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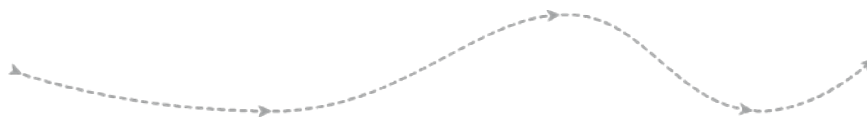
“Success factors and barriers for mainstreaming RRI in SMEs”

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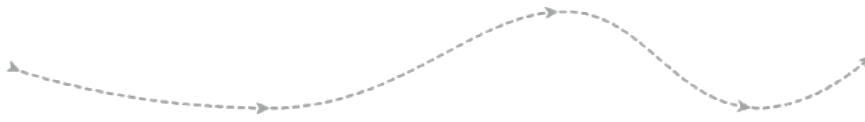


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Executive Summary

The aim of this qualitative study was to capture the experiences and opinions of healthcare and nanotechnology industry leaders on the concept of RRI. 30 Industry leaders, 18 from the healthcare sector and 12 from the nanotechnology sector across Europe, participated in in-depth interviews based on an interview protocol. Results of qualitative analysis showed that most of the companies follow some RRI principles, although they are not fully aware of the concept and of what does it involve. Some of the main concerns of the participants for adopting RRI were that companies which adopt RRI will be less competitive, because of the possible extra cost, and the issue of protecting their ideas. The major barriers identified of adoption of RRI in SMEs are the financial issues, the society's and researchers' values, the regulatory framework, the lack of knowledge (education) in citizens, in order to appreciate and show a preference to products that were constructed by companies which followed the RRI principles, as well as the lack of technology and training in researchers. The success factors for adopting RRI in SMEs identified were collaboration between different stakeholders, recommendation from the European Commission for adoption of RRI, better information to both citizens and companies and successful case studies. Finally, the participants offered some suggestions for overcoming the challenges, which involve changes in the legislation, support from government, development of RRI platforms, collaboration between universities and business and better education to both citizens and scientists for being responsible.



1. Introduction

One of the first steps in the COMPASS (710543) project was to undertake a series of in depth, distributed interviews with key industry personnel across Europe. The aim of this qualitative study was to capture the experiences and opinions of what are thought to have been healthcare and nanotechnology industry leaders on the concept of RRI in industry and realise the following objectives:

- To achieve an understanding of applicability, relevance and values of RRI for industry;
- To highlight potential challenges, drivers, and requirements for RRI in industry;
- To identify practical implications and success factors of implementing RRI in healthcare and nanotechnology.

Task 1.2 complements the systematic review (D1.2) through fact-finding interviews with key healthcare and nanotechnology representatives across Europe. Their perspectives on critical responsibility issues, success factors, and barriers for adoption of RRI in healthcare and nanotechnology were gathered and analysed for each innovation field. These interviews have been compared to elicit innovation field specific success factors and barriers as well as general industry concerns/positions.

The interviews will be complemented by six fact-finding input papers from high level experts assembled in the Advisory Board. In order to ensure consistency, the task leader developed the interview guideline, including innovation field specific variants, analyse the collected information and compile it in a synthesis report (D1.2 Synthesis report “Success factors and barriers for mainstreaming RRI in SMEs”). The results of the task will directly feed into the preparation of the Responsible Innovation Labs (WP2).

2. Methodology

2.1. Instruments

An interview protocol was developed by UCY to ensure consistency in the data collection. A first draft of the protocol was prepared, based on the interview protocol that was used in the Responsible Industry project. The task leader disseminated the protocol to the rest of the partners for suggestions. The interview protocol was then revised and finalized, based on partners’ feedback. The interview protocol consisted of 16 questions. Figure 1 includes all the questions that were included in the interview protocol. The first two questions (1. Can you tell



me about the research and innovation that is happening in your company? How do you try to make it a success? 2. The purpose of this interview is to seek your opinions about success factors and barriers for employing a relatively new idea, namely Responsible Research and Innovation, or RRI, in SMEs. Is that a concept you have ever come across before?) examined individual's prior knowledge and understanding of the concept of the RRI. Then participants were asked to report what they considered as the main barriers and challenges for adopting RRI in healthcare and nanotechnology, as well as what they considered as success factors. Participants were also asked to report whether their company use ISO or other forms of certifications and what attention is paid to different stakeholders during the process of decision making in their companies.

The instruments were then submitted to the Cyprus National Bioethics Committee to get ethics approval. WU submitted information on these instruments and detailed information on procedures that will be implemented for data collection, storage, protection, retention and destruction and obtained the opinion of the WU Data Protection office. WU also signed a Data Protection Pledge and submitted a notification to the Austrian Data Processing Register (Datenverarbeitungsregister). DMU has also applied and received ethics approval from De Montfort University.



1. Can you tell me about the research and innovation that is happening in your company? How do you try to make it a success?
2. The purpose of this interview is to seek your opinions about success factors and barriers for employing a relatively new idea, namely Responsible Research and Innovation, or RRI, in SMEs. Is that a concept you have ever come across before?
(Probe further here if necessary and help by offering suggestions to find out about particular ways of how RRI can be recognized in practice)
3. In your experience what are the key drivers for this type of activity? (e.g. who is in charge, are there any requirements for, and what are people's motivations for undertaking research and innovation responsibly)
4. In your experience what are the success factors for adoption of RRI in healthcare/nanotechnology?
5. In your experience what are the main challenges/barriers for adoption of RRI in healthcare/nanotechnology?
6. What do you think would need to be in place to help with those challenges/barriers?
7. What are your main concerns regarding the adoption of RRI in healthcare/nanotechnology?
8. In decision-making in your organization, do you involve a wide range of stakeholders?
9. In what ways is consideration paid to your target or end users in research and innovation activities? (e.g. who is consulted in the development phase, who benefits from it and why specifically these groups, do you interact with NGOs?)
10. Do you find that people you deal with in the research and innovation phases of your activities have different values, interests and ideals? If so, how do you deal with that?
11. What attention is paid to codes of conduct in your company? (e.g. Do you have any particular protocols in place to consider ethical aspects of research and innovation? Do professional ethical codes have an impact in your view and if so, how? If you don't believe they have impact, do you have any idea why not?)
12. What attention is paid to ISO or other certifications in your company?
13. To what extent does your company attempt to predict (unintended) consequences of your businesses' research, development and innovation activities, in particular when it comes to impact on the environment, society and the well-being of users? (Ask about any methods used in this assessment)
14. Have you or would you consider making the results of your research and/or other innovation data openly available? (What would be the benefits or reasons why not?)
15. Has this interview given you any ideas that you find interesting?
16. Anything else you would like to add?

Figure 1 Interview protocol



2.2. Procedure

In total, 30 in-depth interviews were conducted, 18 in healthcare and 12 in nanotechnology. Three partners, the Wirtschaftsuniversitat Wien (WU), the De Montfort University (DMU) and the University of Central Lancashire Cyprus (UCY) carried out the interviews. Three interviewers, one from each of the three partners listed above, conducted all the interviews. Each interviewer conducted 10 interviews, and provided a transcript of the interviews to UCY. For recruiting interviewees, all the partners were involved. Partners were asked to send suggestions along with contact information to the task leader. The task leader formed a list, based on the suggestions received by the partners, and distributed the list to the three interviewers. Some of the times the partners made the initial contact and introduced the interviewer to their contact. Then, prospective interviewees were sent an invitation to participate and an information sheet (see Appendix I). Those that responded positively were interviewed. Each interview lasted approximately 25-60 minutes and were conducted in person, via Skype or telephone. Participants were prompted to give their views on the issues that were asked, but they were also informed that if there were any issues that they prefer not to discuss they could do so. Every interviewer followed the same interview guidelines that had been developed specifically for this study and utilised the same interview schedule. This was necessary to promote consistency between interviewers. The task of the interviewers was one of probing for further details or asking for clarification when necessary without offering opinions or using leading questions. A recursive approach to questioning was adopted for the interviews so that they proceeded as a conversation than a question and answer session.

The interviews were audio recorded, transcribed and translated into English where conducted in a different language. All interviews were conducted in line with ethical considerations such as informed consent, respect of privacy, and avoidance of harm and deception (Diener & Crandall, 1978; Fontana & Frey, 2005).

Analysis of the transcripts was undertaken centrally, led by one of consortium partners (UCY) to ensure consistency. A stepped process of thematic coding was utilised. Using an inductive approach, the first stage of open coding was followed by a further stage of thematic coding during which emerging themes were compared and contrasted and gradually refined.

2.3. Participants

Key industry representatives in healthcare and nanotechnology sectors across Europe participated in the study. Purposeful sampling was conducted to identify prospect interviewees. All the partners were asked to propose prospect interviewees from their network. For pragmatic reasons, the sample size was limited to 30 which is generally agreed as a good



sample size for this type of qualitative research. As Adler and Adler (2012) point out, “we often suggest aiming for a sample of loosely around 30. This [...] offers the advantage of penetrating beyond a very small number of people without imposing the hardship of endless data gathering, especially when researchers are faced with time constraints” (Cited in Baker & Edwards, 2012, p. 8). The participants were from different countries across Europe, 10 were from the UK, 7 were from Austria, 5 were from Spain, 4 were from Cyprus, 2 were from Belgium, 1 participant was from Italy, 1 participant was from Slovenia and another one was from Switzerland.

Table 2. Overview of Interviewee details

Participant	Country of origin	Type of business	Position held
H1	Spain	Healthcare	CEO
H2	Cyprus	Healthcare	Founder
H3	Spain	Healthcare	CEO
H4	Cyprus	Healthcare	CEO/Founder
H5	Cyprus	Healthcare	CEO/Founder
H6	Spain	Healthcare	Director
H7	Austria	Healthcare	CEO
H8	Spain	Healthcare	IT - Manager with Managing director
H9	Austria	Healthcare	Founder
H10	Austria	Healthcare	Founder
H11	Austria	Healthcare	Founder
H12	Austria	Healthcare	Founder
H13	UK	Healthcare	Chairman
H14	UK	Healthcare	Chief Executive Officer of UK subsidiary
H15	UK	Healthcare	National Sales Manager
H16	Slovenia	Healthcare	Managing Director.
H17	UK	Healthcare	Managing Director
H18	UK	Healthcare	Managing Director
N1	Spain	Nanotechnology	Founder
N2	Belgium	Nanotechnology	Founder/CEO
N3	Switzerland	Nanotechnology	Owner & Chief Innovation Officer
N4	Cyprus	Nanotechnology	Senior Engineer
N5	Belgium	Nanotechnology	CEO
N6	Italy	Nanotechnology	Founder
N7	Austria	Nanotechnology	Owner
N8	Austria	Nanotechnology	CMO
N9	UK	Nanotechnology	Consultant
N10	UK	Nanotechnology	Company CoFounder
N11	UK	Nanotechnology	Founder of the company
N12	UK	Nanotechnology	Founder and Co-Owner



RESULTS

3. Category 1: Existing RRI related activities in interviewees' companies.

In this section, we describe participants' responses regarding the research and innovation that is happening in their companies (question 1 of the interview protocol), whether they involve a wide range of stakeholders in decision-making in their organizations (question 8) and whether they think that people that they deal with in the research and innovation phases have different values, interests and ideals (question 10). Finally, we present participants' main concerns regarding the adoption of RRI in healthcare/nanotechnology (questions 7).

Almost all of the interviewees reported activities that fall under the umbrella of RRI. In many cases it was the case that the companies rather implicitly followed particular RRI principles without actually being aware of their responsible innovation behaviour. The activities described by interviewees varied greatly and a wide range of activities and processes were described. This was attributed, in part, to the fact that the participants came from very diverse companies. Interviewees acknowledged that innovation is a necessity in order for them to address the needs of the market:

“Well we are doing research and innovation activities because we needed to build a new system that didn't exist before. So, there was a requirement to research and find new ways to do things. Because there is no other system in the world.” (H8)

An interviewee gave as example for implementation of RRI, the development of tele-medicine:

“developing new technology platform that will meet the needs of tele-medicine in the next coming years” (H14)

With regard to innovation, most of the interviewees appear to have had in mind an associated view of the responsibility they had towards customers and clients.

Some of them view responsibility towards clients as companies' response to their needs. Few of them (two participants) viewed responsible selling as part of the implementation of RRI in SMEs:

“Another thing ... it's two different things – responsible innovation and responsible selling.” (N9)



“I think the responsibility element is about flagging up things that you think don't work and mechanisms of pricing and, propositions on a commercial basis that are potentially unethical. We have, and we require the manufacturers or distributors, to not only put in who it's intended for, but who it is not intended for. In other words, what the occupational therapist would describe as the exceptions, and why it will not work for them. Of course you can understand why people would not want to put that in, because it's really saying, maybe, 10, 20% of the market should not buy this. So, we see our responsibility as exposing, if appropriate, but certainly inducing clarification so that there isn't any miss-selling; so that people aren't disappointed. In other words, products need to, to do what they say on the tin.” (H13)

Some other interviewees (five interviewees) viewed responsibility in SMEs as a term including also responsibility towards the environment.

“RRI is it's quite vague. Responsible like else safety and I will say for environment. With Nano-materials we are not so experienced on what could be the danger or not and so sometimes it's really difficult to find appropriate ways to evaluate them or give some info on that. So let's say for the responsible I see more in agency. I know that there are some also restrictions regarding limiting contention of resources and to reveal whether it's very valuable or not.” (N5)

“I suppose it's two strands – first, using materials which are maintained and allow the building to perform in the way that it was designed; second is this thing about healthy environment for people ... so healthy buildings, healthy people. It's kind of interlinked actually – it's about maintaining a healthy environment using material that don't have VOCs (volatile organic compounds). [...] It's looking a bit more at the wider picture ... the cradle to grave of products in terms of their carbon when they're produced, their life-span and then how do you dispose of them at the end of their useful life.” (N9)

Two of the interviewees reported that RRI includes responsibility towards the company's employees, such as the example below:

“we have 8 permanent employees now, 3 of which are women and they are in highest positions. So, the head of quality is a lady, the head of R&D is a lady so yeah” (H12)



3.1. Stakeholders' Values

Most of the interviewees reported that they involve a wide-range of stakeholders in decision making in their companies. This tended not to be the case for small companies, where the decisions are normally made by the CEO/Founder of the company.

When asked if they think that the people they deal with in the research and innovation phases of their activities have different values, interests and ideals, 70% of the interviewees asked (N = 14) reported positively:

“they are of course different. The universities are more interested in gaining knowledge for the knowledge sake I'd say, and they are also satisfied with we have a result that proves that it's not possible. So of course this is not our aim. Our aim is to concentrate on those things that have a high chance of finally functioning and working out.” (N7)

“you need to be aware of these inflictions in your process. And you need to be aware that you need to serve all those different needs and those needs are completely different. The diagnostic lab wants a test that is cheap, automated, quick, maintenance free. The physician wants a good diagnostic result and the patient wants to be treated in the optimum way. And those are often conflicting interests. Something that is cheap and quick is not maybe the best tool. So this is something we try to overcome. The only one who probably will suffer initially is the actual treating doctor because he has to deal with more information. So we need to make sure how can we benefit the doctor for his initial higher effort level that he has to give.” (H12)

The other 30% (N = 6) of the interviewees asked, reported that they don't think that different stakeholders share different values:

“No, we haven't encountered that. they had the same motivation to do something right” (N4)

“Not really. We definitely share the same ideas for research. So most of the time, the research is paying by himself, let me say. So you are just taking care about what's happening and to understand what's happening, what's going on and testing your own ideas. So, I can't use any other words to say: enthusiasm in the research.” (H4)

3.2. Concerns for adoption of RRI

When interviewees were asked to report what their major concerns are for adoption of RRI, 19% of them reported that they have no concerns whereas the rest provided the following concerns:



3.2.1. Companies adopting RRI will be less competitive.

13% (N = 2) of the interviewees asked reported that companies adopting RRI may be more expensive compared to companies that are not adopting RRI, therefore they would be less competitive.

“Because for example if competitors don’t follow responsible research and innovation, but we in the company yes, it could become our disadvantage.” (H8)

“Responsible innovation is not just for me so ... also the other party - lets say ... our government should over-see, act responsibly to support innovative processes in our country. So I try to be responsible from my point of view, but I expect some understanding or so, on the other side.” (H16)

3.2.2. Protection of ideas

13% reported that the major concern of the adoption of RRI is the protection of ideas:

“the main things in which everything is generated is the protection of your own idea. And so it’s very difficult to share about... everything is based on that unfortunately... So most of the big earning is based on the little bit of knowledge that you have and other people don’t” (N6)

“I would say a large part of it is based on published material already... there is further research on the applications downstream that we’re more protective of simply because it may mean that we have at this point an advantage that we are not willing to to share at this point.” (N10)

3.2.3. Most companies won’t adopt RRI

Another 13% expressed the concern that RRI will not be adopted by most companies.

“I don’t think the concern should be in adopting RRI, it’s about whether it will be adopted. So, whether people will be responsible in their research” (H2)

3.2.4. Patients will be underrepresented

13% of the interviewees asked expressed the concern that the patients will be underrepresented:

“because of the economic pressure, and the, the challenge of introducing innovation, I think, my concern is that a lot of players are not paying enough attention to the patient... what the patient needs. So that could be in safety, that could be a compromising on the service. So I think a lot of the economic pressure could compromise what the patient will experience at the end.” (H14)

“They have very heterogenous interests. The clientele.. we have for one business presentation one slide saying that we want to create a triple win situation. Triple win means benefits for the



patient, benefits for the staff and benefits for the hospital. I would say again, before the economic situation and the DC situation and the other environmental things were not so difficult, there still was a good balance between these three groups. Today I'd say, the hospital is the only decision maker in the end of the day. The physician can make pressure in case the product is so good that he desperately wants it. Sorry for saying this but the interest of the patients is not really there and the patients is a very small lobby in this situation. Maybe the patient have a strong lobby for public things but technology wise and medtech wise, if he looks from this perspective, the physician decides a little bit but mainly the hospital decides if this technology is used or not.” (H11)

The following concerns were adopted by 6% of the participants:

3.2.5. A lot of work is required to educate citizens

One interviewee reported that there is a need to educate customers in order to be able to select products that have been produced by companies which adopt RRI, however there educating citizens involves a lot of work:

“Well, as the technology is very new, basically there is no much companies that does it, so there is no much point of comparison. So we need to have to educate our potential clients about the technology and this is kind of a lot of work... a lot of effort in order to you know to sell the product. But, on the other hand, people show a lot interest specially when they see how beneficial that product can be to, you know, the [their] industry and to their business.” (N12)

3.2.6. Effective collaboration between stakeholders

H1 expressed the concern that effective collaboration between different stakeholders is difficult to be achieved:

“Because it means you have to be generous in order to work for something greater like a better society a better health care, but that's easy and nice to say but not easy to do. Because it means that at some point you have to step back or aside and say “okay I don't always have to win”. If you always want to win and win big then it's going to be very difficult.[...] how are we going to be able to all work together.. emm for me when I think about RRI health care I think about this it's like four panels, generally speaking, you have the government, the academia, the patients and the private sector. So how are we going to be able to sit in the same table and share ideas and share new ways to do it” (H1)

3.2.7. Companies adopting RRI will lose money

N2 expressed the concern that companies which adopt RRI will be in disadvantaged position compared to companies which do not adopt RRI.



“we shouldn’t lose opportunities or lose market share because we apply RRI. Again, it’s contradicting but from a true business point of view, we have to achieve a certain revenue at the end of the year, we have to achieve a certain profit so that we can co-exist again next year and so on.” (N2)

3.2.8. Healthcare becomes expensive and not accessible by poor people

H5 expressed the concern that healthcare is becoming very expensive and therefore inaccessible to poor people:

“That health care in general is significantly improving, it’s possible to get really good treatments nowadays but they are becoming so expensive in a world where the gap between the poor and the rich is continuously increasing which means that the health care is developed for the rich. That’s my only concern. This has to be resolved. There must be a base line. If we go more and more expensive and at the same time we have the gap between the rich and poor increasing allow me to say I don’t give a fuck about health care I mean it means nothing to humanity even if you make a lot of progress and you are novel and you have the best things you can do if they are not accessible to everyone well then they are useless. We are moving towards the wrong direction that’s my main concern.” (H5)

3.2.9. Careful implementation of technology to prevent the development of bigger problems

N10 expressed the concern that if the technology is not implemented in an appropriate way, it may cause bigger problems than the ones that it tries to solve:

“We are conscious of the fact that if you are not careful in this technology you could actually introduce problems that could cause even bigger problems in the years ahead ... so one of the things we are very careful of is just engaging in technologies where we can have a circular economy to recuperate. Let me give you an example ... the removal of arsenic from water. The difference is that we are able to re-use (the) filters again and again to recuperate the contaminants if they are valuable; (or) condense them in such a way that we minimise the footprint required to dispose of them....We have to try to infer what the damage will be from testing in vitro. If we got it wrong, I can’t quantify what kind of damage that would be. We’re not concerned so much about the methods and processes we’ve patented in order to produce these materials, we are more concerned about the down stream applications where such rigour is not implemented...Obviously we have to have safeguards to prevent unintended consequences of the usage of these materials in ways that were not meant.” (N10)



3.2.10. Mis-selling of RRI products

H13 expressed the concern that RRI products will be mis-sold.

“miss-sold, especially if you provide a safety device for someone who has Alzheimer's then it will work quite well probably in the early stages, and even in the moderate state. But please don't think that it's going to keep someone safe when they enter the final stages” (H13)

3.2.11. Developing reliable technology

Another concern expressed was the challenge of developing reliable technology that people can trust:

“trusted technology caring for people and I believe that, that, that should be at the heart of everything you do... Trusted technology i.e. when you have a product that, that we've designed and built, put it to your house, you know, you have to trust that when you need help, help will be forth coming. Of course, you haven't got that person at the other end of the room, so you have to rely upon the technology and the infrastructure, telling somebody remotely that help is required, and, you know, as such we have a duty of care to make sure that the products that we, we innovate and produce can supply, and meet those needs.” (H15)

3.2.12. Individuals will be resistant to RRI

Finally, another concern mentioned is that individuals will be resistant in accepting new innovative products. Below is an example describing this issue:

“I think the best feedback I ever had was a, was a throw-away line from a customer when we, when we first brought [our product], we cast our mind back six years, distress alarms were beige, great big red button on the top, they were very boxy, very institutional, and, and as such you know they looked like a badge of need – and people don't like them. When we invented [our product], we took the feedback from the market that are set to provide this was going to be in people's homes and, and we developed a product that looked like a broadband router, that radio, something that wouldn't be that badge of need. Ad straight away, the throw-away that customer came up with was - I went up to an individual that could really benefit from tele-care he said, no, no, no all the way through, and then when I showed him the [our product] he, "but I'll have that". And as soon as he did that, he opened himself up to the possibilities [what] our tele-care, and tele-health can actually aid him and, and make positive difference to his life... keep him in his own home for longer. That's what it's designed to do.” (H15)



3.3. Making results of research and innovation openly available

When we asked participants whether they have considered making the results of their research and/or other innovation data openly available almost all of them (except one) were positive but expressed major concerns. The majority of the interviewees reported that they would make some extent of their data openly available or they will first patent their product and then make it publicly available.

Some of the interviewees identified the benefits of making their data openly available:

“you cannot cheat if you show your technology to all the people. You cannot say that you have a wonderful technology that doesn’t work. You can do it if you don’t show anything and say that everything is secret. The more you show, the more robust your technology has to be.”
(N1)

However, all of the interviewees underlined the possible thread of someone “stealing” their ideas:

“Because it’s a very competitive domain. We have... some aspects of our research has to stay confidential. We cannot share with everybody otherwise we lose our advantage over our competitors.” (N2)

“once you are in the company, the first layer of worry is always IP. So first thing is to protect, second is to protect a bit more and then if it’s really well protected and the risk of giving away some rights or information, then we talk about publications and putting in some journal that is published. So it’s not.. for the researchers it’s important but once you are in the company, everybody understands that the first step is to protect properly.” (H6)

“I mean all the things happened because people put money and wanted to earn money. So especially in health, you can have the best molecule, ever find to solve the problem, but if you don’t have a proper patent who can protect you molecule, no one would put money in order to develop the project. So it’s very complicated by my view.[...] I definitely support the idea of finding and put it together all the research and make it available for the... for all the human being. Which makes sense. My personal point of view. But it will be very difficult to find a way which you... you have to go for a different... I mean it’s a sort of socialism, or it’s very different. With capitalism in this way, it will be very difficult.” (N6)

“And we have quite a few patents to protect of what we are using in our products so it’s not so easy to copy and paste. The Chinese market is also very active in that area, we need to be very careful there to protect our IP which is also the value of the company. There is lot of



invention and IP involved in our product development and at a certain point in time, if that company is maybe acquired by another company your IP portfolio is a big portion of how your valuation will be at this certain point of time. We are open to a certain extent but of course we also need to protect our differentiating IP, our procedures that we use to produce our innovative products.” (N8)

«I think that scientific results, especially when they are publicly funded, they should always become freely available and I'm much in favour of having open source type of scientific platforms, like plus 1 and so on, where researchers can actually get the information because a lot of these publication systems today it's a commercial business and you pay fortunes to get access to that. The other thing is, I mean innovation, when it comes to your internal secrets, because usually you have to file a patent what for example we have done. But in the patent you have only very rough information and there is much more details to the method and so on. So you also need to make sure to protect your basic knowhow and intellectual property so that it's not too easy to copy you.” (H12)

“We've been guilty for a number of years in taking ideas to trade shows, such as the TSA conference, and showing them to people, and asking people what do you think of this, should we develop this, is this something that will be needed in the market, and then you come back next year, and someone else has got that very product because they, they've seen it to.” (H15)

“We want to publish. There is only one limitation as a company, private company, actually I have competition which is some four years behind us. So whatever, I publish, they read, and study. But they are technical and more equipped [and] have more manpower so they can easily, actually, advance in this area, if they know what to do and if they know what not to do. So I keep a little bit cautious data for ourselves. So the company does not share everything.” (H16)

3.4. The use of protocols and tools for RRI related activity

Most of the interviewees, especially from healthcare reported that they follow protocols and tools.

“ISO 13485 is the main ISO quality norm for medical products. That means we have to have a quality management system in place, quality control procedures. We need to develop in a documented and validated way. We cannot just develop something and then go to the market



*and when somebody asks you just say 'Well it works because we tried it'. So you have to develop test plans, validation plans, test cases and then test and, most of all, document the result of your test. We also have several clinical studies, in German it's called *Leistungsbewertungsprüfung*, that show that the software, our analysis software, performs in a way that is applicable to diagnostical procedures.” (H10)*

“We are members of several associations in the United States and European Union. The NIA (Nano-Technology Industry Association) is one [where] I represent (the company) in the Nano groups that are developing the roadmap for European implementation of nano-technology... [Re. standards] The ISO22197 is one such standard that actually measures the performance of our materials against other materials.” (N10)

4. Barriers for mainstreaming RRI in SMEs

Interviewees were asked to report potential barriers and challenges for the inclusion of RRI in the private industry. Below are the main potential barriers that were reported by the interviewees:

4.1. Financial issues

The most commonly mentioned source, reported by 30% of the participants asked ($N = 17$), was the financial issue and particularly the challenge of balancing the need to achieve financial profit with the need of finding the resources needed to conduct activities in a responsible manner. Those who identified cost as a barrier mentioned cost for testing materials and for receiving feedback while testing the products:

“There's a lot of testing of materials – which is very expensive because there's different types of testing. So we use [2 Universities cited]. But the best place to test materials is on buildings. But it's just horrendously expensive to go through the system and BBA [British Board of Agrément, a quality mark] approvals.” (N9)

“Today you have to have a large budget, you have to sponsor end customers to do research for you. And I'm not talking about 10,000 EUR, that's what we also pay to doctors or technicians in the hospital to spend extra time or if we have to get access to a machine, we give products or we make an agreement. A consultancy agreement so they can cover their costs. But today everything costs much more. If it is more professional or less professional, I don't know but nobody does normally anything for you if you do not put cash on the table.... Either you have to pay or they want to get license. This makes it all very difficult because only



large companies can afford this. When I was in my first company it was more or less a deal. They get access to new technology, they get a highly discounted system and the deal more or less was you do some publications, that's good for your career and that was kind of an informal give and take situation. Today you want to set something up you spend thousands of problems to solve the leader things. Contracts, ethic commission, hard to do with a small company in a small environment where you do not have a legal department but you do need to handle all this. I'm not complaining but I still, from my former company, I still have a strong network and I can use this network and there is long term relationships and trust on both sides. So this will end up in a fair deal but starting from scratch without a network, really difficult.” (H10)

They also underlined that part of the problem is that innovative products do not last long, because technology is developing rapidly. This is reflected in the following quotes:

“The cost of innovation ... developing new products quickly. It's a lot of cost because it's not a volume based industry. Products tend not to last long. If you take a mobile phone, for instance, they last 6 to 12 months and then they're gone!” (H15)

“One downside is that [the building materials] are still much more expensive. But the market is now growing – so I think there is definitely demand. It's not niche as in 'tiny'. It's not yet massive.” (N9)

The cost of responsible innovation, according to the interviewees, makes the products that have been developed following RRI procedures more expensive compared to products that have not been developed following responsible standards and this place them in a disadvantaged position in terms of competition:

“You've got to accept that you may be more expensive than your competitor because actually he doesn't care at all.” (H17)

As the interviewees mentioned, the financial issue is a barrier especially for small and medium size companies which have limited resources:

“normally the major challenges or barriers are resources because sometimes you could have more impact doing some things but they do not create value itself... or by economic value. Because the company got very limited resources, have to decide what to do or what not to do. So some of them, some activities that could be... that could have an impact in some way. But they are not core business or core in the development. So they are the first things that you are gonna lack outside the plan. And the time... when an investor ...in this kind of company or other professional investors, the time starts to be a really important driver in the process. And



implement these kind of processes in terms of think about responsibility in more than the core business, it takes time.” (H6)

However, the financial issue is also a barrier for big companies which focus on profit.

“The insurance company - they don't talk about the patient, they just talk about the medical stuff, and scoring of different activities. So the patient is absent, not important. So the innovative work in this way would be, if we change the approach toward the patient; also towards the users of tele-health services; also those working on prevention, not on a long term conditions. So in our view, as we see, in the [Telehealth Quality Group – a quality standards body] is that we should actually focus on maintaining health and using tele-health services for prevention” (H16)

“we don't talk with the highest management decision making persons so even if we talk with middle management or lower levels, they would be, “Oh yea, this is a fascinating idea. Let's do this”, but they will never do it because the top management will not approve anything that will not generate more revenue, right.” (N2)

“the interest of the people. I mean in earning money. Because sometimes going for the long way, it takes a little bit longer and sometimes people who want to earn their money quite quickly back.” (N6)

4.2. Values

The third most commonly mentioned barrier was the society's and researchers' values. 22% (N = 5) of the interviewees asked, mentioned that citizens' and scientists' values is one of the major barriers for adoption of RRI in SMSs. The following interviewees have described nicely this barrier:

“I think that the Vantage Points that are listed in philosophy and from philosophy to culture and from the cultural to the policy and from the policy to the strategy, from the strategy to tactics, from the tactics to logistics and from logistics to tasks. So, you don't go to the task directly if you don't have the philosophy and the culture before. I think that if your philosophy and your culture is to get as much money as you can, as fast as you can and the world will be fixed by God, then there is nothing to be done. I think is the cultural thing before you start innovate. I think we should be more educated about consequences and more responsible. There are consequences in everything we do” (N1)

“I don't think that RRI program will make people more responsible. To make people more responsible you have to go deeper into society. You need education. And this is not a problem of innovation responsibility. It is the problem of society. Not responsible societies will not make



responsible innovation! They will make stupid innovation. Stupid societies make stupid innovations, stupid decisions, and stupid referendums. So education should go first and once you have responsible societies you will get responsible innovations.” (N1)

“There is traditional business culture where research is not appreciated because you have to make money and all the business, culture around the university, investors, spin offs and start-ups don’t want to invest into anything which is not fast profit. It is quite a low cost, a low quality business culture we have now in our world, in US, in Europe. That’s the problem. They don’t ask you do things well. They ask you to cheat and invent and make artificial things and get plenty of money from investors. The economical culture is quite low, happy, low cost, not very useful.” (H1)

“Applying RRI, or not, is not a matter of decision. It’s a matter of culture, a way of company operation.” (H4)

“Those starting the social responsible innovation are already sociably responsible scientists or stake holders.... there is also the point of over regulation. This is a way where responsibility is enforced in a counter productive manner. Always more and more regulation, more documentation, more rules to follow.” (H5)

4.3. Lack of knowledge/technology/training

The third most commonly barrier mentioned was the lack of knowledge, technology or training for RRI. 17% of the interviewees asked (N = 4) identified lack of knowledge of both researchers and citizens about RRI, as a major barrier for the adoption of RRI in SMSs.

“lack of knowledge of the term in the society in general. And in most of the companies that they have in mind the responsible research and innovation.” (H8)

4.3.1. Lack of knowledge (education) in citizens

“Other people like it bigger, stronger, faster and cheaper and they don’t care about consequences. That’s the problem. That’s an education problem. We will use our overwhelming future benefits to make the education. The bigger, faster and stronger that was 2000 years ago in Roman times, we should get away from that. The atomic bomb and all that. We don’t need it anymore. The philosophy of going faster, bigger and stronger and more powerful and cheaper and bigger and bigger and more energy more energy more energy.” (N1)

“I don’t think that RRI program will make people more responsible. To make people more responsible you have to go deeper into society. You need education. And this is not a problem of innovation responsibility. It is the problem of society. Not responsible societies will not make



responsible innovation! They will make stupid innovation. Stupid societies make stupid innovations, stupid decisions, and stupid referendums. So education should go first and once you have responsible societies you will get responsible innovations.” (N1)

“it’s the cost and the and the lack of digital awareness, perhaps, digital literacy, the, the understanding that being able to use a tablet device or a smart-phone doesn’t mean that you can use the app appropriately.” (H13)

4.3.2. Lack of knowledge/technology/training in researchers

The lack of technological knowledge was a barrier mentioned particularly by interviewees in the nanosector:

“But from the technology point of view, it is not always easy to find solutions which are into the concept of RRI. For example, there are materials that people have to use... the example, for example, is the batteries, lithium batteries. This is a huge environmental problem but still everybody is using lithium batteries as they don’t have any other choice. This is the best choice that they have. Of course, it needs a lot a research, a lot of work to find the new material but since there is nothing there, people will still keep using this. Same for windmills, for generating electricity, the material, it is a big difficulty to fabricate these windmills so there is also a technological aspect because it will... ok, they want to do responsible research but they still have to reach their goals, technological goals of the... we will have to find a compromise, right.” (N2)

“The most difficult part of the Nano material is that you need to give some let’s say information about physical and chemical properties and most of the time let’s say there is huge lack of characterization of the Nano materials; still huge important lack of let’s say any kind of important physical characterization. To have some statistical measurements of land, diameter and so on and there’s still plenty of work to do on the characterization.” (N5)

“There is a confusion of Nano toxicology and this is a lot for engineers. They don’t know anything about life science and health to make the right decisions about to avoid toxicity parameters, because they are not probably described. That’s the problem. We need to tell people who develop new technologies they need parameters to make particles that are not toxic, they are safe and in addition stable and green.” (N1)



4.4. Regulatory Framework/Standards

17% of the participants asked (N = 4) considered the regulatory framework as a barrier for adoption of RRI in healthcare and nanotechnology sectors. Those interviewees believed that the regulatory framework place restrictions to small companies which cannot afford the cost of producing products which follow the standards imposed by the regulatory framework. The quotes of the following interviewees are characteristic of this problem:

“The legal requirements to which we are exposed, namely by the EU authorities, has been increasing over time. In fact, you should be aware that the rules and regulations provided by Europe... to some extent limits what we can do [and] which products we can develop - because the cost for developing medical products will rise incredibly and small companies will not be able to afford it. So I'd say [there is] a discrimination against small companies. This is how I see it. Only the big players in the market, they will be able to follow these rules.” (N11)

“... standards and regulations stifle innovation. There has got to be a trade off between (being) able to do innovation and having standards.” (N10)

“Well, the most important barrier is the regulatory issue, it's a terrible thing. I have my own theory on that. I guess this benefits very much the big pharma because, at the end, they are the only ones who can go through all these complicated regulatory issues. In the majority of those, are nonsense, totally nonsense. So, the field requires a huge revolution on the regulatory. So, I think, this is the main trouble.” (H3)

“you don't pay attention to that because nobody is gonna value... or at least in the first stages, nobody is gonna measure your work or your job because you make all these things.” (H6)

“the structures in Europe are too slow. I mean, they're a bit rigid.” (N3)

“The problem with things like ISO standards is, you know, it can take some 20 years to get agreement on the terminology in some cases – so the application of technology has always moved faster than the standards for this. There's nothing wrong with standards. There's a need to standardise things because if you don't then we get to ridiculous variations in performance, in batch to batch variations when we're using the wrong metrology. On the other hand you may end up trying to standardise something that, ultimately, nobody's got very much interest (in) ... so it's a tricky job for the standards organisations. Short term thinking is often a bit of a barrier to responsibility, whereas if the capital that you raised was a little more patient, then you could really take the time to have a major impact.” (N16)

Interestingly one of the interviewees underlined that the fact that the regulatory framework is not the same in all the countries, place companies in countries which do not have strict



regulatory system in an advantage position over companies which are located in countries which impose strict standards to companies. The later companies are in a disadvantaged position when they are competing with the former companies, because their products are more expensive:

“One of the things that I’m most concerned about is that the regulations are often not implemented on a global basis and affect only those particular countries that are under regulation. For example European regulations obviously affect our ability to produce these types of materials but it won’t affect in any way the fact that China is working on these ... and that would give them an advantage that later on companies in the EU would not be able to undertake or compete with. It [regulation] should be looked at from a global perspective rather than a national perspective.” (N10)

4.5. Traditional families are risk averse

13% of the interviewees mentioned that one of the major barriers is that traditional, manufacturing and more mature companies are very conservative and are not open to innovation:

“Many of the SMSs we’ve got in the cluster in catalonia are very innovative because they come from the academia so they have technology break through so they really want share even open innovations so they are not afraid. The bigger or the more traditional the company then it changes a lot. Because they are more afraid of risks, they are less willing to change things the way they’ve been doing it for years. In Catalonia for example we have a lot of traditional companies that they are family business. Even some median Catalan farmers are still Catalan family business; I mean they’ve been of course professionalized and the CEO is not from the family but at the end of the day the culture is beyond everything. So in my experience, generally speaking, these companies are more reluctant in trying new things and they have their part lines they know what they want to do and if something is interesting okay but they don’t want to try fancy things as they say” (H1)

...” family is family so sometimes when you compare to companies from the states or UK or from other places you see that they are more kind of like quick, they change, they are more flat in the way they decide and the family is the family so the father is the father and it’s kind of something that it is kind of integrated in the company behave.” (H1)



“My concern is like the traditional productive sector in Europe they always have that kind of feeling of being in a race against different problems innovation technology communication social media” (H1)

“We don't have now, with the new management in that hospital, any support. These people don't understand what they have. They have good eggs actually in their hands. They could raise the flag to be in the most innovative hospital in eh, in Slovenia, in this regard. But they don't see the opportunity, they don't need that. For them its to perform with the standard work and to earn money from the insurance company, which comes every month, so they are quite happy if they get that.” (H16)

“the barriers are the old way of doing business. It is a very strong one because if you want to embed innovation you have to flexible, you have to be transparent and you have to be agile. And the structures in place are not agile.” (N3)

4.6. Challenge of being cheap & massive

Some of the interviewees asked, (9%), identified as a major challenge for adoption of RRI in the healthcare the need to develop cheap technology which will be available to the whole population.

“The main challenge in my personal opinion is going cheap and massive because there is a lot of innovation in medical care but it always goes towards more complexity. Towards more expensive equipment, I mean let's say you have an accident and there might be a bone broken or not, an x-ray costs a few Euros and you will know if it's broken. But nowadays they put you under MRI which costs thousands Euros to know precisely how broken it is. There is no big difference actually between the two systems but because we have the expensive one and everybody demands it we go with the expensive one. But if we go with the expensive ones everywhere, this is why in the health systems that are big envisioning, also in America and other countries, will never work. Because everyone will want the most expensive treatment available, but you cannot pay for it and it's a very difficult decision when to use an x-ray and when an MRI I mean for whom to use and x-ray and for whom an MRI. Therefore, I would say the greatest challenge is for those researchers who are developing new technologies for health care to think of small and cheap technologies that may have a big impact.” (H5)

“So how do you mitigate between low cheaper product, according to very time demanding timeline, and the same time making sure that you give the opportunity to everyone to (a) get to be involved, and (b) how do you trade-off between developing certain services and features



that will satisfy specific investment. versus, the cost social... I mean, to be honest the number one is, are you saving money? Yes! In the kind of environment, if you're adding cost you're in trouble... I mean, simply because there's no capacity..., I mean, you can bring in wonderful innovation but if the innovation means additional cost, it would be perceived as highly risky business. So, I think we need to think in economic terms, but to answer your question, we also looking at the wonderful benefits round... Are we improving access? Are we improving convenience? Are cutting on the hassle and the burden? Are we cutting on the potential unnecessary health risks that we are exposing patients by them going into facilities when they don't need to?" (H14)

4.7. Challenge of developing trusted technology

Another challenge identified by one of the interviewees is the need to develop technology that the patients can rely on, especially in the case of emergency for older individuals who live alone:

"Trusted technology, caring for people should be at the heart of everything you do. [Thinking of a person living alone] When you need help you haven't got that person at the other end of the room, so you have to rely upon the technology..." "Number 1 priority is the infrastructure. The products that we use must be fit for purpose. You shouldn't have to press a pendant or button. You should be able to say 'Alexia please call for help!' or 'Alexia, help!' Let's face it Alexia is more likely to play the Beatles song 'Help' than it is to ring an ambulance." (H15)

4.8. Other barriers and challenges

Some other barriers mentioned by a small percentage of interviewees (9% or less) were the following:

4.8.1. Extra effort and time

"it's an extra amount of effort you need to do. You are unaware of it some bureaucracy that you need to find who you have to speak to about what and there are delays that this will take longer and especially for some companies sometimes you don't have the luxury to wait" (N4)

4.8.2. Companies are afraid to share

"I think sharing is very frightening for some companies because is kind of like their property you know this is mine I don't want to share it with anybody because they are going to take it they are going to." (H1)



4.8.3. Sensitive data

“I would say, because it’s healthcare, it’s a lot more sensitive data. So, I guess, it comes down to the people involved, again. If the patients are okay with giving whatever information is needed and allowing the transparency to occur. I guess that might be one of the things.” (H2)

4.8.4. Lack of communication between stakeholders

“No one listens to us. That is the problem. I had a conversation (with the insurance company) and wrote to him as a consequence of our talk ... but, no response.” (H16)

5. Suggestions for overcoming challenges/barriers

When interviewees were asked what they think should need to be in place to help with those challenges/barriers the following suggestions were reported:

5.1. Legislation

27% of the interviewees asked (N = 4) suggested changes in the legislation in order to force the companies to use standards:

“you can make a law to make them share. And I think that’s important. I mean for me generally speaking you can either push them to do it, I mean it’s law or legislation that’s the best way to do it and the second way is with money it can be direct money or it can be in tax with action or whatever at the end of the day for the company the money is the money coming in or less money going out. But for me I think as administration as government or whatever point of view you either push them to do so, so you say that’s the way it’s going to be now that’s the legislation so you have to do it so that’s very effective but is hard for politicians to do because sometimes the legislation people are not really happy with it so they don’t know if with new elections the legislation is still going to be there. But I think sometimes the government should be a little bit braver doing that.” (H1)

5.2. RRI should be one of the criteria for funding EU projects

Another suggestion was to include RRI as one of the major criteria for funding EU projects in order to force companies to adopt RRI. 13% (N = 2) proposed this suggestion:

“I think that Academia needs another funding agency foundation where we can trust. These people could start asking for responsible innovation. You don’t get funded if you don’t have responsible innovation plan, you don’t get the scholarship if you don’t have responsible



innovation plan. Even if this would be weak, because we would copy one text from one proposal to another, that will force people to think about it and engaging resources.” (N1)

“there is part of research going in industry, like in (SME), which is funded by public money and there should also be a push from the public funding towards RRI because today in our case, for example, we submit a project for research and innovation. We are not judged based on RRI. The judges, the public, the government, or whatever who judges projects, they only look at how good the project is from the innovation point of view, how good chances are that it will succeed and make more money and so on.” (N2)

“If you can get this as a policy of the European Commission and the local governments that it has to be... when you submit a project as (), you got approved based on some factors, every factor has a weight and then you have a final call and then you on charge of (). So if you include this as one of the criteria with a factors and it has specific weight and judgment, this will be motivating because, at least in Europe, many, many SME’s depend on the public funding for the big part of their research activities.” (N2)

“I think yes because all the money given by Europe, for example, all the money given to create European research in order to put different teams with different cultures and different languages and different needs all together working for the research, that definitely generated a new tissue which was not present a few years ago. And, for example, the mission Marie Curie, or whatever, it’s great things in which you can create the culture of having a good approach to research and to disseminate, in order to involve people working with that. And unite researches, for example there are initiative about sharing the results. I mean, making people a knowledge about what’s going on.” (N6)

5.3. Support from government

Another major suggestion, proposed by 27% of the interviewees asked, was support from the government. Those interviewees suggested that the government should support the private sector in adopting RRI:

“closer collaborations between governments and the private institutions that are willing to do this thing. So, the government gives them whatever help they might need in order to be more responsible, to be more transparent” (H2)

“The governmental money is quite neutral in terms of requirements. We just have to prove that we work on a relevant subject and that we have done all the working steps that were proposed and that we have had the costs. So there it’s more based on the actual cost of our doing and



of course by the target, whether it is qualifying for governmental money or not. While when we work with the companies, their interest is mainly to do business. Either being supplier in the future for materials or using themselves a competitive advantage. So they do require from us that we, of course work in a direction that they can use in the market in the near future but that's... We are looking for partners that do want to make business with our development.” (N7)

“I think that the ethical question here is, and this is not up to a small company, this is a society question or a question of the government. Where does the government want start ups or small companies to be? Is there and impact on the society of the technology? Is it worth to let these companies survive, and this is a cash and infrastructure question. And if these companies can survive what does the government or state say, well I'm ok if this company gets sooner or later to a large company. And not the patient's, physician's and hospital's interests are number one than it's more a question, you know, how are the large company report this technology. It's this typical shareholder value thinking that comes in here now. Lobbyists working on reimbursement numbers with the local government or in Brussels or wherever.” (H11)

“responsible innovation eh, is not just eh, for me so ... also the other party lets say the government eh, our government should over-saw, act responsibly eh, to support innovative processes in our country. So, I, eh, I try to be eh, responsible from my point of view, but I expect some understanding or so, on the other side...” (H16)

5.4. Developing RRI Platforms

Another major suggestion, proposed by 27% of the interviewees, is the development of platforms which will inform companies about RRI.

“these kind of platforms are much needed but they also need to be widely communicated.” (N3)

“ an information tool, something like a self service tool that you may not answer questions but it may give you indications like whether you should do it or if you don't need to do it and if you have to which are the steps you need to follow.” (N4)

“to develop a form of platform where you can try and play on some eco-responsible innovation and so you can define your creation material and then you see if it's more or less responsible an existing stuff and so on. At the moment I am not sure the platform is accessible for everybody.” (N5)



5.5. Collaboration between universities & business

20% of the interviewees asked proposed closer collaboration between universities and companies:

“I guess if you start making nicer business maybe you will have an effect, but for sure funding agencies, foundations, universities can impose responsibility even if their position will be at the end bla bla bla and we will do things as always, starting the discussion, getting people involved, show different ways of doing things” (N1)

“Probably being closed to the university is good, because in principle in universities there are many people thinking and thinking is good for us, for innovation and for progress.” (N1)

“there’s a big gap between theory and practice...if you always stay with the same usual suspects, I would say, if you always stay with the same group of people, how can you innovate? Maybe universities could be a good field to explore.” (N3)

“20century it’s completely different and if you don’t share if you don’t work together, and we see things changing nowadays for example big farmers and biotech’s working together which ten years ago they didn’t use to do it. Why? Because the farmers they see they don’t have all the ideas in the world and the world is very big and many ideas are around and are not their own, so the only way to get ideas is to work with somebody with academia’s with other companies etc.” (H1)

5.6. Train Scientists to be responsible

Another major suggestion, proposed by 20% of the interviewees, was to offer training to scientists, usually through university education:

“how can we be scientists without studying the story of science? How can we be scientists without epistemology, without ethics or research and innovation? That should be Important subjects in the scientific curriculum, not just doing some work in labs. I think is a real cultural problem as I told you before. You need responsible citizens and they need to be trained, to be responsible, because we don’t face the consequences of our acts.” (N1)

“People has to be come out from university with this awareness because they will be the people who do research later and decision makers later. So overcoming these barriers... yeah, the () but there has to be the motivation first. If people are aware of this, they will do the effort needed to go through these barriers and to go through these businesses and technical difficulties they face.” (N2)



“I work on young people, so I give lectures to, um, to young people at the Faculty of Medicine, Faculty of Nursing, Faculty of Social Work ... so just trying to raise an interest ... to consider something new in their work.” (H16)

5.7. Educate citizens to be responsible

Besides proposing educating scientists, interviewees proposed to educate citizens. 20% of the interviewees proposed to teach ethics and issues of being responsible in the mainstream curriculum:

“When you use your money, you are making a political act; you are giving the money to someone, or someone else. You are giving your money to the guy who is closing your companies; closing little factories because your money goes to IKEA or LADA. You are responsible for closing many little companies that disappear when IKEA rise. You should know that. The solution for this problem is to go to the children and basic education.” (N1)

“So you take let’s say a specific history lesson and that history lesson is about what happened in 1453 when it was the fall of Konstantinoupoli. So our suggestion for RRI and safer internet and history is that they all go together. So instead of teaching kids what happened in 1453 and teach it from the aspect of losing Konstantinoupoli, ask the kids to do their research and come back and tell us what happened on that day and why and what were the reasons it happened and what were the effects. Tell them where did you find this information? Did you copy paste it from the internet? You know that’s not right. I mean why isn’t it right? Because of this and this and that’s how you teach them about copyrights, about intellectual property, about cheating, and then you can teach them the little rules and then the kid will say okay then where is the limit? How can I get some ideas from the internet and put them into my own project without you calling me a cheater? Then you explain them that you must reward it you must work it in a different way. I think like eighteen words you can’t have more so bring in all these issues. Or other concepts of using the internet responsibly, and then you are doing research and you ask them to come up with new ideas about mobile apps and kids now like mobile apps and you tell them to develop some mobile apps to let people know what happened in 1453. So you connect history with the responsible use of the internet and technology and then you bring in the angle “I am going to sell this! How am I going to sell this?” is this research we are doing for develop technology good or bad for society? What is the difference of this app from other apps that somebody else is doing to make hotel reservations? Are these apps fundamentally different; In what respect? Could one make more money than the other? Is the one more responsible for educating people about something?” Because a date like 1453 it’s



a date that people have different angles of it. I mean we as Greek descents we say it's the day we lost the war because the ottomans took over Konstantinoupoli but the ottomans say this is a wining day we captured the headquarter of Byzantine. So you have to see the big picture so what is socially responsible? Is to make people aware that truth is not absolute for example it's subjective and related to our background. So the new educational reform system that we are visioning is project oriented and learner centered" (H5)

5.8. Other suggestions

Some other suggestions proposed, usually by one interviewee, are the following:

5.8.1. Create committees to offer advice to companies about RRI

"From all these institutes, put people, create a mini group, think-tank, mini group that would spend, maybe, a couple weeks giving a couple hours to assess whether the idea is viable, whether there is a market, whether this can be embedded in this and this company and then, you know, make it happen like this"

5.8.2. Use social media for Social Pressure

"top millionaires of America-the owner of Facebook –Twitter-LinkedIn and twelve other big companies they issued together a statement against him claiming that what he is doing is harmful for America. So it is the billionaires who represent the modern capital because they have users- they don't simply have buildings like Trump- which are assets, they have projects that have billions of users, so when they externalize an opinion that opinion is heard by their users as well. A simple user of twitter in any country can now see that the owner of twitter has made that statement, so if he is the power to become more critical about what he buys and from whom he buys. So that's a warning to companies that if they don't show social responsibility in their company all these people may turn against them. Nowadays it's easy to turn against a company because you can use social media and spread the message very fast and if you do move very fast and people start believing that this company is not very sociably responsible and don't buy from this company for one month the company will then go down. So I think business people will listen more when they fear that they may lose money if they do the wrong thing." (H4)

5.8.3. Use models to predict consequences

"So life cycle but also let's say the new save by design reflection, by doing we will try not to perform on some trials on what could be the eco-toxicity, but we need to predict it with models." (N5)



5.8.4. Inform citizens about the risks of nano-materials (at the EU level).

Another suggestion was that EU should provide information to the citizens of the EU regarding the nanomaterials and their possible dangers:

“Well I think first would be communication regarding risk or let’s say exposition to Nano-material. I know that in the past they tried to perform in EU a kind of a definition for Nano-material, I think the definition is available it’s something like 70 pages to define Nano-material which is already a problem. I’ve discussed with some people that we are that definition and I think it needs two or three more of them to make the definition so it means that it’s already a problem because if you don’t have a clear definition for everybody it would be complicated. I would expect European commission to give some insights about key, let’s say Nano-materials could be dangerous because of their shape and small size and so on but you need to understand the already existing materials that are also dangerous and you need to balance that with what could be the exposition, the risk, the potential let’s say of the perform.” (N5)

5.8.5. Pursue more research on nano-materials

One interviewee suggested further research, which will provide insights on the nanomaterials.

“first you need to find appropriate physical or chemical characterization or data which is already a cost, and then you ask people to perform life cycle assessment and most of the times that’s quite expensive. So let’s say some tools to achieve, first evaluation of life cycle could be of interest of course.” (N5)

5.8.6. Impose Taxes

Another suggestion was to impose taxes to companies to force them adopt RRI:

“If traditional companies work with SMSs coming from the academia if doing so they are going to have 10% with action in the taxes or in whatever so that makes them a little bit more willing to do so and exploring.” (H1)

6. Success Factors

When we asked participants to report what they consider as success factors for adoption of RRI in healthcare/nanotechnology, based on their experience, we received the following answers:



6.1. Collaboration between different stakeholders

The majority of the participants asked, 37% (N = 7), identified collaboration between different stakeholders as the major factor for success for adoption of RRI in healthcare or nanotechnology sectors. Those interviewees considered that it's important to take into consideration the needs of the different stakeholders.

“transparency and positive impact and having... being able to, at every level, having something tangible for every stakeholder. So from the end user, to the company itself, to the director, to the CSR director, to the CFO, you have to understand the different stakeholders, understand their needs, understand their priorities, understand who you are talking to make it happen.” (N3)

“We are selling to the market and understand what will make a difference for them Then I think it's mitigating on how you bring everyone to a table and align their incentives and motivation, because often they try and use multiple stakeholders and there may be some conflict, so how do you bring something that is truly aligning, and finding a value proposition that applies to everyone? That's the key success factor, because if you leaving some people out, it will bite you. It will halt your adoption and your success.” (H14)

Interviewees also find it important to take into consideration particularly the needs of the users:

“Taking in mind the user when you design something rather than take the best engineering approach. It's better to have some user input or try to see what they think before you go ahead and actually do the research and do the implementations and then find out they didn't like it.” (N4)

“...to have appropriate key partner with you and most of the time it's quite critical again because you need to have different level of people. You need to have for sure industry or end user, you need to have some academic for sure to try to go deep into fundamental research and so on but the key factor for me at the moment is all the information related to lifestyle assessment and environmental safety that really needs to be sort and for most application no need to be let's say driven from the start of the program. Most of the times is difficult to find labs or people who want to work on that domain or with enough experience to give some information on that.” (N5)

“If they are not aligned, the money is not going to get into the company so return isn't gonna happen. And if the scientist is not aligned and motivated, research is not going to happen. You need to create that space where the scientist, besides the knowledge and besides the research itself, is focused on value creation and the investors and the management create a



path where value creation is important but the research process, where they got that kind of liberty and freedom, to feel comfortable doing that kind of research” (H6)

One interviewee stressed the need to keep the stakeholders (e.g. medical staff) happy by providing them any help that is required:

“(Need to) make medical staff collaborative, so make them happy. We actually put a lot of work into that ... to support them in every aspect so that they have minimal additional work. And we work towards making users [of the service] happy too. So every solution is very simple, very primitive. We have quite a lot of good clinical success and a very positive response from the users.” (H16)

Another interviewee identified the need to engage more the end users, by offering them better information in a language that they can understand. He described this need as a need for health literacy:

“you have in Austria three stakeholders. You have the insurance, you have the medical experts who treat the people and on the patient side you have this society which are connected somehow. Of course it would make plenty of sense that a company tries to make a connection to all three of them and to take a look at all three aspects. I don’t have told you yet but one of our stuff is health literacy. We are not only up to make a measurement of the knee or make a measurement of the movement. On the other hand we want to make the results presented and the method and the impact of the results presented in a way that the patient has more knowledge about what is done and what the impact of having less flexion of the knee, for example. This is something which is called health literacy, which a study already showed 3 or 4 years ago that Austria is in Europe on the second last place.” (H9)

6.2. High level recommendation (EU commission) – RRI necessary for success for bids

The 32% (6 participants) believed that RRI should be one of the criteria for receiving funding from the EU:

“through the commission events. So when you see a specialized session about it then you know it’s important. So you have to take it in mind also from the proposal to the implementation. So yes I think some high level let’s say or some high profile or highlighting the importance of these factors for the success of, or for proposal because we are an RRI company but also for products, that would be a good case” (N4)



“So I think the government is the key issue. Because if they don’t hear this message I mean that we are kind of like the second layer. It is very difficult for us to convince everybody of the importance of our I if the government doesn’t talk about it.” (H1)

“policies at the government level and the EU level. You need policies to drive innovations towards a certain direction. I mean from one hand you need policies from the other you need incentives. For example, let’s take EBEA our research promotional organization in Cyprus. if you come up with a simplistic idea about research do you think the reviewers will give you the money? If you come with a complicated one you have more chances! So it’s like are cultivating a society that appreciates complexity more than simplicity. So unless you consciously tell your reviewers give extra points to simplicity you are not pushing innovation forward because innovation usually is also simplicity.” (H5)

“I think that the local government must play an important role. By publishing resources of that, for example promoting or awarding the companies which follow responsible research and innovation.” (H8)

“I mean we mostly do software and microscopes, so there is no really big impact on the environment. It’s not the waste product that you throw away and you grow the garbage. I mean, this is honestly, also when we write a grant there are always these questions on impact on the society and gender and all this stuff, it’s a little bit hard to answer.” (N11)

“I mean if there are external motivations like access to funding and so on then this is always a driver to make you consider these things and put some more policies or whatever on paper for your employees to follow.” (H12)

6.3. Inform citizens

The third most prevalent response among the interviewees asked regarding success factors for adoption of RRI in healthcare and nanotechnology was to inform citizens. 21% (N = 4) of the interviewees asked provided this response. Those interviewees reported that informing citizens about RRI is a great success factor because then citizens will prefer products that have been developed following RRI and will put social pressure on companies forcing them to adopt RRI. Here are some of the quotes provided by the interviewees:

“If this is a market which is usually driven by customer needs, if there is an awareness even at the level of customer that the... on the purchase, for example, components that is developed with an RRI behind the development, the companies will actually use this as a marketing tool. So from the true business point of view, it will need to see that they are not sacrificing



something just to adopt RRI. As I said, from the personal point of view, everybody is motivated to do this but when it comes to the decision making, if it is not generating more revenue nobody will... nobody I'm taking about big companies, even (name here) with a bigger size than ours, they will not take the challenge to go through a direction where they are losing money.” (N2)

6.4. Provide support to customers

16% (N = 3) of the participants asked, reported that it is important to provide support to the customers, by organizing for example workshops, seminars or offering support through telephone for the use of products:

“We get between 600 and 2000 people through each year on (our) courses. 80% of them are home owners.” (N9)

“We have big telephone support – because these aren't products that you can just pick up and put them on the wall ... they (people) need help. It's also speaking to people and having a conversation.” (N9)

“We offer free training for our customers [understood to mean installers] to make sure there is awareness of what the product is and what it can do...I do believe we do understand our customers very well.” (H15)

6.5. Inform companies about financial benefits of adopting RRI

Another 16% (N = 3) of the interviewees asked considered as a success factor for adoption of RRI in healthcare and nanotechnology, informing companies about the benefits of adoption of RRI, especially stressing the fact that adoption of RRI will increase the company's profit.

“When you talk about companies because companies when they tell them oh we found 10 projects or we put so much money in research they say okay but what happens? At the end of the day do we have new drugs or do we have new products for our patients? Because it's very nice that you put money but if we don't get anything we can have a problem so I think that's very important and the companies they really understand this language and now in this new post that I deal a lot with companies I see that they like this language.” (H1)

“Talk their language” (H14)



“the best option is to let them know about it, give them more information about let’s say how can this improve their prospect to succeed more or less. I think it would be more incentive, incentive I mean by showing them the benefit how responsible research can be let’s say, give more profits in the end in the long term.” (N4)

“I don’t know my opinion is a little mix of top down bottom up always but of course you don’t have to imply them to do it but you have to encourage them and explain that it works and make them for example many times with scientists, talk to your friends that you were with last year and you organize for a patient was very successful so share experience with them” (H1)

6.6. Using RRI as a marketing tool

16% of the interviewees suggested to promote the idea that RRI can be a great marketing tool:

“The fear and the benefit are the key drivers. As I said one is the warning towards the business people that they are customers are already sensitized on these issues so if they don’t satisfy them they risk of losing their clients and the second is knowing that they are so many responsible for their clients out there to need to design a product and use the social responsible innovation aspect of their product as an advertising angle.” (H5)

“we have to limit things to a workable way that innovation can still be marketed successfully, meaning profitably in the end.” (H7)

“What you do for the community, your social engagement, your appearance to the society in general, how let’s say environmental friendly you are, in terms what you do during your production. I think that these kind of things will also give some positive feedback afterwards to the company in general. And I think it’s important in a certain... when you reach maybe a certain critical marge in terms of the company, how you are perceived in the society in general. And all the big companies basically do this. And as I mentioned for a small company, I think at a certain point in time you probably, it’s very good to do” (N8)

6.7. Show Successful case studies

11% (N = 2) reported that it is important to show success stories. They believe that it is a great motivation for companies to see examples of successful implantation of RRI in companies:

“And of course I think you have to be a little smart; from my experience if you share experience with companies; with scientists, it’s kind of easy so it’s not like something coming from top



saying you have to do it because I say so no you have to do it because look we have this we did it and it was very nice it was very interesting we had some success, so I think people understand more practicing than theories.” (H1)

“sharing experience with companies that they have that which that people see that it’s not something that is either complicated or it means that they are going to lose job or this kind of things. It’s the same with open innovation or I don’t know companies sharing projects I think when something works and you see that there are some outcomes that they are interesting it’s then the neighbours start looking saying “a that’s kind of something perhaps I should think about” (H1)

Interviewees also underlined that it is important to also provide examples about things that did not work in the application of RRI in some companies:

“we don’t have enough information of good and bad things that happened, especially bad, because of that so now that I think with EU or age 2020 with these projects there’s always difficult to know what happened with all these projects so the exante? Is very good of course because there is the evaluation and there’s everything. But the expo sometimes I know commission does it but sometimes you want to hear more results Ok we had-funded 200 projects or initiative, these ones didn’t work and why didn’t work I think it’s very useful to know why they didn’t work, and we had I don’t know 10 successful projects and I don’t know now we have 5 products in the market. So, I think when you have all these information it’s very nice and it really everybody makes sure that they do it in the good way and also make the companies that initially they do it because they have a more intensive? which it lasts a little but after 10 years or after x years that of course depends on the initiative they are not going to do it anymore if they are not successful but if they know the people of other companies they worked with small non innovative? Companies they have better a product they’ll be more successful then that’s the key issue. Because at the end the companies they want to do new products they want to sell things because they want to make money at the end of the day. So sometimes the administration in general the expos which is very complicated because the impact is always complicated to measure we don’t do it that way and sometimes I put them in myself because I am from the administration side and that’s very important. When you talk about companies because companies when they tell them oh we found 10 projects or we put so much money in research they say okay but what happens? At the end of the day do we have new drugs or do we have new products for our patients? Because it’s very nice that you put money but if we don’t get anything we can have a problem so I think that’s very important



and the companies they really understand this language and now in this new post that I deal a lot with companies I see that they like this language.” (H1)

6.8. Government should develop policy for adoption of RRI

Another 11% of the interviewees asked, reported that the government should impose the adoption of RRI by companies through policies. Those interviewees believed that only the government can force companies to adopt RRI.

“success as I said I think is sharing experience. First there have to be clear policies and clear messages from the government or whatever responsible is in each region that’s an important thing... so of course you start with the theory but in the end, I would say 90% of the population understand concrete things not just that the innovation and these kind of like fancy words. So I think, a clear message from the administration government whoever is responsible I think that’s important because at the end of the day it’s what the reference you have. And of course it has to be from different parts because you can have the health department having a message but then you go to the industry department and then the message is not that clear because they have different views.” (H1)

“We (have been) working with building control in F (municipal authority) which have produced guidance on retro-fitting and repairing older buildings – which recognise all of these materials and systems. Once one authority does it, other authorities can use that same guidance ... so that’s a really good positive step forward.” (N9)

6.9. Other success factors

Other success factors suggested by some individuals (5% of the interviewees asked) were the following:

6.9.1. Collaboration between industry and academia

“at least I found out since we turn into a research project together with these universities, we have two advantages. Number one, the percentage of support for the is much higher then if we would do it in our own project. Number two, the probability of acceptance is also higher because we have the latest know-how on that subject as part of our project. So that was a very positive influence in those two dimensions.” (N7)



6.9.2. Transparency

“transparency. So, being transparent with what you’re trying to achieve and how you’re trying to achieve it. And, you’re transparent because you don’t have anything to hide and you believe that what you’re doing does not compromise anybody else’s well-being.” (H2)

6.9.3. Developing low cost RRI products

“we tried to be an innovative company that offers a new type of concept that allows doctors to make more informed decisions for a better overall better price... So when you start today with 50 euro, you can expect that in 10 years, regardless of inflation and everything it’s going to be 10-20% less. So you need to make sure you have the margin and the economies of scale so when you get peer you can cope with that pressure. And that’s what we have accepted from the beginning. So cost of goods is one of the big drivers for our design and manufacturing process. So we need to make sure we can do this cheaply. Otherwise you cannot sell it. (H12)

6.9.4. Receiving regular feedback from customers

“We get feedback every day from our customers ... whether the product has worked or not... We organise leadership meetings, our development meetings with customers and non-customers to find out what worked, what didn’t, what could be changed, what could be added to, how could it be developed?” (H15)

6.9.5. Taking into consideration the specific needs of each country

“So in the case of water purification, a lot of effort has been done up on till now... but never taking into mind what the cost might be. So for example, in the case of eliminating arsenic from place that are particularly hard impact such as India, you know a, a solution with a novel idea such as nano-technology may fall second place to a simpler solution of using a rusting nail to attract that arsenic. So we have to take into account what the needs might be of the specific economic [circumstances] in that country that we’re addressing.” (N10)

6.9.6. Selecting the right partners

“Select the right partners. You need champions who have a vision; to partner with to make it a success. So, speaking of commissioners, you need commissioners who are pioneers,” (H14)

6.9.7. Identifying the right time to talk to stakeholders

“So if you look at the innovation cycle, when is the right time to go to the different stakeholders? I think this is the key of success. When is the right time to go to the stakeholders and talk to them. Because if you do it in the beginning you won’t have an innovative product because all stakeholders will tell you, they don’t need it. You cannot make innovation if you talk in the beginning to the stakeholders. I think this is the complicated part within. When is the time to go to the stakeholders and maybe if you want to help the SMEs, what is the questions you



should ask them. So this is something... So the question cannot be, if you go to the medical experts, „Do you want to use this technology and are you willing to pay this amount of money.“. This is not a question you ask the stakeholders. This is very often a problem. So when is the perfect time to talk to the stakeholders and what kind of language and things I'm discussing with them. Not to be too technically specific.” (H9)

6.9.8. Not involving citizens (patients) at the early stages of product development

Although most of the interviewees suggested close collaboration between different stakeholders, especially end users, one of the interviewees recommended not to involve patients at the early stages of the product development because patients' expectations may damage the development of the product:

“Of course they are involved but in the very early stage, normally they are far away from the clinics so, of course there is second input but they are not hands-on at that moment. If you're thinking more about more patients or patients associations, those are really far away from what the company needs at that process need and even can be...even not helpful, even can be damage the process itself.

I: Why damaging?

R: *Well because of expectations. When you're talking to patients or associations of patients, they want solutions on short-, medium-term. When you're investing in early stage you are thinking about 20 years to have the solution on the market. So that disappointment in your research could damage the image of the research because if you don't deliver, they can think that you are not going in properly or say that you are not doing properly.”* (H6)

6.9.9. Approaching the managers for promoting RRI

“...of course the managers have their positions and so could promote the idea to the employees.” (H8)

6.9.10. Technology meets the needs of the infrastructure

“We need to make sure our technology is fit for purpose – not just [from] the functional perspective of the individual, but does it still meet the needs of the infrastructure. A prime example is how we've used the PSTN infrastructure for telecare and telehealth for a long time. PSTN or analogue is changing to digital and so our technology has to change with that infrastructure to make sure that it remains safety critical of the new networks and new infrastructures.” (H15)



“We need to make sure that our technology is fit for purpose for the individual, the infrastructure and the environment that it’s going into.” (H15)

“There’s lots of drivers for innovation clearly, like our technology to be state of the art - but there are lots of changes to the environment, to the users, to people’s needs, to the infrastructures, that our technology has to fit into and work with. So we have a policy of continuous improvement, plus [parent company] have a policy where technology has a 5 year lifespan, and, and, and basically throughout that, cycle, it is improved and changed in advance. But then at the end of it, it generally remains state of the art.” (H15)

6.10. Specific issues to the Healthcare sector

6.10.1. Difficult not to be responsible

Interestingly, some of the interviewees from the healthcare sector, when we asked them to report the barriers for applying RRI in the healthcare sector they mentioned that there are strict regulations and procedures (e.g. ISO) that they have to follow in order to produce a product. That means it’s impossible for them not to be responsible:

“RRI is very generic terms. So, when we are talking about developing new products, there are strict, as I said, procedures. There are very strict certifications, that the new innovative product should follow. So, there is... it’s very difficult not to be responsible. So, the procedures of the specific industry and the certifications and the approvals of the specific industry define...” (H4)

“this is the only way forward, the serious company that they are developing products, for commercialization, definitely yes. Applying RRI, or not, is not a matter of decision. It’s a matter of culture, a way of company operation.... If you are working in the medical industry, if you want to be serious and to be taken seriously, or to have a future in that (land), you have to be responsible even though that it’s called RRI or if it’s called procedures, approvals or whatever... there are so many strict rules in order to be able to place a product on the shelf, or in the specific market, that there is no any room for doing wrong. So, companies that are players in this domain, this is the only way forward.” (H4)

“In some respects, in health care is kind of by definition socially responsible innovation so I mean if somebody is trying to develop a new MRI it’s not like they are only doing it for money they have as their goal to serve patients. So by definition is already sociably responsible innovation.” (H5)



“responsibility in order to go for a new product. You have to go to regulatory and it is. So the rules are quite clear in pharmaceuticals development.” (N6)

“I mean we are working in a pretty much regulated environment, medical devices. So we have our processes in place which qualify us to be a medical device manufacturer in some of these. Like when you look in our quality statement, for example code of conduct internal, we have behavioral code of conduct which addresses openness, fairness but also the willingness to accept change.” (H7)

“I think that’s the basis of what we are doing. Improving quality of life of potentially affected people. Of everybody. You and me and everybody who could be sick one day but trying to improve the quality of life of people and probably the life expectancy, something like that. That is why we are doing things” (H7)

“Also we don’t know every company but in our environment, the companies that we know, we think that they also share the same values that in the end is to have common sense.” (H8)

“There is a European legislation which mandates... we see it as a dictate sometimes but it’s just a regulation that hits every manufacturer in the segment. And there are certain standards because the public health, the individual health is concerned. Theoretically if we develop bad products, then a patient could be hurt, damaged or come to harm in any way. Because medical devices go from implantable heart rate sensors to external pregnancy tests. So you have to make sure these things work properly. So there is a common standard based on the risk of the device that you are manufacturing.” (H12)

*“And you have to implement a quality management system and you have to get a certificate for that quality management system, which demonstrates that you are in compliance with the regulatory framework. So that is by itself something that you have to do and in the past it was self declaration. This CE marking declaration of conformity for in vitro diagnosis was in many cases a self declaration. This is changing now, so there has to be a notified body, *benannte Stelle* which exists about 70 different or so in Europe. And they confirm that you are in conformity with the IVD directive. Then of course there is all kinds of additional regulations. For example in Austria you need to have a managing director by trade law, *gewerberechtlicher Geschäftsführer*, if you are producing medical devices you need to have a certificate that you are allowed, it’s like a trade registration, which takes several years of experience, plus education and so on. So you have to apply for it. I already had it so that was not the problem. And then you have institutions like ARGES, this agency for food and environmental safety, and they will come and inspect you on a regular basis. So this is something, once you bring products to the market, you have to register your medical device*



*products in a European registry and then the local authority is obliged to inspect you in a defined interval 3 to 5 years. They will come and they will look at your quality management, they will look at your procedures, they will look about your dealing with things. Then of course you will have to do post market surveillance, meaning if there is a complaint from a customer you always have to decide do I have to report this, do I have to make a call back of products, and so on and so forth. And then of course you have all the other regulatory. You have the *Gewerbeamt*, the MA that look for you. If you work in a chemical laboratory like we do you have to fulfill a lot of stuff. So it's huge, it's huge overhead. So you can estimate that in the next one and a half years, or let's say from beginning of 2017 until end of 2018 we are probably going to spend 30% of our resources for the regulatory" (H12)*

"I think if you are not a total capitalist, responsibility for society is a mandatory thing to do. Especially if you have employees, if you have kids, if you believe certain things should be given I think, for me it's not something I see.... it's self explanatory that this should be." (H12)

"You know the industry that we work in, ethics play a bit part. We deal with statutory, local authority, and government, NHS. Ethics are a massive part of the world that we live in... and we need to be an ethical company to deal in that environment." (H15)

6.11. Specific issues to the Nanotechnology sector

In contrast to the healthcare sector, where there are standards and it seems "difficult" not to comply with RRI, for the nanotechnology sector there is a greater need for standards. Some of the reasons identified by the interviewees for the problem of lack of standards are the following:

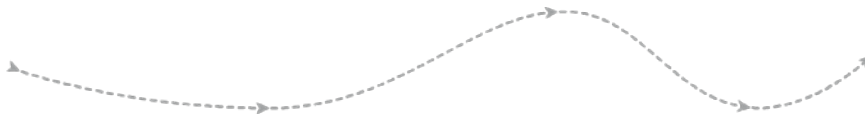
(a) the nanotechnology is an emerging new field:

"We already have a big problem with laptops and computers for recycling issues. With smartphones too. We are entering into a new era where the number of devices will be astronomical so this is an aspect where there is no study after today, no study, no awareness of how we will deal with this problem, for example." (N2)

(b) the nanotechnology is a very broad term, including many different fields and it is therefore very difficult to develop standards which will be applicable to all the fields that are included under the umbrella of nanotechnology. One of the interviewees has nicely described the problem below:

"Nano-technology is such a broad church and there is very little in common with what we do. It's sort of like every chemistry-based business lumped together in the same field... You can't regulate nano-technology as a whole because it's a very wide thing. What we have to regulate





it through whatever the end application is - whether that's paints and coatings, medical devices or pharmaceuticals." (N11)



7. Appendix I: Participant Information Sheet

Dear xxx,

You are invited to participate in a research project but before you decide whether you want to take part, it is important that you understand why the research is being undertaken and what your participation will involve. Please take time to read the following information carefully, discuss it with colleagues if you wish, and ask if anything is unclear or if you would like more information.

What is the purpose of this study?

This project forms part of a much larger, EU funded, project entitled *Evidence and opportunities for responsible innovation in SMEs*. The project investigates whether the relatively new idea of “responsible research and innovation” can improve industrial research, development and innovation. Possible improvements would be investigated both in terms of processes and in terms of positive outcomes for society. Such research is new in SMEs (it has – to date – been mostly undertaken for publicly funded research and innovation) and we are excited about the project!

The *Compass* project has been broken down into different components to be undertaken by the institutions involved and you are being invited to take part in one of the first activities, namely, interviewing of key thought leaders in industry to seek their experience and opinions about critical responsibility issues, success factors, and barriers for adoption of RRI in SMEs. This part of the project is being led by researchers from The University of Central Lancashire (UCLan) in Cyprus.

Why have I been invited to participate?

You are being invited to share your experience and opinions about the conduct of research and innovation in industry because you have been identified as someone who has a key role in the healthcare or nanotechnology industry. As noted earlier, RRI is a relatively new concept. You may not have heard of it before. That is not problematic. What is important is that you have experience of working in industry where healthcare or nanotechnology research and innovation are undertaken. Your input will help us to understand the potential values, challenges, and implications for RRI in industry, and this is key to ensuring that the output of our project (for instance, a comprehensive, customizable, user friendly and up to date web portal on RRI for SMEs) has practical, real world relevance.

What will I have to do if I decide to take part?

You are asked to read this information sheet and decide if it is something you would like to do. If you are willing to participate, you will be asked to sign a consent form and we will contact you via email or telephone to arrange a time for your interview. Depending upon your location and availability the interview may be conducted face to face but it is more likely that you will be interviewed via telephone or Skype, depending upon your preference. We ask that you put aside one hour for the interview as it should last for 45-60 minutes. During the interview you will be asked some questions about your experience and opinions and you will also have an opportunity to raise other issues that you believe may be relevant. You are under no obligation to answer the questions that are asked and you may decide not to answer any if you wish. We appreciate that there may be some restrictions upon the information that you are free to share, for example where data is commercially sensitive, and request that you only share information you are happy to have in the public domain. On request, we can send you a list of questions in advance, but we may explore other similar questions on the day.



In total 30 key personnel in the healthcare and nanotechnology industry from around Europe will be interviewed for this part of the *Compass* project. Where we have permission from interviewees, all interviews will be audio recorded and information from the interviews will be analysed by researchers from UCLan Cyprus to identify common themes, concerns and issues.

Do I have to take part in this study?

No. Participation in this study is entirely voluntary.

Can I use my preferred language?

Where requested, and if possible, the information sheet and consent forms will be supplied in your preferred language. It may also be possible for interviews to be conducted in your preferred language, depending upon the availability of an interviewer. If your interview is conducted in a language other than English then the information you provide will be translated into English for the purpose of analysis.

What will be the benefits of taking part?

No incentives will be offered for your participation and it is not intended to benefit you directly. However your input may help to benefit the project as a whole and subsequently inform debate on the future for RRI in Europe. It has also happened that a research project similar to this one discovered innovative good practice in an individual company, which then achieved a small reputational gain through the study's publications. However, this is not the norm.

What are the possible risks in taking part?

There are no anticipated risks but please ensure that you only share information that we would be allowed to use in publications and other materials. Please see below for confidentiality.

What if I wish to withdraw from the study?

You are free to withdraw from the study at any stage before or during the interview and up to two months afterwards by contacting Kalypso Iordanou (Klordanou@uclan.ac.uk). Any information you have provided up to that point will be destroyed. After this time, once analysis of the interview and write up of the study has begun, it will not be possible to isolate your contribution from the rest of the study.

Will my taking part be kept confidential?

Yes. Once the researcher has transcribed everything that was recorded during the interview, the tape will be erased. The transcript of your interview will be stored in a password protected file, accessible only by the interviewer and researcher conducting the analysis. It will be destroyed after 5 years. Some of your words and phrases will be used for reports but these will not have any identifiable information within them. Your name, your contact details or any other personal identifying information will not appear in any publications resulting from this study; neither will there be anything to identify your place of work unless you have provided explicit consent for this.

What will happen to the information I provide?

The information gained from your interview will be incorporated into project reports and may also be included in publications and presentations about the project and RRI. Interview data will not be passed onto researchers who are not part of the Compass group.

Who is conducting the interview?

An experienced researcher from one of the 7 institutions involved in the *Compass* project will conduct your interview. They will contact you to make arrangements and will ask for your consent form. They will also be transcribing your interview and translating documents where necessary. Their contact details can be found at the end of this information sheet in case you have any queries or concerns.

What happens next?

If you would like to participate in the study please complete and return the consent form. You will be contacted by the researcher within one week for confirmation and within one month to arrange a convenient time for interview.

Further information

If you would like to read more about RRI, please let us know and we will send you some articles.

If you have any questions about your invitation to participate or would like further information about the interviews please contact Kalypso Iordanou (Email: Klordanou@uclan.ac.uk; Phone: +357 99539372).

UCLan Cyprus lead for the interviews:

Dr Kalypso Iordanou
University of Central Lancashire Cyprus,
University Ave 12-14,
Pyla 7080, Cyprus
Klordanou@uclan.ac.uk

Compass project lead:

Dr. Katharina Jarmai
Research Fellow & Project Manager
Institute for Managing Sustainability
WU
Wirtschaftsuniversität Wien
Vienna University of Economics and Business
Building D1, 2nd Floor, Welthandelsplatz 1
A-1020 Vienna



8. Appendix II: Consent form

Please complete this consent form if you are willing to be interviewed for the study by placing your initial each box and then signing at the bottom.

When completed please return a copy, either by email or post to:

Dr Kalypto Iordanou
 University of Central Lancashire Cyprus,
 University Ave 12-14, Pyla 7080, Cyprus
Klordanou@uclan.ac.uk

Issue	Respondent's initial
I have read the information presented in the information letter about the study, "Industry perspectives on critical responsibility issues, success factors, and barriers for adoption of RRI in SMEs".	
I have had the opportunity to ask any questions related to this study, and received satisfactory answers to my questions, and any additional details I wanted.	
I understand that my participation is entirely voluntary and I am under no obligation to answer all questions during the interview.	
I am aware that some of my words and phrases from the interview may be included in the final report and publications to come from this research but any quotations will be kept anonymous.	
I give permission for the interview to be recorded using audio recording equipment.	
I understand that I am free to withdraw my consent at any stage before or during the interview and up to 2 months after the interview.	
I agree to take part in this study	

My preferred method of being contacted is:

- Telephone _____
- Email _____
- Other _____

Participant Name:		Consent taken by	
Participant Signature:		Signature	
Date		Date	

