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Responsible for Responsibility? A Study of Digital E-health Startups

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Abstract: Responsible innovation (RI) has received increased attention from policymakers and academics as a solution to grand challenges and is viewed as the main driver for innovation. The United Nations has suggested 17 Sustainable Development Goals and responsible innovation can be seen as a tool that allows the movement of society towards reducing inequality, coping with environmental challenges and sustaining countries' economic and societal development. Our knowledge of how businesses act responsibly in solving these challenges is scarce. An inductive analysis of 14 e-health startups in Norway, shows that responsibility is highly prevalent. Entrepreneurs have instant contact with users (patients or healthcare professionals), which increases inclusiveness, anticipation and reflection as the main elements of responsibility. However, firms' contextual and strategic awareness of responsibility remains low, which means an absence of focused strategies to exercise responsibility. Consequently, entrepreneurial startups are prevented from reaching broader stakeholders and fully reflecting the knowledge obtained. Moreover, RI activities are often bundled with other activities on the "path" to successful commercialization. This paper contributes to and enriches the current RI understanding from a firm perspective and suggests some implications for practitioners as well as policymakers to enhance sustainable development in the healthcare sector.

Keywords: awareness; responsible innovation; startups; e-health; digital health

1. Introduction

Seeking to transform the world, the United Nations has developed 17 Sustainable Development Goals (SDGs); that is, "a plan of action for people, the planet and prosperity" [1]. Those goals intend to help people and the planet, and to create profit, so that by 2035 societies can take action in critical areas including poverty and hunger, the degradation of natural resources and climate change, and economic, social and technological progress, through peaceful, just and inclusive societies. Responsible research and innovation (RRI) has become an all-encompassing concept, leveraging sustainability transformation on a societal level [2]. It is often viewed as a tool to address challenges such as poverty, inequality, aging populations and the availability of care for achieving the SDGs [3,4]. RRI first relates to governing the innovation process and involves governments, which can act through policies and regulations. However, RRI only attracted wide public attention a decade ago, and we can observe that policies and regulations are still at the development phase [1,5]. Although such policy measures are useful, the participation of private as well as public economic actors, such as firms and institutions, is necessary to align research and innovations with societal values, needs and expectations [6].

Such principles suggest broader stakeholder inclusion in the decision-making process, anticipation of societal needs, and reflection on concerns, which all call for new innovation policies [7].

Therefore, responsibility is closely connected to SDG17, which seeks to "strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development" with the objective of "mobilizing and sharing knowledge, expertise, technology and financial resources" [1]. RRI can become a means for highlighting multi-stakeholder partnerships to "encourage and promote effective public, public-private and civil society partnerships, building on the experience and resourcing strategies of partnerships" [8]. RRI is incorporated into governing tools such as Horizon 2020 and other policy briefs directed towards economic and academic actors.

As a consequence, research on innovation is gradually shifting attention from "how to achieve groundbreaking innovation" towards "how to achieve groundbreaking innovation in a responsible manner" [1,9–11].

While several conceptual models of RRI have been developed, there is still a need to examine what these frameworks mean for practitioners [12,13]. The theoretical development has focused on normative models of responsibility and there are scant empirical studies which support this development. Even the empirical literature on RRI mostly concerns research projects rather than their implementation at the firm level [3,14]. Thus, the RRI concept may follow the same path as the concept of Corporate Social Responsibility, which has been criticized for being employed at the level of corporate philanthropy [15]. While it was originally meant to strategically shape the corporate identity of companies [16].

The principles of RRI direct us to involve the user early in the innovation process, but lacks direction on whom to involve, how to involve them, and at what stage [3]. While several researchers claim that RRI is advantageous for businesses [2,10,17,18], other studies point to the negative effects of RRI for innovation processes. For example, Blok, V. et al. [14] find that involving stakeholders in the process is challenging for innovation processes. Grand challenges require complex solutions and stakeholders are often very diverse. Therefore, stakeholder inclusion might slow down the innovation process. Another barrier is that the prediction of social outcomes is difficult, and further, openness and transparency are limited because innovators and investors value exclusive information.

With this background, we follow the argument that responsibility lies with individual actors [2] and that responsible decisions need to be undertaken at the firm level. Whereas RRI has developed from research, we employ the term RI (responsible innovation) due to its fine-grained focus on the innovation itself [14,19–22]. As there exists scant knowledge on how entrepreneurs actually deploy RI, we explore its relevance to startups by asking "How are RI concepts reflected and approached by entrepreneurs and managers of new start-ups".

Our empirical setting is healthcare. Aging populations, increased life expectancy and costly developments in medical technology contribute to increase healthcare costs and, proportionally, healthcare budgets worldwide [23–25]. Improving healthcare systems, while restricting cost pressures, is a key policy challenge in most OECD countries and this sector has been largely immune towards disruptive innovation [26–29]. Policymakers are looking to new platforms of digitalization as they promise to reduce costs while increasing the quality of services through the adoption of new technologies [5,30]. However, this development challenges the responsibility concern; vulnerable users beyond the "digital divide" might be abandoned and the technology might eliminate human contact, resulting in "cold" care [18].

This study contributes to the emerging literature of "responsible innovation" and provides a review of the several conceptual models. Further, it provides an empirical perspective through a multiple case study research design [31,32].

In the following section we review the literature on RI and present our conceptual framework. This is followed by our research setting and methodology, empirical findings, discussion and conclusion.

2. From RRI to RI: The Consequences for Firms

In policy, the RRI concept was first incorporated towards the end of the 7th European Framework as an approach to governing research and innovation in a manner that is interactive, transparent

and responsive to public concerns. RRI in this context is seen as a social layer of roles and responsibilities, which is gradually being articulated for actors and stakeholders [33–35]. Furthermore, it is a reflection of how research processes affect societal development and goals, meaning sustainability transformation is at the core of science's responsibility to society [35–37]. RRI focuses on the scientific integrity of research processes [38]; for example, the epistemologically valid generation of research results might have either expected or not expected socially reprehensible consequences, such as research on genetic modifications or the development of new technologies and materials mainly used for economic or military purposes [38]. The results of such research may also be misused or exacerbate societal concerns. Scientific reflection concerning how a particular type of research could benefit or harm society would help identify the best solutions to societal challenges. Therefore, discussions on the scope and content of social responsibility and moral accountability by researchers have been facilitated in the literature and by international research networks [39,40].

A seminal RRI framework is proposed by United Nations General Assembly [41] in which four key elements are described. Inclusiveness requires the involvement of the different stakeholders in innovation activities and the capture of their ideas, creativity and voices [42,43]. The inclusion of different concerned parties in innovation and entrepreneurship processes opens up the platform for dialogue and discussion that provides social communication [44]. Inclusion is not new in the innovation literature [8,45–49]; it is needed for legitimization, public acceptance and the introduction of a diversity of insights and values. Anticipation refers to systematic thinking about emerging critical issues and discovering new possibilities and opportunities [50,51]. The concept is applicable during the whole innovation process and goes beyond traditional risk-benefit analysis in terms of profit/loss [52–55]. It can be linked to risk assessment through understanding stakeholders' perspectives. Reflexivity in the context of RI holds up a mirror to one's activities, commitments and assumptions, leading to awareness of the limits of knowledge and being mindful that a particular framing of an issue may not be universally held [51,56]. Reflexivity is needed to remain aware of one's own assumptions and values, and one's role in and responsibility for society as a researcher or innovator. *Responsiveness* ensures the ability to respond and show care and respect for stakeholders and existing societal values [57]. It thus refers to the adoption of feedback from different stakeholder groups to ensure the most socially desirable outcomes of innovation. Responsiveness is needed to ensure that the overall process appropriately affects the research or innovation trajectory rather than being just another form of window-dressing. The [51] framework has become a foundation of the RRI literature, as it represents a tool for monitoring and understanding the concept.

However, a challenge with regard to innovation in RRI is that the concept is derived from an academic setting, where researchers in life sciences are asked to consider the total impact and risk of introducing their research to the public. Further, RRI is often performed from a policy or socio-ethical perspective and is focused on academic environments, while most innovations occur in commercial or industrial settings [2,14,58]. Therefore, firms' role in responsible innovation is mostly omitted from the current debate [2,17,59,60]. In their review article, Stephan, U. et al. [21] postulate that innovators need to take ultimate responsibility for societal developments which are or might be initiated by the large-scale implementation of innovations. At the company level, "RI involves customers and users in the innovation's development [61]. Thus, relationships between stakeholders and innovators produce and sustain the mutual responsibility of the innovation and its outcomes [2,14,17,62].

Therefore, this paper focuses on "responsible innovation" (RI) as a framework directed towards understanding how firms may approach, use and implement this concept.

3. RI Maturity Models

Building further on the work of [21,41] proposed a maturity model of RI. This model suggests that RI should be viewed as consisting of three parts: the purpose, the process and the outcome of an innovation. Purpose reflects how to solve grand challenges and should be linked to the higher goal of what is considered beneficial for challenges to humankind (e.g., climate challenges, poverty and health).

In this sense, RI may overlap with areas such as CSR, sustainable innovation, eco-entrepreneurship, and sustainable and resilient entrepreneurship [63]. Process refers to all the activities that are undertaken in the pursuit of responsibility. A key principle is that adaption of the innovation processes may be necessary to support the RI principles and values. Process might include elements from [44] model such as anticipation, reflection, inclusion and responsiveness. Outcome refers to identifiable consequences of firm activity. Stahl, B.C. et al. [2] suggest that most of the RI pillars that the European Commission has proposed can be categorized as "outcomes." These are not based on firm performance, but how the firm, with its responsible processes and products, has influenced society. To achieve responsible outcome, organizations need to link it to the initial purpose and perform adjustment when necessary [64].

Stahl, B.C. et al. [2] suggest that RI is a matter of maturity. This means that with more knowledge and awareness of it, the more strategically and effectively it can be employed. Their maturity model assumes different degrees of awareness of RI. Stahl, B.C. et al. [2] suggest five maturity levels, beginning with unawareness of responsibility, and that the firm achieves maturity when it establishes responsibility as a strategy.

Another maturity model was suggested by Parikh, J. [31], who introduced the concept of "RI sensitivity". This is a four-step progressive model describing how strategically the RI principles are used. Starting from the "standard model of RI", in which RI principles are not utilized, the fourth and final "co-constructive" model uses these principles proactively and strategically.

We argue that [20,21] follow a similar logic, postulating that with more awareness and knowledge, RI principles are included and used more strategically. They further assume that increasing awareness of RI leads to gradual and positive inclusion of the principles of RI. We find the concept of awareness thought provoking, since the maturity models claim that there needs to be awareness of a concept before it can be developed. To understand awareness, we can draw from research by [65,66], who discuss different types of awareness.

According to these authors, the greater the entrepreneur's strategic awareness, the greater the possibility of completing certain projects and reaching preset objectives. Strategic awareness of RI principles indicates that the company is aware of the concept and how to proactively use it to reach its goals.

Contextual awareness concerns awareness of the concept of RI as a demand imposed by the political and public system. This focuses on intellectual and academic awareness. The challenge is that actors may not know how to utilize the concept, even though they are aware of it. In a way, it is top-down awareness, that needs further acceptance and adoption into the organizational level.

Finally, temporal awareness [65] represents a bottom-up process. Gibb and Scott's [10] framework refers to the ability of entrepreneurs to be aware of their own purpose and the goal of their entrepreneurial process-"where they want to and can go". The word "temporal" refers to a time dimension. It implies the strategic paths to take, and "how to get there" in the future, taking into account the environmental restrictions and internal resources possessed. However, it can also be argued that this is a type of "intuitive awareness" (RI as an intuitive activity) and could be separated from the academic construct.

In the models proposed by [2,20], the focus is on contextual awareness. In them, RI does not emerge as stemming from entrepreneurs' intuitive awareness of "doing right", so they might have limited ability to explain firm behavior.

Based on the above discussion, Table 1 presents our conceptual understanding of the RI framework. This model encompasses Stahl's maturity model, [1] dimensions of RI and the refined [20] framework. The levels reflect the assumed relationship between the awareness and action of RI. Starting with a lack of awareness, and, therefore lack of RI activities, it moves to the next step of gaining awareness, thus increasing the RI processes until the highest level, where awareness is high and RI is used as a strategy.

Table 1. Summary of RRI frameworks.

Awareness	Stahl	Paredes-Frigolett	Stilgoe Et Al.			
			Inclusion	Anticipation	Reflexivity	Response
No awareness	Unaware	Standard Model	Inclusion only of internal stakeholders/experts	Low	Low	Low
	Explorative/ reactive	Revised Standard Model	Lack of appreciation of external bodies			
	Defined	Consultative Model	External bodies are included because of outside influence.			
	Proactive	Co-Constructive model	Recognition of value of outside stakeholders			
Full awareness	Strategic		High and varied inclusion of internal and external stakeholder through a variety of methods	High	High	High

Table 1 combines contemporary conceptual models of RI, suggesting that with more awareness of it, firms will act more strategically and proactively towards the demands and expectations of key stakeholders. In an attempt to review the relevance of the literature, we aim to investigate how close these models mirror the realities of firms.

4. Research Setting and Methods

As an emerging field, there are currently few RI empirical studies on how startups might approach responsibility. This article aims to understand how responsibility emerges in start-up firms. Based on the 'how' formulation of our research question, we chose a research design that allowed us to grasp RI as a social phenomenon from the perspective of the actors involved. Based on [33,55], we view this to be in line with a phenomenological approach. Following [12], phenomenological studies require researchers to go into depth and consider the details of the situation to understand the 'reality'. We thus argue that a qualitative approach and choose a multiple case study [12,13,67] to explore the theoretical framework is needed.

4.1. Context: Characteristics of the Norwegian Health Sector

Most countries base their healthcare on an insurance model, with which users purchase healthcare insurance through different market mechanisms. We chose Norway as an empirical context, as healthcare is viewed as a human right and a citizen's privilege, based on the 'Beveridge model' (a) Healthcare is a human right, not a privilege; (b) Government owns and operates healthcare; (c) National government responsibility for delivery of equitable, efficient healthcare; (d) Full access to all regardless of ability to pay; (e) Primary care physician as gatekeeper to the rest of the system [68]. Healthcare in Norway is highly regulated by the national healthcare policy [68,69]. According to the stated goal of providing equal access to healthcare regardless of age, social status or place of residence, the government is responsible for providing public and free care for all inhabitants, either partially or completely, depending on the nature of the care. Norwegian healthcare can be divided into two categories: primary and secondary (specialised). Almost all services are public, and funded by the state or municipalities through taxes collected from citizens, while insurance companies play a minor role.

To ensure the safety of medical solutions, a complicated procurement system is in place. The system is quite restrictive and only tested products can reach the consumer. Firms that are aiming to work in the sector thus need to deal with multiple actors who are driven by different motives. This is one of the reasons for the claim that innovation in Norwegian healthcare is complicated and difficult [28,70]. The complexity of the system, as well as the protective laws and regulations,

often serve as an "institutional wall" for innovative firms attempting to commercialize their products [71]. The government has control mechanisms over the quality and quantity of services.

At the same time, demographic changes increase the pressure on public demand for quality care provisions, and it is anticipated that the current healthcare and welfare services will not be sustainable in the near future [71]. Consequently, the Norwegian government has made clear signals that digital innovations are in high demand in healthcare. The directorate of e-health was established in 2003. E-health is defined as an emerging field at the intersection of medical informatics, public health and business, referring to health services and information delivered or enhanced through the internet and related technologies [72]. In 2012, the Norwegian Coordination Reform was implemented, with major motivation to promote healthcare provision and reduce the increasing public spending on it [57]. The government suggested that Norway's aim was to be the leader in e-health innovation in the Nordic Region [73].

4.2. Sample Criteria

We selected companies using a mix of quota sampling and theoretical sampling logic [74]. Quota sampling was used to understand the prevalence of relevant Norwegian firms [75,76]. Firms developing digital health-oriented products or services were deemed applicable; the sample was selected from two cluster organizations, Norwegian Smart Care Cluster and Oslo Med Tech, two publicly-funded cluster organizations aiming to increase knowledge and cooperation among firms in the e-health industry. To spread the sample base geographically, we chose cities in three healthcare regions: Stavanger, Tromsø and Oslo, representing West, North and East. Oslo is the capital of Norway, where most healthcare institutions are located.

Tromsø and Stavanger are both dynamic cities, with a strategy focus on e-health [64,73]. Theoretical sampling was selected for the purpose of explaining and refining the emerging theory and involved choosing appropriate cases for the research question [77] and an appropriate unit of analysis. In the study, it was important to uncover the emergence of responsibility in younger firms, influenced by the founding entrepreneurs, before they become immersed in the market and perhaps develop more rigid business routines. To focus our study on how startups approach responsibility, we chose companies established in 2014 or later. Tromsø is Norway's largest city in the North and has long traditions of telemedicine technology and research units for e-health. Stavanger is the main city in a dynamic and entrepreneurial area, mainly fuelled by the oil industry. Finally, we chose the capital, Oslo, which has its own incubator for medical startups. We produced an overview of startups in the three cities, and as the sector is emerging, there was high discrepancy in the number of startups in each. We identified only three startups that met our criteria in Tromsø, all of which joined our research project. In Stavanger, we identified several cases, four that met our criteria, and seven in Oslo. We interviewed the person that was associated with the operation of each start-up; sometimes it was the founder, and sometimes it was a hired manager. Table 2 shows the core information about the cases.

Table 2. Overview of firms.

Firm	Product	Interviewee	Est.	Location
Start-up A	Monitoring of heart rate.	Manager, co-founder	2014	Tromsø
Start-up B	Digital communication system for hospital.	Founder	2015	Tromsø
Start-up C	Digital diabetes tool.	Founder	2015	Tromsø
Start-up D	Pictograms for pharmacy industry, designed to make medical information easier.	Manager	2014/2015	Oslo
Start-up E	App helping people achieve and manage a wide range of lifestyle goals.	Consultant	2015	Oslo

Table 2. *Cont.*

Firm	Product	Interviewee	Est.	Location
Start-up F	Virtual platform for medical services, started by two co-founders who thought waiting at the doctor's office was too time-consuming.	Two co-founders	2015	Oslo
Start-up G	Combines pedagogical methods with state of the art simulation technology so that health personnel can practice in an inexpensive and safe environment when it suits them the best.	Founder	2014	Oslo
Start-up I	Provides the dental industry with software that makes it possible to examine the risk of osteoporosis, started by three founders who have invested their own money into the project.	Founder	2014	Oslo
Start-up J	Digital arena where people with time can help other people	Founder	2014	Oslo
Start-up K	App to map your day and help you identify associations between what you eat or are exposed to and personal allergic reactions. A tool to help people gain an overview of their health.	Founder	2015	Oslo
Start-up L	Digital platform for volunteer healthcare organizations and other stakeholders for efficient coordination of resources, resulting in effective healthcare outcomes. Founded by two young entrepreneurs.	Founder	2016	Stavanger
Start-up M	Smart-watch solution for health alarms (automatic alarm and two-way communication in a compact package). The automated alarm is based on measurements of the pulse, body temperature and movement. The alarm is activated when a fall occurs or there are abnormalities in the combination of measurements.	Founder	2015	Stavanger
Start-up N	Digital technology, hardware and software for hikers to collect and own personal data; a digital platform allows sharing and trading of digitized personal experience data. The purpose is to personalize one's hiking experience; to digitize information in a way that ensures ownership of one's personal data and thus prevent data exploitation by a third party.	Founders	2014	Stavanger
Start-up O	Platform for planning volunteering activities, communicating in teams and making a difference with others.	Founder	2015/2016	Stavanger

4.3. The Interview Process

We based the interviews on the maturity models, in particular that of Stahl, G.K. et al. [78], focusing on the purpose, process and outcome of the innovation activity. They were also based on [44], with more detailed focus on the process dimension (see Table 1). This was because we were seeking specific evidence of how firms approach anticipation, reflectiveness, inclusiveness and responsiveness. In the interviews, we briefly explained the project and encouraged the respondents to talk about their business, with particular focus on their product. While we did not ask directly, we probed to understand if they were familiar with the RI concept. Moreover, we wanted respondents to speak freely and in their own words, so we used a rough topic-structured interview template, allowing for flexibility in questioning. We started with questions related to the nature of their innovation, the nature of their business and their stakeholders. We allowed the respondents to openly reflect on these aspects and did not interrupt them, in order to get as close to their views as possible. Furthermore, as "responsibility" as an academic concept was vague for the respondents, we attempted to reveal this by probing questions (i.e., "what drove you to start this business?" (purpose); "how are you working with any stakeholders?" (inclusion, responsiveness); "did something cause your business to take another course?" (anticipation, reflexivity); and "does your business influence society in any way?" (outcome). The interviews averaged one hour and were recorded and transcribed. Secondary data were also collected to establish how the company was positioned in the industry.

4.4. Analysis

We chose a directed content analysis approach [67,79], which involves a process of summarizing raw data into categories or themes based on interpretation. Direct content analysis is a moderate approach compared to pure inductive analysis, which involves coding categories derived directly

and inductively from the raw data. In the direct content approach, initial coding starts with a theory or relevant research findings. We first deductively coded broader sections of the transcribed interviews based on our theoretical framework, calling this "aggregate code words". The first level of aggregate code words was related to the terms "purpose", "process" and "output", as indicated in the framework by Stahl, B.C. et al. [2]. We related purpose to the "overall meaning" of the business and to the innovator's wish to solve a societal challenge. Within the process dimension we further coded the second level of aggregate code words based on [21] framework of inclusion, anticipation, reflexivity and responsiveness. Inclusion related to their relationship with stakeholders was also covered. Anticipation concerned the ability to review future risk and externalities related to the innovation. Reflexivity was assumed as the innovator's aptitude to reflect on current practices based on input from stakeholders. Finally, responsiveness was understood as the actual change of practices in order to meet their stakeholders' needs." As regards the outcome, we looked at the actual results of RI attempts. Finally, following Wickson, F. et al. [32] and Hsieh, H. et al. [79] we used an inductive "line by line" approach, in which we considered each sentence separately and allowed themes to emerge within the broader concept. Within the purpose and inclusion dimension, several first level codes appeared. Within the remaining process dimensions, there were fewer examples and much overlap between them. Finally, on the third first order aggregate dimension of "output", we sought broader results from the RI activities. As the startups were relatively new, the output dimension did not yield results and was therefore omitted from the study.

Lincoln, Y.S. et al. [80] recommend four criteria for evaluating interpretative research work: credibility, transferability, dependability and confirmability. Consequently, to ensure credibility, we browsed all the transcripts and noted our first impressions. Second, the team discussed the coding processes by reading and evaluating the transcripts. We agreed on a coding procedure, and chose the first author of the paper to code all the interviews, in order to avoid inconsistencies and increase reliability [67]. However, the coder accessed the other team members to discuss the procedure and results throughout the process. Further, secondary data, including company websites and reports, were referenced to clarify our understanding of the respondent in question. The coding was performed using NVivo qualitative software. As this was an explorative study based on 14 case studies in a certain country context, we cannot claim transferability. We have assumed dependability of the data, as they were collected from different parts of the country and it is a multiple case study. Confirmability was ensured, as the tapes of the interviews were accessible and the interviews transcribed. Furthermore, the Nvivo coding enables a more distanced and systematic relation to the data.

5. Findings

To reveal the process by which the findings emerged from our data, we present an overview of the coding and the distribution of references and sources. As some texts seemed applicable to more than one category, these were coded in all the categories that seemed suitable. This overlap of categories is presented in Table 3. We then move on to discuss each part of the theoretical framework upon which our data were informed.

Overview of the Data

Table 3 provides an overview of the Nvivo data, stating the number of interviews (sources) in which we found evidence of a certain responsibility concept and the incidences (total occurrences) in which we found evidence of the concept. While none of the respondents showed familiarity with the RI concept, the data still showed that responsibility was indeed a vital element for the startups. The dimension driving the founders was responsibility as purpose. Evidence for this was found throughout, in all the interviews, and with multiple references in some of them. In addition to the inherent presence of responsibility as purpose in the interview data, there was also evidence of responsibility as process. Several companies had mechanisms in place that can be associated with [78] framework for responsibility as process. According to the [20] framework, we found that

most companies fell between the categories of the "revised standard model" and "consultative model", in which there is a high degree of inclusion, but the other processes were more limited.

There was little evidence for responsibility as outcome, which was expected since the companies were startups and only a few of them had launched on the marketplace when the interviews were conducted.

Table 3. Findings from responsibility stages.

Aggregate Level 1	Aggregate Level 2			
Phase of Responsibility		**Sources**	**References**	
Purpose		14	92	
Process		11	79	
	Inclusivity	10	70	Overlapping with responsiveness
	Anticipation	2	5	Overlapping with reflexivity
	Reflexivity	5	17	Overlapping with anticipation and responsiveness
	Responsiveness	5	13	Overlapping with reflexivity and inclusion
Outcome		2		

The following sections discuss each of the phases in the maturity model respectively.

Figure 1 shows how respondents interpreted purpose for their business. We found ample evidence for responsibility as a purpose among the interview subjects. Entrepreneurs reported different motivations, which included the enthusiasm to help and contribute to positive change.

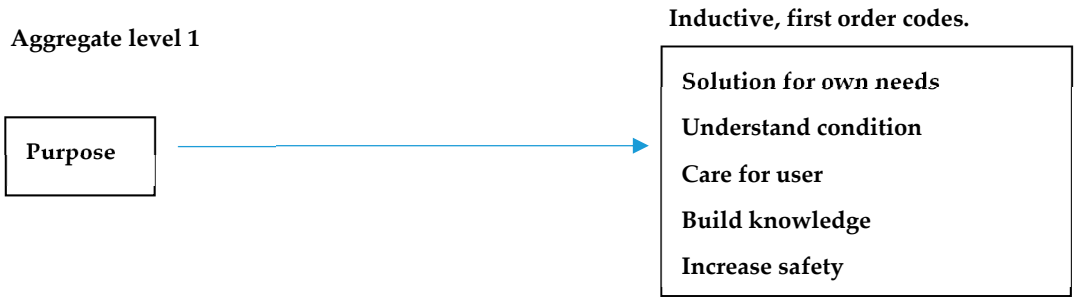

Figure 1. Responsibility as purpose.

The data showed that 11 out of the 14 cases were founded or managed by former patients or caretakers. Based on own needs, they had developed innovative solutions to tackling aspects of their illness. This is important, as it shows that these founders were motivated by their experience and an intention to help others. Another driver was the need to understand their own health condition. Further, it became evident that the profit motive was secondary for most of the founders.

> *To be honest, I did not think about money to begin with. I have heart disease myself, and was told you are not alone, 75% of people dealing with heart disease have the same problem. So then I thought that if it's 75%, the market should be quite large. I was thinking that more kids can be saved because one third of kids born with heart disease die, undiagnosed, before the age of one. So at least 70% of those could be saved if they are diagnosed early. Earlier surgery for kids means that they would be healthy adults. That was the main idea, to figure out the problem as soon as possible, and to solve it before it becomes acute.*
>
> (Founder, Start-up A)

"Care for the user" was also an important purpose, as illustrated in the quote below.

> *I thought that the doctors should have time to do their job. Today the phones or communication systems do not work properly in hospitals. Doctors and nurses are impossible to get hold of, and they spend a lot of time looking for each other . . . giving messages, simple things they could send in a message and receive confirmation that it was received, and they spend hours on it. Our system sends the alarm only to the person responsible for that patient. It will be repeated every three minutes, then, if they are busy and cannot take it, it goes on to a larger pool. So you disturb fewer people. My thought behind it all is simply that the health worker will have time to work, and patients will be able to get hold of them.*
>
> (Founder, Startup B)

Some of the founders did not have personal experience, but had knowledge through research, and had developed a strong conviction that they could improve the status quo for people with particular health issues.

> *When we were researchers, we also noticed a peculiar thing: there was a stack of empirical literature, books, articles, etc., of what is rewarding to do in the clinic! There is so much knowledge, it is just that when we were in the clinic, at the hospital, then we did not know this, and we did it other ways. In other words, healthcare is not working with the best methods. And nobody has taken this role to transfer the expertise back to the practice, so that's the business idea. This idea is to build a bridge between the research world and the practice. Because it is in a way academic robbery: researchers enter the clinic, find something new, write articles and then nothing more happens.*
>
> (Founder, Start-up G)

The purpose-driven entrepreneurs demonstrated evidence of a high intuitive awareness of the principles of RI. Thus, investigating RI in startups underlines that the motivation for starting a company is not necessarily rational. Compared to other types of entrepreneurial motivation [44], most of which are individual-based, this study indicates that even though responsibility as a concept was foreign to the firms´ respondents, none of them failed to have a strong purpose for their work. Indeed, instead of being motivated by individual circumstances, these entrepreneurs were motivated by their ability to contribute to providing for other people´s needs. In most cases, the strong motivation came from having firsthand experience of the system and seeing potential for improvement. Moreover, there was a sense of wanting to support the user.

However, recently research has made available knowledge of a new type of entrepreneur, motivated by the greater good. One example is "sustainable innovation", which similarly aims to solve grand challenges and include stakeholders [63]. While sustainable innovation has not delivered a process, the purpose overlaps with that of the RI concept.

Further, the concept of user-innovators is the idea that the consumer changes the good or service to enhance the benefit provided [49] Patient innovation is a type of user innovation. [20,81,82] and [83] have conducted extensive studies of patient- and caregiver-originated innovations. In initial explorations among patients with rare diseases, they found a variety of ingenious solutions (i.e., innovations) to daily problems, hitherto unknown therapies and treatments, and even new ideas for medical devices.

The results of this study, as such, support these new avenues of research and point to entrepreneurs having greater motivation that goes beyond being individualistic and self-centered. They further show that entrepreneurs can have an inborn responsibility that is connected to their purpose. Therefore, we find that contextual awareness is not decisive for becoming involved in RI activities."

Figure 2 shows that we used [84] as a reference for coding process. Thus, the processes of responsibility consist of inclusion, anticipation, reflexivity and responsiveness [44]. The inclusion dimension was the most prevalent in the data, found in 11 out of the 14 firms. Furthermore, the inclusion dimension consisted of many sub-categories found through the inductive coding. For example, inclusion could occur through the firm actively asking stakeholders, or firms cooperating with stakeholders, as the following quotes show:

I have a lot of feedback from patients. I have also used people I know because you can follow up on specific issues with them and ask 'what do you mean by that? What do you think of that'? From the doctors I got some feedback before I started developing, but apart from that, I have not received a lot of feedback from them.

(Founder, Startup F)

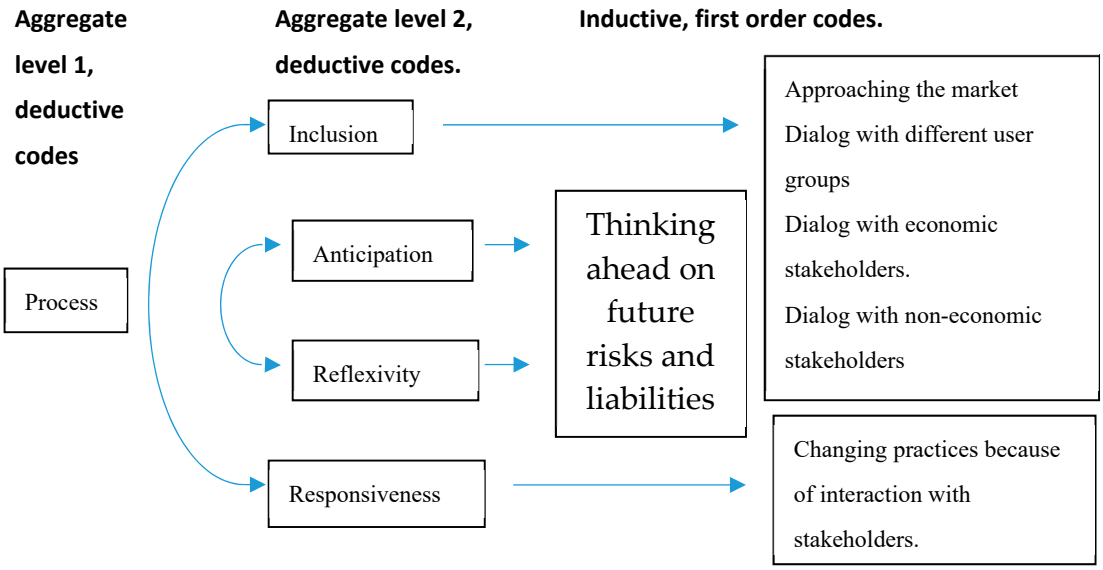

Figure 2. Responsibility as process.

The founders were very open to receiving feedback to solutions through pilot projects, reference group and research projects.

We have a pilot project with a hospital pharmacy in east Norway. They won a one year free plan with us last year during the "pharmacy congress." Therefore, they have used our product for a whole year, and we have had very constructive feedback from them.

(Founder, Start-up D)

We work with different researchers in the individual areas: We have our own sleep researcher, we have psychologists; on health, on physical activity, we may have physicians . . . we have clinical nutritionists. Each program is compiled with relevant professional competence.

(Founder, Startup E)

We found a high degree of inclusion at all levels. We interpret this as the companies following up their purpose with action and being serious and professional in solving problems for certain groups of people.

While several of the firms reported inclusion, we found less evidence of the other dimensions. In addition, we found that the dimensions were not mutually exclusive and that there was overlap between them. First, inclusion overlapped with responsiveness, so that the respondents talked about including stakeholders and responding to them at the same time. We assumed that was natural, since one cannot respond without having anyone to respond to. Moreover, inclusion was far more prevalent than responsiveness, indicating that it is the first step, and anticipation and reflexivity overlapped with each other. It occurred to us that these were reflection processes distinguished by a time-dimension: anticipation was a reflection on future risk, and reflexivity was a reflection on current practices. Reflexivity also overlapped with responsiveness. Since responsiveness was closely connected to the stakeholder, reflexivity also seemed to be more stakeholder-driven than anticipation.

For anticipation, describing the process debating future outcomes and risks of a novel product or service, we found that some firms actively asked themselves about the side effects of their products and how they could improve these.

> *When you are going to be on that trend then you constantly improve the product. We make new agreements with new software developers because we realize that it can be more efficient, faster. One can minimize human error and have the best possible product at all times, all the time.*
>
> (Founder, Start-up J)

Reflexivity, on the other hand, is a way of assessing current practice. Our data showed an overlap between the dimensions of reflexivity and anticipation. The following quote from Startup F illustrates this; it shows that (a) they assess both current practices, in addition to (b), asking 'what if' concerning a feature of the service.

> *We have always been surprised by our market discovery. An aspect of this was that when we started with drop-in consultations, we gave patients the opportunity to cancel the consultation right away. The cancellation was free of charge. I had a small feeling about it as there were several cancellations. We decided to remove it to see then what happened. When we removed that opportunity to cancel the consultation, nobody cancelled . . . So it suggests that they just cancelled because cancellations were available; I think it's a bit about being just insecure about 'ah, does this really work?'*
>
> (Founder, Start-up F)

Finally, responsiveness may overlap with all the dimensions. It seems to emerge from the assessment process of anticipation or reflexivity, based on the inclusion of stakeholders. In the following quote, the respondent explains the process from inclusion of the patient-user and the thought process of the current practices, with some anticipation of alternative practices and the final response to the patient-user.

> *We thought about early diagnostics when we started this product. But after meeting with several families, we figured out that this is just one part of the problem. Another part is when the kid is already diagnosed, they have half of a year period when they see the doctor. Within this half a year, it's up to the parents to evaluate whether the kid is getting worse or better. And it's very subjective, which is making parents feel really unsafe. Kids in hospital are surrounded by doctors and all the technology. When you get you kid home, and doctors say to the family, "you evaluate how it's going. If you feel that it is going wrong, you have to come to the doctor". How do you know if it is going wrong or not? Maybe the kid is just tired, or it's a new symptom of a heart disease. The doctors told us they also need our product to monitor the development of the condition that was already diagnosed. So we have an additional market niche. Before, it was just early diagnostics, now it's also follow up of those who are diagnosed.*
>
> (Founder, Start-up A)

Based on these observations, we see that RI activities may be "bundled" together in the start-up and thus be hard to distinguish. In the following section, we discuss our findings in relation to the development of the RI concept.

6. Discussion

In the models proposed by Parikh, J. [31] and Stahl, G.K. et al. [78], a general assumption seems to be that the more awareness and knowledge firms have about RI, the more advanced the models they develop will be. However, awareness and knowledge are discussed in a contextual perspective as academic tools and a policy framework. The results of this study show that even without contextual awareness, responsibility as a purpose is strong among the start-ups. In fact, responsibility for their own situation, or that of others, is often the sole motivation for these entrepreneurs.

One can argue that there is a temporal or intuitive awareness around the RI concept. Pauwels, P. et al. [85] discusses the role of intuition in strategy making and shows that it is an under-researched area, which is included in the foundation of strategic decision-making. While intuition in strategy making does not have a strong empirical base, it is perceived as playing a major role in the professional lives of managers and has a role in strategy making [86]. We claim that the intuitive actions of the entrepreneurs we identified in our study are a type of temporal awareness of RI, as they form an understanding of the contingency between purpose and outcome though the process.

Further, our cases demonstrate very broad inclusion, with the other RI elements are not so prevalent. In fact, there is a bundling of activities that comes into play with the dimensions of responsibility as a process, making each dimension hard to differentiate. Several of the dimensions overlapped, and we can assume that while larger companies might have a clear division between different tasks, the startups have fewer resources to accomplish this. Therefore, we observe a pattern which points to a chronological order between the dimensions, as the model in Figure 3 illustrates.

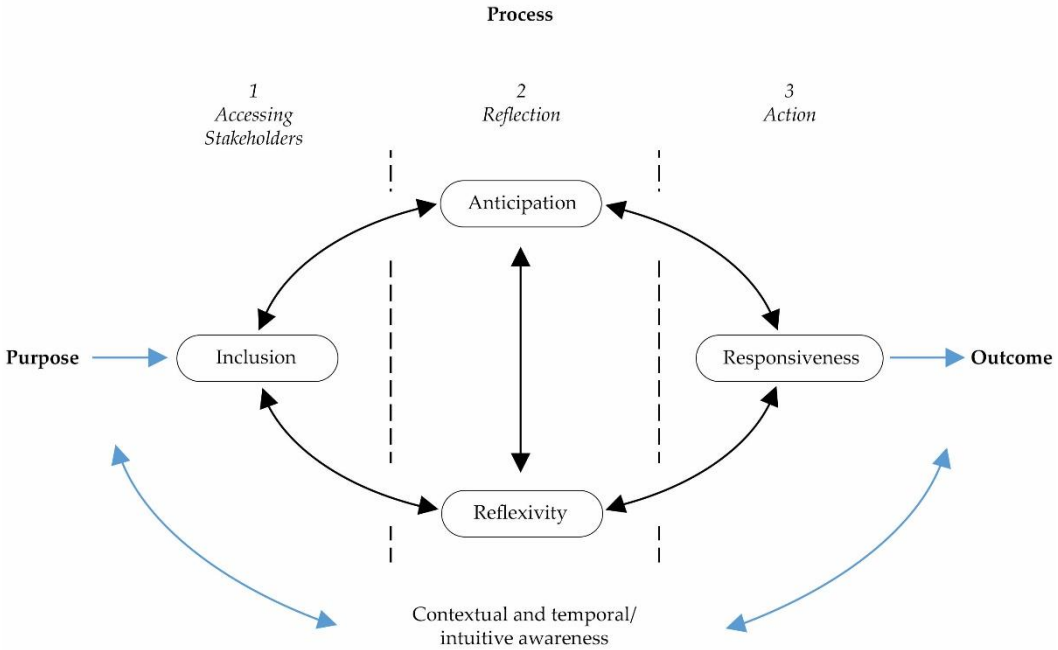

Figure 3. Dynamics of RI practices in startups.

Since inclusivity is the most widespread of the elements, we can assume that it may be the first step for a company. Moreover, we judge that it is hard to have any reflective processes such as reflexivity and anticipation in a startup without some kind of inclusion of the stakeholders, since without this one would not be aware of inconsistencies between the firms' offerings and the stakeholders. Anticipation and reflexivity clearly mirror each other, as the former questions future consequences, while the latter questions ongoing practice. Finally, responsiveness is a result of all three elements, and cannot exist without reflective processes or inclusion. Through Figure 3, we therefore suggest that inclusion leads to reflective practices, which in turn lead to responsiveness.

We thus argue that there is mutual enhancement and discussion between the two perspectives: on the one hand, contextual awareness could provide a more advanced approach to RI as it is based on research and academic concepts. At the same time, since it can be seen as an external pressure, it may suffer the same fate as many other well-meaning academic and policy concepts and end in superficial and symbolic strategies (i.e., greenwashing). On the other hand, entrepreneurs' intuitive search for better decisions to achieve their goals [87] leads to higher awareness of the importance of the goals that address grand challenges and are thus seen as important by most stakeholders. The literature

on entrepreneurship has highlighted that the decision-making process in startups is strongly guided by entrepreneurial sensitivity, creativity and intuition, rather than by systematic analysis of internal and external information [37,87]. It is also strongly influenced by the entrepreneur's personal goals and tends to be based on incremental processes rather than on planning.

We found that startups in digital health have purpose that is strongly motivated by the desire to solve problems in the healthcare sector, and that they practice inclusion and to a lesser degree anticipation and reflectivity, but at the same time they are not aware of the concept of responsible innovation. This points to the low contextual awareness of RI, although entrepreneurs intuitively embrace important principles of it. This intuitive awareness is related to the purpose of why they exist as companies. Further, it is related to the process and to a notion of "where they were going" and as such is related to a "temporal" awareness of RI.

We therefore suggest a revised maturity model, as presented in Table 4. The revised model starts with intuitive temporal awareness, with which the entrepreneur has an inborn understanding of responsibility and how to achieve it. The next step is contextual awareness, when the entrepreneur learns about the concept of RI. However, when there is full strategic awareness, the entrepreneur balances intuitive and contextual awareness and thus is able to approach RI issues strategically.

Table 4. Maturity model for RI.

Awareness	**Adapted Maturity Model**	**RI Activities**			
		Inclusion	**Anticipation**	**Reflexivity**	**Response**
Intuitive temporal awareness	Simple model	Inclusion of arbitrary stakeholders; lack of appreciation of external bodies	Low	Low	Low
Contextual awareness	Advanced Model	Understanding of the importance of including all types of stakeholders			
Strategic temporal awareness	Strategic Model	Strategic inclusion of internal and external stakeholders through a variety of methods	High	High	High
Purpose	⟷				Outcome

Our findings show that at the very basic level these startups include the most "obvious" and easily accessed stakeholders. As they become more advanced, and even strategic, the heterogeneity of the inclusion increases. Our data further suggest that inclusion at the lowest level does not automatically lead to anticipation, reflexivity and responsiveness. Moreover, we see that when inclusion is high, the other activities also become more prevalent. The change we see is that the inclusion becomes steadily more advanced, as suggested in Table 5. Further, the other activities such as anticipation and reflexivity increase with the increased inclusion. Finally, as a result responsiveness is also affected.

6.1. Conclusion and Implications

In the study, we have asked the question of how RI concepts are reflected and approached by entrepreneurs and managers of new startups. As suggested by the Von Hippel, E. [88], achieving sustainability goals should become a priority for nations, and RI is seen as useful tool for that purpose. European innovation policy, in particular, focuses on achieving a smart, sustainable and inclusive Europe. Despite the fact that the RI concept is included in political and academic debate, little is known on how it can be applied to economic actors. Our study challenges the assumption that the top-down approach of informing business about RI can result in increased applicability of the concept. The history and debates around CSR showed that such assumptions are often misleading and result in only limited ability to encourage business actors to take truly responsible actions [1,16].

However, we found that RI is a tool for firms and stakeholders to communicate how innovation can benefit society beyond company goals. Startups intuitively integrate some core principles of inclusiveness and reflexivity into their daily practices. While they are limited in their ability to involve all stakeholders and are bound by time and resource pressures, it still shows they have a high degree of temporal/intuitive awareness of responsibility. This awareness has a contingency nature, as firms develop from the idea generation phase to creating solutions for, and together with, users. This is important, as it credits the businesses for their inborn and intuitive awareness, instead of assuming that everything has to be learned through academic or policy entities. Recognition of the presence of temporal awareness might influence the way we conduct future research and perhaps focus attention on different approaches to RI and how to make it more effective.

We also found that the elements of the RI model are interrelated. Previous literature treats purpose, process and outcome as sequential elements, while our research shows that firms do adjust their purpose after establishing inclusion of stakeholders and reflecting on their feedback, and that new need-solution pairs often emerge as a result of the interactions. Therefore, they should be considered as reciprocal processes that reinforce the innovation circle, rather than sequential ones. Moreover, RI processes consisting of the four activities, has a sequential logic in which inclusivity is the first step, leading to the reflective process and then to response. Therefore, we welcome research on different types of inclusion and their influence on anticipation and reflexivity, and finally outcome.

6.2. Implications for Practitioners

Innovation and entrepreneurial processes are never straightforward, but instead hectic, full of backwards loops and characterised by effectuation logic. Although recent literature has extended far beyond the classical "technology-push" model of innovation and advanced our view of the innovation process through more flexible innovation models, many innovations are still locked into the "dominant design" of the solution too soon after the concept phase. To help entrepreneurs be reflective and inclusive, we suggest that firms could easily apply RI process thinking into their dominant logic of innovation development (as illustrated in Table 5).

Table 5. Integration of responsible innovation into an entrepreneurial process for achievement of responsible outcome.

		Entrepreneurial Development Path		
		Intuitive/Temporal Awareness	**Contextual Awareness**	**Strategic Awareness**
Dimensions of responsible innovation	Anticipation	Identify social need Consider impact of the solution (environmental, social)	Consider impacts of different alternative designs Be clear on the impacts of the chosen solution design, identify potential risks (economic, societal and environmental)	Anticipate consequences of different business models for different user/stakeholder groups Testing of anticipation assumptions, making new anticipations
	Reflexivity	Be open with regard to possibly different views	Be aware of the difficulty to following "dominant design"	Be open and play with different business models solutions
	Inclusion	Identify stakeholders, clarify their involvement and include them in idea development	Agile methods and interactive process of co-creation of solution	Agile methods and co-creation for the business model.
	Responsiveness	Respond to different views from stakeholders	Continued loops of reflections and learning from design process	Absorbing new knowledge gained and adapting solution and business model

Having routines to go through current and possible future practices in light of stakeholder feedback may give companies an edge in dealing with their stakeholders.

6.3. Policy Implications

At a time when there is growing recognition of global challenges and sustainable goals [89], responsible research and innovation (RRI) is suggested as a way of governing innovation development to address the challenges populations face, such as poverty, inequality, aging populations and availability of quality healthcare [90]. Such principles suggest broader stakeholder inclusion into the decision-making process, anticipation of societal needs, and reflection on concerns [86], which in turn call for innovation policies [7]. The failure of institutions to include all layers of society into decision-making processes can lead to a sense of individual powerlessness. We claim that in order to overcome this challenge, new policies that might stimulate innovative firms in healthcare to become more responsible are welcomed. For this, an enabling approach might be useful–a physical context, toolkit and framework methodology–through which users can be actively involved in the innovation process at the firm level.

In the healthcare sector in particular, new methods are needed to enable users to articulate their needs and to work together with other stakeholders (firms, the public sector and healthcare professionals) in the design and co-creation of innovative products and services. In the healthcare sector, one of the challenges is the complex procurement process. Such procurement processes are a web of laws and regulations, norms and procedures, and established knowledge, which form an "institutional wall" [64,70,91]. This wall is effective in filtering new products and services to secure a reliable, predictable resource for users. It may also cement old norms and knowledge and lock them into different "codes of knowledge, depending on their position in the ecosystem. However, the wall also may effectively hinder improvement in products and services. Digitalization seems able to change this imbalance for the benefit of patients, and our cases have proven that innovative firms are able to include and interact with patients in much quicker and direct way thanks to the use of digital technologies. On one hand, innovative startups in digital health have a shorter communication channel and thus better user inclusion, while on the other hand the absence of the well-accepted procedures for integrating digital technologies into the traditional procurement system act as a brake on innovation in this sector. It is therefore necessary to change the modern procurement process to allow digital healthcare to be a useful channel for stakeholder inclusion. User voices, may be the most valuable instrument in achieving equality and ensuring quality healthcare that is affordable for the masses.

To achieve this inclusion, it is useful to move beyond user involvement per se, to consider the broader innovation environment–the specific networks of actors, and the interactions and flows of knowledge between them, together with the institutional settings these are embedded in, such the innovation ecosystem [91–93]. Such an eco-system approach has been shown to be a determining factor in the innovation clusters emerging around digital platforms [94], providing specific conditions for possibilities and limitations to involve users due to the characteristics of health and welfare systems, regional innovation clusters, or even due to particular structures and practices that have emerged around key innovation players. The eco-system approach will help provide a more robust framework within which different actors in the social healthcare innovation ecosystem, system integrators, municipalities, healthcare professionals, small and start-up entrepreneurs and end users, can explore ways to create and capture shared value.

A thorough and well-communicated policy on RI would therefore help the businesses develop their intuitive awareness of a more strategic approach. In line with this, it might therefore be important for policymakers move away from the perspective of businesses as pure profit seeking and maximizing actors, with initially no awareness of or interest in RI, and rather to understand that startups may be driven by a responsibility purpose. Understanding this motivation in startups may be helpful for policymakers and managers in healthcare. By informing and creating incentives for firms that act responsibly, they will develop an enhanced healthcare system based on digitalization.

6.4. Limitations and Future Research Avenues

This study is a multiple case study and though it is useful to explore the RI theory and concepts, it does not provide statistical generalizability [67,86,95]. Therefore, future research could shed light on the generalizability of these results through quantitative or comparative studies. For example, future researchers could test the new maturity model among different types of businesses to establish if (1) the proposed pattern is supported statistically; (2) if there are differences between the established actors and startups; and (3) if there are differences in different sectors. An interesting avenue of related research could be to examine the specific type of entrepreneur that are more purpose- rather than profit-driven. It is highly probable that this type of entrepreneurship is more prevalent in areas that normally constitute our grand challenges. And if this is the case, they might also need different stimuli than other firms.

We also see that e-health entrepreneurs operate in a context where stakeholders differ greatly in terms of power and influence. In the healthcare sector, we often see that customers are distinguished from users; the former are either large corporations or public health institutions with a high level of power and influence, while the latter are individual patients who are vulnerable and have low power and influence [64] (Will reveal authors if published). It is reasonable to believe that if startups experience greater economic pressure, the weakest stakeholders, often the users, could easily be ignored. As such, future research could contribute with sophisticated RI models based on stakeholder analysis. An even broader question addresses how RI may reach across societies with quite different knowledge bases and value systems. As such, including local stakeholders in the innovation process might ensure globally-responsible outcomes.

There is a need in the research on responsible innovation to include business as part of the solution and to focus on the global agenda for sustainable development. When the RI concept was introduced, the focus was mainly on the responsibility of science, and the ethical and social implications of scientific innovations [20]. We suggest that future research takes a broader perspective and consider a variety of actors inside and outside the scientific system who might be involved in innovation processes [96]. This means that future research can focus on the micro, meso or even macro level. At the micro level, research could focus on addressing the facilitators of innovative behaviours which target the grand societal challenges at the firm and individual level, or focus on the forms of leadership that can stimulate responsible innovations in firms, governance and management for responsible innovation. At the meso level, research could address the impact of eco-systems on firms' implementation of responsible practices, while at the macro level questions to be addressed include national and regional policies for responsible innovation, external enablers (open innovation, collective innovation, digitalization, sharing economy) for responsible innovation, and the influence of the sustainability goals on research and development in business.

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References

1. Visser, W. The Future of CSR: Towards Transformative CSR, or CSR 2.0. *SSRN Electron. J.* **2012**. [CrossRef]
2. Stahl, B.C.; Obach, M.; Yaghmaei, E.; Ikonen, V.; Chatfield, K.; Brem, A. The Responsible Research and Innovation (RRI) Maturity Model: Linking Theory and Practice. *Sustainability* **2017**, *9*, 1036. [CrossRef]

3. Da Silva, L.M.; Bitencourt, C.C.; Faccin, K.; Iakoveleva, T. The Role of Stakeholders in the Context of Responsible Innovation to Achieve Sustainable Development Goals: A Meta-Synthesis. *Sustainability* **2019**, *11*, 1766. [CrossRef]
4. George, G.; Howard-Grenville, J.; Joshi, A.; Tihanyi, L. Understanding and tackling societal grand challenges through management research. *Acad. Manag. J.* **2016**, *59*, 1880–1895. [CrossRef]
5. European Commission. *Indicators for Promoting and Monitoring Responsible Research and Innovation: Report from the Expert Group on Policy Indicators for Responsible Research and Innovation (No. EUR 26866)*; European Commission: Brussels, Belgium, 2015.
6. Burget, M.; Bardone, E.; Pedaste, M. Definitions and conceptual dimensions of responsible research and innovation: A literature review. *Sci. Eng. Ethics* **2017**, *23*, 1–19. [CrossRef] [PubMed]
7. Kuhlmann, S.; Rip, A. Next-Generation Innovation Policy and Grand Challenges. *Sci. Public Policy* **2017**, *45*, 448–454. [CrossRef]
8. Von Hippel, E. *Democratizing Innovation*; MIT Press: Cambridge, MA, USA, 2005.
9. Ahsan, M.J. Entrepreneurship and Ethics in the Sharing Economy: A critical Perspective. *J. Bus. Ethics* **2018**. [CrossRef]
10. Hempel, L.; Ostermeier, L.; Schaaf, T.; Vedder, D. Towards a social impact assessment of security technologies: A bottom-up approach. *Sci. Public Policy* **2013**, *40*, 740–754. [CrossRef]
11. Iglesias, O.; Markovic, S.; Bagherzadeh, M.; Singh, J. Co- creation: A Kay Link Between Corporate Social Responsibility, Customer Trust and Customer Loyalty. *J. Bus. Ethics* **2018**, 1–16. [CrossRef]
12. Remenyi, D.; Williams, B.; Money, A.; Swartz, E. *Doing Research in Business and Management: An Introduction to Process and Method*; Sage: London, UK, 1998.
13. Welman, J.C.; Kruger, S.J. *Research Methodology for the Business and Administrative Sciences*, 2nd ed.; Oxford University Press: Oxford, UK, 2002.
14. Blok, V.; Lemmens, P. The Emerging Concept of Responsible Innovation. Three Reasons Why It Is Questionable and Calls for a Radical Transformation of the Concept of Innovation. In *Responsible Innovation*; Koops, B.J., Oosterlaken, I., Romijn, H., Swierstra, T., van den Hoven, J., Eds.; Springer: Cham, Switzerland, 2015; Volume 2, pp. 19–35.
15. Cutlip, M.; Center, A.; Broom, G. *Effective Public Relations*, 6th ed.; Prentice-Hall: Englewood Cliffs, NJ, USA, 1985.
16. Laudal, T. Determinants and Impacts of Corporate Social Responsibility: A Market Centric Approach. Ph.D. Thesis, University of Stavanger, Stavanger, Norway, 2011.
17. Gurzwaska, A.; Mäkinen, M.; Brey, P. Implementation of Responsible Research and Innovation (RRI) practices in Industry: Providing the Right Incentives. *Sustainability* **2017**, *9*, 1759. [CrossRef]
18. Smith, A.; Voß, J.P.; Grin, J. Innovation studies and sustainability transitions: The allure of the multi-level perspective and its challenges. In *Research Policy*; Elsevier: Amsterdam, The Netherlands, 2010; Volume 39, pp. 435–448.
19. Genus, A.; Stirling, A. Collingridge and the dilemma of control: Towards responsible and accountable innovation. *Res. Policy* **2018**, *47*, 61–69. [CrossRef]
20. Paredes-Frigolett, H.; Flavio, L.; Gomes, A.M.; Pereira, J. Governance of Responsible Research and Innovation: An Agent-Based Model Approach. *Procedia Comput. Sci.* **2016**, *55*, 912–921. [CrossRef]
21. Stephan, U.; Hart, M.; Drews, C.C. *Understanding Motivations for Entrepreneurship: A Review of Recent Research Evidence*; Enterprise Research Centre and Aston Business School: Birmingham, UK, 2015.
22. Von Schomberg, R.A. Vision of responsible innovation. In *Responsible Innovation*; Owen, R., Heintz, M., Bessant, J., Eds.; John Wiley: London, UK, 2013.
23. Economist Intelligence Unit. *The Future of Healthcare in Europe A report from the Economist Intelligence Unit*; The Economist: London, UK, 2011.
24. Estrin, S.; Korosteleva, J.; Mickiewicz, T. Which institutions encourage entrepreneurial growth aspirations? *J. Bus. Ventur.* **2013**, *28*, 564–580. [CrossRef]
25. European Comission. State of Health in the EU Companion Report. 2017. Available online: https://ec.europa.eu/health/state (accessed on 15 September 2019).
26. Christensen, C.; Waldeck, A.; Fogg, R. *How Disruptive Innovation Can Finally Revolutionize Healthcare. A Plan for Incumbents and Start-Ups to Build a Future of Better Health and Lower Costs*; Clayton Christensen Institute for Disruptive Innovation, 2017; Available online: https://www.christenseninstitute.org/wp-content/uploads/2017/05/How-Disruption-Can-Finally-Revolutionize-Healthcare-final.pdf (accessed on 21 September 2019).

27. Christensen, C.M. *The Innovator's Dilemma: When New Technologies Cause Great Firms to Fail*; Harvard Business School Press: Brighton, MA, USA, 1997.
28. Herzlinger, R.E. Why innovation in health care is so hard. *Harv. Bus. Rev.* **2006**, *84*, 58–66, 156. [PubMed]
29. Marmot, M.; Allen, J.; Goldblatt, P.; Boyce, T.; McNeish, D.; Grady, M.; Geddes, I. *Fair Society, Healthy Lives: Strategic Review of Health Inequalities in England Post-2010*; The Marmot Review: London, UK, 2010.
30. Mack, M. What Drives Rising Health-Care Costs? In *Government Finance Review*; WHO: Geneva, Switzerland, 2016.
31. Parikh, J. *Intuition: The New Frontier of Management*; Blackwell Business: Oxford, UK, 1994.
32. Wickson, F.; Forsberg, E.M. Standardising Responsibility? The Significance of Interstitial Spaces. *Sci. Eng. Ethics* **2015**, *21*, 1159–1180. [CrossRef] [PubMed]
33. Clarkson, M.B.E. A Stakeholder Framework for Analyzing and Evaluating Corporate Social Performance. *Acad. Manag. Rev.* **1995**, *20*, 92–117. [CrossRef]
34. Donaldson, T.; Preston, L. The Stakeholder Theory of the Corporation: Concepts, Evidence, and Implications. *Acad. Manag. Rev.* **1995**, *20*, 65–91. [CrossRef]
35. Von Schomberg, R. Prospects for Technology Assessment in a framework of responsible research and innovation. In *Technikfolgen Abschätzen Lehren: Bildungspotenziale Transdisziplinärer Methode*; VS Verlag für Sozialwissenschaften: Wiesbaden, Germany, 2011; pp. 39–61.
36. Markard, J.; Raven, R.; Truffer, B. Sustainability transition–and emerging field of research and its prospects. *Res. Policy* **2012**, *41*, 955–967. [CrossRef]
37. Shane, S.; Venkataraman, S. The Promise of Enterpreneurship as a Field of Research. *Acad. Manag. Rev.* **2000**, *25*, 217–226. [CrossRef]
38. Douglas, H. The moral responsibility of scientists: Tensison between autonomy and responsibility. *Am. Philos. Q.* **2003**, *40*, 59–68.
39. Clark, W.C.; van Kerhoff, L.; Lebel, L.; Gallopín, G.C. Crafting usable knowledge for sustainable development. *Proc. Natl. Acad. Sci. USA* **2016**, *113*, 4570–4578. [CrossRef]
40. Nath, I.; Winnacker, E. Responsible Research Conduct. *Science* **2012**, *338*, 863. [CrossRef] [PubMed]
41. United Nations General Assembly. *Transforming Our World: The 2030 Agenda for Sustainable Development*; United Nations General Assembly: New York, NY, USA, 2015; Volume 2, Available online: https://sustainabledevelopment.un.org/post2015/transformingourworld/publication (accessed on 15 September 2019).
42. Hajer, M. *Authoritative Governance: Policy Making in the Age of Mediatization*; Oxford University Press: Oxford, UK, 2009.
43. Irwin, A. The Politics of Talk: Coming to terms with the new scientific governance. *Soc. Study Sci.* **2006**, *36*, 229–320. [CrossRef]
44. Stirling, A. Opening up or closing down? Analysis, participation and power in the social appraisal of technology. In *Science, Citizenship and Globalisation*; Leach, M., Scoones, I., Wynne, B., Eds.; Zed: London, UK, 2005.
45. Brun, E.; Sætre, A.S. Managing Ambiguity in New Product Development. *Creat. Innov. Manag.* **2009**, *18*, 24–34. [CrossRef]
46. Cooper, R.G. *Winning at New Products: Accelerating the Process from Idea to Launch*, 3rd ed.; Perseus Books: New York, NY, USA, 2001.
47. Jou, G.; Yuan, B.J.C. Utilizing a Novel Approach at the Fuzzy Front-End of New Product Development: A Case Study in a Flexible Fabric Super capacitor. *Sustainability* **2016**, *8*, 740. [CrossRef]
48. Von Hippel, E. The dominant role of users in scientific instrument innovation process. *Res. Policy* **1976**, *5*, 212–239. [CrossRef]
49. Von Hippel, E. *The Sources of Innovation*; Oxford University Press: Oxford, UK, 1988.
50. Martin, B.R. The origins of the concept of "foresight" in science and technology: An insider's perspective. *Technol. Forecast. Soc. Chang.* **2010**, *77*, 1438–1447. [CrossRef]
51. Stilgoe, J.; Owen, R.; Macnaghten, P. Developing a framework for responsible innovation. *Res. Policy* **2013**, *42*, 1568–1580. [CrossRef]
52. Ribeiro, B.E.; Smith, R.D.J.; Millar, K. A Mobilising Concept? Unpacking Academic Representations of Responsible Research and Innovation. *Sci. Eng. Ethics* **2017**, *23*, 81–103. [CrossRef]
53. Rip, A. The past and future of RRI. In *Life Sciences, Society and Policy*; Springer: Cham, Switzerland, 2014.
54. Stahl, B.C.; Coeckelbergh, M. Ethics of healthcare robotics: Towards responsible research and Innovation. *Robot. Auton. Syst.* **2016**, *86*, 152–161. [CrossRef]

55. Yin, R.K. *Case Study Research: Design and Methods*; Sage: Thousand Oaks, CA, USA, 2009.
56. Lee, J.N.; Kim, Y.G. Effect of Partnership Quality on IS Outsourcing Success: Conceptual Framework and Empirical Validation. *J. Manag. Inf. Syst.* **1999**, *15*, 29–61. [CrossRef]
57. Meijboom, F.L.B.; Visak, T.; Brom, F. From Trust to Trustworthiness: Why Information is not enough in the Food Sector. *J. Agric. Environ. Ethic* **2006**, *19*, 427–442. [CrossRef]
58. Flipse, S.M. *Enhancing Socially Responsible Innovation in Industry*; Ridderprint: Ridderkerk, The Netherlands, 2012.
59. Lubberink, R.; van Blok, V.; van Ophem, J.; Omta, O. Lessons for Responsible Innovation in the Business Context: A Systematic Literature Review of Responsible, Social and Sustainable Innovation Practices. *Sustainability* **2017**, *9*, 721. [CrossRef]
60. Porter, M.E.; Kramer, M.R. Strategy and society: The link between competitive advantage and corporate social responsibility. *Harv. Bus. Rev.* **2006**, 78–92. [CrossRef]
61. Asante, K.; Owen, R.; Williamson, G. Governance of new product development and perceptions of responsible innovation in the financial sector: Insights from an ethnographic case study. *J. Responsible Innov.* **2014**, *1*, 9–30. [CrossRef]
62. Koops, B.J. The concepts, approaches and applications of responsible innovation; an introduction. In *Responsible Innovation*; Koops, B.J., Oosterlaken, I., Romijn, H., Swierstra, T., van den Hoven, J., Eds.; Springer: Cham, Switzerland, 2015; Volume 2, pp. 1–15.
63. Belz, F.M.; Binder, J.K. Sustainable Entrepreneurship: A Convergent Process Model. *Bus. Strategy Environ.* **2017**, *26*, 1–17. [CrossRef]
64. Oliveira, P.; Zejnilovic, H.; Canhão, H. Challenges and Opportunities in Developing and Sharing Solutions by Patients and Caregivers: The Story of a Knowledge Commons for the Patient Innovation Project. *Gov. Med. Knowl. Commons* **2017**, 301–325. [CrossRef]
65. Gibb, A.; Scott, M. Strategic Awareness, Personal Commitment and Process of Planning. *Small Bus. J. Manag. Stud.* **1985**, *22*, 597–631.
66. Savelli, E.; Pencarelli, T.; Splendiani, S. Strategic Awareness and Growth Strategies in Small Enterprises. *Int. J. Bus. Econ.* **2009**, *8*, 1.
67. Zhang, Y.; Wildemuth, B.M. Qualitative analysis of content. In *Applications of Social Research Methods to Questions in Information and Library Science*; Wildemuth, B., Ed.; Libraries Unlimited: Santa Barbara, CA, USA, 2009; pp. 308–319.
68. Monkerud, L.C.; Tjerbo, T. The effects of the Norwegian Coordination Reform on the use of rehabilitation services: Panel data analyses of service use, 2010 to 2013. *BMC Health Serv. Res.* **2016**, *16*. [CrossRef] [PubMed]
69. Official Norwegian Reports. The Coordination Reform. 2009. Available online: https://www.regjeringen.no/contentassets/d4f0e16ad32e4bbd8d8ab5c21445a5dc/en-gb/pdfs/stm200820090047000en_pdfs.pdf (accessed on 15 September 2019).
70. Oftedal, E.M.; Foss, L. Meeting the Institutional wall. In *Responsible Innovation in Digital Health*; Iakovleva, T., Oftedal, E., Bessant, J., Eds.; Edward Elgar Publisher: Cheltenham, UK, 2019.
71. Oftedal, E.M.; Iakovleva, T. Stavanger: From Petroleum Focus to Diversified Competence through Crisis and Consensus. In *Academic Entrepreneurship - from University Research to Implementation and Commercialization of Innovations – A Comparative Study*; Foss, L., Gibson, D., Eds.; Routledge: Oxford, UK, 2015.
72. Eysenbach, G. What is e-health? *J. Med. Internet Res.* **2001**, *3*, 20. [CrossRef]
73. Oftedal, E.M.; Iakovleva, T.; Bessant, J. Challenges in healthcare—The changing role of patients. In *Responsible Innovation in Digital Health*; Iakovleva, T., Oftedal, E., Bessant, J., Eds.; Edward Elgar Publisher: Cheltenham, UK, 2019.
74. Glaser, B.G.; Strauss, A.L. *The Discovery of Grounded Theory: Strategies for Qualitative Research*; Aldine: London, UK, 1967.
75. Hood, J.C. Orthodoxy vs. Power: The Defining Traits of Grounded Theory. In *The SAGE Handbook of Grounded Theory*; Bryant, A., Charmaz, K., Eds.; Sage: Los Angeles, CA, USA, 2007.
76. Jenna, B.; Derek, J. Demystifying Theoretical Sampling in Grounded Theory Research. *Grounded Theory Rev.* **2009**, *8*, 113–126.

77. Breckenridge, J.; Jones, D. Demystifying Theoretical Sampling in Grounded Theory Research Grounded Theory Review Issue no.2, June 2009, Volume 08. Available online: http://groundedtheoryreview.com/2009/06/30/847/ (accessed on 25 September 2019).
78. Stahl, G.K.; de Luque, M.S. Antecedents of responsible leader behavior: A research synthesis, conceptual framework, and agenda for future research. *Acad. Manag. Perspect.* **2014**, *28*, 235–254. [CrossRef]
79. Hsieh, H.; Shannon, S.E. Three Approaches to Qualitative Content Analysis. *Qual. Health Res.* **2005**, *15*, 1277–1288. [CrossRef] [PubMed]
80. Lincoln, Y.S.; Guba, E.G. *Naturalistic Inquiry*; Sage: Newbury Park, CA, USA, 1985.
81. Oliveira, P.; Zejnilovic, L.; Canhão, H.; Von Hippel, E. Patient innovation under rare diseases and chronic condition. *Orphanet J. Rare Dis.* **2014**, *9* (Suppl. 1), O33. [CrossRef]
82. Owen, R.; Stilgoe, J.; Macnaghten, P.; Gorman, M.; Fisher, E.; Guston, D. A Framework for Responsible Innovation. In *Responsible Innovation: Managing the Responsible Emergence of Science and Innovation in Society*; John Wiley and Sons: Hoboken, NJ, USA, 2013; pp. 27–50.
83. Canhão, H.; Zejnilovic, L.; Oliveira, P. Revolutionising healthcare by empowering patients to innovate. *Eur. Med. J. Innov.* **2017**, *1*, 31–34.
84. Voegtlin, C.; Scherer, A.G. Responsible innovation and the innovation of responsibility: Governing sustainable development in a globalized world. *J. Bus. Ethics* **2017**, *143*, 227–243. [CrossRef]
85. Pauwels, P.; Matthyssens, P. The Architecture of Multiple Case Study Research in International Business. In *Handbook of Qualitative Research Methods for International Business*; Piekkari, R., Welch, C., Eds.; Edward Elgar: Cheltenham, UK, 2004.
86. Penders, B.; Vos, R.; Horstman, K. Sensitization: Reciprocity and reflection in scientific practice. *EMBO Rep.* **2009**, *10*, 205–208. [CrossRef] [PubMed]
87. Sarasvathy, S.; Kumar, K.; York, J.G.; Bhagavatula, S. An effectual approach to international entrepreneurship: Overlaps, challenges, and provocative possibilities. *Entrep. Theory Pract.* **2014**, *38*, 71–93. [CrossRef]
88. Von Hippel, E. Comment on is open innovation a field of study or a communication barrier to theory development? *Technovation* **2010**, *30*, 555. [CrossRef]
89. Lund Declaration. 2015. Available online: https://www.regjeringen.no/contentassets/27b6beaf195a42bea42a0c3001b431cb/lund_declaration2015v4.pdf (accessed on 15 September 2019).
90. European Commission. *Responsible Research and Innovation: Europe's Ability to Respond to Societal Challenges*; European Commission: Odense, Denmark, 2012; p. 6.
91. Oliveira, P.; Zejnilovic, L.; Azevedo, S.; Rodrigues, A.M.; Canhão, H. Peer-adoption and development of health innovations by patients: A national representative study of 6204 citizens (Preprints). *JMIR* **2018**, 11726. [CrossRef]
92. Adner, R. Match your innovation strategy to your innovation ecosystem. *Harv. Bus. Rev.* **2006**, *84*, 98–107. [PubMed]
93. Adner, R.; Kapoor, R. Innovation Ecosystems and the Pace of Substitution: Re-Examining Technology S-Curves. *Strateg. Manag. J.* **2016**, *37*, 625–648. [CrossRef]
94. Koch, S.; Kerschbaum, M. Joining a smartphone ecosystem: Application developers' motivations and decision criteria. *Inf. Softw. Technol.* **2014**, *56*, 1423–1435. [CrossRef]
95. Flyvbjerg, B. Five Misunderstandings about Case-Study Research. *Qual. Inq.* **2006**, *12*, 219–245. [CrossRef]
96. Khavul, Susanna and Bruton, Garry, Harnessing Innovation for Change: Sustainability and Poverty in Developing Countries. *J. Manag. Studies* **2013**, *50*, 285–306. [CrossRef]