



Deliverable 2.1

Pilot Methodology

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Executive Summary:

RRIstart is an H2020 Research and Innovation Action aiming at fostering impact investment by developing an innovative RRI-based model for start-ups, the **Responsible Impact Assessment Model (RIAM)**, that encompasses RRI-oriented indicators spanning all helices of the quadruple helix (QH) model (Carayannis & Campbell, 2009, 2012; Fitzpatrick & Malmborg, 2018; Monteiro & Carayannis, 2017). Currently, start-ups and investors do not adopt existing Responsible Research and Innovation (RRI) principles and indicators due mainly to the limited compatibility of existing RRI models which are tailored mostly for more traditional organisational structures. By adopting a lean/agile approach to RRI embedment, RRIstart seeks to demonstrate the importance of RRI in the science, technology, engineering, and mathematics (STEM) entrepreneurship ecosystem.

RRIstart **tests** the RIAM for exploring its feasibility and effectiveness in impact investment. More specifically, we are interested in assessing the ability of the RIAM 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.

Testing is accomplished through a **translational ‘from-lab-to-market’** approach organised around three pilots:

- environmentally sustainable start-ups from Northern Europe;
- 3D printing & advanced materials in Italy;
- bioeconomy (agrifood) in Greece.

This deliverable sets out to devise a **methodology** for these pilots. The methodology draws upon the concept of **Social and Behavioural Labs**: an approach to addressing complex societal problems i.e., problems whose solution is not confined within the locus of control of any single organisation but requires, instead, interaction among a range of different stakeholders. Social and Behavioural Labs foster inclusivity and mutual learning by enabling a broad range of stakeholders to collaboratively diagnose challenges, appraise current practices, and experiment with interventions that typically trigger organisational change.

This deliverable outlines the processes taking place within Social and Behavioural Labs, particularly the various stakeholder meetings that they comprise, showcasing how these meetings can be grounded to the context of WP2. This is of utmost importance for such meetings are the main sources of data based on which the RIAM is tested. It must therefore be ensured that the required kinds of data are indeed collected. At the same time, however, care must be taken to ensure that such grounding does not over-constrain stakeholders who should maintain considerable ‘degrees of freedom’ when participating in Social and Behavioural Lab meetings; this is, in fact, a basic tenet upon which Social and Behavioural Labs are founded as containers of social experimentation.

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1 Introduction

RRlstart is an H2020 Research and Innovation Action aiming at fostering impact investment by developing an innovative RRI-based model for start-ups, the **Responsible Impact Assessment Model (RIAM)**, that encompasses RRI-oriented indicators spanning all helices of the quadruple helix (QH) model (Carayannis & Campbell, 2009, 2012; Fitzpatrick & Malmborg, 2018). Currently, start-ups and investors do not adopt existing Responsible Research and Innovation (RRI) principles and indicators due mainly to the limited compatibility of existing RRI models which are tailored mostly for more traditional organisational structures (RRlstart, 2022). By adopting a lean/agile approach to RRI embedment, RRlstart seeks to demonstrate the importance of RRI in the science, technology, engineering, and mathematics (STEM) entrepreneurship ecosystem.

RRlstart **tests** the RIAM for exploring its feasibility and effectiveness in impact investment, and hence updating the SwafS database with evidence-based and applied models. Testing is accomplished through a **translational ‘from-lab-to-market’** approach organised around three pilots:

- environmentally sustainable start-ups from Northern Europe;
- 3D printing & advanced materials in Italy;
- bioeconomy (agrifood) in Greece.

Each pilot will involve start-ups, public/private investors, and stakeholders from all helices of the QH model, collectively assessing the ability of RIAM’s indicators to facilitate the embedment of RRI in the start-up innovation process, as well as to facilitate (public and private) impact investment. Each pilot will seek to:

1. identify any constraints and barriers in implementing the RIAM,
2. assess the relevance of its indicators,
3. and create impact in each helix of the QH model.

To achieve this, RRlstart will implement in WP2 a **Social and Behavioural Lab methodology**. Social and Behavioural Labs (or **Social Labs (SLs)** for short) were introduced by Hassan in 2014 [ref] as a method for addressing complex societal problems i.e., problems whose solution is not confined within the locus of control of any single organisation but requires, instead, interaction among a range of different stakeholders. Examples of such problems are climate change, poverty, sustainable food production, ageing, radicalisation, etc. SLs offer a real-life, albeit controlled, environment within which stakeholders may experiment with solutions to such problems. They are local hubs that foster inclusivity and mutual learning. They enable stakeholders to collaboratively diagnose challenges, appraise current practices, and experiment with interventions that typically trigger **organisational change** (PARTICIPATION, 2021).

“We have scientific and technical labs for solving our most difficult scientific and technical challenges. We need social labs to solve our most pressing social challenges.” Zaid Hassan

Like other related kinds of labs, such as media, innovation, and living labs, SLs are rooted in the philosophy of **pragmatism** whereby problems (and especially complex ones) should be dealt with through practical (‘hands-on’) approaches, rather than merely through abstract theoretical conceptualisation (PARTICIPATION, 2021). In other words, SLs are characterised by the tenet that complex social problems can be tackled successfully only through a process of **experimentation** i.e.,

by transforming knowledge and understanding through the **interplay** that occurs between **experience** and **conceptualisation**; an interplay that should be as **broadly sourced as possible**, including a multitude of stakeholders. SLs therefore advocate Kolb’s experiential learning theory, fostering an **iterative experiential learning process** that integrates concrete experience and encourages active experimentation. As depicted in Figure 2, this process unfolds along the following four steps:

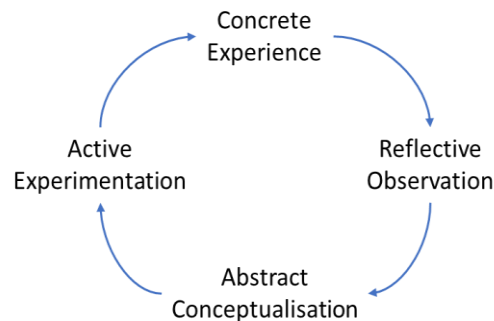


Figure 1: SL iterative experiential learning process

1. *Concrete experience*: stakeholders share experiences regarding the current situation with respect to some aspect of the problem. This is a crucial step that aims at fusing a multitude of perspectives regarding the problem at hand.
2. *Reflective observation*: stakeholders evaluate/review the current situation by reflecting on shared experiences.
3. *Abstract conceptualisation*: based on the evaluation of the previous step, stakeholders decide whether to actuate change towards a desirable situation or state.
4. *Active experimentation*: stakeholders plan and execute a prototypical intervention to actuate change towards the desired situation or state.

Notably, this 4-step iterative, multi-stakeholder-based process exhibits **significant similarities** with both the **RRI** and the **Lean Start-up** approaches, two foundational approaches underpinning the RIAM (see Section 2 for more details). More specifically, it is characterised by the four core dimensions of RRI processes¹ which, as convincingly argued in (RRISstart, 2022), are also conceptually inline with the Lean Start-up approach, and are hence **reflected in the STEM**:

- **reflexivity**, through the *concrete experience* and *reflective observation* steps;
- **anticipation**, through the *abstract conceptualisation* step;
- **inclusion**, through the *active experimentation* step that is sourced upon a broad range of stakeholders;
- **responsiveness**, through the *agile* and *iterative nature* of SLs that strives to rapidly incorporate, hence respond to, external feedback.

SLs thus form an ideal ‘platform’, or ‘launch pad’, for the execution of the translational pilots, for they **inherently incorporate** suitable ‘structures’ and practices for streamlining the infusion of these dimensions into the pilots, hence into the operationalisation and testing of the STEM; such ‘structures’ and practices are, for instance:

¹ RRISstart adopts the RRI model proposed in (Owen et al., 2013).

- the three tasks - ‘Describe’, ‘Evaluate’, ‘Prescribe/Refine’ - that each SL cycle comprises (see Section 5), and which provide the necessary grounds for **reflexivity** and **anticipation**;
- the experimental nature of the activities planned and implemented in repeated SL cycles i.e., the absence, in essence, of detailed long-term action plans in favour of more dynamic, agile, flexible, hence **responsive**, approaches;
- the strictly participative nature of SLs, that prompts **inclusion**;

Finally, it is to be emphasised that SLs are **long-term** endeavours lasting from several months to years: they are, after all, containers within which social experimentation is conceived, nurtured, and developed (Kieboom, 2014).

This deliverable reports on the design of a SL that is appropriate for accommodating the three translational pilots outlined above. It is not its purpose to accurately prescribe activities that will be taking place during SLs: this goes against the spirit of SLs and wouldn’t have been possible anyway for it requires insight of the context of each pilot (an insight that only pilot stakeholders can provide). Instead, this deliverable focuses on providing general orientations regarding SLs, orientations that are suitable for testing the RIAM. The rest of the deliverable is structured as follows. Section 2 provides an overview of the RIAM. Section 3 outlines the main components of SLs, and Section 4 the main roles encountered in SLs. Section 5 presents the main processes that are iteratively repeated in SL cycles, and crucially grounds them to the context of WP2. Finally, Section 6 presents conclusions.

2 The Responsible Impact Assessment Model²

The RIAM takes as a conceptual starting point the **QH model** (Carayannis & Campbell, 2009, 2012; Fitzpatrick & Malmberg, 2018) and uses it to frame the challenges, impacts, and requirements for responsible behaviour stemming from the **Lean Start-up** methodology and **RRI theory**. According to the QH model, innovation is a resultant of an interplay occurring between four ‘helices’: the *industry helix*, containing businesses and for-profit organisations, the *policy helix*, containing policymakers as well as regulatory and executive bodies at different policy levels, the *research helix*, containing universities, research organisations and other knowledge institutes, and the *(civil-)society helix*, containing citizens as well as media and non-governmental organisations. In fact, the RIAM advocates a **processual interpretation** of the QH model, one that focuses on the actual *processes* through which stakeholders – in our case the members of the start-up and their external partners – seek to create value in each helix during the innovation process. A helix thus represents a **behaviour**, one that manifests as a sequence of activities, is directed at a certain *value*, and is rewarded through certain *outputs* (when that value is achieved). Table 1 outlines prototypical behaviours for each helix and the kinds of output that it seeks.

Helix	Values	Prototypical behaviour	Outputs
Industry	Business Value	Starting a business, investing in a business, mergers and acquisitions, managing a business.	Return on investment, market share etc.
Policy	Political Value	Campaigning (arguing) for or against a policy, a programme or	Votes (for a party or policy)

² This section largely integrates material from (RRISart, 2022).

Helix	Values	Prototypical behaviour	Outputs
		an individual.	
Research	Research Value	Researching, publishing and presenting scientific work.	Publications, patents, books, academic and honorary titles, citations
Civil society	Societal value	Protests, petitions, lobbying, starting and managing an NGO.	Rights and artefacts that answer societal needs.

Table 1: Innovation as value-creation along four helices

It is exactly these helix-oriented behaviours that the RIAM aims at exploiting for extending the Lean Start-up methodology, typically focused on creating (business) value along the *Industry* helix, with **RRI-oriented value-creation activities** along the other three helices.

Evidently, start-up innovation activity should ideally be directed towards **all four** types of value. In other words, the development of an innovative product should ideally result in:

- *Research value* i.e., generating new knowledge during the making of the product.
- *Societal value* i.e., solving a societal problem, either actively, through the product itself, or passively, e.g. by following regulatory policy regarding ‘green’ practices during product development.
- *Political value*, i.e. serving a democratic cause or promoting a political ideal either through the product itself, or during the product development phase.
- *Market value*, i.e. generating profit, e.g. through product sales or through other commercial agreements.

Notably, the four types of value are often in a **state of competition** with one another. Since the decision-making process that constitutes innovation cannot maximally satisfy all four values, balance is needed between the four helices and this balance will inevitably serve some values at the expense of others. Since every start-up has limited resources, **the question of responsibility is in essence a question of optimal value creation**. The central question for the organisation looking to act responsibly, and consequently the central question for the evaluator looking to assess the responsibility of the organisation is: *Is the activity/product optimally serving the four helices such that no value overpowers others and no value is sacrificed for the sake of others?* **Responsibility thus becomes a form of balance between the four helices.**

The RIAM aims at steering the start-up innovation process towards creating value in all four helices. To this end, it offers a set of **per-helix indicators** through which start-ups may ‘measure’ their value-creation performance in each helix; clearly, should this performance be rated as inadequate, interventions that aim at steering the start-up innovation process towards the directions pointed at by the indicators should be undertaken. These interventions shall henceforth be termed **RIAM-driven interventions**.

Figure 2 indicates the lifecycle of a start-up company. Initially, when an idea is conceived and the innovation process that develops a **Minimum Viable Product (MVP)** commences, the RIAM indicators are used to identify ways in which this process can evolve in a responsible manner. This enables the evaluation of the idea and business model **in the context of** its potential impact on each helix. Although

the RIAM is intended for the pre-investment phase of a start-up lifecycle, the principle of a quadruple helix ‘check’ of practices i.e., the investigation of the MVP against the background of the four helices, can also be adopted later in the business lifecycle.

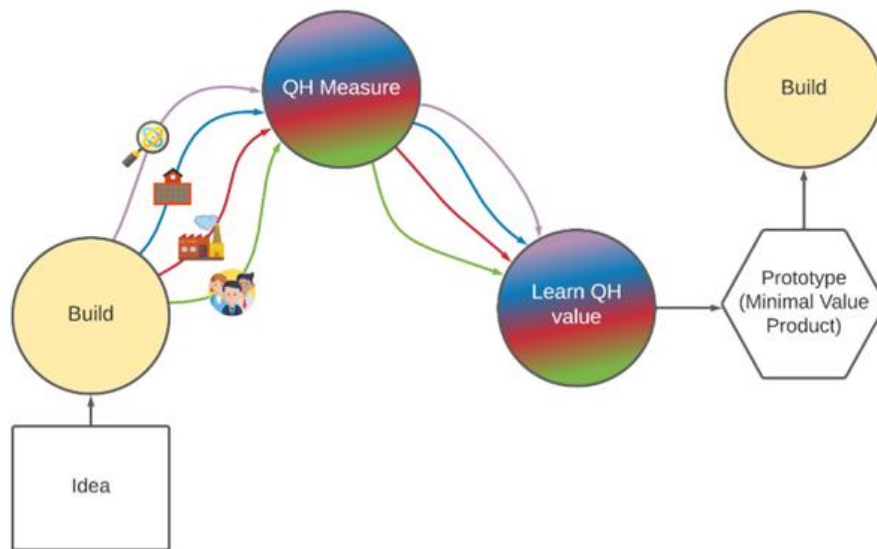


Figure 2: The start-up lifecycle

3 Main Components of a Social Lab

A SL comprises four main components (RiCONFIGURE, 2018):

1. A complex problem.
2. A group of stakeholders.
3. A space for experimentation.
4. A space for learning.

In the remaining of this section, these components are briefly described and grounded to the context of WP2.

Complex problem. SLs are deployed to solve complex societal problems that cannot be tackled within the confines of a single organisation: their resolution typically involves fundamentally re-thinking, as opposed to merely fine-tuning, existing standard approaches. Solving such problems thus calls for a ‘systemic’ approach: an inherently comprehensive approach founded upon *inclusivity* hence requiring the participation of a multitude of stakeholders.

The problem that we are addressing in WP2 is how to operationalise the RIAM proposed in WP1 so that it can be more easily adopted by STEM start-ups and investors. This is a complex problem for such an operationalisation aims at evaluating the degree to which the RIAM fits the needs of start-ups– and reflects the voices – of actors across the quadruple helix (QH). It is, in this sense, a problem that calls for a systemic approach involving stakeholder participation from all helices.

Stakeholders. Individuals from organisations that affect, or get affected, by the situation under investigation. Stakeholders need to be prepared to intervene (or aid others in intervening) in the reality under investigation and thus to trigger a transition process towards a new reality.

In RRiStart, each pilot will mobilise a network of stakeholders comprising:

- At least two start-ups engaging in a series of **RIAM-driven interventions** (see Section 2). In the context of WP2, such interventions function as ‘*proof of concept*’ for the RIAM, aiming at testing its ability to facilitate transition towards more responsible forms of innovation. As discussed in Section 2, RIAM-driven interventions are inherently QH-oriented, each pertaining to a particular helix, and integrating interactions with stakeholders from that helix.
- “An intervention is an attempt to innovate within a certain organization: a business, a consortium or, more generally, within a socio-political network. An intervention is a sustained attempt to solve a problem perceived by some or all of those present in that organization.”*
(RiCONFIGURE, 2018)
- The actors from each helix who are inevitably involved in the RIAM-driven interventions; these include:
 - regional policy makers and public investors,
 - private investors,
 - civic/consumer associations and NGOs,
 - local innovators (universities, research centres, think-tanks).

Space for experimentation. An agreed-upon environment in which new ideas can be tested; this can be anything from a department ready to engage in a new business model to a governmental institution ready to experiment with a new idea. In RRlstart, this space is of course the pilot start-ups implementing RIAM-driven interventions, as well as the stakeholders from each quadruple helix with whom the pilot start-ups interact as part of these interventions.

Space for learning. A space where stakeholders come together and reflect upon their experimental activities. In RRlstart, this space is of course the various pilot meetings that the project will be organising.

4 Social Lab Roles

As already indicated, a SL entails constant collaboration between stakeholders. Naturally, each stakeholder undertakes a distinct role within this collaboration. Based on (RiCONFIGURE, 2018; Timmermans et al., 2020), we identify four such roles:

1. Main-case owners
2. Mirror-case owners
3. Researchers
4. Facilitators

The term **case** refers here to the complex problem that the SL focuses on. In the context of WP2, each *contextualised translational pilot* that tests RIAM is a case; in RRlstart, each pilot comprises (at least) two cases.

In the remaining of this section, these roles are briefly described and grounded to the context of WP2.

Main-case owners. These are stakeholders who are interested in implementing SL methodology within their process and are hence expected to carry out interventions. Ideally, they span all four quadruple helices.

In the context of WP2, main-case owners are the pilot start-ups implementing the RIAM-driven interventions, as well as the stakeholders from each quadruple helix with whom the pilot start-ups interact as part of these interventions.

Mirror-case owners. These are stakeholders who are not expected to implement any interventions, but who do have an interest in participating in the design of such interventions; an interest that crucially stems from their involvement – as main-case owners – in other cases, similar to the one(s) in which they participate as mirror-case owners (hence the term “mirror”).

In the context of WP2, each main-case owner is automatically a mirror-case owner for every case other than his/her own. In fact, given a case say *X*, two levels of mirror-case owners are discerned:

1. Those who are main-case owners of a case in the same pilot as *X*.
2. Those who are main-case owners of a case in a different pilot.

Level 1 mirror-case owners are naturally anticipated to contribute more actively to the design of the RIAM driven interventions than level 2 mirror-case owners for they are more likely to share expertise with the main-case owners. For the same reason, level 1 mirror-case owners are also anticipated to gain more valuable insight/experience from their participation in the design of the RIAM-driven interventions than level 2 mirror-case owners.

Researchers. These are stakeholders with a cognitive stake in the context under discussion. They participate in the SL because they want to understand the phenomenon in question, and they want to draw more general lessons that can be applied beyond that case. They can contribute with knowledge of communication models (discussion formats), as well as with actual knowledge of the field pertaining to the ‘complex problem’ being tackled.

In the context of WP2, researchers are the members of the RRlstart consortium, primarily: WUR, K&I, and SEERC.

Facilitators. Stakeholders who are burdened with the organizational and management side of the SL. They are responsible for formulating meeting agendas, as well as for driving and facilitating discussions with case owners (main & mirror ones).

In the context of WP2, facilitators are the members of the RRlstart consortium, primarily: UNIROMA, EBAN, and YET.

5 Social Lab Processes

A SL is inherently iterative, comprising processes that are repeated **iteratively** (see Figure 3). Here we distinguish four main processes:

1. Case meetings
2. Panel meetings
3. Implementation
4. Research

In the remaining of this section, these processes are described and grounded to the context of WP2.



We employ the term 'social lab' to refer to the four main processes repeated several times. We employ the term 'social-lab cycle' to refer to a single iteration of a social lab, and the term social lab process (or SL process) to refer to any of the main four processes in a SL.

Figure 3: SL cycle

5.1 Case meetings

Case meetings are interactions between main-case owners from a single case. The objectives of case meetings are to obtain a better understanding of the current situation in the case, to identify a set of problems, and to develop action plan prototypes for experimentation. Case meetings, therefore, comprise the following sequence of tasks:

1. Describe
2. Evaluate
3. Prescribe/Refine

In the remaining of this section, each of these tasks is further described and grounded to the context of WP2.

5.1.1 Describe

The aim of a 'Describe' task is to enable main-case owners to *share* their viewpoints regarding the situation/problem at hand. This may be achieved through **storytelling sessions**: sessions in which main-case owners use the **RIAM indicators** as a point of reference for describing *value-creating activities* that they have been carrying out in **each helix**. These sessions are thus aimed at enabling stakeholders to gain insight into the current level of responsibility in the start-up innovation process.

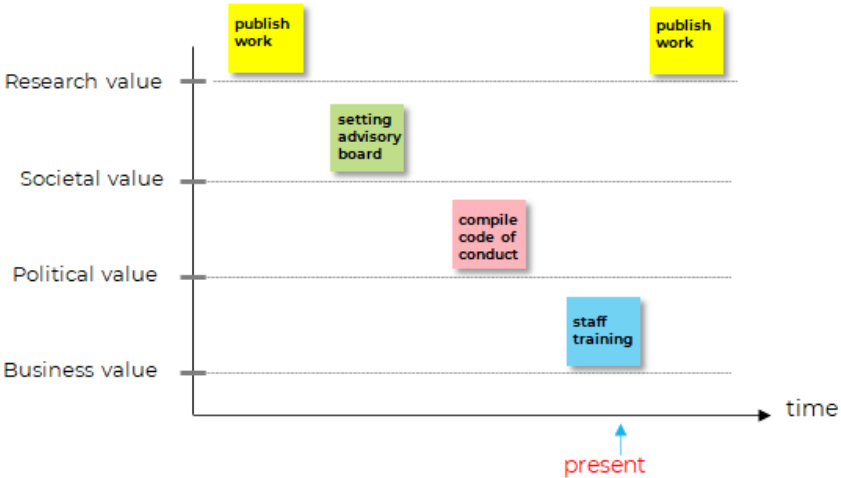


Figure 4: Example learning timeline

Storytelling is a method for the documentation and preservation of stakeholders’ experiences and knowledge about crucial events in a project’s lifetime (Thier, 2018). It facilitates the *integration* of various perspectives on the described situation. Recent works on the organisational function of storytelling have brought this technique to the fore as an appropriate method for setting the stage in *group-based problem-solving activities* (Thier, 2018). Storytelling is also an appropriate technique for creating out-of-the-box dialogue during *transition processes* in organisations (Boyce, 1996).

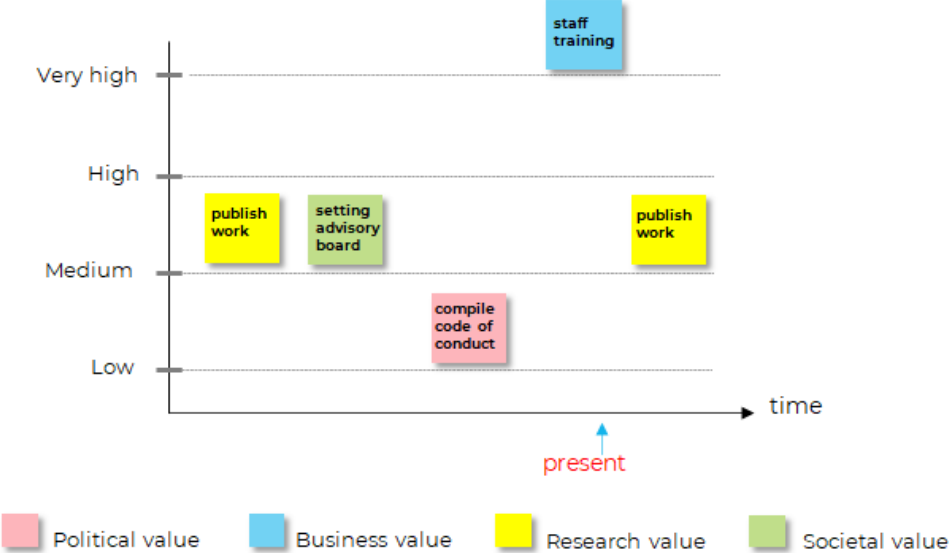


Figure 5: '3D' learning timeline

Learning timelines may be augmented with other elements such as milestones, phases, etc. Moreover, they are not limited to 2D representations but can be extended, if needed, to *n*-dimensional spaces, allowing for 'multivariate' descriptions. For example, Figure 4 plots value creation events in 2D space, i.e. according to two variables: the helix that they pertain to, and their time of occurrence; the same events may be plotted in 3D space, i.e. according to three variables: e.g. the two variables above plus a third one, say the amount of effort spent on each event; in such a case, the vertical axis may measure, for instance, effort, and *colour-coding* (or some other kind of coding) may be used for helix representation (see Figure 5). Additional dimensions may be added if needed through new encodings (e.g. post-it shapes).

In the context of WP2, we draw a distinction between the *inaugural* 'Describe' meeting that occurs in the first SL cycle, and the 'Describe' meetings that ensue in *later SL cycles*. In the former, the focus is on describing the **current situation** regarding *responsibility* in the start-up innovation process. In the latter, the focus is on **monitoring** the *implementation progress*, and *cost*, of activities performed as part of RIAM-driven interventions between SL cycles. Indicative structures for both the inaugural 'Describe' meeting, and the subsequent ones, are provided in Tables 2 and 3. All times shown are, of course, indicative and may be changed subject to meeting needs.

Time	Activity
09:00 - 09:30	Introduction <ol style="list-style-type: none"> Facilitators introduce the case meeting, its objectives, and its participants. Main-case owners take turns outlining their expectations from the meeting.

09:30 - 10:30	Per-helix value creation³. Main-case owners co-create a timeline describing any per-helix value creation activities in which they have already engaged (see Figures 4 and 5); this is done prior to their introduction to the RIAM and its indicators and aims at determining the current level of responsibility in the innovation process.
10:45 - 12:00	Introduction to the RIAM. Facilitators introduce main-case owners to the RIAM and its indicators.
12:00 - 12:45	Familiarisation with the RIAM. Main-case owners acquaint themselves with the RIAM and examine its relationship with any value creation activities already on the timeline. Relevant questions: <ol style="list-style-type: none"> 1. Does the current situation of the start-up fully or partially reflect any of the indicators? If yes, please indicate how. 2. Have you considered moving towards the direction pointed at by any of the indicators? If yes, please indicate which and describe why these considerations have not hitherto materialised.

Table 2: Inaugural storytelling meeting

Notably, the **final** ‘Describe’ meeting shall be of a more *comprehensive* nature, extending descriptions over the *entire scope* of the SL (rather than just over the preceding SL cycle).

Time	Activity
09:00 - 09:30	Introduction <ol style="list-style-type: none"> 1. Facilitators introduce the case meeting, its objectives, and its participants. 3. Main-case owners take turns outlining their expectations from the meeting.
09:30 - 12:45 (15’ break included)	Per-helix value creation. Main-case owners co-create a timeline describing the per-helix value creation activities in which they have been engaging in since the last SL cycle. These activities were outlined in the ‘Prescribe/Refine’ task of the preceding SL cycle and are typically oriented towards the RIAM indicators that the start-up has committed to pursue. Descriptions should include: <ol style="list-style-type: none"> 1. Effort spent (time, cost, manpower). 2. Any barriers encountered. Any facilitating factors.

Table 3: ‘Typical’ storytelling session

As explained in Section 1, a foundational tenet underpinning social labs is stakeholder inclusivity which implies ownership: stakeholders should be largely in charge of steering SL meetings towards directions that they deem appropriate. Nevertheless, in WP2 we are interested in ensuring that stakeholders do steer SL meetings towards certain directions that are imposed by the need to pilot and test the RIAM. Facilitators should therefore ensure that SL meetings are oriented towards the directions indicated in Tables 2 and 3 here, but also more generally, in Tables 4 – 7 in later sections.

³ It is assumed that the RIAM has not yet been disclosed to main-case owners. This to enable them to describe any value creation activities free of the biases that familiarity knowledge of the RIAM will inevitably bring about.

5.1.2 Evaluate

During an 'Evaluate' task, stakeholders attach evaluative statements to the learning timelines created in the preceding 'Describe' task. Evaluative statements consist of the following elements:

1. The entity being evaluated.
2. An 'ideal': a best-case scenario relative to which the entity being evaluated is graded.
3. A grade: measures the distance of the entity being evaluated from the ideal.
4. Criteria: the reasons for which the entity being evaluated is distanced from the ideal.

In a social lab, we separate between descriptive and evaluative activities: stakeholders attach their evaluations to learning timelines, and these evaluations are separate from the actual events that make up these timelines

In WP2 we are interested in directing stakeholders towards evaluating the capacity of the RIAM to:

1. diagnose, through its indicators, the current level of responsibility in the start-up innovation process;
2. guide, through its indicators, the startup process towards more responsible forms of innovation, by implying, along each helix, courses of action that aim at establishing *cross-helix accountability* in research and innovation activities.

At the same time we are also interested in evaluating the progress made towards achieving (pre-agreed) RIAM-driven interventions (see Section 5.1.3).

Indicative structures for 'Evaluate' meetings are provided in Tables 4 and 5. We draw again a distinction between the *inaugural* 'Evaluate' meeting that occurs in the first SL cycle, and the *typical* 'Evaluate' meetings that ensue in later SL cycles. In the former, the focus is on evaluating the **appropriateness** of the RIAM indicators in:

1. diagnosing the current level of responsibility in each pilot context;
2. leading towards more responsible forms of innovation in each pilot context.

In the latter the focus is on:

1. evaluating the *progress* made towards the directions pointed at by the RIAM indicators;
2. evaluating the *effort* (time, cost, manpower) spent on this progress;
3. assessing (e.g., with the aid of investor stakeholders) how far the current progress lies from attaining a *'satisfactory'* level of *responsibility* in the innovation process (hence paving the way for impact investment).
4. Notably, the **final** 'Evaluate' meeting shall have a more *comprehensive* nature, extending evaluation over the entire scope of the SL (and not just over the preceding SL cycle).

Time ⁴	Activity
14:00 - 14:30	Current level of responsibility. Main-case owners characterise the current level of responsibility in the innovation process by evaluating the degree to which it complies with the RIAM indicators.
14:30 - 16:45 (15' break included)	Indicator screening. <ol style="list-style-type: none"> 1. Main-case owners take turns in identifying the RIAM indicators that should be pursued for increasing responsibility in the innovation process; each stakeholder elaborates on the appropriateness of each proposed indicator in the context and current situation of the start-up. 2. Main-case owners take turns in determining the RIAM indicators that should be <i>discarded</i>; each stakeholder elaborates on the inappropriateness of each proposed indicator in the context and current situation of the start-up.
16:45 -	Networking. Wine & snacks.
09:30 - 11:00 ⁵	Select indicators. Main-case owners: <ol style="list-style-type: none"> 1. Evaluate the difficulty of pursuing each indicator in the current context 2. Select a final set of indicators to implement. 3. Priorize and prioritise the order in which indicators will be pursued.

Table 4: Inaugural 'Evaluate' meeting

Time ⁶	Activity
14:00 - 16:15 (15' break included)	Current progress. Main-case owners take turns in evaluating: <ol style="list-style-type: none"> 1. The progress made towards implementing the RIAM-driven interventions that they undertook since the last SL cycle. 2. How far this progress lies from attaining a '<i>satisfactory</i>' level of <i>responsibility</i> in the innovation process. 3. The effort spent.
16:15 -	Networking. Wine & snacks.
09:30 - 11:00 ⁷	Select indicators. Main-case owners take turns in evaluating how urgent and difficult the problems identified are to resolve.

Table 5: Typical 'Evaluate' meeting

5.1.3 Prescribe - Refine

This task comprises two subtasks: **Prescribe** and **Refine**. In the 'Prescribe' subtask, stakeholders agree upon, and commit to, a *plan of action*; this plan is not intended to be a highly detailed one that stakeholders must follow religiously; it is rather a coarse-grained, short-term plan focusing more on the directions that a transition process should take, rather than precisely specifying its constituent activities. Detailed action plans, that try to specify every aspect of a transition process, go against *agility*. Agile planning entails short term plans, and coarsely-specified actions, that are refined

⁴ We assume that the inaugural evaluate meeting takes place after the inaugural describe meeting on the same day.

⁵ We assume that the meeting continues the next day.

⁶ We assume that a 'typical' 'Evaluate' meeting takes place on the same day after the corresponding 'Describe' meeting.

⁷ We assume that the meeting continues the next day.

progressively through experimentation. It is thus able to flexibly integrate new requirements into the process, or update existing ones, dynamically, as the process evolves, in response to changing circumstances. This is clearly of utmost importance when tackling complex problems such as the ones addressed in SLs.

In the 'Refine' subtask, stakeholders update an existing action plan, one that has been devised in a previous case meeting, with additional – perhaps corrective – actions.

Action plans are based on *socio-technical scenarios*. A socio-technical scenario is a description of how the social and technical dimensions of a problem – in our case, whether the RIAM facilitates start-ups in increasing responsibility in their innovation processes – progress from one state to another, such that the latter state is closer to the envisioned solution (RiCONFIGURE, 2018).

In the context of WP2, action plans specify RIAM-driven interventions: interventions that trigger a transition process towards value creation in all four helices of the QH model. As noted in Section 3, RIAM-driven interventions are intended as 'proof of concept' for the RIAM: they are used as a vehicle for determining the degree to which the RIAM acts as a facilitator – but also as an enabler – for this transition process.

RIAM-driven interventions aim at appropriately adjusting the per-helix level of interactivity exhibited by the start-up, ultimately ensuring that sufficient knowledge from each helix is integrated in the start-up innovation process. RIAM-driven interventions use the 24 RIAM indicators as a point of reference: the transition process that they trigger is focused on progressively bringing the start-up to a state that is increasingly aligned with the requirements stemming from these indicators.

In WP2, we shall frame this transition process using the operational model for RRI-oriented change proposed by Kalpazidou-Schmidt et al. (2019). This model views transition as a four-step process⁸:

1. *Transformational agent*. Transition is triggered by a transformational agent endowed with capacities, means, or power to activate it.
2. *Agency mobilisation*. A progressive mobilisation of individuals and stakeholders, internal or external to the organisation, triggered mainly as an effect of the action of the transformational agent.
3. *Friction on structures*. RRI-oriented actions, supported by the agency mobilisation process, create friction on existing organisational structures producing pressure on them to change.
4. *Sustainability*. Establishment of new organisational arrangements to sustain this change.

This model is one of the many developed in the context of RRI-related programmes (Kusters, et al. 2015, Palmén, et al., 2019; Pols, Macnaghten, & Ludwig, 2019). It is mainly opted for here due to the emphasis that it places on the importance of *mobilising agency for promoting and guiding* the organisational change process; an importance that stems from the need for dealing with the various reactions to the "friction on structures" that this process produces over time. In the case of the STEM and 'STEM-driven interventions', such reactions may originate either internally or externally: in the former case, from members of the start-up who deny the importance of responsibility, or who think

⁸ This model is chiefly intended to be used by Researchers and Facilitators for structuring visioning sessions (see below), and for analysing data generated in case meetings. It is not intended to be used by main-case owners.

that responsibility is the very least of their concerns when trying to set up a successful business; in the latter case, from external stakeholders e.g, from funders who are interested in quick profit rather than seeing the start-up ‘wasting’ resources on practising responsibility, or who have radically different ideas of what responsibility is and how to practice it. Interestingly, in the case of start-ups, such pressures, whether internal or external, cannot be interpreted as reactions to friction on *existing* structures, but rather as reactions to friction on *nascent* structures. It would be thus interesting to observe how agency mobilisation deals with this latter type of reactions and how challenging they are to overcome.

Visioning sessions. Activities in the ‘Prescribe’ and ‘Refine’ subtasks may be specified through visioning sessions (RiCONFIGURE, 2018). Visioning sessions envision a situation in which the problem under investigation is solved (or at least alleviated), and prescribe (new) actions, or refine existing ones, for arriving at this situation. Each action pertains to one of the steps of the Kalpazidou-Schmidt et al. model⁹. Visioning sessions may therefore be structured as follows:

1. Prescribe/refine actions to *mobilise agency*. Note that agency mobilisation in start-ups is anticipated to differ from traditional organisations, due mainly to the small size of start-ups, the absence of rigid organisational structures, the fact that start-up members are likely more accustomed to agile modes of operation, thus more receptive and amenable to change.
2. Prescribe/refine actions to *inflict friction on structures*. These are the primary actions that form the backbone of the RIAM-driven interventions; they are focused on creating value in each helix by adjusting the level of interaction and knowledge exchange that occurs along each helix. Notably, these actions must be of a non-transient and *sustainable* character.

Time ¹⁰	Activity
11:15 - 12:45	Rectifying. Main-case owners collectively e.g., through a <i>brainstorming session</i> , add to the timeline activities – either fresh ones, or refinements of existing ones – for dealing with the problems revealed in the preceding evaluation meeting. They prioritise them chronologically according to the urgency/difficulty of the problem they tackle.
14:00 - 16:15 (15’ break included)	RIAM-driven interactions. Main-case owners collectively determine e.g., through a brainstorming session, new activities – or refinements of existing ones – for further pursuing alignment with the RIAM indicators that they have opted for. They prioritise their efforts according to the importance of the indicators for the start-up context and/or current situation (recall that an initial assessment of this importance was carried out in the inaugural evaluation meeting).

Table 6: ‘Prescribe/Refine’ meeting

⁹ The first step of the model, namely “Transformational agent”, is beyond the scope of the SLs organised in WP2. This is because a transformational agent – i.e. the pilot participants – is formed prior to commencement of the SLs.

¹⁰ We assume that a ‘typical’ ‘Prescribe’/‘Refine’ meeting takes place on the same day as the corresponding ‘Evaluate’ meeting.

To prescribe/refine actions, participants work with the timelines constructed in the ‘Describe’ task¹¹ (see Section 5.1.1). Table 6 provides an indicative structure for Prescribe/Refine meetings. Figure 6 summarises this section by depicting the spiral evolution of the three tasks performed in case meetings. Case meetings are anticipated to be held every **four months** for the duration of WP2. All case meetings, whether ‘Describe’, ‘Evaluate’, or ‘Prescribe/Refine’, are attended by facilitators (UNIROMA, YET, EBAN - depending on the pilot) who are responsible for documenting all discussions; this is of utmost importance since the research process clearly depends upon such data.

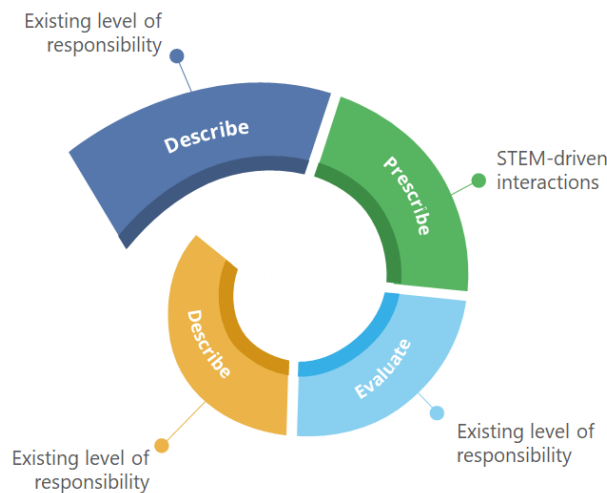


Figure 6: RRIstart case meetings

5.2 Panel meetings

Panel meetings are significantly different from case meetings. Firstly, they take place between owners of different cases and seek to foster interaction between these cases. Secondly, their aim is not so much to enable participants to understand the details of their own case, but rather to put their case in perspective; it is *contextualising* rather than *analysing*. More specifically, panel meetings serve the following objectives:

- Facilitate mutual learning *across cases*. Enable participants from the same helices and/or pilots to learn from each other and broaden their understanding of how to best pursue RIAM-driven interactions in their own cases. As mentioned in Section 4, level 1 mirror-case owners (i.e. stakeholders who are main-case owners in the same pilot) are naturally better-equipped to contribute to the mutual learning process by capitalising on shared expertise.
- Facilitate network-building across cases and case partners.

In the context of WP2, panel meetings are anticipated to comprise 24 main-case owners: 4 representatives from each case – one per helix – for an overall 6 cases. They are also anticipated to comprise at least 4 facilitators (including the representatives of UNIROMA, EBAN, and YET), and at least 3 researchers (including the representatives of WUR, K&I, SEERC).

¹¹ In fact, the prescription process can be seen as a future-tuned description process analogous to the description process outlined in Section 5.1.1.

Each main-case owner is grouped according to the following two groupings:

- Helix-based grouping: main-case owner grouped according to the helix that s/he represents.
- Pilot-based grouping: main-case owner grouped according to the pilot that s/he belongs.

Panel meetings may unfold as follows. After a brief plenary introduction of the objectives of the meeting, a two-phase **poster session** ensues in which each case exhibits a poster outlining the results hitherto achieved, any (RIAM-driven) activities presently being carried out and the objectives thereof, as well as any problems/issues that are being encountered or are anticipated to be encountered. In the first phase, participants form a helix-based grouping and exchange knowledge about each poster from a helix-oriented perspective. In the second phase, participants form a pilot-based grouping and revisit posters from a more contextualised standpoint: agri-food, bio-fabrication/3D printing, environmental sustainability. Such a two-phase approach enables participants to take a multi-angle look at each case – including their own – hence gain a deeper understanding of the underlying issues involved and their potential interrelations.

Time	Activity
09:00 - 09:30	Introduction <ol style="list-style-type: none"> 1. Facilitators introduce the panel meeting, its objectives, and its participants. 2. Main-case owners take turns outlining their expectations from the meeting.
09:30 - 12:45 (15' break included)	Poster Session I: Helix grouping. Four helix-based groups are formed; each comprises: case owners from each case who are representatives of the same helix (6 overall), facilitator(s), and researchers. <ol style="list-style-type: none"> 1. Case owners take turns in explaining how they expect to be aided. 2. They then engage in a brainstorming session aiming at a helix-oriented knowledge exchange between cases
13:45 - 16:00 (15' break included)	Poster Session II: Pilot grouping. Three pilot-based groups are formed; each comprises: case owners from the same pilot (8 overall), facilitator(s), and researchers. <ol style="list-style-type: none"> 1. Case owners take turns in explaining how they expect to be aided. 2. They then engage in a brainstorming session aiming at a contextualised (per each pilot) knowledge exchange between cases
16:00 - 16:30	Stocktaking. Main-case owners take turn summarising key take-away points
16:30	Networking. Wine/snacks

Table 7: 'Typical' panel meeting

We anticipate 3 panel meetings, one every four months for the duration of WP2, taking place over the same periods as case meetings.

5.3 Implementation

In the implementation process, main-case owners carry out RIAM-driven interventions as prescribed in case meetings. As already noted, these actions are focused on adjusting the per-helix level of interactivity and knowledge exchange, hence value creation, that occurs in the start-up innovation

process. Specification of the exact nature of these actions is, of course, beyond the scope of this deliverable: these actions can only be determined in case meetings by main-case owners who are naturally aware of the circumstances surrounding each case. As already noted, the interventions are performed in an agile manner, through short-lived action plans that are experimental in nature, and which can be dynamically steered towards desirable directions as the process unfolds.

5.4 Research

In the research process, researchers use the data documented during SL meetings to assess the ability of the RIAM 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.

Researchers also use meeting data to assess whether the current course of RIAM-driven interventions evolves satisfactorily, or whether it needs to be adapted to increase its effectiveness/efficiency. It is anticipated that the adoption of the Kalpazidou-Schmidt et al. (2019) model will aid this process by enabling researchers to readily isolate the different stages of the change process and thus pinpoint more accurately problem sources and how they can be counteracted more effectively/efficiently.

6 Conclusion

This deliverable reports on the design of a SL that is appropriate for accommodating the three translational pilots through which the RIAM is tested. It focuses on the main processes taking place within SLs, particularly the various stakeholder meetings that they comprise, showcasing how these meetings can be grounded to the context of WP2. This is of utmost importance for such meetings are the main sources of data based on which the RIAM is tested. It must therefore be ensured that the required kinds of data are indeed collected. At the same time, however, care is taken to ensure that such grounding does not over-constrain stakeholders who should maintain considerable 'degrees of freedom' when participating in SL meetings; this is, in fact, an implication of a basic tenet upon which SLs are founded, namely that of inclusivity.

The methodology proposed in this deliverable is intended to provide a framework for structuring, but also for directing, the manifold stakeholder interactions that will inevitably take place within and across the three translational pilots through which the RIAM will be tested. It is also intended to provide indicative structures and orientations for stakeholder meetings. It is anticipated that this document will be complemented, indeed refined, by SL facilitators through more detailed meeting structures, perhaps co-formulated with stakeholders themselves, prior to each meeting.

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Appendix

RIAM Indicators

Societal Indicators. All of the below indicators are relevant for both start-ups and their partners.

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

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

- The start-up should ensure a level of openness regarding data generated, ensure that it is not exclusionary of any groups, and one's data gathering is in line with the relevant policy and ethical standards, while always respecting the legislation in the GDPR. One's data management plan should be in line with these standards and ensure optimal data protection methods (R1).
- The start-up's R&D may provide useful knowledge that can be employed by others in research and innovation, as well as the broader scientific community. In this regard, efforts should be made to ensure one's R&D is open access, as long as it does not harm the start-up's business. The start-up should ensure a strong degree of transparency of research to the public (and language attuned accordingly) (R2).
- A start-up's socio-ethical impact can be facilitated by including both internal and external views in this process. Internal, such as an advisory board that provides input on the socio-

ethical impacts of R&D activities. While external can come in the form of validation from experts in normative approaches to science (ethics, technical assessments, etc.) (R3).

- Start-ups should receive input from a wide diversity of people and groups, taking into account a plurality of views, values, and insights on their products and business (R4).
- Participants in the R&D process should be informed about the results of this process. Training/assistance needs to be provided to citizens to participate in the R&D process(R5).
- Before the commencement of an R&D process, the start-up should investigate the socio-ethical impacts, and create effective feedback loops, so they can be responsive to societal values and/or risks. The start-up should establish how they can make a positive socio-ethical impact, while avoiding risks, during each stage of this process (R6).

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

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

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

- The start-up should assess and anticipate legal, regulatory and other requirements related to the product/service. They should assess the presence of partnerships/agreements establishing responsibilities about possible risks, obligations, sharing of information/technology and protection measures of the involved organisations (B1).
- The start-up should assess what are the potential/actual impacts (social, economic and environmental), from design to post-launch, of their activities and products. It should consider its positive and negative impacts on innovation, try to prevent harmful impacts of the innovation practices on society and the environment, and re-evaluate these impacts at all life-cycle stages (B2).
 - The business model should integrate profit with environmental and social benefits by identifying the start-up's customer base, the mode of distribution, resources and key activities needed, innovation capacities, value creation for clients, and risks.
 - They should assess the life cycle costs of a product (include short, medium, and long-term impact on externalities) and include their principles in a mission statement or code of conduct.
 - The start-up should analyse and treat their impact comprehensively and not restrict it to one criterion, stage or stakeholder (using impact assessment, paying particular attention to environmental and social pillars).

- They should adopt sustainable development criteria into product and service specification (choice of material, quality assessment, recycling, energy management, etc.), their choice of suppliers or service providers, and communication activities.
- Start-ups should carry out innovation in a responsible manner, using objectives for assessing performance (B3), such as:
 - When uncertain of adverse outcomes, they should decide to invest a minimum amount of their annual share of revenue (this could be 1% or 5% based on the products/services for which this principle applies) in independent research and development activities to eliminate, wherever possible, any threats and anticipate the adoption of preventive measures against actual risks.
 - Compliance with standards should be following the stakeholders' expectations, external benchmarks and obligations, the social and environmental impacts, the supply chain, and the law in force.
 - They should periodically review the system of indicators by obtaining appropriate feedback from major stakeholders and follow best practices on how to assess performance. Internal and external stakeholders should be involved from the early stages of product development.
- The start-up should ensure adequate training is provided for its staff by identifying the skills, knowledge, and experience of staff, and their equipment/technology requirements to fulfil their work. Time and economic resources should be given towards reflection, sharing experiences, consulting experts (e.g., on ethics, gender equality, and open access), participation in RRI workshops and training initiatives, and appointing RRI staff experts (B4).
- The start-up should ensure that there is a fair distribution of traditionally disadvantaged groups of highly skilled employees. They should examine the percentages of demographics in the company to ensure a fair share of researchers from different backgrounds, genders, and races (B5).
- The start-up should be reflexive, open to change when confronted with challenges and shifting norms and encourage employees to reflect on the start-up's research and innovation. It should reflect on the start-up's economic sustainability, their ability to handle the project/product in terms of finances, manpower and material and knowledge of risks (turnover, investment capacity, induced financial savings, cash-flow) (B6).