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Responsible Research and Innovation: a New Framework for an Old Controversy

Recent developments in economics and politics across the world have not only modified power relations between different nations and thereby changed the contours of the two spheres, but they have also completely changed the whole idea of progress forcing to change plans according to criteria that are no longer exclusively functional or economic.

On the one hand, we find imperatives of material growth that demand alternative routes to economic development. On the other hand, traditional forms of legitimizing decisional processes no longer seem able to respond to the ever more pressing claims of societies increasing concern about their futures.

For purely material reasons regarding the scarcity of resources and the impossibility of sharing common rules in a global context, the European Union (EU) had to modify, enlarge and differentiate its sphere of action from the mere production of material goods following the tenets of Fordist capitalism to the creation of more complex knowledge, the production of which is better able to respond to the dynamics of a post-Fordist system. As shown by recent analyses about the relationship between capital, production and market [PIK 14, STR 14], European economic development is now closely linked to progress in production of knowledge as opposed to the exploitation of materials. In this sense, it is knowledge(s) that is the central economic strategy aimed at obtaining economic progress. It is, therefore, fundamental to increase measures designed to liberate the potential inherent in Research and Innovation (R&I), paying special attention to Small and Medium Enterprises (SMEs), as they are more likely to produce flexible solutions.

R&Is are then identified as the main responses in order to deal with the shift in the barycenter of global capitalism because they are more flexible and able to produce a higher profit with a little investment.

More precisely, innovation, which is based on the model developed by Schumpeter, specifically answers the requests of avoiding an approach of intensive exploitation, unfeasible in the European context, and of using existing resources. As we know, Schumpeter introduced a non-circular and dynamic model of an economy based on the capability of the entrepreneur to have an intuition and to introduce a new combination of existing factors onto the market [SCH 34a]. Economic development, according to Schumpeter, "consists mostly of the different employment of existing resources, in doing new things with them, without considering if these resources have increased or not" [SCH 34a, p. 70]. Innovation is composed of three main aspects for Schumpeter: "a spontaneous change", within a "dynamic theoretical apparatus" incarnated in the figure of the "entrepreneur" [SCH 34, p. 81]. The entrepreneur must act according to the novelty; he/she will imagine a depiction of the future. The prediction of effects of an economic endeavour is, for Schumpeter, impossible. "Even with an intense preliminary work we cannot exhaustively grasp all the effects and repercussions of the plan. The length of such prevision would be theoretically impossible, according to the environment and the occasion, when we dispose of unlimited means and time, poses difficulties that are practically insurmountable" [SCH 34a, p. 83]. Therefore, the entrepreneur, due to an intuition, will put in place that operation of mixture and interdisciplinary transposition of a "methodology", a "product", a "market", "resource" or "reorganization". Accordingly, the entrepreneur, due to an intuition, will put in place an operation of shuffle and interdisciplinary transposition of a "method", a "product", "market", "supply source" or "[re]organization" [SCH 34a, p. 68]. Considering the tendency to habitual behaviors that pervades the human realm, innovation will happen only as an expression of a great liberty by its entrepreneur. We also need to underline the clear difference that Schumpeter emphasizes between invention and innovation where the latter represents the commercialization of an invention aimed at the satisfaction of needs. "Until they are not adopted in practice, the inventions from an economic point of view are irrelevant. And to actualize an improvement is a different task from the one inventing it" [SCH 34a, p. 86].

Schumpeter's conception is based on the leadership that will be able to modify consumers' preferences according to their capacities of imagining and recombining. It is then not difficult to grasp the connection between this conception and the importance of innovation that has been assumed for maintaining and developing the economy, especially during a period of crisis.

However, this model ended fairly soon by having been applied to itself. As the promotion of social and material progress itself requires economic strategies of highly innovative character, creativity, imagination and flexibility have become key words in order to obtain results in the field of research and innovation [HON 10, pp. 78–103].

In brief, if innovation in Schumpeter's acception is directed towards the changing of products and processes, which we have been witnessing for some years, it could be defined as a change in the "paradigm of innovation" [GOD 07], that is to say an innovation of innovation itself[1].

These changes, however, in the forms of production and the change in access to information as well as the development of new ways of participating in political life, have resulted in consequences of a practical nature in the social repercussions contributing to a real change in the current declination of the idea of progress, which can no longer be understood only according to the dictates of an economic system isolated from the rest of society. Nanotechnologies, genetically modified organisms (GMOs) and several other examples of disruptive technological innovations have caused considerable public outcry owing to consequences of which the effects are not fully known. This indignation has been raised not only because of the presence of these products on the market, but also for the way in which their commercialization was handled, being excluded from the assessment of any moral or ethical aspect. These events and the modalities of the relationship between society and institutions have generated a radical change in the forms of governance through which the interaction between science and society must be regulated. Because of its enormous social impacts, the satisfaction of needs, the main objective of Schumpeterian innovation, must be conjugated in other terms. We cannot limit the understanding of progress, which innovations should contribute to generation, to a technical or economic development, isolated from the rest of society.

Together with the above tendencies, there have also been developments confined to the political sphere where a greater access to information and knowledge and new deliberative forms of democracy have gradually been replacing traditional and dogmatic forms of representation in decisional processes [REB 05, ROS 08, REB 05, GOF 09].

If, as we have said, the need to compete with emerging global realities means that it is necessary to speed up innovation processes, at the same time these processes need to be guided, regulated and encouraged. It is, therefore, essential to establish criteria and parameters in order to evaluate the qualitative prism of research and innovation without this being an obstacle.

This is the aim of the criterion of responsibility, introduced definitively in Europe through the framework of responsible research and innovation (RRI), so as to respond both to the needs concerning the correct functionality of the innovation process and its ethical and political legitimacy. On the one hand, we need to increase the efficacy of R&I as a tool for developing our economies. On the other hand, we

1 For a broad and accurate study on the concept of innovation, see [GOD 07], and also [LEE 13].

must guarantee the legitimacy in the way R&I is steered in respect to society and its needs, values and norms. From a logical point of view, efficacy tends toward practical application of a measure whether legitimacy relies on a theoretical justification of the adoption of certain measures. From a moral perspective, it is not clear which position we could assume in order to develop a legitimate process of R&I. Furthermore, the interpretations of the meaning of responsibility are not entirely clear in their connections. Ethically, it is also unclear how to conceive the relationship among different social spheres given the equal importance of the two sides of the coin. Finally, even on a political side, legitimacy and efficacy seem to be two imperatives difficult to conciliate in the decision-making process. We can underline once again the lively development of new processes for exerting democratic dialectics.

As a result of such an attempt, we are witnessing the redefinition of the concept of progress as the implementation of the relationship between freedom and equality in material and cultural terms.

For these reasons, of a different nature but all related to progress, the EU is developing the definition of a new framework able to respond to the challenges logically connected to this double imperative of legitimacy and efficacy. The notion of RRI emerges from the contemporary articulation between science, technology, economy and society. The increased complexity of technology, and research in general, has pushed us to find new comprehensive manners for steering innovation in science. In order to find the criteria that could contribute to define RRI in its components and as a whole, we need to try to understand its different aspects. The double imperative of legitimacy and efficacy requires the development of a conceptual proposal that can take into account all the difficulties, theoretical and practical, that such a notion entails. Our plan for this chapter is to make a short review on the different interpretations proposed with respect to RRI. First, we need to understand the evolution of a framework that, far from being a novelty, represents the last step of a long process that started in Europe at least 40 years ago. This will help us to understand the difficulties that emerged throughout the years and the solutions adopted. If the problems are quite clear from a conceptual point of view, the solutions or hypotheses for a solution are embedded in the political evolution themselves. A short review and the analysis of the latter could perhaps indicate the path for us to take.

Second, it will be important to grasp the conceptual proposals that have been suggested in the past to answer the questions arising from similar issues. From there, we will arrive at current developments proposed in respect to the framework of RRI. RRI being a new development, most of these interpretations tend to be prescriptive rather than descriptive, trying to define what RRI should be instead of what it is. We will analyze these theories and the paradigms at their bases according to the two

criteria of legitimacy and efficacy, so as to be able to understand which aspects could be useful and which are not useful in helping us solve our thorny issues. At the end of this chapter, we will have analyzed the contours, problems, challenges and opportunities that such a framework entails.

We have hinted at the originality of RRI as being the answer to the economic challenges together with the social problems it entails. The social remodeling at the basis of these dynamics requires an effort that is itself innovative.

However, far from being an original problem, the relationship between science and society has often stumbled on its path in looking for a balanced solution. The relationship among different perspectives, the discrepancies in the interpretations of progress, as well as the complex relation between norms, their application and justification, are all problems that several authors have tried to solve throughout the last two centuries [GUN 98, FER 02, HAB 70, HAB 72, BEC 92, JON 79].

Until the 1970s, the general public still trusted, or, to a certain extent, was even enthusiastic about science: "In the 1960's there was a widespread optimism about technology. The contraceptive pill, television, fashion, and more access to pleasure and leisure activities were changing social relationships across the class system, at a time when the ravages of World War II were fading. In 1963, the Labour Prime Minister Harold Wilson's famous speech enthused about 'How the Britain that is going to be forged in the white heat of this revolution will be no place for restrictive practices or outdate methods on either side of industry"' [SYK 13].

This relationship, however, has deteriorated owing to the diffusion of conceptualizations that emphasize the risk, as well as to negative historical developments. Prior to the 1960s, there were of course criticisms, not only in philosophy [CAR 62] concerning the misuse of technology [HEI 08, HOR 02, HUS 70]. This type of criticism, however, taking into account its peculiarities, remained within the Weberian dichotomization, according to which there is an unbridgeable demarcation between technological and instrumental rationality. In this way, this conception, which developed according to forms and in different fields throughout the 20th Century, has led to the need to rethink the relationship between the two tendencies.

During the 1960s, this dichotomization became more radicalized due to an ideological superimposition with instrumental knowledge. Knowledge and sciences were no longer at this point simply blind disciplines activated by a necessary development but rather they had become ideological instruments of the elevation of values or expression of power (Foucault, Habermas). The perverse relationship between ideology and knowledge that was brought to light during that decade will lead to a counteroffensive that will concern various disciplines. The attempts made

from a philosophical point of view [ARE 05, JON 79, HAB 68], and the sociological point of view [PAR 91, BEC 92], to recompose this fracture or at least to draw attention definitively to this unjustifiable distance must be read in this light. The famous formulae for which "knowledge is power and power is knowledge" and "knowledge" always presupposes an interest, shed much more light on this problem than a more anarchic criticism, and sum up what, a few years later, would be transformed into concrete measures aimed at redefining the entire institutionalized scenario.

Many of these conceptualizations essentially indicated an increase in participatory initiatives and the increase in the use of reflective practices as the way forward. Following on from the intersubjective and communicative redefinition of the criteria of Kantian legitimacy, some of these theorizations exercised a decisive role in the development of initiatives and practices aimed at placing science in a social framework.

It was not by chance, in my opinion, that a whole series of policy-advising activities focused on the evaluation of the impact and consequences of technology began to be generated in that decade.

As reported by Sikes and Macnaghten: "A key influence was the development of technology assessment (TA) organizations which emerged in the United States and Europe from the 1970's. These organizations were typically linked to the legislature aimed at providing authoritative information to U.S. Congress and parliaments to inform decision-making, and to provide early warning of future technological mishaps. The paradigm of TA reflected a model that presumed that the 'problem' of technology associated with a lack of democratic (and technical) input in technological governance and that this could be redressed through providing elected representatives with authoritative information at an early stage [VAN 97c]. Thus, the Office of Technology Assessment (OTA) was established in 1972 by Congress to provide information on the secondary effects of technology. A decade later, a parliamentary TA office was set up in France in 1983. Denmark, the Netherlands, and the European Parliament set up TA offices in 1986, while Britain and Germany followed suit in 1989. It is important to note that each office had its own distinctive model of assessment. The US OTA an expert-analytic and stakeholder model involving a plural array of expertise and representatives of organized stakeholder groups as a means to counter accusations of bias or 'technocracy' especially in the problem definition of issues. This stakeholder model was also an integral element of European-wide assessments for similar reasons which saw parliamentary TA as a form of expert policy analysis [SYK 13, p. 87].

A first example is incarnated by Technology Assessment, founded in the United States and rapidly extended to Europe. "In its first period technology was regarded

as following its own dynamics" [GRU 11, BIM 96], and therefore TA only had an early-warning function in order to enable political actors to undertake measures to, for example, compensate or prevent anticipated negative impacts of technology [GRU 11]. This initial awareness, however, extended to the consideration of values and social needs just a few years later [GRU 11, BIJ 87, BIJ 94]. Technology assessment approaches have evolved to the point of integrating participatory approaches with a view to developing technology in a more democratic way, thereby allowing all stakeholders to discuss their moral assessments (moral intuitions, principles, norms and values), and even be able to influence technology.

In particular, the advent of frameworks such as Constructive Technology Assessment (CTA) and Participatory Technology Assessment (PTA) introduced additional motives that widened the scope and sense of assessing technology in relation to society. These factors, according to Grunwald, have materialized within the field of participatory technology assessment as "approaches to involve citizens, consumers and users, actors of civil society, stakeholders, the media and the public in different roles at different stages in technology governance" [GRU 11]. Participation, in fact, was seen not only as a matter of legitimation in order to dispel any suspicions or doubts, but also for improving technology itself.

In parallel, constructive technology assessment concentrated more on the idea of shaping technology through the increase in "reflexivity in technology development and engineering by addressing the level of concrete products, systems and services" [GRU 11, RIP 95a].

TA, CTA and PTA involve procedures that are much more complex than those used in simple risk assessment. The latter [LEE 13] concentrates entirely on the mathematical calculation of risk or works on modifying the perception of risk. This approach is clearly inadequate from various points of view and has little to do with the social imperatives of inclusion, reflexivity and openness. "Traditional risk assessment approaches which have underpinned regulatory control, are fundamentally limited. The International Risk Governance Council [IRG 09] through multiple case studies usefully summarizes ten deficits in risk management, encompassing difficulties around the gathering and interpretations of knowledge about risks and perception of risks, combined with disputed or potentially biased or subjective knowledge, and with deficits of knowledge related to systems and their complexities. The answers delivered in risk assessment typically depend on the framing of the analysis – not just 'what' informs the framing but importantly 'who"' [HAR 01b, JAS 90, STI 08, WYN 87].

Nevertheless, the positive features of TA must not prevent us from analyzing its nature at a more profound level. What seems to me in some way to characterize TA is the fact that it attributes a kind of external judgment to technology [GRU 09,

GRU 11]. Technology, however, is still in some way anchored within a perspective that identifies its salient features as necessary and instrumental, unlike the social dimension. In other words, technology continues to be considered as a flow of technological developments on which we can express an opinion from the outside. Probably, we can even aspire to block technology. It is not surprising that interventions concerning technology are of a political and not a scientific nature. "While early forms of technology assessment (TA) sought to balance the positive and negative effects of introducing new technology, the balancing act was seen more as the responsibility of political processes than of scientific ones" [FIS 13].

As has been pointed out [GRU 11, VAN 12b], it is important to consider the temporal aspect as a fundamental component of the difficult relationship between technology and society. In fact, if these interventions are placed in an entirely political context, there is often the risk that their valuation is shown to be necessary for contingent reasons rather than as a stable process. This very often implies that such valuations are made when the technology already exists or is at an advanced stage.

To imagine one can act when the technology in question has already been developed means driving through the darkness of possible consequences without headlights. It also means that it will probably be too late to modify the technology in case of necessity. The functional component helps to detect the weak points of such a frame.

What seems to be still missing is a clear normative reference that is able to address the problems arising, for example, from epistemic conflicts [VON 93]. While it is true that TA attempts to weigh up the risks in a comprehensive and complimentary way, it is also true that, as Grunwald points out, in some areas this type of assessment must be supported by a well-defined normative structure. The example cited by Grunwald on human enhancement [GRU 15] for instance clearly shows that a balance cannot be arrived at since it is not even clear where these developments will lead. The same developments can be sustained or blocked [GRU 09, DEW 54, DEW 01] according to the perspective assumed, and the risk is always that the stronger perspective will win. As rightly pointed out by Von Schomberg, the loss of authority to which science had to undergo in the last decade brings the political elites to not being able to decide according to technical criteria. The sacred aura by which society has looked for a long time at scientists has dissolved in the proliferation of discordant communications and dramatic events.

There is, however, in my opinion, a more decisive aspect that we must take into consideration. What starts to emerge is that if a neutral and technical judgment appears as a utopia, the criteria according to which we could make an assessment must be external. An external judgment, which therefore arises in the case of

necessity, in the case of an increase in the percentage of risk, implies that there is a dual relationship between technology and society. This duality constitutes a source of difficulty as well as being mistaken.

Above all, it is essential to understand which criteria can be used to judge a technology and, if necessary, how to solve conflicts. A technology can evolve without any alarm bell being rung in time. A technology that for some reason is considered as good or neutral and is subsequently contested is not a remote occurrence and is a dangerous event from various points of view[2]. The crystallization of the dichotomy between two social spheres is, in my opinion, mistaken for the following reason: if technology follows its own logic in isolation, what are the criteria that enable us to understand it and who is called upon to pass judgment? The concrete risk and, all things considered, the tendency were to relegate the participatory processes to experts and thus exclude what we define as civil society [SYK 13]. As shown by Arnstein [ARN 69] and Fung [FUN 06, FUN 12], participatory processes do not always give much attention to the contribution of society, but use these forms as formal legitimization without allowing the process to be subject to any interference. This tendency will be analyzed in more detail later. Methods of participation that are based on the decisive influence of experts not only create the perception, but also the concrete possibility that technology is developed in a technocratic regime [HAB 70, HAB 72, JON 79, BEC 92, GIA 15]. The thorny problem of the distance between science and society that emerges with the adoption of logical or technical scheme of prediction leads us to a more radical level of the analysis.

The evolution of this political and epistemological paradigm tends in fact to materialize in rationalistic forms of judgment, thus reducing the subjective and affective contribution of society. Consequently, such conceptual framework, to a certain extent, tips the balance in favor of legitimacy and acceptability without considering efficacy or acceptation. That is to say, a rationalistic form of assessing a technology cannot guarantee the safe application of the technology itself [ROS 08, HON 14a, FER 02, GUN 98, RIC 07].

To believe that technology and society evolve according to different dynamics presupposes that society does not develop according to technical dictates and that technology is value-free. It also benefits from a sociological treatment in Max Weber's work, who made an interpretation of modernity as a historical phenomenon of rationalization of the world and life. Weber made a distinction between the end-rationality (*Zweckrationalität*) and the value-rationality (*Wertrationalität*), the instrumental rationality being of the first kind [KAL 80]. The rationalization of the world and life is then a historical process in which the instrumental rationality, that

2 See the several examples of GMOs, body scanners and EPRS [VON 13] or other events that have occurred, for instance, in the Netherlands [VAN 13a, pp. 75–76].

of efficient means, is increasingly deployed throughout the modern societies. This process of rationalization is a key factor in sharpening the historical development of modern societies characterized by the rise of experimental sciences, market economies, bureaucratic state, and formal laws.

I too share the scepticism that this perspective corresponds to reality. "No technology is ever valued neutral" [VAN 12a]. "It is always possible that a particular technology application, or service favors or accommodates particular conception of the good life at the expense of another, whether this was intended or not" [VAN 13a, p. 76]. I agree with the fact that every technology is an expression of value or values, and that to ignore this fact means not being able to read the role and power of technology [DUR 97, PAR 91, PAR 12, MAU 00, HAB 72]. From a functional point of view, this implies the difficulty of developing technologies in general. It risks not only not generating profit but actually incurring severe losses. As reported by Bräutigam, a top manager of Nokia stated: "Typically, the costs of corrective actions are a 1000 times more costly when a service is in the operational phase compared to the design phase" [BRA 12b] in [VON 13, p. 67].

From an ethical perspective, such a conception cannot determine any shared progress. On the contrary, the risk is precisely that technology is exploited for the interests of a single faction [HAB 70].

At the same time, to reduce such a vast and extensive framework as TA with all its declinations and concrete manifestations means not making use of the huge efforts in the direction of its development and improvement over a period of time [FIS 13]. In a sense, even PTA raises the issue of the efficiency of the norms settled during the process (i.e. establishing suitable conditions for making the right changes). However, PTA does not differ from a proceduralist model according to which the guarantee of legitimacy offered by a shared, neutral approach, will lead to the acceptance of the technology at stake.

These kinds of approaches all refer to conceptions similar to the one developed by Habermas. For Habermas, "communicative ethics" is based on two principles [HAB 98]:

> Principle U [Universalization]: "All affected can accept the consequences and the side effects that [the norm's] general observance can be anticipated to have for the satisfaction of everyone's interests, and the consequences are preferred to those of known alternative possibilities for regulation".

> Principle D [Discussion]: "Only those norms can claim to be valid that meet [or could meet] with the approval of all affected in their capacity as participants in a practical discourse".

As brilliantly reported by Lavelle: "According to Habermas, adopting a moral perspective requires therefore, ideally, the participation to a reasoned discussion that is free of any form of coercion. This discussion should ground an emerging agreement on a standard, which all participants are willing to accept in considering all the consequences of the norm application. Habermas claims, however, that he refers to this procedure as a reconstruction of the moral perspective in general, that attempts to distinguish carefully any substantial bias on particular moral theories. However, from the point of view of an ethical democracy, the question of who is a member of the community of discussion is essential, insofar as a restricted community of members will be in a position to decide for the non-members. There is a real danger that, in any way, a smaller community of people would stand as 'experts' of the moral duties in the absence of other people who, for some obvious reasons of time, skill or will, could not actually be members of the community of discussion" [LAV 13].

Participative models, constantly on the increase, often stumble over two main difficulties. They tend not to define the concrete modalities of participation, leaving these attempts to an uncertain fate. These issues, which are evident as well in the Habermasian model, generate exclusions or the blind trust in the acceptance of the results arising from deliberation. At the same time, an excessive participation could lead to an inefficient process, unable to make decisions in a pragmatic manner.

"Technological assessment and participatory technological assessment include different approaches such as constructive technology assessment (CTA), real time technology assessment (RTA), value sensitive, risk assessment, the precautionary principle, new and emerging science and technology approaches (NEST). Technology assessment approaches are based on impact assessment, forecasting, scenario analysis or consensus conferences, and can involve around 50 different devices. Despite their merits, we will highlight the different problems encountered by these approaches. First, the "capacitation of actors" involved (especially the ordinary citizens). Second, the obstacles in communication:

1) to find the appropriate learning process to face the diversity of the public;

2) to be skilled enough, as experts, to translate sophisticated knowledge into interdisciplinary arenas;

3) to compare the different assets behind the choice of neutrality or plurality in the selection of citizens and experts. The third problem is related to the confinement of these mini-publics (as it is impossible to include all stakeholders)" [REB 13, p. 7].

Corporate social responsibility (CSR) is another framework that has played, and still plays, a crucial role in the development of productions and processes. Although its role is mainly centered on the economic aspect and is, therefore, not limited to the assessment of technologies but rather considers innovation in general, its conceptual nature is very interesting, for the purposes of our analysis. Both in relation to TA from which it differs in that a perspective of values is incorporated into it, and from the perspective of progress that CSR considerably extends, CSR represents a turning point on the path that has led to RRI, because it does not consider the formal, objective side of the question very much, but rather the substantive, subjective one.

CSR rests on the idea that private companies should not only take into account the interests of shareholders, but also include the interests of its stakeholders (i.e. employees, customers, suppliers, local communities, potential polluters, as well as regulators, non-governmental organizations (NGOs), civil society organizations (CSOs) or 'the public' at large). Thus, private companies need to comply with national or international legal regulations, as well as with moral norms[3].

As Xavier Pavie [PAV 14] brilliantly pointed out, the conceptual origins of CSR go back to the moral pressure that Protestantism exercised on capitalism. Trusteeship and stewardship are the two notions that explore the relation between companies and society "based on the principle that property is by no means an absolute and unconditional right, and can only be justified if the private administration of these goods can increase the well-being of the community" [PAV 14]. Far from being an abstract theorization limited to philosophers rooms, their theories were defended and applied by Henry Ford, Alfred Sloan and Thomas Edison among others. But, it was only in 1953, when Howard Bowen published his "Responsibilities of a Businessman" that we were able to detect for the first time the idea of CSR. "Two principles form the social responsibility of businessmen. The first is the social contract: if a company exists, it is because society accepts it, and in return, the company's actions and methods must respect the laws formulated by said society. The second is morality: through its influence, and its decision-making power, a company must have an exemplary attitude that is consistent with the values of the society in which it operates" [PAV 14, p. 25].

This prescription, however, is aimed at the businessman as an individual and is not part of an institutional framework of a democratic nature. This will happen with the passing of time where, according to Pavie, we can distinguish four separate stages of CSR. With the first two forms of CSR, the normative and social reference shifts as an alternating current, losing and then finding its normative assumptions as well as with the crucial introduction of environmental issues. A development of the

3 For a really interesting contribution on CSR, see [GOM 07].

theoretical and religious bases of CSR and an opening to the concerns of stakeholders began in the 1980s and would lead in the next century to a geographical and temporal extension of the concerns that CSR wishes to address. The temporal dimension thus tends to take into consideration long-term effects such as those concerning the environment. The spatial dimension, on the other hand, assumes a perspective that is not only corporative but global. The fourth stage of CSR's development is no longer identified with CSR but with the cosmos, science and religion.

CSR thus assumes and embodies in its structure a whole series of concerns regarding the social aspects of a company's products. The innovation must take into consideration factors of a moral nature that reflect the values of the context in which a company operates. The framework of CSR differs, in my opinion, from that of TA in that it does not subsequently add a rationalistic evaluation to the innovation but incorporates those aspects, which could apply at a later stage in its *modus operandi*. The company directions and then the trajectory toward which to steer research and innovation are guided by a value or a normative reference point. The examples provided by Xavier Pavie are numerous and also show the economic functionality of this approach [PAV 14]. The religious origins of CSR have certainly made an important contribution to this development of the relationship between capitalism and society. However, the evolution of the spirit of capitalism [BOL 07] helps us to understand the risks as well as the meaning of the criticism it has received. From a philosophical point of view, CSR is accused of consequentialism, this coming in against all the limits that consequentialism encounters when applied to predicting the impact of innovations [GRU 07, GRU 11].

Grinbaum and Groves [GRI 13] criticize consequentialist approaches for this very reason. The argument shows that it is impossible for an agent, either individual or collective, to control and therefore be able to predict any event in a causal chain [WIL 84][4].

Generally, it is considered as "a too optimistic vision of knowledge and rationality" [REB 13] that also places too much emphasis on the consequences of the action ignoring the fact that "an adequate conception of responsibility also morally engages individuals or organizations by virtue of their actions, regardless of the consequences" [REB 13].

According to Bryane Michael [MIC 03], there are three types of criticism that are usually leveled at CSR. The one made by neo-liberals concentrates on the distortion of functional processes in a company, while the other two maintain that

4 As we will see in Chapter 2, this relationship between causality and chance is crucial for the criterion of responsibility.

the actual outcome is determined by depoliticisation and a consequent democratic deficit. This kind of criticism is based on the belief that the choice of criteria according to which the social interests are defined and their consequent management must not be given to companies as they constituted individual agents of social contexts. That is to say that what should be defined plurally by impartial bodies that are able to guarantee a correct level of objectivity is left to one of the interested parties, inevitably the most powerful. It is, therefore, difficult to understand which criteria are taken into account when the choice is made and what should be dealt with jointly is delegated to a single social actor. The risk is not only that a particular aspect or value imposes itself on others, but also that this can be concealed behind an aura of moral legitimacy guaranteed by participatory practices [BOL 07]. The social and political agenda would thus be dictated by members of society belonging to a specific social context, i.e. the economy.

Considering many of the recent analyses concerning this issue, the above concerns do not seem to be so remote. Moreover, the inclusive mechanisms, if managed privately and designed by single entities, cannot be shielded from suspicions concerning their transparency and legitimacy. Apart from these aspects of critical theory, also from a strictly sociological point of view, CSR tends to promote a particular value aspect, or an interest that in some way it weakens from the point of view of the social plurality that alone can form an ethical dimension. In other words, it seems to me that CSR promotes more a singular, moral perspective as opposed to an ethical one, i.e. it takes into account all the various social issues. Accordingly, CSR cannot fulfill the polysemy of responsibility because it cannot assume the functions of linking the different semantic domains embedded in the political dimension. For this reason, I do not believe that we can speak of responsibility in a strict sense but rather of more specific acceptations that consider certain aspects.

One factor, however, has to be underlined, because it shows the cracks of a dualistic approach to R&I. What CSR perfectly understands is that the economic sector is also an integrating part of the social context, and that the logic according to which it has to develop finds its roots in normative aspects present in society. Obviously, the specificity of the normative contribution will vary according to the size of the "social context". That is to say that, if a company embraces a global market then the value-based issues will be much more abstract than in the case of an SME with a limited range.

CSR does not only represent a bridge between two ethical dimensions such as the economy and the moral dimension but also aims to represent the empirical proof that technology and values, the economy and the moral sphere, are specific expressions of the same social context and must therefore communicate with one another. CSR clarifies this relationship which if underestimated can lead to the

dichotomies already noted when considering TA. CSR, however, in itself cannot exhaust the polysemy of responsibility as it cannot, and should not, assume the coordinating functions that belong to the sphere of politics.

It is not by chance then that the European Commission itself supported this perspective declaring that CSR "being socially responsible means not only fulfilling applicable legal requirements, but going beyond compliance and investing more in human capital, the environments and relations with stakeholders"[5].

Due to these experiences and the limits as well as the potential of these and other approaches (which are still widely used), the European Commission is trying to promote a framework which incorporates all these lessons. This framework attempts to go further in the direction of an ethical dimension of governance capable of developing research and innovation according to democratic procedures. That is to say by the adoption of mechanisms and practices that considerably increase the degree of involvement of stakeholders from various social contexts. The challenge is to develop a model that manages to take into account substantive and subjective aspects together with objective structures of reference.

RRI is a theme that has been dealt with, analyzed and developed extensively from various points of view. We can certainly distinguish between conceptual, academic and strictly political perspectives. The first of these follows different methodological approaches such as sociology [OWE 13], political science [RIP 13, JAC 14], economics [PAV 14, BLO 14] and philosophy [VAN 12a, VAN 13, VAN 15, BOV 14]. At the political level, on the other hand, there is a considerable activity at both national and community levels.

On the basis of the different approaches with regard to the assessment of sciences at a European level, and according to national frameworks, we can notice how RRI represents the last stage of a regulatory process that has started already in 1998.

As stated by Owen, while RRI itself only gained visibility over the last 2 years, it has evolved from earlier discourses within the EU and European Commission (EC) policy context [OWE 13]. The issue of stakeholder involvement and societal acceptance currently put on the agenda of RRI was gradually introduced first in the 5th Framework Programme (FP5) in its call for sociotechnical integration [OWE 13] in the FP6 Science and Society Programme, finally in FP7 with the Science in Society framework where RRI earned a place on its own [EUR 11b]. Finally, with the new framework named Horizon 2020 (Science with and for Society), RRI became a crosscutting issue. This scenario generated efforts for developing RRI

5 Cited in [PAV 14, p. 31].

in a synergetic way between experts and policy-makers who we will analyze in Chapter 5.

The crosscutting function of RRI has raised its importance and attention at different levels. Accordingly, the academic discourse has been definitively turning to RRI in order to address its challenges given the importance that it has assumed for the future of European research.

We also find several examples of RRI developments done at a national level before the EC. The Netherlands, for instance, had already started to introduce the RRI topic in 2008. Although the stimulus has represented an important aspect for developing an understanding of RRI, there are also diverging opinions on the depth and width of the action. Accordingly, the basic impression is that several factors in the Netherlands contributed to promote an "image" of social sciences, where RRI is relegated, as detached and only supportive of the more important technical sciences. In this sense, we should not be hoping to find an integrated approach but only an assessment made at the top political level[6]. It is true, as highlighted by the EPRS or other cases, whose specific aspects have been clearly missed in the development of innovations and perhaps more attention is needed in shaping technologies according to social perspective [VON 13, VAN 13a, p. 75]. However, The Netherlands Organisation for Scientific Research (NWO) recently started to develop RRI to the point that the current programme seems to point toward an inclusive and overarching perspective. Many other parallel measures are also being taken within the Netherlands, promoted by political institutions such as the Rathenau Institute, or private companies such as BASF. In short, in the Netherlands, which was the pioneering country, RRI is "extending due to success"[7].

Also in 2008, in the UK, the Engineering and Physical Sciences Research Council (EPSRC) developed a programme for helping to assess the impacts of nanotechnologies [OWE 13][8]. Since then, the development of RRI concept has led to the following anchor points:

– promoting reflection, understanding and training about responsible innovation (RI) approaches within the wider research community, encouraging broader interactions with other disciplines and spheres of expertise in order to develop capacity for RI;

– welcoming funding requests within EPSRC research grant proposals that seek to explore aspects of RI as an integral part of that research endeavor;

6 http://www.rritrends.res-agora.eu/uploads/27/RRI%20in%20the%20Netherlands%201st%20Report_final.pdf.

7 http://www.nwo.nl/en/research-and-results/cases/extended-due-to-success.html.

8 https://www.epsrc.ac.uk/research/framework/.

– being vigilant to potential social, environmental, ethical and regulatory challenges which arise from new research at the limits of our knowledge, and broadening debate at an early stage;

– ensuring that RI is prominent in our strategic thinking and funding plans, including proposal assessment;

– alerting policy-makers in government and regulators to emerging issues and opportunities associated with new research areas as soon as they become apparent.

The main key words adopted to implement the strategy for obtaining RRI are "anticipate, reflect, engage and act". These steps should be taken through a linear timescale where "anticipate" and "act" are the two extremes of a process of surveillance of technologies.

These are only two examples witnessing the attention that has been given at the institutional level to RRI in the last 10 years. Other countries have also addressed the problem, raising the general level of awareness across Europe[9].

In our reconnaissance, we cannot forget to mention the 'institutional' definition, proposed by the European Commission, which somehow represents the cornerstone for public-funded R&I projects. The Commission defines RRI as such:

"Responsible Research and Innovation means that societal actors work together during the whole research and innovation process in order to better align both the process and its outcomes, with the values, needs and expectations of European society" [GEO 12].

This definition seems to be arising from more developed philosophical and political investigations, gathering all the previous positions regarding the development of science and society.

We cannot make a clear distinction between national and European level because these two influence and interact with each other contributing to reciprocal growth in the development of RRI.

What is important to keep in mind is the crucial importance of the institutional measures if RRI needs to be adopted in an ethical way. This is clear even at a really basic level. If the funding scheme, for instance, is not framed so as to promote certain aspects, it will be nearly impossible for researchers or innovators on their own to manage to do so.

9 For an extended report, see the fantastic contribution made by [FIS 13].

Furthermore, if the definition as such suggests many aspects, there is a specification that if matched with that definition tells us even more about the Commission's perspective. An important development of this definition has in fact been provided with the articulation of six key points through which RRI can be achieved: engagement, open access, gender, science education, ethics and governance are the conditions to fulfill. These key points, according to my reading, need to be conceived and promoted in a complementary way. At the same time, I would state that they need to be considered in a lexical order, meaning that they have to be seen as following in an ethical dialectic. I will define this perspective more carefully in Chapter 5.

As I was hinting at, the Commission's definition seems to be the outcome of many different perspectives that have developed throughout the years in different scenarios. After having shortly gone through some of the main historical developments, we now need to understand how RRI itself is addressed in the literature so as to understand its deepest features.

The literature scenario, which is broad and constantly increasing, finds its reference point in at least six theorizations that can be singled out from the growing body of academic work being produced. These are among the most articulated and deal with various aspects but by no means exhaust the wealth of material available[10].

René von Schomberg developed a massively influential definition of RRI and used it as a reference point for discussing its implementation in the last couple of years. His definition, often cited in the literature and at conferences, covers a wide range of issues. "RRI is defined as a transparent, interactive process by which societal actors and innovators become mutually responsive to each other with a view to the (ethical) acceptability and societal desirability of the innovation process and its marketable products (in order to follow a proper embedding of scientific and technological advances in our society" [VON 07, VON 12, VON 13, p. 63]. Von Schomberg puts the emphasis on the processes involved in RRI so as to draw attention to a crucial factor. What is important is that the process by which a product is developed has to be considered legitimate and not simply the product itself which is never sufficient. This does not mean that any product developed in this way is necessarily "responsible", but only that no product created outside this process can be considered as such.

The delineation of such a process follows a communicative and rationalistic line. The activation of a responsible process of R&I takes place in fact, due to the reciprocal communication that social actors and innovators establish between themselves. Responsibility arises from conditions of communicative responsiveness.

10 For a more detailed account, see GREAT Project, http://www.great-project.eu.

The successful development of such a process must, therefore, respond to communicative criteria within which two social figures enter into communication. The communicative process must take into consideration factors such as acceptability, sustainability and social desirability [VON 12]. The understanding of what these three factors can substantiate must correspond to the clear reference that Von Schomberg makes to European values. The EU human rights charter provides normative anchor points referred to in the treaty of the EU and in its objectives [VON 12]. Von Schomberg also points out that this communication has to be set up at an early stage as steering processes become harder if not impossible at a later point, as shown by GMO's [VON 13].

The theorization by Von Schomberg represents an example of proceduralism that has the merit of overcoming its own limits due to the contribution of a clear normative reference. The impression that I get from his definition is that we need to try to keep a sort of temporary collaboration between two social actors, which must work with an eye to the ethical acceptability. He explicitly highlights the importance of normative stances for developing RRI. When it refers to ethics, he limits his understanding to legal compliance "in an EU context this refers to a mandatory compliance with the fundamental values of the EU charter on fundamental rights (right for privacy, etc.) and the safety protection level set by the EU" [VON 13, p. 64]. But, he does not disregard the more value-oriented reference, placing it under the social desirability meaning that "[it] captures the relevant, and more specific normative anchor points of the Treaty on the EU, such as 'Quality of life,' 'Equality among men and women,' and so on" [VON 13, p. 64]. For Von Schomberg, then it is not a matter of developing new policy guidelines, "but would simply require a consistent application of the EU's fundamental values to the research and innovation process, as reflected in the Treaty on the EU. Perhaps, it has been wrongly assumed that these values could not be considered in the context of research and innovation".

The conception developed by Von Schomberg is one of the most articulated and complex that makes it, not by chance, one of the most cited in the literature and debates. He has the great merit of emphasizing the need of a normative stance that can function as a reference point for the decision-making process. He also underlines how these normative references must go beyond the mere legal dimension, which, although fundamental, cannot, through principle, address certain problems. He also points at desirability conditions that go beyond simple market profitability, although the latter could be a precondition for a product's viability in "market competitive economies" [VON 13, p. 64].

He has the great intuition of integrating the different aspects previously proposed. He points towards the utility of adopting technology assessment together with the precautionary principle together with codes of conduct. These are all useful tools, for different reasons, for forming a process of responsible research and

innovation as they bring up different methodologies. Von Schomberg also tries to integrate a procedural with value and norms based on European treaties and documents. I believe this to be a fertile path toward a complementary approach to RRI as a social framework. However, I am not sure I could agree on the inclusion of all these aspects without understanding what is the basic ground point as well as the overall process for gaining legitimation and efficacy. My understanding of the European values is that they often have been created according to those same procedures that they are going to justify in a second moment, creating a sort of fallacious reasoning risk. If the values and norms, expressed in the Lund Declaration for instance, are produced according to a mainly procedural process managed and developed by a restricted circle of actors (experts), I am not sure they could serve the purpose of expressing civil society's deepest perspective. Thus, those same values and norms, being the expression of an already formal agreement, cannot hope to be used as substantive means in order to gain neither efficacy nor legitimacy. This appears as well by the obvious level of abstractness of those principles that often appear procedural at best.

The same goes for the Treaty of Lisbon, a second-best adopted after the failure of a European Constitution. Habermas sharply criticized the way the Treaty was ratified for not passing through the popular sovereignty but legitimated by a political elite. As reported by Hugh Baxter: "Habermas' language, criticizing the undemocratic character of the Lisbon ratification process is extraordinarily strong. While the 'intention' of both the Constitution and the Lisbon Treaty was 'to promote a higher level participation of citizens during the constitution-founding process"' [BAX 11], there was, on the contrary, the clear appearance of the "elitist character of a political process which is remote from the populations" establishing the decoupling of Europe from the will formation of its people.

Accordingly, relying on "non-democratic document" produced by a political elite or a limited group of technicians should be the normative and value reference for assessing a process that has as its basic procedure people's participation.

In this way, the political elite, or the experts will define what the people are going to use as the expression of their own personal interests, values and desires.

It seems to me a circle that, at least politically, has difficult chances of hoping for legitimacy, not to mention efficacy.

I think this shortcoming is also due to a kind of uncertainty in facing the limits of a fragmented approach to society, where it is hoped that every dimension interacts but according to contingent modalities and with objective that is quite often not shared. To a certain extent, this insecurity comes from the need to reach a perspective that is structurally inclusive and complementary, but in not wanting to

radicalize this operation by the rediscussion of the relations at the basis of society. In other words, the division between science and society still refers to a shared criterion that, however, cannot emerge, at least not in the value-based models that we have cited.

Moreover, the reference to an institutional dimension can be conceived in a more marked way, emphasizing, as rightly pointed out by Habermas, the importance of the production and democratic management of processes. The conditions of application that guarantee the legitimacy and efficacy of the product should be conceived as conditions of possibility of the product itself. In other words, the institutions should be incarnation of shared values, which should be taught, facilitated and improved, but not invented or subtly imposed.

Richard Owen, Phil Macnaghten, Jack Stilgoe, Mike Gorman, Erik Fisher and David Guston provided another definition of RRI that partially relies on that of Von Schomberg. They defined RRI as "a collective commitment of care for the future through responsive stewardship of science and innovation in the present" [OWE 13]. This definition is intentionally kept broad in order to facilitate further reflections on the concept of RRI, considering the early stage of its development [OWE 13]. However, further specifications are indicated in the ingredients that should compose RRI. RRI should always anticipate both intended and unintended impacts of R&I. It must reflect on underlying purposes, motivations and potential impacts, what is known and what is not known, and associated uncertainties, risks, areas of ignorance, assumptions, questions and dilemmas. It should then "deliberate visions, purposes, questions and dilemmas collectively and in an inclusive manner". And finally, as a crosscutting attitude, RRI needs to be "responsive to issues related to R&I in an iterative, inclusive and open manner" [OWE 13, pp. 27–50].

These "dimensions" of RRI are framed in a manner that "align well with the definition of RRI offered by Von Schomberg" [OWE 13] .

However, there are indications that differ from Von Schomberg's communicative conceptualization. In particular, it seems to me that the reference to care implies a different vision of the concept of responsibility [GRI 13]. Taking care of something is one of the acceptions often adopted to express an understanding of responsibility that dares to go beyond current regulation and procedures, and that projects itself toward an uncertain future through commitment. Every agent, in this sense, in order to respond to the management of science and innovation must take charge of his own acting in considering future consequences. The concept of care recalls deep existential grounds that touch the agent in his intimacy as a human being [SAR 93, HEI 08, LEV 98, BLO 14]. The consequences of actions affect the entire collectivity.

Owen *et al*. open the semantic space of responsibility, highlighting its existential articulation and giving continuity to the tradition that sees in responsibility an ethical imperative [JON 79].

However, by explicit will of the authors, they do not propose more precise ideas with regard to the political and institutional applications by which such perspectives should be realized. The sense is that the problems have rendered all the previous attempts incapable of providing a solution. The epistemic conflicts, the moral dilemmas and the space of meaning that goes into the realm of norms do not enter into Owen *et al*. conceptualization. In other words, the indications on the decisional processes that should steer those procedures are left to the contingent interpretation. I believe that in this contribution is praised the immanent and subjective definition of what is still only a notion. However, I think that we need to start to think of a normative solution that could able to guide the immanence of the dialogue and the assessments, in order to enable the institutions in charge to operate according to a legitimate and efficacious reference. As much as I find this opening to discussion and reflection on the basis of a reciprocal care a fascinating suggestion, I also believe that we need to help the policy-makers in a moment when RRI is passing from its definition to its implementation[11].

A different conception that focuses, through moral dilemmas, on a structural manner of rethinking the relation between science and society is the one proposed by Van den Hoven [VAN 13]. For Van den Hoven, who deliberately engages only with innovation, RI as: "an activity or process which may give rise to previously unknown designs either pertaining to the physical world (e.g. designs of buildings and infrastructure), the conceptual world (e.g. conceptual frameworks, mathematics, logic, theory, software), the institutional world (social and legal institutions, procedures and organization) or combinations of these, which when implemented expand the set of relevant feasible options regarding solving a set of moral problems [VAN 13a, p. 82]". Here, research is deliberately left out from the investigation as this conception focuses more on the concrete development of products rather than producing more generic or fundamental results associated with research.

If the other two conceptions hinted at the temporal importance of the process, Van den Hoven puts a clear emphasis on it. An RI is one that acts on the design phase and not later.

Apart from this important aspect, which already drives us to the path leading to his theoretical construction, the key feature of Van den Hoven's conception is the

11 See the passage from pilot projects to current ones as well with recent calls where RRI is supposed to be already defined and in need of being applied to the different sectors.

understanding of "technique"[12] implied in it. For him, technology is not morally neutral. The assumption that it could be so is only masking implicit values at play. The role of RI is then to make them explicit. "No technology is ever value neutral [VAN 12a]. It is always possible that a particular technology, application, or service, favors or accommodates a particular conception of the good life, at the expense of another, whether this was intended or not. There is, therefore, virtue in making particular values at play explicit" [VAN 13a, p. 76]. Making values underlying innovations explicit will also help improve the functionality of them. The example that Van den Hoven takes for demonstrating how to solve moral dilemmas follows a dialectical methodology showing how the resolution of moral conflicts is feasible from a moral point of view and also from a functional one. The conflict generating from situations of "moral overload" happens when "one is morally overloaded when one is burdened by conflicting obligations or conflicting values, which cannot be realized at the same time" [VAN 13, p. 77].

However, these kinds of situations, common in the domain of technological development, can be solved if we adopt a value-based perspective in the design of the innovation. The conflict, for instance, between security and privacy, does not have to be solved choosing between the two, but instead by proposing a third option that could embrace the two and at the same time overcome them [VAN 13a, VAN 12a]. The proposition of a "third horn" shifts the perspective, managing to increase the functionality of an innovation by implementing it through the moral value embedded in the two conceptions of it. This approach radicalizes the question, going to the heart of the issues generated by moral pluralism. Van den Hoven, who proves his philosophical background in this, addresses the problem of how to maintain the efficacy of an innovation without losing the side of the legitimacy. The search for a third option that could be developed in the design phase not only protects the moral perspectives but also fosters the functional and economic aspects. The radical perspective that needs to be emphasized in Van den Hoven is exactly the reformulation of the paradigm at the basis of the several approaches so-called rationalistic. The Dutch philosopher marks the presence of values and moral perspectives in every technology, crumbling the rigid Weberian and Habermasian dichotomy between science and society. For Van den Hoven, who gets this basic idea from the value sensitive design framework, "values and moral considerations can, through their incorporation in technology, shape the space of action of future users, that is they can affect the set of affordances and constraints of users" [VAN 13a, p. 79].

12 I have expliclty highlighted this term to show the substantial differences that technique and technology embed, the former entailing a strongly normative and human-oriented root [MAU 00, DUR 97].

Van den Hoven's conception also shows the active and innovative aspect of responsibility. To innovate responsibly means to "*expand the set of relevant feasible options regarding solving a set of moral problems*" [VAN 13a, p. 82] in order to increase the chances of reaching a "good life" through a technology that is a technique. Van den Hoven develops on the basis of the paradigm of "Value Sensitive Design" an approach that sheds a light on ethics in order to show its decisive role in the development of progress. This approach is surely the one that more than the others has touched the roots of the problem. An ethical perspective for the resolution of moral conflicts is surely a fertile path for the resolution of issues arising from moral pluralism.

Nevertheless, I find two puzzling issues in Van den Hoven's conception. The first is surely a secondary one, given the conclusions to which Van den Hoven himself gets with his concept of responsibility. In fact, Van den Hoven seems to accept the acception according to which responsibility is an ascription to a person of certain capacities, reducing responsibility to an epistemic factor. As much as we find several references to the preconditions that the capacities of an agent should be recognized and inserted in a complex social net, these same capacities seem to be relegated to a moral or juridical dimension.

I find, however, another factor, related to the first one, more important in order to solve the issues that Van den Hoven faces. In fact, I detect an absence, or at least an aspect that is still implicit and needs to be made explicit. Van den Hoven talks in a recurring way of the necessity of modeling technology according to perspectives that arise from the "sublation" of a moral conflict. However, it is not clear which is the principle, or the reference value that could guide this dialectic. How can we enter a situation according to which we should accept even a moral position contrary by principle to dialogue, or a relativist one, or a sceptic one. In order to avoid such a possibility, we need to find a reference criterion that is at the same time external but not alien to the moral agents. A transcendental/immanent criterion that does not emerge from his texts. Moreover, the resolution of moral conflicts requires an institutional dimension, especially if the ground of resolution is strictly practical. We will need to understand where to find the grounding point to this interesting conception made by Van den Hoven.

Armin Grunwald has been trying to address the different conceptual dimensions embedded in RRI through a three-fold theorization that he has developed through several contributions. RRI for Grunwald is an umbrella term, characterized by involving ethical and social issues more directly in the innovation process by integrative approaches to development and innovation. It must bridge the gap between innovation practice, engineering ethics, technology assessment, governance research and social sciences (STS) through a hermeneutic approach. It should try to give a new shape to innovation processes and to technology governance according to

responsibility reflections in all of its three dimensions (governance, moral and epistemic) in particular, making the distribution of responsibility among the involved actors as transparent as possible. Finally, it should support 'constructive paths' of coevolution of technology and the regulatory frameworks of society" [GRU 11, p. 26].

Here, we do not find a definition of RRI, but rather a pragmatic explanation of methodological paths in order to avoid too abstract conceptualizations. The main idea at the basis of his conception is the fact that moral dilemmas, or social clashes in general, can be solved through a hermeneutical turn [GRU 11]. Drawing on the constant increase of its usage [NOR 14b, VAN 14d], Grunwald detects in technovisionary projections of the future a solution to the clashes rising from epistemic uncertainty. Given the impossibility to adopt a consequentialist approach, like the ones present in scenario-building and prognostic orientation, Grunwald suggests to move toward narrative practices that could comprise all the different sides at stake in RRI.

One aspect that needs to be highlighted is the fact that Grunwald is perhaps one of the few to address responsibility in a substantial way. Whether or not it is important for other accounts to describe what a responsible behavior would entail, for him responsibility is such that it needs to be questioned. Grunwald identifies three dimensions of responsibility, (empirical, ethical and epistemic) which need to be addressed in a complementary way. Grunwald believes that the dark shade usually associated with responsibility arises from conceiving it only as an ethical issue. Conversely, responsibility cannot be only identified with its ethical dimension but needs to be addressed in a broader way, also encompassing the epistemic and empirical side.

"Debates over responsibility in technology and science frequently often focus on the ethical dimension while considering issues of assignment processes and epistemic constraints secondary issues. However, regarding the analysis given so far the ethical dimension is important but only part of the game. It might be that the familiar criticisms toward responsibility reflections [see above] of being simply appellative, of epistemological blindness, and of being politically naïve, are related to narrowing responsibility to its ethical dimension. Meeting those criticisms and making the notion of responsibility work is claimed to be possible by considering all the three EEE dimensions of responsibility together" [GRU 15, p. 25].

Grunwald raises many important aspects regarding RRI. He points out how RRI embraces previous and concomitant frameworks to assess technology or innovation in general (STS, TA, etc.). He exhorts a collaborative and comprehensive approach. Grunwald has also the merit of posing the question of responsibility in a thicker way, broadening the issue to epistemology and governance. He tries to save

responsibility from drowning into the ocean of morality by proposing a three-fold articulation. The attempt to solve dilemmas arising from epistemic uncertainty through hermeneutic practice has the quality of overcoming cognitive barriers and "discourse" exclusions. Narration can be a remedy for the shortcomings of communicative reason and rationality in general. It can help to make the "unheard" emerge in public debate and shape innovation according to a social framework. In this sense, Grunwald has very much in mind the problem of efficacy of norms.

However, I believe that his understanding of ethics can be framed into more inclusive terms and his proposal of a "tripartition" of responsibility can be reformulated in terms of acceptions of responsibility. Moreover, as for the previous theorizations the normative or institutional reference does not emerge that could drive the encounter of different narrations.

What does emerge from these conceptions are the following issues. First, I did not find a conception that would make the link among the different acceptions and understanding of responsibility in order to understand when and why we can choose one. To be clear, I have not cited some important essays related to it because they focus exclusively on the criterion of responsibility and not on the notion of RRI. As we will see, however, even more specific essays have the tendency to analyze rather synthetize the modalities of interaction. Despite this, the conceptualizations of RRI all presuppose in a more or less explicit way a conception of responsibility that does not suggest their relation or grounding criterion.

The references to epistemic faculties represent an important starting point but they do not exhaust the meaning and potentialities for RRI.

The second point that arises from this is the definition of ethics that, while appearing in almost all conceptualizations, is not explained exhaustively. Or at least, it is not clear to me what the difference is, if there is one, between ethics and morality, given that they often have a similar meaning in different texts. I believe that it is an aspect that deserves to be discussed thoroughly, as all the conceptualizations make a clear reference to ethical issues or ethical aspects, etc. An ethical approach to science requires a rereading of what we intend by ethics and what in this sense the concept of responsibility can offer.

Many of these perspectives remain attached more or less consciously to a procedural dimension of development of RRI. This enables objective procedures that can hold together the various aspects involved to be developed. The various subjectivities, embodied in values, interests and desires, are transmitted within formal processes and lack that semantic of values that would not reach a sufficient criterion of legitimacy.

The limit of this perspective, however, is that it does not take into due consideration, only that subjective aspect which is necessary for the agents to be able to recognize themselves and their values within those procedures. The proceduralism that wants to protect the dignity of individuality risks losing its braces, dissolving them in a gray procedure in which it is no longer possible to tell black from white. The joining link is an empty basin in which no one finds anything for himself or for the other/others. In this way, the distance and incommunicability remain as the claims are canceled and not understood and developed. Without wanting to go into the various differentiations between moral or epistemic proceduralism, I believe it is important to note how its constant use in the difficult relationship between science and society is anything but casual.

In fact, I believe that the constant necessity to adopt a neutral perspective is considered as the solution to the apparently irresolvable contrasts between two opposing factions. On the one hand, we have an end-rationality (*Zweckrationalität*), deaf to normative appeals and launched toward an unknown future of which to take possession, and on the other hand a value-rationality (*Wertrationalität*) confined in an extrainstitutional public sphere, invincible hero of justice, exclusively guided by normative assumptions.

This dichotomy that for a long time has been relegated to the twin peaks of science and society today finds a third contender, allied to the former and more "interested" than it. Without necessarily being able to choose between the two equally crucial for the social fabric, the solution is, therefore, indicated in the adoption of a language that can neutralize both claims. The consequent result would be that of obtaining a shared and therefore legitimate assumption and that this legitimacy automatically guarantees the efficacy of the assumption. The valuable attempts to resolve the contrast between two factions by the introduction of a third able to overcome the limits soon reveal their limits owing to the emptiness in which the third faction tends to be manifested.

While the solution is to be found in a third language, as implicitly proposed by all these theorizations (particularly by Grunwald and Van den Hoven), this third language must be filled by subjectivities, within which the two contenders see themselves represented and they recognize each other so as to understand their relational nature. This joining link must be illuminated by both of them so that common assumptions and objectives emerge. The third language must function as a narrative medium. This medium that is able to adopt a common language must, therefore, be found outside the two worlds but must not be alien to them. It must be the formal reflection in which the specificity of its contents can be found.

On the other hand, while the way to achieve this objective assumes the contours of a procedure, the latter must be begun and concluded by someone who is not the

procedure itself in order not to fall into the proceduralist circle. In this sense, we need institutions that are able to set in motion the dialectic(s) between different dimensions. The institutions must be the joining link as they not only embody values, interests and individual preferences, but also the translation of those values into a comprehensive and recognizable language. It is recognizable owing to the fact that it derives from the same basic function and has the same objective. Society formed by different social spheres connects them much more than it would have believed us. The different languages, accordingly, are only a functional modality by which to reach the same objective.

Thus, to reach a conception of RRI able to assume these different meanings in itself, we must identify the various spheres but above all identify their relationship, assumption of a common basis and common objective. That is to say, the reference that will enable us to resolve the moral and epistemic conflicts. What is the basic assumption that allows the relationship between responsibilities?

After analyzing the problems at the root of what we are looking for and the complexities of the question and its outlines, we now have to unpack RRI in order to understand what the basic features and objectives within its aspects are.