

RESEARCH OUTPUTS / RÉSULTATS DE RECHERCHE

Analytical Grid Report to EC

Gianni, Robert; Goujon, Philippe

Publication date:
2014

Document Version
Publisher's PDF, also known as Version of record

[Link to publication](#)

Citation for published version (HARVARD):
Gianni, R & Goujon, P 2014, *Analytical Grid Report to EC: WP2 Current Theory and Practice task 2.3 Construction of an analytical grid*. Commission of European Communities. <<http://www.great-projet.eu>>

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal ?

Take down policy

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.



Analytical Grid Report to EC			
Deliverable		D.2.3	
Workpackage No.	WP2	Workpackage Title	Current Theory and Practice
Task No.	2.3	Task Title	Construction of an analytical grid
Start Date:	01.05.2013	Revision Date:	30.01.2014
Authors		Robert Gianni, Philippe Goujon	
Contributors			
Status (F: final; D: draft; RD: revised draft)		F	
Distribution		PU	
Document ID / File Name		GREAT_Del2.3_final	

Table of Contents

1. Introduction	6
2. Critical assessment of Responsible Innovation in Research.....	9
2.1. Innovation.....	10
2.1.1. Current understanding and limits of innovation	14
2.2. Responsibility.....	24
2.2.1. Accountability or Responsibility?.....	30
2.3. Responsible Innovation	34
2.3.1. The problem of definitions	37
2.3.2. Three layers of analysis of RRI: Logical, Ethical and Political	43
3. The construction of norms.....	50
3.1. A limited approach to norms construction: SIM Presupposition.....	51
3.2. Embedding the dialectic	54
3.3. Theoretical Paths for Norms Construction	56
4. Conditions for RRI	59
4.1. A first condition of RRI: Participation	59
4.1.1. What kind of Participation?	64
4.1.2. How much participation?	66
4.1.3. Participants: Stakeholders, Agents and Actors	67
4.2. Reflexivity and the Cognitive framing.....	69
4.3. A third condition: ethics as a guiding principle.....	77
5. Governance Approaches and Limitations.....	79
6. Analytical Grid of Analysis: a logical translation of the theoretical landscape for the empirical investigations	83
6.2. Explanation of Parameters	83
6.2. Implementation	89
7. Internal Glossary	92
8. References	96

List of Figures

Figure 1: Responsibility : paradigms (G. Gorgoni GREAT “Kick-off Meeting” Brussels)	26
Figure 2: Constitutive dimensions of responsibility (the “Methodological Meeting” Paris)	28
Figure 3: Characteristics of responsible innovation	48
Figure 4: Norms & Context (Egais, Del. 2.1)	56
Figure 5: Levels of participation (J. Arnstein, 1969)	61
Figure 6: IAP2 Spectrum of Public Participation	62
Figure 7: Tools for enhancing participation	63
Figure 8: Participatory approaches dimensions (Fung, 2006)	65
Figure 9: First and Second order Reflexivity	74

List of Tables

Table 1. Innovation structure, Aygen Kurt & Penny Duquenoy	16
Table 2. The structure and the operation of Innovation system	17
Table 3. Division of innovation structures according to institutional frame	17
Table 4. Layers of Innovation (Theoretical Workshop held in Paris, April 2013, analysis provided by Jack Stilgoe on innovation).	19
Table 5. Pathologies of Innovation	19
Table 6. Means of setting Innovation in motion	20
Table 7: S.I.M presuppositions	52
Table 8: Kinds of reflexive governances	76
Table 9: Relation between norms and context	82
Table 10: Manners of participating into a development process	87
Table 11: Governance typologies matrix for case studies.	88
Table 12: Parameters’ matrix for case studies analysis	88
Table 13: Analytical grid	89
Table 14: Making Innovation Responsible (Based on what presented by J. Stilgoe at the “Methodological Meeting” in Paris, April 2013)	90

Je crois qu'il existe de la raison dans l'humain, du raisonnable et du rationnel dans les univers sociaux, comme il existe des valeurs. Cette raison comme ces valeurs sont toutefois humaines. (Pestre 2013)

Structure of Deliverable

The following deliverable is focused on the scientific development of parameters through which we can propose a reference grid for the empirical analysis.

This task will be accomplished through the accomplishment of several steps.

The discussion and analysis of the theoretical background depicted in Del. 2.2 will be a first starting point. From there we should be able to provide a depiction of the justifications connected with RRI, a discussion of the epistemology behind the problem, through a set of analytical steps of defining the problem, and then a full justification for the approach, explaining why current governance approaches are limited in their relationship with RRI.

Analytically speaking, we will provide:

- an introduction depicting the actual situation with regard to Responsible Innovation in the EU.
- a definition of the problem(s) related to Responsible Innovation
- a discussion of the epistemology that cross-cuts the problems and that opens up the real problem
- a methodological path or justificatory explanation for our approach
- the parameters needed in order to collect empirical data and analyze research according to our frame.

The present deliverable has the aim of providing the criteria or, better to say, the parameters necessary for processing applied approaches. To accomplish such a task we will start by outlining what the problems are with regard to RRI, gaining knowledge from the previous **"Theoretical Landscape"**, and from our partners

understanding. From there we will try to shortly, but critically, assess the current Responsible Innovation approaches. We will accomplish this task first by considering RRI through its two sides, responsibility and innovation, and after the current understandings of RRI itself. This should put in evidence that the main shortcomings of RRI are represented by a reductive way in which norms are conceived and constructed with regard to the context. Therefore, we will have to depict how this particular matter is handled and how it could be differently managed. Consequently, we will need to analyze the decision making process in its actual frame so to show gaps and limits. From this stance we will then be able to offer parameters through an analytical grid that will help the investigation in detecting similar shortcomings and limitations in most of the EU research projects.

It goes without saying, that the critical assessment of norms construction and governance approaches stands on a precise methodological ground, one that doesn't intend to impose a single perspective but only to depict the logical and ethical weak points of current scenarios. A normative core, a focused perspective that stands necessary for every investigation, needs to be always highlighted and justified. Throughout the entire deliverable then, we will provide, explicit or implicit, logical and ethical, justifications to our perspective. Given the length of the issue at stake perhaps some points or theoretical presupposition will be left implicit or treated briefly.

Accordingly, we need to respond to the challenges and difficulties outlined in Del. 2.2. In particular the following deliverable, namely "Analytical Grid", will represent the definitive formalization¹ based on the results of the previous "**Theoretical Landscape**" that will favor the subsequent **empirical investigation**. The precise aim is thus to translate theoretical insights into a 'language' useful for further empirical inquiries, by providing a dynamic methodological analytical tool suitable for this purpose.

At the same time, in a second time, the results of the latter will feed the formal structure of the grid, confirming (or contradicting) the outcomes of the former.

¹ With the term formalization we refer to the french '*mise en forme*', that is, to give a definite form or shape to something. We believe it will be necessary in order to use the insights coming from the theoretical landscape.

1. Introduction

The EU seeks to become a genuine Innovation Union in 2020 striving for excellent science, a competitive industry and a better society without compromising either on sustainability goals or on ethically acceptable and socially desirable conditions. Europe thus needs to develop a normative and comprehensive governance framework for Responsible Research and Innovation (RRI).

However, this raises new questions regarding the relation between technical development and society that are often hard to deal with. This matter has been demonstrated by various cases in recent history, for instance, the research on genetically modified organisms (GMO), where the resulting controversies and ethical issues had a broad resonance in society and generated serious economical counter-effects.

Consequently, the societal challenges accompanying this kind of research cannot any more be addressed only by the research community, but also need to include a societal perspective. As stated by David Delpy *“the challenge will be to define an approach that promotes creativity and innovation in research underpinned by a commitment to its responsible development”*. What appears difficult on paper shows to be even harder in practice.

What are the main problems at the basis of such a target? Undoubtedly the issues at stake are several and on different layers.

The first and most basic question regards exactly how to conceive a responsible kind of innovation? As understood in the previous deliverable, responsible innovation seems to be a paradoxical conception, given the fact that the couple appears to pertain to two different and opposite rational spheres².

In fact, on the one hand innovation is usually intended as a flow running through technological developments, based on a strategic approach to progress, aimed at marketing or develop marketable products and processes³.

On the other hand, responsibility, although facing different ranges of understanding given the polysemy of the term, is generally conceived as an ethical matter related

² Referring to Habermas or Parsons.

³ However, innovation encounters problems in its development as shown by the “Report on Innovation”. The level of innovation in EU is much lower when compared with other countries like the US or Japan. In this sense we will have to then develop some RRI conceptions that manages not only to ‘responsibilize’ innovation but also to help boosting its trend. If the two operations are part of one same conception as we think, it will be shown in the further pages.

to the potential consequences that may occur with innovation. This implies somehow that responsibility, and therefore ethics, tend to represent a limit to innovation. The main difficulty stands then in conceiving an innovation process that could be responsible in terms of consequences without hampering the marketization or technological development.

But this kind of problem could be immediately felt to represent only the superficial layer of deeper questions and most of all an assent on those definitions. On the contrary the supposed clash between responsibility and innovation represents only a clear signal or evidence of more complex matters. Although they appear in a different shape, the clashing terms are not new in their basic roots⁴, and this fact will turn out to be a good indication in order to highlight gaps and limits.

In fact, what we understood from deliverable 2.2 is that responsible research and innovation is considered at the same time a necessary target and a paradox. But, if we could easily agree on the necessity of a responsible innovation in research for several reasons, would it be also really true that these two terms stand in opposition?

We believe that in reality, although being different, they do not stand in general as opposite, but that a reductive perspective on the question tends to place them into a clash. On the contrary the mistake lies exactly in keeping this opposition alive through different means. The current evaluation tools (e.g., risk assessment), by which responsibility is embedded more or less in research, tend to maintain this opposition either implicitly or explicitly.

As we will see in the proceeding of our analysis, this opposition leads to several effects not least the potential ineffectiveness of innovation especially in economic terms.

We believe that keeping these two fields separated is a mistake from many points of view and that it becomes quite evident at a political level.

There are three layers on which the current understanding of responsible innovation shows its limits and they all can be re-conducted and synthesized to their practical concretion, that is how governance models and measures act in order to manage and pursue specific issues.

Furthermore, this problem reaches a different and much more evident difficulty when it is transposed onto a political level that is always a plural one. How in fact, do we manage to conjugate or merge different normative settings given the fact that innovation involves different fields and actors? How do we conceive, in other words,

⁴ The counter position could be expressed in terms of science and ethics, laws and norms, nature and culture.

a collective action in terms of innovation outcomes? The current answer, as we already understood from Del. 2.2, is usually to recall a meta-level justification. In particular the agreement or choice is always to be found in some sort of rationalistic or a priori schemes on which to refer. Although there are several different nuances of which we will provide an analysis, the common trait of most of innovation approaches in current research, lies in this aprioristic or top-down understanding of normativity, an attempt that we will call reductionist and that could be intended as a mathematization of 'life'. The risk here is represented by an instrumentalization of RRI at the expenses of ethics.

In order to demonstrate our hypothesis we will proceed showing that is exactly this reduction that makes emerge all the actual problems connected to innovation. Furthermore we will highlight the different reasons for which we have to reject this understanding and put in evidence how an 'abstract' failure affects the 'practical' dimension in political terms.

We will adopt such structure:

We should firstly highlight, following the hints and explanations of Del. 2.2, we will go into the two concepts of innovation and responsibility in order to offer an alternative understanding of them. We will then tackle the political layer, trying to show why and how a contradictory acceptance of RRI fails in its political management. This part will be also based on a two folded explanation; a more theoretical stance, focusing on how norms are conceived and constructed, and a more practical one, that is, what are the governance forms by which normativity and therefore responsibility is handled in innovation processes.

In order to do this we need to understand what these perspectives are, why they are all expressions of one same problem, and show the embedded contradiction in them. Once we have made clear what lies at the heart of those contradictions, we will propose our alternative conception. From there on we will then analyse how this misunderstanding affects the current governance models and consequently offer a solution, keeping in mind that is not the solution but *a* solution.

2. Critical assessment of Responsible Innovation in Research

As everyone can understand even at a first glance there are several aspects that need to be treated if we want to develop an analysis on Responsible Innovation. Furthermore there are different layers of understanding that lead us to the main core of the problem, the relation between norms and context(s).

From a **practical point of view**, the main starting problem, for everyone who wants to develop a conception of RRI, comes across together with the understanding of the fact that innovation, and therefore responsible innovation, can occur both in different fields or manners affecting a large number of contexts. Without the necessity to provide an exhaustive enumeration of possible fields (technologies, environment, medical, food) it is important to assess and keep in mind the variety of different potential applications and regulations that characterize every specific domain, and therefore the insufficiency to take into account only one of them. On the contrary this 'normative clash' calls in for a proposal that could be sufficiently wide in order to be valid without losing at the same time all the different normative sets.

Also on a **theoretical stance**, as it has been shown in Del. 2.2, the concept of responsible innovation involves a lot of different perspectives and "sub-acceptations" that renders hard to develop a common understanding. To be more precise, responsible innovation is usually seen as the addition of two antithetic concepts, innovation and responsibility, as mentioned previously. If the former is generally more or less definable through a shared conception, the latter encounters a lot of different perspectives due to its recent formation, etymological richness and wide range of application. (Hart, 1968; Groves, 2006; Bovens, 2006).

In order to develop an alternative conception of RRI we then need to see if, how and where we could find indications that would be useful in order to go out from a common understanding of it. We don't need to recall all the possible options as this has been exhaustively done by Del. 2.2. We will just see if there are some indications that could lead us on the right path, the one of a logically correct, ethically good and practically effective conception of RRI.

Lets shortly set a frame of what **innovation** could be and how we could handle it.

2.1. Innovation

The main basic problem, as we hinted, is how to assess and prevent all the potential consequences of an innovation process, considering the enormous range of possible outcomes in different fields and from different perspectives? How, in other terms, an innovation process could be successful considering that not only its scientificity will represent the proof of it, but also that the context will judge it? If an innovation aspires to be successful it needs to consider how to 'offer' the result to potential beneficiaries. Besides, as we will show, an innovation cannot be reduced to its economic impact in terms of profit but has to take into account the social benefits in a broader sense. So, again, given that innovations could and potentially aims at affecting different fields and perspectives, in which way we take into account different normative settings?

Although innovation seems to be a quite recent concept, in reality only its current understanding in economical terms represents a novelty. Its origins are rooted across a long tradition where the stress has been placed on the role and acceptions of creativity⁵. Along with the implementation of technology in the production process, innovation has started to become conflated to developments for profit purposes. As largely shown⁶, Schumpeter's theory of economic cycles represents the common reference for all those attempts of placing innovation into its market dimension. But innovation seems to enclose a wider range of meanings coming from different periods and according understandings.

Lets briefly analyse the genealogy of innovation in order to find useful issues for our developments.

According to Benoit Godin⁷ there are at least six main layers from which innovation can be analysed. We could study *"the words (or terms), their genesis and transformation, and the cluster of concepts involved in speaking about innovation: invention, ingenuity, imagination, creativity, etc"*. We could have a look at its meanings or the *"discourses held in the name of the concepts"*. The latter are usually of three kinds: *"innovation as a factor for change in society, innovation as progress, and innovation for its own sake"*.

If we would want to go deeper in our enquiry, and this particular side closely touches our investigation, we could also analyse the norms on which innovation is based, given the fact that it often implies a sort of tension between tradition and novelty that raises conflicts and tensions. But there is also a fifth and sixth layer that should be taken into account. The former being theories and conceptual models developed

⁵ <http://www.csiic.ca/PDF/IntellectualNo1.pdf>

⁶ See, Del. 2.2

⁷ <http://www.csiic.ca/PDF/IntellectualNo1.pdf>

to explain innovation and the latter “*the study of the context in which the category emerged: economic (trade), politics (the courts) and culture (expressiveness, awareness of history)*”.

It goes without saying that it would be difficult to make a clear distinction between these different sides of innovation and therefore it sounds more useful to concentrate on different hints and the general main purpose of such a study: to show how innovation embeds an excess of significance that needs to be unveiled. It means how innovation carries many related meanings that are thicker than a simple profit focused one.

Until the beginning of the twentieth century innovation was a term that has been extensively used only in two main circumstances. The first reference to innovation can be found in Machiavelli’s *Principe* where he describes the role of innovation with regard to the people. Machiavelli describes the reluctance of ‘contexts’ to innovations and, adopting the fox metaphor, describes the management of novelty as a quality to be held by potential sovereigns.

In Bacon, the reference to innovation is even more evident although with a different meaning. Bacon, that titles his work exactly “*Of Innovations (1625)*”, describes the resistance of people to innovation⁸.

In history innovation has been always connected to novelty and therefore often overlapped with invention or compared to imitation⁹. But a deeper theory on innovation was produced in sociology only at the end of the nineteenth century, with Gabriel Tarde¹⁰. The French philosopher attempted to explain social changes in a broad sense and not at all limited to the market side of it. As recalled by Godin, Tarde was interested in understanding social evolution with regard to “*grammar, language, religion, law, constitution, economic regime, industry and arts*”.

But still in Tarde’s work as in many others’ ones, innovation is still tightly connected to invention and imitation. Whether the latter is conceived as a natural settlement process after inventions, the former one was still assigned and embedded in great personalities¹¹ or to some better-developed people, nations, etc., within an evolutionary frame.¹² Also later general sociology and anthropology didn’t show much interest in innovation as such but rather on imitation as a matter of evolution. Only with the rise of technology and the consequent focus by sociology, innovation

⁸ Whitney (1986)

⁹ For the history of the term see, <http://www.csiic.ca/PDF/IntellectualNo1.pdf>.

¹⁰ Perhaps not a coincidence that came from a work called *Les lois de l'imitation*, Paris 1890.

¹¹ In philosophy most of all we find a sort of romantic accent on the role of imagination, inspiration etc., later merged into a kind of metaphysical necessity and retrospectively described as a psychological description.

¹² In anthropology, the ‘diffusion controversy’, (Smith et al., 1927).

became a central topic.

Although it is true that a clear definition has not been provided by sociologists along the twentieth century, it is also true that there was a common understanding of it that appears to be interesting. W. F. Ogburn and S. C. Gilfillan were the first ones who conceived technologies as a factor of social changes or cultural ones. If, on the one hand, Ogburn focused more on the gap between material culture and the rest of it occurred with the appearance of technology, Gilfillan (1935: 6) on the other hand stresses the social aspect of every technological development. For him technology is a social process in at least three senses. The first one is the social forces or conditions that made possible the development. A second one should be detected in its cumulative aspect for which a new technology is always the result of previous modifications, adaptations and similar small or big details that made that outcome possible. Lastly, technology is a systematic process being developed in research laboratories and structures specifically aimed at furthering the process.

If we could say that maybe Gilfillan forgot to mention explicitly a fourth sense, that is the social outcomes of every technology, it is also true that this statement was probably omitted because it was considered to be obvious. As shown by Stern (1927), Mulkay (1969, 1972a, 1972b) and to some extent Chaplin (1928) most of the sociologists of that time agreed on implicitly conceiving innovations in technology with regard to their use and the consequent social impact. Moreover, to sociologists, *“an innovator was not one who invents but adopts an invention for the first time”*¹³ stressing the contextual side of every innovation.

Although, of course, there are important nuances between different thinkers, there are two main aspects that appear peculiar for our investigation.

A first one is the social impact of an innovation that is considered to provoke considered as cultural change.

A second one is the general understanding of innovation *“as a process where both the production of an invention and its use are discussed rather than contrasted”*¹⁴.

To summarize, innovation had a wide understanding in terms of social impact and as a cause of social evolution. And of course, social evolution, as foreseen by Marx, passes also and mainly through economic progress.

Economists made a slight but crucial change in the common understanding of innovation conceiving it not simply as a contextualisation of an invention but as a commercialization.

The relationship between economics and technology intended as a novelty carrier could be seen as quite recent one. As noted by Godin, *“the study of economic*

¹³ Godin, p.30.

¹⁴ Op. cit., p. 31.

change is not a fundamental concept in economics, as culture change is in anthropology or as a social change is in sociology. Change really got into economics with the study of technology as a cause of economic growth”¹⁵.

Although Schumpeter is the one usually indicated as the main father of innovation, it is also true that most of his developments were achieved on the basis of previous work, particularly the ones of Tarde and Maclaurin. Especially this last one defined in specific terms the different stages of an innovation process from which Schumpeter gained his hints.

From both these two authors, anyway, came the push that has driven innovation through a mere economic track. Innovation shifted its attention from social and cultural development coming from different sources, towards economic profit depending on technological (initially also technical) progress at several stages of the production process. From another perspective innovation passed from being intended as an individual unpredictable talent to an organized, planned research structure.

Nowadays, for a series of reasons that go across economic developments, cultural changes and specific policies, “the measurement of innovation concerns innovation in firms only”. Innovation in this sense goes along with a specific economic model, i. e. neo-liberalism, that defines its traits in a determined way. Innovation then is the symbol of an era, or historical period, that focuses on *efficiency* in economic terms. Paraphrasing Gramsci or Lukács, the relation between the production process model of an historical period and its social (cultural) structure are always strictly intertwined. As correctly shown by Schön, “*innovation came to be seen as the instrument of growth and growth as the occasion for and the object of innovation*”¹⁶.

All this historical investigation had two main aims. The first one to understand if there were some other, wider or different, understandings of innovation, and the second one to match the current developments of innovation with its original, better say theoretical, intention.

The outcome seems to be quite clear. If on the one hand is possible to detect throughout history a different and wider perspective on innovation, one that enhances the social and cultural aspects and outcomes, on the other hand, we manage to extrapolate a sort of key-word underlying the recent economic developments of innovation, the one of efficiency.

At this point, considering these two aspects, and taking into account how innovation

¹⁵ Op. cit., p. 32.

¹⁶ Quoted in Maesschalck & Lenoble (2003).

seems to be not efficient (in economic terms), to understand whether maybe it is exactly that cultural side and an unbalanced relation with it that contributes to this inefficiency.

2.1.1. Current understanding and limits of innovation

To speak about a general theory of innovation seems to make little sense for several reasons as suggested by Moldaschl: *“The primary objective here is not to explain the drivers and logic of innovation (if such do exist), or to predict the course of technical, social and socio-technical change, but rather to grasp and explain the relative capability and achievement of social entities (organizations, regions, countries, persons) when dealing with drivers of change”*

At the same time though, to describe and define a theory of specific innovations doesn't seem to go further for the same reasons. An innovation *per se* could be embodied in so many different things that it results impossible to face them in one same way. Innovation, as we seen, is about novelty, or as a definition would sound, is about mixing different factors coming from different fields in a completely new way. Besides, the level of combination and displacement contributes to define if innovation could be considered radical (disruptive) or incremental. Accordingly to define a theory of innovation seems to be too ambitious to be correct and at the same time an analysis of all innovations appears an endless and ineffective operation. What we could do instead, is maybe to draw the lines of innovation within technological domain and connect it to the current understanding of it within RRI.

All the previous analysis shows that nowadays innovation represents the marketization of an already existing process or product¹⁷. Ironically we could say that innovation represents itself an innovation, or at least a new understanding of it.

Thus, this simple consideration paves the way to many important consequences in order to assess innovation and to propose some alternatives. A first one could be the fact that innovation, as it is commonly conceived, represents only one aspect of a larger frame. Being then considered as the only possible acceptance surely casts some shadows in being genuinely addressed. However, without the need to reject this market declination we could at the same time affirm the possibility of its modification or enlargement. Innovation, though it appears to be strictly connected to technological innovation, cannot be conflated to an understanding where

¹⁷ M. Moldaschl, 'Why Innovation Theories Make no Sense', *Papers and Preprints of the Department of Innovation Research and Sustainable Resource Management (BWL IX)*, Chemnitz University of Technology No. 9/2010. http://www.csiic.ca/PDF/WP_2010_09InnoST_eng.pdf.

technology is a product/process that must be only profitable. If a merely profit-driven innovation has shown to be potentially counterproductive is because innovation has many different direct and indirect layers that require a larger structure of development. We can't further neither the discussion on the normative basis of economies as layers directly connected to it, nor the multiple layers on which an innovation could and should occur due to the objective of this document. It is nevertheless important to understand how most of the problems with innovation come not from the concept itself but from its reductive understanding that it also a reductive understanding of economy itself.

There are many other areas or frames where an innovation could occur and, furthermore, an innovation, for to be efficient and therefore successful, has to be conceived as a general development, not a single one. It's not one side of the normative structure on which societies are built that can be privileged against the others, because other normativities will raise their claims against it.

Lets try to sustain our hypothesis through wider definitions and deeper depiction of what innovation is.

Although the acceptions provided in the last years on the concept of innovation, without affecting the main core of a common understanding, are more or less different just in terms of words, it is still important to briefly highlight some implications contained in those definitions. One of the most articulated is the one provided by Jeroen van den Hoven when he defines innovation as *"an activity or process which may lead to previously unknown designs pertaining either to the physical world (e.g., designs of buildings and infrastructure), the conceptual world (social and legal institutions, procedures and organization) or combination of these, which – when implemented – expand the set of relevant feasible options for action, either physical or cognitive"*¹⁸. This definition highlights the 'multiverse' nature of innovation in terms of products and areas. As correctly noted by van den Hoven, although innovations usually "concern technical artifacts or technical system, [...] they are not limited to the material domain, - and therefore they – allow us to do things we could not do before, or allow us to think about things we have not thought before" (Owen et al., 2013).

It appears already interesting for the level at which it is going to affect a wide range of people. If an innovation would have been something concerning only a mere material object it could have been eventually bypassed. Some material innovations

¹⁸ Owen et al., (eds.) (2013), *Responsible Innovation. Managing the Responsible Emergence of Science and Innovation in Society*, Chirchester, Wiley 2013.

haven't changed our life in such a radical way to require a thicker embedment. An innovation that changes our conceptual frame on the contrary, always calls into question for an active participation by the largest number of people potentially affected. But assuming a large participation doesn't represents a condition of legitimacy in the sense that participation has to be freed by potential ideological stances and therefore requires a level of reflexivity that can provide not only its necessity but also its sufficiency. In this sense the kind of participation that this definition implies is a thick one. If an innovation, moreover, affects our actual thinking framework then it will be exactly that frame that we will have to pass under judgment. Following these two definitions and their implications we already see the path we might need to follow. But lets not put the cart before the horses and lets try to focus on the structure of innovation.

In order to connect these definitions of innovation to a broader and deeper frame, we need to go further on analyzing the structure of innovation, to try and understand its traits, tendencies and nature.

After that, we should be able to see if there is an intrinsic mistake or it's just an instrumental manipulation of innovation that makes it so specifically focused.

As described by **Aygen Kurt & Penny Duquenoy**¹⁹ there are at least four different, though interlaced, characteristics that we should keep in mind when we consider innovation:

INNOVATION STRUCTURE
<ul style="list-style-type: none">• Systemic character of innovation.
<ul style="list-style-type: none">• Collective roles innovation actors - innovation activities in organisations (e.g. firms) depend on external sources.
<ul style="list-style-type: none">• Hence innovation activity occurs in a system where several different actors play a role.
<ul style="list-style-type: none">• Firm is the key innovator – its survival depends on its capacity to adapt to changes in the external environment and to influence it (Freeman and Soete 1997).

Table 1. Innovation structure, Aygen Kurt & Penny Duquenoy

Innovation has a systemic character in the sense that it tends to occur on a regular base. Therefore it requires a particular attention as a constant phenomenon. It is also true that innovation affects a system composed by different actors and therefore has, and has to be seen from, mostly a pluralistic point of view. Although it

¹⁹ Presentation given at "ICT that makes the difference", Bruxelles, November 2009.

has been lately reduced to this side of its implementation, we are not sure we could agree in considering innovation in its ‘firm’ reduction. Innovation is developed in research of all kind and doesn’t have to be reduced to a firm. It is true that firms’ survival depends on their capacity to innovate but we could say that the other way round is equally true.

According to Kurt & Duquenoy, the structure of an innovation system is always based on elements, relationships and processes, but these systems could vary according to the specialization, the institutions and routines, or the mode of innovating.

INNOVATION	
Structure (common)	Operation (different)
Elements – institutions and organisations with a focus on firms	Specialisation – what they do
Relationships – focus on inter-organisational networks	Institutions and routines – how they operate
Processes – focus on interactive learning	Mode of innovation – how they innovate (e.g. integrated or isolated?)

Table 2. The structure and the operation of Innovation system

For the two authors then, a further division of innovation structures, according to the institutional frame they are embedded in, could be provided, following Schoser (1999):

	<i>Directly involved with the innovation process</i>	<i>Indirectly involved with the innovation process</i>
Informal institutions	Informal cognitive and behavioural patterns in the innovation process	Cultural and historical factors
Formal Institutions	Innovation network in a narrow sense	Formal institutions in the background of the innovation process

Table 3. Division of innovation structures according to institutional frame

This is more or less the general structure of innovations, the way they generally proceed and the frame in which they are embedded. This helps us a bit to understand innovation in its structural frame but doesn't still tell us a lot with regards to its dynamics. We need then to understand in which way we should define our enquiry not only in a spatial mode but also in a time one.

The analysis provided by **Jack Stilgoe** on innovation²⁰ makes a bit clearer what the most common questions in this sense could be, and why there is such a strong need for framing innovation in a different way. The problem that often seems to be connected with innovation, if we would like to talk about it in ontological terms is its lack of reflexivity or, better say, its avoidance of ethical reflexivity.

Stilgoe lists the following 'normative' issues in order to detect if an innovation process is conducted through a reflexive attitude or, on the contrary, lacks it.

He divides innovation in three layers, namely the products of innovation, the processes that are carried out and the purposes for which are started.

The questions are the following:

What are the products, the results of innovation?

How the research process is started and pursued?

What are the purposes of innovation?

WHAT	HOW	WHY
<p>Products</p> <ul style="list-style-type: none"> • What are the likely risks and benefits? • How will the risks and benefits be distributed? • What other impacts can we predict? • How might these change in the future? • What don't we know about? • What might we never 	<p>Processes</p> <ul style="list-style-type: none"> • How should research and innovation take place? • How should standards be drawn up and applied? • How should risks and benefits be defined and measured? • Who is in control? • Who will take 	<p>Purposes</p> <ul style="list-style-type: none"> • Why should this research be undertaken? • Who will benefit? • What are the alternatives? • Who gets to decide?

²⁰ Theoretical Workshop held in Paris, April 2013. The PPT is available at the following address, <http://www.great-project.eu/>.

know about?	responsibility if things go wrong? What if we are wrong?	
-------------	---	--

Table 4. Layers of Innovation (Theoretical Workshop held in Paris, April 2013, analysis provided by Jack Stilgoe on innovation).

All these questions (that we could call normative) should help, according to Stilgoe, to understand the complexity of potential consequences implied by innovation. Furthermore, they should provide an ideal, though starting, reflexive background in order to define those same consequences and most of all the responsible actors. What Stilgoe tries to bring to attention is exactly that normative side often connected with innovation.

Although it provides a wide range of questions it seems a fundamental table in order to unveil the structure of a research process and define how the decision-making process is managed.

Such a reflexive frame seems then to be a necessary condition in order to avoid certain recurrent and endemic phenomena that could fossilize in to what Stilgoe calls “pathologies”.

In fact, according to Stilgoe and to other authors that he cites, a series of consequences are already embedded in innovation itself when not developed in a ‘reflexive’ way.

Pathologies of Innovation
<ul style="list-style-type: none"> – Late lessons from early warnings (EEA) – The dilemma of control (David Collingridge) – Systemic risk and normal accidents (Charles Perrow) – Technological lock-in (Paul David) – Myths of techno-fixes (Dan Sarewitz) – Altered nature of human action (Hans Jonas) – Organised irresponsibility (Ulrich Beck) – Expectations and Imaginaries (Brown, Hedgecoe, Jasanoff, Wynne et al.) – Deficit models of publics (Brian Wynne) – Society as a laboratory (Krohn and Weyer)

Table 5. Pathologies of Innovation

If on the one hand we could definitely agree with this list of pathologies and we could also understand the importance of enacting a reflexive process in order to try

to avoid them, on the other hand we are not sure that we could share the same understanding of reflexivity that Stilgoe adopts.

Indeed, if he rightly point out the necessity of a reflexive process within and on innovation, the way in which Stilgoe defines the reflexive frame of innovation resembles a common understanding of it. Innovation is considered to be a process that should be warned or saved from risks and, accordingly, the kind of reflexivity that is felt to be required is one on calculations of potential harms and eventual responsibilities. This layer of question represents a fundamental one but at the same it is only the basic one. To assess innovation consequences in terms of risk could lead to the same point where most of the problems start, the one where responsibility is reduced to the assessment of risks and their eventual compensations.

For now, what we understood and what assumes a fundamental role, is the fact that innovation can be handled in an ethically free way or conceive ethics in a really narrow way. Accordingly, the first step is to understand how innovation requires a kind of reflexivity that implies logically a large participation. What is not clear is how to enact this participative reflexivity and, most of all, what does it mean.

To accomplish this ‘action side’ of our investigation, the depiction provided by **John Bessant**, (Owen et al., 2013) helps us in discovering four possible dimensions of innovation on which we could act. According to Bessant, innovation is formed by, and consequently we could modify, the product, the process, the position or the paradigm. As explained by the table 6, innovation is set in motion by means of certain conditions (paradigm) that affect its process and consequently both the products that will be offered as the place in which they will be offered.

We can’t change the products in the sense that they are independent from guidance as technique in itself. The context is the one giving the last word on innovation and it’s usually rationalistic foreseen instead of being asked.

INNOVATION	
Product	Changes in the things (products/services) that an organization offers.
Process	Changes in the ways in which products and services are created and delivered.
Position	Changes in the context in which the products/services are introduced.
Paradigm	Changes in the underlying mental (business) models which frame what the organization does.

Table 6. Means of setting Innovation in motion.

According to this table of innovation, wanting to change something in the current innovation structure implies to act on one of these layers. If we look at them from our perspective, one aiming at establishing an alternative conception of responsible innovation, then the choice becomes much narrower. More precisely, we can easily see how all these stages of an innovation process are strictly intertwined/connected and therefore taking into account one implies to question also the others. And it is also true that all these layers are not synchronic but rather diachronic. For it would be more sensible to act at an earlier stage in order to influence the other points. It is also true that they kind of assume a hierarchy due to their own purposes. As we will see after, the position assumes a particular and illuminating role.

This idea seems to be logical and therefore correct for many, connected, reasons. Lets imagine, for instance, that we have an innovative product that can't be really described as an example of responsible innovation, a product that brought bad consequences or turned out to have negative side effects. If we'd analyse the product we would acquire only the existing outcomes and the only thing we could detect is what the people have rejected. But the products would be already there and the damage as well. Moreover a product, a technological product in our specific case, often cannot be foreseen in the sense that technique and its development cannot be predicted neither blocked.

The GMO example shows us exactly how a rejection *ex-post facto*, although helpful to set in motion a reflexive process, doesn't really solve the problem. This way of coping with potential problems doesn't tell us more than what we already can see, a sort of tautological analysis.

At the same time analysing the product side of innovation doesn't make us advance in our investigation. It would be only a never-ending quantitative data collection of what is considered to be bad or what brought in actual terms negative side effects. It represents a perfect starting point only to understand what is hiding behind the success or failure of a product, and this leads us exactly to analyse a different stage of innovation.

What we can act on is not then the product itself, but what facilitates innovation, its condition of possibility.

Going deeper in our understanding of innovation shows us in fact that analysing a product implies automatically calling into question the entire process that made possible to create such a product. This upgrade allows a more general analysis on how the research process is conceived and managed in order to understand what are the procedures that structure the product creation. Innovation will flow no

matter what we do; the point is not to block it but to structure it.

And continuing along this path it make even more sense to analyse the underlying paradigm that forge innovation processes. In fact, it is true that it is the process that in practical terms contributes to define innovation according to certain criteria. But it is also true that the process is already present in its complex structure. Therefore, it doesn't seem to be sufficient to act on one point within the process cause others will stay the same creating only confusion when not even paving the way to ideological exploitation of tools. Besides, the criteria according to which we could decide where to act and in which way would appear at least arbitrary and potentially ineffective.

Accordingly, we need to go deeper and analyse the paradigm underlying innovations This could be done only through means of a normative background against which we could compare correspondences and discrepancies. It goes without saying that this normative background is not an arbitrary itself, but rather is inductively gained by the current situation and some basic assumptions that are not at all narrowed in an ethical dimension. As we showed before, an innovation that throws products on the context quite probably will encounter several complicated problems. In this sense our normative background will be one that won't settle any precondition but the one of opening the frame for new conditions.

Without going to far in our analysis we could easily detect the differences in paradigms, namely *"the underlying mental models which frame what the organization does"*, according for example, if they proceed following avoidance of risks or if they are more concerned on the social effects that can occur with an innovation. Therefore, acting on those paradigms implies to set a different development of innovation process and, consequently, but not necessarily, the creation of products that could have at least less counter effects on the contexts.

If it is clearer now why it would be more sensible to direct our efforts on one side instead of the other it is not clear at all in which way we could or should do this. Our idea is that the 4 layers of innovation, are different moments of the same process and most of all the same frame.

As largely agreed (O'Sullivan 2008, Godin 2008), what innovation requires and what makes it different from an invention, is surely its relation to a context where the specific innovation will be adopted²¹.

Furthermore, an innovation, doesn't assume a creation but simply an original combination of existing materials, or the application of existing novelties, and therefore can be better assessed and discussed than a completely new invention. This could also mean that innovation can be changed and handled along a time line.

²¹ D. O'Sullivan, L. Dooley, *Applying Innovation*, Sage 2008

But, being innovation strictly tied to a context where it finds life means that it's exactly from a context perspective that we should depart. The product of an innovation tells us that the context is perfectly able to reject it or to accept it like it happened with famous cases as GMO or nanotechnologies. The problem then appears to give the context a stronger role in the innovation development. Accordingly then, changing or modifying innovation means to radically change our perspective. But the current perspective seems to take in little consideration the context reaction to an innovation at least in planning terms. What is felt to be necessary is just a technical or management exploitation of the process that could lead innovation to be more and more profitable. What is actually pursued is the development of a theory of innovation able to increase profits or technical progress. But, as shown by Moldashl (Moldashl 2010), to think about a theory of innovation makes no sense. Innovation in itself involves too many different aspects and fields that if conceived only in economic terms, it becomes impossible to develop a common structure. Innovation, too often reduced to economic innovation in Schumpeterian terms, implies the possibility of a social progress that cannot be conflated to an economic profit. What we need to think instead is, according to Moldashl, the contextual primacy that every innovation involves and therefore its normative outcomes.

In this sense we need to act on the innovation frame, on its paradigm and process, in terms of enacting and enhancing the context participation.

Applying this alternative understanding of innovation in research we can already obtain a main methodological, though formal and just scratched, way of how to proceed in our investigation. Innovation is too often reduced to its economic, Schumpeterian acceptance and tends to ignore what the context or privilege the acceptance of innovations instead of their acceptability. The latter implies a normative stance that turns out to represent a key-issue for innovation. In order to then modify this understanding we need to act on the earlier phase of innovation, the paradigm underlying its process and we need to do it in direction of the context. This will help us to overcome the limits in terms of logic, ethics and practice under which innovation seems to be caught.

But, in order to overcome those limits, we still need to consider and tackle a lot of different aspects. In fact there could be several ways of taking into consideration the context and be attentive to its normative dimension. That doesn't mean that they all have to be good. We will see how problematic this could be.

Before applying our hints to responsible innovation in research then, we need to fill the form with some contents, or better said, to extract other core problems at the heart of a new, effective conception of responsible innovation. We will try to

accomplish this attempt by taking briefly into account responsibility and some suggestions on how it could be conceived. Then we will delineate what is the underlying problem that we should consider if we want to modify paradigms of innovation in order to think of an alternative frame for RRI.

Lets recall briefly the conceptual complexity coming from the **responsibility side**.

2.2. Responsibility

Although is often conceived and reduced to a single acception, responsibility is a concept with a wide-range of interpretations and acceptions, depending on the context, historical period, and timeline we take into account.

We believe it is important to highlight some of them in order to draw out some indications from specific understandings or misuses of the concept.

Nicole Vincent, recalling Hart's explanation, lists six different possible acceptions of responsibility detectable in the actual scenario²². **Capacity, causal, role, outcome, virtue and liability** exhaust, according to Vincent, the possible differentiations of responsibility. This list appears interesting if we want to consider it from our complex understanding of responsible innovation.

In fact, this shows us already how responsibility, far from being only a legal term, turns out to be a complex matter implying several issues. It could be seen as a simple mechanical understanding of causes and effects. Or it could be intended as a matter of role assumption or ascription. It is true that there are lots of simple cases where these two perspectives represent an unavoidable aspect of responsibility. Therefore tools like risk assessment or technology assessment can still represent necessary means in order to determine figures and facts.

But, beside those, we find also other deeper and ambiguous sides of the concept. Although the understanding of virtue offered by Vincent seems to be reduced to the mitigation or not in some ascription of fault and therefore still within a legal frame, the 'virtuous' acception of responsibility puts us on a complex but interesting path. Virtue doesn't seem to be reducible to some kind of clear measurement. How can we in fact measure a virtue? It appears evident that forms of judgment other than rationalistic ones should be considered.

For **Ibo Van de Poel** on the other side, what is important to assess is the distinction between a backward perspective and a forward perspective of responsibility (Vincent et. al. 2011). Here we find an important aspect of how responsibility

²² Van de Poel, Ibo, Nicole Vincent and Jeroen van den Hoven (eds.), 2011, *Moral responsibility, beyond free will & determinism*, Dordrecht, NL, Springer.

changes according to the time it involves/affects. This points out at the width of consequences of innovation and therefore asks for an enlargement of potential actors affected and that need to be accordingly involved.

However, if we connect it to the knowledge level of risks we see how this differentiation could be implemented. First of all, it appears difficult to clearly distinguish between a backward and forward perspective as this means putting together different kinds of responsibility. An insurance-based model that might focus on the future, trying to quantify consequences appears to be different from a reflexive one that still concentrates itself on the future. Although they share a kind of attention towards the future, they don't seem to be equivalent.

Anyway, this takes in an articulation of epistemic tools in connection with risk knowledge that will be faced in a further moment.

In general terms, every dualistic conception that divides spheres of responsibility tends to fall in the same conceptual mistake that we underlined previously. Responsibility has several layers with different depths. To isolate them could be a theoretical exercise in order to understand or define traits, but it cannot neither be extended or crystallized in a wider proposition, nor applied in a practical domain. Instead of dividing spheres of responsibility we shall think of understanding how they are all part of one, wider conception. This statement is clearly shown by Gorgoni when he traces the history of underlying principles within responsibility.

If we consider his depiction, responsibility could be understood as a concept differently shaped according to a leading principle underlying its history throughout the last two centuries.

He manages to depict a summary of different acceptions of responsibility that turns out to be really interesting under the light of our inquiry.

Responsibility: paradigms

Coexisting paradigms of responsibility: accumulation and not substitution (both from a theoretical and historical perspective)

Scheme inspired to Ewald (1996, 2001)

Paradigm	Guiding Principle	Criterion of ascription	Mean of realisation	Dimension	Orientation in time
Responsibility (XIX century)	Fault	liability	sanction (process)	individual	retrospective
Solidarity (XX century)	Risk	damage	compensation (insurance)	systemic	prospective
? Safety ? (XXI century)	Precaution	responsiveness	participation (deliberative fora)	collective	prospective

Figure 1: Responsibility : paradigms (G. Gorgoni GREAT “Kick-off Meeting” Brussels)

This table shows us a perfect example of how responsibility should not be too strictly tied to one context failing in being useful for all the others. What is highlighted here is how responsibility has been conceived according to historical developments in terms of guiding principle, epistemic tool, orientation in time and dimension. This last one adds to van der Poel’s time-focus a space side that appears really interesting. Responsibility, according to a generic understanding, can be seen and developed as an individual matter, where one is responsible for x , and/or thought in collective terms where ‘we’ is intended as some kind of general entity. Gorgoni explains how the usage and understanding of responsibility has changed according to the historical period. Although we could move some objections on some of his matches, we largely agree on the shifts occurred and the consequential developments.

There are two connected aspects that we consider to be interesting and prove our hints. The first concerns the mean of realisation for that RRI requires an effort in enlarging participation. In order to assume a responsibility process we need to favor participation. Of course the question on how to promote this aspect and most of all how to assign it the necessary and sufficient thickness is a matter that we will face at a later stage.

At the same time, and this is the second consequent aspect, the dimension of

responsibility expands also into a collective one (environment, globalization, etc.). Although we do agree on this evolution and its complementarity, we still believe that a plural perspective could/should be more taken into account. What individual and collective responsibilities seem to lack, given some kind of emptiness embedded in both alternatives, is a strong reference to differences in normative sets. If on the one hand individual responsibility is for obvious reasons reduced to an ascription of fault, on the other collective responsibilities appears as an empty frame. They both share some sort of universalism where the former one is based on a rationalistic perspective on human intentionality, and the latter one to a universalistic perception of human ends.

One of the most tackling issues in the responsibility frame is exactly the one of finding a shared platform for clashing views and normative backgrounds and this cannot be associated neither with a mere individualistic perspective nor to a generic collective one.

If we match these two aspects it is easy to see how responsibility then has to be considered under a pluralistic light, taking into account all the different actors potentially involved. It means also that the only mean by which we can and we must develop RRI is participation. What is explicit also in Gorgoni's explanation is the fact that these sides are, and should be, considered as an accumulation and not as a substitution. As stated previously, we agree with this conclusion although it has to be better defined and articulated.

However, Gorgoni doesn't offer more than this interesting depiction. He doesn't tell us more on practical solutions in order to achieve this state of things, and he doesn't define the problems connected with a formal development of responsibility. It is true that principles could and should be conceived in a complementary way, but at the same time they cannot be adopted freely according to some casual choice. They have to be structured in a logical frame that determines the right tool for the right issue. Moreover we need to act a more radical reconsideration of future looking responsibility and not to reduce it to a probabilities calculation.


Besides, the problem of effectiveness related to means and tools is not sufficiently developed. The only fact to conceive participation within research as a necessary condition doesn't guarantee in itself the effectiveness of that participation, as it could be just placed in a research process as smoke and mirrors²³. Furthermore, we will see how is exactly this kind of ideological exploitation of ethics that needs to be

²³ We will engage later this particular aspect of "thick participation" connected to ideological manipulation.

detected and contrasted.

Armin Grunwald is perhaps the one, together with Jack Stilgoe, who provides a more articulated and interesting analysis of responsibility. Although a real philosophical explanation and normative justification is still lacking, we find interesting hints for our construction. According to Grunwald we have three constitutive layers of responsibility:

Constitutive dimensions of responsibility



- **Empirical dimension of the actor constellation:** who ascribes responsibility, who is made responsible? Distribution of responsibility, relation to the „governance“ of the respective field, stakeholders, people concerned or affected. Questions of power and exerting influence.
- **Ethical dimension of the criteria what is regarded responsible:** Criteria of responsible action, solving moral conflicts by ethical reflection, reconstruction of ethical patterns of justification and argumentation (e.g. ethics of responsibility by Hans Jonas)
- **Epistemological dimension:** what is known about the respective field (chances, risks etc.) and what can be said about the quality and reliability of the knowledge? Knowledge, uncertainties, possible scenarios of future development, possible risks

14 Institut für Technikfolgenabschätzung und Systemanalyse

Figure 2: Constitutive dimensions of responsibility (the “Methodological Meeting” Paris)

This last understanding resembles the analysis we tried to offer previously. Without functioning as an explicit critique of current models of RRI, it tries to offer a more descriptive distinction of issues related to RRI. In this manner, it puts us on the way of intending how responsible innovation implies a pluralistic dimension where different normative settings and interlaced influences come across. As we can see, the tree layers have in common the same basic issue. How shall we conceive RRI considering that we need to take into account different normative settings?

Grunwald's descriptive perspective seems to imply that a top-down, rationalistic, a priori approach is the main polemic reference if we want to develop an epistemologically correct, ethically right and practically effective structure of RRI.

However, it doesn't seem to push the analysis further, describing or proposing in deeper terms what a solution could be. Besides, his empirical domain seems to comprehend many issues that should maybe be placed or tackled separately.

This apparent confusion and the consequent lack of proposals suggests a wider though blurry underlying critique. What Grunwald seems to be interested in is the possibility always present of exploiting responsibility within innovation processes by power-holders. The empirical, ethical and epistemological layers are all clearly targeting power and its manipulation effects from different sides. If this evident in the Empirical dimension when he highlights the role of power and influences, it is also present in the other two where he questions the authority of criteria selection and knowledge reliability. In other words, Grunwald is mainly concerned with the veil of ideological exploitation that ethical matters always carry especially if strictly related to economic issues. And we think he is right in focusing our attention on this fundamental aspect inherent in responsible innovation.

These questions pose us in front of an issue that we shall be able to connect to what already previously suggested, that is, how can we settle a dimension of participation that can be considered not ideologically exploited?

What we have understood from this brief reconstruction is the fact that even if responsibility is basically handled as an external monolithic object that could be ascribed and assigned, there are different and more complex layers within the single concept. Responsibility, far from being reducible to its legal or economic frame, contains several different nuances according to its time line, its space matrix and the capability of being humanly understood. We saw that a clear distinction between these layers cannot be drawn unless specific, small cases. It was automatic to assume that responsibility involves a greater participation, as it seems to involve different dimensions and actors. We also highlighted that intending responsibility in participatory, pluralistic terms doesn't represent a sufficiently developed conception because it could always incur in the danger of being exploited by some power influences.

What we need now is to understand what are the reasons underlying the current reduction of responsibility in order to search for an alternative.

Lets then pass to a more theoretical layer in order to look for a potential alternative understanding of responsibility that could merge with what we already highlighted

and that could engage with a reductive concept of it.

2.2.1. Accountability or Responsibility?

If we want to understand what a common presupposition underlying all these different acceptations of responsibility is, and how we could develop an alternative one, we need to briefly recall what **Paul Ricoeur** has lucidly depict as a puzzling and therefore interesting conception.

According to Ricoeur²⁴, on the one hand the concept of responsibility *“is well fixed in the classical juridical tradition. In civil law responsibility is intended as the duty to repair a damage, caused by someone’s own fault and in the terms foreseen by the law. In penal law the duty becomes the on standing the punishment”* (Ricoeur 2007). On the other hand, the proliferation and dispersion of acceptations in its actual understanding make responsibility a wider conception taking into account a grey area that calls for issues far beyond the mere juridical frame.

However, Ricoeur show us how the ancestor of responsibility, imputability, has played a major role in the recent developments. Thus, imputability has in its understanding and definition the reference to a bad action, a fault, for which someone is accounted. But what was still present in the 18th century and that plays a fundamental role in our analysis is the fact that at that time imputation preserved the other acceptance of attribution to an agent. This second one calls in for all those kind of actions that are not directly sanctionable or punishable. What happened after, considering that still Kant up to a certain point kept them together (antinomically), is well explained by Ricoeur. He put in evidence the slight but decisive shift that has occurred first with Kant and his ‘critiques’ and later with their interpretations by Kelsen, where the strict connection between a more epistemological or cosmological attribution of an action to a specific subject, and the juridical moralized one, where the action is accounted on a subject, was lost in favor of a conflation of the former on the latter.

“This process of disposal, basing itself only on Critique of Practical Reason, falls, in Kelsen, for instance in his “Pure Theory of Law”, in a total moralization and juridicalization of imputation. At the end of this process, we can affirm that the idea of accountability (of a fault) has supplanted the one of attribution (of an action to its agent)” (Ricoeur 2007).

Ricoeur goes on explaining how a different path has been taken by several authors, following Strawson’s ascription theory. The most known in the current debate on RRI is surely Hart’s one.

However, Ricoeur is extremely lucid in describing the developments and the potential implications hidden in an understanding of responsibility in terms of

²⁴ Ricoeur, P., (2007). *Reflections on the just*. Chicago: University of Chicago Press.

accountability. Taking into account civil law, Ricoeur shows that speaking of responsibility as the duty to repair the damage paves implicitly the way to a *responsibility without fault*. The latter has been thus replaced by concepts like *“solidarity, security and (most of all) risk, that tend to occupy the place previously held by fault”* (Ricoeur 2007). This replacement that at a first glance seems to represent a positive development of responsibility, hides in reality a deeper shift that occurred already at the end of the 19th century. The law promulgated in 1898 in France over work accidents was probably the first official document where the accent has been shifted *“from an individual management of fault to a social management of risk”* (Ricoeur 2007). What was crucial was exactly how the stress placed previously on the agent causing the damage was then put on the victim and on the consequent damage that needed to be refunded. *“The settlement of a compensation system, at the same time, automatic and forfeit, translates the need of having insured a compensation in absence of a blameworthy behavior”* (Ricoeur 2007). The displacement of responsibility as an ascription in favor of the calculation of risks changes also the time frame in which responsibility is then placed. All these factors taken together create a really dangerous situation where the absence of fault transforms responsibility from the ethical company of every decision made by an agent in the frame of solidarity to a fatal and anonymous event that could endanger the security maintenance. *“If the victimization is aleatory, also its origin tends to become it, according to the probability calculation that situates every occurrence under the sign of fate. Once disconnected from the problem of decision even the action can be seen under the sign of fate, that is the exact opposite of responsibility”* (Ricoeur 2007).

It is not solidarity the main frame in which responsibility or accountability is then placed but rather the one of security ending with conflating responsibility to accountability and this to an economic calculation of risks and damages. *“At most, at the end of an evolution in which the idea of risk may conquer the entire the entire space of right of responsibility, it would subsist simply one obligation, the one of insuring from every risk!”* (Ricoeur 2007).

We won't go on explaining the different possibilities useful to modify such a reductive and distorted understanding of responsibility as here its importance has to be seen under the light of our specific issue, the one of responsible innovation in research. However, it's important to underline how responsibility is currently reduced to accountability and what are the tools used to enhance this understanding and the problems that we need to face.

Reducing responsibility to its legal or economical side means to remain in a one-sided dimension of normativity, either the legal or the economical one. Therefore the norm and its construction are still somehow imposed through means of evacuation of contents and accordingly, context. Furthermore the entire process

connected to accountability avoids any reflexive turn as well as a free participation.

The problem here appears the one of tying the question to a compulsory approach that remains still in what we might call a top-down approach. If we take into account the GMO problem that puzzled (and still is at stage) EU in the last years, it will be easy to understand how limited could be an approach that tend to solve issues in such a way. All the main difficulties rose exactly from those areas which let no possibility to be formalized in legal terms but that still reveals themselves to be fundamental in order to preserve and promote autonomy within societies.

If we have to delineate in current terms what already suggested in theoretical terms on responsibility, it would be important to go beyond all these useful and correct taxonomies and reduce the main distinction criteria to a negative/positive perspective.

Briefly, a perspective we think could suit the assessment of current practices, is one that conflates responsibility onto some sort of risk assessment and that therefore assumes a negative perception for researchers or actors who are supposed to take on responsibility. Accordingly, if we consider responsibility as an add-on load that we will place as a safety harness, the whole project of building an effective conception of responsible innovation would be vain. In fact, the actual widespread risk-assessment acceptance reduces responsibility to its legal frame.

“The main objections voiced about the principles in the European Code related to the language of ‘accountability’. It was thought to be unrealistic and unfair obligation to place upon researchers and ill-suited to a spirit of open-minded and creative inquiry through research. Interestingly, the objection in certain countries, such as Germany and France, was that the term accountability was close to the juridical idea of liability, which can be defined as being charged with a legal obligation that might be enforced by private or public law” (Robert Lee, ‘Adaptive Governance for Responsible Innovation’, 2013 p. 148).

The current developments pointing towards economical compensations don’t seem to really go out from the same conceptual frame. What is it important is to avoid consequences through a process of delegation of responsibility to external and often anonymous actors, that in the end will make responsibility a mere mechanical and quantitative factor. According to this perspective, responsibility has to be conceived as an external object that needs to be allocated as far as possible.

But, for instance: *“The International Risk Governance Council (IRGC) (IRGC 2009) through multiple case studies usefully summarizes 10 deficits in risk assessment, encompassing difficulties around the gathering and interpretation 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”²⁵. In other words, “there is a demand for more than risk management, at a much earlier intersection with the innovation ecosystem. The argument therefore to go “upstream” in terms of deliberation and public engagement has become loud” (Lee 2013).

Consequently, considering responsibility in this way doesn’t manage to be effective in all those grey areas of the actual conception. Reducing responsibility to a matter of legal nature it’s an operation that avoids exactly the capacity and possibility to take into account the ethical nature of it, a nature that goes beyond a mere legal frame.

However, we think that the legal side of responsibility doesn’t have to be expelled from RRI. What we believe it would be necessary it’s to start thinking and developing a conception of responsibility that is carried on under a positive light. Responsibility has to be conceived and understand as something positive, that an actor freely and enjoyably wants to take, something that accompany every attempt of innovation he could bring to the society. Furthermore, responsibility should be seen as a process of reflection, consultation, and deliberation within a co-constructive framework. What we would like to reach is a stage where actors in general, and researchers in the specific, will be worried, concerned about their ‘environment’.

As wished by Lee, “It would have been better to have adopted notions of responsibility in the sense of requiring some reflection by the researcher in unwelcome possibilities over time, and wider debate and engagement on these issues in order to engender a sense of care and responsiveness. This doesn’t mean that there is no room for accountability” (Lee, 2013).

The fact that all consequences cannot be foreseen doesn’t mean that we don’t have to still try through enacting procedures able to enlarge our shared knowledge and therefore the level and quality of participation. *“Thus a researcher may be some way far from envisioning the technological end use of an innovative breakthrough, but is not absolved from responsibility for reflecting on where the findings might lead, or from a degree of stewardship over the research that reflects that trust that scientists might wish society to place in them”. [...] Certainly, as science has become increasingly connected with application [...] questions of responsibility have become much harder to ignore” (Lee, 2013).*

However, as we said, it is important to keep in mind not only the quantitative side of

²⁵ R. Lee, J. Petts, ‘Adaptive Governance for Responsible Innovation’, in R. Owen, J. Bessant, M. Heintz, (Eds.), *Responsible Innovation*, Wiley 2013.

participation but also the qualitative one, in order to avoid certain kind of political traps. The issue of participation, although a fundamental one, might turn up to be not sufficient in order to reach a reflective and effective process of responsible innovation. As noted by Lee, *in the UK, governmental views of this have still often been restricted to promoting understanding and debating fears around a potentially controversial technology in advance of significant application. [...] It is still about risk regulation, rather than a more vital discussion about science, values, and what society expects from technology-based innovation*" (Lee, 2013).

However, on the other side we have the core problem of efficiency that is raised every time we think about the application of RRI. One of the biggest problematic accordingly *"is around understanding how, when, and with what purpose to engage multiple stakeholders and the public. While the "deliberative turn" has now captured policy attention, certainly in the UK government narratives have too often seemed to focus on the instrumental idea of "gaining public confidence" around new technologies (e.g., HM Government, 2005) as opposed to processes of collective reflection around notions of care and responsiveness. The problem is that public engagement when done well (i.e., when it is inclusive of all key interests, is representative of the range of possible views, is well informed, allows for challenge of stated views and evidence, and is done early enough that the outcomes can effect decisions) can be time consuming (over weeks and months) and expensive."* (Lee, 2013).

Considering what we briefly showed before in regard to innovation, and connecting it to our understanding of responsibility, we see that the two sides cannot be conceived and developed separately. What we should do then is build an entire new framework, one that reads the entire process at stake in a process of hypothetical responsible innovation in research.

"Importantly, taking care has to be a collective responsibility given the understanding of innovation as involving a network of actors and actions. It is as much about the process of doing science and innovation as their products. What motivates a scientist, and with what purpose they embark on particular research is as important as how they do their work" (Stilgoe 2010, Lee 2013).

2.3. Responsible Innovation

As we have seen from the previous deliverable and from our analysis, societies are nowadays entangled with an acceleration of technological development that requires some sort of structure in order to not lose the grip on it. Innovation, development and progress are increasingly and massively modifying our lives and

our cultural framing. This general development has been changing its shape in accordance to specific mutations of different orders and cannot be anymore understood through categories that were built and drawn in a completely different time and context. Therefore we need to develop new frames, new ways and new structures by which we can understand the actual scenario.

In order to proceed towards this target we then need to follow two main steps. The first one is to try and depict what is the current situation and after attempt to eventually modify its ideologies through means of a critical analysis. If the first step has been accomplished through the theoretical landscape that described the lines of responsible innovation in research, and through the more evident depiction of what innovation means and implies, the second step needs to move towards the core of that cultural legitimation that every innovation process in research requires as a necessary condition.

The speed of technological innovation, as we seen, renders quite impossible to determine all the potential outcomes that are going to affect societies in a large scale of space and time. Furthermore, innovation in itself calls for continuous adaptations and shifts across different fields becoming too wide and disparate to be foreseen. Besides, innovation in research needs to maintain this unpredictable nature in order to preserve its main progressive role for societies.

As stated previously though, innovation tend to be reduced to its capacity of producing profit in mere economic terms and ends up by forgetting all the several other implications that it carries with. For this reason it doesn't appear strange that the legitimation structure built around it tend to be also quite reductive. The ethical but most of all political legitimation structure is in fact often conflated to some hyper-rationalistic justification that takes the form of a risk prediction and cost/benefit assessment. We understood how a negative, defensive understanding of responsibility represents the tool by which innovation is framed and the ethical responsibility is defined. It's hard to find any attempt to reach any target inspired by the spirit of a common good and how this, consequently, affects the legitimation structure built on innovation.

The shift from social struggles based on groups or classes and specific normative or determined claims towards improvements to a global scenario where everyone is potentially affected by an obscure and sinister future. The passage from an ethic of the future intended as a common good, although seen from different perspectives, to safety (either legal, economic or medical) where future is risky and danger. This change in the structures and superstructures has been clearly stated by Ulrich Beck in his masterwork on risk society²⁶.

²⁶ Beck, U. (1992). *Risk Society: Towards a New Modernity*. Transl. by M. Ritter, London: Sage.

“Class societies remain related to the ideal of equality in their developmental dynamics (in its various formulations from equal opportunity to the variants of socialist models of society). Not so the risk society. Its normative counter-project, which is its basis and motive force, is safety. The place of the value system of ‘unequal’ society is taken by the value system of the ‘unsafe’ society. Whereas the utopia of equality contains a wealth of substantial and positive goals of social change, the utopia of the risk society remains peculiarly negative and defensive. Basically, one is no longer concerned with attaining something ‘good’, but rather with preventing the worst; self-limitation is the goal which emerges. The dream of class society is that everyone wants and ought to have a share of the pie. The utopia of the risk society is that everyone should be spared from poisoning” (Beck 1992).

How this situation came to be has been exhaustively narrated and we don’t need to repeat it once more. What has to be highlighted again is the width underlying this understanding. Because it is true that these tools find their historical and conceptual roots within the fields of law and economics. *“The law, in the moment that invents the professional risk and the accidents without neither fault nor responsibility, in the moment it invents the systemic risk, [...] it (the law) renders accidents and their human costs, to say it cynically, a part of the general expenses”* (Beck 1992). And it is also true that this relation is unbalanced pending towards economic stances. By substituting the individual foresight with general insurance guarantees, by replacing responsibility with statistics the risks are enclosed more in a commercial dimension. But it is also true that, how stated by Pestre, this shift and its legitimation have been sustained by general theoretical tools. *The tools developed inside these new spaces are at the same time conceptual and general, and therefore easily transposable and translatable in concrete devices”²⁷*. That’s because the question here is not the one of assessing a specific technology and its risks but how the management of specific issues refers to an underlying ordering scheme of the world. *“This principle of rationality is a principle of world performativity, a moral technology and control, transform the unlucky accident in a regularity [...] that defines a new conception of living together, a new unit of social that refuses to refuse progress”*(Pestre 2013). And it’s easy to detect these tools in concepts like system analysis or rational decision, all tools of a greater mathematization of life. System analysis for instance, *“extends the practices of operational research and sees efficiency through the deconstruction of actions in all their pertinent parameters, through statistic compilation, modeling and game theory”* (Pestre 2013).

²⁷ Pestre, D. (2013), *À contre-science*. Paris: Seuil, p.131.

All the main references to the societal outcomes and normative acceptability of innovation are narrowed into social desirability and acceptance. It doesn't appear then unpredictable that in such a way the relationship with the so called context can be often be intended as a risk information or to say it in other words, a mere form of communication.

And it is exactly when we analyse the conception of responsible innovation in itself that we note how a reductive understanding of both innovation and responsibility, can negatively affect even positive attempts to frame ethically innovation.

We will have to develop a RRI structure that could be fit to overcome the current limitations embedded in a risk society mode. But to do so we first need to understand how this finds its concretion in the actual developments of RRI and try to see if there some of them that could help us in this attempt. So the first next step will be to depict a scenario of RRI as such in order to highlight 'new versions of the same mistake', but also to extrapolate elements that could be fruitful for a different development.

2.3.1. The problem of definitions

Apparently all the most known conceptions of RRI tend or to refer to some definition or to produce one in order to offer a model of reference for every RRI case.

All these definition aspire to include traits that are commonly perceived as fundamental within RRI. Therefore we find in literature many examples on how a RRI conception is or better say, should be.

In this sense we find definitions that although being quite different in their specific traits, tend to reach the same aim, offering a final, schematized position to which to refer. So if von Schomberg's one highlights that RRI is (or should be) a *"transparent, interactive process by which societal actors and innovators become mutually responsive to each other with a view to the (ethical) acceptability, sustainability and societal desirability of the innovation process and its marketable products"*. (von Schomberg 2012). Hilary Sutcliffe thinks that RRI implies *"trying to get better at anticipating problems, taking into account wider social, ethical and environmental issues and being able to create flexible and adaptive systems to deal with these unintended consequences"*. (Sutcliffe). And Jeroen van den Hoven believes that, *"Innovation is an activity or process which may lead to previously unknown design, pertaining either to the physical world, the conceptual world, the institutional world or combination of these, which – when implemented – expand the set of relevant feasible options for action, either physical or cognitive"* (van den Hoven 2013).

Every definition seems to be complete in the definition of what characterizes RRI and how to distinguish RRI from something else. We can note that their normative

backgrounds are explicated clearly in their statements. While von Schomberg seems to be focused on the political and communicative structure basing his definition mainly on freedom given by equal access to the public discourse, Sutcliffe tends to enlarge the reign of assessment bringing in all those social, ethical and environmental issues that accordingly should be lacking in a mere risk assessment procedure. So here the stress is placed on a common good that has to be pre-established. Van den Hoven, lastly, seems to maintain a descriptive definition of RRI. Of course, a description implying that specific and new framing will be produced, assessing somehow the difficulty in predicting them before.

All three represent a precious contribution for indicating what are main issues at stake with RRI. They all more or less, stress the fact that innovation can procure unexpected consequences, consequences that at the actual stage, with the current tools, cannot be determined. Therefore they all seem to agree on the fact that we need to implement the current cognitive and political frame of RRI. If van den Hoven implicitly admits the current impossibility of modifications, indicating only that something will have to be done, and giving a good hint on how to start intending innovation differently, Sutcliffe suggests concentrating on that cultural or ethical side that is actually excluded from analysis of costs/benefits. Von Schomberg believes is the access to the discourse that will solve the problems currently experienced by innovation processes.

However, we believe that they all represent only a partial contribution to the RRI problematic and that, eventually, they could even represent a slippery whether not dangerous development of RRI in the sense of supporting existing ideologies. This perspective is justified according to a general normative frame and can be divided in two main sub-criticisms.

The first sub-criticism is a detailed one, understanding the weak points of each position. The second one would show that a problem relies also and especially in the attempt of providing a definition (literally to set borders), operation that closes up for context-based contributions or novelties (conditions in there are necessary but not sufficient). The three perspectives are then combined by the fact that they spur from the same understanding of norms construction and from a rationalistic [(Apriori/top-down) to settle a priori the conditions means also to adopt a top-down approach to the future and especially to life in its variety, in its unpredictability.

Van den Hoven's definition is perhaps the less ambitious of the three but at the same time the more realistic. What is hinting at is the fact that is not really possible to predict outcomes of innovations and therefore the maximum we can do is to prepare to the enlargement of potential actions to take or even the novelty of possibilities. Although it is interesting the connection he make between innovation

as product and innovation as a cognitive framing, he doesn't seem to offer more than what we already know. Innovation is about novelty and its consequences are hard whether to some extent impossible to determine in advance. As we said, this indication assumes a crucial importance as an implicit criticism to current paradigms but it doesn't indicate any feasible or practical solution.

Hilary Sutcliffe's one (*trying to get better at anticipating problems, taking into account wider social, ethical and environmental issues and being able to create flexible and adaptive systems to deal with these unintended consequences*"), seems to focus on the enlargement of normative stands particularly stressing ethical and environmental issues. As we highlighted, this enlightenment appears a good path to take into account whether not a necessary one in order to provide a conception of RRI diverse from the leading ones. However, the language or the underlying paradigm doesn't appear that different. Firstly, she talks about *anticipating* problems giving the hint that the crucial side of the entire process is not to invert the tendency of mathematically assessing reality and the future, but rather *trying to get better* at it. This impression finds a further ground when she defines the practical task connected to it, that is, *creating flexible and adaptive systems*. It is quite clear that this system could and should be created post-factum in case we didn't manage to foresee unintended consequences in order to deal with them. The entire picture emerges as management of risks and negative consequences instead of indicating a structural way of constructing the process of innovation. It ends up in showing that innovation can be controlled either before, through means of risk assessment, or after by systems that can paper over the cracks.

There is also another passage in this definition that indicates a deeper concern. Sutcliffe divides ethics from environment as if they were two different things or fields. Given that environment needs to be considered as a specific domain in order to be carefully handled, it is not clear why it shouldn't be considered an ethical problem, or the other way round, why ethics is not affected by environmental issues. This understanding, reducing the space of ethics to (we suppose) humans, confuses ethics with morality (although morality cannot be really confined to human-beings, in a certain way we imagine this is the sense Sutcliffe assigned to it). But in this way, the environment, nature, assumes the traits of a mere object that we have to preserve in order to survive. It goes without saying that this demarcation goes along with the exploitation of nature for human scopes that finds its theoretical roots in the Marxian tradition of production development. However, to consider human beings as detached in some ways from the environment, to believe that human beings are not the 'Environment' themselves and therefore to make a demarcation between ethics and the environment means to miss the crucial point about responsible innovation and to remain in the same paradigm of mathematization of life. Ethics is exactly about the connections not between a subject and an object, but

between the different layers of the subjects. We can't go here into an explanation of ethics, but it will emerge along the development of our deliverable.

Von Schomberg surely provided the most articulated and dense definition. This density makes it at the same time really difficult and really easy to criticize. Von Schomberg (*"transparent, interactive process by which societal actors and innovators become mutually responsive to each other with a view to the (ethical) acceptability, sustainability and societal desirability of the innovation process and its marketable products"*) defining RRI as a process where two different subjects (*societal actors and innovators*) increasingly become (*responsive*), settles it on a interesting path. The dimension to be highlighted has to be a communicative one along a process that makes actors increasingly closer to each other. Von Schomberg chooses the responsive side of responsibility showing how responsibility embeds this communication significance, this enacting device in order to coordinate the process of innovation. However, the transparency of the process could create some difficulties if taken in its fully ontological sense. To be transparent in fact could seriously affect complex processes of research for the sake of information. But also transparency has etymologically a double meaning, the one of letting someone see and the other of adopting a perspective, a filter to see. It is not difficult to imagine that then transparency could be considered not simply neutral.

Besides, and here rise the difficulty connected with density of the definition, if the process has to also keep an eye on marketization (that is also an important side of every innovation) how could it be completely transparent? There are certain sensitive data that can't be made public in order to preserve competition and most of all labs, companies, and industries simply don't want to.

Also the social desirability appears to be a vague and therefore slippery concept, especially when connected to transparency. To consider RRI in its social desirability could mean different things. It could imply a discussion, a co-construction, but it could also signifies that innovations (!) should stick to what it is considered to be appealing (or sellable) to the people. But what if the transparency at an earlier stage makes a prototype not appealing enough cause all the developments are not understood? And what, on the other side, if a research process is socially desirable at an earlier stage but it is not at a later one? Moreover what should the consequences be if something is considered to be not socially desirable? Perhaps, it could be the case that certain kind of projects or fields won't be able to receive funds and therefore entire sectors of knowledge could go lost.

All these minor questions raise some deeper concerns, in particular three. The first one is the time dimension that seems to be lacking in this definition. There's no hint or suggestion about the different timing that an innovation process faces and with it all the related interactions. These last ones cannot be considered in the same way

without taking into account the research phase. It is quite reasonable to affirm that the further the research process goes the stronger the co-construction should be. And at the same time, at a really early stage of the process, the creative one, innovation should be better left in its own free dimension.

A second layer is a political one. What seems to be stressed here is the communication side of research. Communication and access to information represent a sufficient and necessary condition for innovation to be considered responsible. But the questions would then be several: who provides the information, in which way and with what aim? The criticisms of discourse regimes and ideologies have been carried out extensively enough for needing a resume²⁸. But assembling ethics, market and communication requires more than a simple omnicomprehensive sentence. We need to define what are the structures, the aims, and the normative background would be required.

And this last point leads us directly to the second perspective from which these definitions could be questioned for the reason that every definition could be as well. A definition is a predetermined sum of characteristics that (pre) de-fines what could be labelled as such. In the case of RRI, to provide a definition means to not take into account the dynamic and dialectic nature of RRI. As we have seen, particularly in von Schomberg's definition the time line is completely absent and this implies that the criteria are already settled. But this raises many doubts concerning the strict demarcation of what stays out and what stays in from the RRI label in terms of internal time of an innovation. But also, and most of all, implies that the different normativities are tackled in a mere procedural way. The different issues at stake in one definition (ethics, economy, law, etc.) could be clashing ones and a simple procedural structure could represent an inefficacious whether not ideological manner to cope with them. Besides, how can we define what is ethical, desirable, etc. a priori? All these difficulties make us understand that the proceduralism crosscutting every definition relies on a rationalistic understanding of normativity. If the different normative settings are already pre-established and ranked, or if they are neutralized in their vital energy by a proceduralist structure, then we loose all the significance that a norm embeds. Its power goes far beyond a mere rational compromise or adherence to rules, and that is exactly the difficulty that rises from the entire responsible innovation attempt.

One of the perspectives from which we could define the problematic outcomes of current manners of coping with responsibility in innovation processes is exactly by highlighting the relation between rationality and normativity.

²⁸ Foucault, M. (1966, 1971, 1975).

It is quite clear that in both, actual management of innovation within research and current attempt to overcome those limits, we find an unbalanced relation between rationality and normativity. There are two main sub-sets of this disequilibrium that indicates the very nature of this distortion and its limits. On the one hand we could find the preference of only one normative set at the expense of the others. For instance, and this is the actual tendency, we could find reasoning on an innovation only in terms of costs/benefits or maybe reduce it to legal terms. In this way one priority is established, either implicitly or explicitly and decisions are made within that single normative sets. So, even if some clashes are still possible, being the objective quite clear and the normative preferences more or less uniform, the agreement is easier to reach.

But, if preferring one normative set could be sometimes acceptable for specific cases, i.e. we could use the legal terms to determine legal responsibilities in some kind of innovation processes, it seems to create some difficulties in some other cases. For instance if we consider bigger innovations or the so-called radical or disruptive (in Schumpeterian terms) ones. In this case the range of potential consequences is so wide that taking into account or preferring only one side of the question doesn't seem to be simply enough. Given the example of GMO, the considerations for legal matters or economic benefits for certain purposes don't imply the understanding of other side effects that were shown to be ignoring different normative claims.

On the other hand we could take into account different normative perspectives and therefore understand one issue from many layers. But still, the problem rises from the way in which the obvious clashes are then managed. The tendency in this case seems to be the one of relying on rationalistic presuppositions where the right decision, or the last one, will be taken and accepted because rationally valid. *"The main words are operational research and system analysis, mathematization and rational choice, optimization of resources and help to decision"* (Pestre 2013).

This shows us that the common methodology by which innovation is tackled is a rationalistic one, either we find it in explicitly preferring specific (rationalistic) normative sets like the economic one, either it emerges from the decision making process that adopts a rationalistic justificatory met-level. The two layers find their common root in their way of handling norms as if they were objects that could be assessed, placed, displaced and dismissed.

We need to briefly explain why we believe that such an understanding of the relation between rationality and normativity turns out to be weak from a logical, ethical and political perspective.

2.3.2. Three layers of analysis of RRI: Logical, Ethical and Political

If we focus on RRI this hypothesis becomes quite clear. As we said, one of the common problems with RRI is how to merge responsibility with innovation given that they seem to be an antithetic concept. This is because responsibility, as we have seen, tends to be conflated to its objective and rational understanding.

One of the commonalities of quite all the approaches to responsible innovation is the fact that responsibility is understood as an object, external, that can be assigned, moved or removed. Being considered in such a way implies that responsibility can be delimited and therefore measured. To be responsible is then intended as: who is going to compensate the negative outcomes if something goes wrong? Therefore, it is not by chance that responsibility is nowadays intended as a negative factor merely connected to some legal or economical compensation (something we could say that might put us in the position to incur some debts) and, accordingly, is conceived as a factor to escape from, or to delegate to some anonymous institutions. In this way, responsibility is believed to be easily determined, assessed and assigned.

If only one single normative set is chosen, the legal one for instance, it becomes easy to determine the margins of risk and compensation enough for innovation to appear safe in its outcomes. Also from a pluralistic perspective, one that takes into account different normative settings, the capacity of rationally establishing costs and benefits appears to be the perfect solution in order to merge different aspects together through a comparative quantitative approach (if the legal normative side is respected and quantified in x and the profits are foreseen to be y , then the innovation should proceed).

This latter level of justification is usually pursued through means of rationalistic foresight or assessment. In other words, someone decides these proportions and the overall calculation determining before all the potential outcomes. The actors who will be subjected to those consequences will accept them being foreseen according to some rationalistic justification.

This kind of methodology doesn't seem to represent an optimal condition for responsible innovation given that in most of the cases doesn't help in solving the knots related to negative outcomes.

This means that this way of coping with ethical issues, in the end responsibility has a strong ethical ground, doesn't turn out to be the most effective one.

We believe that there are three main sides from which we could detect mistakes in considering responsibility as a mere risk assessment procedure.

Analysing it from a logical perspective, we can detect the attempt to determine the unknown as paradoxical. From an ethical perspective confusion between subjective and objective understanding of responsibility creates undesired counter effects. And

thirdly, from a political perspective, the rationalization of normativities turns out to be ineffective. Lets explain further these assumptions.

Stated that responsibility is in the end an ethical issue, measuring and quantifying responsibility means to reduce ethics to a sort of mathematical object. As stated by Pestre, nowadays *“the debate [...] is still being conducted exclusively or dominantly in the terms and formulas of natural science”* (Pestre 2013).

And this sort of methodology generates some problems from a **logical perspective**, when we try to understand how to insert in the ‘calculation’ unforeseen factors.

If we admit the possibility of operating a calculation of potential consequences we have to presuppose also that the unknown is knowable a priori. But this appears to be a contradiction in principles. How could we think the calculability of something that we don’t know, the rationalization of the irrational? Maybe with an x that could contain all the options. But is it really possible to determine exhaustively the value of an x? Either we consider that the future embedded in responsibility can be fully determined and therefore reducible to some sort of risk assessment or we have to believe that there is a sphere that stays out of this assessment. If we choose this second option, given that the first already showed practical limits, we can easily understand that having an unknown external space, means that also the size of this space is unknown and accordingly could be even much bigger than the size of the known one.

We don’t want to deny the importance of compensation coming out from a risk assessment or similar, either they are expressed in backward or forward terms, either economic or juridical. Justice and law restrictions are the main basis of a society, no matters what kind of modern society we are looking at. As suggested by von Neumann, *“every behaviour that is unambiguously describable in a finite number of words is computable by a network of formal neurons”*²⁹. But, at the same time, could we affirm that a space exists that falls out of those assessments and cannot be known a priori, and consequently cannot be assimilated or neutralized. Or in other words, *“is it reasonable to assume as a practical matter that our most complex behaviours are describable in their totality, without ambiguity, using a finite number of words?”*³⁰ Although we could surely say that it depends on the specificity of the case it is also true that on the other side this state of things tend to reduce the complexity of the context to manageable issues. *“The dimensions of the hazard are limited from the very beginning to technical manageability. In some circles it is said that risks which are not yet technically manageable do not exist – at least not in scientific calculation or jurisdictional judgment. These incalculable threats add up to*

²⁹ Dupuy & Grinbaum (2005)

³⁰ *Ibid.*

*an unknown residual risk which becomes the industrial endowment for everyone everywhere*³¹.

Even more, it doesn't appear wrong to affirm that the main problem connected with responsible innovation lies exactly in this obscure area. In fact, if responsibility could be calculated, it wouldn't be such a problem defining a conception of responsible innovation. But as we have seen, a problem, and a complex one, persists exactly for the fact that not everything can be foreseen.

From another perspective, an **ethical** one, being objectivized means that ethics is deprived of its subjective connotations and relegated to an understandable and knowledgeable issue (for the sake of transparency?). But then, all the other spheres that are implied in every ethical decision end up by being ignored with all the potential dangers of such a reductive conception. *"It remains unrecognized that a social, cultural and political meaning is inherent in such scientific 'immiseration formulas'. There exists accordingly a danger that an environmental discussion conducted exclusively in chemical, biological and technological terms will inadvertently include human beings in the picture only as organic material"* (Beck 1992).

But are we really sure that ethically speaking we can reduce responsibility to its rational justification considering that *"the social effect of risk definitions is not dependent on their scientific validity"*³²? Are we sure that the tribunal of reason represents a necessary and also sufficient condition to exhausts the ethic layers of an innovation? Because, objectifying responsibility, shaping it, means to shape the future, signifies to pretend to enclose all the energy, the power, coming from life itself and its unpredictable manifestations and combinations, in one narrow box. This implies that, all the processes connected with responsible innovation, that tend to have sooner or later repercussions on the subject (in the end it wouldn't make much sense to speak of responsibility if actors weren't directly or indirectly involved, in this sense the etymology of the word could tell us a lot about it), can be conceived in mere terms of compensation. But then, if we accept this, and given that ethics appears to embed more than its objective side, the effects of those same processes, of innovation to make it clear, will manifest themselves reifying subjective matters, or even ignoring completely them. As showed quite clearly by many authors (Adorno & Horkheimer, the Marxian tradition going from Lukács to Honneth, and last but not least Foucault), if we treat nature only with the aim of dominating her/it, then we are prosecuting a dominion on human beings themselves, given the fact that we are not only subjects *on* nature but also objects *of* nature. The interconnections

³¹ Beck, p.29.

³² Beck, p.32.

between subject and object, nature and culture, science and ethics, life and strategy, can't never be fully distinguished or isolated.

According to Dupuy & Grinbaum (2005) this drift can be understood also as the reduction of the conception of nature that has been undergoing within some natural sciences, especially in the NBIC convergence. They believe that this process could be exemplified on two main scores. *"Firstly, the ambition to (re)make nature is an important dimension of the metaphysical underpinnings of the field. If the NBIC converging technologies purport to take over Nature's and Life's job and become the engineers of evolution, it is because they have redefined Nature and Life in terms that belong to the realm of artifacts"*³³.

But this will lead to a situation that the two authors describe, following von Neumann, as such: *"it will be an inevitable temptation, not to say a task or a duty, for the nanotechnologists of the future to set off processes upon which they have no control. The sorcerer's apprentice myth must be updated: it is neither by error nor by terror that Man will be dispossessed of his own creations but by design"*³⁴.

This aspect rises also if we take into account potential cross cutting outcomes of innovation. The possibility of a comparative assessment makes sense only if we forget that norms and normative settings have a personal binding power that cannot be reduced to a formula. Ignoring the subjective importance of norms produce the belief that different normative structures could be put in comparison and ranked. It implies furthermore that those same actors involved in this calculation will accept and agree with it. But this means that normative settings are nothing else than rationally chosen beliefs that could be replaced or dismissed at every moment in favour of another, potentially clashing or self-destructive one. And, we know that rationality doesn't contain in itself the conditions for its application

Conceived in these terms, responsibility seems to lose all the potential benefits and, besides, all the positive importance that it usually assumes, not to talk of any real effectiveness. If responsible innovation is reduced to a simple calculation of objective harms without taking into account the fact that not every value or norm can be calculated and predetermined, then what we have is something different from an ethical stance.

But there is also another aspect connected to the ethical and logical insufficiency of a reductive understanding of responsible innovation and it's the **political** side. If we can say that it is ethically wrong and logically a contradiction or a paradox, what about the effectiveness of such a reductive approach? Does it work in real terms?

³³ *Ibid.*

³⁴ *Ibid.*

Are the governance approaches managing innovation processes in a correct way in terms of reaching some kind of objective?

Because, as we have seen in the innovation analysis, the main aim of an innovation, even when considered only in economic terms, is its capacity of improving efficiency. On the acceptations and significance of this term we could discuss, but still can we detect efficiency in general terms?

Unfortunately, according to recent experiences those kinds of approaches don't seem to be effective in the sense that the context in which the innovation has been thrown often rejected it for ethical reasons.

The fact that innovation have been conceived and justified in rational terms turned out to not be a sufficient condition for to be accepted by the context. Nanotechnologies or GMOs are only the two most evident examples of what we mean here. This spurs from the fact that prevision could be not only insufficient in terms of potential unknown outcomes, but also on the side of the context applying those same analysis and criteria of acceptability. A rational choice of a normative setting doesn't contain in itself the terms of its own application. And furthermore, the reason why we are often moved to act is not simply expressible in rational terms. For these reasons it seems that politically speaking, these kind of mathematical approaches are suffering from many weaknesses. In the end what these kind of approaches³⁵ share is a top-down (top-down is also expressible in terms of time) approach based on rationalistic presuppositions that try to predict and plan development in terms of economic progress or legal and medical safety. But they don't succeed for ethical, logical and political reasons.

This generates the necessity of thinking an alternative way to the management of different normative settings. However, the problem remains the same: how do we manage to take into account different normative understandings without imposing anything neither practically nor theoretically?

Now we need to preserve some indications that emerged from the positions just analysed. Furthermore we could say, that some ingredients are without doubt necessary for developing a RRI framework. What is missing, or what we believe could be constructed differently, is exactly that framework.

Before starting to depict some traits of that frame, we should pick up another few important features of RRI. This should provide us with a bigger quantity and deeper quality of key-concept for our frame.

The essay previously mentioned by Jack Stilgoe (Owen et al. 2013) sees different stages at which RRI could be defined according to the enhancement of deliberation,

³⁵ To have a quite clear scenario of these approaches, cf. Pestre (2013) and also Del. 2.2.

participation and reflexivity. According to him there are five stages that we could distinguish:

1. Safety (Legal)
2. Compliance (Legal, Code of Conduct)
3. Framing and Communication (Reflexive, Efficient)
4. Imagination of Applications and Implications (Anticipatory, Reflexive)
5. Hearing Public and Stakeholders Views (Inclusive, Participatory)

As we can see there are different layers that go from the mere legal one to an inclusive, participatory one. As anticipated during the analysis of responsibility, these conceptions are not exclusive but rather summing. What we need to try and reach is exactly a conception of RRI that is at the same time participatory and efficient, and this means to go through different stages of framing and reflexivity in order to reach such a stage.

Stilgoe summarizes four characteristics that Responsible Innovation as such requires to be considered effective:

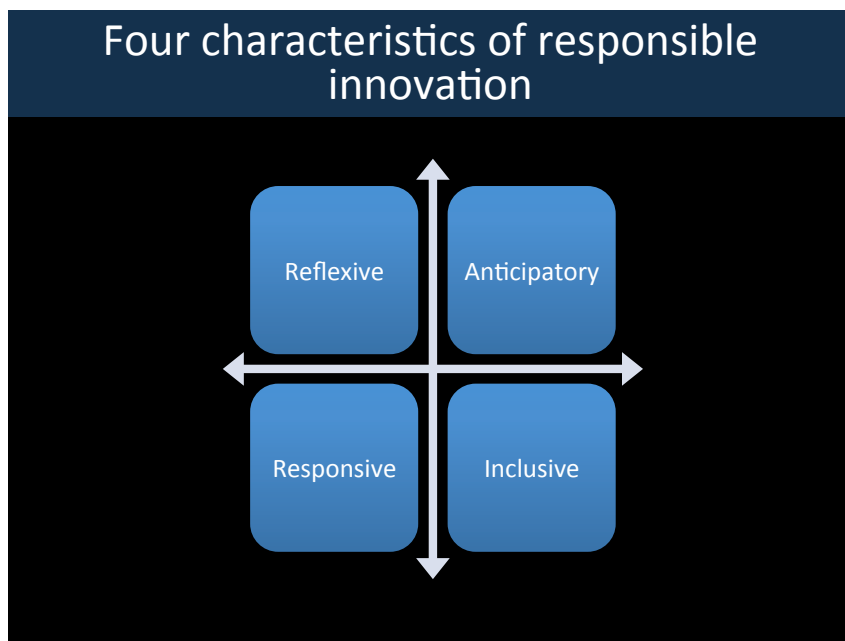


Figure 3: Characteristics of responsible innovation

According to this explanation, it seems to be a quite easy goal to reach. But there are many difficulties that we still need to face in order to reach a successful result in our purposes. These difficulties are both empirical, (why don't we have such a conception in reality if it is so easy to define and assess?) and theoretical (how anticipation matches with responsiveness or reflexivity?).

It seems that also here, although we have some ingredients that seem to be suiting

the aim of avoiding a top-down, rationalistic drift of norms construction, we are missing articulated indications and a time frame in order to enact such an attempt.

Both sides leads us to the hint that RRI is a conception that has got deeper implications and needs therefore to be investigated at another level, more precisely the level of construction of norms.

Depending on the specific field, on the way in which norms are conceived, and the way in which they are handled, we could assemble or divide them in categories useful in order to determine how responsibility, and therefore the underlying normativity, are constructed. If these norms are more or less imposed by the specific fields or if, on the contrary, actors or stakeholders manage to overcome those constraints. Furthermore we need to understand in which way normative horizons are built following or distancing themselves from the context, and if this process is a top down approach or if instead is pursued in a participatory manner. Moreover, and this will be one of the most sensitive points, how participation is enacted and enhanced, meaning with this the great attention that has to be given to the danger of its exploitation.

We already have many questions related to responsible innovation that require an approach able to indicate the right path to follow.

3. The construction of norms

The brief depiction outlined above leads us to a deeper development of the problem and connects us to the real conundrum of the question.

As we have seen in Del. 2.2, the conception of responsible innovation as such is quite new in Europe. But the question that rises spontaneously is why such a conception was required and what is original about it in respect to previous frames? This doubt turns out to be deeper than it appears. In fact, given that research had several different structures to be guided from, like CSR, TA, PTA, etc., why all these were replaced by RRI or at least why a need seems to be felt to develop them?

Our hypothesis is that this shift has become necessary in order to develop a larger dialectical frame due to the technology acceleration and its overlap.

The previous paradigms were still connected and created to deal with specific ethical matters rising with the development of particular technologies. All of them tried to address problems from a specific perspective in order to solve those issues. But as we have tried to describe previously, they all turned out to assume a partial and therefore reductive understanding of the relation between science and society. If some of them assumed a one-side perspective meaning that they considered only consequences in particular perspectives (CSR), others tried to assess problems adopting a aprioristic structure (TA). The result was that none of them managed to sufficiently face neither the new acceleration of technology nor the political issues that emerged with it.

RRI then, has been developed exactly in order to overcome those reductive understandings of the relation between ethics and science.

However, far from being clear on what does this mean, the question that we should pose to ourselves would be, how can we develop a conception of RRI that could be **valid for all the contexts** potentially involved (even on a different time line, i.e., not existing contexts) considering that those fields are based on, and follow, different set of norms, taking into account the fact that we can't impose laws and rules to the context?

The entire problem connected with a conceptual frame able to include all perspectives potentially involved in technology innovation is to be able to not set any a priori statement. If we have different perspectives, it means that we are facing different normative sets and these sets have a practical strength, a power, that can't accept any imposition or dismissal. Different normative sets can't simply be diluted or rejected on some pre-given rationalistic base but will have to be taken into deep consideration.

In order to do this there are two sides of the question that we would need to implement, a theoretical and a practical one.

In fact on the one hand we have to define how a ‘normative dialogue’ could and should be settled in theoretical terms so that we can draw our model. After that we need to transpose this model onto reality to prevent ourselves from incurring in the same rationalistic mistake we are trying to overcome.

When we consider closely the concept of responsible innovation we cannot avoid seeing that we are touching a deeper layer, at the heart of every acceptance of responsibility, the one of normativity. To refer to responsible innovation means to **address the problem of normativity** that grounds every theoretical and practical conception.

So then, the main general question should be posed in a different and deeper form. How can we think of a governance approach that would make different norms implied in different conceptions of responsibility communicate with each other in an open way aiming at reaching one shared **normative horizon**? How do we create and promote a meta-normative dimension without falling back into the paradigms we previously highlighted?

3.1. A limited approach to norms construction: SIM Presupposition

We need to choose a critical theory that could support our investigations and help us in finding a solution to the way in which norms are constructed, used and reflected upon. Our main concerns are exactly to not presuppose a normative frame but to build one that manages to take into account single values contained in norms, transforming them into a new, shared common normative horizon.

For this reason we consider the Louvain’s (Lenoble & Maesschalck, 2003, 2006) contextual pragmatic theory to be helpful, at least for the purpose of underlining the limitations of every theory that presupposes the conditions that makes the exercise of reason possible. This is true for all the ethical approaches that are characterized, according to Lenoble and Maesschalck’s terms, by “intentionalist, mentalist, and schematising” presuppositions.

By this, the two authors intend the way in which norms are ‘constructed’, that is how norms are intended to be and how, consequently, are considered to work in practice. As we have seen through the analysis of RRI scenarios, the understanding of how to build a norm or perceive normative sets goes along with norms functioning in real terms. If I think that an innovation will be safe I do it because I privilege some kind of legal norms and in doing so I presume that all the related effects in practice will be managed under the umbrella of safety. In other words, what it is deduced from one normative set, are those cluster of actions that are

believed to be logically consequential to the presuppositions. A mistake or unexpected outcome is then imputed to irrationality of some sort.

The **S.I.M.** presuppositions and a brief explanation are resumed in the following table:

Intentionalist Presupposition:	Schematising Presupposition:	Mentalist Presupposition:
The norms' effects are supposed to be deducible from the simple intention to adopt the norm. Additionally, we find the implicit presupposition that an actor will have full capacity and intention to contribute in the discussion when involved in a participatory approach.	The norms' application is a simple formal deductive reasoning on the basis of rules themselves. The determination of the norm is linked to these rules, such as ethical guidelines, laws, or other schemes, that is consider able to predetermine the effect and therefore the application of a norm. External constraints are not taken into account.	The norms' application is deduced by an imaginary set of rules that the mind is supposed to have. Also here the context doesn't play any active role and a process 'interruption' is considered as expression of irrational attitudes or behaviours.

Table 7: S.I.M presuppositions

The reason of the lack of questioning about the effectiveness of the norms is that implicitly all theoretical approaches presuppose that the conditions that determine the effectiveness of norms are linked to rules presupposed within the mind (**mentalist** presupposition) and consequently are supposed to be a function of mental capacities. Since the mental capacities are independent of the external context of the subject, the governance theories ignore the question of the effectiveness of the norm. In other words, often governance theories presuppose that the effectiveness of the implementation of norms is not a question, because it is not dependent on external factors, but is the necessary result of the norm itself. The mentalist presupposition is then thinking that the existence of norms is enough to activate mechanism in the mind that will assure the effectiveness of implementation. However, if the problem is addressed, the solution cannot be in the theory of norms itself, according to the mentalist presupposition, because it depends on the

condition of the mind, that accept or not the norm.

The mentalist approach is often linked to an **intentionalist** presupposition, which assumes that the norms effects are deductible from the only intention to adopt it. That means that the intention of adopting the norm is the only factor that determines the effect of the norm. The will of the users and developers to implement the norm is simply presupposed, so the problem of implementation is solved without even being addressed.

Another very common presupposition is the **schematising** presupposition, which assume that the effectiveness of the norm is taken from the norm itself, as a simple deduction of the norm. There is nothing needed than the norm itself in order to apply it. The effect of those presuppositions – which has been developed in the School of Louvain - is that the condition of the application of the norm is ignored, because a lot of theories consider that those conditions are in the mind of the person, and if they do not consider it to be automatic, at least, they think the governance theory has no impact on it.

In this way, in presupposing the application of a norm by its formal justification, the SIM presuppositions loose two main characteristics that should ground every norm construction, even in principle, that of legitimacy and of effectiveness. Avoiding to take into account reality and the possibility that a certain norm won't be accepted, trusted or applied, means to empty that same norm from its content, the same content that solely give every norm the reason to be and to be followed, i.e., the context.

This unveils the wider issue of the problematic relationship between deliberation and participation. If, on the one hand, deliberation is synonymous of a certain extent of efficiency, coming from procedures that permit deliberation and therefore select participants, on the other hand a greater extent of participation is required in order to not loose the grip on the context. But, as commonly understood, participation doesn't automatically imply neither a deeper knowledge or understanding, nor the respect of complex and intricate selective procedures.

So the dilemma is put in evidence again within the SIM framework. What we then need it will be a new form of governance that will demonstrate the capacity, in practical terms, of overcoming the above-mentioned problematic.

The criticism we level here emphasizes the necessity of understanding the reference to the background as a speculative and transcendental logical constraint of the operation. This should allow us to reach a higher level and better understand the consequences and the requirements of our approach to the reflexivity of judgment on the level of the construction of governance arrangements.

First, however, we need to highlight what is the theoretical anchorage that we can use in order to assess not only the shortcomings, but also positive examples of

norms construction within governance approaches.

3.2. Embedding the dialectic

According to our perspective, it is not only important to provide a horizon but we need to concentrate our efforts in **providing the necessary tools** for any actor to continuously **build and settle new normative horizons**.

This is crucial as the current way of constructing norms fails in exactly this scope, the one of being able to overcome contextual limitations without ignoring them.

If we recall briefly what the current scenario offers in terms of normativity is exactly what we could call a **top-down approach**, one that doesn't allow for actors to become aware and then freely choose the preferable option.

What a top down approach ignores is exactly the effectiveness of a norm in its application. A norm, if it has to be effective, i.e. applied, it has to be conceived and built starting from the context that the norm itself will affect or address.

Norms, according to what we managed to understand in the actual scenario, rely on a presupposition that doesn't take into account its future application (Ferry 2002, Maesschalck & Lenoble 2003). Being more specific, what it is always presumed when a norm is constructed is exactly the fact that the legitimation of a norm will imply and automatically pave the way to its application.

As we have shown for responsible innovation often the frames are built according to a rationale that pretends to be able to describe the conditions of applicability and from there to predict all the possible outcomes. This implies that different normative sets that could come into a clash in innovations are managed and solved thank to a rational draw. Value-sensitive design, risk assessment, technology assessment are only few examples of how these theoretical structures conceive the relation with norms. This is exactly the kind of mistake we have to try to avoid.

What is it then in the end the context that we shouldn't presuppose? What are we intending when we take into account and highlight the importance of the conditions of possibility of reflexivity? Relying on a meta-definition provided by Maesschalck and Lenoble, the context, *"is not a local set of factual constraints. It is not that false 'representation' of Marxist ideology. It is not that particular culture which cultural anthropologists could identify and which would be 'deposited' in the minds of individual actors as continually adaptable conventions that would serve as 'capacitating' structures for them. These three ingredients certainly exist as so many functions of context. But by themselves they do not exhaust the function of the context. On the contrary, by reducing context to one or other of these functions one misses the question of 'potentiation or capacitation of context' to produce these meaning effects. These neologism indicate the necessary reflexivity of the judgment*

by which the context, on the basis of which a norm is given sense, is 'perceived'. The concept of 'context' must, indeed, itself be reflexively constructed, as has just been recalled. Qualifying it in this way we seek to highlight this reflexivity of the concept of the context, which cannot be reduced to any 'convention' supposed as given (and spontaneously revisable by the cognitive and communicative capacities of the subjects)³⁶.

In this sense, the possible relationships of norms to contexts are the following:

- *De-contextualised* – refers to the situation where the ethical norm is seen outside the context of its application
- *Context restricted* - refers to the situation where the ethical norm is seen restricted in the context of its application
- *Fully contextualised* - refers to the situation where the ethical norm is seen fully inside the context of its application

Criticism of this reconstruction of the reflexivity used in the construction of the social norm also affects the moral approaches to legitimacy. Economic theories often obliterate the operation of the choice of possibilities that already condition the effects of rational decisions³⁵, but the deliberative or communicative approaches also miss the question of the conditions for an effective expression of the ethical objectives they intend to promote. As correctly pointed out:

*"certainly economic theories obliterate the operation of the choice of possibilities (in terms of choice of a way of life and not of the operation of maximization or of 'satisficing') that always already conditions the effectuation of a decision or of a norm, the deliberative or communicative approaches miss the question of the conditions for an efficient realization of the ethical objectives they intend to promote. In this sense **one can dismiss both the economic theories of efficiency and the deontological approaches of discourse ethics.** [...] Therefore, this critique, provoked by this reconstruction of the reflexivity at work in the operation of the production of a social norm, is not aimed only at economic theories of efficiency. It also concerns the moral approaches to legitimacy"³⁷.*

The insufficiency of proceduralism, for instance, is evident in that the arrangements that are necessary for organising the reflexive capacity for the actors to identify the various effective possibilities on which the norms selection will be carried out are

³⁶ J. Lenoble & M. Maesschalck, *Toward a Theory of Governance: The Action of Norms*, Kluwer Law International, 2003, p.87.

³⁷ J. Lenoble & M. Maesschalck, *Toward a Theory of Governance: The Action of Norms*, Kluwer Law International, 2003, p.93.

problematic. *“What is often presented to us as the only ‘effective’ choice is thus always conditioned by an operation that such a presentation does not take into account”*. Whether a norm is effective in modifying a way of life in a rationally acceptable way presupposes an independence from the context that cannot be a given factor.

The following table explains this common dualistic understanding and the underlying mistake:

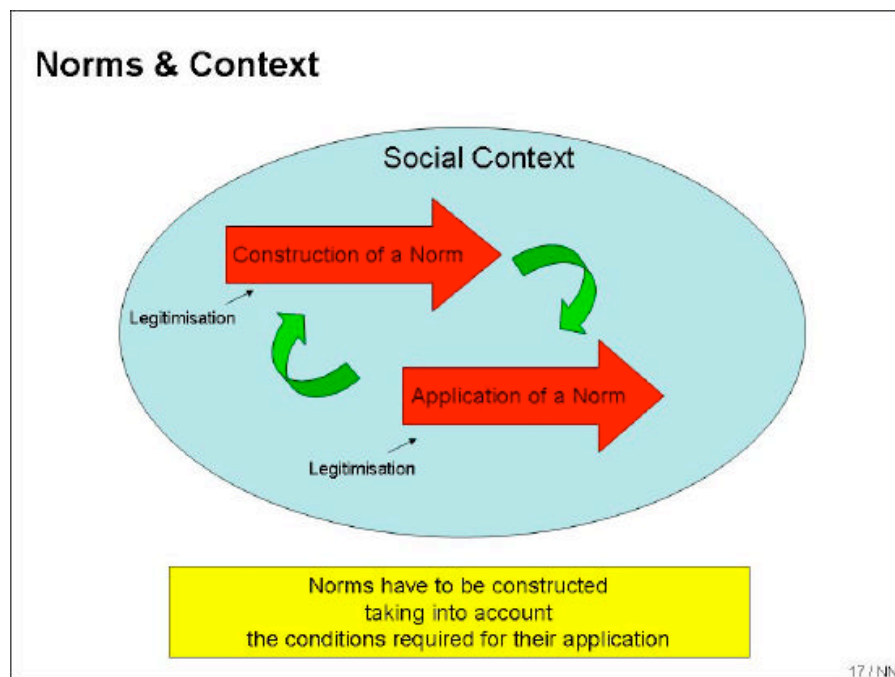


Figure 4: Norms & Context (Egais, Del. 2.1)

Norms then must be conceived and constructed taking into account the conditions of its application, that is, with the participative and reflexive approach of the different actors possibly involved.

How could we intend this in theoretical terms?

3.3. Theoretical Paths for Norms Construction

We have already pointed that there are several theories about how to construct norms. The most famous one is probably represented by the discourse ethics from Jürgen Habermas. Discourse ethics, included in a trend in ethics called proceduralism, link the legitimacy of a norm to the procedure of construction of that norm. The norm, in this case, has to come from a free dialogue between stakeholders, only

framed by the requirement of rationality of the argument. At the end of the discussion, one argument is supposed to be judged more rational than the others, and is chosen by everybody. That procedure applies for every argument, until constituting a set of norms that comes from a free rational consensus¹⁰⁴. This theory proposes a justification of moral issues through a rational procedure of discussion. The challenge, for us, is to include in that theory the context of application – but of course doing that is changing the structure of proceduralism itself. Our input is not only an addition in the trend of proceduralism, but a fundamental change of the principles at the roots of proceduralism, which threaten the entire trend, and not one particular author.

As we said, the rational justification of a norm, does not contain in itself the conditions for its application, the conditions for the modification of the relationship of the norm to the ideal, and does not even ensure the norm construction. The procedural approach in particular fails to guarantee the construction of the norm, and presupposes a will to be ethical. The discussion is not compulsory, it is a decision made by the individuals but the discussion has to follow some rules, some procedure, such as involving every stakeholder. Which means that the will of people who have an interest in the question, the norm debated is willing to participate, and even more, is willing to fit into the rules of discussion. This critique joins the one of **Jean-Marc Ferry**. His criticism of procedural ethics has based his conception of the role of values in the construction of the norms. It is impossible, for him, to deny the values that determine people decisions. On the contrary, the discussion has to take them deeply into account. However, say Ferry, it does not mean that no agreement can ever be reached (because of the plurality of value). On the contrary, for him taking the values into account (via narration, interpretation, argumentation and reconstruction) doesn't only add effectiveness to the norm, in the sense that people will be keen in following them, but it would be impossible to think a norm without values, because the reason why we accept a norm is not reducible to its rational demonstration.

The confrontation of values, when it does not have as a goal the triumph of a belief, but aims at founding a norm, is then, as a space for practical discussion, perfectly compatible with the aim of agreement (understanding). Procedural formal constraints are not needed, for Ferry, in the construction of the norm, because people can reach an agreement without having to discuss a scale of values. The important problem is the practical problem. And it can be resolved in a discussion that is open to values. People can reach agreement because they are able to submit themselves to a norm even if it is opposed to their values. This is a fundamental principle, which completes the criticism of proceduralism made by the School of Louvain, and will allow us to think of a way to construct norms that will be accepted

by people as a norm they can submit themselves to.

Ferry criticizes the reductions and the restraints that proceduralism inserts in discussion. But we can see that Ferry stay in the demarche of discussion.

What we are saying, is that it is not enough to reach an agreement on the process of the discussion to have a consensus that could found a norm. We have to look at the construction of the norms into a context and taking into account the context of the application of those norms. This is also why we cannot just look at the ethical norms already used, but need to analyse how those norms have been constructed.

Maesschalck's "*pragmatique contextuelle*" (contextualised pragmatic approach) (Maesschalck, 2001) stresses the importance of taking into account the specificities of contexts when creating norms. He recommends that, in lieu of the democratic apparatus set by authorities in which community members are invited to participate (school councils, for example), the actors' ability to participate is mistakenly taken for granted. Therefore, existing cooperative networks should be exploited and supported. Moreover, he suggests that implementation of norms is more likely to be feasible when norms are created in collaboration with the actors in context, since they are the most knowledgeable about the particularities and limits of this context.

Every norm aims to institute a way of life that is judged to be rationally more acceptable. The formal rules that condition the rationality of this choice, such as calculation of optimisation, argumentative rules, or any formal mechanism, don't guarantee, by themselves, the transformation of existing ways of life. The realization of the ideal way of life called for by the norm is conditioned by something other than the simple formal validity of the rule. The operation of judging the conditions of the choice of the rationally acceptable, idealised way of life, that is, the rational determination of the norm that is supposed to enable the realisation of this objective, and the effective transformation of the same way of life by the application of the norm, is distinct and asymmetric. Asymmetry is the way in which the social meanings of a norm are conditioned by an operation that cannot be anticipated by formal variables of reasoning (variables that condition the norm's relevance). Therefore every reconstruction of the process that was enacted by the production of a norm itself mobilizes two operations, which do not respond to the same conditions of production. The intersecting articulation of this asymmetry is the focus for governance arrangements.

4. Conditions for RRI

So, at this stage we have briefly defined the general underlying justification of current approaches and critically assess some difficulties related with that. We now need to propose an alternative conception drawing from those previous understandings and from actual gaps and limits.

The problem we need to address then is the problem of effectiveness in the application of norms within the governance of responsible innovation in research, the way that they are constructed and applied within innovation. We wish to examine how research reflects and address responsible issues in innovation process, understanding if it is only an add-on process or a different and structurally grounded responsible innovation process is at stage. To do this we need to rely on real examples, and investigate them according to the structure and consequentially the effectiveness of their governance. But, to be able to reach such an attempt we need to define the criteria we need to look for when we carry an empirical research.

We will now start defining the condition necessary, in theoretical terms, for a governance of RRI.

4.1. A first condition of RRI: Participation

Considering the most frequent difficulties and claims that are nowadays rising from different sides, the first stage in a normative construction should then be the one of allowing participation in the research process. This procedure is justifiable from a logic perspective, if the norms will be adopted and followed only by being chosen then we need to allow agents to choose, and from a theoretical political one, governance implies a lengthen of actors and democracy's legitimation derives from participation.

Without the need to justify participation as such in political theory³⁸ we do have to explain why and how participation could and should be embedded in a deliberative decision-making process.

As we have said previously, the only way to conceive an effective application of innovation is to avoid the premise that this could be imposed on the context. At the actual state of things, frontal imposition and counter-position don't represent anymore doable options. Methodologies that are usually considered to be top-down

³⁸ Although, as we will see participation is sometimes considered to be a myth or something counterproductive for political management. This negative understanding of participation will be highlight through the issues that a full participation raises in the relation with science, indeed a particular one.

approaches, especially when applied to scientific progress, can never obtain a public legitimacy. Besides, given the shift that our political structures have undergone in the last decades, the trajectory of the decision making process had to deviate from a classical governmental way to something more blurred, known as governance. What is the main feature of governance models at least in principle? It is the one of taking into consideration the consequences of the process by which decisions are taken more than the contents of the decision itself. In this sense, in order to fulfil this attempt, the main methodological core is to try to involve the greater number of people in the making and implementation of policies.

Participation is then the key word to reach a shared construction of societies and the center around which all the processes are nowadays developing. There are four objectives that are supposedly pointed out when a valuable stress is placed upon participation. *“First, popular participation is the best way both for leaders and for the people themselves to discover what the people want. Second, widespread participation will ensure that all the relevant interests are considered. [...] Participation may increase the legitimacy, acceptance, and enforceability of policies, in part because decisions made in light of popular participation should be more in keeping with the desires of the people. Additionally however, people are more prone to accept decisions they help to make, even if they don’t like the decisions reached”*³⁹. The fourth objective that Katz detects (Katz 1997), the one of increasing autonomy, seems to be only partially fitting in the specific relation between science and politics that is particularly highlighted here. In this sense, we can’t theoretically affirm the primacy of participative approaches in democracy as there are other systems that could be considered equally valuable. As we said, participatory approaches concentrate more on the processes by which decision are taken rather than the contents of the decision, and this way best fits the specific and particular domain of responsible innovation. The products or processes rising from innovation are directly concerning and affecting the context in which they are going to be placed and consequently participation is the only way to avoid the problematics previously shown. We don’t have to forget that innovation in its current understanding is directly connected with marketization or, as we would say, ‘societalization’.

However, the fact that participation in itself is not considered to be the panacea of democracies helps to understand the slippery sides of this wide conception for RRI. As pointed out also from Katz himself, *“participation becomes as much a strategy of manipulation and control as a way for the people to govern themselves and again is congenial with the elitist popular sovereignty or liberal democratic approaches”*.

³⁹ R. Kranz, *Democracy and Elections*, Oxford University Press, 1997.

Participation in itself represents a necessary condition for the implementation of innovation assessment but we believe that it can't be taken also as a sufficient one. This because participation in a very formal acception could include many strategies that wouldn't lead to what we might intend with 'responsible' innovation. As we have shown, responsibility cannot reduce its polysemy to a mere legal frame but implies also and mostly an ethical one. So even if we don't want to talk about it in a wider political dimension, participation in research and innovation could still have several layers and different, implicit or explicit meanings. The current definitions or indications of RRI all rely more or less on participatory presuppositions but that doesn't protect them from being potentially negative for the sake of RRI⁴⁰. Furthermore there are different ways of participating. Taking into account Arnstein's ladder, the OECD scale or the IAP2 structure, we find several ways through which participation could be conceived and not all of them maintain what participation in principle promises.

According to Arnstein⁴¹, we find three different layers on which participation could be conceived according to effectiveness of participant in the decision making process. So, we find direct examples of exclusive policies like therapy and manipulation, instrumentalized ways of excluding agents as 'information', 'consultation' and 'placation', till forms of real and explicit citizen participation namely 'partnership', 'delegated power' and 'citizenship control'.

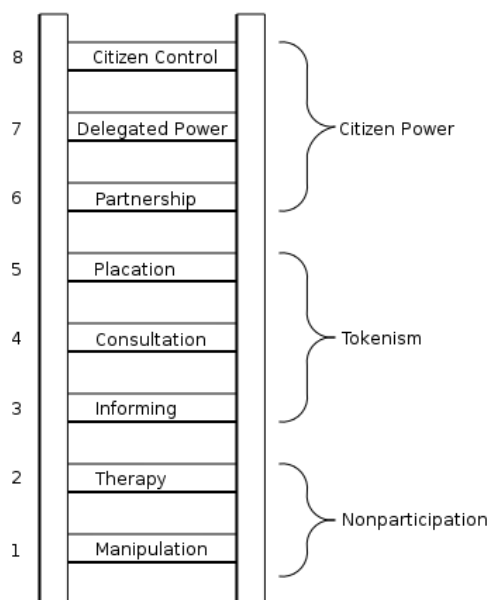


Figure 5: Levels of participation (J. Arnstein, 1969)

⁴⁰ See the previous chapter on RRI and the critiques of current approaches.

⁴¹ J. Arnstein, 1969.

However, although this differentiation is a classic scheme and represents an optimal background to understand different levels of participation, it suffers of two important weaknesses connected also with the actual development of participation, deliberation and consequent counter-strategies. The first weakness could be detected in being generic and at the same time demarcating clearly the different layers without leaving space for overlaps or complexity that always raise from participatory experiments (Fung 2006). The second one, closely connected to the first one, is the apparently unintentional mechanism underlying these models and absence of a critical stance from which to assess them. It appears as if those approaches could be easily detected and furthermore as if they weren't susceptible of instrumentalization. In this way it becomes difficult to assess and criticize more ambiguous attempts to enhance participation. More over it could lead to a certain degree of 'objectivity' in the judgment confusing a descriptive analysis with a political one.

The IAP2 Spectrum is only one example of what this could mean for further analysis.

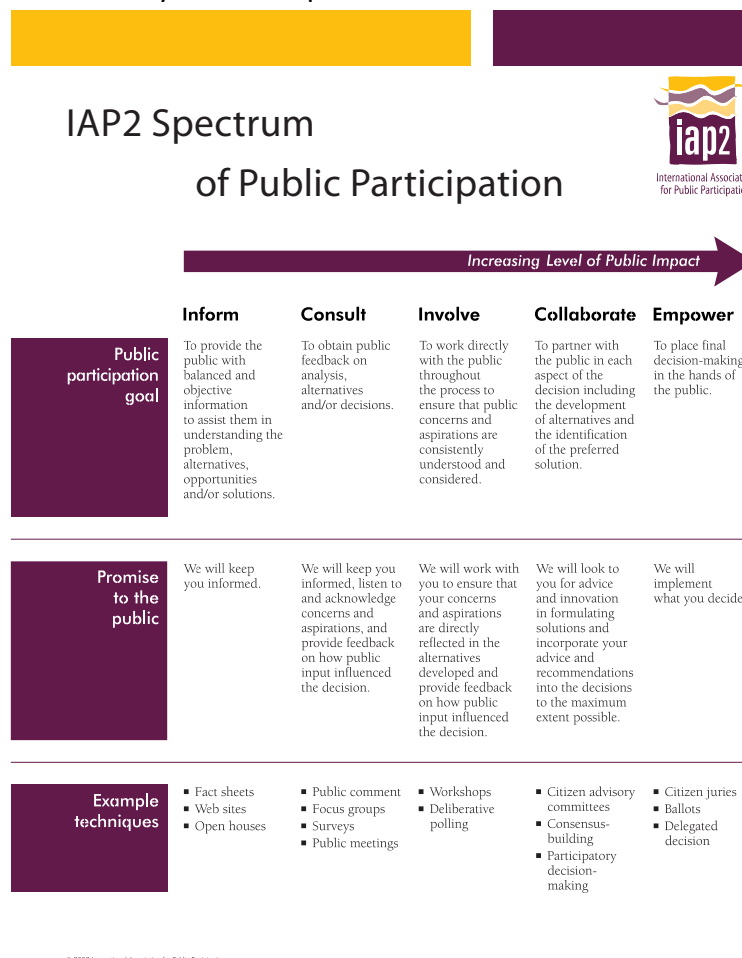


Figure 6: IAP2 Spectrum of Public Participation

As we can see consultation and information are seen as effective means of interaction and don't include any sort of potential threat.

This table however represents an interesting step in the definition of tools useful to enhance participation.

In short, several attempts to define what participation is and how it could be conceived have been proposed across the last years. The following table summarizes three important examples that remain within a similar conception.

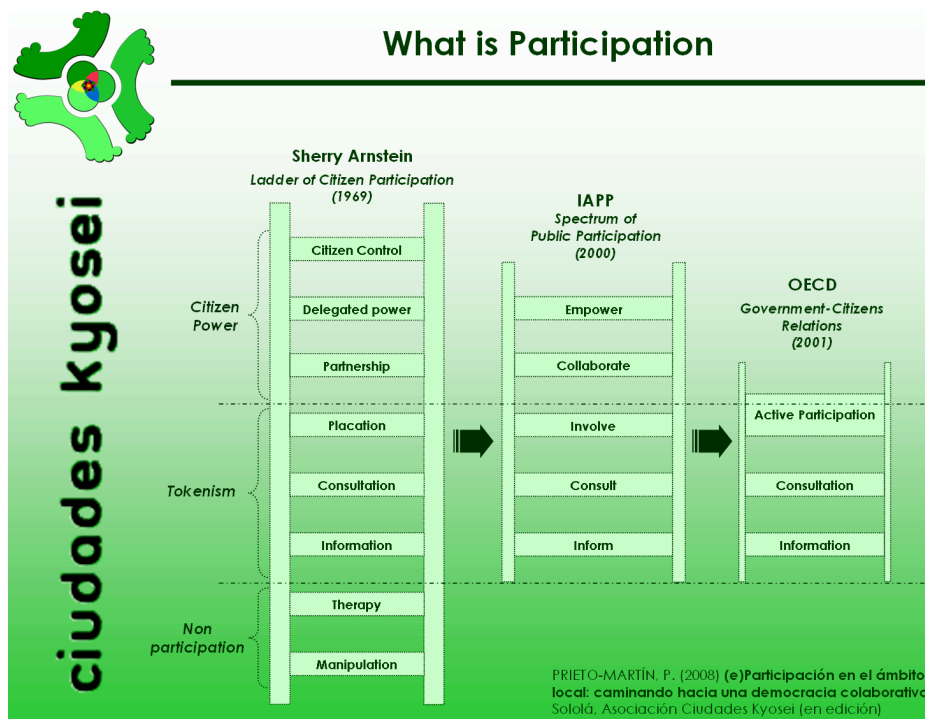


Figure 7: Tools for enhancing participation

4.1.1. What kind of Participation?

However, these attempts do not exhaust the nuances and complexity connected with the concept of participation. All the relations, implicitly or explicitly ambiguous, are not inferable from these tables (Fung, 2006). Neither are described the different dimensions in which participation could be intended taking into account plans that are often interlaced. Furthermore, we do not have many indications with regard to the concrete exemplifications of this taxonomy. What is missing according to our analysis is an overall normative perspective from which we could determine the contingent forms of participation. Consequently it becomes impossible to critically assess participation as an exploitation tool⁴².

Participation is a really wide and formal concept that could include a wide range of options that go from being informed of something to deciding everything. But how do we cope with the problems obviously connected with these particular modalities and all the other intermediate stages, considering that participation is a multi-layered conception?

Who are the 'participants' (agent/actors/stakeholders/experts) we are considering or who should they be? How do we establish the level and limit of participation (deliberation/direct participation?) considering the communication modes and the power influences that are strictly connected to different modalities of participation? All these questions are connected with a main one, how do we intend the process of interaction between participants from a normative standpoint? This question, that implies participation in itself, cannot however ignore that participation needs to be shaped and determined according to a frame.

As we have said, we consider a frame for responsible research and innovation to be one that doesn't impose any specific normativity to the context but, on the contrary, one that makes the contexts interact and develop with each other. At the same time in science is almost impossible to fully involve non experts due to the level of knowledge required to understand and debate on some specific issues.

It seems quite obvious then that participation needs some further condition in order to result effective for our attempt.

As we can see from one of the most developed investigations on participatory approaches⁴³, in such a wide container we find three intertwined dimensions, one concerning authority and power, a second one related to communication and decision mode, and a third dimension defining the kind of possible participants.

⁴² B. Cooke, U. Kothari, *Participation: the New Tyranny?*, Zed Books 2001.

⁴³ Fung (2006).

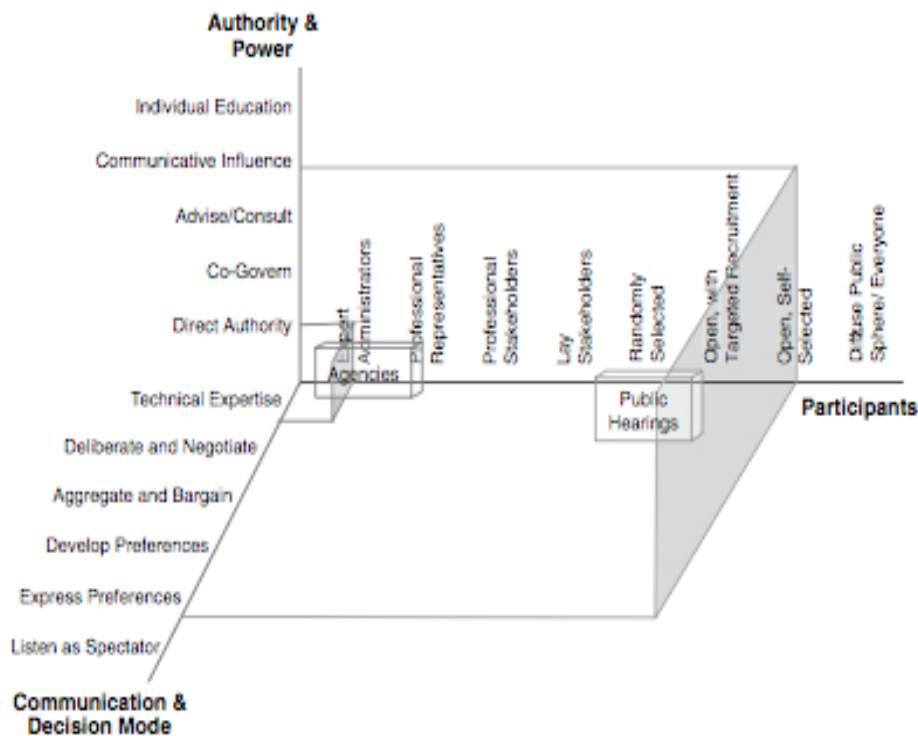


Figure 8: Participatory approaches dimensions (Fung, 2006)

In all the possible combinations of these three interlacing dimensions we can find every particular mode of participation. Each line goes from a really external or marginal position to a directly effective role. This doesn't imply that the ideal situation would be that of experts expressing a direct authority thanks to their expertise. As well it doesn't mean that the worse situation in a participatory frame would be represented by the one in which everyone could only be a spectator. It means only that these are the possible degrees detectable in a participative interaction. Moreover, the rate of participation has to depend according to the specific situation. As Fung puts it, *"public participation advances multiple purposes and values in contemporary governance. Master principles such as equal influence over collective decisions and respect for individual autonomy are too abstract to offer useful guidance regarding the aims and character of citizen participation"*⁴⁴. A real, thick, participation requires certain conditions that are not only often difficult to reach but also sometimes not desirable. In order to avoid what Pasolini thought to be the greatest danger implicit in participation that *"the participant mass is*

⁴⁴ A. Fung, 'Varieties of Participation in Complex Governance', in *Public Administration Review*, December 2006, Special Issue, p. 66.

manipulated by power through the imposition of “other” values and “other” ideologies: imposition that happens in life and in life will also be adopted” (Trans. of the writer)⁴⁵.

4.1.2. How much participation?

To respond to the question what is the level of participation we need is not easy as it always depends on the context in, and the reason for, which this participation is required. If we analyze it from the perspective of RRI, and we also limit our field to ICTs, it appears sensible to establish a frame for participation or better say an empowerment.

Participation could serve different purposes. It could be adopted in order to enhance efficiency in small policies developments or could be useful for gauge the public perception with particular events occurring and/or being far from elections. It could have a structural role in policy-making or could be seldom encouraged.

What lies at the heart of a participatory effort is the need for legitimation that every decision-making organ requires. Of course, this legitimation could be substantial or formal and, in this second case, could be quantitatively and qualitatively differentiated.

As we said, and as Fung suggests, direct participation is not always the best answer, rather participation should be intended as a complementing function of deliberative structures (Fung 2006). Direct participation in its real core is a mean useful to express concerns, wishes and claims, an instrument that frees an affirmative energy. It represents a fundamental tool in order to make people express their perspective. At the same time we are not sure that direct participation, due to the time and freedom from constraints, could be useful also in the establishment of a dialogue. More than its passive side, direct participation enhances the active, imposing side of action. Little, if none, space seems to be left to listening, to understanding, to the reflexive side of a political discussion. And this represents a great danger exactly because it represents, in other terms, the same expression of partial imposition of normative perspectives. Therefore it lacks all the counterbalances useful to settle an open discussion with all the potentially affected people.

So to understand how much participation do we need means to pose the question in another way, that is in which way we need to make people participate, that implies a more basilar question, who are the participants we need to take into account if we want to avoid a partial understanding and consequently want to enact a dialectical and reflexive process?

⁴⁵ Pasolini, *Scritti Corsari*, Garzanti, Milano 1975.

4.1.3. Participants: Stakeholders, Agents and Actors

These questions then, who are the participants or who should they be, brings us to an interesting aspect underlying participation. In fact we usually assist to participatory efforts built in a certain way, conceived through similar structures, tending to get stuck in the development of the decision making process. What usually happens in fact is that or one position soars as the main one (justified through rational or power reasons) or the entire process is stuck in the impossibility of assigning priority to one. We believe that this *cul de sac* is also due to the discourse in which participation tends to remain embedded. Such a discourse, according to our perspective, already establish a priori what are the ways in which participation will be managed by defining who are the participants and what are they are called to express.

This language starts from the definition of participants and the consequent expression they are supposed to provide. We can define the different kind of participants relying on Fung's list or onto other similar investigations. There are three main figures that are usually adopted when participants are described, stakeholders, agents and actors.

The most common one is without doubt stakeholders for the reason that they are felt to be representative of civil society and because they are supposed to bring all the different interests as a guarantee of balance. The term stakeholder, coming from an economic ground (Freeman 1984, 2010), suggests that a subject is tightly connected to an *interest*⁴⁶, often economic, already willing to participate in order to defend or strategically promote that interest. Stakeholders are usually figures that have already an expertise but often a partial one and are likely tended to preserve that single perspective. The maximum that is expected from such a participatory structure is then the possibility of starting a bargaining procedure that should lead to some strategic (often readable from a game-theory perspective) compromise or agreement. But if we look closely at the process of participation where stakeholders are involved, this is a process in which they contribute with a specific reason, an interest, that implies or that they already went through a reflective moment or they are just willing to defend, dogmatically or irrationally, a position. It appears unlikely that stakeholders could give up their beliefs and reframe their understanding of the process. Therefore it looks like that this whole structure can't overcome the limits implicit in a strategic interaction. The stakeholders are in some sense actors with a specific pre-given script that are not willing or able to change. A participatory structure based on involving stakeholders could then lead to a situation where all the participants know the reciprocal interests but are not keen in giving up them.

⁴⁶ *The same term interest is recent, of technical-countable origins: "interest", latin, that used to be written in accounts ledgers, in front of the incomes to draw. (Mauss 1950)*

What are the possible options in such a situation then? A first one would be represented by the stagnation of the discussion; no one can make an explicit decision against someone else's interests otherwise participation loses its sense.

A second one would be to pursue a decision and to do it due to some practical and often hidden agreement that entails a wider frame.

A third one, subtler, would be to embed from the beginning participation in certain formal structures by which, for instance, the 'best argument' will be chosen. We don't need to repeat how a logical justification, apart from suffering of a discourse kind of domination, doesn't help us in our task of defining a suitable structure for RRI. We have defined already how the justification of a position doesn't imply the application of that very position by someone else.

In general, however, if we limit participants to stakeholders and therefore their perspectives to interests, it will be hardly impossible from them to be able to change them. An interest is already a settled and crystallized position that can't be changed unless the material position would change as well.

In this way all the problems connected with the discursive ideal situation, that is inclusion/exclusion, terms of the discourse, etc., remain. Accordingly then, participation based only on stakeholders tends to appear as an already driven one. Given that we are looking for a structure that manages to avoid imposition and succeeds in coping with conflicting perspectives without ignoring them, a stakeholder-based process is not the best candidate.

This stakeholder-modality indirectly leads us to one of the problems connected to participation, especially when connected to research and innovation. The economic stress that underlies such a reasoning and that reduces participation to a bargain shows us how the timing of participation is fundamental in two ways. If on the one hand here participation could be also enacted at an earlier stage of the research, on the other hand if those participants are already formed as stakeholders along the participatory process the stage at which they will start to participate won't affect the innovation in ethical terms. This means that normative contrasts and conflicts in general will be handled in a strategic or rationalistic way or dismissed. But this doesn't fit the research and innovation field where certain kind of products or processes will be followed only if they respect the exceeding of reason. Furthermore, the rules of participation are already established and there is no space for questioning them. So it is not only the time at which participants are included in the process but also at what stage participants are made such, that is how we intend them to be an active part in the construction of the process.

If we would like to express this in other terms we could say that, within a stakeholder conception, participants are already actors whether they should still be agents. The distinction between the two lies in the intentionality by which they

participate. Agents could be merely driven figure that haven't developed yet a sort of consciousness on how and why they would prefer to participate. It is not by chance then that also the language directs our hypothesis towards this understanding. If in English agent could also be used in natural sciences, actor always implies some kind of human quality that firmly distinguishes it from the former. An actor is someone that has to play a role based on a script. It is a subject that constructs and defines himself by acting in the wake of a canvas. After all if to act is a verb easily understood, on the other side to age could only mean to be passively standing a necessity of nature. Therefore we can affirm that while agents are unintentional figure driven on the scene, actors are consciously moving on the stage. Being the two terms usually interchanged without any particular difference we understand how such a marked distinction could be object of doubt, but we still believe that there is a difference in the way particular figures enter in the participatory frame and we think that this difference could be well expressed by the agent/actors figures.

According to our perspective then, the two major risks connected to participation, especially when it comes to RRI, are to involve agents or actors/stakeholders with an already fixed role. What we believe should be the case, on the contrary, is to create the conditions in order to form an actor from an agent, that is, to enact a reflexive process.

So, what we tried to say is that participation is a wide an empty conception that could be intended and adopted in different ways not all appropriate for the declared scope. Therefore, participation needs to be defined in terms of real influence in the decision-making process. Furthermore, in order to not reduce the different normativities to a general economic perspective, that will maintain the crystallization of position, we need to think of participants as pursuing specific preferences or better say vision of the worlds and not merely interests.

This in order to facilitate a reflexive process that we now have to define.

4.2. Reflexivity and the Cognitive framing

Stressing the importance of a preference instead of an interest implies the possibility of change that every preference automatically carries with. A preference can always be modified if new conditions are brought to light. A preference could be intended in in different ways and different gradations. It could go from a simple and superficial choice made in every day life to a conception of the world. Being usually tied to a cultural and spiritual dimension, by acting on this side, a preference could be modified. This particular action of modification, far from being an imposed one, is what we call, reflexivity.

Obviously each conception of the world is related to a specific framing. Neutrality, or a 'perspective from nowhere', as much as a certain positivist stream pretend to adopt, seems to be quite an unrealistic position, especially if we are questioning ethical matters⁴⁷. We believe that when an actor tries to consider an ethical issue, he does so within some pre-conceptions, or, otherwise called, visions of the world. These can be derived from the tradition (Habermas, Gadamer), or can simply represent our source of practical assessment (Husserl, Parsons). What is important here is not as much the understanding of a specific determination of the framing but rather the comprehension that there is always a *frame*.

Through the framing concept, we can highlight the necessary contextualisation of every judgment and how it relies on the routines that an interpretive approach will continually adapt to new contexts. Cognitive framing consists of the way the actors conceive a situation. And this cognitive framing means that an actor is already embedded, constraint in a specific understanding of things, we could say, he has a normative framing. Framing constraints could be economic, scientific, technical, or similar, and have a major effect on the decisions made by the actors involved.

The issue of the frame has been debated for a long time in social sciences. Although there are several different perspectives on the structure – agent/actor (Giddens, Archer, Habermas) we consider Bourdieu's one to suit best our understanding of it. Bourdieu's approach to the agency-structure linkage is **usually known as the** theory of habitus and field. Bourdieu sought to bridge subjectivism (the individual) and objectivism (society) with a perspective called constructivist structuralism. Structuralism focuses on the objective structures of language and culture that give shape to human action. Constructivism looks at the social genesis of schemes of perception, thought, and action. Bourdieu wants to examine the social construction of objective structures with an emphasis on how people perceive and construct their own social world, but without neglecting how perception and construction are constrained by structures. An important dynamic in this relationship is the ability of individual actors to invent and improvise within the structure of their routines.

The habitus is the mental structure through which people deal with the social world. It can be thought of as a set of internalized schemes through which the world is perceived, understood, appreciated, and evaluated. A habitus is acquired as the result of the long-term occupation of a position in the social world. Depending on the position occupied, people will have a different habitus. The habitus operates as a structure, but people do not simply respond to it mechanically. When people change positions, sometimes their habitus is no longer appropriate, a condition called hysteresis. Bourdieu argues that the habitus both produces and is produced by the

⁴⁷ See Bernard Reber, *La démocratie génétiquement modifiée*, Laval, 2011.

social world. People internalize external structures, and they externalize things they have internalized through practices. The concept of field is the objective complement to the idea of habitus. A field is a network of social relations among the objective positions within it. It is not a set of interactions or intersubjective ties among individuals. The social world has a great variety of semi-autonomous fields, such as art, religion, and higher education. The field is a type of competitive marketplace in which economic, cultural, social, and symbolic power are used. The preeminent field is the field of politics, from which a hierarchy of power relationships serves to structure all other fields. To analyze a field, one must first understand its relationship to the political field. The next step is to map the objective positions within a field and, finally, the nature of the habitus of the agents who occupy particular positions can be understood. These agents act strategically, depending on their habitus, in order to enhance their capital. Bourdieu is particularly concerned with how powerful positions within a field can perpetrate symbolic violence on less powerful actors. Cultural mechanisms such as education impose a dominant perspective on the rest of the population in order to legitimate their power. In this sense then we need to carefully take into account what a context could mean and imply in social interaction.

As we have said different positions, conflicting ones, are always at stake in a dialogue. Different perspectives are a matter of fact for which participation itself is required. What we need to do is not to dismiss them or to be kept prisoner by them. *“A democracy is not a political regime without conflict but a regime in which conflicts are open and negotiable [...]. Under this regime, conflict is neither an accident nor a misfortune; it is expression of the character of public good that is not determinable dogmatically or in a scientific way”*⁴⁸.

What we need to do is to ‘listen’ to these frames and try to overcome them in order to find a common horizon. And in order to do that we need to open the frames, but to open a frame a certain level of consciousness is needed. If to a certain extent this awareness wouldn’t require too much effort, we know that we have a specific perspective in most of the case, it does become much more complicated when it comes to a deeper level of the question.

We enter in this way into the problem of **reflexivity** with its related issues, the problem of capacitation of the actors⁴⁹. The problems connected with capacitation

⁴⁸ P. Ricoeur (1991), p.166-167.

⁴⁹ In philosophy, and in School of Louvain’s theory in particular, the term is used to describe the coming to capacity of an actor, the process by which the actor acquires a new capacity (here the second-order reflexivity, i.e. the capacity of being conscious and critical about his/her own framing). The term is used to underline the process by which the actor gain the

are several and of different nature. We believe it still represents the main unsolved general dilemma of a critical tradition and perhaps even the suggestions we grasp from other authors analyzed by Lenoble & Maesschalck won't represent a satisfactory answer. However we can say that this uncertainty is connected to the specific field in which we are moving our considerations. Because if it is true on the one hand that a general and necessary countermovement to domination seems impossible to be set in motion, at the same time, on the other hand, we believe that a change in the perception of things represents a feasible way when it comes to the relation between science and society. Responsible Innovation is a dimension that requires exactly such awareness in order to make sense. And we think that this awareness could be raised or highlighted by different means. It could be an historical one (GMO, Nanos), could be political (change in the political structure) epistemological (change in the paradigm) or pedagogical (a theory of learning)⁵⁰ Probably, according to specific issues an hybrid represents the best answer, but what really counts here is to enact this capacitation in order to develop an awareness on issues related to RRI.

Currently, given the participatory efforts that we mentioned, it's likely to find a reflexive approach. To participate means after all to reflect on something in order to offer an opinion. But as we have seen there are many slippery or better say ideological attempt to establish certain procedures without making them effective. In this sense the reflexivity that we often encounter is a kind of reflexivity that focus on specific issues that are as well already pre-determined and shaped. The risk is then to fall in a rationalistic dimension or, even worse, in an instrumentalized participatory process⁵¹.

From an epistemological viewpoint, this linkage between social actors and their context has been widely neglected by procedural (but also pragmatist) political philosophy. Finally, a sound epistemological theory of the relationship between actors, the formation of norms and their context it still missing in a way that threatens the possibility of implementing norms in an efficient way. At a cognitive level, in order to conceive in a more appropriate way our relation to the context, we need to introduce the possibility for the agents to be reflexive and to revise not only their judgments, but also the way in which they size and understand the problem

ability to do something, which is a bit different from the term "empowerment", which refers to a power that the actor already have in potentiality, and need to be reinforce or allow to be expressed.

For a more detailed explanation see, J. Lenoble & M. Maesschalck, *Toward a Theory of Governance: The Action of Norms*, Kluwer Law International, 2003.

⁵⁰ Lenoble & Maesschalck, *Democracy, law and governance*. Farnham, Ashgate 2010.

⁵¹ Foucault M., *Les mots et les choses*, Paris, Gallimard 1966.

(epistemic and normative). The possibility of revision is an important bet in deliberative theory of democracy. Indeed if we don't agree to change our mind in front of better arguments it is useless to enter in such process. Better continue on other ways using bargaining, or force reports.

In order to avoid such a danger we need to distinguish between two kinds of reflexivity, a first and a second order one.

The reflexivity of a responsible approach is often reduced to a first-order reflexivity, i.e. a reflexivity that let its own framing unquestioned. The first-order reflexivity is not an absence of reflexivity, but a limited reflexivity, a reflexivity that comes from the framing itself and avoids asking questions on the framing. The novelty of modernity is to bring in front of the tribunal of reason itself, its objectives, its functioning, the side effect of its grow and functioning, and so on. This is what we call first-order reflexivity.

The second-order reflexivity instead is a reflection on how society, and modern rationality in particular, work, and reflect on itself, and how those reflections can be limited by presupposition. A second-order reflexivity is not only a reflection on our own actions (as individual or as society), but a reflection on how the presupposition, the governance principles and the values determine our way of acting. We could also say that the second-order reflexivity is the mean by which we can reach the first-order one. We need to understand the institutional frame that surrounds us and in which we are embedded before we could start questioning sensibly about us.

Here, we see that an appropriate conception of reflexivity will rely on a **theory of learning**. We refer to the capacity of actors to identify the various effective possibilities on which the operation of the selection of the norm will be carried out. **Actors not only reflect on the adequacy of their norms and values, but also on the way in which they construct these norms and values.** These norms and values can be focused on what is right – or false- (epistemic norms) or what is good, just or evil, unjust.

The following table recaps the distinction between a first and a second order reflexivity.

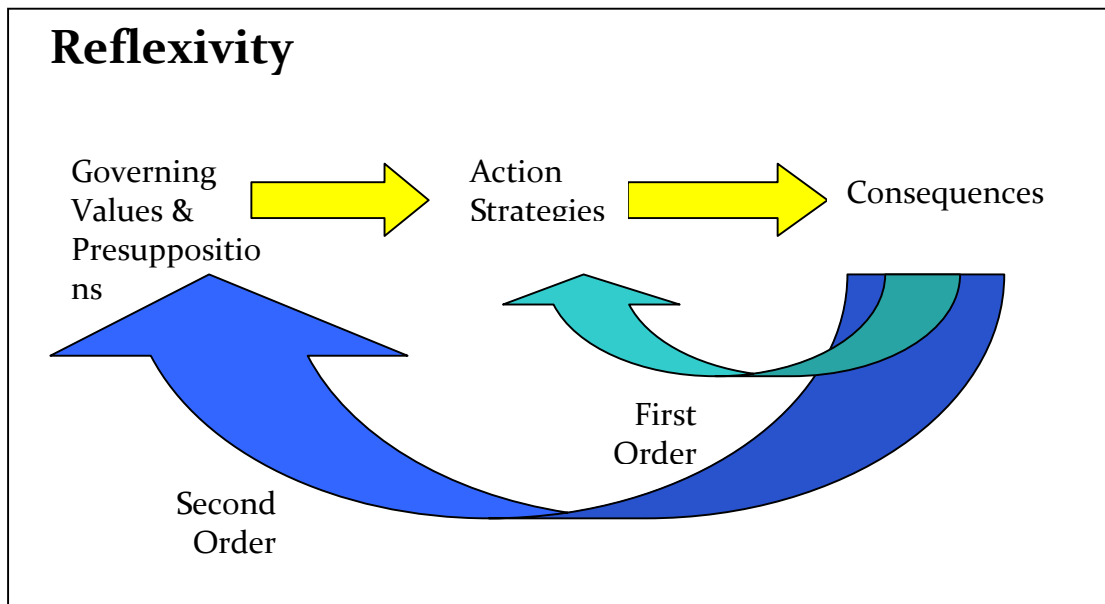


Figure 9: First and Second order Reflexivity

(inspired by Argyris, Chris, 1993, *Knowledge for Action: a Guide to Overcoming Barrier to Institutional Change*, San Francisco: Jossey Bass)

In terms of RRI a first-order and a second-order reflexivity could have different meanings. However we could say that, considering an innovation (GMO, for instance) on which participants are called to express an opinion, a first order reflexivity would be a reflection on that specific innovation in its consequences, effects, need, etc. A second-order instead would require thinking about the same conditions that allowed us to think and to think in a certain way. What could it be the interest behind, who is financing the project, who settled the participatory structure, why, etc. Of course this second-order could go from questions of a practical nature to more abstract and ambiguous matters as the discourse itself.

So, to recap, a second condition to ensure that a participatory effort is made respecting its intentions and aims at modifying the status quo is to enact a reflexive process. Even here the reflexivity doesn't have to be limited to a pre-framed one but needs to question the frame itself.

The norm can only be expressed in reality by establishing reflexivity both on the perceptions of the ways of life that are lived and promoted by those to whom the norm is addressed, and the institutional frames that allow those perceptions. To suppose that the adaptation to the dominant perception and the corresponding ways of life will happen automatically, or is directly linked to the simple implementation of a formal mechanism conditioning the acceptability of the norm, means a great misunderstanding of this reflexivity contribution. We need to move

from a simple deliberative or participative approach that develops throughout a naturalistic assumption. As resumed by Maesschalck and Lenoble: *“This advance involves a ‘reflexive’ construction of collective actors and of negotiation arrangements. It is only on this condition that one will move beyond either the belief in a natural capacity of collective actors to ensure a ‘rationally efficient’ regulation of risk, or the equally formal belief in a natural capacity of individual actors to define, with the contribution of ‘experts’, the condition of an admissible common world. Participation cannot presuppose this capacity as given. Such a presupposition ignores the reflexive operation upon which this ‘potentiation’ of the capacity to ‘rationalize’ the world and to establish a common world depends. This reflexive formation of the conditions of collective negotiation occurs through a double reflexivity. At the level of the actor, it is necessary to control the institution of internal arrangements required to ensure reflexive construction. Only on this condition can the ‘confrontation’ of the diverse ‘contexts’ involved be constructed. It is also necessary to organize a reflexive ‘return’ to the first level at the level of negotiating arrangements itself, particularly in determining the problems to be discussed and of their possible solutions”*⁵²

Especially, and accordingly, a fundamental problem is the one of enacting this reflexivity as this cannot come on its own, neither from an epistemological perspective nor from a practical one. This kind of matter has been characterizing the history of critical thoughts throughout the twentieth century. If already this problem has been face with scarce success and several difficulties by the Western Marxian tradition, now the proposal or the possible solution is grounded in a more a practical dimension. Notoriously, the established net of power that provokes and maintains social conditions of dominion, materialized in effects like reification or alienation, could be overthrown through a reaction that starts with a gain of knowledge, the so-called awareness or self-consciousness. The problems raising from this kind of necessary perceptions of history were enclosed in the reason by which the subjects considered to be reified could, at the same time for some magic or transcendental structure, and all of a sudden, start to get aware of this process and find the means by which to react.

But again a main question is how to translate this theoretical attempt in a practical structure? What we need is a model of governance that allows such reflexivity.

Aware of these epistemological and political difficulties, now the solution should be one that assumes a different shape due to the particular governance situation in which nowadays a norms construction is always embedded. Therefore, although the

⁵² J. Lenoble & M. Maesschalck, *Toward a Theory of Governance: The Action of Norms*, Kluwer Law International, 2003, pp. 261-262.

main aim turns out to be unaltered, the form by which to reach the same goal is a more 'intrusive' one. According to Lenoble and Maesschalck, "*the efficiency of a norm (or a rule in general) will be measured according to the incentives required to enable the reflexive reconstruction by the actors mobilized of what will motivate their effective institution of a concrete new way of life*"⁵³.

To summarize the two kinds of reflexive governances we could propose the following definitions:

First-order reflexive governance

First-order reflexive governance is the level at which issues are identified and solutions enacted. This is done through interaction between the governing organization and its citizens, which helps to identify what the problem is, who is experiencing it and what an appropriate solution may be. There can be differing opinions in an organization as to what constitutes a problem and there is, to some extent, a degree of subjectivity in coming up with an 'ordered problem definition'. The interaction with those being governed helps in this respect as it legitimizes the definition. Once a problem is identified, a solution usually comes in the form of laws and/or regulations passed by the governing body.

Second-order reflexive governance

Second-order reflexive governance is the level at which the institutional arrangements are provided within which first order governing takes place. Institutional arrangements can take many forms in both the public (a regulatory agency) and private (the financial market) sectors. What is important is that a framework is provided that enables first-order governance to take place. There is a distinct 'two-way role' at this level with both those being governed and those governing having input into the process to provide an effective and legitimate institutional setting. This approach enables a more comprehensive analysis of governing interactions, as actors can often be influenced by institutions (and the way) these help or hinder them in the pursuit of their goals.

Table 8: Kinds of reflexive governances

⁵³ J. Lenoble & M. Maesschalck, *Toward a Theory of Governance: The Action of Norms*, Kluwer Law International, 2003, p.92.

4.3. A third condition: ethics as a guiding principle

After understanding why a reflexive participatory governance is the one best suitable to fulfill the implicit claims embedded in the conception of RRI we need to highlight a third condition that to a certain extent represents an overarching reference. In fact if it is true that participation is necessary to the extent that allows the possibility for participants to create a common horizon this formal structure doesn't tell us much with regard to the target we want to achieve. What we believe it is fundamental to keep in mind is not the content of that reflection intended in thick terms. The norms and values provided by the different contexts represent the material on which to work. Our conception can't be shaped differently than in an immanent way. The context with its unpredictable issues will determine the matter at stake. But, at the same time our structure is also a transcendental one. In fact if the material is always unknown the form that will contain that material and the guiding principle are known. So, if the form in RRI is a reflexive participatory one, the guiding principle has to be represented by ethics.

There is a substantial difference between morality and ethics for the fact that morality involves an intimate relation with some rules that could be considered universal⁵⁴ whether ethics concerns an overarching dimension that contains different spheres and regulate contextual issues. Ethics is the container of all the different normative sets that are expressed in a particular community without preferring one. Ethics is the addition but still not the sum of economic, cultural and moral reasons. But ethics is also something more than a simple frame, is a guiding principle in the sense that it does not only preserve certain kinds of universal values like freedom or equality but has also to enhance the general wellbeing of that community. Ethics has a positive and proactive side that keeping together all the subsets tries to show how their cooperation leads to an improvement, a development of the general and therefore the single dimensions. Ethics is the effort of dialoguing, is the dialectic of immanent forces towards a better future. Therefore ethics is never given, it's not something that could be detected, isolated or reached once for all. Ethics is a constant movement.

In this sense, ethics should represent the common guiding principle and the shared effort in any reflexive participatory process. And it is not by chance that this structure represents the perfect one for responsible research and innovation.

⁵⁴ Of course the description of this distinction is quite superficial due to the aim of the text. For a better clarification, that implement single aspects, see Ritter, J., (1968), *Metaphysik und Politik. Studien zu Aristoteles und Hegel*, Frankfurt a.M. Suhrkamp.

Responsible research and innovation represents a new paradigm in order to enforce the relation between science and society. Society is composed by different normativities and RRI can represent the perfect frame to take them all into account given the polysemy of responsibility. But this term in RRI, as we have shown, should maintain this polysemy through a complementary approach to innovation. Not only one acception of it can exhaust the implications embedded in RRI. To act responsibly in front of the shareholders can never represent a condition both sufficient and necessary to obtain the legitimation of a responsible kind of innovation. Only the attention to all of those sides, all the normativities embedded in responsibility can provide the above mentioned legitimation. And this is what we define as an ethical understanding of RRI. Therefore what RRI should mean is exactly that ethical side that we have to preserve from being downgraded or diluted.

In short, RRI needs to be structured along a reflexive participatory process that is led by ethical principles. By ethical principles we intend all those transcendental lines filled by contingent issues belonging to specific communities.

At this stage we need to provide a practical proposal in order to enact such a target and after we will provide a grid that could be useful in order to assess and detect RRI. To do this we have to analyze the political level of the question and define what would be the kind of governance we require.

5. Governance Approaches and Limitations

To question how a norm is constructed in relation to the context means automatically asking how is the decision-making organ coping with this construction. The goal of our project is the "Governance of Responsible Innovation in Research". We have mentioned what innovation could be and the different understanding of responsibility across the different fields. We detected the main common shortcoming with regard to norms construction as the absence of reflexivity coming from a sort of naturalistic presupposition. Now we need to address directly the problem that we consider of fundamental importance in order to develop our parameters, the one of how governance cope with this particular relationship between norms and context.

The notion of governance appears more and more at every stage of political matters. It is a very generic term that could be easily misunderstood or undertaken in all its significance.

The most recent developments of the concept, in the context of the European Union for example, qualify this mode of coordination as democratic, participative and pragmatic, with a focus on supporting collective action (Maesschalck, unpublished, p.3-4). According to Jessop, governance is now seen as an "important means to overcome the division between rulers and ruled in representative regimes and to secure the input and commitment of an increasingly wide range of stakeholders in policy formulation and implementation" (Jessop, 2002, p.3).

This new governance model requires both groups (rulers and ruled) to engage in a social learning process (Schön, 1983). Indeed, joined participation in collaborative problem-solving can lead to critical scrutinizing of governing variables: goals, values, plans and rules. In this perspective, "reflexive governance" (Lenoble and Maesschalck, 2003) reviews its own mechanisms to insure institutional learning. Hence, it results in the co-design of institutions and the elaboration of common social representations.

Therefore, as we mentioned above, and in the wake of 'contextual pragmatics', we are interested in what governance approaches we can find.

These governance models, or better said, typologies, are the following:

Standard Model: In this model, the disagreements between the experts and the public are perceived as irrational due to the public's lack of knowledge. There are various reasons for the public being considered irrational, such as cognitive bias, the lack of comprehension of technical subjects, and aversion to novelties and risk. This model fits perfectly into the classical distinctions between facts and values. Experts

have an objective ethical approach to risk whereas the risks perceived by the public are marked by a greater degree of subjectivity. Several essential elements characterise the functioning of this model:

It is necessary to preserve the purity of expertise by not combining the facts and value judgments. Expertise is generally independent from political, economic and social influence. Trust is a central element for the functioning of the system. It is the condition of the delegation of a decision to institutions. Different mechanisms can contribute to the construction of trust. In this model, it is considered that trust gives credibility to institutions and that it is better to contain problems rather than to draw attention to them. The difference in perceptions between experts and the public can be reduced by means of education. It is supposed that people who have more advanced knowledge, especially in ethical disciplines, understand better and adopt experts' arguments. In this model, risk communication plays an important role. It is related to a one-way method of communication since the experts have little to learn from the public. The objective is to reassure the public to perceive the benefits concealed behind the risks.

Consultation Model:

This model brings into question the fundamental thesis of the standard model, namely the opposition between the irrational public and the rationality of the experts. The distance between experts and non-experts is not connected with the level of knowledge, but with the difference in the perception of risk. The public asks wider questions with regard to risk because they are no longer confronted with abstract scientific theoretical risk, but with real risk. It is no longer correct to consider that only experts are rational. Moreover the experts' perception of risk takes into account their connections with industry and commercial interests etc.

The elements which constitute this model are:

- Voluntary or involuntary exposure to responsibility. A responsibility taken voluntarily is more likely to be accepted. Conversely, an involuntary responsibility is less likely to be accepted.
- The unknown character of responsibility. The responsibilities which are invisible, unknown, or new, are less acceptable than those which are more familiar. Here the notion of uncertainty becomes central and opposes the notion of danger.
- The number of people affected by consequences. The responsibility, which may affect only a small specific group is more likely to be accepted by the wider population.

The solutions of this model are different from those of the first. Risk communications and risk management are based on a two-way process. Both the experts and the public have valid views and opinions to contribute. Each side respects the opposition's insights.

In this model, trust is incompatible with a closed, confined, or secretive attitude. To establish trust the public needs to participate in the decision process. Only by engaging the public can regulatory institutions gain legitimacy. In practice, there is a clear distinction between public opinion and the ethical opinion of experts. The public, still seen as irrational, is engaged only in risk management but not in responsibility definition.

Revised Standard Model: The first two models are based on the atomistic perception of society. The public opinion is seen as a kind of data – the aggregation of individual opinions, and not like a social production, the result of confrontation of different social groups on the public arena. In this way, the question of the social construction of a problem is omitted.

In this model, which is the extension of the standard model, the emphasis is placed on the interaction between the regulation process, social groups and media. Breyer's model of vicious circle of risk regulation is a good illustration of this model. For him, the legislative process is caught in a vicious circle with the source of the problem being the public attitude towards risk and uncertainty created by the media. Breyer claims that public perception of risk is usually inadequate. Risks are often overestimated, however the efforts to educate the public about scientific risks have failed and will fail in future. Consequently, responding to public attitude, legislature itself will exaggerate the risks and "[...] combined with an institutional inability to set detailed, scientific standards, will cause inconsistent, random, and often irrational ... lawmaking". As a result, the public will feel unprotected by law and decision-makers, which will lead to more political pressure to take action.

In this model, public influence and participation in risk management are considered with great suspicion. Accordingly, risk management includes the following elements:

1. Delegation of risk management to a competent and independent administrative body (in order to avoid the influence of media, pressure groups and politics)
2. Clear distinction between risk assessment and responsibility management.
3. Risk cannot be measured in an abstract way but rather analysed, comparing various action scenarios, respecting the general principle of coherence and
4. Trust is not connected with openness, but rather with reputation and competence. Consequently, this model corresponds with the technocratic vision. The bias against industrial lobbying, polarisation of public opinion and groups of

interests, and reinforcement of independent scientific expertise, represent the elements of the traditional top-down approach.

Co-construction Model:

This model distinguishes itself by questioning the way in which technological development projects use experts. Representations of technology come from numerous collected case studies. The works of the new sociology of sciences have progressively come to blame the traditional conception of science as a revelation of universal, independent truths of the social system they produce. This important work results from taking the methodological path proposed by Latour. It is therefore a criticism of sound science, which „melts“ the analysis of risks in the preceding models, and which invites us to place it into a pragmatic perspective.

In this model, both facts and values being taken into account, as underlined by Stirling (1999), is not only a democratic matter; it is a matter of analytical rigor because it is the only way of treating these essential points seriously. If not, how can we criticize and validate the framing? Why hide and withdraw from the debate which will discuss what may eventually be changed? The Co-construction Model usually fits in the *participatory* paradigm, since it, too, requires a participatory approach, and particularly the “weak proceduralism” of Latour (which we will return to in Chapter 6). Once again, this model has legitimacy, but not efficiency.

According to this description and having already articulated how the relation between norms and context could be, we can then match them together as follows:

Relation to the norm	Governance Typology	
	Efficiency	Participatory
Contextualised	Revised Standard	Co-Construction
Decontextualised	Standard	Consultation

Table 9: Relation between norms and context

Having all the pieces of our picture we now need to translate it into a grid of analysis useful in order to assess empirical cases.

6. Analytical Grid of Analysis: a logical translation of the theoretical landscape for the empirical investigations

(All the contents are just examples, the real data will have to be collected)

Given all the justificatory explanation and the hints we harvested from our investigation, we think that the following guidelines could be a good draft for the grid.

In order to avoid the mentioned theoretical gaps, it is necessary to organise the reflexive capacity of the actors by constructing the capacities of reflexivity in such a way as to not presuppose it as already existing due to a formal method, such as argumentation, deliberation, debate or discussion. All of these formal methods presuppose their own required conditions and as such do not necessarily involve reflexivity.

We then now propose the steps necessary in order to provide an analytical grid containing the parameters that, according to our frame, are necessary in order to investigate and empirically assess responsible innovation in research.

The first step along the development of parameters useful to assess research projects, is represented by the understanding of what kind of governance approach is used within the project. Of course, this choice would be motivated only by an intuition given in accordance with the explanation of different sorts of governance typologies. At this stage no scientific certainty can be provided in the choice, also because it will be difficult to find one research project that embeds completely one and only one typology of governance.

Therefore this will represent a starting point that will have to be fed by the following table in which we provide the parameters necessary to assess every research project that want to be labeled as a responsible innovation one.

The parameters that we developed, though perhaps we could even renamed them or add other issues, are 8 and summarize the most important aspects that need to be detected, both in qualitative and quantitative terms, in the chosen case.

6.2. Explanation of Parameters

Tools:

What are the tools that are settled in every research project in order to maintain and enhance reflexivity and therefore an ethical approach to the project and its potential consequences? (Ethical board, ethical review, committee, etc.). We will try to evaluate them in order to understand what is preferable according to our reflexive approach.

Product:

What kind of product the research project is aiming to create? What are the ethical implications of such a product and what are the reasons for which this product has been felt necessary. For this we could rely in part to what suggested by Stilgoe and add other questions, connected to our investigation on norms construction.

Process:

What is the procedure or procedures that are used within the project to pursue reflexivity and therefore an adequate level of participation? We have to assess not only the quantitative aspects of these issues but also the qualitative ones. Are the procedures influencing the process or they have an ideological aim?

Epistemic Tools:

Is the project implicitly or explicitly using a risk assessment or precautionary principle? This should maybe could be thought in terms of knowledge percentage of risks, i.e., are all the consequences foreseeable, partially, or completely unknown? In order to understand better what an epistemic tool could represent and which are the most adopted ones lets just briefly report them.

In RRI there are two main underlying principles that are commonly driving resolutions or methodological justifications, that of risk assessment and the so called precautionary principle. We will now briefly analyze them in order to put in evidence shortcomings and limits when it comes to a wider and deeper understanding of RRI.

Risk Assessment

Risk assessment, as the following precautionary principle, could be considered epistemological tools adopted implicitly or explicitly in most of the current governance approaches. Furthermore, it wouldn't be false to affirm that risk assessment is the most common one due to its highly practical and strategic spirit.

There are several possible application of risk assessment depending on the field that we take into account.

In information security, risk assessment can be qualitative or quantitative. Quantitative assessment is based on mathematical calculations of security metrics, and takes a large number of resources, whereas qualitative assessments are more personal and involve experts interviewing personnel and inspecting the setup of organisational infrastructure.

The fallback of using expert opinion when pure mathematical and systemic approaches cannot be performed is important to note here: as we argue, expert opinion is not a sufficient mechanism for assessing the impact of a system upon

society. In this case, the impact is more likely to be a financial impact than that of societal or ethical implications of the activity.

One of the biggest problems with risk assessment is the fact that its vagueness and informality forces policy-makers to conform to procedural strictness. Sets of procedures are used in this uncertain environment, immediately establishing a set of values that are dominant in the situation, limiting the debate to, for example, scientific, technological, or economic perspectives. This leads to a traditional, “top-down” governance of risky activities reliant on expertise that is, as previously argued, separated from the ethical and social impacts of the activity. This in turn leads to a removal of the democratic process from the approach. Thus the rich debate on differences in knowledge and experiences of different people in society is lost, and a positivist (and often reductionist) approach is established, leading to cognitive closure in the disguise of a deliberative democratic framework.

Precautionary Principle

The precautionary principle is a principle used in policy making to shift the burden of responsibility to prove that a potentially harmful action is, in fact, non-harmful, to those wishing to take the action. In other words, if scientific evidence exists that shows that the action is potentially harmful, there is a responsibility on the policy-makers’ behalf to protect those affected by preventing that action, unless those wishing to take the action can provide more robust support (usually scientific) for an alternative future. Although many definitions exist, most reduce to the idea of practicing caution within risky or uncertain contexts, that is, that it builds on risk assessment in order to inform policy and legal decisions. It is currently a major focus for policy-making in the European Union, where it is used in a greater risk-management program for public policy and where it is a compulsory principle of law (Raffensperger & Tickner, 1999).

It is a relatively new concept, however, and is most commonly practiced in policy that affects the environment or society. It arose from the West German “foresight” principles in water protection law in the 1970s, which assessed future plans for potential harms. This principle was then applied to other environmental contexts including acid rain, contamination of bodies of water, and other industrial-environmental contexts. It has since been introduced around the world, with several major treaties and conventions employing it (such as the Maastricht Treaty, the Barcelona Convention, and the Global Climate Change Convention), as well as outside the European Union in the policies of the US Food, Drug, and Cosmetic Acts and other US acts, culminating in the UN Rio Declaration of 1992 which called for all member states to adopt the Precautionary Principle (Raffensperger & Tickner, 1999). Since then it has been prominent in other policy measures, particularly in trade agreements with the European Union. It favors the precautionary principle as used in

two ways: risk management, where the precautionary principle acts as a risk factor, bringing more conservatism to risk assessment, and as a “primary precautionary approach”, where it is used to force testing of activities before wide-scale implementation (such as requiring a chemical to be tested and proved harmless, rather than requiring an instance of harm before it is removed) (Goldstein & Carruth, 2004).

The Rio Declarations’ definition of the precautionary principle is as follows:

“Where there are threats of serious or irreversible damage, scientific uncertainty shall not be used to postpone cost-effective measures to prevent environmental degradation” (United Nations Conference on Environment and Development, 1992). It fits into public health and environmental policy as that of a primary prevention mechanism: preventing the carrying out of some harmful action before it occurs, and its relationship with risk assessment as a secondary prevention mechanism is that it provides the initial approval for the action to be assessed. This part of the “three level prevention program” and, as all forms of primary prevention, “suffers from both a lack of certainty that a preventive effect will occur, and a difficulty in quantifying the benefit side of a cost-benefit analysis”. Despite its noble goals, the invocation of the precautionary principle in EU policy is criticized for being based more on politics than on scientific findings, and particularly as a block for trade agreements or international obligations (Goldstein & Carruth, 2004). It is also highly criticized as being imprecise, and unable to be easily operationalized, with critics claiming it is more ideological than practical, requiring high level of interpretation and clarification (Kaiser, 2008).

Kaiser also argues for the use of the precautionary principle along with a supplement of participatory policy tools. He argues that this allows for greater public consultation and thus a greater democratic mandate for the decisions, institution and implementation of outcomes of the assessment process. “No ethicist has a higher authority in basic value matters than the people themselves. [...] If the public is given a voice and listened to in the final decisions, then the public is also willing to take on co-responsibility for the outcome” (Kaiser, 2008). Although Kaiser’s claims are a little bold, he also does not address the methods for which the public should become involved or how they should be chosen. Another issue at stake is what constitutes an “acceptable risk”, or makes something “potentially harmful”. There are no strict rules about the determination of acceptability of risks. This is highly problematic and somewhat paradoxical, since the precautionary principle is most commonly used when there is little knowledge about what the outcomes might be. As von Schomberg states, “Scientific and public controversies often remain inconclusive when there is a lack of consensus on the normative (ethical) basis of such assessment mechanisms. In the development of nanotechnologies, there is not yet a shared understanding of how we might define the acceptability of possible

risks or of how we would weigh them against possible benefits” (von Schomberg 2010). The precautionary principle may rely on values, but these values are not part of the principle itself, instead, for the precautionary principle to give good guidance on ethical issues, it requires the principle to rely on ethical conceptions at its basis. Therefore it is necessary to think about specific ethical governance that could allow for an analysis of those values that underlie the precautionary principle and its application.

Participatory approach:

In which way participation is enacted and conceived? At what level would you assess it considering 5 possible level? According to Archon Fung analysis on participation we can find five different manners of participating into a development process. These 5 possibilities vary according to level of effectiveness in the decision making process.

Level of influence	Typology
Manifestly Absent	Spectator
Ambiguously Absent	Commentator
Medium	Influence
High	Co-costruction
Too High	Binding

Table 10: Manners of participating into a development process.

Assessment:

In which way the technology, the developments and results are actually assessed? Do they involve any reflexive process? If so, focused on which aim? Is it a general normative horizon that is addressed or simply the technological development or profits?

Cultural differences:

Are the cultural differences, meaning also in a certain way among the others organisational culture, potentially affecting the territory taken into account? If yes, in which way?

Norm/Law relation:

The internal conduct is driven only by laws or also by norms and if so, what kind of normativity is pursued? It will be important to understand how normativity is

conceived with regards to specific dimensions. Norms possess a power for action that cannot be limited to a legal commitment.

Once assessed, these parameters need to be confronted and matched with the corresponding norm presupposition in order to understand in which category they pertain.

At the end of this matching process we should have a certain amount of similarities that will allow us to abstract a limited number of models.

Governance Typologies	Standard	Revised Standard	Consultation	Co-construction
Case X				
Case Y				
Case Z				

Table 11: Governance typologies matrix for case studies.

Product	Process	Tools	Epistemic Tool	Participatory Approach	Assessment	Cultural Context differences	Norms/Law relations
Safety/Sustainability/Privacy/Justice	Accountability/Transparency/Stakeholder Involvement		Risk Assessment/Precautionary Principle	Spectator Participant Influent participant, Decisive participant			Committed to law/beyond law

Table 12: Parameters' matrix for case studies analysis

		Presuppositions →	Internalist	Schematizing	Mentalist
Governance Typologies	Parameters	Product			
		Process			
		Tools			
		Epistemic Tools			
		Assessment			
		Cultural Contexts			
		Differences			
		Norms/Law relation			

Table 13: Analytical grid

Collecting information on cases as established in the DOW will lead us to certain kind of conclusions. In fact, as mentioned, we should discover a certain amount of similarities that will help us in defining common practices and consequently models useful to be simulated through the SKIN program.

6.2. Implementation

It is not sufficient to assess the preconception and presupposition at a theoretical level –even if those presuppositions are revealed by our empirical enquiry.

The implementation of the norms, the models and the presupposition are very important to assess.

For instance we could ask ourselves, what are the tools that are used or could be used in order to make innovation responsible?

It is still difficult to indicate precisely what kind of tools we could use in order to implement the norms construction under a co-constructive governance typology.

The only sure statement we could move

We have plenty of suggestions in regard to RRI, not all of them fruitful according to our overall perspective.

For instance, Arie Rip suggests a set of “soft intervention practices” (Fisher, Rip, 2013) that should be taken at different levels. He takes into account legislative initiatives, Research Funding Agencies, Intermediary Organizations & Consortia, and also really concrete activities that could be carried on. Not all of them seem to be the useful in order to implement the construction of norms as we shown it previously. STIRing for instance is a really interesting case in order to show our

perspective in actual terms. *“STIR is a form of collaborative inquiry between natural scientists and engineers on the one hand, and social scientists and humanities scholars on the other, that has been shown to broaden and enhance R&D decision-making processes”⁵⁵*. The results of this process *“are then assessed in terms of a framework of ‘midstream modulation’ which charts sequential modes of reflexivity and action”*. The result is that you have a series of modulation that involve reflection and deliberation across scientists, bringing an *“increased awareness of the broader context within which an individual or an organization is acting”*. Although it could be considered a good starting point or an increase in tools production, however there is a high percentage of risk that this kind of interactions are played on the ‘expertise’ level analyzing the context from above.

Coming to speak about general governance tools, Jack Stilgoe determines a distinction between some issues that are already at stake in governance approaches, and some others that could be defined as ‘experimental’.

MAKING INNOVATION RESPONSIBLE	
Governance Experiments	De facto Governance
<ul style="list-style-type: none"> • Life-cycle analysis • Risk assessment • Ethics committees • Public dialogue • Foresight • Codes of conduct • CTA/RTTA/midstream modulation/STIR etc. 	<ul style="list-style-type: none"> Multidisciplinary collaboration Technology appraisal Training and capacity-building Institutional structures Reward and recognition Intellectual property Standards Publication Peer review Political economy of science

Table 14: Making Innovation Responsible (Based on what presented by J. Stilgoe at the “Methodological Meeting” in Paris, April 2013)

Some arrangements that we could propose but surely won’t exhaust them are:

⁵⁵ *STIR has been taken up in over 30 public and private laboratories in a dozen nations across North America, Europe and East Asia. An initial project in 2009 was funded at just over US \$1 Million, with half coming from the National Science Foundation and the rest from a dozen or so collaborators. The NSF award helped support research and training activities, including workshops in the US, Europe and Asia for an international network of science and innovation scholars based in a dozen nations. It also established STIR as associated project of the CNS-ASU.*

Societal Issue Panel (SIP) in the wake of what has been done by the UK Research Council within the Engineering and Physical Research Council (EPSRC)

Ethical Committees: A group of external experts that form a committee to deal with ethical issues within the project. These experts can come from a variety of disciplines, usually related to the focus of the project. The experts may or may not have had explicit ethical training, or be dedicated ethicists (STIR).

Focus Groups: A moderator works with a small group of people at whom the project is targeted. There is structured discussion with full transcripts recorded and analysed by specialists.

Ethical Expert Analysis: Ethical experts consult for the project on potential and actual ethical issues. Some sort of analysis of the project aims, effects, and development is made and results drawn from this.

Hybrid Panels: Similar to an ethical committee, but with internal participants. This panel involves representatives from different sets of stakeholders to give their input into the ethical impact and governance processes to be used.

Living lab approach and field trial could also represent examples of arrangements that could be adopted and implemented.

7. Internal Glossary

Reflexivity:

- Internal Reflexivity (subjective) calling a self-regulating system (re-representation in Latour, re-regulation in Habermas)
- External Reflexivity (objective) calling a tendency of correcting the incomplete reflexivity of self-regulating systems p.17

Context:

“Context” is a key component of any interpretation: In order to understand a phenomenon or give sense to it, social scientists and anthropologists gather its surrounding features. In other words, contextualization “involves making connections and, by implication, disconnections” (Dilley 2002: 438-439). For instance, a context can be “political or “economic”, but the concept can also indicate different levels of (micro or macro) analysis, such as the “situation”, a particular “society”, a specific state or even the “world-system” (Dilley 2002: 438).

Thus, contextualization is also problematic because it results from prior interpretation, and from already existing theoretical perspectives: How are the surrounding features selected? Which connections are regarded as relevant, while others are ignored? Hence, various scholars have developed the “view that context is generated and negotiated in the course of social interaction and exchange” (Dilley 2002: 439). For instance, Harold Garfinkel (1984) put forward what was seen in sociology as a radical re-specification of context, saying that it is locally created and sustained by participants. This was from an ethno-methodological perspective. Furthermore, in conversation analysis, Heritage (2004: 223) elaborates upon how utterances participants make are “context shaped”, and how participants also “*create (or maintain or review) a context for the next person’s talk*” (emphases in the original).

Governance:

Although there are several different possible definitions of governance, we could choose the following: Innovative practices of networks or horizontal forms of interaction, in which actors, political and non-political, arrive at mutually acceptable decisions by deliberating and negotiating with each other.

Responsibility:

A polysemic term that includes a wide range of acceptations going from accountability to care. For an extended explanation: (Vincent 2013, Ricoeur 2007)

Innovation:

Innovation, the creation of new, technologically feasible, commercially realisable products, processes and organisational structures (Schumpeter, 1912; Fagerberg, Mowery and Nelson, 2006), is the result of the continuous interactions of innovative organisations such as universities, research institutes, firms such as multi-national corporations and small-to-medium-sized enterprises, government agencies, venture capitalists and others. These organisations exchange and generate knowledge by drawing on networks of relationships (innovation networks) that are embedded in institutional frameworks on the local, regional, national and international level (Ahrweiler 2010). For innovations to emerge, agents require not only financial resources to be invested in R&D, but the ability to recombine their own with external knowledge, to design interfaces to related knowledge fields and to meet customer needs. Because agents engaged in innovation processes are confronted with a high degree of complexity, which is related to their competitors' behaviours, the overall knowledge development, and dynamic changes in their customer needs, it is very unlikely that single firms will master all relevant knowledge fields in isolation, not to mention pushing ahead the technological frontier in all relevant areas. Innovation networks are considered to be an organizational form of R&D which allows for mutual knowledge exchange and cross-fertilization effects among the heterogeneous actors involved. As innovation is recognized as the driving factor of economic growth, an important part of economic policy today focusses on innovation. Not surprisingly political instruments often attach significant importance to supporting innovation networks as they are considered to be an ideal framework for creative knowledge development without well specified (technological) goals.

Normativity:

Norms are sentences or sentence meanings with practical, i.e. action-oriented (rather than descriptive, explanatory, or expressive) import, the most common of which are commands, permissions, and prohibitions. Another popular account of norms describes them as reasons to act, believe or feel.

Orders and permissions express norms. Such norm sentences do not describe how the world is, rather they prescribe how the world should be. Imperative sentences are the most obvious way to express norms, but declarative sentences also do it very often, as is the case with many laws. Generally, whether an expression is a norm does not depend on its form, on the type of sentence it is expressed with, but only on the meaning of the expression.

Those norms purporting to create obligations (or duties) and permissions are called deontic norms (see also deontic logic). The concept of deontic norm is already an extension of a previous concept of norm, which would only include imperatives, that

is, norms purporting to create duties. The understanding that permissions are norms in the same way was an important step in ethics and philosophy of law.

In addition to deontic norms, many other varieties have been identified. For instance, some constitutions establish the national anthem. These norms do not directly create any duty or permission. They create a "national symbol". Other norms create nations themselves or political and administrative regions within a nation. The action orientation of such norms is less obvious than in the case of a command or permission, but is essential for understanding the relevance of issuing such norms: When a folk song becomes a "national anthem" the meaning of singing one and the same song changes; likewise, when a piece of land becomes an administrative region, this has legal consequences for many activities taking place on that territory; and without these consequences concerning action, the norms would be irrelevant. A more obviously action-oriented variety of such constitutive norms (as opposed to deontic or regulatory norms) establishes social institutions which give rise to new, previously inexistent types of actions or activities (a standard example is the institution of marriage without which "getting married" would not be a feasible action; another is the rules constituting a game: without the norms of soccer, there would not exist such an action as executing an indirect free kick).

Any convention can create a norm, although the relation between both is not settled. There is a significant discussion about (legal) norms that give someone the power to create other norms. They are called power-conferring norms or norms of competence. Some authors argue that they are still deontic norms, while others argue for a close connection between them and institutional facts (see Raz 1975, Ruiters 1993).

One major characteristic of norms is that, unlike propositions, they are not descriptively true or false, since norms do not purport to describe anything, but to prescribe, create or change something. Some people say they are "prescriptively true" or false. Whereas the truth of a descriptive statement is purportedly based on its correspondence to reality, some philosophers, beginning with Aristotle, assert that the (prescriptive) truth of a prescriptive statement is based on its correspondence to right desire. Other philosophers maintain that norms are ultimately neither true or false, but only successful or unsuccessful (valid or invalid), as their propositional content obtains or not (see also John Searle and speech act).

Another purported feature of norms, it is often argued, is that they never regard only natural properties or entities. Norms always bring something artificial, conventional, institutional or "unworldly". This might be related to Hume's assertion that it is not possible to derive ought from is and to G.E. Moore's claim that there is a naturalistic fallacy when one tries to analyse "good" and "bad" in terms of a natural concept. In aesthetics, it has also been argued that it is impossible to derive an aesthetical predicate from a non-aesthetical one. The acceptability of non-natural

properties, however, is strongly debated in present day philosophy. Some authors deny their existence, some others try to reduce them to natural ones, on which the former supervene.

Other thinkers (Adler, 1986) assert that norms can be natural in a different sense than that of "corresponding to something proceeding from the object of the prescription as a strictly internal source of action". Rather, those who assert the existence of natural prescriptions say norms can suit a natural need on the part of the prescribed entity. More to the point, however, is the putting forward of the notion that just as descriptive statements being considered true are conditioned upon certain self-evident descriptive truths suiting the nature of reality (such as: it is impossible for the same thing to be and not be at the same time and in the same manner), a prescriptive truth can suit the nature of the will through the authority of it being based upon self-evident prescriptive truths (such as: one ought to desire what is really good for one and nothing else).

Recent works maintain that normativity has an important role in several different philosophical subjects, not only in ethics and philosophy of law (see Dancy, 2000).

Precautionary Principle:

Where, following an assessment of available scientific information, there are reasonable grounds for concern for the possibility of adverse effects but scientific uncertainty persists, provisional risk management measures based on a broad cost/benefit analysis whereby priority will be given to human health and the environment, necessary to ensure the chosen high level of protection in the Community and proportionate to this level of protection, may be adopted, pending further scientific information for a more comprehensive risk assessment, without having to wait until the reality and seriousness of those adverse effects become fully apparent. (Von Schomberg 2006)

Responsible Innovation:

It sounds paradoxical to provide a definition, as our main aim is exactly to demonstrate how a definition fails in the exact aim of a crosscutting conception of Responsible Innovation in Research. However we could provide the well-known definition provided by René von Schomberg Responsible Research and Innovation is a transparent, interactive process by which societal actors and innovators become mutually responsive to each other with a view on the (ethical) acceptability, sustainability and social desirability of the innovation process and its marketable products (in order to allow a proper embedding of scientific and technological advances in our society)." (Von Schomberg 2011).

8. References

- Adam, B and Groves, G, (2011) Futures Tended: Care and Future-Oriented Responsibility. *Bulletin of Science, Technology & Society*, 31(1) 17-27.
- Armstrong, M., G. Cornut, S. Delacôte, M. Lenglet, Y. Millo, F. Muniesa, A. Pointier and Y. Tadjeddine (2012). Towards a Practical Approach to Responsible Innovation in Finance: New Product Committees Revisited. *Journal of Financial Regulation and Compliance*, 20(2), 147-168.
- Barben, D., Fisher, E., Selin, C., &Guston, D. H. (2008). Anticipatory governance of nanotechnology: Foresight, engagement, and integration. In (eds O. A. Edward J. Hackett, M. Lynch and J. Wajcman. *The Handbook of Science and Technology Studies* (Third ed., pp. 979-1000). Cambridge, MA: MIT Press
- Bessant, J. (2013) 'Innovation in the 21st Century'. In: Owen, R., Heintz, M. and Bessant, J. (eds) *Responsible Innovation*. Chichester, UK: Wiley.
- Beck, U. (1992). *Risk Society: Towards a New Modernity*. Transl. by M. Ritter, London: Sage.
- Bovens, M. A. P. (1998). *The quest for responsibility: Accountability and citizenship in complex organisations*. Cambridge, England: Cambridge University Press.
- Bovens, M. A. P., Hart, P., & Peters, B. G. (2001). *Success and failure in public governance: A comparative analysis*. Cheltenham, U.K: Edward Elgar.
- Bovens, Mark, 2010, "Two concepts of accountability: accountability as a virtue and as a mechanism," *West European Politics* 33, 946–967.
- Bruszt, L., & Holzhaacker, R. (2009). *The transnationalization of economies, states, and civil societies: New challenges for governance in Europe*. New York: Springer.
- Callon, M., (1998), Des différentes formes de démocratie technique, *Annales des Mines*, January 1998,
- Callon M. and A. Lacoste, 2011, "Defending responsible innovation", *Debating Innovation*, Vol. 1(1): 19-27
- Carroll A. B., 2009, « A History of Corporate Social Responsibility, Concepts and Practices », in *Handbook* (2009).
- Christensen, C. M. (1997). *The innovator's dilemma*. Boston: Harvard Business School Press.
- Coeckelbergh, M., 2012, Moral responsibility, technology, and experiences of the tragic: From Kierkegaard to offshore engineering. *Science and Engineering Ethics*, 18(1): 35–48.
- Crane A., Mc Williams A., Matten D., Moon J., Siegel D., (eds), 2009, *Handbook of Corporate Social Responsibility*, 2009, Oxford University Press, New-York.
- Davis, M., 2012, "Ain't no one here but us social forces": Constructing the professional responsibility of engineers. *Science and Engineering Ethics*, 18(1):13-34.

- Doorn, N. 2012, Responsibility ascriptions in technology development and engineering: Three perspectives. *Science and Engineering Ethics*, 18(1), 69-90.
- Doorn, Neelke, and Ibo van de Poel, 2012, "Editors' Overview: Moral Responsibility in Technology and Engineering", *Science and Engineering Ethics* 18 (1):1-11.
- Douglas, M., *Risk Acceptability According to Social Sciences*, London 1986.
- Dupuy, J. P., Grinbaum, A. 'Living with Uncertainty: Toward the Ongoing Normative Assessment of Nanotechnology', in *Techné: Research in Philosophy and Technology*, vol. 8, n. 2. Virginia Tech.
- Ferry, J.-M., 1991, *Les puissances de l'expérience*, 2 vol., Paris, Cerf.
- Ferry, J.-M. (1991). *Les ordres de la reconnaissance*. Paris: Éd. du Cerf.
- Ferry, J.-M. (2002). *Valeurs et normes: La question de l'éthique*. Bruxelles: Éditions de l'Université de Bruxelles.
- Fogelberg, H. and B. Sanden, 2008, "Understanding reflexive systems of innovation: An analysis of Swedish nanotechnology discourse and organization, *Technology Analysis & Strategic Management*, 20(1): 65-81.
- Forst, R., (2012). *The right to justification: Elements of a constructivist theory of justice*. New York: Columbia University Press.
- Freeman, E., (1984), *Strategic Management: A stakeholder approach*. Boston Pitman.
- Freeman, E., (2010) *Stakeholder Theory: The State of the Art*.
- Fung, A., Wright, E., *Deepening democracy: Institutional innovations in empowered participatory governance*, London 2003.
- Giddens, A. (1999). "Risk and Responsibility" *Modern Law Review*: 62, 1, 1-10, January.
- Godard, O., "L'ambivalence de la précaution et la transformation des rapports entre science et décision", in GODARD O. (ed.) (1997). *Le principe de précaution dans la conduite des affaires humaines*, Paris, 1997, pp. 37-83.
- , "Le principe de précaution, entre débats et gestion des crises", in *Regards sur l'actualité*, n°274, 2001, pp. 33-49.
- , "La précaution légitime et la proportionnalité", in *Risques*, vol. 47, 2001, pp.95-100.
- Goven, J. (2002) Citizens and Deficits: Problematic Paths toward Participatory Technology Assessment. In S. Karner and B. Wieser (Ed.), *Conference Proceedings of the International Summer Academy on Technology Studies: Technology and the Public*: 75-84. Graz, Austria
- Grinbaum, A. and Groves, C. (2013) 'What is the 'responsible' in responsible innovation'.. In: Owen, R., Heintz, M. and Bessant, J. (eds) *Responsible Innovation*. Chichester, UK: Wiley.
- Groves, C. (2006) Technological Futures and Non-Reciprocal Responsibility. *The International Journal of the Humanities*, 4 (2), pp. 57-61.

- Groves, C., L. Frater, R. Lee, E. Stokes, 2011, "Is There Room at the Bottom for CSR? Corporate Social Responsibility and Nanotechnology in the UK", *Journal of Business Ethics*, 101:525–552.
- Grunwald, A., 2011, "Responsible Innovation: Bringing together Technology Assessment, Applied Ethics, and STS research", *Enterprise and Work Innovation Studies*, Vol. 7, pp. 9-31
- Guston D.H. (2006) Responsible Innovation in the Commercialised University. In (ed D.G. Stein) *Buying in or Selling Out: The Commercialisation of the American Research University*.
- Habermas, J. (1973), *Theory and practice*, Boston.
- Habermas, J. (1984, *The theory of communicative action*, Boston.
- Habermas, J. (1993), *Justification and application: Remarks on discourse ethics*, Cambridge, Mass.
- Habermas, J. (1996), *Between facts and norms: Contributions to a discourse theory of law and democracy*, Cambridge, Mass.
- Hacking, I. (1986), "Culpable Ignorance of interference effects", in MacLean D. (de.), *Values at Risk*, Totowa, NJ: Rowman & Allanheld, pp. 136-154.
- Hajer, M., Wagenaar, H., (eds.) (2003), *Deliberative Policy Analysis: Understanding Governance in the Network Society*, Cambridge.
- Hart, H., 1968 (2008), *Punishment and responsibility: Essays in the philosophy of law*. New York, Oxford University Press.
- Hellstrom T. (2003), Systemic innovation and risk: technology assessment and the challenge of responsible innovation, *Technology in Society* 25 369–384.
- Hegel, G. W. F. (1955), *The Philosophy of Right*. Chicago.
- Hippel, E. (2005), *Democratizing innovation*. Cambridge, Mass.
- Hopt, K. J. (2005), *Corporate governance in context: Corporations, states, and markets in Europe, Japan, and the US*, Oxford, Oxford University Press.
- Husserl, E. (1970), *The crisis of European sciences and transcendental phenomenology: An introduction to phenomenological philosophy*, Evanston, Northwestern University Press.
- Jessop, B. (2003), 'Governance and Metagovernance: On Reflexivity, Requisite Variety, and Requisite Irony'. In H. P. Bang (Ed.), *Governance, as Social and Political Communication* (pp. 142-172). Manchester, UK: Manchester University Press.
- Johnson, J. M. (1977), 'Ethnomethodology and existential sociology'. in J. D. Douglas and J. Johnson (eds.), *Existential sociology*. Cambridge: Cambridge University Press.
- Jonas, H. (1979), *The imperative of responsibility: In search of an ethics for the technological age*, Chicago, University of Chicago Press.
- Jonas, H. (1982), "Technology as a Subject for Ethics." *Social Research* 49, pp. 891–98

- Kant, I., (1990), *The critique of practical reason*, Raleigh, N.C, Alex Catalogue.
- Kant, I., (1969), *Foundations of the metaphysics of morals*. Indianapolis, Bobbs-Merrill.
- Kant, I., (1955). *The critique of pure reason*. Chicago: Encyclopædia Britannica.
- Kelty Christopher M. "Beyond Implications and Applications: the Story of 'Safety by Design'," *NanoEthics* 3, no. 2 (2009): 79-96.
- Kermisch, C. 2012, "Risk and responsibility: A complex and evolving relationship". *Science and Engineering Ethics*, 18(1), 91-102.
- Kjølborg, K., G.C. Delgado-Ramos, F. Wickson, R. Strand, 2008, "Models of governance for converging technologies", *Technology Analysis & Strategic Management*, 20(1): 83-97.
- Korsgaard, C. M., & O'Neill, O. (1996). *The sources of normativity*. Cambridge: Cambridge University Press.
- Kuzma, J. & Kuzhabekova A, (2011)a, 'Corporate social responsibility for nanotechnology oversight', *Medicine, Health Care and Philosophy* 14:407–419.
- Kuzma, J. & Kuzhabekova A, 'Nanotechnology, voluntary oversight, and corporate social performance: does company size matter?' *Journal of Nanoparticle Research* 13:1499–1512.
- Ladd, J. (1991), 'Bhopal: An essay on moral responsibility and civic virtue', *Journal of Social Philosophy*, 22(1), 73–91.
- Ladikas, M. (2009), "Introduction". In Ladikas, M. (ed.), *Embedding society in science & technology policy: European and Chinese perspectives*. Luxembourg: Office for Official Publications of the European Communities, p. 7-20.
- Latour, B. (1987), *Science in action: How to follow scientists and engineers through society*. Cambridge, Mass: Harvard University Press.
- Lee, R.G. (2012) Look at Mother Nature on the Run in the 21st Century: Responsibility, Research and Innovation. *Transnational Environmental Law*, 1:1 (2012), pp. 105–117.
- Lee, C. (January 01, 2009). *Chapter 3: Historical Evolution of Risk and Equity: Interdisciplinary Issues and Critiques*. *Review of Research in Education*, 33, 1, 63-100.
- Lenoble, J., & Maesschalck, M. (2010), *Democracy, law and governance*. Farnham, Surrey, England: Ashgate.
- Lenoble, J., Maesschalck, M. (2003), *Toward a Theory of Governance: The Action of Norms*, trans. by J. Paterson, The Hague.
- Lenoble, J., & Maesschalck, M. (2006). *Beyond Neo-institutionalist and Pragmatic Approaches to Governance*. REFGOV, FP6.
- Lhuillier, J.-N. (2007), chapitre II; 'Innover, c'est faire du nouveau', in S. Boutillier and D. Uzunidis (eds.), 2007, *La gouvernance de l'innovation. Marché et organisations*, Paris, L'Harmattan.

- Macnaghten, P., Kearnes, M., & Wynne, B. (2005), 'Nanotechnology, Governance, and Public Deliberation: What Role for the Social Sciences?', *Science Communication*, 27 (2), 1-24.
- Maesschalck, Marc, (2001), *Normes et Contextes*, Georg OlmsVerlag.
- Maesschalck, M, Lenoble, J, (2010), *Democracy, Law and Governance*, 2010
- Margolis Joshua D. and James P. Walsh. 2001. *People and profits? The Search for a Link Between A Company's Social and Financial Performance*, Mahwah, NJ: Lawrence Erlbaum Associates.
- Mitcham, C., (2003), 'Co-Responsibility for Research Integrity', *Science and Engineering Ethics* 9, 273-290.
- Moldashl, M., (2010), 'Why Innovation Theories make no sense' Department of Innovation Resources and Sustainable Management, Chemnitz University of Technology, Germany.
- National Nanotechnology Initiative. (2007) 'National Nanotechnology Initiative Strategic Plan', December 2007, <http://www.nano.gov/sites/default/files/pub_resource/nni_strategic_plan_2007.pdf?q=NNI_Strategic_Plan_2007.pdf>
- National Research Council. (2006) 'A matter of size', Triennial Review of the National Nanotechnology Initiative, <http://www.nap.edu/catalog.php?record_id=11752>
- Nordmann A., Macnaghten, P., (2010), 'Engaging Narratives and the Limits of Lay Ethics': Introduction, *Nanoethics* 4:133–140.
- Owen R, Baxter D, Maynard T, Depledge MH. (2009a), 'Beyond regulation: Risk pricing and responsible innovation'. *Environmental Science and Technology*, 2009; 43(14):5171– 5175. 18
- Owen R., Crane M., Deanne K., Handy R.D., Linkov .I, Depledge M.H. (2009b), 'Strategic Approaches for the Management of Environmental Risk Uncertainties Posed by Nanomaterials'. *Nanotechnologies: Risks and Benefits* (Ed I. Linkov) Springer.
- Owen, R., Macnaghten, P., Stilgoe, J., (2012), 'Responsible research and innovation: From science in society to science for society, with society', *Science and Public Policy* 39, pp. 751–760.
- Owen, R., et al. (eds.) (2013), *Responsible Innovation. Managing the Responsible Emergence of Science and Innovation in Society*, Chirchester, Wiley.
- Pestre, D. (2013), *À contre-science*. Paris: Seuil.
- Pellizzoni, L., (2004), 'Responsibility and Environmental Governance'. *Environmental Politics*, 13(3), 541-565.
- Pettit, P. (2002). *Rules, reasons, and norms: Selected essays*. Oxford, Oxford University Press.

- Porter, M. and van der Linden C., 1995, "Toward a New Conception of the Environment-Competitiveness Relationship", *Journal of Economic Perspective*, 9: 97-118.
- Raz, J. (2011). *From normativity to responsibility*. Oxford: Oxford University Press.
- Report of the Expert Group on the State of Art in Europe on Responsible Research and Innovation, 2013, "Options for Strengthening Responsible Research and Innovation", Chair: Jeroen van den Hoven; Members: Linda Nielsen, Françoise Roure, Laima Rudze, Jack Stilgoe; Rapporteur: Klaus Jacob.
- Ricoeur, P., (2007). *Reflections on the just*. Chicago: University of Chicago Press.
- Richardson, H. S., (1999). Institutionally Divided Moral Responsibility, in Paul, E. F., Miller, F. D., Paul, J., (eds.) *Responsibility*. Cambridge University Press, Cambridge, pp 218-249.
- Simon, Herbert, 1955, "A Behavioral Model of Rational Choice", *Quarterly Journal of Economics*, 69, pp.99-118.
- Simon, Herbert, 1980, "From substantive to procedural rationality", in Latsis, S. (ed.) *Method and appraisal in economics*, Cambridge: Cambridge University Press.
- Stilgoe, J. (2011) A question of intent. *Nature Climate Change* 1,(7).
- Thompson, D. F. (1980). "Moral responsibility and public officials". *American Political Science Review*, 74, 905–916.
- Tirole, J., 2001, "Corporate Governance", *Econometrica*, 69:1-35.
- van den Hoven Jeroen, 2013, "Value Sensitive Design and Responsible Innovation, in Owen et al. (2013), p. 75-84.
- Van de Poel, Ibo, Nicole Vincent and Jeroen van den Hoven (eds.), 2011, *Moral responsibility, beyond free will & determinism*, Dordrecht, NL, Springer.
- Van de Poel, Ibo, 2011, "The relation between Forward-looking and Backward looking Responsibility", in Van de Poel, Vincent and vanden Hoven (eds.).
- Verbeek Peter-Paul, 2011, *Moralizing Technology*, University of Chicago Press.
- Vincent, Nicole, 2011, "A structured taxonomy of Responsible concepts", in Van de Poel, Vincent and van den Hoven (eds.), 2011, pp. 15-35.
- Vogel D. (2005), *The Market for Virtue: The Potential and Limits of Corporate Social Responsibility*, Washington, Brookings Institution Press.
- von Schomberg, Rene (2013). "A vision of responsible innovation". In: R. Owen, M. Heintz and J Bessant (eds.) *Responsible Innovation*. London: John Wiley.
- von Schomberg (2011a) The quest for the "right" impacts of science and technology. An outlook towards a framework for responsible research and innovation. in: (eds M. Dusseldorp, R. Beecroft) "Technikfolgenabschätzen lernen. Bildungspotenziale transdisziplinärer Methoden". Springer Verlag pp394.
- von Schomberg, R. (2011b). *Towards Responsible Research and Innovation in the Information and Communication Technologies and Security Technologies Fields*, European Commission, Brussels.



von Schomberg, R., & Baynes, K. (2002). *Discourse and democracy: Essays on Habermas's Between facts and norms*. Albany: State University of New York Press.

von Schomberg, R., (1993). *Science, politics, and morality: Scientific uncertainty and decision making*. Dordrecht: Kluwer Academic Publishers.