from the early stages of product development?	R3, B3
How are you gathering positive and negative feedback and how does the feedback affect start-up activity?	S5, S7, R4
List the types of stakeholders you involve, how you involve them, selection methods, and impact of involvement on firm activity? How do you communicate to stakeholders (e.g., through the use of social media)?	S6, R4, R5

Worksheet 6: Stakeholder Involvement

Questions	Indicators
Is there an advisory board dedicated to the socio-ethical issues of your R&D activities? Are they present at crucial decision-making points in the organization?	S4, P3
Is there a common set of values made explicit and agreed upon by employees (Charter, code of conduct, mission statement, etc.)? What is it?	S3, P3
What has been done to ensure the awareness of employees regarding socio-ethical issues about the organization and its product(s)?	S3, P3
How do you ensure procedures to prevent harmful impacts of innovation practices on society and the environment?	S4, R3, B2
How do you describe the values, principles, and standards of behaviour of the start-up? How did you arrive at these? How are these adopted and implemented by employees?	S4, P3
What training is being provided to employees for research integrity; research management, methods in public engagement; data management, understanding current debates and controversies?	S3, P3, B6

Worksheet 7: Value Statement and Ethical Training