The Guidelines for governance setting

RRIstart - Responsible Research & Innovation Model for Impact Investment & Responsible Startups

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Executive Summary

These Guidelines provide a pathway to familiarise the reader with the issue or responsibility for STEM start-ups and understand how to launch the practice of responsibility in new firms in high-tech sectors. These Guidelines, in summary, provide indications on how to make the best use of the tools produced by the RRIstart project, i.e., adapting the Social Responsibility for Start-ups Model (SRSM) and the related indicators and worksheets to each specific start-up.

After a brief introduction, the reader can go directly to the recommendations that are the core of these Guidelines. They are articulated into the steps of the pathway possibly conducting to the practice of responsibility, consisting of the cycle of Interpretation, Decision, and Action. We added a series of notes, annexes, and references that can be used by the readers to implement the recommendations or go more in-depth into relevant issues. Annex I contains a presentation of the model. Annexes II and III report, respectively, the indicators and the worksheets that are constitutive of the SRSM and can be used as tools for conducting a self-assessment exercise. They are, consequently, fundamental for implementing some recommendations.

The ultimate objective of these Guidelines is to enable the readers not only to apply the model and use the related tools but also to understand the possible way in which such model and tools can be tailored to their start-ups (with their specific characteristics), each being in a particular (and specific) stage of development.

Foreword – RRIstart, Responsibility for STEM start-ups

Start-ups are grappling with the **challenge of setting up successful businesses**. This implies that those who undertake such ventures, be they a group or an individual, have to manage processes such as the establishment of a new organisation, creating connections with external stakeholders, refining the core product or service, and defining the related business model.

In this framework, it is becoming more and more apparent that **the practice of responsibility is not at odds with the start-ups' typical economic challenges but it is a smarter way of pursuing them**. Responsibility, according to the approach of Responsible Research and Innovation – RRI (see Note #1), can, indeed, be part of their overall endeavour of business creation.

Responsibility, in fact, has much to do with some salient aspects **of the start-up core business**: the establishment of relations with stakeholders in order to test and fine-tune the business idea and model; the potential (social, environmental, etc.) impacts and risks connected to production/services provision; the management of relations with stakeholders and investors who are also sensitive to how risks and impacts are managed; the establishment of fruitful exchanges with the research systems and with the related actors (scientists, research managers, etc.).

Furthermore, the **issue of responsibility is particularly relevant for start-ups in the STEM (Science, Technology, Engineering and Mathematics) sector** (see Note #2)**,** since they are typically developing **highly innovative products or services** whose impacts – by definition – have not yet become clear. In this case, mere **compliance with current regulations is not sufficient** to guarantee that the impacts produced by the innovation will be managed according to ethical and societal principles. Are the innovators sure that health risks are duly taken into account? Are the ultimate social impacts of a certain production activity considered (e.g., use of child labour in the value chain)? Are vulnerable users protected against the misuse of a certain technology (e.g., videogames or social media)? Are the start-up's products/services and activities based on the respect of gender related rights, or on the awareness of minority and diversity related issues? And so forth.

RRIstart**, a European research project** led by the University of Rome "La Sapienza" (IT) is aimed at **defining a model for facilitating STEM start-ups to practice responsibility** and becoming, in this way, a possible object of **investments that are also impactful**, therefore capable of generating "positive, measurable social and environmental impact alongside a financial return[1]". The **project's results** are, thus, targeted to **start-ups entrepreneurs** and to **investors** as well as a variety of actors belonging to the start-ups' ecosystem who are interested in the promotion of entrepreneurship and technological innovation.

The challenge of RRIstart is to **make responsibility implementable by start-ups in the STEM sector**. The efforts made so far to define tools and indicators for firms have predominantly focused on well-established enterprises – the issue of responsibility is increasingly recognized within the business community. However, in the case of start-ups, there are some relevant differences, especially because taking up responsibility, to them, does not mean merely changing a given state of things, but somehow changing their very process of business creation.

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[1] This is the definition provided in the framework of The Global Impact Investing Network GIIN (https://thegiin.org/impact-investing/need-to-know/#what-is-impact-investing, accessed on 2/07/2023).

To this purpose, RRIstart has developed the **Social Responsibility for Start-ups Model (SRSM)**, a novel RRI-based model specifically targeted to start-ups, complemented by a list of 24 new qualitative indicators and seven operational worksheets in a multi-stakeholder (quadruple helix) context. The model (presented in **Annex I**) contains the principles and the rationale for the practice of responsibility by STEM start-ups. The indicators (**Annex II**) provide instruments for identifying responsible start-up practices. The Worksheets (**Annex III**) help organisations identify, detail, and strive towards the best responsible practices in their start-up. For start-ups, they represent tools for conducting a self-reflection and a self-assessment exercise.

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The Guidelines for governance setting:
a pathway to responsibility for STEM start-ups

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The **Guidelines on governance settings** presented here are aimed at assisting the users to approach the model, the indicators it is composed of, and the related worksheets to adapt it (fully or partly) to their specific needs. Ideally, the Guidelines are a tool for start-ups to make explicit their interest in the issue of responsibility, make it part of their operations, and be able to present it as a crucial element of how they approach the market and the relevant stakeholders.

These Guidelines, therefore, deal with the issue of **how start-ups can embed the practice of responsibility as a way to improve the overall process of business building and promoting innovation**. Building start-ups is a very context-related process, hence a one-fit-for-all approach and a set of ready-to-use suggestions cannot be appropriate.

Consequently, what is outlined here is a **pathway** leading the new entrepreneurs **to use the SRSM to define their own approach to the practice of responsibility** and the consequent actions. The idea is to **trigger a process** composed of three steps, Interpretation, Decision, and Action, through which the practice of responsibility can inform the way in which start-ups are managed.

For this reason, the concept of **governance setting[2]** is used, since the objective is to embed, within the governance systems of the new firms, the principles of responsibility. This is also the reason why the Guidelines are designed for **start-ups in their early stage**. They are designed, indeed, for being used for a limited period after which, hopefully, the practice of responsibility will have become part of the operational routines of the start-ups and could evolve according to the needs of the new firms and the new challenges emerging thereby. The issue, for a nascent body like a start-up, is not so much defining once and forever how responsibility informs its life but setting up an approach aimed at continuously anticipating the possible impacts of its entrepreneurial activities and the possible reactions of the stakeholders' in order to manage them accordingly. Implementing the SRSM means initiating a process whose results, including the unexpected ones, should be monitored for being managed properly. It implies activities that are not obvious or trivial, such as establishing new relations with stakeholders, or anticipating and watching over possible criticalities. It consists of conducting recurring self-assessments and evaluation of results, and requires making a preliminary mindful choice, a kind of investment in responsibility.

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[2] In RRIstart (based on the experience of another European project on RRI, FIT4RRI), with the term "governance setting" we mean a coordinated set of actions serving as a trigger to implement RRI or some of its components in a start-up. Therefore, the focus is on the first steps to take for creating in a start-up the minimal conditions necessary to ensure that a process of change towards RRI can take place. Of course, this approach easily fits the concept of Responsibility adopted in RRIstart and presented above.

The Guidelines for governance setting: a pathway to responsibility for STEM start-ups

The proposed pathway to the embedment of responsibility in the core of the start-ups is marked by **three steps: Interpretation, Decision, and Action.**

Interpretation is focused on making the case for the connection between entrepreneurial success and an orientation toward responsibility. Such a reflection would also impact the firm's very **purpose and vision**.

Decision is about **the main decisions to be taken** on how a given start-up can opt for responsibility. Decisions of this kind concern also the (re)definition of the firm's **mission** through the attribution of an explicit role to the practice of responsibility.

Action concerns the definition and implementation of a **plan of action** consistent with the decision to practice responsibility. The time horizon of the plan should be the short-medium term, since its objective is to trigger the practice of responsibility in the framework of the overall firm's foundation and establishment process, given the available resources.

The presentation of each step is structured in the same way. First its rationale, then a series of recommendations on how to implement each step of the pathway. Both the rationale and the recommendations are based on the results of the work done so far in the framework of the RRIstart project (i.e., for defining the SRSM and for testing it during the pilots – see **Annex I**).

The formulation of both rationale and recommendations has considered the fact that the pathway to practice responsibility is very contextual and changes according to the specific characteristics of each start-up and of the (economic, cultural, and social) environment in which it operates.

The Guidelines, therefore, contain suggestions and practical tools that each start-up can use by adapting them to its own actual situation and needs. Therefore, reading the following sections should not be understood as a recipe to follow slavishly, but as an exercise in looking at responsibility and its practice according to the individual start-up's angle.

Interpretation
What does responsibility mean for your start-up

Rationale

The first step of the pathway leading to the embedment and practice of responsibility must be dedicated to understanding if and how it is expedient for a STEM start-up, given the conditions in which it is operating. What follows is a brief presentation of the rationale proposing the good reasons for a start-up to engage in such a reflection as well as some recommendations on how to carry it out.

The life of a start-up, especially in its early stage, is characterised by the fact that the entrepreneurial group (or the individual entrepreneur) defines the most fundamental features of the business so that further processes and, hopefully, development and success become consequential.

Responsibility should be considered an impelling issue for STEM start-ups. Practicing responsibility is a condition for promoting a firm's better **embedment in the business (and social) environment**, therefore the **condition for more resilience and success**. In this sense, founding a business on responsibility principles is not only ethically sound but also inherently advantageous (e.g.: anticipating potential risks at an early stage helps prevent the necessity of making costly adjustments to the firm's operations later on).

Notwithstanding this, **we cannot assume that the practice or responsibility takes place straightforwardly**. Creating start-ups is a risky endeavour requiring entrepreneurs to make decisions and implement activities in highly uncertain contexts. It is thus by no means assured that the involved parties – first of all, the members of the group that promotes a start-up, but also those in the workforce who perform relevant functions – can view, or agree about, the connections between the challenges they face and responsibility. A specific effort should be done to produce a shared understanding of the issue.

Informing a STEM start-up on **responsibility affects several aspects of the business creation process**, such as the choice of strategy and markets, the alliances to establish, the definition and implementation of the firm's operations, the specification of production processes and technologies, the expertise to acquire, the involvement of stakeholders in various aspects of the firm's life, etc. This is particularly complex in the cases of STEM start-ups in which innovative high technologies are being adopted and developed.

Consequently, a **specific reflection is needed** to decide, in the given situation and based on the assessment of the start-ups' members, if and with what general aims **to take a responsibility-oriented approach**.

Hence, the start-up leadership should proactively initiate a process to conduct this discussion, which significantly influences the start-up's vision (about new markets, possible unknown impacts, the establishment of connections with relevant research institutions and scientific communities, and so on). Elaborating a vision is, therefore, a prerequisite for the definition of start-ups' strategies and decisions that include responsibility. A sound reflection on these issues also implies a coherent definition of the new ventures' "**purposes**". Important, here, is considering how the proposed activities of the firms are going to **interact with the actors with the four main society sectors or "helices" and their leading values** (i.e., the actors in the main society sectors or 'helices': industry; policy; research and civil society; see Annex I and, particularly, [Box #2 on the Quadruple Helix](#)).

Recommendations

To implement such a reflection the following recommendations are outlined, also considering some relevant key issues that emerged from the literature and from experiences of practicing responsibility in organisations and in the business sector.

1. Creating occasions for discussing about responsibility

Adopting an orientation to responsibility is a process that is unlikely to happen spontaneously. Some issues, indeed, are key and not necessarily have been debated within the entrepreneurial group. Nevertheless, they represent a necessary starting point for any reflection on responsibility. A new firm should **create a place where it is possible to reflect** on issues that, although crucial, still need to be debated in-depth. This means dedicating specific occasions to debate on how to frame the issue of responsibility.

In general, the reflection should aim at understanding how the envisaged new firms' production activities will interact with the values and interests typical of the four helices and the related stakeholders.

The occasion for discussion could be a **series of meetings** to be held in successive steps. How these meetings could be organised depends on the habits of each firm, the time available, etc. In order to frame the discussion – and avoid vagueness – the **SRSM indicators and worksheets** could be very expedient.

    i. The **list of 24 indicators** will make it clear what are, in practice, the issues to deal with as a first approach to responsibility (see Annex II – List of Indicators). Discussing **the list of indicators will** help to:
- Focus on the practical issues that the entrepreneurial group would like to consider more
- Figure out how the discussion could continue.

    ii. **The worksheets** (see Annex III – Seven Worksheets) could give analogous support to the discussion: they provide a series of questions that help to frame the problem of practicing responsibility and help in figuring out how to further deepen the issues.

Both tools could be used partially by choosing just some indicators or worksheets. For example, to begin with self-reflection, it could be advisable to use the worksheet #3 on "Self-reflection Report".

Creating occasions for reflection is an **open process**. Discussion meetings could foresee the participation of external experts and stakeholders on emerging issues. The discussions should be complemented also with information collected by the participants on emerging issues. In general, it is worth stressing that creating such occasions is the necessary condition of any reflection on responsibility related issues, not just in general, as those implemented through the Indicators and the Worksheet but also those related to some specific topics such as those suggested in the following recommendations.

The practice of **responsibility is often implicitly adopted by start-ups**. This is particularly true for start-ups that are openly trying to address needs that are socially or environmentally relevant (e.g., producing items with low GHG

2. Analysing the current responsible practices of a start-up

emissions; using new technologies for easing certain production activities; favouring women workers through specific arrangements, etc.).

Therefore, even when social responsibility is not explicitly part of a firm's concerns, procedures (of any type and complexity) could already be in place anyhow, aimed at controlling and managing risks, and positive and negative impacts of start-up activities (such procedures could be, for example, internal rules, organisational structures, informal discussions, etc.).

In general, responsibility could be already embedded somehow in the start-up's practice and orientation and this possibility should become **a topic of self-reflection**.

If a start-up is already engaged in responsible behaviours, it is advisable to acknowledge them so that **existing arrangements can become more consistent and effective** and become the **basis for systematic decisions about the future**. The reflection should be focused on issues such as:

- What are the current responsible practices, (in order to effectively single out the so-called "de-facto responsible practices", it is advisable to use one or more of the worksheets)
- The reasons why they have been adopted
- How they could be improved
- The possible advantages and difficulties for scaling up or proliferating them within the overall firm's practices.

> ### 3. Mapping the potential investors taking into account how they consider impact investment

Responsibility has become, in recent years, an **important issue in many industries** and one of the frontiers of economic development in the future. Such centrality is **acknowledged by many investors as well** especially through concepts such as: "impact investment", "environmental, social, and governance standards (ESG)", or "corporate social responsibility (CSR)". Investors are more and more interested in businesses with an orientation towards and a practice of responsibility.

In general, being able to prove a start-up's orientation and practice could be important for approaching investors.

The reflection, therefore, should be dedicated to how the potential investors of each start-up approach the issue. In practice, an effort is requested aimed at **mapping investors and considering their orientation toward responsibility**. Such activities will be of different types, for example:

- Collection of information (e.g., those institutionally provided by investors)
- Consultation of key informants (e.g., by interviewing people who are in the financial sectors)
- Discussion of the results among the members of the start-ups.

Such an analysis could be extended also to industrial stakeholders, i.e., those who cooperate with each start-up, such as possible partners, and customers (in business-to-business cases).

Based on the information collected, it will be possible to understand **if the start-up needs to further elaborate its own approach to responsibility** and, in general, **react accordingly** to the orientation of the relevant members of the financial community.

Maintaining relations with the academic community is important for STEM start-ups because of the crucial role of **scientific research for them.** This makes the issue of responsibility even more important given the **growing concerns for it within universities and the research systems in general**. Keeping good relations

> ### 4. Reviewing how the current and potential research partners approach responsibility

among these two helices cannot be taken for granted, considering the overall diversity of leading values – and the long-lasting and sometimes strong diffidence – between business and research communities.

In this case, too, a reflection should be done on **how start-up's academic and research reference groups are oriented towards responsibility**, particularly by collecting information on how the relevant research actors consider responsibility and whether it is a debated issue.

Furthermore, one should reflect on the current relations with the relevant academic and research communities (the "reference groups" singled out previously), the possible difficulties in keeping such relations (and, in case, the reasons). Such reflexive activities should be implemented by:

- Listing the current exchanges with academic/research organisations
- Defining the emerging critical issues (through approaches such as SWOT analysis).

Based on the information collected a further effort could be made aimed at **defining open problems and issues that need to be solved** or, in any case, tackled. This can be done by engaging in direct exchanges with researchers (e.g., through meetings and/or informal interviews) to assess their points of view on the collaboration and the possible perspectives.

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5. The new firm's activities and the stakeholders (in the remaining helices): Figuring out possible impacts and opportunities for cooperation

Setting up start-ups, including STEM ones, implies **keeping strong relations also with other societal actors** in the policy and civil society helices, such as local and public authorities, training organisations, civil society organisations, etc. As for other actors, **involving such stakeholders** is crucial for enterprise creation.

The new firm's **operations could affect negatively different stakeholders** in various ways. A reflection should be done on the attitudes of the possible stakeholders towards the technological and economic choices of the new firm and the related impacts. For examples: Are pollutants being used? Does the firm's technology entail the unavoidable use of pollutants? Are production activities going to hurt some stakeholders? Are their opportunities for cooperation with stakeholders?

Stakeholders could be interested in the new firms not only because of the possible negative impacts they could suffer but also because of **possible positive interactions** (e.g., possible cooperation, joint ventures, and so on). A new firm should outline an, at least tentative, idea of this kind of positive interaction with stakeholders. Such an idea should include concerns about responsibility.

A reflection on these things could be carried out through the following path:

- Begin with a first tentative of mapping the main stakeholders a start-up keeps relation with
- Describe the main stakeholders with the aim of singling out the most critical and the most supportive ones. Possible supporters should also be included in this description
- Based on a first picture and analysis of criticalities, the reflection could continue also with the collection of information concerning similar situations (e.g., how other firms responded to NIMBY[3] reaction?)

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[3] NIMBY is an acronym that stands for "Not in my backyard". According to the Cambridge Dictionary, it indicates "the behaviour of someone who does not want something to be built or done near where they live, although it does need to be built or done somewhere". In general, it is recognized that oppositions to impactful actions (such as those in which a that a start-up could be involved, e.g., public works or the establishment of industrial plants) should be acknowledged and analysed by the proponents through a dialogue with opponents.

- Such an effort could be carried out also by talking with key persons (e.g., the leader of the local industrial association, or with the chamber of commerce).

This exercise will end with an overall assessment of the relation with stakeholders and the possible action to be taken.

For STEM start-ups, adopting responsibility as a guiding principle has to do with their **core business and structure,** i.e., with how the products/technologies and the internal organisation are envisaged and developed. As was said above, this implies a deep connection with

> **6. Refine the start-ups' purpose and vision**

stakeholders within the four helices and various forms of their involvement and experimentation.

All this can be facilitated if the orientation to responsibility is **expressed explicitly**, therefore impacting on STEM start-ups' vision and purposes, which should be defined and formulated accordingly. In this way, stakeholders, investors, and customers can recognise and value such an orientation.

A useful exercise could be **updating the existing purpose and vision statements** or, in case they do not exist, defining them, so that they include the issue of responsibility. The statements should be consistent with the actual characteristics of the firm (and, in case, the responsible practices already underway) and consider the leading values of the four helices. The way to do it would require:

- Reviewing the existing statements and discussing how they could be changed
- Approve the proposed changes.

If these documents have not been defined yet, a review of those produced by similar firms will be a useful starting point for drafting them from scratch.

Decision
Is your start-up going to practice responsibility?

Rationale

After justifying the case for responsibility, the next step is to **decide upon the possible responsibility-oriented changes** to introduce in the (already outlined) start-up's **objectives** and in its **development plan and operations** (it implies the identification of possible alternative practical choices, the assessment of the related advantages and disadvantages, and so forth).

It is important to recognise that this type of decision is not just **necessary** but, oftentimes, also **urgent**. Failing to consider responsibility-sensitive issues could hamper the development of connections with crucial stakeholders (for example, those in the research sector, or the investors interested in impact investments). Furthermore, practicing responsibility, connecting, and exchanging with various stakeholders in the four helices is a trial-and-error process that evolves over time and interacts with the entire business process: retarding it could hinder the development of technology or of the business model. In general, practicing responsibility typically **impacts how the firm is shaped** and therefore requires a timely intervention at an **early stage of the start-up development**. Such a decision can impact a new firm so deeply that it affects the **start-up mission**, i.e., the very idea of what a certain firm does, and how.

Embedding the practice of responsibility in new firms is a **complex decision** that should be appropriate to the situation of nascent organisations that are normally focused on their very foundation and establishment.

The decision to practice responsibility, especially in its early stage, **interacts with several aspects of the construction of a start-up**. In particular, it interacts with:

- The ways in which the members of the **entrepreneurial group see the firm's development**, which should include also the issue of responsibility
- The way in which **the new organisation is being structured** for coping with the challenges ahead, including that of operating responsibly
- The **creation of connections with various external stakeholders** for the implementation and facilitation of the new firm's operations and programs; practicing responsibility implies a fine tune with other helices' leading values and changing accordingly the firm's constellation of relations with stakeholders
- The specification and test of the **new firms' product(s)/service(s)** and the related aspects (technical as well as organisational, logistical, economic), also including responsibility concerns
- The **definition of a business model**, which is likely affected by the decision of the start-up to act responsibly.

Recommendations

Once the start-up has outlined the "good reasons" to practice responsibility, a decision-making process and a list of priorities for action need to be established. Such an effort will require reviewing current start-up operations and using the SRSM and its worksheets. It could also include the (re)definition of the start-up's mission statement to include the practice of responsibility.

7. Deciding on responsibility in the framework of the established internal decision-making process

Responsibility should become part of the normal way of operating of a start-up. For this reason, the related decisions should be made considering the issue as crucial and worthy of deliberation as other issues. In this case, it is not advisable to create a dedicated procedure and the issue of responsibility should be discussed in the existing decision-making process. Nevertheless, because of the peculiar characteristics of this decision, the process should receive the necessary time and effort (e.g., it should be foreseen that some issues have to be debated in depth; the deadlines of the process should be established in an expedient way).

The **engine of decisions** in a start-up, especially in the early stages, is represented by the founder or by the founding entrepreneurial group. Thus, the decision to practice responsibility and how depends on **the internal decision-makers' willingness** to do so and on their sensitivity to the issue among those who have

8. Achieving consensus among the internal decision-makers about Responsibility

a say on the matter, also considering that the practice of responsibility is not a "one-size-fits-all" choice.

To decide about practicing responsibility, the internal decision-makers need to **reach a consensus** about the type of engagement of the start-up and how it may possibly evolve in the future. Discussions have to be held among the people who are in the position to decide, and it is advisable that possible divergencies are spelled out and cleared.

It is crucial to understand what are **the possible obstacles** for the entrepreneurial group to decide, and, consequently, define consistent lines of action. For example, internal decision-makers might be sensitive in a generic way about values or issues but a **shared and strong orientation towards them** could be lacking (e.g., possible impacts on gender equality dynamics connected to certain business activities).

Possible ways to reach a consensus could be the following:

- Part of the effort could have been already carried out in the "Interpretation" phase of the pathway described here. Some of the issues to be cleared within the entrepreneurial group could have already emerged and could be further discussed and elaborated
- In order to reach a consensus, the SRSM worksheet #7 **on Value Statement and Ethical Training** can be used. It helps in carefully scrutinising ethical issues on which there could be divergencies among the internal decision-makers.

9. Adapting the organizational structure to responsibility orientation

Practicing responsibility requires that start-ups create appropriate organisational structures. Therefore, it is crucial to consider **how a start-up is evolving as an organisational unit** since, probably, it has not established complex internal routines yet, but is still developing them.

The problem is that start-ups are usually small organisations that cannot afford to commit to this end many resources and could **lack the organisational capacity to act appropriately on responsibility-related issues**. Such capacity would include among others: interacting with stakeholders and actors that are not usual partners and are focused on issues that could not be familiar to start-ups' entrepreneurial groups and/or management (e.g., dealing with social or policy issues); changing organisational and productive routines based on feedback from stakeholders (this requires an assessment that has to be based on skills that could be not available yet or procedures never been practiced before – e.g., meeting with grassroots organisations).

Arrangements should be devised, which are aimed at making it possible to implement responsibility according to an "agile" style, **using the currently available structure and avoiding, as far as possible, organisational complexity**. Overall, the approach to decision should be based on gradualism, that is on the assessment of priorities, available resources, and possible costs of deciding (or not). It is advisable to prepare decisions by following two steps:

- Based on the current situation, ascertain if internal structures and routines are already in place that can be adapted to pursue responsibility-related objectives (functions)
- Similarly, ascertain if organisational tasks have been already assigned that could be enlarged to cover also the attainment of responsibility-related objectives (roles).

As mentioned above, **the start-up could be already engaged in "de-facto" responsible activities**. In this case, decision could be made about how to formalise (and, in case, strengthen) them. Otherwise, it could be important to highlight the possible lack of certain functions and roles and decide how to develop them.

Mapping investors, current partners and stakeholders in general and recording how (and if) they are oriented to responsibility has been recommended above as part of the interpretation

10. Getting in touch with the main stakeholders of the four helices

part of the pathway. Such an exercise – it has also been said – could imply having direct exchanges with stakeholders.

To decide the scope of the new firm's decision to practice responsibility it is advisable to select, among the stakeholders singled out previously within the four helices, those that are actually relevant and, if possible, **get in touch with them**.

The objective of this activity will be **to check the kind of relations that should be actually established and the type of exchanges that it would be useful to trigger**. Such exchanges could be focused on:

- Information about activities, points of view and reciprocal expectations (e.g., on start-up's activities and possible impacts)

- Advise on aspects of start-up's activities (e.g., how to implement certain operations, participation in different forms of experimentation)
- Cooperation on some aspects of business' operations and/or financing.

A useful guidance for preparing and implementing such exchanges could be found in the SRSM Worksheet #6 on "Evaluation of Stakeholder Involvement".

Of course, **not all exchanges could happen at once**. Some of them should be prepared and, in general, it is to be acknowledged that creating such relations is a process. Some stakeholders could not appear as relevant at first sight, or they could even be not known at the beginning of this activity.

What is important is this activity should be a first test for better understanding the kind of relations that have to be created and how they could be managed. These first contacts could be used later to increase the set of stakeholders the firms should be in touch with.

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11. Pay attention to the core technology development process

Central to the start-up process – especially in the STEM sector where new firms are supposedly engaged in innovation – are the activities connected to the **choice and/or development of the technology being used and of the product/services** that will constitute the core business of the new firms.

Being sensitive to responsibility implies **keeping this process under tight scrutiny** to ascertain if the production activities being defined will be in line with the start-up's values and with the relevant stakeholders' expectations.

A common praxis in the start-up sector is promoting the **check and validation of prototypes with stakeholders** (the so-called Minimum Viable Product, MVP). Such an assessment, beyond its focus on strictly technical aspects of production, could include criteria related to responsibility (e.g., minimisation of input needs, reduction of polluting emissions, care of end-users needs, and so on). Implementing such checks could give the innovation process somehow a "participatory" character, making it more able to capture stakeholders' orientations and to avoid future problems.

A decision of this type implies that the new firm makes the **innovation process more complex** since more actors – and therefore their decisions and assessment – will enter it. Also in this case, the start-up could decide how gradual this process should be to avoid going beyond its actual capability to carry it out.

Deciding to practice responsibility, therefore, includes issues such as if, or to what extent, and how technology/production process must be tested, re-arranged compared to the decisions already taken on the matter. An assessment should be given if responsible practices should concern:

- The production activities within the firm
- The activities outside the firm implied by internal activities (e.g., polluting input are needed for certain output).

The object of such decisions is mainly technical and the main actors to involve in the decision exercise are start-ups leaders. A useful guidance in this reflection is represented by the **SRSM worksheet #5 on "Product and Organisational Report"**. It will help in deciding if the issue merits to become one of the objects of responsibility practices.

Deciding for the practice of responsibility implies devising a business model (and reviewing and monitoring it) so that it is aligned with the decided responsibility principles. Start-ups are

12. Pay attention to the business model being developed

typically engaged in defining their **business model** by translating technology into an economically relevant activity.

Making a start-up's core product/service commercially viable implies also that the **points of view and orientations of actors in various helices are considered**, and this could lead to consistent changes in the related choices (concerning, for example, possible partnerships, type of contracts, value chains in which operating, relations with suppliers, the ways in which customers are sought).

It is important to stress that these exchanges could lead not just to the refinement of **how production is organised** but also to the **specification or revision of the very business idea** – especially when new markets are being created – and/or to singling out **new business opportunities**.

Deciding to practice responsibility also in relation to the definition of the business model is therefore very challenging for a nascent firm. Collecting and using relevant inputs from external actors and helices requires a strong commitment.

Production technology(ies) and operations are not the only aspects to control for framing the overall economic viability of new firms. This depends also on how **start-ups' employees work and contribute to their growth**. In this framework, **gender and diversity** issues are the most obvious issues to consider: start-ups must ensure that their (usually small) workforce has the opportunity to grow within the organisation and to bring their knowledge and skills on board within the structure and aims of the company.

Nevertheless, they are not certainly the only relevant workforce-related issues: how **workers' rights** are considered – both within the start-up and along the value chain(s) – is also important and, consequently, how these aspects of the management process are set for. Other relevant issues concern the involvement of workers in the promotion of responsibility and its practical implementation in the production process. Overall, the issues connected to worker rights are relevant once alignment with Quadruple Helices values is considered, as well as for the fair and fruitful management of possible conflicts potentially connected to them. Other relevant organisational issues connected to relations with stakeholders are **data management** as well as other aspects of **privacy**.

All these issues (adaptation of production technologies and operations, workers' rights, etc.) are all aspects contributing to how the basic business idea becomes commercially viable. In order to decide if and, especially, how put responsibility in the "business model equation" the following suggestions could be given.

- Use the SRSM tools to reach an overview of where the business model components meet responsibility related criteria: these could be the list of 24 indicators or the Worksheet #3 on "Self-reflection Report".
- Use the Worksheet #2 on "Report on the start-up's Workforce" for defining the issues to decide upon concerning workers' rights and diversity issues.
- Use the Worksheet #1 on "Data Management Report".

These tools should be used by the main actors responsible for deciding how to frame the business models, i.e., the start-up's leaders.

13. Including responsibility in the start-up's mission

Defining the start-up's mission, and drafting the related statement, is an important step in the business creation process. Embedding responsibility in a firm's operation needs reflection, experimentation, and decisions whose results have to be communicated both internally and externally also because it is not something that can be taken for granted. Defining explicitly how a firm performs its operations responsibly and drafting a statement on it is a useful step to take and is an advisable consequence of a decision about the issue of practicing responsibility.

All the processes described above could lead to the definition of how responsibility enters the start-up's mission or to re-define and already-existing mission statement. The procedure to arrive to this is not different, from a practical point of view, from that already described for the definition of the vision and purpose statement. Also in this case, the way to do it would start by:

- Reviewing the existing mission statement and discussing among the business leaders how it could be changed
- Approve the proposed changes.

If a mission statement has not been defined yet, a review of those defined by other similar firms will be a useful starting point for drafting it from scratch.

Action
Putting responsibility into practice

Rationale

After deciding to practice responsibility, the **next step of the pathway is planning and launching the activities to begin the implementation of such practice**.

The risk of any decision, especially those concerning a vision of the future of a nascent firm, is that it could remain a dead letter and never get to be implemented. The problem is that a novel approach – practicing responsibility – has to be **implemented in the framework of a wider innovation initiative**: the creation of a STEM start-up. Special care must be devoted to **how to conjugate two daring objectives** (i.e., establishing an innovative start-up and practicing responsibility).

The challenge is that of establishing in the start-up a **governance setting** (see above) enabling the practice of responsibility. It means defining how to begin a process in which **the practice of responsibility is not defined once and for ever but evolves** as a part of the start-up's growth. Action, therefore, should be conceived in a relatively **short time span** and using tools that could be updated based on the results being obtained through implementation. The goal will be embedding the practice of responsibility so that it becomes a distinctive feature of the new firm and responds to its specific needs and characteristics.

The way to do this is to define **a plan of action** aimed at launching a set of activities to root in the start-up the practice of responsibility, **starting with the most urgent issues**. It will cover a short period and then will be reframed, based on the experience and the assessment of the results. The SRSM will provide the conceptual framework and tools to use for starting such an endeavour.

Recommendations

In order to devise a plan of action to launch and embed responsibility in a STEM start-up and act for responsibility, the following recommendations could be formulated.

14. Launching a dedicated workshop for planning actions

As already recommended (see recommendation #1), it is useful to **create an institutional space** where planning activities are concentrated. It could be a **Workshop** that foresees various sessions (the suggested number is at least three, i.e., for launching, implementing, and wrapping up decisions, but it could vary). It is the place in which the plan and its articulation are discussed and deliberated.

There is no specific guidance to provide about the duration of sessions or how to implement them, since each start-up has its own habits concerning how to proceed to analyse and decide upon complex courses of action (e.g., defining a production cycle). The workshop could be more or less articulated, depending on the contingent situation. The only practical recommendations are that:

- Each session **results are duly wrapped-up** (e.g., decision registered, tasks assigned, etc.); this would be obvious, except that reasoning on responsibility-related issues is assumed here as something that is not very familiar to start-ups and, maybe, there are not routines aimed at dealing with these issues

- A final document (even a simple one) describing the **action plan is issued** at the end of the planning exercise of the workshop.

The plan of action will contain the results of the two phases of (self)interpretation and decision and, consequently, will be very specific to the needs and characteristics of the individual STEM start-up.

The **plan's components should be consistent with the aim of kicking off the practice of responsibility** (the so-called governance setting, see above) within a start-up so that such an orientation will characterise its operations. This objective, although apparently limited, is indeed ambitious since start-ups are evolving bodies. Therefore, introducing a trait – the practice of responsibility – so that it can change and persist all along the life of the new firm (notwithstanding its evolution) is a big challenge to consider.

As with any plan, it should entail a careful definition of:

- The specific objectives to pursue
- The activities to carry out
- The timeline and the milestones
- The distribution of roles and tasks among the start-up members/offices/departments.

When defining the objectives, it is suggested to carry out two actions.

- A **prioritisation exercise**, based on the results of preceding phases of the pathway. For example, the focus could be the technology being developed and not the procurement system, or vice-versa; it could be decided to overlook, in the first period, external and distant social issues in favour of closer ones such as equal opportunities; etc.
- A check of the overall and **potential scope of the plan's components** (typically, the lack of human resources could hamper the implementation of certain tasks; it could be decided to reach an excessively wide array of stakeholders compared to the actual outreach potential of the start-up, and so on).

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16. Decide on the articulation of the plan consistently

The action plan has to be articulated consistently with its specificity. In defining the plan, attention should be paid to its **duration**. The objective of the plan is embedding responsibility within a nascent organisation so that its practice becomes accepted and integrated into the start-up operations; therefore, the duration cannot be too long also because its results should be interpreted in the framework of the organisation's overall evolution. This likely implies that the approach to responsibility will have to be adapted to how the start-up is changing. A **short duration** (e.g., one year or even less) of the plan should be considered as an appropriate option.

It is suggested that **the plan's activities** are focused on the **main aspects of the (STEM) start-up process** (and this means that a plan for a different type of organisation would not work). For example, the plan could act for:

- Strengthening motivational and interaction aspects of responsibility practice by acting on the entrepreneurial groups and on the staff

- Creating routines and organisational arrangements that make the practice of responsibility possible
- Creating and/or strengthening connections with relevant stakeholders within the four helices so that they can help the start-up to practice responsibility relational aspects
- Developing the product/service and/or the related production processes trying to serve responsibility principles in product development
- Adapting the business model so that it is consistent with the start-up's overall aspirations.

The focus of the plan could be on one or more of the above-listed aspects of the start-up process according to the decisions taken, and on the identified priorities. Focusing on these aspects makes it possible **to make a plan that is appropriate for a start-up**.

As for any plan of action, especially this one that has an ambitious but limited aim (starting up responsibility practice), provisions should be given on how to implement it. In order to do so, the following suggestions can be given.

17. Defining the pathway of implementation

- The plan should be based on the definition of **milestones** to reach and **expected results**. It is on this basis that the implementers of the plan will be aware of the directions that they are giving to the undertaken actions.
- The implementation should be imagined starting from the identification of different **roles** and by assigning them to **people** who are committed to the implementation and are able to do so.
- Actions should be designed so that the results being obtained can be **monitored** and the possible criticalities managed properly.

18. Use already existing resources and advice

Drafting and implementing a plan of action represents a further burden of innovation for a start-up since the process has not been systematically codified yet. Nevertheless, it is possible **to access resources and advice** that could help the start-up founders in promoting responsibility.

The definition of the plan of action does not start from scratch. Such an exercise, indeed, will have been preceded, and therefore prepared, by the two previous phases of the pathway. A great help will come from **using the ideas and indicators of the SRSM, and the Worksheets that complement it**. Their use has been already recommended previously as tools for reflection and decision. They should be seen also as tools for putting into practice the action plan's components and/or for acting on one or more aspects of the start-up process.

In practice, based on the decision taken, in writing the plan of action **the worksheets could be used for scoping the activities to do and/or to define them in more detail**. The advantage of these tools is that they will provide guidance on the range of possible choices relevant to those interested in promoting responsibility in industry. In this sense, they will provide a sort of shortcut that **should be adapted to the actual needs of start-ups**.

Beyond the SRSM and the related worksheets, the effort for designing and implementing action could be supported also through the **advice from experienced professionals**, which could be sought, also on an ad hoc basis.

19. Flexible/agile implementation of the plan of action process

Responsibility, according to this Guidelines' approach, implies strengthening the relations with stakeholders. Therefore, the very plan of action will be affected, during its implementation, by the results of this interaction. In this framework, the plan's implementation should **foresee flexibility**. In order to do so, monitoring of results should be included so that activities could be reframed based on the actual needs. Changes will be probably the results of **negotiations** between various actors both within the start-ups (within the entrepreneurial group, between leaders and employees) and outside them (with investors, consultants, stakeholders and so on).

In this framework, and also because of the centrality of investors and stakeholders for start-ups, it is important to consider that the implementation of the plan (and the pursuit of responsibility in general) implies (at least) some **activities aimed at communicating and making visible** the effort being made for pursuing responsibility. In order to communicate, especially to external stakeholders, Worksheet #4 on "Activity Report" could be of help (even if it could contain some redundancies).

Communication, therefore, should become a component of the plan's design and implementation. Finally, it should be considered that the context of the plan's implementation is almost new for its promoter. Consequently, advice on how to better introduce and present the practice of responsibility to internal as well as external stakeholders should be obtained from people with previous experience.

Summary list of recommendations

No.	Recommendations
	Interpretation
1	Creating occasions for discussing about responsibility
2	Analysing the current responsible practices of a start-up
3	Mapping the potential investors taking into account how they consider impact investment
4	Reviewing how the current and potential research partners approach responsibility
5	The new firm's activities and the stakeholders (in the remaining helices): Figuring out possible impacts and opportunities for cooperation
6	Refine the start-ups' purpose and vision
	Decision
7	Deciding on responsibility in the framework of the established internal decision-making process
8	Achieving consensus among the internal decision-makers about Responsibility
9	Adapting the organisational structure to responsibility orientation
10	Getting in touch with the main stakeholders of the four helices
11	Pay attention to the core technology development process
12	Pay attention to the business model being developed
13	Including responsibility in the start-up's mission
	Action
14	Launching a dedicated workshop for planning actions
15	Choosing plan's priorities and components based on the results of self-interpretation and decision phases
16	Decide on the articulation of the plan consistently
17	Defining the pathway of implementation
18	Use already existing resources and advice
19	Flexible/agile implementation of the plan of action process

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Notes

Note #1 – RRI and Industry – Definition and challenges

Responsible innovation is at first instance a precautionary endeavour that seeks to avoid social and environmental hazards. Although this is a good starting point, the negative conception of responsible innovation does not pay due attention to the positive contributions that innovation can (and generally speaking should) produce in society.

Innovation is not just an intellectual endeavour of finding new solutions to problems, rather, it is a social endeavour in which society and science change together and influence each other. New technologies are not just answers to technical questions – they change the world we live in. The notion of Responsible Research and Innovation (**RRI) is thus a way of "taking care of the future through collective stewardship of science and innovation in the present."** (Owen et al., 2013).

Various models of RRI have been developed in the past decades to help bring this idea of science closer to reality (Asveld, 2017; Koops et al., 2015; van den Hoven, Swierstra, Koops, & Romijn, 2014). A model that has been particularly successful in capturing the essence of RRI is the one proposed in Owen et al. (2013) and Stilgoe et al. (2013). This model revolves around four principles or '**process requirements**'[4]: Anticipation (asking questions about the future); Reflexivity (thinking and being critical about the innovation process); Inclusion (engaging various stakeholders to participate from the start in science and innovation); Responsiveness (responding and modifying ways of thinking and behaviours).

These process requirements are the cornerstone of the RRI literature but have not been incorporated into literature on socially responsible investment. In addition, there is also **a tension between how RRI is implemented in academia and how it is used by companies in practice**. While existing RRI research and practice mainly focus on public Research & Innovation (R&I) at universities, privately funded industrial R&I provides a completely different context with its own challenges (Blok & Lemmens, 2015). The self-evidence of public engagement in RRI (Stilgoe, Owen, MacNaghten, 2013) turned out to provide **particular challenges in the industrial context** (Blok et al. 2015) because of fundamental tensions between the social and economic logics employed by companies (Brand & Blok, 2019).

This particular context of industrial RRI received increasing attention in the literature, resulting in dedicated special issues in recent years (Scholten & Blok, 2015; Blok, Scholten, Long, 2018; Martinuzzi et al. 2018). While research highlighted how RRI can provide a competitive advantage for firms (Blok et al. 2020), can be aligned with the Corporate Social Responsibility (Blok, 2018) and open innovation strategy (Long et al. 2018) of companies, and how RRI can be implemented in R&D decision making processes (Blok et al. 2017) and company strategy (van de Poel et al. 2020) to mature over the years (Stahl et al. 2017), **the particular context of finance and private investment in RRI didn't receive attention in the literature so far**.

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[4] These differ from the six keys of the EU's RRI model (Ethics, Science Education, Gender Equality, Open Access, Governance and Public Engagement). The keys are more focused on the issues that must be dealt with than on how to practice responsibility. Furthermore, they are more fit for academic organizations than for firms.

Note #2 – Examples of the practice of responsibility for Start-Ups and SMEs

What does it mean to be a responsible start-up or to practice responsibility in the way one does business and gains the confidence of stakeholders, users, and citizens with respect to one's products and enterprise? Several experiences have been made in this direction.

In the context of the implementation of the **Millennium Development Goals**, some start-ups decided to contribute through the realisation of innovative technological solutions that can be used in developing countries. Such as the start-up **Embrace,** which designed an Infant Warmer consisting in a low-cost sleeping bag-like product that does not require electricity, can be operated with no specific technical knowledge, and is designed to be durable and re-usable[5] or **Westergaard**[6], which produced a new portable technology to filter drinking water.

Several SMEs and start-ups, in different fields, have linked their mission and activities to the promotion of **environmental sustainability**, through the development of technological innovations and the application of processing procedures aimed at reducing environmental impacts. In the field of agriculture, **Magila**[7], has developed a soilless agricultural technique derived from the integration of the aquaculture system (fish farming) and hydroponic cultivation; while **Smart farm Srl Società Agricola**[8] has started an experiment for the production of microalgae for the extraction of medicinal oils with low water consumption.

Several SMEs and start-ups have **integrated a responsible approach in the very way they do business and innovation,** in line with the contents of the **RRI**, i.e., anticipating possible risks, including the involvement of different categories of stakeholders and citizens from the onset, reflecting on their business and innovation activities, willing to change and modify their product/service on the basis of the inputs received. This has happened and is happening a in in the fields of **ICT**, **health**[9], and even of **bio- and nanosciences** and **materials**. The start-up **oldntec GmbH**[10], for instance, designed and produced Ambiact, a smart meter for social alarm systems for elderly people living alone, through the involvement of potential users from the very beginning, with a focus on privacy protection, the anticipation of possible risks, and adapting the product based on the outcomes of stakeholder consultations. A spin-off from some London universities involved in different ways (focus groups, design workshops, etc.) people with dementia and their caregivers in the design of **My brain book**[11], a product to monitor and record daily therapies, and information, in a platform shared with doctors and caregivers. BodyTel (Germany), for the development of GlucoTel (a telemedicine device to measure blood glucose level) involved, from the design stage, several categories of stakeholders such as patients and families; caregivers and medical advisers; health insurance; medical technology and pharmaceutical companies; integrators of sensors and services.

According to a study conducted in Norway, several start-ups in the field **of digital innovation in healthcare and welfare services**[12] have in fact practised the four dimensions of RRI in their venture creation. All the

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[5] See, Cavallaro, F.I., Schroeder D, Bing, H. "Responsible Industry D1.2 "PROGRESS RRI – Best practices in industry", 2014 - https://www.progressproject.eu/wp-content/uploads/2020/09/PROGRESS-D4_1-Best-practice-in-industry-updated.pdf

[6] See, Cavallaro, F.I., Schroeder D, Bing, H. "Responsible Industry D1.2 "PROGRESS RRI – Best practices in industry", 2014 - https://www.progressproject.eu/wp-content/uploads/2020/09/PROGRESS-D4_1-Best-practice-in-industry-updated.pdf

[7] See, Del Baldo, M., "When innovation rests on sustainability and food safety: some experiences from Italian agri-food startups", in Frontiers in Sustainability, August 15, 2022, https://www.frontiersin.org/articles/10.3389/frsus.2022.889158/full

[8] See, Del Baldo, M., "When innovation rests on sustainability and food safety: some experiences from Italian agri-food startups", in Frontiers in Sustainability, August 15, 2022, https://www.frontiersin.org/articles/10.3389/frsus.2022.889158/full

[9] An interesting pilot experience of the participatory definition of needs in the health sector with the participation of citizens and active involvement of some telemedicine companies in a co-creation process of innovative technological solutions involving stakeholders and citizens was tested by the European project CHERRIES – Responsible healthcare ecosystem, - https://www.cherries2020.eu/.

[10] Schroeder, D., "Responsible Industry D1.2 "Case Study Descriptions", 2014

[11] See, Schroeder, D., "Responsible Industry D1.2 "Case Study Descriptions", 2014

[12] Thapa, K. R., Iakovleva, R. "Responsible innovation in venture creation and firm development: the case of digital innovation in healthcare and welfare services", in Journal of Responsible Innovation, 2023 DOI: 10.1080/23299460.2023.2170624. See also Merethe Oftedal, E., Foss, L., Iakovleva, T. "Responsible for responsibility? A study of digital E-health startups", in Sustainability 2019 **https://doi.org/10.3390/su11195433** . Similar results emerged

companies investigated had involved (or tried to do so, deeming it necessary) customers, investors, and potential users of their products, at different stages of the venture creation process, to acquire information, ideas, knowledge, experience useful for the feasibility and growth of the enterprise and confidence building. All of them tried to anticipate possible risks, especially at the beginning of the process, e.g., with regard to privacy, security, expectations, etc., in order to increase awareness of possible risks beyond the economic ones. Almost all of them during the business creation process practised forms of reflexivity on the meaning of their enterprise, its mission, business model, etc. Almost all of them practised forms of responsiveness, at different stages, especially when testing their products, in a process of improvement and adaptation to users' needs. The study shows that the practice of responsiveness helped the consulted start-ups and start-up companies to identify, understand and assess the opportunities and risks associated with innovation and business creation. For the consulted start-ups, two main difficulties were encountered: the lack of economic resources and the fear of missing opportunities due to the presence of competitors. The study also documented a low awareness of the issue of accountability, although it was practised in different forms.

In other areas, start-ups and companies are trying to practise principles of environmental sustainability and energy transition, in the choice of materials used, the use of electric vehicles or alternative energy sources, waste reduction and management, etc., as **Mi-Metal srls**[13] or **MISO**[14], both based in Italy, are doing in the manufacturing sector.

The application of RRI in start-ups and SMEs has also been experimented through a number of European projects in the fields of **nanosciences, material sciences, and biosciences**. An example is that of **Laboratori Archa Srl**,[15] on the production and use of nano capsules to be used in cosmetics and biomedical applications while respecting the environment and human health, preventing possible risks, and respecting ethical principles; or the case of **Spectro**[16], a family business in the cleaning sector that produces products geared to minimising the impact on the environment through continuous customer involvement (one of their products is the Ecodos dispenser). Other examples are offered by **Applied nanoparticoles** (AppNP)[17] a scientific spin-off in the biogas sector for the production of nanoparticles for biogas production from organic waste, and by **MiAlgae**[18], a biotechnology company engaged in the production of an oil from algae rich in omega three. In all these cases, the involvement of the various stakeholders played a fundamental role as well as the focus in anticipating possible risks.

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from the study conducted on SMEs in the medical sector in Austria, which focused on the analysis of obstacles and facilitating factors to the implementation of RRI: Auer, A., Jarmai, K., "Implementing responsible research and innovation practices in SMEs: insights into drivers and barriers from the Austrian medical device sector", in Sustainability 2018: **https://doi.org/10.3390/su10010017**.

[13] www.mimetal.it

[14] www.miso.it

[15] See, Porcari, A., Pimponi, D., Borsella, E., Mantovani, E. "PRISMA Pilots: RRI Roadmaps. The PRIMA Roadmap to integrate responsible research and innovation in industrial strategies. Case studies". https://www.rri-prisma.eu/wp-content/uploads/2019/09/PrismaRRI_Roadmap_CaseStudies.pdf

[16] See, Porcari, A., Pimponi, D., Borsella, E., Mantovani, E. "PRISMA Pilots: RRI Roadmaps. The PRIMA Roadmap to integrate responsible research and innovation in industrial strategies. Case studies". https://www.rri-prisma.eu/wp-content/uploads/2019/09/PrismaRRI_Roadmap_CaseStudies.pdf

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Annexes

Annex I –
SRSM explained: A model for facilitating STEM start-ups to practice responsibility

A.1. Responsibility, innovation, stakeholders and STEM start-ups

> A model for practising Responsibility –
> Conceptual underpinnings

To foster **impact investment**, RRIstart has developed the **Social Responsibility for Start-ups Model (SRSM),** a novel Responsible Research and Innovation (RRI) based model for start-ups[19], complemented by a list of 24 indicators in a multi-stakeholder (quadruple helix) context and seven worksheets (see Annex II and Annex III, respectively).

BOX #1 – Where does the SRSM come from?

The SRSM was based on a wide review and analysis of the existing approaches to the practice of responsibility by firms (a relevant presentation can be found here – Deliverable 1.1 of RRIstart Project and in Ryan et al 2023) and special attention was paid to the indicators that these approaches utilize to measure responsibility (particularly the IRIS+ and those based on various RRI projects). A review of the theoretical and grey literature on the topic, as well as on the literature on ethics and responsibility of finance was also carried out. In doing so, it was realized that – apart from other weaknesses – **such approaches and the related indicators were not fit for start-ups**, especially highly innovative ones such as those emerging from STEM research (see Del 1.1, particularly par. 3.2). Furthermore, we tried to cross-fertilize these two fields, the more ethically oriented world of RRI and the more financially-oriented world of socially responsible investment (IRIS+method). We did it also by drawing upon literature on Lean Start-up Approach (LSA). In particular, we extended the LSA's initial focus on interaction with customers (through MVP, Minimum Viable Product) to interactions across the other three helices proposed by the QH approach (see below) and the benefits from the interplay that occurs across them.

The **SRSM** is based on various pillars (not just RRI, but also Lean Start-up Approach, LSA, see Box #1) and particularly, on the Quadruple Helix approach. i.e., on the idea that **innovation occurs as the result of diverse stakeholders' behaviours and interactions directed at pursuing certain values typical of four main society sectors** or '**helices**': *industry; policy; research and civil society* (see below, Box #2).

This is relevant also for **STEM start-ups innovation activities**. As a matter of fact, if the start-up creates an innovative product or service, then the act can result in added market value (e.g., if the product is marketable), research value (e.g., if in the making of the product knowledge was produced that can be used for future progress), societal value (e.g., if the new product solves a social problem) and added political value (e.g., if the product respects the rights of the citizens who will use it, for example by guaranteeing the protection of personal data). In any given innovation act, the *values are thus entangled*. (see Box #2 below for a brief presentation of this approach).

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BOX #2 – THE QUADRUPLE HELICES APPROACH IN THE SRSM: SOME DEFINITIONS

In the SRSM, a processual interpretation of Quadruple Helices is advocated (with some differences from the most common interpretation, Popa et al. 2020), one that focuses on the actual processes through which stakeholders – in our case, the members of the start-up and their external partners– contribute to creating value in each helix during the innovation process. Their efforts – according to this approach – are rewarded when that value is achieved. A helix thus represents a behaviour that manifests as a sequence of activities directed at a certain value. Table 1 outlines values' definitions, and prototypical behaviours and outputs for each helix.

Table 1 – Innovation as value-creation along four helices

Helix	Values	Definition	Prototypical Behaviour	Prototypical outputs
Industry	Business Value	Direct or indirect monetary worth	Starting a business, investing in a business, mergers and acquisitions, managing a business.	Return on investment, market share etc.
Policy	Political Value	Contributing to a fair and just system.	Campaigning (arguing) for or against, a public policy, a programme or an individual. Implementing public policies	Definition and deliberation of public policies; public policies implemented
Research	Research and education Value	Producing new knowledge contributing to the development of a disciplinary field or science in general	Researching, publishing, and presenting scientific work.	Publications, patents, books, academic and honorary titles, citations
Civil society	Societal Value	The contribution of an act to the protection and implementation of civil, and social rights.	Starting and managing an NGO, promoting capacity building, empowerment and citizen engagement, participation in local and territorial consultation, involvement in petitions and in lobbying activities	Rights and artefacts that answer societal needs.

Responsibility for start-ups

The four helices values are, nevertheless, in a state of competition with one another also because they are the results of actions of start-ups that typically have limited resources and cannot pay the same attention to all of them. Since the decision-making process that constitutes innovation cannot maximally satisfy all four values, a **balance is needed** between the four helices, and this balance will inevitably privilege some values at the expense of others. For example, STEM start-ups are places where high-tech innovation occurs, oftentimes in close connection with research organisations and the academic world. This implies that the complexities characterizing the research systems are also relevant to them (the potential conflict between research and business values is a very well-known phenomenon, see below).

The start-up might **create a product with amazing market value**, but with negative repercussions on the quality of life of its end-users (e.g., individual health risks) and other stakeholders (e.g., environmental risks). The gain in business value might be said in this case to overpower the loss in social value, in which

case we can speak of irresponsibility. The same idea applies, *mutatis mutandis*, to other cases where the decrease in value on one side is sought to be compensated by the increase in value on the other side.

Responsibility thus becomes a form of balance between the four helices. Therefore, finding a fair balance cannot be taken for granted and some values, typically, the market value – or more precisely the anticipated creation of market value – could "dominate" the innovation process in a way that is detrimental to the other three helices.

This helps in defining **the central question of responsibility for start-ups**: **is the activity/product serving in a fair way the four helices so that no value overpowers the others, and no value is sacrificed for the sake of others?** Technological progress might contribute to a gain in value generally speaking, but this gain might not translate into an equal gain for all individual values. In some cases, the disparity between two or more values can be particularly obvious, leading to friction or conflict.

> Innovation and Responsibility: a necessity nexus

In this framework, it is worth noticing that **the SRSM views innovation as a broad social phenomenon** involving a multiplicity of actors and values (societal, political, business, and research), with impacts that go beyond those affecting the parties directly involved in the entrepreneurial activity, i.e., firms and customers.

It is this **nexus** that makes the issue of **responsibility relevant, and maybe inescapable, for start-ups**: if the social scope of innovation is wide, it is important that **start-ups equip themselves to get ready for being part of the societal exchange innovation consists of**.

The **issues at stake**, for any innovation effort, are indeed numerous and diverse and depend on each of the helices. Not only connections with the **research helix** are needed for generating new knowledge and developing new technologies but interactions with **civil society's actors** are crucial as well. Such interactions are, indeed, needed for understanding both the possible risks and reactions to innovation and for creating, through capacity building and citizen empowerment – if not partnership and alliances – a friendly environment where innovation can be promoted. More: connections with the **policy helix** could help promote innovations that are in line with overall policies in certain sectors (e.g., enhancing welfare systems through strengthening the provision of online services; reducing carbon footprint of industry, etc.). As for the **industry helix**, it is important to consider other businesses' choices and orientations (e.g., firms in a certain value chain could pursue standardization strategies that should be followed).

In general, when looking at start-ups, it can be said that they must implement knowledge and information from the four helices at a very early stage of development. The basic characteristic of STEM start-ups is that they do not have a Business-as-Usual-activity to be maintained. Rather, their very **identity is based on the effort of promoting a novel business and innovating**. For this reason, the awareness of the relevance of the **nexus with responsibility should inform the very process of setting up the new firm**.

A.2. Using the SRSM: Indicators and worksheets

A brief outline of how the SRSM model works

The model is designed and meant mainly for the pre-investment phase of a start-up life cycle. Once a start-up comes up with an idea and begins to build a prototype (or a Minimum Viable Product, MVP), the SRSM should then be implemented to identify how to act responsibly. **The SRSM allows the start-up to evaluate its idea and business model in the context of its impact on society, business, research, and policy**.

Using the model could also help to **single out the possible stakeholders through which to evaluate the Prototype/MVP.** Of course, the customers will evaluate it from the stance of the particular functionalities in which they are most interested. Other stakeholders would assess different aspects of the same MVP (for example, in terms of the impacts on certain classes of people, such as workers). The most practical way of implementing this model is through the model's set of 24 indicators.

The **24 indicators composing the SRSM** can provide indications to start-ups on how to become more responsible organizations. They indicate what an organization should adhere to within the four strands of the SRSM in order to pursue responsible behaviour. These indicators are the result of the model and are also the clearest and most succinct way for a start-up to implement this model in practice.

The **24 indicators are mapped into the four helices**: political, business, societal, and research. The list is provided in **Annex II**. They are qualitative and proposed in a prescriptive manner to guide and enable start-ups and responsible investors to understand what should be done in particular situations. These indicators differ from traditional ones because they are more forthright in the ethical obligation of relevant

stakeholders. A possible result of the implementation of the Model and its indicators by a start-up could be the identification of some more detailed and specific impact indicators through which its specific performances can be measured. This process would result in a form of contextualization of the Model.

<div style="text-align: center; color: #1F6FB2; background-color: #A9D08E; padding: 8px; border: 1px solid #000; display: inline-block;">
Practical worksheets for using the Model's indicators
</div>

While the 24 indicators are clear and work as effective *goals* and instruments for identifying responsible start-up practice, start-ups still need practical tools to implement them. For this reason, **seven worksheets have been defined (see Annex III)** that help organisations identify, detail, and strive towards the best responsible practices in their start-ups. There is a strict connection between the indicators and the worksheets.

A worksheet is **an assessment tool that can allow start-ups to self-identify and reflect on responsible behaviours and enables them to monitor their progress**. More specifically, the worksheets provide questions to identify how start-ups are already implementing responsible practices, how they are doing so, if there are areas for improvement, and how to develop approaches to future better practices. **The indicators are essential for implementing this self-reflection exercise since they represent a list of practical issues on which to focus one's attention**. The correspondence between the questions of each worksheet and the indicators is provided in Annex II. 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 right or wrong answer.

Furthermore, **a worksheet can be used by external parties too** (e.g., researchers, investors, etc.) to comprehend start-ups' understanding of specific topics or issues, how they respond to them, the outcome of learning from this process, and the process of learning itself.

The worksheets are seven and are collected in a workbook (see Annex II) listed in the Table below.

Seven Worksheets
1. Data Management
2. **Workspace fairness**
3. Self-reflection Process
4. Organisational Activities
5. Product/Services
6. Stakeholder Involvement
7. Ethical Goals and Values

BOX #4 – PILOTS HAVE BEEN ORGANIZED FOR TESTING THE SRSM WITH START-UPS AND STAKEHOLDERS

The SRSM (with its indicators and worksheets) was tested to verify its feasibility and effectiveness for start-ups and for impact investment. In particular, it was tested to assess its ability to:
1. Successfully diagnose, through its indicators, the current level of responsibility in the start-up innovation process.
2. Pave the way for more responsible forms of innovation in the start-up innovation process.

A translational 'from-lab-to-market' approach was adopted around three Pilots[20], which used a methodology derived from Social and Behavioural Labs for addressing complex social issues and requiring interaction among a range of different stakeholders. The three pilots (through 2 Social labs for each pilot) covered the following sectors:

- Environmentally sustainable start-ups from Northern Europe, carried out by EBAN
- 3D printing & advanced materials start-ups in Italy, carried out by La Sapienza University of Rome
- Bioeconomy (agrifood) start-ups ain Greece, carried out by YET.

One of the major findings from the Pilots is the interest and eagerness in implementing socially responsible practices and guidelines within the start-ups that we focused on. It was highlighted that very often the entire goals, aims, and products of a start-up can be designed to fill a specific societal gap or issue, making the initial direction towards social goods implicit within the organisation. It was also noted the usefulness of activities aimed at supporting socially conscious entrepreneurs and empowering them. In addition to this, we noticed that once start-ups are provided with more information, help, and methods to achieve positive social outcomes, they are very receptive to these and implement them within their organisations, even outside of the focus of the Social labs and the RRIstart project. Thus, as a result of the Social labs, some of the start-ups have strengthened or incorporated from scratch forms of dialogue with stakeholders, gender equality, or the development/adoption of tools for impact assessment. Furthermore, during the Social labs, it emerged that some of the start-ups involved already practiced forms of "*de facto responsibility*".

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[20] Information on the 3 Pilots (and its 6 Social labs) are collected in: Deliverable D2.5 "Pilot Outcomes and Implications for the developed innovations" (May 2023); Deliverable D2.2 "Pilota 1" (March 2023); Deliverable D2.3 "Pilota 2" (March 2023); Deliverable D2.4 "Pilota 3" (March 2023); Deliverable D2.1 "Pilot Methodology" (May 2022), available at: https://rristart.eu/deliverables/

Annex II – List of Indicators

The SRSM Indicators

The following are 24 indicators that a start-up should adhere to for practicing responsibility. They are the result of the SRSM (see Annex I) and are also the clearest and most succinct way that a start-up can implement this model in practice.

The indicators are provided in a prescriptive manner to guide and enable start-ups and responsible investors to understand what should be done in particular instances, rather than simply making vague statements where the intent and responsibility is unclear. This also corresponds to our specifically responsible set of indicators, which differ from traditional indicators, because they are more forthright in the ethical obligation of relevant stakeholders. This does not preclude the decision to adopt specific measurements (tailored to each start-up) of the performance achieved as this process progresses.

We make the groups of indicators clear and colour-coded (Fig 1). We split them up into their respective quadruple helix categories and shortened the indicators to make them understandable at a glance (Fig 2). The overall list in Sections 1 – 4 below.
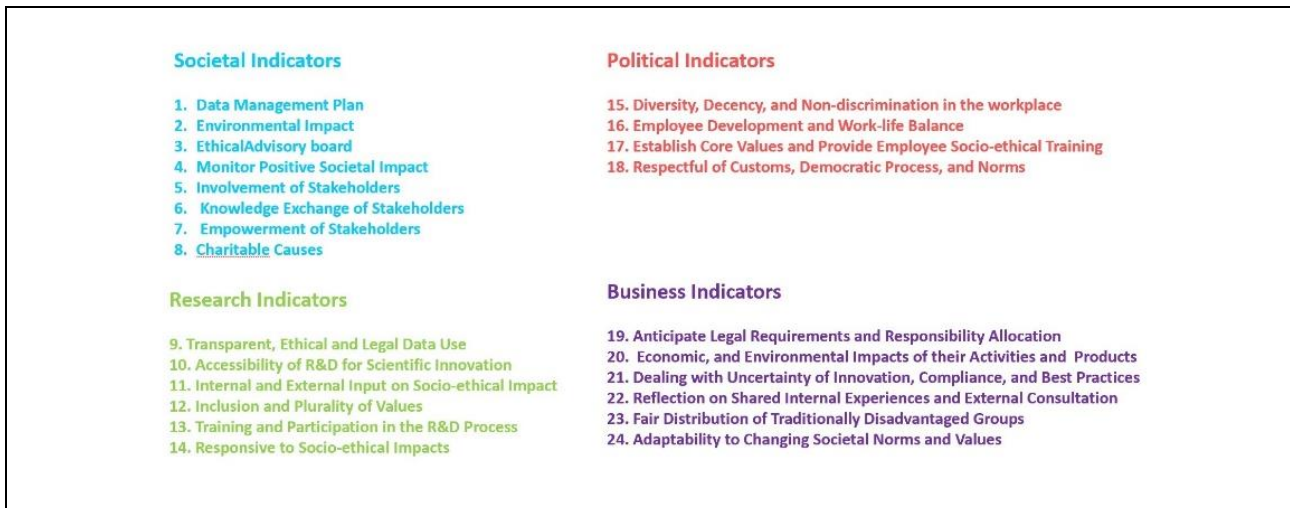

Figure 1 Quadruple Helix Indicators

Figure 2 Indicators colour coded

1. Societal Indicators

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

S1	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.
S2	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. Whenever possible, they should publish a sustainability report on their efforts.
S3	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. Specific roles and duties of individuals within the organisation must be established.
S4	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.
S5	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).
S6	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.
S7	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.
S8	The start-up should optimally contribute to charitable causes or engage in other social activities that give back to society.

2. Research Indicators

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

R1	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.
R2	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).
R3	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. Measures should be taken that the advisory board reflects the broad diversity of views within, and outside, the start-up. While external can come in the form of validation from experts in normative approaches to science (ethics, technical assessments, etc.). If the start-up does not have resources to implement these themselves, they should try to identify ways to allow this (such as through grants, assistance from researchers/universities, free ethical guidelines, and so forth).
R4	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.
R5	Participants in the R&D process should be informed about the results of this process.
R6	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. It is important to include staff during this process to establish how they can make a positive socio-ethical impact, while avoiding risks, during each stage of this process.

3. Political Indicators

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

P1	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 and staff should be trained in methods of self-reflection and anti-discrimination prevention.
P2	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.
P3	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).
P4	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.

4. Business Indicators

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

B1	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.
B2	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. This can be implemented through external auditing, risk assessments, feedback and stakeholder engagement. • 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.
B3	Start-ups should carry out innovation in a responsible manner, using objectives for assessing performance, 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.
B4	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. Staff should be involved in deciding about their training plans. 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.
B5	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.
B6	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).

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Annex III – Seven Worksheet

The seven worksheets are tools of self-reflection to identify current (new) firms' behaviours and enable them to monitor progress.

The seven worksheets are listed below and then, presented in detail:
1. Data Management
2. Workspace fairness
3. Self-reflection Process
4. Organisational Activities
5. Product/Services
6. Stakeholder Involvement
7. Ethical Goals and Values

The worksheets are based on the SRSM and its 24 indicators (see Annex II). We realized that while these indicators are clear and work as effective *goals* and tools for identifying responsible start-up practice, 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. The worksheets allow companies to provide qualitative responses, as well as further details to such questions and report on them. Questions about the same topic come 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.

The 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– as in the framework of implementing these Guidelines). For example, the product/services worksheet 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 Organisational worksheet can be used at regular moments to document the organisation's progress, and the stakeholder involvement worksheet 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.

1. Data Management

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 presents the data management worksheet and indicates the SRSM indicators that feed into each of its questions.

Table 1: Data management worksheet

	Question	Indicators
1	Do you have a company-wide data management plan? What methodology do you use to do this?	S1
2	How do you share data that can be used for social goods (e.g., environmental, beneficial to the public, or for society)?	S1, R1
3	What type of technologies are you using for data protection (employee data, client data etc.)? Are you asking consent to use data?	S1, R1
4	How is your R&D process generating useful knowledge that can be used by others in research and innovation?	R2, R3
5	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
6	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
7	Where will the open-access information be stored and who is responsible for maintenance?	R1

2. Workspace Fairness

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.

Table 2 presents this worksheet and indicates the SRSM indicators that give rise to each of its questions.

Table 2: Workspace fairness worksheet

	Question	Indicators
1	How are employees free to be creative in their work? Do they have an opportunity to grow and develop in their roles?	P1, P2
2	What skills, knowledge and experience of staff are taken into account? How are their training needs assessed?	P3, B4
3	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

	Question	Indicators
4	What are the percentages disaggregated by gender, race, disability, etc. involved in R&I/R&D function/teams in the company?	B5
5	What are the average hours of training programs for research employees, disaggregated by gender, race, disability, etc.?	B5
6	How do you ensure that discrimination based on gender, race, disability, etc. does not occur?	B5

3. Self-reflection Process

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.

Table 3 presents this worksheet and indicates the SRSM indicators that give rise to each of its questions.

Table 3: Self-reflection worksheet

	Question	Indicators
1	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
2	How do you ensure stakeholders have sufficient knowledge and power to voice their ideas and concerns?	S5, S6
3	How do you ensure diversity at work and in the stakeholders you engage?	R4, P1, B5
4	How do you ensure innovation meets: • stakeholders' expectations, • external benchmarks, • positive social, environmental, and economic impacts, • the law in force	B1, B2, B3
5	How is the start-up respectful of societal traditions and customs of their target market?	P4, B6
6	How is the organizational process affecting public safety? How is the organization reducing safety risks?	S4, R2, B3
7	Is the research process intelligible and transparent to the public? Is the language attuned to a diverse array of stakeholders?	R2, B2
8	How do you encourage employees to reflect on the company's research and innovation? How do you maintain and enhance reflexivity?	P3, B4

4. Organisational Activities

Similarly, to the self-reflection process worksheet, the organisational activities worksheet 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 worksheet focuses more on the organisation as a whole, this one can be used on a case-by-case basis for the start-up's actions.

Table 4 presents this worksheet and indicates the SRSM indicators that feed into each of its questions.

Table 4: Organisational activities worksheet

	Question	Indicators
1	How do you define your responsibility during the R&D process? How do you implement it?	R2, R3
2	How are you optimally applying risk assessment methods to organizational processes?	B2, B6
3	Are you working with an advisory board on ethical issues? What does this work consist of? How did it affect your behaviour?	R3, R6
4	Do you provide training/assistance to citizens to participate in your R&D process?	R5
5	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
6	How is your organization involved in the scientific community for knowledge exchange and feedback?	R2
7	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

5. Products/Services

This worksheet 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 5 presents the worksheet and indicates the SRSM indicators that feed into each of its questions.

Table 5: Products/services worksheet

	Question	Indicators
1	How do you identify and anticipate legal, regulatory and other requirements related to the product/service?	R6, B3, B4
2	Is the R&D output socio-ethically validated by experts in normative approaches to science? (ethics, tech assessment etc.)	R3, B3
3	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
4	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

	Question	Indicators
5	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
6	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
7	What are your charitable endeavours?	S8, B2

6. Stakeholder Involvement

A very important factor within responsible research and innovation (RRI) is ensuring that 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. The stakeholders involvement worksheet aims at shedding light on a start-up's current practices concerning stakeholder involvement, providing insight into areas that need to be enhanced.
Table 6 presents the worksheet and indicates the SRSM indicators that feed into each of its questions.

Table 6: Stakeholder involvement worksheet

	Question	Indicators
1	How are external experts auditing your activity? How do they investigate societal aspects (e.g., environmental auditing)?	R3, B3
2	How are internal/external stakeholders involved from the early stages of product development?	R3, B3
3	How are you gathering positive and negative feedback and how does the feedback affect start-up activity?	S5, S7, R4
4	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

7. Ethical Goals and Values

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. The **ethical values/goals worksheet** aims at shedding light on a start-up's ethical values, how they are being implemented, and how they can be improved. Table 7 presents the worksheet and indicates the SRSM indicators that feed into each of its questions.

Table 7: Ethical values/goals worksheet

	Question	Indicators
1	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
2	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

	Question	Indicators
3	What has been done to ensure the awareness of employees regarding socio-ethical issues about the organization and its product(s)?	S3, P3
4	How do you ensure procedures to prevent harmful impacts of innovation practices on society and the environment?	S4, R3, B2
5	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
6	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