

## D2.1: The COUCH RRI Vision

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## Abstract

This report presents a framework for the operationalisation of Responsible Research and Innovation (RRI) at the project level and an RRI Vision for the COUCH project produced using this framework. The report provides an overview over the state-of-the-art of the RRI debate as it relates to operationalisation at project level and explores existing codes of conduct of relevance to the Council of Coaches project. The report then provides a methodology for using these frameworks to define a project-specific RRI vision and shows how the COUCH project has done so. The report ends with some observations and outlooks towards the further RRI work in the project.



## Corrections

- v1.0.1      Correctly applied EU logo on header page.  
Changed UPMC to Sorbonne University (SU).

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## Symbols, abbreviations and acronyms

CMC	Centre for Monitoring and Coaching
COUCH	Council of Coaches
CV	Curriculum Vitae
D	Deliverable
DBT	Danish Board of Technology Foundation
EC	European Commission
FP7	7 <sup>th</sup> Framework Programme
GDPR	General Data Protection Regulation
GOe	Global Observatory of eHealth
ICT	Information and Communication Technology
ISPRINT	Innovation Sprint
M	Month
RRD	Roessingh Research and Development
RRI	Responsible Research and Innovation
STIR	Socio-Technical Integration Research
SU	Sorbonne University
T	Task
UDun	University of Dundee
UPV	Universitat Politècnica de València
UN	United Nations
UT	University of Twente
WP	Work Package

# 1 Introduction

This report outlines a vision for Responsible Research and Innovation (RRI) for the Council of Coaches project and details the method by which the project consortium has arrived at this vision.

## 1.1 The challenge: responsible development of virtual coaches

The Council of Coaches project has a technologically and commercially ambitious agenda. The project aims to develop a platform for coaching applications where the user interacts with a council of virtual coaches, each of whom represents a specific type of knowledge. The project will develop prototypes of this approach, which focus on users that suffer from ailments related to ageing, including chronic pain and type 2 diabetes. What the project aims to demonstrate is that a 'council' of coaches beats the traditional single-coach approach in terms of motivation, dynamism, and the level of reflection that is sparked in the user. In the long term, the Council of Coaches platform could grow to benefit users in areas far beyond health applications with councils being built by third party providers.

At the same time, the Council of Coaches is also concerned with proceeding towards its goals in a responsible manner. We wish to make sure that the project consortium as an interim organizational unit lives up to the values of society during the time of its existence. We also wish to lay the groundwork for the Council of Coaches platform and prototypes to embody a responsible approach to virtual coaching – in general and in specific relation to the health prototypes developed by the project.

This concern is a timely one. Virtual coaches that help people to make decisions based on some form of data analysis and feedback are spreading into all corners of life. This is the case not only in health and lifestyle, but also in financing, consumption and sustainability, social interaction and positioning, stress management, and more. This tendency is naturally driven by users wishing to take advantage of the reliable insights provided by a steady stream of data analysis to improve their life in some way or another. Meeting this need may be a way of addressing societal challenges, such as health issues. But the spread of virtual coaches is equally driven by a business model logic of providers that do not always hinge on a traditional commercial relation between the provider and the user. Many virtual coaches make use of 'freemium' models where the user gets access to the coaching service for free by providing something that is often more valuable than money, namely personal data the use of which by 3rd parties is not always clear to the user. In such models, the user is in fact the 'product' sold or otherwise shared by the provider of the virtual coach with some interested party.

For each opportunity that virtual coaching presents, we are likely to find that these opportunities also imply a risk of doing harm. Starting from such concern, the Dutch Rathenau Institute has conducted an extensive analysis of the ethical and social implications of virtual coaching. They recommend that developers aim for what they call sincere coaching (Kool, Timmer, & Van Est, 2015), i.e. coaching that actually puts the needs of the user before those of any other stakeholder involved in the development, delivery and use of the virtual coach. We will return to this report in Section 3.2.3.

## 1.2 A co-creative approach to RRI implementation at project level

The approach taken in this report is one of co-creation of responsibility. Rather than trying to deduce in a top-down manner the responsibilities that fall on the shoulders of the Council of Coaches consortium members from existing legal and ethical frameworks, this report rests on an attempt to stimulate bottom-up reflection within the consortium about which responsibilities arise naturally out of the ambitions of the project. Inputs to such reflection include an overview of the RRI debate in general, suggestions for professional and ethical frameworks that might be relevant to the project, and inputs from stakeholders about the social and ethical concerns that might prove salient for the project. All of this input was consumed and made use of by the consortium in a two-day workshop, where the

consortium members themselves decided on an initial list of priorities and a rough plan for how to deal with them within the project. It is the ambition of the report to provide a basis for subsequent ‘soft interventions’ (Fischer & Rip, Responsible Innovation: Multi-Level Dynamics and Soft Intervention, 2013) into the daily of the project members and thereby to facilitate the implementation of RRI at the project level.

### 1.3 How the report fits into the broader context of the Council of Coaches project

The RRI vision will help to identify risks and potentials which arise out of the project’s ambitions, which the project must seek to avoid or realise. Along with the user requirements (identified in T2.3) the RRI vision will help ensure the responsible development of the Council of Coaches final prototype (in WP3, 4, 5, 6 and 7). If you are among the people involved in the different aspects of the technical development, you can expect to receive ongoing support for the implementation of the RRI vision (in task 2.4). The RRI Vision will also inform the non-technical parts of the project including risk management, data management, and innovation management (WP1), exploitation (WP8), and ethical approval (WP9).

### 1.4 What the report covers and how it is structured

Note that this report does not aim to provide a systematic literature review aimed at giving a complete overview of the RRI discussion. Rather, it is a practically oriented document aimed at conveying lessons learned from previous efforts at conceptualising and implementing RRI. The report thus makes use of systematic literature studies but superimposes on these studies a perspective that fits with the practical concerns of the project.

The report is divided into five parts. Firstly, the report covers the overall history of the RRI concept, how it fits into recent developments in European research and innovation policy, and how other research projects have sought to make possible the implementation of the concept at project level and the limitations they have come up against. For this purpose, the report draws on existing reviews of the RRI literature. Secondly, the report describes the approach taken in WP2 to the implementation of RRI at project level. We call this approach a ‘STIRRING’ approach because we combine elements of best practice from the RRI field with socio-technical integration research (STIR). Thirdly, the report then delves into a few closely related themes having to do with ethics and public values around the development of virtual coaches for eHealth applications. We draw these themes from literatures that all pertain to the Council of Coaches, including the ethics of eHealth and mHealth, robo-ethics, the ethics of coaching, and various assessments of virtual coaches and their social impacts. Fourthly, the report summarises the inputs provided by stakeholders in the field of health technology for the consideration of consortium members. Finally, the report outlines the RRI vision agreed on by the consortium members. In this context, we define an ‘RRI Vision’ as *an agreement between the project partners about what responsibilities arise from the ambitions of the project, who needs to bear these responsibilities, and how the project is going to ensure that they do*. The RRI vision is thus a vehicle for translating societal expectations as expressed in the RRI debate, in professional codes of conduct, and in stakeholder statements, into manageable issues that apply to the design, exploitation and implementation of the Council of Coaches technology.

Ultimately, the report exemplifies one to how RRI can be operationalised with regard to the specific ambitions of a particular research project. We thus hope that it will be made use of not only by the Council of Coaches consortium, but also other consortia wishing to follow a responsible approach to research and innovation.

## 2 The challenge of operationalising RRI at project level

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*Responsible Research and Innovation (RRI) is the ongoing process of aligning research and innovation to the values, needs and expectations of society (...). Decisions in research and innovation must consider (...) the respect of human dignity, freedom, democracy, equality, the rule of law and the respect of human rights, including the rights of persons belonging to minorities. RRI requires that all stakeholders are responsive to each other and take shared responsibility for the processes and outcomes of research and innovation.*

*(The European Council, 2014)*

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### 2.1 What are the responsibilities of researchers and innovators?

In recent years, efforts have been made to explicate the responsibilities of researchers and innovators. These efforts stem from at least three closely related pressures on research and innovation policy-makers.

Firstly, as governments and other societal decision-makers face increasingly complex governance and development challenges, they turn to research and innovation to contribute to meeting these 'Grand Challenges'. But whereas earlier generations might have trusted researchers and innovators to come up with answers and solutions on their own terms, today decision-makers are aware that the organisation of research and innovation is a key factor in enabling them to meet these challenges. So, for instance the highly influential Lund Declaration (The Swedish European Presidency, 2009) highlights the need for such a reorientation. But in the same breath it also posits that for such a reorientation to be achieved, we need better coordination between different levels of organisation of research and innovation and between different sectors of society involved in research and innovation processes.

Secondly, there is an awareness that the traditional incentive structures of peer-reviewed science do not automatically lead researchers and innovators to produce societally relevant results. On the research side, increasing global competition lead researchers to focus their efforts on increasingly narrow parameters of success that are not necessarily good proxies for societal relevance, e.g. the amount of peer-reviewed publications in highly specialised international journals. On the innovation side, increasing concentration of investment capital in multinational corporations produces centres of gravity that attract good ideas and breakthroughs and often limit their use to those applications that benefit the economic position of the corporation. Together, these incentive structures risk limiting the interest of researchers and innovators in open-ended exploration of practical uses of science for the benefit of society (Bennessia, et al., 2016).

Thirdly, as the value-chains of research and innovation become globalised, ethical and environmental protection standards become negotiable in new ways. Those who develop projects and products can increasingly shop around the globe for favourable framework conditions and assessment practices. This increasing freedom of movement sadly sometimes tempts globalised organisations to operate beyond the rules and norms of their home countries ('ethics dumping') (The TRUST Project, 2016).

Altogether, these different pressures add up to increasing urgency in coming to understand anew the responsibilities to be assigned to researcher and innovators and the organisations in which they work.

## 2.2 What are the responsibilities of researchers and innovators vis-à-vis society?

When we talk about societal responsibilities of research and innovation, we need to consider the question from two perspectives at once. On the one hand, we need to consider the responsibilities of the individual researcher and innovator. On the other hand, there is the question of the collective responsibility of groups, organisations, and the research and innovation sector. The two questions are obviously interlinked, but they are not the same, and mixing them up is bound to cause confusion.

### 2.2.1 The responsibilities of the individual researcher

The individual responsibilities of people who chose to play the role of researcher or innovator is the theme, for instance, of debates over research integrity and research ethics. A traditional position is that the researcher ought to be motivated solely by “science for science’s sake”. Similarly, a standard position on the innovator’s responsibilities is encapsulated in the adage that “the business of business is business”, i.e. innovators should focus exclusively on the bottom-line of their enterprise. Both traditional positions rely on an understanding of science and business as relatively separate areas of social activity that are governed by particular logics and values, which the individual is responsible for following and keeping apart. Notice also that in both traditional positions, the role responsibilities of the researcher and innovator are quite separate from the responsibilities of the person playing those roles regarding his or her engagement in democratic politics. Research and innovation are thus seen as separate from value-based struggles over, for instance, how we define the “progress” which research and innovation are supposed to contribute to (Weber 1918). Notice also that the traditional position entails great freedom for the researcher as well as the entrepreneur. As long as each of them stay devoted to the pursuit of the goals specific to their role (scientific excellence or profitability) they are free to follow this pursuit by any means necessary.

### 2.2.2 New limitations to the freedoms of researchers

For researchers, the traditional position remains the starting for codifications of research integrity. The European Code of Conduct for Research Integrity, for instance, sets out four principles for research integrity that more or less revolve around the realisation of the traditional ideal of good science. Among these four principles, reliability, honesty, and accountability, all reflect the traditional position that a ‘good’ researcher is one that pursues science ‘well’. The inclusion of the principle of respect, however, shows that the traditional position has been amended and that limitations have been imposed on researchers. Research integrity is more than just good science – it is also science conducted with respect for the world into which science intervenes.

**Table 1: Four principles of research integrity.**

Four principles of research integrity	
<b>Reliability</b>	in ensuring the quality of research, reflected in the design, the methodology, the analysis and the use of resources.
<b>Honesty</b>	in developing, undertaking, reviewing, reporting and communicating research in a transparent, fair, full and unbiased way.
<b>Respect</b>	for colleagues, research participants, society, ecosystems, cultural heritage and the environment.
<b>Accountability</b>	for the research from idea to publication, for its management and organisation, for training, supervision and mentoring, and for its wider impacts.

### 2.2.3 Emphasis on the social responsibilities of innovators

A similar development has taken place about the way innovators and their freedoms are perceived. Although the traditional emphasis on profitability in market terms remains a core element of the role, innovators today are expected to take on a social responsibility by contributing to a triple bottom line that includes social benefit and environmental sustainability (Elkington, Towards the Sustainable Corporation: Win-Win-Win Business Strategies for Sustainable Development, 1994) (Elkington, 2004). These expectations are encapsulated by the UN Global Compact and its ten principles for corporate social responsibility.

**Table 2: Ten principles of corporate social responsibility.**

Ten principles of corporate social responsibility	
<b>Human Rights</b>	Businesses should (1) support and respect the protection of internationally proclaimed human rights; and (2) make sure that they are not complicit in human rights abuses.
<b>Labour</b>	Businesses should (3) uphold the freedom of association and the effective recognition of the right to collective bargaining; (4) the elimination of all forms of forced and compulsory labour; (5) the effective abolition of child labour; and (6) the elimination of discrimination in respect of employment and occupation.
<b>Environment</b>	Businesses should (7) support a precautionary approach to environmental challenges; (8) undertake initiatives to promote greater environmental responsibility; and (9) encourage the development and diffusion of environmentally friendly technologies.
<b>Anti-Corruption</b>	Businesses should (10) work against corruption in all its forms, including extortion and bribery.

### 2.2.4 New expectations to add value to society

If there was once a general understanding that research and innovation would automatically add value to society, today there is much greater scepticism and a much greater demand for research and innovation to legitimise itself through positive contributions to society. Such legitimisation is not achieved in the full through compliance with the principals of research integrity, nor the principles of corporate social responsibility, which both centre on overarching the principle to 'do no harm'. Research and innovators today are expected to positively tell us, how they work to ensure that a positive contribution to society will result from their efforts. Agreement on the principles for how such legitimisation may be achieved is only gradually emerging. (Gwizdała & Śledzik, 2017), however, identify seven emerging principles around which an agreement seems to be gradually emerging; at least in academic treatments of the subject.

**Table 3: Seven principles of responsibility in research and innovation.**

Seven principles of responsibility in research and innovation	
<b>Inclusion</b>	A conceptual dimension which can be considered as fundamental for most of the discussions [on responsibility]. Inclusion is also associated with all other conceptual dimensions, it engages different stakeholders in the early stages of research and innovation process.
<b>Anticipation</b>	Anticipation is a dimension that aims at envisioning the future of research and innovation. It takes into account understanding how current dynamics help design the future. Successful anticipation means understanding the dynamics of economy that help shape the technological futures. Anticipation of potential

	impacts of technology serves the purpose of: reflecting on the motivations and implications of a research project; being clearer about uncertainties and dilemmas, opening the visions to broader public, using the outcomes for shaping the research and innovation trajectory.
<b>Responsiveness</b>	Responsiveness is linked to risk. The risks involved in new technologies can be medium or long term, economic, environmental, security or societal. In this case, identification and analysis of risks as part of responsiveness is linked to the anticipation dimension. In the research, discussions involving responsiveness were also primarily linked to ethics, risks, transparency and accessibility.
<b>Reflexivity</b>	Reflexivity is linked to public dialogue, science and public collaboration, and anticipation. It can be defined as "holding a mirror up to one's activities commitments and assumptions, being aware of the limits of knowledge and being mindful that a particular framing of an issue may not be universally held". Responsibility turns reflexivity into a public matter. Involving the public in the research may help researchers reflect on the ethical and social dimensions of their work.
<b>Sustainability</b>	Although the sustainability issues can be found in the majority of the research, it is not clearly referred to as a dimension. In the recent research sustainability is identified as a key driver of innovation, research and development. Sustainability is already starting to convert the competitiveness concept, which will force organisations and business to change their strategy.
<b>Care</b>	The main challenge of future-oriented ethics is to answer the question of how to deal with uncertainties derived from social practices like technology and innovation. Care is a "public domain" dimension so that society is responsible for the decisions and actions carried out on its behalf.
<b>Economy</b>	Concerns about the impact of new technologies on economy and society explain growing calls for the responsible innovation concept, the sustainable transition of social and technical arrangements, and stronger engagement between science-driven innovation and society.

## 2.3 Making sense of new responsibilities

Often individual researchers and innovators, project groups, consortia, and organisations, face the challenge of making sense of the new responsibilities assigned to them without clear guidance. This is due to several factors.

Firstly, the terms of debate are fundamentally not clear. There are different positions on who must take responsibility for what and who is going to hold them accountable. Below we summarise some recent attempts at providing an overview of the academic debate.

Secondly, when individual researchers or groups attempt to decide on ways to assume responsibility, knowingly or not they are involved in a multi-level sense-making process. The debate about responsibility in research and innovation takes place at high levels of policy, in the engine rooms of research funding agencies, and at consortium meetings all at once. Below we try to give an overview of these processes and where individual projects fit in.

Thirdly, the sense-making processes that go on around RRI are neither fully about 'hard' or 'soft' regulation, but a mix of both. Debates and initiatives that seek to ensure responsible research and innovation occur at the same time as much broader regulatory battles are being fought, e.g. about how

to ensure privacy in a digital economy, how to ensure gender equality in publicly funded programs, and more. This means that in individual projects, responsibility strategies must necessarily co-exist with compliance strategies in a manner where it be unclear where the one ends, and the other begins.

Individual projects which, like the Council of Coaches, try to make sense of the multiple demands that arise under the heading of 'responsibility' are thus in a very real sense in a vanguard position, and the solutions they come up with may prove to be influential in the debates in the coming years.

### 2.3.1 Who is responsible for what and to whom?

Across the board of policy-making in research and innovation, there is a general agreement that the freedom of researchers and innovators to pursue their core objectives must be limited to some degree and that their efforts must be directed towards producing societal value. However, this general agreement does not imply a consensus on how such 'responsibilisation' is to be achieved.

There are different 'camps' of researchers and policy-makers arguing for different approaches to achieving socially responsible research and innovation. These camps can be categorised according to how they answer two basic questions namely: 1) Whether responsibility is best achieved through internal or external regulation, and 2) What is the object of the steering; the process or the outcome (Glerup & Horst, 2014)?

The combination of these two questions produces four basic logics of responsibility that co-exist in current debates as summarised in Figure 1 by (Glerup & Horst, 2014) below.

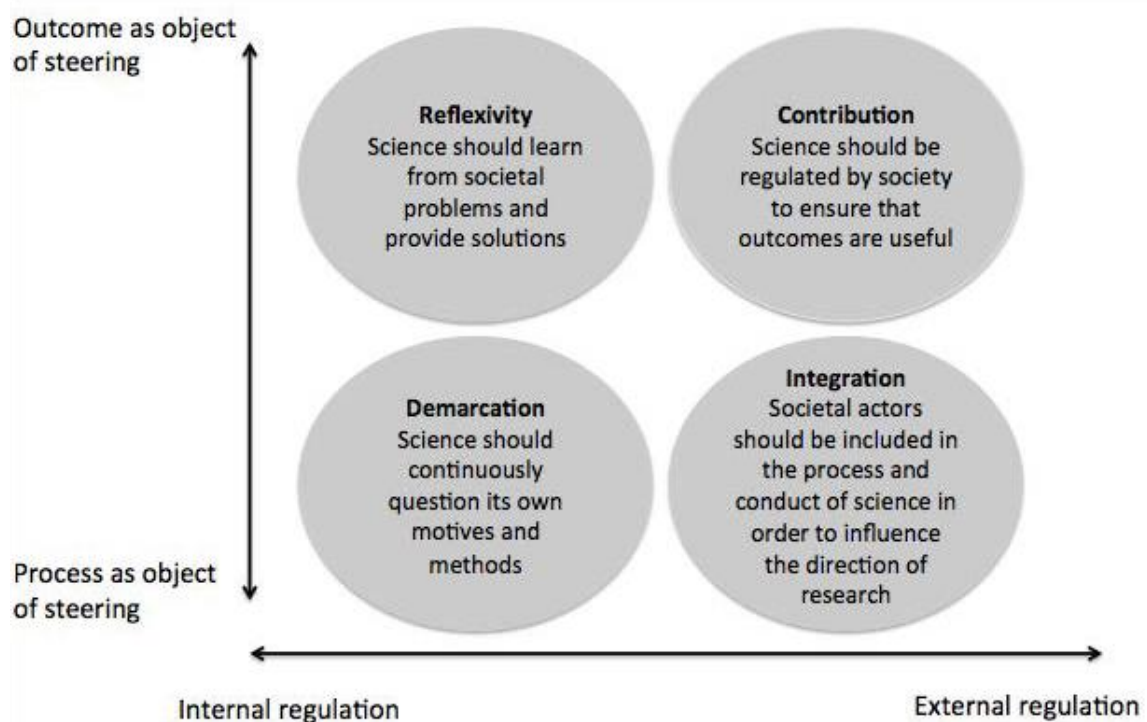


Figure 1: Four basic logics for how responsibility is to be defined and achieved.

### 2.3.2 Who is going to make sense of responsibility and how?

The ongoing process of making sense of the new responsibilities assigned to research and innovation takes place at multiple levels without any clear direction or hierarchy of authority. There are top-down effects (e.g. policy shaping innovation funding) and bottom-up effects (e.g. lessons learned from individual research projects feeding back into policy formation). Individual projects and organisations must therefore take into account hard and soft signals coming from 'above' but can also shape how

responsibility is implemented going forward. These effects are mapped by (Fischer & Rip, Responsible Innovation: Multi-Level Dynamics and Soft Intervention, 2013) as outlined in the Table 4 below.

**Table 4: Making sense of new responsibilities at multiple levels.**

<b>Making sense of new responsibilities at multiple levels</b>	
<b>International and bi-lateral meetings</b>	Exchanges between research and innovation policy makers at international level provide an arena for discussing and seeking inspiration about the new responsibilities and their implementation in a manner not bound by specific national or regional policy paradigms.
<b>Legislative initiatives</b>	'Soft' legislation in the area of nanotechnology provides – exemplified by the U.S. strategy for responsible development of nanotechnology and the EU Code of Conduct for Responsible Nanoscience and Nanotechnologies Research – have been adopted to help specify the new responsibilities of researchers in this particular area.
<b>Research funding agencies</b>	Research funding agencies – notably the U.S. National Science Foundation and the European Commission – have chosen to operationalise new responsibilities in research and innovation in different ways. For the European Commission, the key term is 'Responsible Research and Innovation' (see 'The European Approach' below). These agencies play a key role in shaping our understanding of new responsibilities as they change their funding criteria to promote responsibility and fund research on how responsibility works. Some act within their own remits while others follow specific policies set out at government level.
<b>Intermediary organisations and consortia</b>	Standardisation agencies, professional networks, clusters, centres of excellence, and project consortia dedicated to the development and dissemination of knowledge and tools for acting responsibly in research and innovation each in their own way contribute to a process of gradual concretisation.  Also, intermediary organisations with a specific disciplinary focus, e.g. nanotechnology or robotics development, can and do contribute to the process of making more tangible the new responsibilities in specific areas of research and innovation.
<b>Concrete research and innovation activities</b>	Ultimately, the question of how to enact in practice the new responsibilities assigned to researchers and innovators is a matter of interpretation that each individual research group and innovation team must go through, either on a project-by-project or a department level. Even as policy-makers, research funding agencies, and intermediary organisations seek to clarify the new responsibilities and provide guidance on how to meet them, the novelty and creativity involved in research and innovation means that by necessity, there will be uncharted areas on the map that each group has to chart for themselves. Learning from project to project and from lab to lab is likely to become ever more important as the pressure to 'be' responsible increases.

## 2.4 The commission approach: Responsible Research and Innovation (RRI)

The European Commission has adopted its own way of talking about and operationalising the societal responsibilities of researchers and innovators. Central to this approach is the phrase Responsible Research and Innovation (RRI). This approach does two things at once. On the one hand it gathers under

a common umbrella some of the non-scientific and non-economic demands placed upon projects funded by the Commission (ethical behaviour, open access, gender equality, and more). On the other hand, it gives a frame of reference for discussing the political and societal expectations of such projects to produce societal value. The RRI framework is thus at once a framework for compliance and a framework for normative guidance.

### 2.4.1 RRI in the European context

The concept of RRI first appeared in the EU's 7th Framework Programme for Research and Development (FP7) and has gained in importance during the implementation of Horizon 2020. With this concept, the European Commission has sought to frame the question of how best to respond to a number of issues that have to do with the relationship between research and innovation (R&I) activities funded by the Commission and society at large. The concept was taken up by the European Council (in this case the gathering of the science and innovation ministers of the EU Member States) in its 2014 Rome Declaration. It has also been adopted by national actors, including research councils in the Netherlands, Norway, and the UK. Centrally, the UK Engineering and Physical Sciences Research Council (EPSRC) developed its own framework for what it calls 'Responsible Innovation' in parallel with the efforts of the European Commission.

They say that too many cooks spoil the broth, and this has certainly been a real risk for RRI. We should therefore be clear about how far the consensus on RRI goes.

Firstly, it is important to observe that the concept of RRI is not meant to describe a new phenomenon; something that is already there and just needed to be properly conceptualised. Rather, RRI is an inherently normative concept linked to high-level R&I policy, which sets out a goal for how the relationship between science and society ought to be.

Secondly, all actors agree to emphasize that RRI should be thought of as a process by which R&I activities become aligned with societal values, needs and expectations, see e.g. (von Schomberg, Towards Responsible Research and Innovation in the Information and Communication Technologies and Security Technologies Fields, 2011).

### 2.4.2 The RRI Keys

The European Commission itself has been a driving force in the development of the RRI concept and has invested significant resources in making the concept tangible and operable at both a policy and a practice level. During this process of operationalisation, the Commission has settled on an understanding of RRI as an umbrella concept for five RRI 'keys', namely: public engagement, science education, gender equality, ethics, and open access.

It is worth to know that each of these keys were already focus points for the European Commission's R&I agenda before. But with adoption of the RRI concept, there now exists an umbrella concept for talking about these and other responsibilities that policy-makers in the Commission believe should be shouldered by organisation in the R&I sector.

The more precise meaning of these keys has been fleshed out by the MoRRI project (Ravn, Nielsen, & Mejlgaard, 2015) as outlined in Table 5 below.

**Table 5: Operationalising the five RRI keys.**

Operationalising the five RRI keys	
Public engagement	
Public communication	the aim is to inform and/or educate citizens

<b>Public activism</b>	the aim is to inform decision-makers and create awareness to influence decision-making processes
<b>Public consultation</b>	the aim is to inform decision-makers about public opinions on certain topics
<b>Public deliberation</b>	the aim is to facilitate group deliberation on policy issues, where the outcome may impact decision-making
<b>Public participation</b>	the aim is to assign partly or full decision-making-power to citizens on policy issues
<b>Science education</b>	
<b>Science education</b>	Science education aims at educating (especially young) citizens about scientific facts (textbook knowledge)
<b>Science communication</b>	Science communication activities aim at educating citizens of all ages about science and generating awareness of science-related issues and a positive image of/attitude towards science.
<b>Co-production of knowledge</b>	Co-creation of knowledge through cooperation of scientific experts and non-experts
<b>Gender equality</b>	
<b>Horizontal and vertical participation</b>	Measures to promote women in fields, where they are underrepresented as well as to increase female participation in management positions.
<b>Structural change in institutions</b>	Structural measures aimed at revising existing organisational arrangements to progressively eliminate barriers impeding women's advancement to top positions and factors inducing women to drop out of science
<b>Gender in content</b>	The integration of a gender dimension in research and innovation content
<b>Ethics</b>	
<b>Ethical governance</b>	Ethics debate in terms of the implementation of standards in research ethics in science, technology and innovation policies
<b>Ethical deliberation</b>	Ethics debate that raise issues in science and technological developments in science, technology and innovation policies
<b>Ethical reflection</b>	Ethics debate that support critical reflection and engagement in debates on research standards, emerging technology issues and social justice in science, technology and innovation policies
<b>Open Access</b>	
<b>Open Access</b>	Making research results freely available to anyone that wants to access and re-use them.
<b>Open Data</b>	The free access to the research data that underpins publications or research projects, also referred on its own as Open Research Data (OD)

## 2.5 Putting RRI into practice – a challenge for individual projects

### 2.5.1 Cross-pressures on individual researchers

The emergence of new role images for the individual researcher and the individual innovator does not mean that these new images replace the traditional ones. Rather, the new understanding of researchers and innovators as socially responsible produces an additional layer of responsibilities on top of the traditional responsibility to pursue excellence (for the researcher) or profit (for the innovator). This creates cross-pressures on the individual, which are not easy to resolve. In most institutions, for instance, it is still common practice to hire based on the individual's record of peer-reviewed publications in high-ranking international journals; a criterion which squarely favours a focus on disciplinary excellence. Similarly, attracting investment to innovation projects is very much a question of the track record of profitability in previous projects. With the traditional demands being front and centre, many researchers and innovators will naturally perceive demands for compliance with human rights issues, gender policies, data protection regulation, and other ethical considerations, as a brake on their primary work.

Reversely, for researchers or innovators who adopt a self-image as 'socially responsible' and seek out research collaborations that are oriented towards societal benefit and cross across disciplines and sectors, the experience itself may 'pay off' in terms of experiences and novel insights. But in most institutions the link between such extra-curricular activities and individual career advancement is tenuous at best. High-ranking peer reviewed journals do not always appreciate interdisciplinary research designs and their results, nor does the contribution to societal betterment necessarily improve the CV of the innovator.

With regard to the impacts of research and innovation, most types of cutting-edge research and high-tech innovation have a wide spectrum of potential impacts, many of which are not knowable at for the individual researcher or innovator, and most of which are ultimately out of the hands of the individual. While the individual researcher or innovator may wish to limit the application to one type or the other based on ethical or environmental concerns, this choice in no way guarantees that someone else won't pursue other, more risky applications and reap the short-term benefits of being their creator. This creates a pressure to override ethical or environmental concerns in favour of individual career advancement.

The existence of these and other cross-pressures means that we cannot rely only on the choices of individuals to ensure that the broader responsibilities being assigned to researcher and innovators are borne effectively. We need instead to develop ways of ensuring collective responsibility.

### 2.5.2 Assuming responsibility collectively: a matter of organisation and culture

The long-term outcomes and impacts of contemporary research are the results of collective action, whether plan or unplanned. An idea, a technology, or a product will have changed hands many times and gone through multiple iterations and combinations with other ideas before it is ever taken up and used broadly. This process can take place in a somewhat planned manner within the confines of a university research program or the R&D division of a corporation. But what is increasingly the case is that ideas travel through complex networks of organisations in different sectors and that – from a planning perspective – the point at which an idea becomes applied in the form of a broadly used product or a large-scale infrastructure is more or less unpredictable (see (von Schomberg, 2013) (Grinbaum & Groves, 2013)).

Assuming responsibility for the outcomes of research and innovation and their impacts becomes a matter of strengthening the ability of actors engaged in network interactions to steer these interactions towards desired outcomes and away from undesirable ones, all the while maintaining a culture of

cooperation that is in keeping with the principles of integrity set out above. Beyond the principles of research integrity and corporate social responsibility, which were outlined above, this includes making systematic use of a number of different organisational tools that help to guide and govern the collective actions of researcher and innovators. Examples of such tools include technology assessment and foresight; application of the precautionary principle; multi-stakeholder involvement; public engagement; codes of conduct; standards, certification, and other self-regulation schemes; ethical design; and more (von Schomberg, 2013).

### 2.5.3 Why is responsibility about more than compliance?

It is a well-known challenge that if society wants innovation to be possible, regulation must leave 'blank spaces' of little or no regulation open for innovators to experiment with new approaches. This necessity, however, has all too often led to costly process of reactive regulation and retrofitting in response to unforeseen negative impacts (Harremoës, et al., 2001). Attempting to learn from these failures of researchers, companies and regulators to intervene in a timely manner, many theorists have recommended that regulators should take an 'anticipatory governance' approach to emerging science and technology (Guston, 2014). This involves not only attempting to foresee unintended consequences – which is often impossible because of our ignorance of long-term or systemic effects of technology and innovation – but also to ensure that research and innovation professional remain responsive to 'soft' signals of various kinds, such as the values, premonitions and 'feelings' of non-scientific professionals (designers, sci-fi writers), others stakeholders (policymakers, grass roots activists), and lay people/citizens.

In a value chain perspective, the attempts by individual research groups to take responsibility for their research and innovation process in a way that goes beyond compliance to already existing regulation may be seen as a way of preparing the ground for uptake by innovative companies. How? In new technology areas, regulation is often uncertain. Taking extra care to follow principles of responsible development is a way for the research group to ease the burden of ensuring corporate social responsibility on the part of the lead user company. How to do this in practice was investigated by the Responsible Industry project funded under H2020. The Responsible Industry project points to the increasing demands that society places on companies to be responsible as one of the drivers for companies to apply principles of responsibility throughout their value chains (Stahl, 2017). All else being equal, such an approach will lower the risks involved in investment in developing a commercial application based on the research results.

### 2.5.4 How do we decide on the responsibilities that are pertinent at project level?

The RRI in Practice project – a recently initiated H2020 project - aims to develop a 'practical handbook' for such implementation. But until this appears, individual projects aiming to develop a common RRI vision for their project will be in somewhat uncharted territory. The Responsible Industry framework (Stahl, 2017) suggests that to implement RRI all R&I activities should be accompanied by user and stakeholder engagement. Furthermore, R&I activities at different levels of maturity should make use of already existing approaches to ensuring social value. These approaches include various design approaches aiming to capture human needs, wants, and behaviours (e.g. participatory design, human-driven design), which the framework recommends to use at the applied research stage. For R&I activities at the prototyping and demonstration stage, the framework suggests pilot studies can be used to evaluate different design and implementation scenarios.

At the same time, Forsberg et al. suggest that RRI 'implementation' cannot be expected to be universally standardised (Forsberg, Shelley-Egan, Ladikas, & Owen, 2017). 'Responsibility' is inevitably going to be

defined on a case-by-case basis and with reference not only to universal values (as expressed in the Charter of Human Rights), but also with regard to the values held by individual organisations and the national or local communities in which they are embedded. Implementing RRI will be a reflective process, where individual organisations, groups and project may learn from each other, but where the resulting implementation approaches will diverge on many crucial points. The resulting uncertainty should be accepted as a condition.

Altogether, at the current stage, individual research consortia are left with a great deal of sense-making to do on their own. In the following, we will outline the approach developed for the Council of Coaches project.

### 3 Responsibility in COUCH: Some relevant frameworks

*E-coaches can be very valuable to help individuals, but they also bring new challenges and dilemmas. Interestingly, we learned that existing codes for responsible human coaching can be an important guide in our interactions with e-coaches: expertise, respect for privacy and autonomy, integrity and responsibility. The Rathenau Institute therefore advocates the introduction of criteria to ensure the quality of advice from e-coaching. I hope this book inspires the discussion about the development of responsible e-coaches. To me, that means no unobtrusive monitoring in the background: I asked the electronic store to help me switch off the activity tracker on my smartphone.*

*M. Peters, Director, Rathenau Institute*

In this chapter of the report we outline some of the most immediately relevant frameworks for professional conduct and ethics, which may have some bearing on the Council of Coaches project, and which may thus be relevant for the consortium to consider. We begin by revisiting the European Commission's RRI keys and considering to what extent the project already from the planning stage has been designed to attain a degree of compliance with these keys. We then turn to other relevant frameworks, e.g. the ethics of coaching, in order to consider other perspectives on the responsibilities that the Council of Coaches project may wish to bear.

This part of the report was first presented to the consortium as input for the RRI workshop, where consortium members used it as background for their discussions. In this report, the function of the chapter is to help put meat on the bone of the question of responsibility in relation to this particular project and thus to prepare the reader for the following chapters.

#### 3.1 Compliance strategies in the Council of Coaches

The Council of Coaches project as described in the project's Description of Action is already in several ways designed to achieve compliance with the RRI 'keys', not only in terms of 'hard' regulation in areas such as personal data protection, but also in areas regulated by 'softer' signals, such as policies, strategies and voluntary programs. By implementing these various compliance strategies, the Council of Coaches comes a long way towards achieving 'responsibility' in the process dimension, i.e. in terms of the conduct and organisation of the consortium and its members during the lifetime of the project.

**Table 6: Compliance with the RRI keys in the Council of Coaches.**

Compliance with the RRI keys in the Council of Coaches	
Public engagement	
<b>Public communication</b>	T8.1 makes information about the project, its processes, results, and long-term perspectives available to the interested public through a number of different channels, including a website, social media, press releases, journal publications, and more.
<b>Public activism</b>	T8.3 seeks to involve decision-makers, including developers, vendors, service providers and stakeholders, in the development of the ecosystem of the Open Agent Platform. T8.4 furthermore makes it

	possible – if relevant – that the Council of Coaches may engage in the work of further developing eHealth/eCare standards.
<b>Public consultation</b>	(The Council of Coaches does not make use of public consultation as defined by the MoRRI indicators)
<b>Public deliberation</b>	T2.2 facilitates deliberation with societal stakeholders on the ambitions and development strategies set out by the Council of Coaches in the context of societal development in the eHealth and eCare areas.
<b>Public participation</b>	T2.2 and T2.3 involves professional users and end users in reflection and practical testing of development plans and prototypes.
<b>Science education</b>	
<b>Science education</b>	The Council of Coaches co-funds the training of a number of PhDs.  T8.5 furthermore develops training activities to raise understanding and awareness of the Open Agent Platform, including training concerned with virtual coaching in general and the project's solutions in particular.
<b>Science communication</b>	(The Council of Coaches does not implement science communication as defined by the MoRRI indicators).
<b>Co-production of knowledge</b>	Task 2.2 and 2.3 facilitates the co-creation of knowledge about user preferences and stakeholder preferences with users and stakeholders.
<b>Gender equality</b>	
<b>Horizontal and vertical participation</b>	(While the Council of Coaches consortium is fairly well-balanced in terms of gender, the GA does not implement an explicit gender balance policy for consortium member employees).
<b>Structural change in institutions</b>	(While the Council of Coaches consortium is fairly well-balanced in terms of gender, the GA does not implement an explicit gender balance policy for consortium member employees).
<b>Gender in content</b>	The Council of Coaches projects implements the cross-cutting priority in the following manner (2.1.1 in the GA): "COUCH ensures gender balance as part of its platform, through incorporating gender balance principles as part of its user-centered design and implementation methodology. This will be based on a balanced sampling of the subjects to be involved in the project, taking into account gender and diversity by balancing participants in terms of sex, age, culture and social factors like education, occupation, and residence. Hence, methods of the COUCH user-centered design process will socio-scientifically be complemented by gender-specific aspects. Furthermore, virtual embodied agents developed will be balanced in terms of gender."
<b>Ethics</b>	
<b>Ethical governance</b>	The Data Management Plan ensures privacy protection throughout the project. Design choices and exploitation (across WP8) continually

	takes into account medical devices regulation. All user interaction (in T2.3) takes into account medical ethics principles as elaborated in the Helsinki Declaration.
<b>Ethical deliberation</b>	Ethics debate that raise issues in science and technological developments in science, technology and innovation policies
<b>Ethical reflection</b>	T2.1 and T2.4 facilitates debate and critical reflection among the consortium members regarding standards for ethical research, substantive issues having to do with the specific technological solutions emerging through the project, and issues of social justice in relation to their implementation.
<b>Open Access</b>	
<b>Open Access</b>	Deliverables from the Council of Coaches will be accessible via the project website. Elements of the results may be made available to other developers as part of the Open Agent Platform, although the line between what will be open source and what will be protected is yet not clearly drawn. T8.2 and 8.3 will ensure that this line is clearly drawn in terms of IPR agreements, licensing agreements, open sourcing, etc.
<b>Open Data</b>	The Data Management Plan of the project will ensure that as much of the data generated and collected will be made available on the conditions of the FAIR policies of the European Commission, taking into account the need for data security and privacy protection.

## 3.2 Beyond compliance

Looking beyond the generally applicable RRI 'keys' of the European Commission, the substance of the Council of Coaches calls for reflection on the responsibilities of the consortium and its potential partners further down the value-chain. To facilitate such reflection, the following section lists a number of professional codes of ethics (see Figure 2) that each relates to a central aspect of the ambitions of the project. Specifically, this chapter invites reflection on what the Council of Coaches can learn from: (social) robot ethics, codes of conduct for human coaches, recommendations for the quality of digital coaches, ethics of mHealth, and approaches to responsible ICT for the ageing society.

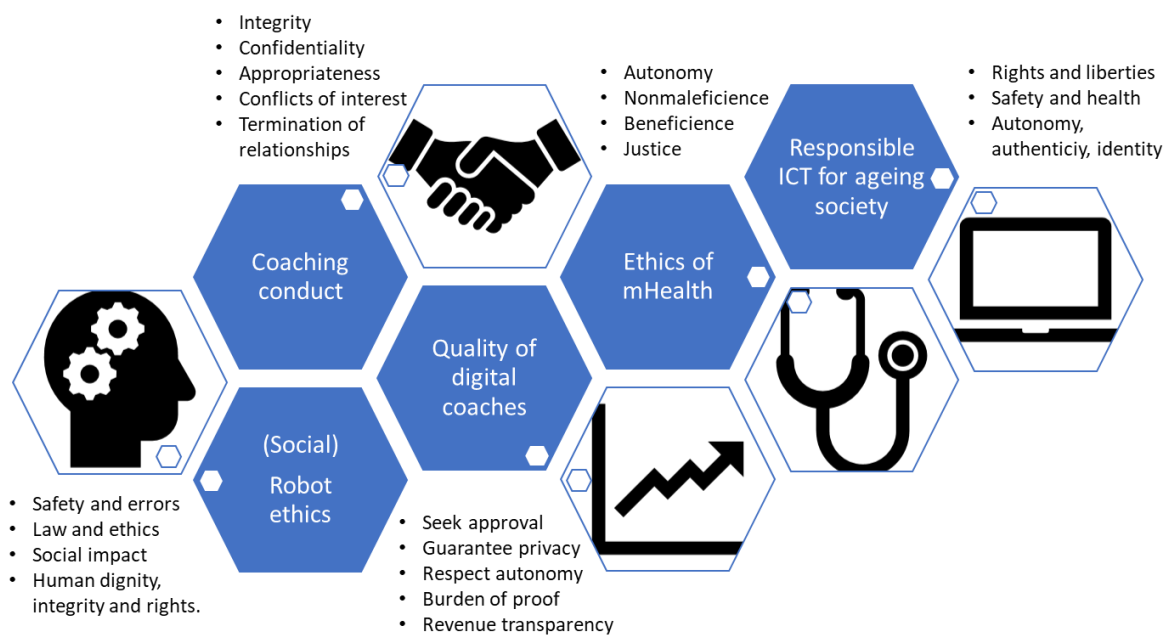


Figure 2: Different codes of ethics.

### 3.2.1 (Social) Robot Ethics

Is the Council of Coaches a kind of robot? “An engineered machine that senses, thinks, and acts”. “A robot must have sensors, processing ability that emulates some aspects of cognition, and actuators. Sensors are needed to obtain information from the environment. Reactive behaviours (like the stretch reflex in humans) do not require any deep cognitive ability, but on-board intelligence is necessary if the robot is to perform significant tasks autonomously, and actuation is needed to enable the robot to exert forces upon the environment. Generally, these forces will result in motion of the entire robot or one of its elements (such as an arm, a leg, or a wheel) (Lin, Abney, & Bekey, 2011).

On this definition, the “forces” that the sensing and thinking engine is supposed to be able exert on its environment are missing in the case of the Council of Coaches. Having no arms, no legs, no wheels, the Council of Coaches would seem to remain ‘trapped’ behind the screen. However, if the Council of Coaches were to gain the ability to intervene in the lives of their users, e.g. through text messaging, in reaction to perceived changes in the state of the user, would such information-only not place the Council of Coaches in the grey area in between artificial intelligence and robotics; that of the artificially intelligent virtual robot?

*Coach (measuring high heart rate, low speed of movement, texting the user): “Are you all right?”. User: “No, I just found out that my department is closing down and I’m out of a job”. Coach (having detected a pattern of behaviour in the user of agitation being followed by smoking and drinking, seeks to intervene): “That’s terrible. Sounds like a good day to go to the gym and work out some of that frustration.”*

In this thought-up example, even though the Council of Coaches cannot physically reach out to manipulate its environment, the combination of its sensory abilities (heart rate and motion sensing), its thinking capability (pattern recognition, strategy formation), and its ability to initiate communication via text nevertheless means that the device is able to act at a distance. There is an argument to be made that this would place the Council of Coaches in a specific subset of robots and that robo-ethics would apply to it.

Unlike robots with great ability to move about and intervene in their environments, virtual agents cannot cause physical harm through direct action. However, designers of virtual agents like the Council of Coaches need to take into account how the ability of the coaches to intervene autonomously in the mental processes of its users – however limited this ‘force’ may be – may create potentials for damage, and how errors could lead to harm. Faulty medical advice could lead users to make unhealthy or even dangerous medical choices. Reinforcing user behaviour that is generally considered healthy (e.g. running) could lead some users to adopt addictive training patterns to the detriment of long-term health and their social lives. Artificial intelligence designed to learn from interactions with multiple users could potentially reach flawed ‘conclusions’ by learning from unsound behaviours. In a complex system like the Council of Coaches, sources of harmful actions could potentially arise in the information databases mobilised by the virtual agent, the programmed logics that the coaches use in applying the information, coding glitches, or even hacking.

When designing an automated care system, we can easily come to ignore the necessity of having an option for direct human contact as part of the system. This can create situations that undermine the dignity of the user, leaving him/her to battle it out with an unresponsive or ‘stupid’ system. The German Standardisation Roadmap for Industry 4.0 recommends taking a ‘people-friendly’ approach in which users of an automated system should always have some way of circumventing the main interface of the automated system and get ‘behind the screen’ to the person in charge (DIN/DKE, 2016). While this recommendation is developed in an industrial context, design of telecare and mHealth systems would benefit equally from thinking of the whole socio-technical system from the beginning.

#### *Care vs. efficiency*

*An ethnographic study (Mort, Roberts, & Milligan, 2011) of telecare monitoring implemented in the UK showed that the elderly users of the system attached great significance to the personal contact they had (via telephone) with monitoring staff. In case an alarm went off (e.g. in case a monitoring device indicated the user had fallen), a telephone call with the monitoring staff would be initiated to check in with the user. The staff was formally only expected to assess whether an emergency response was needed but being polite, and in many cases having a background in traditional care, they would take the time – going against protocol – to ‘check in’ with the users to see how they were doing overall. The study showed that the telephone conversations that followed from false alarms were therefore perceived by the users as the most emotionally important part of the monitoring system; these conversations made users feel safe, taken care of, and treated with dignity.*

### 3.2.2 Coaching Conduct

Since virtual coaches are designed to mimic the conduct and interaction of actual human coaches, the codes of professional conduct that apply to human coaches ought to be respected by virtual coaches as well. Such respect, of course, needs to be built in from the start. Ensuring respect for codes of conduct may also– especially in the case of learning algorithms that gradually change behaviour based on success or failure in interaction with users – demand ongoing training and some form of supervision.

The Association for Coaching and the European Mentoring and Coaching Council have developed a joint Global Code of Ethics for Coaching and Mentoring (Association for Coaching & European Mentoring and Coaching Council, 2016) from which we can learn a great deal about the issues that pertain to the coaching profession. The Code is extensive and covers many aspects of coaching and mentoring practice. One specific area of the Code, however, is of particular interest to us, namely the principles for working with clients. The principles in the section are listed in the table below.

These principles raise a number of interesting questions. How much ‘wiggle-room’ will there be in how the Council interacts with users? Will there be one set program, will there be options of different

programs, or will users be able to access the Council completely at their own pace? Will the Council of Coaches abide by a code of conduct? Will there be mechanisms for complaining if users think the Council has violated the code? Who will receive complaints? How do we ensure that users understand the nature of their relationship with the Council? How do we ensure that users can gain an appropriate level of understanding of what the Council does without violating IPR? How will the Council determine when a user has had enough coaching? When a goal has been achieved or in some other way? How can we design the Council to avoid user dependency? How can the Council of Coaches show the kind and level of 'professionalism' of the Council? These questions are just the result of a short brainstorm among the authors of this report; many more could be posed based on the principles set out in the Global Code.

**Table 7: Excerpt from the Global Code of Ethics for Coaching and Mentoring.**

<b>Excerpt from the Global Code of Ethics for Coaching and Mentoring</b>	
<b>Context</b>	Coaches and mentors will do their utmost to understand their clients' and sponsors' expectations and reach agreement on how they plan to meet them.
<b>Contracting</b>	Before they start working with a client, coaches and mentors will explain, and make explicit, their commitment to abide by this code. Coaches and mentors will also make their clients and sponsors aware of their respective bodies' complaints procedures.
	Before starting to work with a client, coaches and mentors will explain and strive to ensure that a client knows, and fully understands, the nature and terms and conditions, of any coaching or mentoring contract, including financial, logistical and confidentiality arrangements.
	Coaches and mentors will be open about the methods they use, and on request be ready to supply the client with information about the processes involved.
	Coaches and mentors will ensure that the duration of the contract is appropriate to achieve the client's and sponsor's goals and will actively work to avoid the client's dependency.
<b>Integrity</b>	Coaches and mentors will accurately and honestly represent their relevant professional qualifications, experience, training, certifications and accreditations to clients, sponsors, members, coaches and mentors.
	When talking with any party, coaches and mentors will accurately and honestly represent the potential value they provide.
	Coaches and mentors will attribute ownership of work, ideas and materials of others to the originator and not claim it as their own.
<b>Confidentiality</b>	When working with a client, coaches and mentors will maintain the strictest level of confidentiality with all client and sponsor information unless release of information is required by law.
	Coaches and mentors will store, and dispose of, any records regarding clients, including electronic files and communications, in a manner that promotes confidentiality, security and privacy, and complies with all applicable laws and agreements.
	Coaches and mentors will have a clear agreement with clients and sponsors about the conditions under which confidentiality will not be maintained (e.g.

	illegal activity, danger to self or others etc.) and gain agreement to that limit of confidentiality where possible.
	Coaches and mentors will share with clients that they are receiving supervision and identify that the client may well be referred to in this context anonymously. The client should be reassured that the supervision relationship is itself a confidential relationship.
	If the client is a child or vulnerable adult, coaches and mentors will make arrangements with the client's sponsors or guardian to ensure a level of confidentiality in the best interests of that person while working within current legislation.
<b>Inappropriate interactions</b>	Coaches and mentors are responsible for setting and keeping clear, appropriate and culturally sensitive boundaries that govern interactions, physical or otherwise, with clients or sponsor(s).
	Coaches and mentors will avoid any romantic or sexual relationship with current clients, sponsor(s), students or supervisees. Further, coaches and mentors will be alert to the possibility of any potential sexual intimacy between the aforementioned parties and take appropriate action to avoid the intimacy or cancel the engagement in order to provide a safe environment overall.
<b>Conflict of interest</b>	Coaches and mentors will not exploit a client or seek to gain any inappropriate advantage from the relationship – financial or non-financial.
	To avoid any conflict of interest, coaches and mentors will distinguish a coaching or mentoring relationship from other forms of relationships, such as a friendship or a business relationship.
	Coaches and mentors will be aware of the potential for conflicts of interest of either a commercial or personal nature arising through the working relationship and deal with them quickly and effectively to ensure there is no detriment to the client, the coach or the mentor.
	Coaches and mentors will consider the impact of any client relationships on other client relationships and discuss any potential conflict of interest with those who might be affected.
	Coaches and mentors will discuss any conflict openly with the client and agree to withdraw from the relationship if a conflict arises which cannot be managed effectively.
<b>Terminating professional relationships &amp; on-going responsibilities</b>	Coaches and mentors will respect the client's right to terminate the engagement at any point in the process, subject to the provisions of the coaching or mentoring service agreement.
	Coaches and mentors will encourage the client or sponsor to stop the coaching or mentoring engagement if it is believed that the client or sponsor would be served better by another coach, mentor or another form of professional help.
	Coaches and mentors understand that their professional responsibilities continue beyond the termination of any professional relationship. These include: <ul style="list-style-type: none"> <li>▪ Maintenance of agreed confidentiality of all information relating to clients and sponsors</li> <li>▪ Safe and secure maintenance of all related records and data.</li> </ul>

	<ul style="list-style-type: none"> <li>▪ Avoidance of any exploitation of the former relationship, which could otherwise call into question the professionalism or integrity of the member or the professional community</li> <li>▪ Provision of any follow-up that has been agreed to.</li> </ul>
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### 3.2.3 Quality of virtual coaches

Recognising the growing pace at which virtual coaches are being developed and adopted in different areas of societal activity – from health and exercise to personal financial management, day-to-day sustainability coaches, and social coaching – the Rathenau Institute conducted a broad assessment of the potential impacts of virtual coaching. The object of this analysis is not only the individual user interacting with a single virtual coach. With the proliferation of smart devices – whether they be phones, TVs, or cars – and their increasing interconnectivity as part of the Internet of Things, virtual coaches are likely in the not so distant future to become part of an increasingly automated and pervasive apparatus of behaviour monitoring, analysis, and management.

From this perspective, responsible development of virtual coaches is not only a matter of ensuring the usefulness and value-sensitivity of individual coaching products, although this is also of central concern to the authors of the report. The wider perspective of assuming responsibility in the development of virtual coaches is to take active part in forging the pathway along which virtual coaches – along with other elements of the increasingly smart, Internet of Things – are going to shape social reality.

As with the general discussion of the responsibilities of researchers and innovators, individual research groups cannot alone assume responsibility for handling all potential RRI issues related to virtual coaches. The Rathenau Institute (Kool, Timmer, & Van Est, 2015) argues that responsible development in the field of virtual coaches must be ensured through ongoing interaction between a number of different actors, such as research groups, patient groups, product developers, the health sector, and state regulators. They propose a unifying vision of ‘Sincere Coaching’ and that actors should work together on ensuring the quality of the coaching provided.

Central to their idea of what constitutes quality in this connection is that the virtual coach, and the system of its implementation, is in fact designed to help the user. This criterion ought to be obvious, but the potentials for secondary use of the data collected, for manipulation of users towards ends other than their own are such that nothing should be assumed to stay obvious as virtual coaches become increasingly embedded in daily life. As a starting point, the Rathenau Institute recommend the following principles for quality assurance in virtual coaching development.

**Table 8: Recommendations for ensuring the quality of virtual coaches.**

Recommendations for ensuring the quality of virtual coaches	
<b>Professional seal of approval</b>	Consumer organisations and app developers should reach agreement on quality criteria for e-coaches. Consumers need information about what the e-coach does and on what information the e-coach comes to its advice.
<b>Guarantee privacy</b>	The stricter privacy legislation that is on the horizon imposes more stringent requirements on product developers. Product developers and governments need to prepare now for those requirements and work diligently on protecting privacy.
<b>Respect autonomy</b>	The e-coach influences the user in order to bring about a change in his/her behaviour. Providers of e-coaches should therefore be compelled to make clear what techniques of persuasion the device is using.

<b>Government bears the burden of proof</b>	Government can only make the use of an e-coach mandatory if it first demonstrates that doing so is justified.
<b>Transparent revenue models</b>	Users of e-coaches now deal with a network of parties, each of which has its own (commercial) interests. The user's interests are not always automatically the top priority. The Rathenau Institute calls on regulatory bodies to investigate the revenue models used for e-coaching applications. Governments should also make it mandatory for providers to be transparent about their revenue model.

### 3.2.4 Ethics of mHealth

WHO's Global Observatory of eHealth (GOe) defines mHealth as "medical and public health practice supported by mobile devices, such as mobile phones, patient monitoring devices, personal digital assistants (PDAs), and other wireless devices".

Does mHealth present ethical challenges other than those associated with healthcare in general? The four principles typically cited in codes of medical ethics – also known as the 'Georgetown mantra' – are autonomy, beneficence, non-maleficence, and justice. According to (Albrecht & Fangerau, 2015) these principles still apply to mHealth applications, but their concrete implications are new.

The authors, however, note that the convergence between mobile and non-mobile ICT systems as well as health and non-health systems should lead us to take a broad perspective on what counts as mHealth.

That being said, the two authors produce the following remarks on specific concerns to be taken into account by mHealth developers seeking to ensure ethical development and implementation.

**Table 9: Adapting medical ethics to mHealth.**

<b>Adapting medical ethics to mHealth</b>	
<b>Autonomy</b>	<ul style="list-style-type: none"> <li>Respecting the right to self-determination with respect to active or passive participation, use or application of mHealth are concerned</li> <li>Voluntary participation and the right to withdraw at any time</li> <li>Comprehensive and target-group as well as situation specific information must be provided to allow an informed decision</li> <li>Promotion of health awareness for (self-) confident decision making in health contexts</li> </ul>
<b>Beneficence</b>	<ul style="list-style-type: none"> <li>The primary benefits for the affected persons must be obvious or deducible</li> <li>The objectives must be achieved based on valid data</li> <li>Decision processes must be transparent and need to include all stakeholders concerned (affected persons) in order to justify an intervention in a comprehensible manner</li> </ul>
<b>Non-maleficence</b>	<ul style="list-style-type: none"> <li>The mHealth intervention shall not in any way have a negative impact on its user or on the receiving party. Specifically, this applies to the physical and mental wellbeing of each individual, a group of individuals or the individual's environment.</li> <li>The risks of an intervention must be commensurate with its expected benefits.</li> </ul>

	<ul style="list-style-type: none"> <li>▪ This requires carefully weighing up the risks and benefits based on valid and reliable information.</li> <li>▪ The right to privacy, which, aside from confidentiality also includes protecting personal integrity, must be protected in order to prevent any harm.</li> </ul>
<b>Justice</b>	<ul style="list-style-type: none"> <li>▪ mHealth interventions must be available to everyone, regardless of social status, income, education, political orientation, religious faith, inclinations and ideals, gender, age, ethnic group but also when it comes to technical affinity, health competence, mental or physical impairments. Neither discrimination nor stigmatisation may be caused by the intervention.</li> <li>▪ mHealth interventions should aim at eliminating existing inequalities. For this, the fair distribution of potential benefits and potential harm within the target group is a prerequisite.</li> </ul>
<b>Good Science Practice</b>	<ul style="list-style-type: none"> <li>▪ Research is necessary to generate valid and reliable data. For all research, the commonly known principles of good scientific practice as well as the biomedical principles of research must be respected.</li> </ul>

### 3.2.5 Responsible ICT for an ageing society

The final code of conduct to be discussed here is responsible ICT for an ageing society. Recognising the great potential for ICT to provide new solutions for delivering health and social care for an ageing European society, the Responsible Industry project (Stahl, 2017) nevertheless underscores the necessity for addressing responsibility issues that the development of such solutions brings about.

The project conducted a stakeholder and expert Delphi exercise to identify the most important RRI challenges posed by ICT developed for an ageing society. The Delphi method is a classic assessment method in which the participants review each other's lists of priorities anonymously in several rounds and gradually arrive at a tentative consensus on the matter being assessed. The exercise produced a list of principles ranked by their importance for developers in the field. At the top of this list were: **the protection of individual rights** (privacy, data protection, rights to freedom of movement, etc.); **personal safety and health**, and **autonomy, authenticity and identity**. In addition, the exercise identified a list of enabling technologies that present especially urgent ethical challenges listed below.

**Table 10: Ethically challenging ICT areas.**

<b>Adapting medical ethics to mHealth</b>
<b>Transmission of data to a third party</b> e.g. transmission of personal data from the user's smartphone to e service portals
<b>Technologies for data management, such as Data Storage and Data analysis</b> e.g. cloud computing
<b>Real time monitoring of the user lifestyle through sensing systems</b> e.g. environmental sensors for surveillance applications at home
<b>'Brain-computer interfaces; reasoning systems for medical data analysis</b> e.g. detection of trend anomalies in vital signs to alert caregivers or family members
<b>Reasoning systems for privacy-sensitive data analysis</b> e.g. noise analysis for activity recognition
<b>Action enabling technologies</b>

e.g. automatic control through actuators, artificial muscles
<b>Machine to machine communication systems</b> e.g. transmission of medical data from the user smartphone to care management portals
<b>Human-machine interaction</b> e.g. robotics
<b>Social Networking Techniques</b> e.g. location based social networks
<b>Health monitoring through sensing systems</b> e.g. wearable or implantable sensors for daily monitoring of physiological parameters

### 3.2.6 An overlapping patchwork of principles: why a bottom-up approach is necessary

We cannot on the basis of the literature-based discussions above conclude much about which responsibilities the Council of Coaches ought to take upon itself, beyond its contractual and legal obligations. Why? There are two reasons, which are informative not only for the Council of Coaches project, but also for the broader discussion of how to operationalise RRI.

Firstly, the above exploration of relevant professional codes of conduct and ethics produces a patchwork of overlapping principles that do not fit neatly together. Not only do the different codes include many of the same principles, which we might solve simply by gathering all of the principles in a common pool and eliminating redundancies. It shouldn't be a problem that 'privacy', for instance, occurs in many of the different codes.

But secondly, what does pose a problem is that in total these frameworks present an overabundance of potential responsibilities to be taken into account by the project. If we were to approach this list as one in which all emerging issues are mandatory, the project could easily become bogged down by additional tasks draining resources from the project's core work. This adds another perspective on why a bottom-up approach is necessary. We may explore and become inspired by top-down principles, but we can only find a workable approach by engaging the consortium in the negotiation between the activities that the project is contractually bound to perform and the additional responsibilities that the project might take upon itself. With the consortium onboard in the exploration of responsibilities, it is furthermore possible to ensure that taking on responsibilities not already described in the project contract or in existing legal frameworks does not result in symbolic activities unconnected to the core development work. Instead, with this bottom-up approach it becomes possible to identify RRI issues and how they apply to the actual technical and organisational choices already being undertaken by the project.

## 4 RRI at the project level: methodology

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*We suggest that [RRI] as a guiding concept is in need of operationalisation within the specific context in which it is used. A point of entry for such a process is the role responsibility taken on by scientists. Resistance can be expected as [RRI] can be equivocated with a limitation on the autonomy of science. To avoid evasive practices, extra efforts are needed to involve the scientists in a co-constructive process to operationalise [RRI].*

*(De Jong, Kupper, Roelofsen, & Broerse, 2015)*

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### 4.1 RRI + STIR = STIRRING

Since RRI cannot be neatly reduced to a matter of compliance but must necessarily involve an element of open reflection in each consortium, many researchers recommend a co-creative approach to RRI implementation. (Wickson & Forsberg, 2015) identify four principles necessary for the bottom-up operationalisation of RRI. With a few necessary additions made by ourselves (in **bold** below), these principles serve to guide the Council of Coaches approach.

The four principles (amended for the purposes of the Council of Coaches) are:

1. A specific focus on addressing significant societal needs and challenges
2. A research and development process that actively engages and responds to a range of stakeholders and their expectations, **including expectations expressed by the funding and governance bodies under whose auspices the research project is carried out through 'soft' signals such as strategies and non-mandatory policy ambitions.**
3. A concerted effort to **identify pertinent RRI issues, including issues of compliance with 'hard' regulation that potential technology adopters could face due to upstream design choices**, identify alternatives, and reflect on underlying values, and
4. A willingness from relevant actors to act and adapt according to 1-3 **by assigning specific responsibilities within the project's lifetime, engaging in ongoing reflection, and attempting to pre-empt undesirable development and exploitation after the end of the project through design choices and policies and contracts developed by the project.**

The following approach seeks to setup a method for applying these principles in an interplay between the consortium members carrying out the research and innovation of the project and a dedicated 'RRI group' facilitating dialogue and reflections.

### 4.2 Methodological elements

Methodologically our approach draws together elements from different contributions to the current discussion on RRI implementation. Together, we employ these elements to ensure that the four principles of RRI operationalisation outlined above can be realised in a practical manner.

The first principle - a specific focus on addressing significant societal needs and challenges – is written into the project proposal from the beginning. As outlined above, the project aims to provide an enhanced form of software support for personal reflection over lifestyle changes and health management. The project's prototypes will seek to address specific needs of three groups of elderly

people, specifically groups that are challenged by chronic pain, diabetes II, and general age-related ailments. The wider aim, however, is to establish a technological platform for councils of coaches designed to support people in many different life situations and with different needs. Together, these aims add up to a specific focus on addressing significant societal needs and challenges that arise within welfare states with ageing publics. Such a focus, of course, can slide in a number of ways. The intricacies of technological development can easily distract from the overall goal and lead into pathways of development that are interesting in terms of research excellence but less relevant in societal terms. Likewise, the dynamics of the market may lead towards models of exploitation that are potentially profitable but that prioritise less-than-necessary social functions, e.g. entertainment or advertisement. The rest of the principles are therefore there to ensure a dynamic and ongoing negotiation and realignment of different possible development trajectories with the societal needs and challenges identified from the outset.

The second principle – engagement with stakeholders and their expectations – is implemented using two methodological elements from the Responsible Industry framework (Stahl, 2017). We take the outcomes of already existing policy discussions about the responsibilities of innovators (in general and in eHealth) into account through the production of a background brief for consortium members and the facilitation of discussions within the consortium about the meaning of these discussion for the project. What is implied by this methodological element is a view of the project as being positioned downstream from policy and broader societal debates about the directions of technology and as having an inherent responsibility to seek some form of alignment with stakeholders in a way that goes beyond compliance with regulation. This leads to another element imported from the Responsible Industry project (and one that is generally recommended in the entirety of the RRI literature), which is to ensure user and stakeholder involvement through the entire project. The details of this involvement are outlined in D2.2. For the purposes of this deliverable suffice it to say that the user involvement will ensure upstream embedding of the prototypes in daily reality of the target groups through mapping of patient journeys, the information usage of potential users, and the daily practices of professional users. The methods employed include diary studies and user interviews. The stakeholder involvement will ensure that organised groups representing different interests are engaged in identification of RRI issues and the discussion of possible areas and models for implementation. The methods involved include workshops and interviews. Both user and stakeholder involvement take place in step with the development of prototypes.

The third principle – anticipation of RRI issues – is implemented using a methodological element from the Res-Agora framework (Bryndum, Lang, Mandl, Nielsen, & Bedsted, 2016), namely the use of a co-constructive workshop format to identify relevant RRI issues and set out strategies for assuming responsibility for each of them. This workshop method centres on four sessions of dialogue: i) an open exploration of responsibility as perceived by the actors involved; ii) a presentation of existing frameworks and considerations of RRI; iii) an in-depth identification of RRI issues to be handled by the actors involved; and iv) concretising the responsibilities that fall on the shoulders of specific actors and how they may proceed. Since the Co-Construction Method developed specifically for the Res-Agora project has the actors of a given innovation system as its scope, some adaptation is needed for its application at project level. The resulting workshop plan is described below- The outcomes of this workshop is an overview over RRI issues, that the consortium believes to be crucial to handle for the projects outputs to be successful, an assignment of responsibilities for following up on these issues, and a list of ‘issues to watch’ which may gain in importance as the project progresses, the COUCH RRI Vision. All outcomes are listed in chapter 5 of this report.

The fourth principle – acting and adapting to the inputs from stakeholders and the identification of RRI issues – is implemented by adding to the above outlined methodological elements (which are all native

to the European RRI discussion) a version of the socio-technical integration research (STIR) method (Fischer & Schuurbijs, 2013) developed by researchers in the US. The STIR method involves exercises of anthropological embedding where humanists (or other researchers with a profile enabling them to act as advocates of the overarching principles of responsibility) undertake six-week outplacements among laboratory scientists. During these embedding periods, the humanist interacts with the scientists via semi-structured protocols of interviews and interventions aiming to 'stir' up reflection about responsibility aspects of lab practices, e.g. animal rights, human rights, etc. What we have imported from this method is the overall rationale of ongoing interactions aiming to 'stir' up reflection about the practical implications of the RRI vision agreed upon by the consortium (hence the acronym STIRRING). But since the Council of Coaches is carried out by a cross-European, lengthy outplacements with each of the partners is neither economically feasible nor perhaps the most impactful approach. To adapt the STIR method to these conditions, we use a blend of semi-structured interviews with individual researchers and mini-workshops in connection with consortium meetings and 'hackathons' to intervene at strategic points during the development period. Deliverable 2.4 to be produced at the end of the project will detail how this plan comes to unfold.

#### 4.2.1 Conceptual clarifications

In addition to the methodological notes made above, a few conceptual clarifications are in order. In the Council of Coaches project, we define an 'RRI Vision' as

*an agreement between the project partners about what responsibilities arise from the ambitions of the project, who needs to bear these responsibilities, and how the project is going to ensure that they do.*

For such an agreement to be reached, the consortium first needs to get an overview of such responsibilities and reflect on who can and should bear them.

Centrally, the consortium must agree on which RRI issues pertain to the project. As a shorthand, we define an 'RRI issue' as *an opportunity for adding societal value that also implies a risk of impacting society negatively*. Of course, as the consortium seeks to identify RRI issues, they may be discovered in the reverse order, i.e. as a risk of negative impact on society that also implies an opportunity for adding societal value.

RRI issues fall into two major categories. On the one hand, there are issues regarding *ensuring compliance* with existing regulation, and issues of *acting responsibly* regarding those aspects of the project that are novel and not yet regulated. The *actors* on whose shoulders different responsibilities fall likewise fall into two categories, namely those who are internal and external to the consortium.

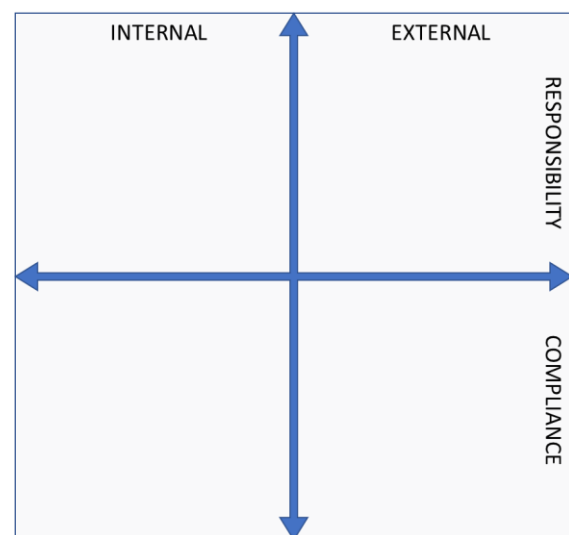


Figure 3: Dimensions of responsibility.

#### 4.3 Identifying RRI issues together

To identify RRI issues, the consortium must draw on a wealth of different sources of information. Compliance issues may be identified partly through the requirements set out by the funding agency, and partly by taking a broader view of sectoral regulations (e.g. medical regulations).

Broader issues of acting responsibly may be identified by interacting with and reflecting on codes of conduct, industrial roadmaps and business strategies, and societal values as represented in policies or the statements of stakeholders and citizens

The task of identifying RRI issues is shared between different elements of a H2020 project. Some RRI issues will be handled by achieving compliance with legal and contractual demands on the consortium. These issues have a home in the risk management, ethics, and data management plan.

Other issues present more complex challenges that the consortium may not be able to handle alone. Some such issues belong to the exploitation strategy while others – those issues that really don't have a clear place in the formal structure of the project – fall within the RRI work package.

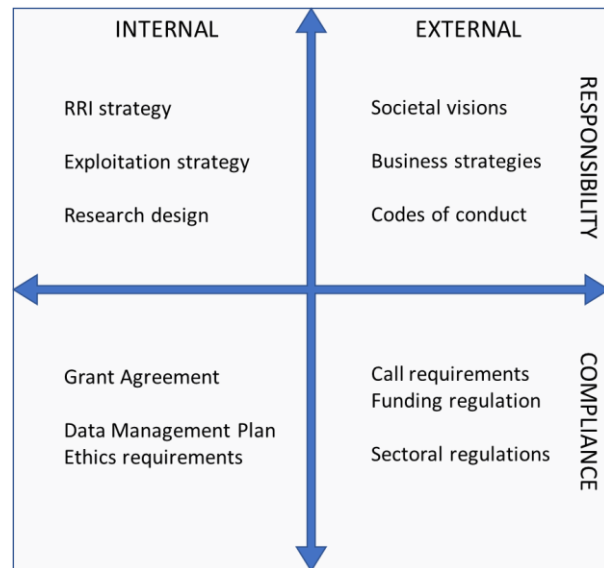
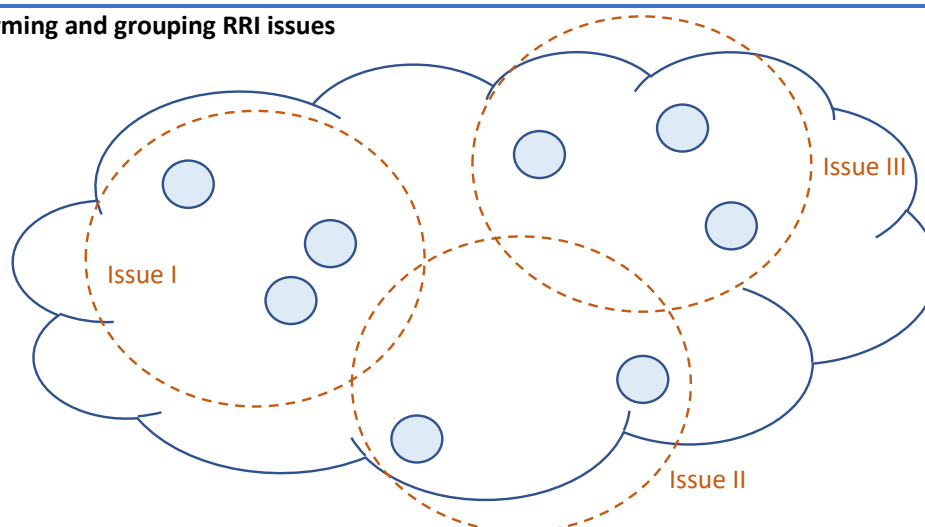


Figure 4: RRI issues within a project.

#### 4.4 RRI Workshop format

The workshop plan was designed and implemented to support the consortium in identifying RRI issues pertinent to the Council of Coaches project and agreeing on what to do about them is illustrated below. A background brief (consisting of drafts of chapters 2, 3, and 4 of this report) was distributed two weeks before to give the participants time to consider the RRI agenda, the approach to be taken, and the specific codes of conducts and ethics that might be relevant to the project. The workshop followed a 1½ day format divided into three sessions. Session one was a brainstorm, informed by the background brief, of RRI issues that occurred to the participants, and a common grouping exercise. The second session divided the participants into three groups, each of which developed a detailed description of one or several closely linked RRI issues, along with suggestions for how to handle them and who. The third session was a group discussion of where in the project plan to place the responsibility to follow up on these suggestions.

**1. Brainstorming and grouping RRI issues****2. Explicating RRI issues**

	Issue I	Issue II	Issue III
What is the issue?			
Why is it important?			
How can the issue be handled?			
Who is responsible?			

**3. Concretizing responsibilities**

RRI issues and solutions	WP1	WP2	WP3	WP5	WP6	...
Issue I						
• Solution I.A	X					
• Solution I.B	X		+	+		
Issue II						
• Solution II.A						
Issue III						
• Solution III.A		X		+	+	
• ...						

**Figure 5: Illustration of the three sessions of the RRI workshop format and their purposes.**

## 5 Input from the RRI workshop

In this chapter we first outline the RRI issues, which have been identified as especially pertinent by the consortium, including the consortium's initial ideas for solutions and assignments of responsibilities for following up during the rest of the project. We then list additional 'sleepers' issues that may prove more important as the project progresses or further downstream in the phases leading towards product development.

Readers wishing to understand the methodology behind the identification of RRI issues, including the workshop format used, are kindly referred to chapter 3.

### 5.1 RRI issues pertinent to the Council of Coaches project

As an output from the RRI workshop, the consortium identified four major RRI issues, which the consortium agreed to develop solutions for during the project lifetime. These are listed here in order of discussion at the workshop. The order of list does not reflect importance, nor is the list intended to rule out other issues becoming more pressing during the project's implementation.

**Table 11: RRI Issue #1: Privacy and Informed Consent.**

Issue #1: Privacy and Informed Consent	
<b>What is the issue?</b>	In order to function optimally, the Council of Coaches must be able to collect and process multiple kinds of personal and medical data (including physical and mental health data) and share this data with multiple actors, e.g. general physicians. At the same time, users must be able to understand how data is used and retain control over the data
<b>Why is it important?</b>	<ul style="list-style-type: none"> <li>▪ <b>Law</b> With the GDPR, enabling users to stay in control of their data (cf. the right to be forgotten) is a legal requirement for anyone implementing the Council of Coaches in a real-life situation with European citizens. One thing is that the Council of Coaches project must be able to grant this ability in trial settings, but anyone wishing to license the outputs downstream will be faced with this challenge as well. Proactively engaging with the issue of privacy and informed consent will therefore help to make the Council of Coaches more attractive to potential licensees/investors/etc.</li> <li>▪ <b>Moral obligation</b> More than a legal requirement, there is arguably a moral obligation to ensure transparency and user empowerment when designing ICT solutions in the health area.</li> <li>▪ <b>Product quality enhancement</b> Solving the issue of privacy and consent in a proactive manner would free the consortium to pursue design solutions that make full use of the data gathered and thus enhance the quality of the coaching support provided by the product.</li> <li>▪ <b>Enhanced capability of generalising</b> Solving the issue of privacy and consent upstream manner would further enhance the flexibility and scalability of the Council of Coaches platform. We would have to develop specific solutions to ensure privacy and informed consent in a real-life implementation of the specific products being prototyped</li> </ul>

	in the project. But beyond these specific solutions, the Council of Coaches platform – which should ideally be usable by developers targeting entirely different actor-networks – would also benefit greatly from a more generic solution to handling this issue. It would thus be very useful to design a ‘plug and play’ system for consent and use of personal data, which could be taken up by any application developed on the Council of Coaches platform.
<b>How do we address it?</b>	<p>The group discussing this issue suggests a modular system of data collection and data processing in which the user is able to consent to gradually more types of data being used, dependent on the kind of advice the user wants to make use of and which external actors the user wishes to give access to the data. This would involve a ‘basic’ consent to the minimal data needed for the Council to work, and additional modules being added on, e.g. corresponding to each new coach being added (physical health, mental health, social wellbeing, etc.).</p> <p>The system would have to be able to distinguish different types of data and different purposes of use:</p> <ul style="list-style-type: none"> <li>▪ <b>Types of data</b> Basic data, mental health, physical health, social</li> <li>▪ <b>Purposes of collection and processing</b> Internal to the council, 3<sup>rd</sup> party uses (GP, insurance, ...)</li> </ul>
<b>Who does what?</b>	Such a system would have to cut across content modules, data collection mechanisms, and data processing – it is thus a cross-cutting issue which all technical work packages must work together to solve.
<b>Who takes the lead?</b>	<p>LEGO system of consent (proactive approach) (lead T2.4: working with T1.1, T3.3, T7.1, T8.3P)</p> <ul style="list-style-type: none"> <li>▪ User interface (push messages on consent)</li> <li>▪ Data collection and storage (checking w/ consent database)</li> <li>▪ Data processing (what kind of advice will be given compared with data gathered)</li> </ul>

Table 12: RRI Issue #2: Trust (not too little, not too much).

Issue #2: Trust (not too little, not too much)	
<b>What is the issue?</b>	On the one hand, if users don’t trust the advice given by the virtual coaches, they won’t use it. On the other hand, if the users trust the advice too much, it might impede health or create social addiction to using the Council. The issue is thus one of handling trust-building in a reflected manner, where the design choices in the project and the exploitation choices after the project should all support a balanced approach to the relationship between the Council and its users.
<b>Why is it important?</b>	This issue is important because achieving a proper balance between trust and independence between the user and the Council will help to ensure that the user can get the most out of using the Council and avoid being subjected to the potential negative consequences of misinformation or overreliance on the Coaches. This issue is thus one that is closely related to the professional ethics

	of human coaches, where building trust while supporting the autonomy of the client is a crucial issue.
<b>How do we address it?</b>	<p>The group working on this issue suggests a number of interrelated actions to handle this issue, some of which overlap to a certain extent:</p> <p><b>Establishing trust</b></p> <ul style="list-style-type: none"> <li>▪ Quality assurance of information provided by the coaches</li> <li>▪ Ensuring a good match between relevant characteristics of the user and the advice given to the user</li> <li>▪ Establishing rapport with the user, e.g. through small talk where appropriate</li> <li>▪ Enlisting advice from external actors when necessary</li> <li>▪ Full transparency about what information will be shared – both at the point of registration and when data sharing occurs. This should apply to data sharing between coaches (“I’m going to tell Sue about your needle phobia, because...”) as well as between the system and external actors (“I’m going to tell a professional about your suicidal thoughts, because...”)</li> </ul> <p><b>Avoiding overreliance</b></p> <ul style="list-style-type: none"> <li>▪ The Council should remind users to visit relevant health-care professionals and to prioritise their advice over the information provided by the Council</li> <li>▪ While stakeholders suggested to ensure a physical likeness between the coaches and the users’ real-world care professionals, going the opposite road of avoiding such likeness would help as a reminder to the user that this is ‘just’ a program</li> <li>▪ Ensure that users have the Council of Coaches system explained to them in a manner that they understand and that they are warned about its limitations</li> <li>▪ In general, avoid too great a degree of realism in the appearance.</li> </ul>
<b>Who does what?</b>	These issues cut across all of the technical work packages and into implementation as well.
<b>Who takes the lead?</b>	<p><b>Building trust</b></p> <p>WP2,3,4,5 Quality assurance of knowledge (lead T5.4, working with T4.4)</p> <p>WP3-6 Match between user characteristics and advice given (lead not yet identified)</p> <p>WP3,5 6 Establishing rapport, e.g. through small talk where necessary (lead not yet identified)</p> <p>Getting recommendations from doctors (how, who?)</p> <p>WP8 Virtual Agent Explaining the system (or other means of giving a clear explanation) (lead T8.1, working with T3.2)</p> <p>WP3, 5 Transparency of what information will be shared with e.g. GPs or other actors and with other coaches (internal sharing (explicit): 3.1) (internal sharing (implicit): in connection w/ informed consent) (external sharing, technical: WP7) (external sharing, contractual: 8.2) (to be taken up in T2.4 as well)</p> <p><b>Avoiding overreliance</b></p>

	<p>Quality assurance (see big paper) (lead 5.4, working with 4.4))</p> <p>WP3, 5, 6 Remind users to visit human experts (modesty) (lead T3.1)</p> <p>WP6 Avoid likenesses with real doctors, too great realism in looks, etc. (lead T6.1, T6.2)</p> <p>WP8 Initial explanation of how the system works (lead T8.1, working with 3.2)</p>
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Table 13: RRI Issue #3: Handling disagreement between coaches.

Issue #3: Handling disagreement between coaches	
<b>What is the issue?</b>	An interdisciplinary Council of Coaches will necessarily produce conflicting advice at some point. This demands a solution to solving conflicts arising between lines of argument modelled on different professions. For example, a patient with a cardiovascular disease and asthma profile is recommended to drink coffee by one coach but another couch may recommend the opposite.
<b>Why is it important?</b>	This issue is important because a user seeking medical advice from the coaches may either become confused by the conflicting advice coming from coaches drawing on different sources of information or may choose to make use of one piece of advice based on non-medical factors, e.g. how much the user likes one coach or the other. Ultimately, this may lead to misinformed and potentially dangerous health choices.
<b>How do we address it?</b>	<p>Conflicts between the argumentation patterns of the different coaches can be identified in two ways:</p> <p>1) We imagine that there would be something like COUCH “knowledge packages” for each of the coaches. Whenever we are about to update the system and add a new “package”, we can define/identify those conflicts and 2) During execution, i.e. dialogue with the patient, it will be possible to identify conflict that were not apparent during the updating process.</p> <p>In both cases and based on the system definition, there will be agreed on a strategy, i.e. talk to a human expert to settle conflicts. Overall, it will be necessary to establish a hierarchy of conflicts and a modus operandi for solving them, including protocols for documentation of conflicts and probable solutions (guidelines, papers, etc.).</p>
<b>Who does what?</b>	The issue of handling conflicts between the knowledge bases and argument patterns must ultimately be handled through organisational protocols to be followed by actors running implementations of the Council of Coaches.
<b>Who takes the lead?</b>	Developing a proper organisational response for handling these conflicts seems to fall in the vicinity of task 8.2 (exploitation and business planning) where criteria for implementation can be set out. However, exactly how to solve this issue remains unclear at the end of the RRI workshop and the STIRRING follow-up (task 2.4) will be charged with following up on this issue.

Table 14: RRI Issue #4: How to keep healthcare knowledge up to date?

Issue #4: How to keep healthcare knowledge up to date?
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<b>What is the issue?</b>	Healthcare knowledge is fluid. System should give advice based on the latest medical knowledge. Adding a new coach or new “medical” insight results in a change in knowledge base. Such a change can cause unforeseen issues in the interaction between different domain knowledge bases. Bottom line: This can lead to the wrong advice.
<b>Why is it important?</b>	A lot of the credibility of the Council of Coaches as a potential tool for healthcare will rest on its ability to give access to reliable medical information, even if this information will be supplemented by other types of knowledge. As such, the product would need to have a reliable protocol for knowledge updates to attract investors/licensees/buyers downstream.
<b>How do we address it?</b>	<p>The group that worked on this issue suggests to develop a mechanism or protocol for model-checking to be run after every change made to the knowledge-base. - Identifies potential risks that may be manually checked. In other terms, this approach to systematic updating of medical knowledge could perhaps be described as “verifiable by design”.</p> <ul style="list-style-type: none"> <li>▪ Manual checking of conflicts, what is the problem, what is the solution (e.g. by external expert)</li> <li>▪ Knowledge verifiable by design (linked to quality assurance)</li> </ul>
<b>Who does what?</b>	<p>WP3 = Knowledge Design</p> <p>WP5 = Early design of model checking tool.</p> <p>To be sure, designing a working version of such a checking tool would be an entire development project in itself, and is not part of the obligations of the consortium. The WP, however, can outline the initial requirements for the benefit of potential further development efforts after the end of the project.</p>
<b>Who takes the lead?</b>	Knowledge base checking tool identifying conflicts between the “knowledge packages” of each coach. This should be closely linked to quality assurance (lead 5.4, along with WP3).

## 5.2 Additional ‘sleeper’ issues

In addition to the above mentioned RRI issues, the workshop also produced a number of ‘sleeper’ issues that were not explored in-depth, but which will be kept in mind during further RRI work in the project since these issues may prove increasingly important during the project or as the consortium gains increasing insight into possible exploitation models.

**Table 15: Additional ‘sleeper’ RRI Issues.**

<b>Issue #5: Intrusion</b>	
<b>What is the issue?</b>	There are several ways the coaches’ behaviour can become intrusive. The coach may ask questions that are deemed too personal. The frequency of the information or questions provided on daily basis can be perceived as ‘pushy’. Long talks/messages can be annoying.
<b>How do we address it?</b>	<ul style="list-style-type: none"> <li>▪ Enable use-profiling (WP 2 and 3)</li> <li>▪ Make questions more personal with time / build relationship</li> <li>▪ Include a “do not disturb option”</li> <li>▪ Enable “do not record data” for specific conversations</li> <li>▪ Prompt the user to participate in the conversation</li> </ul>

	<ul style="list-style-type: none"> <li>▪ Summary-option for long conversations with intentions of humor that might be annoying to some users</li> </ul>
<b>Issue #6: Personalisation</b>	
<b>What is the issue?</b>	Who decides how the coaches are personalised and on what background? Are they individually shaped or even for all?
<b>How do we address it?</b>	We need insights into users' preferences and behaviours to know how to handle this issue.
<b>Issue #7: Consistency/honesty</b>	
<b>What is the issue?</b>	What if there is a discrepancy between sensory information and what the user says? If the user lies then the coaches may advice wrongly.
<b>Issue #8: Privacy by design</b>	
<b>What is the issue?</b>	How and to which extent can we ensure that organisations implementing Council of Coaches software downstream are not able, without proper legal authorisation, to mine personal data for other uses than those to which the user has given consent? This issue is especially important if the Council of Coaches were ever implemented in an ecosystem of other digital services, e.g. the national health care system.
<b>Issue #9: Illegitimate exploitation</b>	
<b>What is the issue?</b>	What can we do to prevent sharing / theft of the application?
<b>Issue #10: Economic vs health incentives</b>	
<b>What is the issue?</b>	How do we balance the need for the coaches to refer to GPs and other healthcare personnel in situations that go beyond the expertise of the coaches? This goes against the policy-level need to stimulate self-management and health to lessen the strain on public health resources.
<b>Issue #11: Equality</b>	
<b>What is the issue?</b>	What can we do to ensure that the Council is adopted and used by those who need it the most, not only those for whom use of the system is easiest.
<b>Issue #12: Liability</b>	
<b>What is the issue?</b>	Who is responsible in cases of damage due to wrong advice?

## 6 The Council of Coaches RRI Vision

The RRI Vision of the Council of Coaches is to be *an agreement between the project partners about what RRI issues arise from the ambitions of the project, who needs to bear these responsibilities, and how the project is going to ensure that they do*. The elements of this vision have been identified during facilitated activities carried out by the RRI team during the first six months of the project. As outlined above, these activities have consisted the dissemination within the consortium of a background brief of facilitated discussions in the consortium. The RRI Vision is to serve as a reference document for discussions and reflections later on in the project, where the vision will be continually expanded upon, and where its implications will be decided upon in relation to choices to be made about design and exploitation of the project's technical outcomes.

The following constitutes a suggested formulation of the RRI Vision for the Council of Coaches project. The consortium members will be able to consider this formulation before fully committing to it. The status of the agreement will be internal and not legally binding.

### THE COUCH RRI Vision

#### **Our commitment to adding societal value**

The Council of Coaches project has the ambition of changing the way we look at virtual coaching. The project consortium aims to develop a virtual coaching system that can assist (older) adult users in the areas of physical, cognitive, mental, and social well-being. The project will focus on bringing alive a memorable cast of characters and pushing the boundaries of intuitive user interaction, and user experience. This system will try to learn to understand the user, the user's behaviour and daily context in order to provide personalised coaching. Through sensing and profiling, the system builds up a knowledge base that the virtual coaches in the council will use to tailor their coaching to the specific user. The consortium aims to advance the field of dialogue management by introducing a multi-party, automatic dialogue system in which multiple virtual characters can interact with a human user. Altogether, these ambitions add up to an earnestly held wish to contribute to supporting high quality health and welfare services in ageing societies; one of the grand challenges of our time.

#### **Our awareness of responsibilities arising from our ambitions**

The Council of Coaches consortium recognises that while realising the development ambitions of the project gives us an opportunity for adding societal value, these same ambitions also entail risks of impacting society negatively.

Four issues stand out in this regard.

The first issue is privacy and informed consent. In order to function optimally, the Council of Coaches must be able to collect and process multiple kinds of personal and medical data (including physical and mental health data), and share this data with multiple actors, e.g. general physicians. At the same time, users must be able to understand how data is used and retain control over the data. This is their right both in a legal and ethical sense.

The second issue is trust and how to manage it. On the one hand, if users do not trust the advice given by our virtual coaches, they will not use it and therefore not benefit from our work. On the other hand, if the users trust the advice too much, it might impede health or create social addiction. The issue is thus one of handling trust-building in a reflected manner, where the design choices in the project and the exploitation choices after the project should all support a balanced approach to the relationship between the Council and its users.

The third issue is how to manage disagreements between coaches. An interdisciplinary Council of Coaches will necessarily produce conflicting advice at some point. This demands a solution to solving conflicts arising between lines of argument modelled on different professions. For example, a patient with a cardiovascular disease and asthma profile is recommended to drink coffee by one coach but another couch may recommend the opposite.

The fourth issue how to keep healthcare knowledge up-to-date. Healthcare knowledge is always advancing and being reordered. The Council of Coaches system should give advice based on the latest medical knowledge. Adding a new coach or new “medical” insight results in a change in knowledge base. Such a change can cause unforeseen issues in the interaction between different domain knowledge bases. Bottom line: This can lead to the wrong advice.

Other issues should also be kept in mind during the rest of the project and in the afterlife of the project when exploitation models and opportunities for product development are being explored. These include: avoiding intrusive behaviour by the coaches; preventing illegitimate exploitation of our work; balancing economic vs. health incentives; tackling the digital divide; and more.

### How we will assume responsibility

As a group, the partners of the Council of Coaches consortium agree that the responsibility for handling these issues must be clearly distributed in order for the project as a whole to proceed responsibly. This does not constitute a commitment to spending extra time or resources on these tasks. Instead, and more relevantly, it constitutes a commitment to handling these added responsibilities as an integral part of the development work itself; to impose on ourselves the restraint of always aiming for the overlap between what is technically possible and what is societally desirable.

During the project’s lifetime, the following partners accept responsibility for ensuring that our technical solutions are at the same time solutions to these issues of responsibility.

**Table 16: Responsibilities within the consortium.**

RRI Issue	Lead partner and task(s)	Assisting partner(s) and task(s)
<b>Privacy and informed consent</b>	RRD (T2.4, T3.3)	UT (T1.1); UPV (T7.1); iSPRINT (T8.3)
<b>Trust (Not too little, not too much)</b>	UDun (T5.4)	CMC (T4.4); RRD (T3.1, T3.2); (UPV T6.1, 6.2)
<b>Handling disagreements between coaches</b>	DBT (T2.4)	iSPRINT (T8.2)
<b>Keeping healthcare knowledge up-to-date</b>	UDun (T5.4)	RRD (T3.1, T3.2, T3.5)

Responsibility for handling additional issues will be assigned as they mature. The job of keeping these additional issues in mind meanwhile falls to the DBT as part of T2.4.

## 7 Observations and outlooks

At the point of delivery of this report the following observations and outlooks can be made to guide the rest of the RRI work in the project's lifetime.

### 7.1 Observations

The methodology by which we have arrived at the above RRI Vision of the Council of Coaches project is novel and experimental in character. We are literally learning-by-doing. It is therefore only natural that the consortium members would have experienced some uncertainty about what to expect from this process. Our discussions with project participants have at least given us clear indications that while quite a few of the consortium members are actively interested in understanding RRI better and learning how to 'do it', many were also hesitant about whether a broad range of responsibilities would still be manageable.

As outlined above, RRI as a thematic is inherently confusing in that it leaves a significant amount of sense-making to the individual project (see Chapter 2).

What we have sought to contribute so far in terms of such sense-making is:

- Increased awareness on RRI through distribution of a tailor-made background brief;
- Identifying RRI issues through a facilitated workshop;
- Coming up with initial solutions for RRI issues at the same workshop;
- Planning follow-up to integrate issues in technical development and assigning responsibility;
- Planning Stirring approach to support ongoing reflection on RRI during the project.

We have not yet produced systematic evaluation of the RRI approach: this will be part of task 2.4. But we have received generally positive remarks from those participants who have volunteered evaluations.

We hypothesise four factors for the positive outcome so far:

Firstly, we believe that the commitment from the Coordinator to the RRI agenda, which has been evident already from the proposal stage, and which the Coordinator has reiterated in many ways during consortium meetings and discussions, has helped to give the RRI exercise weight in the consortium.

Secondly, we speculate that there is a high level of pre-existing interest in RRI and related debates in this particular consortium. Our experience has been that there is a marked interest among the interdisciplinary technical partners in understanding and getting a handle on the RRI agenda and what it means in practice. We will have to look out for ways of comparing our experience with those of other consortia.

Thirdly, we believe that the work we put into explaining RRI from the perspective of a project consortium – including the work done to gather frameworks from outside of the field of EC-funded RRI research – has helped to translate the very broad terms of the RRI debate into a challenge that may be difficult to manage but is at least concretely related to the work to be done in the project.

Fourthly, the workshop design and facilitation has taken great care to follow a bottom-up principle. We have thus avoided the temptation, for example, to measure the RRI identification against the Commission's five keys framework as operationalised by the MoRRI project. This has created an open-ended flow of ideas, that might otherwise have been stifled with a more top-down ('checklist'-type) approach. From a top-down perspective, it is clear that not everything that would count as RRI has been taken up as relevant by the consortium. But at the same time, the issues that were taken up have been treated with a great deal of seriousness and 'buy-in', which we hope to maintain during the project.

Some of the areas for improvement with respect to the re-use of this methodology that are already visible include;

- A clearer up-front introduction to consortium members about what they can expect from the RRI vision process.
- A dedicated sub-process for involving consortium members and/or external stakeholders in the identification of relevant codes of conduct.
- A dedicated sub-process for making a connection between existing assessment tools (e.g. Privacy Impact Assessment) and the planning of the STIrring process, e.g. so that a consortium which decides to take up privacy-by-design as an issue could decide whether and how to carry out such an assessment.

## 7.2 Outlooks

At the point of writing we only have limited oversight over how we are going to implement the STIrring method for the rest of the project. Below are, however, a few considerations and a first few steps. The STIR method in its original form involves the embedding of 'humanists' in research organisations. In particular, such humanists physically relocate to technical laboratories in 6-week periods where they follow a semi-structured approach to having talks with technical researchers about values and responsibilities and thereby facilitate reflection.

The approach was discussed internally in the RRI group as well as in the consortium as a whole. There is a general agreement that this particular approach would not work in the context of the Council of Coaches project, even if the overarching idea is sound. For one thing, the development work in the Council of Coaches project is carried out by several organisations that are physically apart most of the time. This means that a lot of the design and research decisions are being made in the overlap between the different organisations, and as such an embedding in one particular organisation would not likely produce the results that the STIR method aims for. Another thing is that the organisations in question are all at the same time involved in a host of different other projects and as such an extensive embedding would risk being inefficient in terms of interaction about the actual project.

For these reasons, we have decided to adapt the STIR method so that it follows a logic of reflexive monitoring and mini-interventions. What we mean by 'reflexive monitoring' is that once the RRI Vision has been discussed and decided on in an initial form, the RRI team naturally inherits the task of monitoring progress and supporting ongoing reflexion about the meaning of the vision. In operational terms it seems feasible for this task to follow the same rhythm as the overall coordination of the project and thus to be taken up in consortia meetings as well as in ongoing online coordination meetings where relevant. What we mean by 'mini-interventions' is the idea that the RRI team should facilitate individual talks, mini-workshops, or distribute further analysis at strategic points in the project's development. This could be just before and/or just after the production of prototypes, for instance. These two parallel tasks have at this point given us the following ideas for how to proceed with task 2.4 (the STIrring task):

Reflexive monitoring:

- Introduction of the RRI Vision to the entire consortium and taking onboard feedback.
- Analysis comparing progress by the technical partners to the RRI Vision.

Mini-interventions

- 2-hour workshop at 'hackathon' already planned by the technical consortium partners.

Outcomes of these results will be reported in an ongoing manner; format yet to be determined.

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