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Grant Proposal

Virtue-based ethics and integrity of research: train-the-trainer programme for upholding the principles and practices of the European Code of Conduct for Research Integrity (VIRT²UE)

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Abstract

Background: Recognising the importance of addressing ethics and research integrity (ERI) in Europe, in 2017, the All European Academies (ALLEA) published a revised and updated European Code of Conduct for Research Integrity (ECoC). Consistent application of the ECoC by researchers across Europe will require its widespread dissemination, as well as an innovative training programme and novel tools to enable researchers to truly uphold and internalise the principles and practices listed in the Code.

Aim: VIRT²UE aims to develop a sustainable train-the-trainer blended learning programme enabling contextualised ERI teaching across Europe focusing on understanding and upholding the principles and practices of the ECoC.

Vision: The VIRT^{2}UE project recognises that researchers not only need to have knowledge of the ECoC, but also to be able to truly uphold and internalise the principles underpinning the code. They need to learn how to integrate them into their everyday practice and understand how to act in concrete situations. VIRT^{2}UE addresses this challenge by providing ERI trainers and researchers with an innovative blended (i.e. combined online and off-line approaches) learning programme that draws on a toolbox of educational resources and incorporates an e-learning course (including a YouTube channel) and face-to-face sessions designed to foster moral virtues. ERI trainers and researchers from academia and industry will have open access to online teaching material. Moreover, ERI trainers will learn how to facilitate face-to-face sessions of researchers, which focus on learning how to apply the content of the teaching material to concrete situations in daily practice.

Objectives: VIRT^{2}UE's work packages (WP) will: conduct a conceptual mapping amongst stakeholders to identify and rank the virtues which are essential for good scientific practice and their relationship to the principles and practices of the ECoC (WP1); identify and consult ERI trainers and the wider scientific community to understand existing capacity and deficiencies in ERI educational resources (WP2); develop the face-to-face component of the train-the-trainer programme which provides trainers with tools to foster researchers' virtues and promote the ECoC and iteratively develop the programme based on evaluations (WP3); produce educational materials for online learning by researchers and trainers (WP4); implement and disseminate the train-the-trainer programme across Europe, ensuring the training of sufficient trainers for each country and build capacity and consistency by focusing on underdeveloped regions and unifying fragmented efforts (WP5); and develop the online training platform and user interface, which will be instrumental in evaluation of trainers' and researchers' needs and project sustainability (WP6).

Impact: The VIRT^{2}UE training programme will promote consistent application of the ECoC across Europe. The programme will affect behaviour on the individual level of trainers and researchers – simultaneously developing an understanding of the ECoC and other ERI issues, whilst also developing scientific virtues, enabling the application of the acquired knowledge to concrete situations and complex moral dilemmas. Through a dedicated embedding strategy, the programme will also have an impact on an institutional level. The train-the-trainer approach multiplies the impact of the programme by reaching current and future European ERI trainers and, subsequently, the researchers they train.

Keywords

research integrity; ethics education; responsible conduct of research; responsible research and innovation; virtue ethics

List of participants

Consortium participants are listed in Table 1.

Table 1.

List of participants.

Participant no.	Part. short name	Main participant	Participant organisation name	Country
1 (Coordinator)	VUmc	Guy Widdershoven	Stichting VUmc	The Netherlands (NL)
2	KUL	Kris Dierickx	Katholieke Universiteit Leuven	Belgium (BE)
3	MEFST	Ana Marusic	Sveuciliste U Splitu, Medicinski Fakultet	Croatia (HR)
4	OeAWI	Nicole Foeger	Austrian Agency for Research Integrity	Austria (AT)
5	UB	Dirk Lanzerath	Universität Bonn/EUREC	Germany (DE)
6	UIO	Bert Molewijk	University of Oslo	Norway (NO)
7	ANKU	Mustafa Volkan Kavas	Ankara University	Turkey (TR)
8	NTUA	Costas Charitidis	National Technical University of Athens	Greece (GR)
9	UH	Erika Lofstrom	University of Helsinki	Finland (FI)
10	UL	Signe Mezinska	University of Latvia, Riga	Latvia (LV)
11	UCP	Ana Sofia Carvalho	Universidade Católica Portuguesa	Portugal (PT)
12	UNINS	Marco Cosentino	University of Insubria	Italy (IT)

1. Excellence

1.1 Objectives

1.1.1 Challenge

Science is said to be in 'crisis' (Redman 2015); reports of prevalent research misbehaviour, (Martinson et al. 2005, Necker 2014, Fanelli 2009, Marušić et al. 2011) high profile cases of scientific misconduct, and poor replicability of research findings (Open Science Collaboration 2015, Begley and Ellis 2012, Chang and Li 2015, Ioannidis 2017, Munafo et al. 2017) threaten public trust in science. Poor research practices can produce misleading results and waste resources (Ioannidis et al. 2014). Society invests considerably in science and is largely dependent on scientific progress. The scientific community, therefore, needs to increase efforts to ensure the highest levels of integrity in the research that it produces.

Modern scientific research confronts scientists with many challenges, including strong competition for funding, pressure to publish – preferably in high-impact journals, dealing with the rapid development of highly advanced methods and statistical techniques and extremely large datasets. Although there are many developments in regulations and professional standards, underlining the importance of ethical, responsible or 'good' research practices, their consistent application in concrete situations is not evident. The increasing internationalisation and collaborative nature of research also creates new challenges for researchers, because researchers' attitudes and behaviour are influenced by the disciplinary, institutional, cultural and political contexts in which they operate (Godecharle et al. 2014, Godecharle et al. 2013, National Research Council & Division on Earth and Life Studies 2002, Heitman and Litewka 2011). In order for cross-country and cross-disciplinary collaborations to be successful, it is important not only that there are certain **standards for good research practices that are universally accepted**, but also that researchers are provided with the **knowledge and skills to understand and uphold these standards across different countries and research settings.**

Recognising the importance of addressing **Ethics and Research Integrity** (**ERI**, described below), in Europe, in 2017, the All European Academies (ALLEA) published a revised and updated European Code of Conduct for Research Integrity (ECoC) for researchers (ESF-ALLEA 2017). This is an important step. Due to its improved simplicity and applicability across research domains, it has the potential to become the European standard across academic research fields and research intensive industries. Its translation into local codes of conduct and consistent application throughout Europe, however, requires widespread dissemination. Moreover, researchers not only need to have knowledge of the relevant codes, but also to be able to truly uphold and internalise the principles and practices explicated in these codes. They need to learn how to integrate them in their everyday practice and understand how to act in concrete situations.

Ethics and Research Integrity

VIRT^{2}UE focuses on ERI. Ethics, in this instance, refers to ethics as it pertains to research integrity, rather than the entire field of ethics of professional practice. Thus, the focus is on research practice and not on other kinds of professional activities, for instance, healthcare practice. Within research practice, a further distinction can be made between research integrity and research ethics. This distinction is important. Steneck (2006) described **research integrity** as 'possessing and steadfastly adhering to professional standards, as outlined by professional organizations, research institutions and, when relevant, the government and public', implying that research integrity deals with professional standards (values) of scientific research, such as the ECoC, and might also be described, as it is in the code, as good research practices. In contrast, **research ethics** can be defined as the 'critical study of the moral problems associated with or that arise in the course of pursuing research' (Steneck 2006). Whereas research integrity focuses on ethical aspects of doing research (ethics *in scientia*), research ethics focuses on ethical aspects of the justification for research, given the burdens to human or animal subjects (ethics *ad scientia*). There is a clear overlap, as research that does not adhere to standards of good research practice cannot be justified in terms of a balance between scientific value and subject burden. Yet,

research ethics is more specific in its focus on protecting research subjects. Since many training programmes for research ethics already exist, aiming at fostering researchers' awareness of ethical issues in research and providing them with knowledge and skills to uphold relevant European and national rules and guidelines, VIRT^{2}UE will not address research ethics as such, but will focus on research integrity, as the standards of good research practice form the broader context of specific considerations and judgements in research ethics.

Innovation in training

Consistent application of the European Code of Conduct for Research Integrity by researchers across Europe requires its widespread dissemination, as well as an innovative training programme and novel tools to enable researchers to truly uphold and internalise the principles and practices listed in the Code.

To realise this, VIRT^{2}UE plans a coherent, standardised and contextualised European-wide training programme, based on a thorough understanding of stakeholders' needs, to foster understanding and internalisation of the principles and practices of the ECoC. The programme will focus on ERI trainers who are themselves experienced researchers. **A train-the-trainer model is most appropriate in this instance due to the extremely large group of researchers to reach across Europe** – teaching trainers allows the programme's efforts to be multiplied many times over, as VIRT^{2}UE-trained trainers will go on to educate researchers and influence the teaching and training in their own institutions over a much longer period of time. They will need to be trained both in the topic they will teach (to ensure consistency of content) and in additional innovative instructional skills.

Ethics and research integrity training over the past decades

Debates on how to train research ethics and, later, research integrity, are decades long (Hay 1998, Eisen and Berry 2002). The theme of these debates, however, has evolved, from questions about whether explicit (teaching interventions) or implicit (role modelling) approaches are best, to what kind of teaching methods are best (working with cases, role-playing, problem-based learning, debates etc.) and what should be taught (compliance with the rules and/or moral development). It has been argued that **approaches focusing on compliance, but neglecting researchers' moral and value development, fail to equip them for the complexities and dilemmas of real life research** and situations not covered by rules and codes (Mulhearn et al. 2017, Steele et al. 2016, Breen and Maassen 2005, Hyytinen and Lofstrom 2017, Rissanen and Lofstrom 2014, Hren 2013). In order to deal with conflicting demands in practice, researchers need to develop moral sensitivity and the disposition to act in a good way. **The VIRT^{2}UE project, therefore, takes a primarily virtue-ethics approach to research integrity**. A 'virtue' approach fosters habits that dispose a person to exemplary practice (Pennock and ORourke 2017, MacIntyre 1981). This allows researchers to go beyond mere compliance by motivating them to strive for excellence in themselves and their practices (Pennock and ORourke 2017). Compliance and virtue approaches are not, however, mutually exclusive (Resnik

2012). Indeed, the ECoC requires both, as it formulates not only rules, but stipulates principles – reliability, honesty, respect and accountability – which also refer to virtues.

Virtues

Virtues, in an Aristotelian sense, are character traits or states that promote human function and excellence. Aristotle described virtue as 'the state of character which makes a man good and which makes him do his work well.' (Aristotle 1889). Virtues are, therefore, dispositions that influence a person to behave in a particular way. Aristotle further emphasised that, although they are innate, as human beings have general dispositions which are given with human nature, they must be cultivated through learning and practice.

As virtues are natural dispositions which are cultivated in practice, they vary historically and culturally, reflecting changing views on human 'excellence' and changing practices fostering virtues. What counts as a scientific virtue nowadays, is different from virtues of science endorsed in early modernity, as science has become a much larger enterprise, with new methods and material conditions and scientists are educated and trained differently to perform their practice well. MacIntyre, argued that these variations reflect differences, not in the underlying concept of virtue, but rather in the development of what is considered 'excellence' in terms of moral and social tradition (MacIntyre 1981b, MacIntyre 1981a). MacIntyre claimed that virtues are the essence of a practice, but also develop as the practice is cultivated; defining virtue as 'an acquired human quality the possession and the exercise of which tends to enable us to achieve those goods which are internal to practices and the lack of which effectively prevents us from achieving any such goods' (MacIntyre 1981b).

Such a conceptualisation of virtue lends itself to theoretical and empirical investigation of professional ethics. For, whilst it is difficult to define what makes a man 'good', it is easier to define what makes a professional 'good' in terms of the ends to which the profession is dedicated (Pellegrino 1989). This is precisely the approach taken in Pennock's notion of Scientific Virtues; Pennock, describing the ends to which science is dedicated as discovering empirical truths about the natural world, defines scientific virtues as the traits that make for an exemplary scientific researcher (Pennock and ORourke 2017). In an empirical study of the virtues endorsed by US scientists, Pennock (2017) describes the top ten traits to be: honesty; curiosity; attentiveness or observance; perseverance or patience; objectivity; humility to evidence; scepticism; meticulousness; courage; and collaboration.

1.1.2 Overall aim and objectives

VIRT^{2}UE aims to develop a sustainable blended learning programme, incorporating online and off-line approaches, enabling contextualised ERI teaching across Europe focusing on understanding and upholding the principles and practices of the ECoC.

In order to achieve this, VIRT^{2}UE will address the following objectives:

Objective 1: To conduct a conceptual mapping amongst stakeholders to identify and rank the virtues which are essential for good scientific practice and their relationship to the principles and practices of the ECoC (WP1)

Objective 2: To identify and consult ERI trainers and the wider scientific community to understand existing capacity and deficiencies in ERI educational resources (WP2)

Objective 3: To develop the face-to-face component of the train-the-trainer programme that provides trainers with tools to foster researchers' virtues and promote the ECoC and iteratively develop the programme, based on evaluations (WP3)

Objective 4: To produce educational materials for online learning by researchers and trainers (WP4)

Objective 5: To implement and disseminate the train-the-trainer programme across Europe, ensuring the training of sufficient trainers for each country and build capacity and consistency by focusing on underdeveloped regions and unifying fragmented efforts (WP5)

Objective 6: To develop the online training platform and user interface, which will be instrumental in evaluation of trainers' and researchers' needs and project sustainability (WP6).

VIRT^{2}UE's innovative blended learning programme will provide a toolbox of educational resources, based on an inventory of existing ERI educational resources and will incorporate an e-learning course (including a YouTube channel) **with face-to-face sessions**. ERI trainers and researchers will have open access to online teaching material. Moreover, ERI trainers will learn how to facilitate face-to-face sessions of researchers, which focus on learning how to apply the content of the teaching material to concrete situations in daily practice. ERI trainers will first take part in the same face-to-face and online sessions that they will later go on to teach; they will additionally be trained to facilitate face-to-face sessions and utilise the online resources in teaching and, as part of the course requirement, set up and teach a blended-learning ERI course for researchers, multiplying, within the course of the programme, its reach. This enables ERI trainers to first learn to reflect on dilemmas in their own practice as researchers and then facilitate reflection in others. In order to plan a didactically sound training programme for the trainers to be trained and, at the same time, providing a model for the trainers to implement in their own training, VIRT^{2}UE utilises three pedagogical principles, namely: learner-centredness; constructive alignment; and research- and evidence-based methods. The learner-centred approach prioritises the learners' needs, motivations and expectations; whereas the trainers' role is defined more in terms of supporting the participant's learning process. Such an approach necessitates adaptable teaching methods and learning activities so that each learner has the opportunity to participate and develop their knowledge and skills. This approach also allows for training programmes to be easily adapted to different contexts (e.g. country and discipline). Constructive alignment entails developing training and assessments, based on the intended learning outcomes (detailed below). The training programme is also based on prior research and evidence of what facilitates learning

processes involving ethics, integrity, value and virtue. These pedagogical principles are discussed in more detail in section 1.3.1.

In undertaking the innovative training programme, both **ERI trainers** and the **researchers** (junior and senior, from academia and industry) will:

- Have an in-depth knowledge of ERI issues, such as e.g. *data management, publication and authorship, conflicts of interest, peer review, research misconduct and unacceptable research practices.*
- Understand and internalise the ECoC.
- Understand that research integrity is a core element of research practice, as it includes careful application of sound methodological knowledge.
- Identify research integrity issues in casuistry and in their own work and name risk factors for issues like these to arise.
- Develop virtues, enabling the application of the acquired knowledge to concrete situations and complex moral dilemmas and the dispositions to act accordingly.
- Know how to act and/or with whom to talk about the research integrity issues they encounter.
- Know how to access a rich repository of online educational materials.

The VIRT^{2}UE consortium aims to primarily include ERI trainers that are experienced researchers themselves, as virtue-based ethics starts from personal experience. Furthermore, research integrity requires understanding of research methods and their application and ERI trainers who are also researchers and are, themselves, role models. ERI trainers will also be trained in additional skills and the use of materials specifically for trainers to enable them to effectively support other researchers in reflecting on dilemmas and to adapt the training programme according to the audience and setting.

We would consider our project a success if we can deliver 305 excellent VIRT^{2}UE trained ERI trainers who, in turn, train 3050 researchers (at least 10 per trainer as part of the course requirement), by the end of the project. By focusing on sustainability of the programme from the start, we expect the number of trainers to increase substantially after the project, thus building capacity. For example, in the two years following the project's end, we aim for a total of 610 trainers to be trained throughout Europe. In our vision, such a trainer should:

- Have an in-depth knowledge of ERI issues, including the diversity of the European context.
- Understand the ECoC, its connections to the pertaining national, institutional and disciplinary codes and how to incorporate it in the training of researchers.
- Possess educational skills needed to train researchers in ERI (e.g. in using the educational toolbox, in developing strategies to highlight the relevance of ERI and in iterative course development and evaluation).
- Apply a learner-centred approach in their teaching and utilise the ideas of constructive alignment (i.e. alignment of learning outcomes, content, methods and assessment of learning) in setting up their training.

- Master skills to conduct face-to-face sessions aimed at facilitating researchers to reflect on moral dilemmas and learn how to apply rules and guidelines in concrete situations.
- Develop their own style of training and reflect on ways in which they, as researchers who devote interest, time and effort to training other researchers, are themselves role models.
- Adapt learning materials for different contexts and audiences.
- Participate in mutual learning and support amongst a community of ERI trainers in an innovative online environment.
- Critically examine their own teaching practice and knowledge.
- Strive to keep up-to-date on content.
- Contribute to further development of training tools/materials and the repository of materials.

VIRT^{2}UE's programme, therefore, seeks to change behaviour at the level of the ERI trainer and the researcher. Additionally, the programme also seeks to affect the level of the institution. VIRT^{2}UE includes a dedicated embedding strategy that encourages the uptake of the VIRT^{2}UE training programme in the teaching curriculum or training in both academia and industry. This strategy will be developed through dialogue with academic and industry management by WP 2 and disseminated by WP 5. Section 2.2.1 and the WP descriptions give more details about the embedding strategy.

1.1.3 Key features and strengths

Implementing a large scale train-the-trainer programme has a number of challenges, including:

1. Ensuring the programme fits stakeholders' (primarily researchers') needs.
2. Developing a programme and resources that can develop researchers' virtues alongside an understanding of the ECoC.
3. Constructing training materials and resources that allow for contextual specification.
4. Reaching a large group of trainers who can target a substantial number of researchers with relatively few train-the-trainers staff.
5. Ensuring uptake of the train-the-trainer programme in a large number of academic and industrial organisations.
6. Keeping costs of programme development (online and offline) balanced.

In addressing these challenges, VIRT2UE has three key strengths (elaborated below): **Excellence and leadership in education; Reach; and Sustainability.**

Key strength 1: Excellence and leadership in education

VIRT2UE partners have extensive expertise in developing, delivering and evaluating ERI training programmes and materials for multiple stakeholders at local and national levels, including blended learning approaches. This key strength will result in the development of

a training programme of high quality and credibility, which will promote uptake. This will help achieve overall **objectives 3 and 4**.

The project builds on the consortium partners' considerable experience in education in ERI in Europe and beyond, combining online and face-to-face approaches, facilitating reflection on moral dilemmas and application of codes and rules in concrete situations and training of trainers. The exploitation and consolidation of existing resources will reduce current fragmentation and replication of efforts and brings together existing expertise.

Education in ethics and research integrity (online and off-line) in Europe and beyond

Many of the consortium partners have substantial expertise in developing, delivering and evaluating RI training programmes for multiple stakeholders at local and national levels:

- **Prof Guy Widdershoven and Prof Lex Bouter (VUmc)** developed an ERI course for PhD students at VU University Medical Center (Amsterdam) and VU University. This course features a blended learning approach: it contains an online component that must be completed in preparation for the one and a half day face-to-face session and a face-to-face training consisting of interactive lectures focusing on methodological research integrity issues, sub-group assignment, Moral Case Deliberation (MCD) sessions on dilemmas submitted by participants and panel discussions.
- **Prof Kris Dierickx (KUL)** developed and coordinated multiple ERI courses and workshops integrating research ethics and research integrity for students and PhD students at Leuven University. Workshops take a bottom-up approach whereby the participants submit a case for discussion with the group and are led by an expert in clinical or fundamental research, as well as an expert in ethics.
- **Dr Nicole Foeger (OeAWI)** is experienced in research integrity training (at national and international level). As Head of the Administrative Office of the Austrian Agency for Research Integrity, she developed the first national training programme on research integrity for the different target groups in Austria, including: undergraduates, PhD students, senior scientists, ombudspersons, administrative staff and managerial staff. So far, she has given more than 70 ERI courses in multiple countries (e.g. Estonia, Finland, Germany and Portugal).
- **Prof Dirk Lanzerath (UB) was instrumental in the development of** the 'Training and Resources in Research Ethics Evaluation' (TRREE) programme, a blended learning RI training initiative from a consortium of universities from the global north and south. TRREE includes international, trans-regional and national modules, developed with local collaborators and includes specific modules for different stakeholders.

- **Prof Ana Marusic (MEFST)** has been involved in the HEIRRI project, which develops Responsible Research and Innovation training programmes and teaching material tailored to Higher Education Institutions. HEIRRI makes publicly available training and education resources that can be easily adapted to the context in which they will be used. Prof Marusic also teaches an elective course on responsible research and innovation at the University of Split School of Medicine in Split, Croatia, as well as teaching publication integrity as a journal editor in courses worldwide.
- **Prof Bert Molewijk (UIO)** is senior ethicist, ethics trainer and scientific researcher at Centre for Medical Ethics (CME) at the Faculty of Medicine, University of Oslo. His specific expertise is on developing, implementing and evaluating various kinds of (clinical and research) ethics support such as Moral Case Deliberation.
- **Prof Costas Charitidis (NTUA)**, being the coordinator of the Advisory Ethics Committee (AEC) of NTUA, has drafted a short series of seminars on ERI that have been tested, for two years, at the School of Chemical Engineering and will be integrated, with the help of the AEC members of NTUA, into postgraduate courses of all Schools of NTUA.
- **Prof Erika Löfström (UH)** is involved in the ENERI project leading the design of research ethics and research integrity curricula and training programmes. She also organised the LERU Summer School (UH) "Doing the Right Things Right" on research ethics and integrity. She has provided the research ethics training for doctoral students in education and psychology, applying blended learning, including piloting a national online research ethics course. She has also been a member of the Doctoral Supervision and Research Ethics Education Working Groups of the Finnish Advisory Board for Research Integrity and is currently the Chair of the Steering Committee overseeing the development and execution of a training programme for research integrity officers at the Finnish Advisory Board for Research Integrity.
- **Prof Marco Cosentino (UNINS)** is responsible for teaching research integrity issues to PhD students and early stage researchers, as well as optional seminars for MD students about integrity and conflict of interest in biomedical research at the University of Insubria. In this context, he also developed, for the first time in Italy, an International School on Methodology, Ethics and Integrity in Biomedical Research (https://goo.gl/AnNpyF).
- **Prof Ana Sofia Carvalho (UCP)** is responsible, within the Portuguese National Science Foundation, for designing a preliminary policy for research integrity within the country. As a result, a number of courses on research integrity and research ethics have been provided in different Portuguese

Universities and Research Institutions. In addition, courses and conferences were organised in Brazilian institutions.

- **Dr Signe Mezinska (UL)** is involved as a faculty member in the Advanced Certificate Programme in Research Ethics in Central and Eastern Europe (CEE) supported by U.S. National Institutes of Health. The programme combines on-site and on-line learning approaches to provide a knowledge base and a skill set in research ethics and integrity and prepare professionals to facilitate institutional change with regard to ethical practices in biomedical research. In this programme, over 60 professionals have been trained in CEE countries.

Experience in teaching research methodology

In addition, a number of partners have skills with respect to teaching research methodology. Involvement of experts in methods education strengthens VIRT2UE's recognition that ethics and research integrity need to be embedded in the application of sound research methods. **Prof Lex Bouter** has expertise in integrating research integrity and research methods education. As Professor in Methodology and Research Integrity, he has 30 years of experience in teaching research methodology; he has taught over 70 intensive PhD and postdoc courses on the application of sound research methods in applied health research and authored a textbook on epidemiology that is in its seventh Dutch print and for which an English version will appear in 2018. **Prof Ana Marusic** also teaches courses on research methodology and scientific communication, both at the graduate and postgraduate level. She has been organising the Summer School of Scientific Communication for Multidisciplinary Audiences since 2006 (http://sssc. ffzg.unizg.hr/2017/). **Prof Erika Löfström** has taught numerous courses on qualitative research methods and developed visual research methods in educational research (cf., for example, Lofstrom et al. (2015))

Being active teachers in ERI and having developed programmes for teaching ERI, the partners in the consortium have experience in education methods. Moreover, they have been involved in education research. **Prof Guy Widdershoven** has experience in programme evaluation, using interactive research methods, involving participants in assessing and improving ethics teaching. **Prof Erika Löfström** has a background in educational sciences (MA and PhD and Docent in University Pedagogy) and trains academics in university teaching. She is also the lead author of *Quality Teaching in Web-based Environments – Handbook for University Teachers (Lofstrom 2010)*.

Facilitating reflection on moral dilemmas and application of codes and rules in concrete situations - Moral Case Deliberation as an example.

Moral Case Deliberation is a method to foster reflection on and dialogue about moral issues that emerge from practice. It was developed and is widely used in the Netherlands, but is also increasingly prominent elsewhere in Europe. **Prof Guy Widdershoven**, the project PI, has led a programme of clinical ethics support that focuses on moral reflection

in the context of clinical dilemmas for over 20 years. This approach focuses on learning how to apply codes and rules in concrete situations.

Moral Case Deliberation (MCD) involves (face to face) group meetings concerning real life dilemmas. MCD focuses on reflection and communication of participants, fostering the development of virtues, along with knowledge about codes and rules. MCD is a group reflection on a dilemma experienced in practice. It follows a structured method, guided by a trained facilitator.

During the session, the facilitator (an ethicist or a trained professional) does not provide answers, like a classic teacher, but fosters an exploration of what is morally at stake for those involved in the situation (in terms of moral principles, values and norms). The goal of an MCD is to find a way to deal with a specific moral dilemma in practice and to foster integration of codes and rules in professional life by stimulating reflection on their application in concrete situations and on the personal emotions and dispositions involved (De Snoo 2017). This entails developing moral awareness and moral reflection and cultivating moral character amongst participants: a disposition that consistently leads to 'excellence' in dealing with the difficult moral issues that one experiences.

MCD is extensively used in a clinical ethics support context, i.e. for deliberation on moral dilemmas in healthcare practice. It is also applied as part of a blended learning programme on research integrity for PhD students at the VU University Medical Center in Amsterdam. During the MCD meetings in this course, PhD students are encouraged to share situations that they have experienced as morally troublesome (in a research context), to focus on their moral intuitions, experiences, doubts and emotions and share these with colleagues. This leads to a joint process of reflection, which stimulates students to become aware of their own moral values and dispositions and to deliberate on what is good in a specific situation, thus contributing to the development of virtues needed to deal with moral issues. MCD focuses on personal understanding of moral problems and this cultivates virtues in an Aristotelian sense, as the basic precondition of being a good professional.

Qualitative and mixed methods studies have shown that MCD is effective in fostering awareness of moral issues in practice, reflection on moral dilemmas and improving understanding and cooperation between professionals (Janssens 2015, Seekles et al. 2016, Weidema et al. 2013, Abma et al. 2010, Abma et al. 2009). Improved quality of work is also reported (Lillemoen and Pedersen 2015, Molewijk et al. 2008). A specific assessment tool for measuring outcomes has been developed and applied in various European countries (Svantesson et al. 2014). Preliminary results of the field study with this tool show that participants of MCD developed moral reflectivity skills and competencies and were better able to cooperate with their colleagues (De Snoo 2017).

Training the trainers

The partners are experienced in training trainers. An important element in **Prof Widdershoven's** MCD approach is the train-the-trainer principle. As MCD should not be a one-time exercise, but should be part of team processes, regular meetings are needed,

ideally every 4-8 weeks; this requires availability of trained facilitators. Therefore, a training programme for MCD facilitators has been developed at VU Medical Center (Stolper et al. 2014). Professionals who have participated in a number of MCD meetings (minimum three) can train to become a facilitator. In this programme, over 800 facilitators have been trained in the Netherlands and elsewhere in Europe. The programme is based on learning-by-doing and also encompasses video-exercises. The programme specifically enables facilitators to develop their own personal style, since fostering dialogue in a group requires the ability to tune in with group processes and intervene though asking questions which stimulate reflection and exchange in a natural way. **Prof Kris Dierickx** also co-ordinates a workshop for all PhD researchers in biomedical sciences and personally trains the trainers facilitating this workshop. The workshop takes a bottom-up approach, whereby the participants submit a case for discussion with a group, including: two professors, an expert in clinical or fundamental research and an expert in ethics. **Prof Löfström** has substantial experience in training university teachers/academics in teaching methods. She has also trained this group in using role-play as a teaching method for research integrity (Lofstrom et al. 2015, Shephard et al. 2015, Lofstrom 2016).
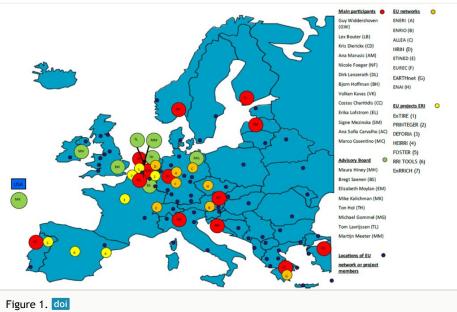
Key strength 2: Reach

In order to reach a large group of trainers who can target a substantial number of researchers with relatively few train-the-trainers staff, the VIRT2UE consortium will build upon and expand the existing networks of its consortium partners. The VIRT2UE project, through its unique access into the ERI and wider research community across Europe, is uniquely placed to identify stakeholder needs, to develop a programme which fits these needs and to train European ERI trainers. This will enable the consortium to achieve **objectives 1**, **2 and 5.**

VIRT2UE's consortium participants approach ERI from **a variety of research domains**: Ethics (Prof Widdershoven, Prof Kris Dierickx, Prof Dirk Lanzerath, Dr Bert Molewijk, Dr Mustafa Volkan Kavas and Prof Carvalho); Epidemiology (Prof Bouter); Medicine (Prof Marusic); Biochemistry (Dr Nicole Foeger); Biotechnology (Prof Carvalho); Engineering (Prof Charitidis); Sociology (Dr Mezinska); Pharmacology (Prof Cosentino); and Education (Dr Löfström). The broad representation of disciplines amongst VIRT2UE's participants will also ensure that a range of disciplinary perspectives is taken into account during the training programme's development with regard to content and its adaptability.

VIRT2UE's consortium also reflects the geographical subregions of Europe (Fig. 1): Western Europe (The Netherlands, Belgium, Germany and Austria), Eastern Europe (Croatia and Latvia), Northern Europe (Norway and Finland) and Southern Europe (Portugal, Italy, Greece and Turkey). They also represent a diversity of European political, social and cultural contexts, including: founding EU members (The Netherlands, Germany, Italy and Belgium), old EU members (Greece and Portugal), new EU member and former communist countries (Croatia and Latvia) and associate countries (Norway and Turkey). Furthermore, taking into consideration different studies on cultural values (WVS 2017, Hofstede et al. 2005, EVS 2017, Lewis 1996), the countries of the consortium are quite representative of diverse European values. The countries represented also differ with

regard to research and innovation activities, representing a continuum from Innovation Leaders (The Netherlands, Germany, Norway and Finland), Strong Innovators (Austria and Belgium) and Moderate innovators (Spain, Portugal, Italy, Latvia and Greece) (http://ec.europa.eu/growth/industry/innovation/facts-figures/scoreboards_en).

Figure 1. doi

Academic partners, advisory board and their associated networks. As shown, the networks that VIRT²UE PI's are involved in, together cover all European countries.

The geographical spread and relationships with established networks put the VIRT2UE consortium in a perfect position to engage and reach ERI trainers and researchers throughout Europe. Prof Lanzerath is the coordinator of the European Ethics and Research Integrity Network (**ENERI**) and the Secretary General of (**EUREC**), Prof Bouter was co-chair of the 5th **World Conference on Research Integrity** that was held in Amsterdam in 2017 and is the Chairman of the **World Conferences on Research Integrity Foundation**, Dr Foeger is a committee member of the Pan-European Platform on Ethics, Transparency and Integrity in Education (**ETINED**) and Chair of the European Network of Research Integrity Offices (**ENRIO**), Prof Marco Cosentino is delegate for the University of Insubria to the European Network for Academic Integrity (**ENAI**, http://www.acade micintegrity.eu/) and Prof Costas Charitidis is the coordinator of the Ethical Aspects in Research and Technology for Human network (**EARTHnet**). The consortium members also participate in a number of other European projects focused on research ethics and integrity, such as **_PRINTEGER, ENERI, EnTIRE, HEIRRI and ENAI_**. The relationship between these EU projects and VIRT2UE is elaborated in section 1.2.2.

The Scientific Advisory Board members are also representatives of a number of important networks for dissemination of VIRT2UE's training programme: Dr Maura Hiney is Chair of ALL European Academies (**ALLEA**) task group on research integrity, was Chair of the

drafting group that revised the ECoC and was Chair of the **Science Europe** Working Group on research integrity; Dr Bregt Saenen is Policy and Project Officer for the Council for Doctoral Education, part of the **European University Association**; Dr Elizabeth Moylan is Council Member for Committee on Publication Ethics (**COPE**); Dr Michael Gommel is a founding member of Team Scientific Integrity (http://www.scientificintegrity.de/en-index.html), which trains trainers and researchers in good research practices across Germany, Luxembourg, Switzerland and France; Dr Ton Hol is Chair of the League of European Research Universities (**LERU**) standing committee on RI and RCR. Figure 1 represents these various academic partners, advisory board members and their associated networks visually, giving an idea of the consortium's ability to reach trainers and researchers across Europe.

The involvement in the Scientific Advisory Board of Dr Michael Kalichman, Director of the UC San Diego Research Ethics Programme, enables **VIRT2UE to extend its influence to the United States and beyond**. Dr Kalichman is Director of the **San Diego Research Ethics Consortium** (http://sdrec.ucsd.edu), a multi-institution core resource to support the ethical conduct of science. He has taught train-the-trainer ERI workshops throughout the U.S., Central America, Africa and Asia and has had lead roles in a collaboration between the **American Association for the Advancement of Science** and the **China Association of Science and Technology** (CAST) and co-chaired the working group for RCR education at the 2010 Singapore meeting of the World Conference on Research Integrity.

In addition to the broad geographical and research domain representation amongst the academic partners, VIRT2UE also has close associations with industry that support the programme's application outside of academia. For example, Tom Lavrijssen, Associate Director Quality Assurance, **Janssen R&D**, is an Advisory Board member.

Context-specific considerations

The ECoC formulates principles which are related to virtues; these will be central to the development of VIRT2UE's training programme. To develop a virtue-based training programme, however, it is necessary to further develop the evidence base regarding which additional virtues should be stimulated and developed and to understand contextual differences in their perceived importance. **VIRT2UE, therefore, includes a 'mapping exercise' in which stakeholders identify and rank the virtues relevant for their research practice**. The results can be compared with a similar empirical study of the virtues prioritised by scientists in the United States (Pennock 2017). This exercise may also draw attention to differences in the importance and practical application of values and principles between different disciplines or sub-disciplines of science or between different regions of the EU, a better understanding of which will allow for more contextualised approaches.

One of the largest challenges in the development of such a training programme is dealing with the sensitivity of context: it needs to recognise that good research practice is supported and regulated in very different ways, depending on scientific discipline and country and to allow for adaptations that take into account national laws, cultural

differences, disciplinary considerations and the level of understanding of the target audience. The programme will, therefore, allow for the inclusion of existing local codes, procedures etc.; this is particularly important for some countries, like Germany, where universities have the legal obligation to formulate their codes, based on federal legislation. This ensures that the proposed the training programme closely **reflects the priorities and preferences of the European research community within its own unique legal and social context**.

The VIRT2UE project, therefore, incorporates context-sensitivity by making training resources highly adaptable, whilst being consistent with regard to general principles.

Key strength 3: Sustainability

It is crucial that such a training programme is sustainable and not just a 'one-off'. **VIRT^{2}UE approaches sustainability in terms of financing, content and commitment.** The model for financial sustainability includes making all the online material open source and open access, while charging – after the end of the project - for face-to-face training sessions (for researchers) and train-the-trainer sessions (for trainers). This combination of an open and closed approach will encourage the widespread use of the online materials on the one hand and training researchers on how to apply these materials in practice, as well as training trainers on how to facilitate the training for researchers, on the other hand. To avoid fragmentation, VIRT^{2}UE's online component will be delivered through the EC-funded platform currently being developed in the EnTIRE project (http://cordis.europa.eu/project/rcn/210253_en.html). The platform's Wikipedia approach and associated community of users will support future update of the training programme's content after the project's end. The experience of partners in VIRT^{2}UE with dissemination of training and teaching materials will provide a basis for sustainability and the commitment of the VIRT^{2}UE partners and their associated networks will contribute to the training programme's continued success. This will particularly support VIRT^{2}UE's overall **objectives 3, 4 and 5.** VIRT^{2}UE will be sustainable in terms of financing, content and commitment.

Financial sustainability

The VIRT^{2}UE training programme incorporates on- and off-line learning. To be financially sustainable, the online component will need some small hosting costs, whereas the off-line training sessions will require more substantial financial input. The model for financial sustainability for the programme includes charging for face-to-face trainer training after the project's end, but making all of the online material open source and open access. This combination of closed and open approaches will encourage the widespread use of the online materials, which will, in turn, foster the interest in the off-line training sessions (section 2.2).

Content

VIRT^{2}UE's online component will be delivered through the online platform of the EC-funded EnTIRE project (coordinated by VUmc (Prof Widdershoven), with a consortium that

includes VU, KUL, MEFTS, UB and UIO). The EnTIRE project aims to create a platform that makes the normative framework governing research ethics and research integrity (including rules, as well as tools) easily accessible, supports application in research and evaluation and involves all stakeholders in a participatory way, thus achieving sustainability. EnTIRE will develop a Wiki-platform and online resources (including teaching resources and tools). This platform is in development and should be live in December 2017. The EnTIRE project also invests considerably in developing a community in Europe which will both use the online platform for information and exchange and add to the information on the platform.

In order to prevent replication of efforts and resources, VIRT^{2}UE proposes to develop an ' **Ethics and Research Integrity Academy**', a blended learning programme, the online component of which will be made available through the EnTIRE platform, which will also be linked to SINAPSE (the free communication platform of the European Commission). In the Ethics and Research Integrity Academy, offline workshops will be offered for face-to-face training of trainers, while content will be made openly available online (Fig. 2, in blue). In addition, a platform for Questions and Answers (Q&A) will be developed in order to interact with the wider scientific community (Fig. 2, in green). Content generated in the Q&A forum can be used to specify and tailor the on-line and off-line training to the needs of the community. A YouTube Channel, managed by an expert communicator, will also be developed (Fig. 2, in red). The use of video content aims particularly at engaging younger generations and provides a social presence (Swan and Shih 2005), which is often lacking in conventional e-learning courses. VIRT^{2}UE also includes, as a participant, the online design company **Momkai**. Momkai is expert at creating usable and attractive online environments and building communities of users and are the co-founders of the award winning online journalism platform 'De Correspondent'. De Correspondent is an entirely ad-free Dutch online journalism platform which was created in 2013 by Momkai in collaboration with journalists. It is funded by its community of members and includes articles, videos and podcasts that have been translated and viewed worldwide, in some cases reaching millions of people. Momkai has, in De Correspondent, demonstrated its ability to create a sustainable organisation, both in terms of finances and a community of contributors. Momkai received the international Red Dot Design Award for the design of De Correspondent. Momkai's involvement in VIRT^{2}UE will ensure that the ERI Academy has a high online visibility, unique identity and focus on ERI content to make an impact and achieve a sustainable platform in the long term.

EnTIRE's online platform and community engagement, made possible by EU funding, will enable VIRT^{2}UE to:

- Benefit from the platform's community of users.
- Keep software development costs low.
- Allow more budget to be spent on innovative training methods, such as the YouTube channel.
- Avoid replication of efforts in community and platform building.
- Avoid fragmentation of stakeholders' attention by delivering the training under the same brand.
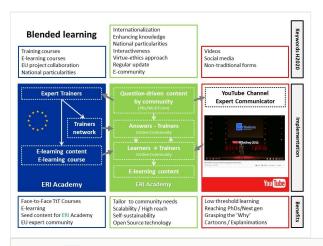
Figure 2. doi

Overview of the proposed Open platform for Blended learning. [Screenshot inset of Science Communicator, Derek Muller, of Veritasium Science Blog from the TED Talent Search YouTube channel].

Commitment

ERI trainers (including the consortium participants) and researchers will be actively involved in the iterative development of the train-the-trainer programme and the teaching materials, thus fostering the adaptation to user needs, user uptake and continued use and development of the materials after the project's end. Finally, the commitment of VIRT²UE's partners and their associated networks to ERI training in Europe will contribute to the training programme's continued, long-term success.

Elements conducive to the project's sustainability, therefore, are present from the very design of the project; this will help overall **objective 6** - to develop the online training platform and user interface, which will be instrumental in evaluation of trainers' and researchers' needs and project sustainability.

1.2 Relation to the work programme

1.2.1 Relation to the general objectives of Horizon 2020 and to the Work Programme 2016-2017

Responsible Research and Innovation (RRI) and pairing scientific excellence with social awareness and responsibility: Responsible Research and Innovation (RRI) is an issue that cuts across H2020 work programmes, particularly the Science with and for Society (SwafS) programme. VIRT²UE's aim to train trainers across Europe to pursue a high standard in ERI using innovative blended-learning techniques tailored to specific contexts directly supports the promotion of RRI and the aim of the SwafS programme to pair scientific excellence with social awareness and responsibility.

Inclusive, anticipatory governance for research and innovation: Inclusive, anticipatory governance for research and innovation is a major theme of the SwafS programme. Anticipatory governance is 'a broad-based capacity extended through society that can act on a variety of inputs to manage emerging knowledge-based technologies while such management is still possible' (Guston 2014). Anticipatory governance of research generated knowledge requires strengthening the power of the 'moral community' within academia to sustain the moral integrity of researchers and to support self-regulation. VIRT^{2}UE aims to foster such moral integrity.

Table 2.

VIRT^{2}UE's objectives and approach in relationship to scope of the topic.

Scope of SwafS-27	VIRT^{2}UE objectives and strategic approach
Develop **innovative methods** to train-the-trainers on ethics and research integrity	VIRT^{2}UE proposes innovative content (virtue based learning) and delivery (blended- learning). Virtue based learning combines knowledge and its application. One particularly important approach employed is Moral Case Deliberation (MCD, see Section 1.1.3). MCD focuses on reflection and communication of participants, fostering the development of virtues, along with knowledge about codes and rules. The training programme will be delivered using a blended learning approach: combining online and face-to-face teaching. Online teaching will consist of an e-learning course, the creation of a networked community which is based on questions and answers (Q&A) that will provide a forum for mutual learning and support, a YouTube channel and developing a toolbox of approaches on the EnTIRE platform. **WP3** is responsible for the development of the training programme, **WP4** is responsible for the development of the materials and **WP6** is responsible for the development of the online component.
Methods should be based on **consultation and the direct involvement of all relevant stakeholders** representing both public and private structures.	VIRT^{2}UE will base the development of the training programme on stakeholder consultation. Stakeholder involvement is reflected in **objectives 1 and 2**: conduct a conceptual mapping amongst stakeholders to identify and rank the virtues which are essential for good scientific practice and their relation to the principles and practices of the ECoC (**WP1**); and identify and consult ERI trainers and the wider scientific community to understand existing capacity and deficiencies in ERI educational resources (**WP2**). Stakeholders will be recruited from both academia (facilitated by the participants associated networks such as ENERI, ENRIO, EUREC, ETINED and EARTHnet and EU projects PRINTEGER, EnTIRE and HEIRRI) and research intensive industries (facilitated by an advisory board member from Janssen R&D). Stakeholders will represent different scientific disciplines and different cultures/countries, to provide input for the contextualisation of the training programme.

Scope of SwafS-27	VIRT²UE objectives and strategic approach
Promote the **consistent application of the principles listed in the "European Code of Conduct for Research Integrity (ECoC)"** developed by the European Science Foundation (ESF) and All European Academies (ALLEA)	Fostering the consistent application of the principles and practices listed in the ECoC is, in fact, the core aim of VIRT²UE's approach. VIRT²UE maintains that researchers not only need to have knowledge of rules and codes, but also to be able to **truly uphold and internalise the principles and practices underpinning in the code**. They need to learn how to integrate them in their everyday practice and understand how to act in concrete situations. The four principles of the ECoC (reliability, honesty, respect and accountability) refer to virtues and are, therefore, ideally trained through VIRT²UE's 'virtue ethics' approach, for example, the method of MCD (see Section 1.1.3). Through VIRT²UE's training methods, trainers will understand the ECoC, its connections to the pertaining national, institutional and disciplinary codes and how to incorporate it in training. VIRT²UE will help researchers to understand and fully internalise the ECoC and enable them to apply its principles in everyday research practice.
Aim to enhance the training skills and improve existing methods **at the level of training the trainers**:	A train-the-trainers programme will be developed, making use of experiences in training facilitators of MCD, amongst others. A training programme for facilitators of MCD has been developed at VU Medical Center. In this programme, over 800 facilitators have been trained in The Netherlands and elsewhere in Europe. The programme is based on **learning-by-doing**, it is situated in context and is experiential in nature. Reflection on what is learned in light of own experiences helps to deepen participants' understanding of their own and others' actions. The reflective practice will support participants in establishing the ECoC principles (reliability, honesty, respect and accountability) in their research activities. Using this 'learning by doing' approach, trainers will be trained using the same programme that they will later disseminate to researchers. This combines an online repository of educational materials and face-to-face meetings. They will also be **trained in additional skills** relevant for training in face-to-face sessions (e.g. planning skills, approaches for face-to-face teaching and learning, motivation, conflict management and facilitating reflection on moral dilemmas). Trainers will also be provided with tools, including hand-outs, observation forms, instruction videos, implementation support plans and materials specifically for trainers to enable them to effectively support researchers in developing competencies and to adapt the training programme according to the audience and setting. Trainers will also have access to an innovative online environment that will make it easy to adapt learning materials for different contexts and audiences and which encourages mutual learning. In addition, they will be encouraged to contribute to the further development of training tools/materials and the repository of materials. **WP3** is responsible for the development of the face-to-face train-the-trainer programme, **WP4** is responsible for the development of the online materials, **WP5** is responsible for the training programme organisation and dissemination and **WP6** is responsible for the development of the online platform and user interface.

Scope of SwafS-27	VIRT^{2}UE objectives and strategic approach
Enhance the knowledge of the trainer with regard to ethics and research integrity issues. This will ensure the consistent application of EU research ethics and integrity standards, while allowing for national particularities (national laws, cultural differences) to be taken into account	VIRT^{2}UE's training programme (combining face-to-face training, developed by **WP3** and online educational materials, developed by **WP4**) will include content to enable trainers to: • Develop and expand their knowledge of ERI issues, including an in-depth understanding of the diversity of the European context and skills needed to train researchers in ERI. • Understand the ECoC, its connections to the pertaining national, institutional and disciplinary codes and how to incorporate it in training. The diversity of the EU context and the connections between the ECoC and other codes will be influenced by the reviews and consultations in **WP 1 and 2.**
Allowing trainers to develop their training and interpersonal skills, such as their skill to understand the audience's needs and tailor the training accordingly, their ability to make lecture-based programmes more interactive and their ability to improve/enhance existing training methods. The use of innovative methods will foster the ethics and research integrity culture of the trainees and, therefore, will encourage them to ***depart from an approach of mere compliance with legal frameworks to a "virtue ethics approach" i.e. to embed ethics and integrity within the research design.***	In the VIRT^{2}UE programme, trainers will specifically learn to: • Master skills to conduct face-to-face sessions aimed at developing researchers' virtues. The face-to-face training (developed by **WP3**) uses a dialogical approach to foster reflection on moral dilemmas and cultivate moral virtues and specifically enables ERI trainers to develop their own personal style. Fostering dialogue in a group requires the ability to tune in with group processes and intervene through asking questions which stimulate reflection and exchange in a natural way. • Apply a learner-centred approach in their teaching and utilising the ideas of constructive alignment (i.e. alignment of learning outcomes, content, methods and assessment of learning) in setting up their training. • Develop their own style of training and reflect on ways in which they are themselves role models.
Aim to enhance the training skills and improve existing methods at the level of training researchers	Currently, ERI training is rather fragmented, often occurring at institutional level through courses developed locally and within specific disciplines. Most training focuses on knowledge of codes and rules only, while training to apply knowledge in concrete situations is also needed to help researchers conduct their work with the highest levels of integrity following the principles and practices of the ECoC. A unified method in the form of blended learning with online and off-line approaches (including MCD methodology) will be provided by VIRT^{2}UE. VIRT^{2}UE employs an iterative methodology: combining development and evaluation. It adheres to the principle of evidence-based teaching: the training programme will be based on existing evidence and be developed iteratively using evaluation data. The platform will provide up-to-date information on experiences in use and ensure active involvement of users (both researchers and trainers) in the development of the programme.

Scope of SwafS-27	VIRT²UE objectives and strategic approach
The creation and regular update of ready to use learning/training material, such as slides, e-learning courses, videos and using the social media as a training resource.	Core **objective 4** of VIRT²UE is to produce educational materials for online learning by researchers and trainers. This is the responsibility of **WP4**. Delivering the materials through EnTIRE's wiki-platform (linked to SINAPSE) will enable the ERI community to adapt and update materials. Core **objective 6** is to develop the online training platform and user interface, which will be instrumental in evaluation of trainers' and researchers' needs and project sustainability. This will be the responsibility of **WP6**, the online component, evaluation and sustainability. Based on the evaluation results, training material will be either modified or updated. Online teaching will consist of a combination of an e-learning course, the creation of a networked community which is based on questions and answers (Q&A), a YouTube channel and the extending of the EnTIRE project with educational tools.
Enhancing the impact of the training by the use of non-traditional forms (art, theatre) should be explored.	**WP4** will update and adapt existing training materials, assembled in WP2 and make them available for on-line use. These will include both classical materials (e.g. presentation slides) and innovative materials and approaches (e.g. card games, role plays/theatre, videos/film scenes and fictional movies and art). The materials will be used to create a series of YouTube movies and a MOOC, which will be made available online in **WP6**.
The ***creation and update of training material***, which can be ***adapted for the needs of the targeted audiences***.	VIRT²UE recognises that good research practice is supported and regulated differently, depending on the discipline and country. The programme and the materials in VIRT²UE will, therefore, allow for adaptations that take into account national laws, cultural differences, disciplinary considerations and the level of understanding of the target audience. The conceptual mapping exercise (**WP1**) will help map these different priorities and preferences across European countries. The programme will thus integrate context-sensitivity into its training materials, whilst paying consistent attention to general principles. Using the EC-funded **EnTIRE wiki-platform**, linked to the EC communication tool **SINAPSE**, training materials will be continuously updated and adapted by the ERI community.

Scope of SwafS-27	VIRT^{2}UE objectives and strategic approach
Enhancing the researchers' understanding of the private and socio-economic benefits of the conduct of research according to the highest ethical and research integrity standards and of the negative impact of research misconduct on society, research institutions/research performers and on the researcher (e.g. in the form of "reputational damage").	The call's stipulation that researchers understand 'the private and socio-economic benefits of good research conduct' follows from the findings of the EC-funded DEFORM project which estimated the costs of research misconduct and the socio-economic benefit of research integrity. The findings from this project will be integrated into **teaching materials** for the **training programme**. As well as understanding the potential socio-economic and private benefits of good conduct, including the lack of confidence of society in the research sector and the costs of research malpractice in terms of lost training, confidence and finances, the VIRT^{2}UE programme also recognises that research misbehaviour sometimes occurs for private gain and that a virtue approach can help researchers to deal with these conflicts of interest.
Create an e-community/database (using the EU Commission tool SINAPSE hosted on the EU data centre), where all the training material/tools will be available.	VIRT^{2}UE will create a network of trainers, using internet and face-to-face interactions. Trainers and researchers will be actively involved in the iterative development of the train-the-trainer programme and teaching materials, thus fostering the adaptation to user needs and user uptake. All training materials will be freely accessible through the EnTIRE platform (which will be linked to SINAPSE) and will continuously be adapted and updated by the network.
Develop and submit plans that will ensure the ***long term viability (including financial sustainability) of the "train the trainers" activities*** and the update of the relevant training material/tools and the management of the e-community/database.	VIRT^{2}UE plans for long-term viability are designed to assure financial sustainability, content sustainability and sustainability of commitment. The development of the sustainability plan is the responsibility of **WP6** (section 2.2). To support sustainability of the programme's content, VIRT^{2}UE will have a close relationship with the EnTIRE project. Close collaboration with EnTIRE keeps software development costs low, allowing more money to be spent on innovative training methods, avoids replication of efforts in community and platform building and avoids fragmentation. The sustainability of the online content is supported by its open access nature, enabling regular updates by ERI community members and consortium partners on EnTIRE's wiki-platform. The offline training will be offered for free during the course of the project, but against payment after the project's end, to ensure financial sustainability

Scope of SwafS-27	VIRT^{2}UE objectives and strategic approach
Aim at the ***training of a sufficient number of trainers in each Member State*** depending on the particular needs in each Member State.	Core **objective 5** of VIRT^{2}UE is to implement and disseminate the train-the-trainer programme across Europe, ensuring the training of 305 ERI trainers by the project's end and build capacity and consistency by focusing on underdeveloped regions and unifying fragmented efforts. **WP5**, the training programme organisation and dissemination, is responsible for this objective. WP5 involves training (at least) 305 ERI trainers (1 per 10,000 researchers in each EU country, Switzerland, Norway and Turkey – See Table 4). These 305 VIRT^{2}UE trained ERI trainers, while passing through the programme, in turn each train at least 10 researchers as part of the course requirement – reaching 3050 European researchers by the end of the project. WP 5 also establishes a capacity building road map for countries with less developed training opportunities. For those areas, a strategy for capacity building will be developed. This includes the identification of persons with capacities to become an ERI teacher in the future and the possible organizsation of additional training sessions in those countries. Furthermore, using a 'learning by doing' approach, trainers will be trained using the same programme that they will later disseminate to researchers who can become future trainers. This approach makes VIRT^{2}UE highly cost-effective, reaching a large group of trainers who can target a substantial number of researchers with relatively few train-the-trainers staff.
In order to ***avoid duplication of work already undertaken and to allow for synergies amongst the relevant EU funded research projects*** (from FP7 and Horizon 2020), it is essential to ensure that the participants will cooperate and make use of all the publicly available results from the related funded projects	VIRT^{2}UE will closely collaborate and cooperate with the following related EU funded projects: EnTIRE; PRINTEGER; DEFORM; and ENERI. The relationship between VIRT^{2}UE and these other projects is outlined in detail in section 1.3.2. Other relevant EU projects, which mainly produce potentially usable educational materials and tools as outputs, include HEIRRI, (Higher Education Institutions & Responsible Research and Innovation), The FOSTER portal (Fostering the practical implementation of Open Science in Horizon 2020 and beyond), RRI TOOLS and EnRRICH (Enhancing Responsible Research and Innovation through Curricula in Higher Education).

Open science, open innovation and accessibility and use of research results: VIRT^{2}UE takes a bottom-up participatory approach, as well as being open to multiple sectors and research domains. All resources within this project will be made publicly available for everybody to use, in line with both the Open Educational Resources (OER) and the open science movement.

Formal and informal science education and spreading good practices: Science education (formal and informal) is one of eight specific activity lines of the SwafS programme, whereas implementing institutional change through spreading good practices is one of the main objectives. VIRT^{2}UE, in its very essence, promotes excellence in scientific practice and, with its focus on virtues, in the scientist.

1.2.2 Relation to the specific topic: SwafS -27-2017

The SwafS call 'Implementing a European Train-the-trainers initiative with regard to Ethics and Research Integrity' aims for the development of 'innovative methods to train-the-trainers on ethics and research integrity', which will 'promote the consistent application of the principles listed in the "European Code of Conduct for Research Integrity"'.

The VIRT²UE consortium underscores the EC's view that researchers not only need to have knowledge of rules and codes, but also to be able to truly uphold and internalise the principles and practices explicated in the code. They need to learn how to integrate these principles in their **everyday practice** and to understand how to act in concrete situations. VIRT²UE aims to take on this challenge by offering the **stakeholder-based** development of a European-wide, innovative, blended learning programme in which researchers in both academia and industry reflect on dilemmas which may arise in applying the ECoC principles in practice. While providing **standardisation** in training ERI trainers, as well as researchers, the programme specifically allows for **contextualisation** related to scientific discipline, setting (academic versus non-academic) and country. Table 2 details VIRT²UE's objectives and approach in relationship to the scope of the topic.

1.3 Concept and methodology, quality of the coordination and support measures and approach

1.3.1 Overall concept

In order for blended approaches to work, it must be clearly outlined what purposes the different components of the programme will serve. In order to plan a didactically sound training programme for the trainers to be trained and, at the same time, providing a model for the trainers to implement in their own training, VIRT²UE utilises three pedagogical principles, namely:

- learner-centredness to encourage deep learning.
- constructive alignment and
- research- and evidence-based methods.

The learner-centred approach to teaching puts the learners' needs, motivation and expectations at the fore. Rather than imparting knowledge, the trainers are orientated towards supporting the participants' learning process. This implies a shift also in the teacher role, who becomes a facilitator of learning rather than a transmitter of knowledge. Shifting focus from what the teacher does to how the learner is engaged in the learning process bears qualitative implications for the nature of the learning. By acknowledging the learners' motivation and facilitating an active knowledge-building process, a deep approach (compared to a surface approach) to learning is supported. Learners applying a deep approach are geared towards understanding meaning, whereas learners geared towards a surface approach merely absorb content without an intention to truly understand, but rather to recite (Entwistle and Ramsden 2015, Marton and Slj 1976, Marton and Säljö 2005).

In order to facilitate a learner-centred approach and deep learning, a training course should be designed to take into account certain basics of didactical planning. The planning starts from setting up the **intended learning outcomes**, which, in this case, relate to understanding the ECoC code and developing virtue. The **content** will, in our case, be related to the ECoC code and strategies for developing virtue in oneself and creating research environments supportive of good research practices. As learners come equipped with different backgrounds, motives and prior knowledge of the topic, they will also respond differently to the teaching and, therefore, **teaching methods and learning activities must be adaptable in such a way that each learner has the opportunity to respond and benefit**. In VIRT^{2}UE, the choice of participatory methods (e.g. MCD, role play) will help to create learning opportunities for all participants. In order to determine how well the intended learning outcomes are met, different forms of **summative and formative assessment** are applied. In the case of VIRT^{2}UE, the focus on adopting and internalising virtuous values and types of behaviour is a challenge. It is much easier to assess purely knowledge-related learning. Therefore, reflective exercises will be used as a form of formative assessment that support the learning process rather than testing gained knowledge summatively after the course. The **constructive alignment** (cf., for example, Biggs and Tang 1999) of intended learning outcomes, content, methods and assessment provides the basic didactical structure of the course, as well as a tool for the trainers to be trained. This didactical model is particularly suitable for taking into account the complex nature of learning in academic contexts. Finally, the didactical planning and the methods used in the training course are based on prior research and evidence of what facilitates learning processes involving ethics, integrity, value and virtue.

The VIRT^{2}UE programme developed in line with the above didactical principles also has three main features:

1.   Virtue-based learning (combining knowledge and application).
2.   Blended learning (combining online and face-to-face teaching) and
3.   Iterative methodology (combining development and evaluation).

These are described below.

1. Virtue-based learning: Combining knowledge and application

In the *Nicomachean Ethics*, Aristotle already observed that moral understanding is different from theoretical knowledge, which aims at general knowledge and which is not related to a specific context. In the case of moral understanding, someone has to know what is the right thing to do in the concrete situation. Cultivating moral understanding and, consequently, good behaviour, requires developing virtues, for which one needs both education and experience. One might be born with the *potential* to become virtuous, but to effectively become a virtuous person, one has to exercise and learn how to apply rules to the specific situation (Aristotle 1889).

In line with the above, **virtue-based learning implies a combination of acquiring knowledge of general principles and learning how to apply them in practical**

situations. In order to know what is good, a person needs to have knowledge of codes and rules; yet, to know what codes and rules really mean, one has to be able to apply them to a concrete case. Therefore, virtue-based learning does not aim at teaching ethical theories, but focuses on the way in which they relate to the case at stake and to the personal experiences of those involved. Therefore, to develop virtue, reflection is vital.

Taking this view on the relationship between knowledge and practical application as its point of departure, virtue-based learning focuses on concrete experiences of researchers (of various levels, from junior to senior). As researchers are involved in a situation they themselves experience to be morally troublesome and as they are the ones responsible for making decisions and taking action, they are supported in reflecting on what they already know (by prior experience) and in developing answers to their moral questions in interaction with each other. Accordingly, virtue-based learning focuses on fostering moral learning of participants. If practitioners would merely follow the expert judgement of the trainer, it is unlikely that this would result in further development of their own moral knowledge and their own ability to deal with a complex situation and its ambivalences. In virtue-based learning, the trainer fosters reflection and participants morally 'cultivate' themselves. This holds not only for the training of researchers, but also for the training of trainers. The core element of a train-the-trainer programme is combining knowledge and skills and developing one's own style of training, whilst applying a learner-centred approach. This implies that becoming a trainer in ethics and research integrity is essentially a process of 'learning by doing' (Stolper et al. 2014).

2. Blended learning: Combining online and face-to-face teaching

Technological innovations, such as the Internet, are often considered highly promising for education, but the value of technology depends on how it is used in context (Ferguson and Sharples 2014). **Blended learning involves a combination of online and face-to-face education that optimises the advantages of online education technologies while, at the same time, allowing tailoring to different contexts**. Evidence suggests that, in education in general, blended learning approaches are more effective than both approaches separately (Means et al. 2009, Sharples 2016, Schneider and Preckel 2017). In ERI training specifically, recent reviews indicate that approaches that involved active participation (Todd 2017, Marusic et al. 2016, Mumford 2017) and case-based activities (Todd 2017, Mumford 2017) were most effective. Science Europe (2016) recent survey of experts from its member organisations recommended active participation and blended learning approaches that include case studies and role play and suggested that training should be part of professional development throughout a researcher's career, from undergraduate to management level. Particularly senior scientists may be reluctant to join training and VIRT^{2}UE pays attention to make the blended mode attractive for this hard-to-reach group, both as trainers and as the target group to be ultimately trained.

The strength of VIRT^{2}UE's blended learning approach lies in the combination of different types of face-to-face sessions for trainers (and subsequently researchers) and the use of an online learning platform, ensuring that knowledge and teaching are contextualised and targeted at the user. The context is actively investigated by

feedback loops between different parts of the project as shown in Fig. 2. This enables adaptation to the needs of the community of trainers and researchers and contextual particularities, to quickly revise content to new developments and requirements as the field evolves over time.

For the face-to-face aspects of its blended learning approach, VIRT²UE will develop an ERI training programme, utilising a toolbox of teaching approaches, a central component of which will be the group reflection on moral dilemmas in practice, but which also includes role play, card games and other interactive approaches. ERI trainers will also learn how to foster participants' knowledge and skills in facilitating the training programme for researchers.

For the online aspects of its blended learning approach, VIRT²UE will make use of suitable approaches of internet teaching. Through the EnTIRE platform, it will provide e-learning courses, interactive online Q&A, a YouTube channel and a blended learning platform.

E-learning: E-learning approaches represent a simple, straightforward way to put quality content in front of lots of students at the same time online, enabling scarce resources to be deployed where they are most needed (Crow 2013). Most e-learning courses are characterised by mass participation, online and open access, lectures formatted as short videos, quizzes, automated assessment, peer and self-assessment and online forums and applications for peer support and discussion (Daradoumis et al. 2013). A distinction should be made with online courses developed by faculty members and offered through an online degree programme (Crow 2013). Such programmes are often restrictive in admittance, have a closed-source character and are often copy-pastes from conventional curricula without specific adaptation to an online environment. Open online courses are considered a middle ground for teaching and learning between the highly organised and structured classroom environment and the chaotic open web of fragmented information.

Online Questions & Answers in a Community: A further element of VIRT²UE's approach to blended learning is creating a networked community which is based on questions and answers (Q&A). Both the questions and answers are edited within a community. Through automated methods of rewards, such as users voting for good edits and answers, the most helpful answers to a question can be quickly identified online. Using such a Q&A platform also enables the live identification of trainers' and scientists' problems. This information can be used to tailor approaches to meet their specific needs. An answer today might not be the best answer in a few years' time, but continuous edits allow for questions and answers to evolve over time. Through automated methods of reputation management and reward, rewarding people in a community with "likes" and "badges", esteem is built alongside high quality content by up-voting good and appropriate content. **VIRT²UE will develop a Q&A approach both for the community of researchers and for the community of trainers that will provide a forum for mutual learning and support.**

YouTube Channel: A YouTube channel with a topic on good science can have a wide audience and reach massive dissemination. For example, Derek Muller's engaging discussion of the seminal article '*Why Most Published Research Findings Are False*' (Ioann

idis 2005) on his Youtube channel 'Vertasium' reached 1.3 million viewers in just 1 year (Ve ritasium 2016), whereas the original article has had over 2 million views since 2005. YouTube videos like these are targeted at an individual viewer instead of a classical lecture which addresses an entire audience and engage a younger generation which is highly familiar with YouTube for learning purposes. Lastly, the YouTube channel will add the human factor and will also include non-traditional forms, such as real and fictional short movies related to research ethics and integrity. As public media coverage about research ethics and integrity is mostly negative (cases of fraud), there will be a focus on positive items, such as entertaining and engaging cartoons as well.

A Blended-learning platform: As teaching materials will be made available on a platform using a Wiki-approach (developed in EnTIRE), the blended-learning approach allows for interactive tutoring off- and online to explain the methods and thinking process. Extending the EnTIRE project with educational tools combines communities and greatly increases the number of users that are bound to a platform, while making it more valuable and recognisable at the same time.

Using Open source software for the Q&A platform (OSQA) and MOOC (Open edX) prevents a high subscription fee and saves financial investments. These investments can be used to tailor the software packages specifically to the current objective. Moreover, by using existing technology, the risk of technical implementation failure is severely reduced. The focus can instead be on creating the highest quality educational materials. Moreover, software bugs and compatibility issues which arise as internet technology evolves, associated with these packages, can be fixed and maintained by the organisations behind these open source software packages. This reduces the technical expertise needed in the VIRT[2]UE consortium and ensures that all software is up-to-date and meets today's and tomorrow's user expectations in terms of quick and responsive technologies.

3. Iterative methodology: Combining development and evaluation

In order for the train-the-trainer programme to foster researchers' understanding and upholding of the ECOC in various European regions, the programme has to be adapted to the users' needs and experiences. This will be achieved by using an **iterative methodology, combining development and evaluation and adapting the programme on the basis of user input.** The stakeholder consultations on virtues (WP1) and educational materials (WP2) will ensure that the perspectives of researchers and (future) trainers are taken into account in the development of the face-to-face component of the train-the-trainer programme (WP3) and in the development of educational materials for online learning (WP4). Moreover, experiences of participants attending the training programme, as well as experiences afterwards during the application in practice, will be gathered using the online platform as an evaluation tool. This will create a feedback loop, enabling the further development of the training programme and the training material. User input will also play a crucial role in the dissemination of the training programme and the training materials, which will involve building a community of trainers in ERI and which will help to adapt the programme to user needs and to develop implementation strategies (WP 5).

Trainers will be actively involved in adapting the training programme and the training material to their own regional and cultural context. They will be stimulated to further develop the methodology of the training programme and the training materials for their own target group of researchers. Trainers will be assisted in this process, by organising interactive meetings of trainers in various regions and countries. In these meetings, participants will reflect on their experiences as trainers and specific challenges will be discussed. This will ensure that trainers are not alone in implementing the training, but have support from each other and, together, come up with ideas and plans which can, in turn, provide input for the overall train-the-trainer programme and the training materials.

The approach of actively including (future) trainers in programme development has already been applied in the development and implementation of training programmes for facilitators of Moral Case Deliberation in various European countries. These training programmes are not organised in a top-down way, but focus on stimulating trainers to work from their own experience and find contextual solutions together (Weidema et al. 2012). The training programmes specifically aim at **building a community of trainers, in order to create a basis for fitting the programme and the materials to the concrete situation and foster implementation.** Such communities require a combination of face-to-face meetings (for instance, yearly national conferences for facilitators) and internet exchange through a supportive platform.

1.3.2 Relations with other research and innovation activities

A number of European projects are closely related to the current proposal. Indeed, the call specifically calls for cooperation with PRINTEGER, DEFORM, ENERI and EnTIRE.

PRINTEGER - Ethics in Research: Promoting Integrity - is a GARRI 5 project that aims to improve governance of integrity and responsible research by improving the fit of governance to practice, improve integrity policies of national and international research organisations and provide tools and resources for research leaders and managers. PRINTEGER's publicly available educational tools will be fed into VIRT^{2}UE's training programme. Prof Lex Bouter, participant in VIRT^{2}UE, is a member of the Advisory Board and Dr Nicole Foeger is a member of the Policy Advisory Board of PRINTEGER. Thus, close cooperation between these two projects is guaranteed.

DEFORM - Determine the Financial and Global Impact of Research Misconduct - is the GARRI 9-funded project which aims to estimate the costs of research misconduct and the socio-economic benefit of research integrity. The publicly available output from DEFORM will be used as training material in the training programme.

ENERI - European Ethics and Research Integrity Network - is the GARRI 10-funded European Network of Research Ethics and Research Integrity. It has established an "operable platform of actors in the field of ERI". ENERI's access into the ERI community will enable VIRT^{2}UE to identify stakeholders and key 'trainers'. ENERI's reach into the ERI community will also aid dissemination of VIRT^{2}UE's training programme. The project also benefits from the extensive ERI curriculum development and pedagogical development in

ENERI. ENERI coordinator Prof Dirk Lanzerath and ENERI WP leaders Erika Löfström and Nicole Foeger are participants in VIRT^{2}UE. In addition, Prof Dr Lex Bouter (VIRT^{2}UE participant) is a member of the Expert Advisory Boards of ENERI. This will secure strategic alliances between the two projects.

Table 3.

Other relevant EU projects with relevant outputs for the VIRT^{2}UE training programme.

Project name	Description	Relationship with VIRT^{2}UE
HEIRRI, (Higher Education Institutions & Responsible Research and Innovation)	HEIRRI is working to develop training programmes and teaching material tailored to Higher Education Institutions. The aim of HEIRRI project is to 'start the integration of Responsible Research and Innovation (RRI) within the formal and informal education of future scientists, engineers and other professionals involved in the research, design and innovation process'.	The publicly available training and education resources available from HEIRRI will be fed into VIRT^{2}UE's training programme. VIRT^{2}UE partners Prof Ana Marusic and Dr Nicole Foeger are partner and advisory board member of HEIRRI, respectively, ensuring cooperation.
The **FOSTER** portal (Fostering the practical implementation of Open Science in Horizon 2020 and beyond)	The FOSTER portal is an e-learning platform that brings together the best training resources for those who need to know more about Open Science or who need to develop strategies and skills for implementing Open Science practices in their daily workflows.	The training materials of the FOSTER portal will be fed into VIRT^{2}UE's training programme.
RRI TOOLS	RRI TOOL is developing the RRI-TOOLKIT, an online tool designed for all stakeholders of the research and innovation system. The RRI Toolkit contains over 350 resources to help design and bring projects to life and to train on RRI.	Results of RRI TOOLS will be fed into VIRT^{2}UE's training programme.
EnRRICH (Enhancing Responsible Research and Innovation through Curricula in Higher Education)	The EnRRICH project will identify, develop, pilot and disseminate good practice and relevant resources to embed the 5 RRI policy agendas 'Public Engagement', 'Science Education', 'Open Access', 'Ethics' and 'Gender' (and optionally also the additional policy agendas 'Governance', 'Sustainability' and 'Social Justice') in academic curricula across Europe.	The aims of EnRRICH partly overlap with those of VIRT^{2}UE, which provides a basis for cooperation regarding science education. EnRRICH and VIRT^{2}UE both adhere to principles of open access.
ENAI (European Network for Academic Integrity)	The ENAI project is supported by the Erasmus+ Strategic Partnerships programme and aims at promoting academic integrity issues, sharing experiences, ideas and materials to help higher education institutions prevent academic misconduct and promote academic and research integrity.	The aims of ENAI partly overlap with those of VIRT^{2}UE, which provides a basis for cooperation regarding science education. ENAI will be an active provider of knowledge and training resources in critical issues, such as plagiarism and responsible scientific communication and publishing.

EnTIRE - Mapping Normative Frameworks for **ET**hics and **I**ntegrity of **RE**search - is a SwafS 16-funded project coordinated by Prof Widdershoven (VUmc) that aims to create an online platform that makes the normative framework governing ERI (including rules as well

as tools) easily accessible. The main points of collaboration between VIRT^{2}UE and EnTIRE, namely the shared branding, the use of EnTIRE's platform and community of users, have already been described in detail above. Prof Dierickx, Prof Marusic and Prof Lanzerath are also partners in EnTIRE. Additional areas of cooperation include the collection of educational materials and cases. These will be directly fed into the VIRT^{2}UE training programme.

Other relevant EU projects are detailed below in Table 3. Many of these produce educational materials and tools as outputs, which will be fed into VIRT^{2}UE's training programme.

1.3.3 Overall approach and methodology

The aim of VIRT^{2}UE is **to develop a sustainable, contextualised train-the-trainer programme, based on blended learning principles, for researchers and trainers across Europe, focused on understanding and upholding the principles and practices of the European Code of Conduct for Research Integrity, beyond mere compliance.** To achieve its overall aim, VIRT^{2}UE is composed of seven work packages that directly reflect its overall objectives (Fig. 3). To gain insight into the virtues and the priorities and preferences of stakeholders, conceptual mapping will be performed (WP1). Next, an inventory of educational resources will be compiled, to map existing capacity and deficiencies in European ERI educational resources (WP2). WP2 also includes stakeholder consultation in order to determine the needs and possibilities for ERI across Europe and to develop the institutional embedding strategy. In WP3 and WP4, the train-the-trainer programme will be developed and innovative online training materials will be created and updated, based on input from WP1 and WP2. WP5 is responsible for the implementation and dissemination of the VIRT^{2}UE train-the-trainer programme across Europe.
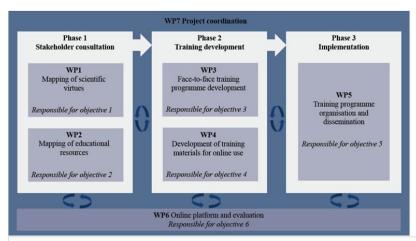

Figure 3. `doi`

PERT Description of the work packages.

Considering the educational expertise of VIRT^{2}UE's participants, the first group of trainers will be comprised of the VIRT^{2}UE participants and their colleagues. This core group will consist of approximately 30 people. In **WP3**, they will be actively involved in developing the training and also be trained. In **WP5** these trainers will train 305 ERI trainers (1 per 10,000 researchers in each EU country, Switzerland, Norway and Turkey – See Table 4). As part of the training programme, these 305 VIRT^{2}UE trained ERI trainers will, in turn, each train at least 10 researchers as part of the course requirement – reaching 3050 European researchers by the end of the project. Furthermore, WP5 also establishes a capacity building road map for countries with less developed training opportunities. This includes the identification and support of persons with capacities to become an ERI teacher in the future. By identifying potential trainers in all European countries, by developing a train-the-trainer programme which reaches 3050 researchers, many of whom are potential future trainers, by developing an embedding strategy and by establishing a capacity building road map for countries with less developed training opportunities, VIRT^{2}UE creates the conditions for multiplying the initial number of trainers trained (305) after project end.

Table 4.

Number of training sessions across Europe – Source:

http://ec.europa.eu/eurostat/tgm/table.do?tab=table&init=1&language=en&pcode=tsc00003&plugin=1

Country group	Number of researchers 2013/2014 (Eurostat)	Number of ERI trainers to be trained (1 per 10000 researchers)	Number of training sessions (10-15 participants)	Participant responsible for training country group
Germany	549283	55	4	Bonn
Belgium and The Netherlands	182519	18	2	Vumc
Poland, Estonia, Latvia, Lithuania and Finland	205921	21	1	UH and UL
France and Luxembourg	369012	37	3	KUL
Greece, Bulgaria, Romania and Cyprus	101201	10	1	NTUA
Czech Republic, Slovakia, Hungary, Slovenia and Croatia	141644	14	1	MEFST and UL
Italy and Malta	169421	17	2	UNINS
Norway, Sweden and Denmark	211132	21	2	UIO

Country group	Number of researchers 2013/2014 (Eurostat)	Number of ERI trainers to be trained (1 per 10000 researchers)	Number of training sessions (10-15 participants)	Participant responsible for training country group
Spain and Portugal	288840	29	2	UCP
Austria and Switzerland	131726	13	1	OeAWI
Turkey	181544	18	2	ANKU
United Kingdom and Ireland	514574	51	4	Vumc + UIO
Total		305		

WP6 will develop the online component and evaluate the training programme in terms of trainers' and researchers' needs, feeding back into WP4 to keep training material up to date and relevant. Overall project management of VIRT^{2}UE is organised in WP7. For more information on the timing and planning of VIRT^{2}UE, see the GANTT chart in section 3.1.

1.3.4 Consideration of gender aspects

All VIRT^{2}UE participants support the principle of equality between men and women as a common value of the European Union. Enshrined in the Treaty on European Union, equality between women and men is a horizontal objective affecting all Community tasks. We acknowledge and fully underscore that research must be carried out to contribute to an enhanced understanding of gender aspects and must address the needs of both men and women equally. Therefore, within VIRT^{2}UE, we address these issues within the scientific content of the project, such as gender perspectives in the virtues considered essential for good research practices and gender differences in research misbehaviour and questionable research practices, as well as in the composition of the consortium and project team (see also section 3.3.7).

Sex/and or gender in VIRT^{2}UE: The overall aim of VIRT^{2}UE is to train trainers across Europe to pursue a high standard in ERI, using innovative synergetic blended-learning techniques tailored to specific contexts. To be able to address gender issues, we will ask both genders to participate equally in the project at all levels. This means that VIRT^{2}UE will, therefore, include equal groups of men and women for the stakeholder consultation and training activities.

Sex and/or gender in VIRT^{2}UE consortium: VIRT^{2}UE aims to be a frontrunner in providing equal opportunities to men and women in the ERI field. To foster gender balance in the VIRT^{2}UE, we have designed a consortium with a well-balanced composition of male and female PIs, researchers and WP leads. Participants involved in the VIRT^{2}UE consortium actively maintain a proper gender balance in their respective organisations.

This also means that, upon recruitment of new members to VIRT^{2}UE, we will strive to maintain a proper male/female balance.

Sex and/or gender in decision-making of VIRT^{2}UE: VIRT^{2}UE will further support gender equality in decision-making within the consortium partners or within the advisory board committee and the related expert groups.

2. Impact

2.1 Expected impacts

The ultimate aim of the VIRT^{2}UE consortium is to promote the dissemination of the revised European Code of Conduct for Research Integrity (ECoC) and to achieve a higher degree of consistency in research integrity practices in Europe. Wide adoption of the ECoC should result in the embedding of the European Code both at an individual level, as well as at institutional level and beyond mere compliance. We will do this by developing an interactive toolbox for our innovative train-the-trainers programme that enables trainers to support researchers to understand and uphold the overarching principles of the ECoC, taking into account context specific considerations. Ultimately, this will result in higher quality research across sectors and research fields and will contribute to the trust of society in the research community (section 2.2.4). In order to achieve maximum impact, the VIRT^{2}UE project will build upon its unique selling points (USPs):

1. To achieve maximum **uptake** of the train-the-trainer programme within the research community and the commercial sector (e.g. industry, research performing organisations (RPOs) and research funding organisations (RFOs)), both at an individual level as well as institutional level, VIRT^{2}UE will include the following steps:

- The involvement of consortium partners who are considered frontrunners and experts in developing, delivering and evaluating ERI training programmes and materials. This will ensure the development of a training programme of **high quality and credibility**, which will foster uptake of the training programme by ERI trainers, as well as researchers.
- To further stimulate uptake, VIRT^{2}UE will develop an **embedding strategy** (section 2.2.1), which includes interaction with academic and industrial management to encourage uptake of the VIRT^{2}UE training programme in their curriculum or training programme.
- Moreover, interaction with learned societies (such as ALLEA), publishing organisations (such as COPE), as well as RFOs (such as Science Europe) is necessary (section 2.2.1). For example, there is still wide variation between different funding organisations in the importance placed on research integrity in their grant conditions and the robustness of integrity overview. These stakeholders participate in the stakeholder consultations, are included in the embedding strategy and will be targeted in the dissemination strategy.

2. To maximise impact across Europe, VIRT^{2}UE will build upon and expand the existing networks of its consortium partners (section 1.1.4). The geographical spread of consortium members, as well as their relationship with established networks (EnTIRE, ENERI, HEIRRI etc.) ensures a **wide reach** of the VIRT^{2}UE project. Finally, industrial partners will also be involved in VIRT^{2}UE, promoting not only its widespread uptake within academia, but also within industry (section 2.2).

Table 5.

Impact stipulated in the call and VIRT^{2}UE's approach.

Expected impact	How VIRT^{2}UE will address this
Promote a higher degree of consistency of research integrity practices in Europe	VIRT^{2}UE will promote a higher degree of consistency of research integrity practices in Europe at three different levels: 1) the train-the-trainer programme, 2) the ERI trainer and 3) the researcher. 1. The train-the-trainer programme will incorporate context-sensitivity by making the training resources highly adaptable. VIRT^{2}UE recognises the fact that good research practice is supported and regulated in different ways, depending on the scientific discipline and country. Conceptual mapping amongst stakeholders will allow for the identification of virtues and ranking of the virtues relevant for their research practice (WP 1). The training programme can be adapted to reflect priorities and preferences of the European research community, taking into account national laws and cultural differences, whilst being consistent with regard to general principles. 2. VIRT^{2}UE will map regional differences in training programmes across Europe through stakeholder consultations (section 2.2.1). ERI trainers and the wider scientific community will be consulted to understand existing capacity and deficiencies in ERI educational resources. Such consultations (WP 2) will be used to optimise the train-the-trainer programme, promoting a higher degree of consistency of research integrity practices in Europe and allowing for consistent application of the ECoC by researchers across Europe. 3. The VIRT^{2}UE train-the-trainer programme will provide researchers with an interactive toolbox that includes face-to-face workshops with innovative online courses that will not only help them understand and internalise the ECoC, but will also create awareness on regional differences and how to handle them, in case research integrity issues are encountered.
Strengthen the research communities' capacity to respect the highest ethical standards	The train-the-trainer programme will have three main features to: 1) combine knowledge with application (through virtue-based learning); 2) combine online and off-line training (blended learning approach); and 3) combine development and evaluation (through iterative methodology; section 1.3.1). VIRT^{2}UE's embedding strategy, which aims to target organisations, not only at the individual level of researchers, but also at the institutional level, will stimulate uptake of the train-the-trainer programme and strengthen the capacity of research communities to adhere to ethical standards.
Enable researchers to adopt a virtue ethics approach, i.e. to embed ethics and integrity within the research design	The innovative train-the-trainer programme of VIRT^{2}UE combines a proven didactic approach for fostering moral virtues by combining knowledge with application in daily practice, in line with approaches focusing on reflection and deliberation on concrete issues and dilemmas, experienced in practice, such as the MCD approach. The VIRT^{2}UE programme will create awareness of the interrelationship between methodology for research integrity and providing tools to support researchers in integrating ERI in the research design. The blended learning approach of the training programme, which includes the use of interactive online tools combined with face-to-face workshops, will provide such necessary tools and strengthens the capacity of researchers to adopt a virtue ethics approach in their research design.

3. **Sustainability** of VIRT^{2}UE on all relevant levels (commitment, financial, content) during and beyond the project duration will result in long-term impact of the project:

- Community building through stakeholder consultations and use of established networks will encourage researchers to maintain and update the training programme during and beyond the project.
- Financial sustainability of VIRT^{2}UE will be pursued through a suitable business model (section 2.2.2).
- Finally, the virtue-based learning approach, which combines knowledge with application, will provide the tools to encourage ERI trainers and researchers to integrate the principles listed in the ECoC in their everyday practice and help them know how to act in concrete situations – ensuring a long-term effect.

2.1.1 Expected impacts as set out in the work programme

The proposed action will result in an innovative blended learning training programme, drawing on a toolbox of educational approaches and materials, consisting of an online e-learning platform, combined with face-to-face interactions that will promote the dissemination and application of the principles of the revised ECoC, beyond mere compliance. This will promote consistency of research integrity practices amongst European researchers, enabling researchers to adopt a virtue ethics approach, where knowledge on ERI principles is shifted from simple awareness of the ECoC and its principles (i.e. reliability, honesty, respect and accountability) to the development of character traits (virtue ethics). Impact stipulated in the call is detailed in Table 5. Short-, mid- and long-term impacts are detailed in Table 6.

Sustainability through community commitment: The involvement in the VIRT^{2}UE consortium of some of the most respected ERI researchers and trainers in Europe underlines their commitment to the long term success of the training programme. VIRT^{2}UE will foster the commitment of the ERI community and existing ERI networks (e.g. ENERI, EUREC, ETINED, ENRIO and EARTHnet) **to implement the train-the-trainers activities, update the relevant training material/tools and manage the e-community/database in the long term**. Sustainability will be pursued at three different levels (i.e. financing, content and commitment, see also section 1.1.4). Engagement of relevant stakeholders and the ERI community will be pursued throughout VIRT^{2}UE and their active contributions will keep the training programme and interactive platform up-to-date and sustainable. Through a commitment to open source and open data approaches, we will develop an online platform that is sustainable, which will, furthermore, ensure long-term continuity of the e-community. In order to prevent duplication of efforts, VIRT^{2}UE will develop an 'Ethics and Research Integrity Academy' that will be made available through the EnTIRE platform and linked to SINAPSE. A Q&A platform will allow for interaction with the scientific community and will be used to specify and contextualise the training programme. Financial sustainability will be pursued by charging for face-to-face training interactions after the project's end, but making all online material open source and open access (business model in section 2.2).

Finally, the experience of VIRT^{2}UE partners with dissemination of training and teaching materials will provide a basis for sustainability.

Table 6.

Short-, mid- and long-term impacts of the VIRT^{2}UE programme.

	Short-term impact (during the VIRT^{2}UE)	Mid-term impact (< 5 years after VIRT^{2}UE)	Long-term impact (> 5 years after VIRT^{2}UE)
Scientific community	- Understanding and increased awareness of the ECoC and its principles and practices. - Access to an interactive platform, providing open access to resources and cases, such as MCD, MOOC and YouTube videos on ERI practices. - Access (as trainee) to a well-designed, up-to-date widely available blended learning training programme including online and off-line elements.	- Access to novel and interactive tools to develop virtues and take a virtue ethics approach in daily research practice. - Greater understanding about how to act and/or with whom to talk about the research integrity issues. - Novel insights into the improvement of research practices, through open access publications, responsibilities and responsible publication practice. - High brand awareness of ERI Academy and a holistic off- and online user experience.	- Confidence amongst European researchers (and beyond) that they comply with and internalise ECoC principles and practices, which allows them to guarantee good research practices and foster excellence. - More confidence with regards to how to act in cases of scientific malpractice and research integrity issues. - Harmonisation of ERI training and research practices amongst European researchers and beyond.
ERI trainers	- Improved understanding of ECoC and its connections to national, institutional and disciplinary codes and how to incorporate it in training. - Improved training skills and methods that are easily adapted for different contexts and audiences. - Access (as trainer) to training programme, based on state-of-the-art in the field and real-world consensus of stakeholders.	- Access to novel and interactive tools for implementing the train-the-trainer programme. - Increased access to non-traditional teaching forms (e.g. card games, theatre, art) to foster moral behaviour in research practices. - Increased access to context specific educational materials. - High brand awareness of ERI Academy and a holistic off- and online user experience. - Access to an online Q&A ERI trainers and researchers forum for mutual support and learning.	- Confidence in own training skills to foster moral behaviour and supporting a virtue ethics approach amongst European researchers (and beyond). - Improvement of ERI training programme through continued interaction with researchers, stakeholders and trainers.

	Short-term impact (during the VIRT^{2}UE)	Mid-term impact (< 5 years after VIRT^{2}UE)	Long-term impact (> 5 years after VIRT^{2}UE)
Policy-makers	- Mapping of virtues, taking into account priorities and preferences in different regions. - Capacity building road map will help identify regions where there is a shortage of ERI educational resources and trainers.	- More effective mapping of ERI educational resources. - Increased consensus between policy-makers, trainers and researchers, leading to more effective policies.	- Harmonisation of policies across scientific fields and countries on ERI training and responsibilities.
Industry	- Access to ECoC and its principles and practices, as well as training materials and tools to stimulate good research practices and foster moral behaviour.	- Novel tools and educational resources, based on the VIRT^{2}UE programme to apply a virtue ethics approach in day-to-day practice. - High brand awareness of ERI Academy and a holistic off- and online user experience.	- Harmonisation of ERI training programme will require less investment in efforts to comply with principles and practices listed in the ECoC and comply with different regulations per organisation/ region /country, as the developed training programme can be tailored to regional and institutional needs (context-specific). - Increased confidence in the results of previous research - from both public and private sources – used as a basis for new innovations.
Society	- Awareness of importance of ECoC. - Better understanding of and confidence in research conduct and output.	- Interest in and engagement with further development of ERI training and educational resources to foster good research practices.	- Widely supported trust in scientific communities and industry and results obtained through good research practices.

<u>Barriers to reach expected impact:</u> Several external barriers need to be addressed in order to achieve the expected impacts of VIRT^{2}UE. The most critical barriers and obstacles are mentioned here, as well as their contingency plans.

Ø **Lack of priority amongst researchers**: Researchers often learn valuable lessons from training sessions on research ethics and research integrity; however, it is not their priority to implement the lessons learnt from such trainings. Researchers are often under pressure from their supervisor to publish results and produce data, as success in obtaining research funding and career advancement requires scientific publication in (high impact) journals. This discrepancy between the willingness of researchers to comply with ethical rules and standards, the lack of tools and methods to adopt these rules and standards, as well as the lack of priority given by the environment to adhere to such rules, demonstrates the need for a widespread train-the-trainer programme that not only targets organisations at the individual level, but also at the institutional level.

Mitigation: VIRT^{2}UE will address this barrier by developing an embedding strategy (section 2.2.1), where consortium member will also seek interaction with faculty Deans, learned societies, publishing organisations and research funding organisations. This will stimulate uptake of the VIRT^{2}UE training programme at an institutional level, enhancing understanding and uptake of the ECoC.

Ø **Lack of interest in industry in ERI issues and improvement of rules**: Industry often provides a poor environment for adhering to good research practices (low compliance). The high-stakes environment and highly-competitive field promotes manipulation of data, suppression of negative results and even plagiarism and falsification.

Mitigation: the importance of the VIRT²UE training programme for reducing research waste and associated financial losses in research-intensive industries through good research practices will be actively communicated by our industry associate (Janssen) and through our consortium participants' industry contacts.

Ø **Lack of trust from society in the integrity of scientists and results of research**: Cases of research misconduct, such as fabrication and falsification of data and, more frequently, research misbehaviour (sloppy science), not only have consequences for science, but also harm public confidence in the scientific community and results of research.

Mitigation: VIRT²UE will implement several special outreach measures (online and off-line), aimed at restoring the public trust in the scientific community (section 2.2.3). In addition, VIRT²UE will promote the upholding of principles in the ECoC through a virtue ethics approach, which includes reflection and open debate between the scientific community and the public on ERI, for which a basis is created in the VIRT²UE platform, which will inform not only researchers, but also the public (for instance, through journalists) and stimulate interaction and discussions.

2.2 Measures to maximise impact

2.2.1. Dissemination and exploitation of results

In order to promote dissemination and harmonisation of the new ECoC across sectors and thereby promoting research integrity across European countries, it is of critical importance to raise awareness on the VIRT²UE project and its outcomes. As such, we have developed a dissemination strategy that will ensure all relevant stakeholders are involved during, before and after the project. The main goal of the dissemination strategy of VIRT²UE is to:

1. Ensure VIRT²UE will reach the expected impacts as set out in the call text (section 2.1.1).
2. Contribute to the long-term impacts as listed above (section 2.1.1).
3. Promote research integrity beyond mere compliance, amongst all types of researchers (junior, senior) and research fields, across European countries by training 305 excellent ERI trainers who will, in turn, train 3050 researchers and who may become trainers themselves, by the project's end. The combination of online and off-line training will encourage widespread use of the online materials, which will, in turn, foster the interest in the off-line training.
4. Ensure sustainability of the VIRT²UE platform in the long run (section 2.2.2). Based on our business model, we expect to have annual incomes between €225k and

€600k four years, which will allow us to maintain and update the VIRT^{2}UE train-the-trainer programme.

Table 7.

Dissemination strategy of VIRT^{2}UE.

Stakeholder	Motivation	Goal of dissemination	Dissemination methods
Scientific community	Engage in good research practices, as detailed in the principles and practices of the ECoC. Promote the upholding of the ECoC and virtue ethics in the scientific community and beyond.	To move beyond mere awareness of the ECoC towards the development of character and habits (virtue ethics).	- Publications; conferences; newsletter; YouTube videos on dedicated YouTube channel Alerts when content relevant for scientific community (further specified in research disciplines) is added to the VIRT^{2}UE platform, invitation to add and edit information. - Branding - Online design company **Momkai** will develop an online platform which engages the scientific community to support the goals of the VIRT^{2}UE project and the sustainability on the long term. - Visibility of VIRT^{2}UE platform in common search engines, such as Google (using pushing strategies such as adwords). - YouTube videos of key learning point on the website and YouTube for easy transfer.
ERI trainers	To train researchers how to undertake good research practices and how to adopt an virtue ethics approach in their daily research practice.	Active use of the online toolbox of educational materials and platform for support in face-to-face training during practical exercises. Development of the face-to-face trainer programme in a participatory way, based on evaluation and expert input of trainers.	- Publications; conferences; newsletter; YouTube channel with educational resources. - Alerts when content relevant for ERI trainers is added to the VIRT^{2}UE platform, invitation to add and edit information. - Branding - Online design company **Momkai** will develop an online platform which engages specifically with ERI trainers. - Visibility of VIRT^{2}UE platform in common search engines, such as Google (using pushing strategies such as adwords). - YouTube videos of key learning point on the website and YouTube for easy transfer.
Policy-makers	Improve policy making, based on outcomes from stakeholder consultations and with use of capacity building road map.	To promote leadership in providing clear policies and procedures on good research practice. To build capacity in regions where there is a shortage of ERI educational resources and trainers.	- Publications; workshops and relevant conferences. - Alerts when content relevant for policy-makers is added to the interactive training platform, invitation to add and edit information.

Stakeholder	Motivation	Goal of dissemination	Dissemination methods
Deans	Promote good research practices and embedding of ERI training at the organisational level (e.g uptake in teaching curricula).	To promote good research practices at the organisation level, as well as the individual level.	- Publications; relevant conferences; newsletter; forum meetings. - Alerts when content relevant for academic organisations is added to the VIRT^{2}UE platform.
Publishing organisations	To prevent research misconduct (e.g. fabrication and falsification of data and plagiarism) and research misbehaviour (sloppy science).	To promote responsible publication practice in the scientific community.	- Publications; relevant conferences; newsletter. - Alerts when content relevant for publishing organisation is added to the VIRT^{2}UE platform.
Industry	To support a proper infrastructure for open and reproducible research practices that are necessary for reproducibility, traceability and accountability.	To stimulate transparency and take responsibility for industry in promoting awareness and ensuring a prevailing culture of research integrity. Compliance with ECoC principles and practices.	- Website; social media; brochures. - Alerts when content relevant for industry is added to the platform. - Making the platform visible in search engines, such as Google (using pushing strategies).
General public	Awareness of importance of ERI education.	To restore trust in good research practices and output by scientific community.	- Website; social media; mass media; brochures; news items and newsletter. - Alerts when content relevant for the general public is added to the VIRT^{2}UE platform. - Participation in public debates. - Develop animation videos to capture the main points of the scientific system to educate the public.

Dissemination and exploitation plan

The aim of VIRT^{2}UE is to target 305 ERI trainers in Europe using the face-to-face element of the train-the-trainer programme developed in the project, which will be updated continuously (WP3). These ERI trainers will then be equipped to train both researchers, as well as the second generation of ERI trainers, resulting in the widespread dissemination of the training programme. The dissemination and exploitation plan will be developed, monitored, evaluated and improved (when necessary) in WP5. Dissemination activities are conducted by all partners, but directed by the work package leader of WP5. WP5 will also be responsible for developing a dissemination policy that has to be agreed upon and signed by all consortium partners and will be included in the Grant Agreement.

Our dissemination strategy starts with the identification of all groups in society with a vested interest in VIRT^{2}UE results (stakeholders). Understanding the interests and motivations of all stakeholders will allow the consortium not only to make the train-the-trainer programme meet user needs, but also to effectively reach all stakeholders and end-users. Measures to reach each of the stakeholders are different and are specifically aimed

to raise maximum awareness for a particular target group. Target groups we wish to reach include the following:

- Scientific community; including researchers in all fields of research and across all seniorities (junior as well as senior scientists, PIs etc.).
- Policy-makers at universities, research institutes, governmental bodies and funding agencies.
- ERI researchers.
- Private sector companies; including industry and investors.
- General public.

An overview of the motivation of each stakeholder, the intended effect of our dissemination strategy and the means we intend to use to achieve it are detailed in Table 7.

Embedding strategy: In order to stimulate good research practices, both at an individual level, as well as at an institutional level, the VIRT^{2}UE consortium recognises the importance of awareness and uptake of the ECoC principles through its train-the-trainer programme. The ECoC should not only be understood and internalised at an individual level, but also at an organisational level. This requires a learning process, including training, consistent enforcement and continuous improvement. Organisational leaders also are important, manifesting ethical commitment in their behaviour. Therefore, we have devised an embedding strategy that should promote integration of ERI training into teaching curricula and training programmes at the institutional level. The main goal of the embedding strategy is to:

1. ensure VIRT^{2}UE will achieve the expected impact of the call,
2. stimulate good research practice also at an institutional level and
3. ensure sustainability of the VIRT^{2}UE train-the-trainer programme.

Different embedding strategies for commercial (industry, RPOs) and non-commercial organisations (academia, RFOs) will be developed. The embedding strategies will be developed, monitored, evaluated and continuously improved in WP5 (in cooperation with WP6) by all partners (coordinated by VUmc as the project coordinator).

Embedding strategy for commercial organisations: to stimulate good practice at the institutional level of commercial organisations, we will perform stakeholder analysis with, for example, industry, learned societies, policy-makers, publishing organisations and RPOs. Forum discussions with key stakeholders will be organised to discuss how to implement the ECoC and to discuss their role in research conduct. Other examples include workshops or focus meetings with key stakeholders, as well as parties that challenge industry on their ethical conduct, such as journalists and consumer organisations.

Embedding strategy for non-commercial organisations: although good research practice should -in theory- be incorporated in all academia, this is often not reflected in teaching curricula of universities (other than incidental courses or training). Uptake of ERI training in the teaching curricula of universities and training programmes of other non-profit organisations, such as RFOs, will promote good research practice and enable researchers

to adopt a virtue ethics approach in their research design and conduct. At the academic level, faculty Deans have a crucial role for embedding ERI training at the institutional level. In forum meetings with faculty Deans and learned societies, it will be discussed how research integrity training and tools can be embedded in teaching curricula. Other stakeholders and involved parties, such as university associations, RFOs and publishing organisations, will also be invited (e.g. in focus meetings) to discuss how they see implementation of the ECoC and embedding of ERI at their organisation.

Stakeholder consultation: The VIRT²UE project enables engagement of stakeholders and community through stakeholder consultations. Stakeholder consultations will be used for **concept mapping purposes** on stakeholders' perspectives on the ECoC's principles and virtue ethics. Representatives from different stakeholder groups (e.g. academia, ERI committees, policy-makers, funding organisations, students and industry) will be involved in face-to-face focus groups. Results from stakeholder consultations will be used to identify virtues related to good research practices, to define scientific character virtues relevant for good scientific practice and to explore potential differences across research disciplines. In addition, stakeholder consultations will be used to make **an inventory of ERI training and tools in European countries** and to map existing capacity and deficiencies in ERI educational resources. A capacity building roadmap will be developed, aimed at unifying training programmes and building capacity in countries where training resources are under-represented. Moreover, training will be made more specific and tailored to regional requirements, based on the outcomes of stakeholder consultations (contextualisation).

2.2.2 Exploitation: knowledge management and protection

Data management plan: All general data that will be generated within VIRT²UE will be made accessible for verification, for re-use purposes and FAIR (Findable, Accessible, Interoperable and Reusable). As a result, VIRT²UE will produce a Data Management Plan (DMP; WP7) to support the management of this data storage. Within the DMP, we will describe the types of data collected and/or generated, as well as how they will be shared, made accessible and made available for research use and how they will be preserved.

Open access publishing and open data: To maximise the potential impact from VIRT²UE, the consortium underscores the importance of open access to all scientific publications. Following their own institutional policies, all partners will fully commit to support the EU efforts to improve access to scientific information and to boost the benefits of public investment in research, funded under Horizon 2020. VIRT²UE will publish important findings in high-impact peer-reviewed scientific journals to reach important stakeholders and project updates will be presented at conferences and meetings (section 2.2.1). Results will be published as peer-reviewed scientific publications through open access (OA). OA refers to the practice of granting free internet access to research articles for broad dissemination and results from VIRT²UE will preferably be made available through OA. Either Green or Gold OA publishing will be chosen. Green OA is OA that is provided through the author self-archiving the final peer-reviewed manuscript in a repository (open archive, for example, ResearchGate), either directly or after an embargo period. Gold OA

entails OA provided by a publisher and research articles are immediately available free of charge to the reader upon publication. All consortium partners are further encouraged to provide open access to conference presentations, book chapters, monographs etc.

Exploitation of VIRT²UE's results: VIRT ²UE will support responsible research and innovation and will promote and facilitate research integrity across European researchers. Beyond VIRT²UE, there are several aspects of the train-the-trainer programme that can be used for exploitation and that will promote financial sustainability of the programme in the long run.

To ensure its financial sustainability, the VIRT2UE consortium will explore different business/earning models. One of the first options to be explored is to offer the face-to-face training (off-line training) of VIRT²UE against payment, while the interactive, online training will be available through open access. VIRT²UEs face-to-face workshops will be offered at €1500 EUR (per participant) for academia and industry (as part of WP6, different pricing strategies will be explored for non-commercial (academia) and commercial organisations (industry), as well as different pricings for different countries). Taking into account a worst-case scenario, realistic scenario and best-case scenario, we will have €600k, €375k and €225k annual turnover to spend on maintaining, updating and improving the training programme after the project and for promoting its dissemination (Table 8).

Table 8.

Best case, realistic and worst-case business scenarios for VIRT²UE.

Training (€1500)	2021	2022	2023	2024	2025	2026	2027
Best case scenario							
No. of training sessions	50	100	150	250	400	400	400
Income	€75k	€150k	€225k	€375k	€600k	€600k	€600k
Realistic scenario							
No. of training sessions	20	50	80	150	250	250	250
Income	€30k	€75k	€120k	€225k	€375k	€375k	€375k
Worst case scenario							
No. of training sessions	10	30	60	100	150	150	150
Income	€15k	€45k	€90k	€150k	€225k	€225k	€225k

In addition, the available training material on the platform itself creates an economic utility for many commercial (e.g. industry) and non-commercial organisations (e.g. universities) in educational activities and the data and ERI community also hold economic value in improving research efficiency on several levels (i.e. improved research practices in research organisations, more effective Ethic Review Committee applications, risk management for industry, editor assessments of submitted manuscripts etc.). Additional business/earning models will be investigated as part of financial sustainability in WP6.

Sustainability: funding beyond VIRT^{2}UE: Several outcomes of VIRT^{2}UE can be further exploited, as described above. In addition, to ensure financial sustainability of the train-the-trainer programme and enable upscaling of the training programme in the long run, we will seek additional European funding with the VIRT^{2}UE consortium to realise our long-term vision. In addition, we will explore other possible business models, by exploring the role of specific stakeholders in sustaining the platform, for example, by creating fee-based patronships for RPOs, pharmaceutical associations and non-profit organisations.

2.2.3 Communication activities

In addition to the targeted dissemination strategy outlined in section 2.2.1, the consortium will execute communication activities at major milestones in the project. Communication activities to promote VIRT^{2}UE will be an important aspect of this Coordination and Support Action, in order to increase visibility of the project, gain awareness of the innovative train-the-trainer programme and reach a wide range of stakeholders and end-users. As part of WP7, the consortium will develop a communication plan that will ensure timely and clear communication of project results to all relevant groups (Table 9). This communication plan will be managed by the WP leaders of WP7; however, all consortium members will contribute to this and provide updates.

Table 9.

Communication measures of VIRT2UE.

Branding
VIRT^{2}UE's consortium includes the award-winning digital design company Momkai. Momkai will design a brand identity for the VIRT^{2}UE platform and educational materials that fits the objectives. Momkai will create the brand strategy and design a visual identity that fits with the brand strategy and takes future outings into account. A brand identity always consists of a logo, colour set and choice of typography and will be used consistently in all communications.

Website
A dedicated VIRT^{2}UE website, hosted and integrated with the EnTIRE platform, will be created and will provide up-to-date information on the project, partners, progress, goals and events relevant to different stakeholder needs. Again, Momkai's skills and experience in creating intuitive and attractive user interfaces and building online communities of users will be key to the website's success. The website will contain specialised portals for both internal use, as well as external use. Internal use: the website will have open portals for all consortium partners in order to provide up-to-date information about the progress of the project and related issues that may arise. External use: the external part of the website will contain information for all relevant stakeholders, including the general public, on progress of the project. Consortium members will be asked to write regular news items for the website on project updates, outcomes and future perspectives.

Conferences
Representatives of the consortium will actively participate in conferences and exchange experiences and ideas about the latest developments from the VIRT^{2}UE project. Conferences are a perfect platform for stakeholder involvement and consultation. In addition, representatives will participate in outside conference and events relevant to the consortium activities. Relevant conferences in the field include the World Conference on Research Integrity (WCRI), International Center for Academic Integrity (ICAI), the National Data Integrity Conference and the EuroScience Open Forum (a biannual, pan-European, general science conference dedicated to scientific research and innovation). During these conferences, several open and closed discussions to discuss project results and strategies with consortium partners and selected stakeholders will be held. Consortium conference: at the end of the VIRT^{2}UE project, a final conference will be organised where all relevant stakeholders will be informed about the results of the project.

Industry meetings

To reach research intensive industries and increase awareness about the importance of good research practices, we will visit business conferences, such as the events of the Society of Corporate Compliance and Ethics (e.g. Basic Compliance & Ethics Academy meetings). We will also seek contact with the European Federation of Pharmaceutical Industries and Association (EFPIA) and the European Business Ethics Network (EBEN).

Scientific publications

Results originating from the research within VIRT^{2}UE will be published in high impact scientific journals with preferred open access, such as Nature Communications and PNAS or in more specialised journals, such as BMC Research Integrity and Peer Review, Accountability in Research, Journal of Empirical Research on Human Research Ethics, Science and Engineering Ethics and Research Policy.

External collaborations

VIRT^{2}UE will set-up collaborations with other researchers and groups outside the consortium, which are active in the ERI field. VIRT^{2}UE builds upon the interactive ERI normative platform developed in EnTIRE and has their support and cooperation for proposed project. VIRT^{2}UE partner Dirk Lanzerath is coordinator of ENERI and partner Ana Marusic is involved in HIERRI. Advisory board member Maura Hiney is a member of ALLEA. For more details about collaborations, see section 1.1.4 (reach) and 1.3.2. These collaborations will provide new ways for communication and dialogue with the ERI community, active in these projects and organisations.

Press releases

At key milestones in the project, press releases will be developed and distributed through all relevant national and international networks with the help of the communication departments of partners involved.

Dissemination material: Brochures and Newsletters

Dissemination materials, such as brochures and media campaigns, will be developed to inform policy-makers, the general audience, relevant stakeholder groups and industry that are interested in the project findings. All stakeholders and other interested parties will be informed with a quarterly newsletter (open for subscription), in which the project progress and relevant updates from outside the consortium are presented.

Social media: dedicated YouTube channel

Nowadays social media is instrumental in reaching the general public and relevant stakeholders. Therefore, VIRT^{2}UE will utilise platforms such as LinkedIn, Twitter, Facebook, Wikipedia and YouTube to create general awareness for VIRT^{2}UE's results, for posting conference presentations and news messages and for uploading (video-)messages (e.g. interview with project participants or stakeholders, experiences of participants in the train-the-trainer programme etc.). In particular, we will create a dedicated YouTube channel that will show VIRT^{2}UE's key learning points captured in short animation videos to make them easily transferrable. These videos will also be published on the VIRT^{2}UE website.

Planned events and conferences within VIRT^{2}UE which will be attended by consortium members for internal and external communication are detailed in Table 10.

Table 10.

Events and conferences.

Event	Timing
Kick-off during EuroScience Open Forum (ESOF)	July 2018
7th World Congress of Research Integrity	May 2019
International Center for Academic Integrity (ICAI)	February 2020
National Data Integrity Conference	June 2020
EuroScience Open Forum (ESOF)	July 2020
End conference VIRT^{2}UE	2021 (to be decided)

Public outreach: In order to further contribute to restore the public trust in the scientific community after a number of research integrity scandals over the past decades, VIRT^{2}UE will implement several special outreach measures. These measures include
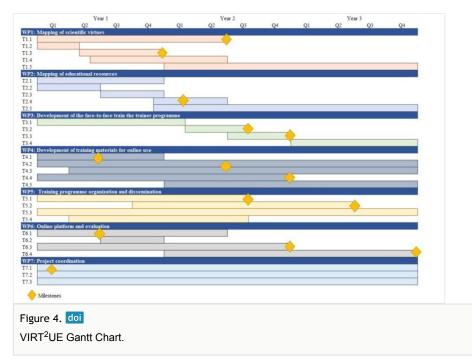
1. participation in inspirational events such as TED talks.
2. dedication of specific sections of the online platform for the general public.
3. involvement of VIRT^{2}UE via social media channels and responses to opinion articles in national newspapers.
4. contribution to national public debates on research integrity, by publishing in national newspapers and magazines.

3. Implementation

3.1 Work plan – work packages and deliverables

3.1.1 Overall structure of the work plan

In order to achieve its objectives, the project will be structured in 7 WPs. These involve stakeholder consultation (WP 1 and 2), training development (WP 3 and 4), implementation (WP 5), development of an online component (including training, evaluation and sustainability) (WP 6) and management (WP 7). For an overview of the interrelationship between work packages, please see Fig. 3 (PERT: Description of work packages). For the timing of the WPs, see the Gantt Chart below (Fig. 4).

Figure 4. doi
VIRT^{2}UE Gantt Chart.

Work package 1: Mapping of the scientific virtues

Start date M1, end date M36

Lead beneficiary: MEFST

Participants: VUmc (0.6 PM); KUL (9 PM); MEFST (40 PM); OeAWI (0.9 PM); EUREC (0.9 PM)

Objectives:

1.   Collect evidence on virtues related to good scientific practice.
2.   Identify, include and engage a diversity of stakeholders to engage in discussion about virtues related to good scientific practice.
3.   Define and rank the scientific virtues relevant for good scientific practice and explore potential differences across research disciplines.
4.   Achieve consensus about which virtues should have priority in developing the VIRT[2]UE training.
5.   Assessing the acceptability and usability of the virtue ranking in the training programme.

Description of work:

This work package is responsible for meeting overall objective 1: Conduct a conceptual mapping amongst stakeholders of virtues which are crucial for good scientific practice and their relation to the principles of the ECoC. The ECoC formulates principles which are related to virtues; these will be central to the development of VIRT[2]UE's training programme.

In order to develop a holistic virtue-based training programme, however, it is necessary to further develop the evidence base regarding which virtues should be stimulated and developed in training for good research practice. What do virtues mean in scientific practice? What is their proper place? How are they related to core elements of research?

The aim of this work package is to involve stakeholders in order to answer these questions. The stakeholder consultation will include a broad range of experts and will consist of a survey and two focus group meetings, followed by a Delphi consensus process. The results of the focus groups will be taken into account directly in the development of the training programme and materials and the results of the Delphi consensus process will be integrated in the process of adjusting the training programme. The results of this work package will provide information for the future efforts in scientific virtue training by providing evidence collected via a mixed-methods approach. In this way, the training programme will be based on evidence from the state-of-the-art in the field and from real-world consensus of stakeholders in the research process. This work package will be closely related to WPs 2 and 5 in identifying relevant stakeholders and analysing the results.

Task 1.1 Scoping review of virtues addressed in ERI training (M1-18)

1.   Prepare a search strategy for the scoping review.
2.   Retrieve, select, analyse publications and synthesise the findings of the scoping review.

Task 1.2 Preparation for stakeholder consultation (M-14)

1.   Identify representatives from different stakeholder groups for face-to-face focus groups from all members of the consortium and different domains – total of 24 from academics (research, education; n = 4), RI committees (n = 4), 2 policy-makers (n = 4), funding and process organisations (n = 4), students (n = 4), industry and SME (n = 4); and invite them to provide their opinions and experiences in a survey and two mixed focus group meetings of 12 persons each.
2.   Prepare the protocol for the focus group meetings (questionnaire and scripts for the group meeting).

Task 1.3 Face-to-face focus groups with stakeholders (M5-12)

1.   Conduct the first focus group.
2.   Analyse the results from the first focus group and adjust the scripts for the second focus group meeting in order to allow
3.   further in-depth discussion of the topics identified in the first focus group.
4.   Conduct the second focus group.
5.   Analyse the results from both focus groups and generate the initial list of virtues for training programmes.
6.   Generate the final list of virtues for discussion, with the input from the scoping systematic review.

Task 1.4 Modified Delphi consensus on virtues for the training programme (M6-18)

1.   Design the questionnaire for the Delphi consensus process, based on the literature results and results from focus groups.
2.   Identify 16 panel lists for the Delphi consensus process (stakeholders from different domains, different from those participating in focus groups).
3.   The first round of the Delphi consensus process.
4.   The second round of the Delphi consensus process.
5.   The third round of the Delphi consensus process.
6.   Presentation and discussion of the results of the Delphi process to the members of the consortium.
7.   Drafting of the final list of virtues for the training programme.

Task 1.5 Assessing the acceptability and usability of the virtue ranking in the training programme (M12-36)

1.   Iteratively assess the acceptability and usability of the virtue ranking during the development and assessment of the training programme.

Deliverables

- • D1.1 Report on the results from the stakeholder focus groups, M12.
- • D1.2 Scoping review of scientific virtues for training, M18.
- • D1.3 Report on results from the Delphi consultation process, M18.

Work package 2: Mapping of educational resources

Start date M1, end date M36

Lead beneficiary: KUL

Participants: VUmc (0.6 PM); KUL (17 PM); MEFST (20 PM); OeAWI (0.9 PM); EUREC (1.4 PM); UiO (0.9 PM); ANKU (8 PM); NTUA (2.1 PM); UH (1 PM); LU (2.6 PM); UCP (1.4 PM); UNINS (1.3 PM)

Objectives:

1. Collect evidence on existing ERI training practices and insights.
2. Identify, include and engage a diversity of trainers and other stakeholders for involvement in exchange on ERI training.
3. Determine the needs and possibilities for ERI training, with special attention for the context.
4. Develop an organisational embedding strategy.
5. Come to consensus on major challenges and good practices that should be prioritised in the VIRT^{2}UE training programme.

Description of work:

This work package is responsible for overall objective 2: Identify and consult ERI trainers and the wider scientific community to understand existing capacity and deficiencies in ERI educational resources.

More and more companies and research institutes experience the need for a thorough and focused ERI training for their researchers and personnel. Some have tried to set up an ERI training, others make use of initiatives that are organised by third parties. So far, there is no detailed overview of the different initiatives available. More importantly, there is a need to bring together the insights of local or regional initiatives, to gain insight into what works, as well as identifying concrete challenges and needs. This WP aims to tackle this need and the gaps in current initiatives. This will give us a state-of-the-art of the scientific evidence on ERI educational resources and allow us to reduce the current fragmentation of efforts and to optimise efficiency. The lead partner (KUL) has extensive experience with systematic reviews and research in ERI. They will closely collaborate with related EU-funded projects, like EnTIRE, PRINTEGER, DEFORM and ENERI. The result of this review will become input for WP 3, 4 and 6.

The work will consist of a literature review, focus groups and a consensus meeting. The results of the focus groups will be taken into account directly in the development of the

training programme and materials and the results of the consensus meeting will be integrated in the process of adjusting the training programme and the implementation.

Task 2.1 Reviewing the existing ERI training literature and practices (M1-12)

1. Review of scientific publications and grey literature on ERI training and education.
2. Map existing ERI training practices, in commercial and non-commercial organisations.

Task 2.2 Stakeholder consultation preparation (M1-6)

1. In close collaboration with WP 1 and WP 5, a representative sample of trainers and other relevant stakeholders from different contexts will be identified. Stakeholders from commercial organisations include industry, learned societies, policy-makers, publishing organisations and RPOs and consumer organisations, whereas stakeholders from non-commerical organisations include ERI trainers, researchers, ERI committee members and faculty Deans.
2. Stakeholders from commercial and non-commerical organisations will be invited to participate in separate focus groups.

Task 2.3 Focus groups on ERI training with selected stakeholders (M6-12)

1. Preparation of the qualitative empirical protocol.
2. Separate focus groups will be conducted for commercial and non-commerical stakeholders, including a dedicated Deans' forum focusing on embedding ERI training and tools in teaching curricula - in-line with the embedding strategy discussed in Section 2.2.
3. Identification of available insights, good practices, needs and lacunas of the different stakeholders.
4. Analysis of the content of the focus groups meetings.
5. The outcome of the focus groups will form the basis of the embedding strategy and be shared with other partners in VIRT^{2}UE so that it can serve as a basis and input for their strategies.

Task 2.4 Consensus meeting on priorities for the ERI training programme (M12-18)

1. In order to agree on which content, formats, needs and lacuna's resulting from the review (T3.1.) and the focus groups (T3.3.) will get priority, a consensus meeting will be organised. Relevant members of the VIRT²UE consortium, other EU-funded ERI projects and stakeholders will be invited so that a final list can be drafted. This will provide input for WP4 (materials to be updated for online use), WP 5 (dissemination strategy) and WP 6 (structure and content of the platform).

Task 2.5 Continuous update of the overview of existing literature and practices, to update the training programme and online repository (M12-36)

1. The training programme will be continuously updated to make it in line with the latest findings and developments in the field.

Deliverables:

- D2.1 Report on the results of the ERI literature and practices review, M12.
- D2.2 Report on the results of the stakeholder consultation, M12.
- D2.3 List of priorities and dissemination strategies for ERI training programmes in Europe, M18.

Work package 3: Development of the face-to-face train the trainer programme

Start date M1, end date M36

Lead beneficiary: UiO

Participants: VUmc (7.7 PM); KUL (2 PM); MEFST (3 PM); OeAWI (4.9 PM); EUREC (0.9 PM); UiO (14 PM); ANKU (8 PM); NTUA (3.6 PM); UH (2 PM); LU (2.6 PM); UCP (9 PM); UNINS (2.6 PM)

Objectives:

1. Develop a first draft of the face-to-face train-the-trainer programme.
2. Organise a pilot of the face-to-face training programme for all partners in VIRT^{2}UE.
3. Adapt the face-to-face train-the-trainer programme
4. Based on experiences and continuous evaluation of the training programme, adjust and further develop the face-to-face train-the-trainer programme.

Description of work:

This work package is responsible for overall objective 3: To develop the face-to-face component of the train-the-trainer programme that provides trainers with tools to foster researchers' virtues and promotes the ECoC and iteratively develop the training, based on evaluations (WP3)

The face-to-face train-the-trainer programme will enable ERI trainers to train researchers in sessions, aimed at reflecting on moral dilemmas and developing researchers' virtues. The face-to-face sessions are complementary to the online elements of the train-the-trainer programme, including the YouTube videos, the MOOC and other training materials (developed in WP 4). The face-to-face train-the-trainer programme will be developed in a learner-centred way, utilising the ideas of constructive alignment (i.e. alignment of learning outcomes, content, methods and assessment of learning), aimed at enabling participants in setting up their own training in the specific countries. The face-to-face train-the-trainer programme will make use of: lectures, literature, group/individual exercises, group and teacher feedback, self-reflection and observation forms, video feedback, personal learning goals and their development and portfolios about learning progress. A central component of the face-to-face train-the-trainer programme will be learning to facilitate group reflection on moral dilemmas in practice, next to role play, card games and other interactive approaches (such as fictional movies, art and theatre).

The face-to-face train-the-trainer programme will be developed in a participatory way. All partners in the consortium will be involved in the process of making the first draft version, by commenting on the draft. They will participate as trainees in the pilot of the programme. Based on the evaluation and the expert input of the partners, the programme will be adjusted. All partners will then organise training sessions in their country or region and train 10-15 future trainers. These newly-trained trainers will, at the end of the project, be equipped to organise training sessions for researchers. Experiences of trainers and researchers, assembled online, will be used to adjust the programme, both during the project and in the future and further adapt it to user needs. WP 3 will cooperate with WP 2 to be able to base the face-to-face train-the-trainer programme on relevant existing programmes and with WP 4 to develop the toolbox for trainers. WP 3 will also cooperate with WP 5 in preparing the trainers who were trained in the pilot phase for implementing the face-to-face train-the-trainer programme in their own country or region and with WP 6 to acquire data for evaluation and adaptation.

Task 3.1 Development of the first draft of face-to-face train-the-trainer programme (M1-14)

1. Based on an inventory of relevant face-to-face training programmes, using results of WP 2 for programmes related to ERI and a search for other relevant programmes, a first version of the face-to-face train-the-trainer programme will be developed. The programme will be based upon research and experience with similar methods available in the consortium, including the international training programme for facilitators of MCD.
2. The partners will be actively involved by organising various rounds of feedback. The basic structure will be a two-day face-to-face course, with lectures, exercises and feedback, followed by two one-day meetings. Between these three meetings, participants will practise the face-to-face train-the-trainer method themselves in small groups, observe each other and give feedback.

Task 3.2 Pilot the face-to-face train-the-trainer programme (M15-20)

1. The first version of the face-to-face train-the-trainer programme will be piloted, with participants from all partners in the consortium. In this way, the expertise in the consortium will be used to evaluate the programme and provide input for further development, both regarding educational aspects and adaptation to various target groups. In addition, all partners will have experience with the same training programme, which will foster standardisation and enable evaluation research.

Task 3.3 Adapt the face-to-face train-the-trainer programme (M18-24)

1. Based on the experiences of the pilot phase, the programme will be adapted. Specific attention will be paid to the need for and quality of tools for training and implementation/dissemination.
2. Hand-outs, observation forms, instruction videos and implementation support plans will be prepared for dissemination. They will be further developed in close cooperation with WP 4.

Task 3.4 Adjust and further develop the face-to-face train-the-trainer programme (M25-36)

1. Based on the evaluation of the online platform (WP6), through interactions and resulting feedback from the Question and Answer part of the platform, the programme will be continuously monitored and developed further.
2. Trainers who were trained in the pilot of the face-to-face train-the-trainer programme will organise face-to-face train-the-trainer programmes in their own country or region (WP5), training researchers who will become future trainers.
3. Experiences and feedback of both of trainers and researchers (potential future trainers), will be gathered and used for improvement of the programme.

Deliverables:

*   D3.1 First draft of the face-to-face train-the-trainer programme, M14.
*   D3.2 Report on the experiences of piloting the face-to-face train-the-trainer programme, M20.
*   D3.3 The face-to-face train-the-trainer programme, M23.

Work package 4: Development of training materials for online use

Start date M1, end date M36

Lead beneficiary: OeAWI

Participants: VUmc (9.6 PM); KUL (1 PM); MEFST (3 PM); OeAWI (22.3 PM); EUREC (0.9 PM); UiO (1.5 PM); ANKU (5.4 PM); NTUA (2.1 PM); UH (3 PM); LU (2.6 PM); UCP (9 PM); UNINS (1.3 PM)

Objectives:

1. Update and adapt educational materials for online learning.
2. Develop and record ten YouTube videos.
3. Develop an innovative online course (MOOC).
4. Develop an online toolbox for trainers.
5. Constantly update and improve training materials according to the needs of trainers and researchers.

Description of work:

The main objective of WP 4 is to produce educational materials for online learning by researchers and trainers. In most European countries, ERI-training is still not a mandatory part of curricula and/or the professional career development of trainers. Therefore, young researchers' training in ERI depends on having good mentors and role models or courses and lectures on ERI given by committed teachers or researchers. In this case, trainers mostly have to establish all training material on their own and might be described as "lone fighters". WP 4 aims to support and facilitate researchers and trainers with a toolkit of online educational materials and methods to promote blended and active learning.

This work package will update and adapt existing training materials, assembled in WP2 and make them available for online use. These will include both classical materials (e.g. presentation slides about different topics, such as data management, publication and authorship and peer review, but also about research misconduct and unacceptable research practices, how to deal with those and their negative impact on society and the research system itself) and innovative materials and approaches (e.g. discussion of case studies/moral dilemmas, card games, role plays/theatre, videos/film scenes and fictional movies and art). The materials will be used to create a series of YouTube movies and a MOOC, which will be made available online in WP 6. Specifically for trainers, tools supporting face-to-face training, developed in WP3, will be provided through an online toolbox, supporting trainers in preparing and executing their training programme. The toolbox will facilitate trainers to adapt their training programme to the diverse target groups regarding different disciplines, career stages and in addition to cultural/national differences. WP 4 is dependent on the results of WP 2 in order to build upon existing educational resources. There will also be close cooperation with WP 3 to incorporate the tools and create a toolbox for offline training. WP 4 will take into account the feedback received from trainers and researchers in WP 5 and WP 6. WP 4 will be dependent on WP 6 to put the results online.

Task 4.1

1. Existing materials (assembled in WP 2) will be scrutinised, updated and adapted for online use.
2. Besides traditional materials, new innovative training materials and approaches to foster blended learning and active learning will be explored and developed. This will include, for example, the use of case study/moral dilemma discussions, card games, role plays/theatre, videos/film scenes and art.

Task 4.2

1. A dedicated ERI YouTube channel will be created. The YouTube channel aims to reach and engage an already present and large community of scientists who are familiar with a certain type of educational video.
2. Ten YouTube videos will be developed to augment traditional online and offline teaching materials, while being available for an audience of trainers and researchers at large. Therefore videos will be produced according to a style specific to educational YouTube videos available today (e.g. 'talking heads', 'explanimations').

Task 4.3

1. Educational materials, as they are assembled in WP 2 and developed in WP 4, will be adapted to and incorporated into a MOOC together with the YouTube videos. The open access character of a MOOC will ensure that the educational materials are within reach of every trainer and scientist in and outside Europe.
2. A minimum of six courses on ERI will be provided on the MOOC, in total.

Task 4.4

1. The tools which are developed in WP 3 to support participants in the face-to-face train-the-trainer programme during practical exercises and in the implementation phase will be turned into a toolbox which will be made available online for trainers. Specific attention will be paid to tools which help trainers to adjust the programme to the target group (discipline, seniority, culture). The toolbox will consist of handouts supporting steps in the train-the-trainer programme or in the implementation phase, also explaining and underlying principles. WP 3 and WP 4 will cooperate closely, in order to use the experiences in practice (WP 3) for making materials more widely available online (WP 4).

Task 4.5

1. The interactions and resulting feedback from the Question and Answer part of the platform (WP 6) available to the community, will be used to improve training materials continuously.
2. Educational materials will be updated, based on input from researchers and trainers. The feedback from the first face-to-face train-the-trainer programmes executed by trained partners in the consortium (see WP 3 and WP5) will be important to further develop the face-to-face training programme and the associated educational materials.

Deliverables:

- D4.1 Delivery of the first educational videos on a dedicated YouTube channel, M18.
- D4.2 Delivery of first MOOC courses for VIRT2UE toolbox, M20.
- D4.3 7 YouTube videos, M24.
- D4.4 Toolbox for trainers, M24.
- D4.5 Massive Open Online Course (MOOC) – 6 courses, M34.

Work package 5: Training programme organisation and dissemination

Start date M1, end date M36

Lead beneficiary: EUREC

Participants: VUmc (1.2 PM); OeAWI (4.4 PM); EUREC (19.3 PM); UiO (0.6 PM); ANKU (0.1 PM); NTUA (2.7 PM); LU (5.3 PM); UCP (1.4 PM); UNINS (1.2 PM)

Objectives:

1. Identification of a significant numbers of ERI trainers in the EU member states.
2. Implementation of the train-the-trainer programme across Europe.
3. Development of a dissemination plan for the programme, the access points and the materials.
4. Establishing a capacity building road map for countries with less developed training opportunities.

Description of work:

This work package is responsible for overall project objective 5: To implement and disseminate the train-the-trainer programme across Europe, ensuring the training of sufficient trainers for each country and build capacity and consistency by focusing on underdeveloped regions and unifying fragmented efforts.

Based on the mapping strategies of WP 1 and WP 2 and on the developed face-to-face training programme and training materials in WP 3 and WP 4, WP 6 will establish a dissemination and implementation plan to organise the train-the-trainers programme in Europe. The main objective is that a European curriculum on ERI, linked with relevant materials and didactical methods, will be implemented in a practical way at an institutional level (universities and academies) and that ERI trainers all over Europe are able to use it in their own training programmes or to establish their own training programmes.

This process shall enhance a common European strategy for the improvement of the dissemination of an ERI teaching programme to foster upholding of the ECoC within the European research area. To guarantee a successful implementation and dissemination process, WP 5 will strongly cooperate with the relevant European networks in the field of research ethics, research integrity (i.e. EUREC, ENRIO, ENERI) and the networks of European universities and academies (i.e. ALLEA, EUA) to identify trainers and to implement the programme. The partners of WP 5 will also analyse the results of the recent EC projects in the field of ERI (i.e. SATORI, PRINTEGER, EnTIRE etc.) to fill gaps of awareness concerning existing case studies, training programmes and materials.

A particular focus will be on a capacity building road map for those countries where there is a lack ERI trainers. This WP is also responsible for implementing the embedding strategy, developed as part of WP 2, to promote uptake of the ERI training programme at the institutional level (e.g. uptake in teaching curricula or training programmes of universities and industry).

Task 5.1 Identification of ERI trainers in the EU member states, Turkey, Switzerland and Norway (M1-20)

1. The partners will develop a list of criteria (training experiences, academic education, professional position, type of students to teach etc.) to identify trainers in the field of ERI.
2. Well-established networks, organisations and institutions will be contacted to identify a significant number of trainers in EU member states (in cooperation with EUREC, ENRIO, ENERI, ALLEA, EUA, TRREE etc.).
3. This will result in a database of ERI trainers. The database will be developed in cooperation with the databases established in the EnTIRE and the ENERI project and provide it via a common European access point.

Task 5.2 Organisation of the face-to-face train-the-trainer programme (M10-30)

1. All the partners in the consortium, after having participated in the first draft of the face-to-face train-the-trainer programme in WP 3, will organise face-to-face training sessions in their country or region. WP 5 will support the partners in finding candidates (based on the outcome of the identification of trainers (Task 5.1)).
2. Monitor progress and provide support when necessary.
3. Develop materials which can assist all trainers in Europe who have been trained in the face-to-face train-the-trainer programme to implement the training themselves later, using evaluation results assembled on the platform (WP 6).

Task 5.3 Development of a dissemination and communication plan and embedding strategy (M1-36)

1. The partners will develop a dissemination and communication plan to advertise and to establish the teaching programme for the ERI trainers. It will include the production of leaflets, electronic advertising (incl. newsletter) and public outreach (incl. social media presence and contribution to public debate).
2. The partners will develop an embedding strategy for commercial (industry, RPOs) and non-commercial organisations (academia, RFOs), promoting integration of ERI training into teaching curricula and training programmes at the institutional level.

Task 5.4 Establishing a capacity building road map for countries with less developed training opportunities (M10-28)

1. Based on the database of ERI trainers in different regions (Task 5.1) and the mapping of existing ERI educational resources (WP 2), the regions, in which a process of capacity building is necessary, will be identified. Together with fellows of the on-going programme of the Advanced Certificate Programme for Central and Eastern Europe and with representatives of relevant institutions/organisations of the identified countries, a road map of capacity building will be established.
2. For those areas, a strategy for capacity building will be developed. This includes the identification and support, including networking and career support, of persons with capacities to become an ERI teacher in the future.

Deliverables:

- D5.1 List of ERI teachers, M12.
- D5.2 Report on face-to-face training-the-trainer programmes (all countries) and implementation plan, M20.
- D5.3 Dissemination strategy for the programme, M24.
- D.5.4 Capacity building road map, M28.

Work package 6: Training programme organisation and dissemination

Start date M1, end date M36

Lead beneficiary: VUmc

Participants: VUmc (13.5 PM); KUL (1 PM); MEFST (3 PM); OeAWI (1.4 PM); EUREC (0.9 PM); UiO (0.9 PM); ANKU (0.1 PM); Momkai (31.3 PM).

Objectives:

1. Deploy an online open source and open access blended learning platform.
2. Develop an intuitive and engaging interface for the online platform.
3. Evaluate the community's use and needs for the training programme.
4. Establish a continuous evaluation and iterative development feedback loop with trainers and researchers.

Description of work:

WP 6 is responsible for overall objective 6: To develop the online training platform and user interface, which will be instrumental in evaluation of trainers' and researchers' needs and project sustainability.

The main strategy in WP6 is to use existing open source software technologies with a proven track record for implementation on the platform. The Massive Open Online Courses (MOOC) software and Question and Answer (Q&A) software have been successfully used by numerous distinguished academic or commercial organisations. This ensures low cost implementation, allows for a focus on the specific ERI adaptation and severely reduces the risk of problems with software development (e.g. developmental delays, additional costs).

The EnTIRE platform will host the online e-learning platform, allowing VIRT^{2}UE to focus investments on user experience software developments. All educational ERI materials will be open access and, thus, freely available. This allows stakeholders (e.g. academia and industry) to embed the materials into their curriculum, which increases the value and dependency on the platform. The Q&A part of the platform allows for a strong involvement of the ERI community for evaluation purposes. Questions which are frequent or have great importance within the community about ERI content will be used to adapt the platform. A continuous evaluation and iterative development feedback loop will be created. Important topics will also be used as input for material development (WP 4), for example, by covering them on the dedicated YouTube channel. This ensures that there is a strong and direct link between the community's needs, actual use and the platform's content and identity. This identity will be strengthened by branding of the platform from which its authority should be recognisable.

Task 6.1 Deploy relevant software packages on the EnTIRE platform (M18)

1. The open blended learning platform will consist of two open source packages readily available online for e-learning. A MOOC and Q&A site will be hosted and seamlessly integrated on the pre-existing EnTIRE platform.

Task 6.2 Perform a pilot evaluation of the user interface (M7-12)

1.   The e-learning MOOC and Q&A software have a general interface. A pilot evaluation will assess the functionality, expectations and needs for the online e-learning platform, specifically with the ERI user in mind.

Task 6.3 Develop an intuitive and engaging user interface and brand for the online platform (M1-24)

1.   For the open blended learning platform, a look and feel will be developed which supports interactive ERI learning on the platform. The interface complements the ERI content to establish the platform as an entity with a distinct and recognisable brand. This will be achieved by developing intuitive pictograms, animations, a distinct typography and a style guide for e-learning content creation. The resulting intuitive and engaging interface will have the feel of a natural extension of the EnTIRE platform.

Task 6.4 Perform an evaluation of the experience of the community with the platform and recognisability of its identity (M13-36)

1.   The new version of the platform will be evaluated by using the community of users online. Current functionalities and wishes for further development will be assessed.
2.   The identity and branding of the platform will be evaluated.
3.   These evaluation results will be compiled in plans for long term sustainability and plans for future development.

Deliverables:

-    D6.1 The pilot version of the e-learning platform is online, M6.
-    D6.2 Report on findings of the pilot evaluation, M12.
-    D6.4 Version 2.0 of the e-learning platform is available, M24.
-    D6.4 Plan for future platform development, M36.

Work package 7: Project Coordination

Start date M1, end date M36

Lead beneficiary: VUmc

Participants: VUmc (27.4 PM); KUL (1 PM); MEFST (3 PM); OeAWI (1.4 PM); EUREC (0.9 PM); UiO (0.9 PM); ANKU (5.4 PM); NTUA (0.5 PM); UH (1 PM); LU (3 PM); UCP (1.4 PM); UNINS (0.7 PM)

Objectives:

1.   Ensure the achievement of the project, as well as WPs strategic objectives.
2.   Ensure inter-WP alignment, collaboration and integration of efforts and objectives.
3.   Ensure compliance with ethical and data management standards.

4.   Manage and monitor financial resources.
5.   Coordinate communication with and reporting to the European Commission.
6.   Support the project bodies and WP leaders.

Description of work:

VUmc will be in charge of the management and coordination of the project and will be supported in this task by the General Assembly, the Executive Board and the Advisory Board, as illustrated in section 3.2. The main aim of WP 7 is to ensure the day-to-day coordination of activities and provide scientific, administrative and financial direction to the VIRT^{2}UE consortium and all WPs. Furthermore, WP 7 will be responsible for: monitoring the ethical, legal, financial, contractual and IPR issues, handling the Grant Agreement and Consortium Agreement writing, amendments and signature procedures, as well as the EC audits and reviews. The Project Coordinator will be responsible for the communication amongst the members of the consortium and with the EC and for the distribution of the EC payment to the partners.

Task 7.1 Scientific coordination (M1-36)

1.   Providing scientific support in order to ensure integration and collaboration between WPs.
2.   Supporting WP 6 in integrating other's WPs efforts.
3.   Monitor the scientific quality of deliverables.
4.   Ensuring intra-WP alignment and integration between the findings of the different WPs.

Task 7.2

1.   Monitoring contracts in collaboration with the finance department.
2.   Keeping financial records.
3.   Calculating and distributing partner shares according to the rules stipulated in the Consortium Agreement.
4.   Coordination of the submission of the financial statement by all partners.

Task 7.3

1.   Writing project management, data management and quality assurance plans.
2.   Ensuring efficient day-to-day correspondence between members and acting as an intermediary between the consortium and the EC.
3.   Ensuring compliance with WP deliverables and milestones deadlines and monitoring their submission.
4.   Monitoring the progress of all WPs and supervising the adaptation of work plan to the status of the outputs.
5.   Providing logistic support for the organisation of General Assembly, Executive Board and Advisory Board meeting.
6.   Providing reports and follow up on project meetings.
7.   Writing and submitting reports for the EC.

8.   Creating and maintaining the project archive.

Deliverables:

- •   D7.1 Project management and quality assurance plan, M2.
- •   D7.2 Documents providing templates and logo for a corporate and uniform look, M3.
- •   D7.3 Data management plan, M6; D7.4 Report for the EC 1, M18.
- •   D7.5 Report for the EC 2, M36.

Work packages are listed in Table 11 and deliverables are listed in Table 12.

Table 11.

List of Work Packages.

WP no.	WP title	Lead participant no.	Lead participant name	Person months
1	Mapping of scientific virtues	3	MEFST	51.4
2	Mapping of educational resources	2	KUL	57.2
3	Development of face-to-face train-the-trainer programme	6	UiO	60.3
4	Development of training materials for online use	4	OeAWI	61.7
5	Training programme organisation and dissemination	5	EUREC	36.2
6	Online platform and evaluation	1	VUmc	52
7	Project coordination	1	VUmc	46.6
			Total PM	365.4

Table 12.

List of Deliverables.

Deliv. no.	Deliverable name	WP no.	Lead Part.	Type	Diss. Level	Delivery date
D1.1	Scoping review of scientific virtues for training	1	3 - MEFST	OTHER	PU	18
D1.2	Report on the results from the stakeholder focus groups	1	3 - MEFST	R	PU	12
D1.3	Report on results from the Delphi consultation process	1	3 - MEFST	R	PU	18

Deliv. no.	Deliverable name	WP no.	Lead Part.	Type	Diss. Level	Delivery date
D2.1	Report on the results of the ERI literature and practices review	2	2 - KUL	R	PU	12
D2.2	Report on the results of the stakeholder consultation	2	2 - KUL	R	CO	12
D2.3	List of priorities and dissemination strategies for ERI training programmes in Europe	2	2 - KUL	R	PU	18
D3.1	First draft of the face-to-face train-the-trainer programme	3	6 - UiO	DEM	CO	14
D3.2	Report on the experiences of piloting the face-to-face train-the-trainer programme	3	6 - UiO	R	CO	20
D3.3	The face-to-face train-the-trainer programme	3	6 - UiO	DEM	PU	23
D4.2	Delivery of the first educational videos on a dedicated YouTube channel	4	4 - OeAWI	DEC	PU	18
D4.1	Delivery of first MOOC courses for VIRT^{2}UE toolbox	4	4 - OeAWI	DEC	PU	20
D4.2	7 YouTube videos	4	4 - OeAWI	DEC	PU	24
D4.3	Toolbox for trainers	4	4 - OeAWI	DEC	PU	24
D4.4	Massive Open Online Course (MOOC) – 6 courses	4	4 - OeAWI	DEC	PU	34
D5.1	List of ERI teachers	5	5 - EUREC	R	PU	12
D5.2	Report on face-to-face training-the-trainer programmes (all countries) and implementation plan	5	5 - EUREC	R	PU	20
D5.3	Dissemination strategy for the programme	5	5 - EUREC	R	PU	24
D5.4	Capacity building road map	5	5 - EUREC	R	PU	28
D6.1	The pilot version of the e-learning platform is online	6	1 - VUmc	DEC	PU	6
D6.2	Report on findings of the pilot evaluation	6	1 - VUmc	R	PU	12
D6.3	Version 2.0 of the e-learning platform is available	6	1 - VUmc	DEC	PU	24
D6.4	Plan for future platform development	6	1 - VUmc	R	PU	36
D7.1	Project management and quality assurance plan	7	1 - VUmc	R	PU	2

Deliv. no.	Deliverable name	WP no.	Lead Part.	Type	Diss. Level	Delivery date
D7.2	Documents providing templates and logo for a corporate and uniform look	7	1 - VUmc	R	PU	3
D7.3	Data management plan	7	1 - VUmc	ORDP	PU	6
D7.4	Report for the EC 1	7	1 - VUmc	R	PU	18
D7.5	Report for the EC 2	7	1 - VUmc	R	PU	36

3.2 Management structure and procedures

In order to guarantee an efficient and effective functioning, VIRT^{2}UE will install a dedicated project management structure, defining the roles, responsibilities, decision-making authorities, processes and procedures. The previous experience of most of WP leaders with projects funded by the EU provides the consortium with an extensive collective expertise and experience in the management and operations of EU-funded projects. Moreover, the majority of partners are currently collaborating, or have done so in the past, in other projects. Prof. Guy Widdershoven (Project leader of WP1) has extensive experience in managing large collaborative projects and is currently the Project Coordinator of EnTIRE, (successfully granted by the EU in May 2017) which counts 10 partners from all over Europe. As Head of the Department of the Medical Humanities (30 fte) of the coordinating beneficiary, the VUmc, he has been successful in scientific supervision and financial management. In addition to this personal expertise, the project coordination will be supported by a large infrastructural support. The coordinating beneficiary (VUmc) is currently involved in more than twenty H2020 projects - nine as coordinator. Thanks to this valuable experience, an extensive set of structures and procedures have been put in place to ensure the successful management and delivery of the project, the scientific quality of the research and to ensure that dissemination and stakeholder engagement deliver the expected impacts. The management structure of VIRT ^{2}UE involves the following decision-making, advisory and executive bodies: an executive board, an advisory board, a general assembly and project management. The management structure of VIRT^{2}UE is divided into three managerial levels (general assembly, executive board and project management) and is highly supported by the advisory board. The management structure and detailed roles, responsibilities, voting procedures, meeting frequencies and procedures and decision-making processes and levels of authority will be stipulated in the VIRT^{2}UE Consortium Agreement (CA), which will be based on the broadly applied DESCA (Development of a Simplified Consortium Agreement) model. Further support is provided by European Commission and external institutions. A schematic overview of the management structure of VIRT^{2}UE is presented below (Fig. 5).

Executive Board (EB): The executive board (EB) is the highest decision-making body of VIRT^{2}UE and consists of the Project Coordinator, who will also chair the EB and the WP leaders. The EB's main responsibility is to oversee the project's progress and provide a forum for discussions on the strategic orientation and development of the project in

accordance with deliverables, milestones and budgetary limits. Additionally, the EB will be responsible for decision-making on issues on strategic-project level, especially for what concerns the overall risk management. Moreover, the EB will be responsible for the definition of the scientific agenda, the preparation of the management meetings, the monitoring of the progress of the inter-work-package collaboration (in line with the overall objectives of the project as defined in the DoA), the preparation of the reports and forms required by agreements with the EC and the collaboration with external stakeholders and partners. As the highest hierarchical body, the EB has the sole authority to decide on issues that necessitate changes in the EC Grant Agreement (in consultation with the European Commission). The EB will convene at least twice a year. One of these meetings will precede the annual GA meeting, whereas the other one could be a telephone conference. Additional meetings can be organised upon request of any member of the EB to the chairman.

Figure 5. doi

Management structure.

General assembly (GA): The second managerial level in VIRT^{2}UE is the General Assembly (GA). The GA will consist of one representative of all partners in the Consortium and will be chaired by the Project Coordinator, Prof. Guy Widdershoven. The General Assembly will discuss results, progress and decisions with the EB on a regular basis. It will function as an internal advisory body and it will meet face-to-face at the end of each reporting period to review the advancement of the project and prepare the contractual reporting obligations to the EC, by specifically focusing on the completeness, timeliness

and quality. Additional meetings can be requested at any time, through a written request to the EB. The GA responsibilities include decisions on issues, such as:

- Changes in the Consortium (new partners, replacement of partners or replacement of the coordinator).
- Changes in the overall objectives or approach of VIRT^{2}UE.
- Decision-making about work package-related activities and corrective procedures for foreseen or unforeseen issues.
- Conflicts between partners.
- Changes in partners' budgets.
- Changes in the composition of the Management Bodies.
- IPR management and dissemination plans revision.
- Changes or amendments in the Consortium Agreement.

Table 13.

Advisory Board Members.

Name	Organisation/ Affiliation	Expertise relevant to the project
Tom Lavrijssen	Janssen R&D	Associate Director and Domain Expert for Quality Assurance in a non-regulated pharmaceutical setting and Bioresearch Quality & Compliance.
Bergt Saenen	European University Association	Policy and Project Officer in the Institutional Development Unit of European University Association, focusing on developing and coordinating the activities and events of the Council for Doctoral Education.
Maura Hiney	Health Research Board, Science Europe, ALLEA	Head of Post-Award Management and Evaluation at Health Research Board (HRB), Chair of ALL European Academies (ALLEA) task group on research integrity, former Chair of the writing committee that revised the ECCRI and of the Science Europe Working Group on research integrity.
Mike Kalichman	UC San Diego, RCREC	Director of the UC San Diego Research Ethics Programme, project director for a Web-based resource for instructors of courses in the responsible conduct of research and founding director of the San Diego Research Ethics Consortium.
Elizabeth Moylan	BioMed Central, COPE	Council Member for Committee on Publication Ethics (COPE), Senior Editor (Research Integrity) at BioMed Central.
Michael Gommel	Ulm University	Founding member of Team Scientific Integrity. Since 1996, he has been teaching good scientific practice and research ethics in several European countries.
Ton Hol	Utrecht University, LERU	Head of the Utrecht School of Law and Vice-dean of Law, Economics and Governance. Professor of Jurisprudence and Legal Philosophy at Utrecht University, Chair of the League of European Research Universities (LERU) Thematic Group Research Integrity (TGRI) and Chair of the standing committee on RI and RCR.

Name	Organisation/ Affiliation	Expertise relevant to the project
Martijn Meeter	Vrije Universiteit Amsterdam	Full Professor in Education Sciences at Vrije Universiteit Amsterdam (VU), Director of the LEARN research institute and of the teacher training programme of the VU. His research focuses on learning and use classic methods of education research and cognitive neuroscience.

More detailed information about the functioning of the GA (including voting procedures, veto right and communication) will be specified in the Consortium Agreement. Advisory Board (AB): VIRT^{2}UE will install an external advisory board (AB), which will provide regular advice on the quality of the deliverables and the development of the project in accordance with the highest ethical and scientific standards. The advisory board will ensure VIRT^{2}UE of input on its activities and results from the perspective of its main stakeholders, including the private sector. The AB members have been selected for 1) their expertise in the field of education, 2) their prominent role in research conducted within the industrial private sector, 3) their expertise in the field of research ethics and integrity and 4) their prominent role in national and international policy-making. The AB will not have decision authority in the project, but will review data, research and other scientific studies published in recognised journals and provide advice and feedback on the achievement of the project. It will also provide advice on dissemination exploitation of the project in order to ensure efficiency and strategic collaboration with the relevant stakeholders in the field. The members of the AB are independent and, therefore, no budget is reserved for AB consultations. Regular meetings will be held between the representatives of the advisory boards and the executive board. Additionally, the advisory board will be invited to provide advice when necessary, also in consultation with the EC representatives. The AB consists of the persons and/or organisations detailed in Table 13.

Project Management: VIRT^{2}UE will have in place a central Project Management structure, which will be headed by the project coordinator (CO) Prof. Guy Widdershoven. A dedicated project office will be established, which will be formed by a project manager, a financial manager and a project secretary. The project office will be responsible for providing the Consortium with professional dedicated administrative, legal and financial support and management of the project. Moreover, the coordinating institute (VUmc) will act as intermediary and main spokes-person for all communication between the Consortium and the European Commission. In compliance with the Grant Agreement and in the Consortium Agreement, this also entails that the coordinator will be responsible for:

1. the collection, revision and submission of the reports, documents and forms required by the European Commission.
2. the administration and distribution of the financial contribution of the European Commission.
3. the developing and maintaining of the Project management plans and a Data management plan.

Moreover, under the responsibility of the CO, Prof. Guy Widdershoven, the project manager will be in charge for the daily administrative tasks and will support the Consortium by:

1.   ensuring effective communication amongst consortium members.
2.   designing templates and formats to be used for the composition of reports and deliverables.
3.   preparing and implementing project and network meeting (including the preparation and distribution of the agendas, supporting documents and minutes).

The project manager will be supported by a legal counsel and a financial controller who will ensure monitoring of the budget and will provide assistance to the Consortium partners for possible issues that might be encountered during the whole life of the project. Furthermore, the project office will be able to count on dedicated support offices to provide expert administrative and project management advice and support to the project management team. WP Leaders and Teams: At the WP level, each WP team is coordinated by a WP leader (WPL). The WPLs are responsible for the operational management and co-ordination of the activities of their respective WP. In order to ensure proper implementation for each WP, specific and concrete tasks and outputs have been defined. WPL will be responsible for the distribution and management of tasks amongst the team members. This will ensure the implementation of the WP duties and will provide support to the WPL. Each task will be led by Task leaders, but the final responsibility for the overall results of the WP will remain with the WP leader who will be responsible for:

•   Monitoring the progress of the activities in their WP towards the WP objectives and deliverables, within the WP budgets.
•   Nominating Task leaders and coordinating their efforts in accordance with the DoA.
•   Ensuring a high quality of the deliverables in accordance with the quality assurance plan (to be delivered by the project coordinator as part of the project management plan).
•   Safeguarding of the intra-WP coherence of the activities by organising team meeting on a regular basis.
•   Identifying risks as early as possible and informing the CO by suggesting appropriate measures to mitigate them and reduce the unfavourable consequences for the project as a whole.
•   Providing outputs for the preparation of periodic and final reports to the project coordinator.

WPLs have the responsibility to report to the GA and the EB (if requested) and, together with the project office, they ensure that efficient time planning and tasks subdivision is established during the whole life of the project. In case a deliverable is in danger of being delayed, an extraordinary report should be provided to the CO who (if necessary) will report to the EB as well as the EC Project officer in order to plan and ensure the implementation of the necessary corrective measures. The WPL will be in charge of organising regular conference calls (at least every 4 months) with the CO and WP partners

in order to inform them about the progress made and ensure alignment of the efforts within the different WPs.

Management platform: The previous management experience with the EnTIRE project will provide the VIRT^{2}UE Consortium with efficient management tools. To ensure smooth management and monitoring of the project progress, EnTIRE has developed an open source management platform, which will be made available for all the members of the VIRT^{2}UE consortium. Through this open source platform, which has been set up according to the wiki-model, the Consortium will be able to monitor and contribute to the management of the project. This will support the management tasks, for which WP7 is responsible, but it will also allow every member to have a broad overview of the advancements of the project and, by fostering transparency, it will also enhance the collaboration amongst members, thus engaging the entire Consortium in the management and monitoring process of the project. Quality procedures: The project coordinator will develop a quality assurance plan to ensure the highest scientific quality of all the deliverables and general outputs of the project. Overall, WPLs are responsible for their WP deliverables, which will have to be approved by the CO and subject to peer review. The peer review process will be divided into three phases:

1.   Approval by the WP leader.
2.   Approval by an external appointed expert or by two scientific experts from the project consortium.
3.   Approval by the project coordinator.

The WP leader, after approval of the CO, will be in charge of approaching and appointing an external/internal advisor and/or scientific expert for the quality checking and review of the deliverable. To ensure dissemination amongst members and intra-WP collaboration, deliverables will be shared through the management platform. This will enable partners to collaboratively work on the deliverables by providing feedback and will also allow the monitoring of the deliverable status. The CO is responsible for submitting the deliverables by uploading them on the participant portal. Any issues with quality will be resolved before final approval and submission to the EC. The Advisory Board can be consulted anytime during the process and AB members can be appointed as external expert reviewers, if necessary.

Communication: Effective communication is essential to guarantee the success of a large collaborative project, such as VIRT^{2}UE. For this reason, VIRT^{2}UE will develop and implement several communication strategies to guarantee effective collaboration and communication within the consortium, with external partners and with advisory board members. The management platform will play an essential role as it will provide the consortium with a communication centre. For what concerns the external communication, a project website will be set up to disseminate the results of the project and provide information on objectives, results, partners and events. As this is a CSA project, communication is a cornerstone of the project. This will be taken care of by WP7, which will be responsible for the public part of dissemination and will take the lead in drafting the communication strategy (as part of the dissemination plan).

Meetings: Regular meeting will be organised during the life of the project. The VIRT^{2}UE Consortium Agreement will include detailed rules and procedures on these meetings and reporting cycles (e.g. notifications of meetings, agenda setting, formal distribution of minutes and voting procedures). In general, the chair of the meeting will be responsible for the organisation (agenda, minutes, location) and follow up the meeting. In Table 14, an overview of the meeting is presented.

Table 14.

Meetings' overview.

Body	Frequency/method	Scope
General Assembly	At the end of each reporting period (face-to-face)	Reporting to the EC, amendments to the CA or GA, dissemination, exploitation, controversies and issues resolution
Executive Board	Twice a year (once before the GA meeting) (face-to-face and conference calls)	Overall progress of the project's objectives, organisation of the management meetings, reporting to the GA, inter-WP alignment, scientific discussions and associated decisions, financial reporting
Advisory Board	Every 12 month (face-to-face and conference calls)	External advice on relevant issues
WP teams	Every 4 months (or more frequently, if necessary) (face-to-face and conference calls)	WP progress, intra WP alignment of tasks, financial monitoring.

Consortium meetings will be held every year. These meeting and reporting cycles are the basis of the VIRT^{2}UE monitoring. At WP level, the WPLs formally meet every four months with additional ad-hoc informal meetings and teleconferences to discuss operational affairs. WP meetings are organised and implemented by the WPL, who is also responsible for reporting the progress of his/her WP to the EB on behalf of the WP. Some WPs can 'suffice' with one meeting every four months; other WPs may need additional WP meetings to do justice to the complexity of the activities in these WPs. The EB of VIRT^{2}UE will meet every 6 months. Standard agenda items for the EB meetings are the progress of work in each of the WPs, issues hampering timely progress or quality of work and possible corrective measures, reporting of ethical issues (collection of approvals etc.), items eligible for external dissemination, external events necessitating adaptations in planning and/or content of activities and items that need External Advisory Board consultations. Standard formal internal report formats for the WP and EB reports will be developed by the VIRT^{2}UE Project Management.

Reporting: During the lifetime of the project, VIRT^{2}UE will provide the EC with periodic technical and financial reports. The periodic reporting periods are listed in Table 15. All milestones will be verified with the EC and the means of verification are detailed in Table 16. In addition to these reports, within 60 days from the end of the project, the Project Coordinator, in consultation with the partners, will submit a final report. This report will include a summary for publication including an overview of results and a description of the

potential impact of the action, with a specific focus on the societal impact and a dissemination and exploitation plan for the long-term use of project results. The financial reporting will be created through the participant portal. The VIRT^{2}UE Consortium agreement will provide guidelines and rules for the reporting obligations including format, deadlines and contents to be covered by the reports. The lead investigator from each Consortium member will be responsible for the provision of the documents needed for the composition of the EC reporting. All reports will be coordinated and monitored by the CO. The final report, cost certificates (audit certificates) and other deliverables foreseen will be sent to the EC representative by the deadline given in the contract.

Table 15.

Reporting periods.

Report	Reporting period
Periodic report	Months 1-18
Periodic report	Months 18-36

Table 16.

List of milestones.

Milestone number	Milestone name	Related WPs	Due date (in month)	Means of verification
M1.1	Stakeholders' feedback from focus groups collected and analysed	1	12	Report
M1.2	Results from the scoping review of literature.	1	18	Report
M2.1	Consensus meeting of experts on priorities for ERI training organised	2	14	Minutes sheet
M3.1	Data from pilot phase collected and discussed with consortium members	3	19	Report
M3.2	Train-the-trainer programme material online	3	24	Screens
M4.1	First materials for online learning for trainers and researchers are available online	4	6	Website
M4.2	MOOC and YouTube channel are online	4	18	Website
M4.3	Toolbox for trainers is available online	4	24	Website
M5.1	Database of ERI teachers	5	20	Launch
M5.2	Face-to-face train-the-trainer programmes organised, covering all EU countries, Turkey, Norway and Switzerland	5	30	Training

Milestone number	Milestone name	Related WPs	Due date (in month)	Means of verification
M6.1	The pilot version of the e-learning platform is available	6	6	Website
M6.2	Version 2.0 of the e-learning platform is available	6	24	Website
M6.3	Over 50,000 users across more than 10 European countries have used the e-learning platform	6	36	User statistics of the platform
M7.1	Kick off meeting	7	2	Minutes sheet

Critical risks for implementation and possible mitigation strategies have also been identified (Table 17).

3.3 Consortium as a whole

The VIRT[2]UE Consortium is specifically designed to cover the objectives as stated in the call text. The project structure has been defined to maximise participation whilst, at the same time, establishing an efficient consortium which will coordinate all the efforts devoted to the project. In deciding on the composition of the VIRT[2]UE Consortium, the following main criteria guided the inclusion in the consortium:

Table 17.

Critical risks for implementation.

Description of risk (indicate level of likelihood: Low/Medium/High)	WP	Proposed risk-mitigation measures
Stakeholders may not be responsive or interested in taking part in consultations	1 and 2	We have experience in focus group research and know well the potential stakeholders so we will be able to address them personally if the interest is low
Delphi consultation process is time-consuming and there may be a lack of interest to participate in the process.	1	We have extensive experience in Delphi consultation process (Ann Int Med 2017) and will ask colleagues from all European countries for assistance in identifying and inviting participants.
Lack of interest in consensus meetings	2	The consortium's strong ERI networks will aid us in attracting experts for the consensus meeting.
Not enough participants or drop out in the pilot phase or the implementation phase	3	In the first draft of the training, partners in the consortium will be trained; they have both interest and financial means; in the implementation phase, the trainers will be supported by an implementation strategy (to be developed in cooperation with WP5)

Description of risk (indicate level of likelihood: Low/Medium/High)	WP	Proposed risk-mitigation measures
Too few tools developed or tools remaining not sufficient to meet trainers' needs in WP 3	4	Cooperation between WP 3 and 4 will be close, so that the needs of WP 4 (make explicit procedures and turn them into tools for online use) can be addressed, for instance, by interviewing trainers to make tacit knowledge explicit
The project cannot establish the programme itself. When universities and research institutions do not cooperate, the programme cannot be implemented.	5	The integration of and cooperation with relevant networks will help successfully involve stakeholders in the implementation plan and the dissemination strategy. The fact that the awareness of the ECoC is necessary for any EC funding should be used in the strategy of the project. Additionally, other funders should be integrated in the implementation to convince them that they also support this process of awareness.
Software development issues (e.g. bugs, delays)	6	The risks of software development are mitigated by using open source software. In case of significant problems, we can involve the developers of the original software package to help resolve software implementation errors.
Low user uptake	6	The risk that we will have a small number of online users can be mitigated by forming connections with existing scientific online networks, such as ORCID who already have a network of millions of researchers.
Lack of communication between partners: this can cause lack of integration between WP efforts and undermine the overall results of the project.	7	A project management platform will be used in order to ensure good communication and transparency. An efficient management plan will ensure regular meeting planning. Moreover, most of the partners have been already collaborating in other projects.
Insufficient integration of results: this can delay the research and lead to delay the submission of deliverables and milestones.	7	The organisation of regular WP team meetings and WP leaders will ensure integration of efforts. The quality assurance plan will suggest a schedule for the preparation revision and submission of the deliverables. The whole deliverable writing and reviewing process will be monitored by all partners on the management platform.
Partners leaving the consortium	7	In the unfortunate situation of one partner leaving the consortium, the other partners will be responsible for finalising the work of the leaving partner and for seeking a new partner of similar value to replace the one who left.

Inclusion of Europe's leading expertise: The VIRT²UE Consortium includes much of the leading expertise in education in ethics and research integrity in Europe. Many of the partners have demonstrated extensive expertise in developing, delivering and evaluating ERI training programmes and materials for multiple stakeholders at local and national levels, including blended learning approaches. This experience is detailed in Section 1.

Synergies and complementarities: Each partner has been carefully chosen to reflect leading expertise in the tasks and WPs they will participate in. Consequently, there are many complementarities. The participatory approach, focusing on stakeholder consultation and community engagement, is endorsed by all partners. The lead partner (VUmc) has experience with fostering stakeholder participation through qualitative research, both nationally (in developing networks for clinical ethics support and for patient participation in healthcare) and internationally (for instance, the European Clinical Ethics Network). Partners 2 (KUL), 3 (MEFST) and 4 (OeAWI) are also experts in the field of stakeholder research. The inclusion of these partners guarantees successful execution of the stakeholder consultation that leads to fulfilment of VIRT^{2}UE's objectives 1, 2 and 6. The scientific partners complement each other in terms of excellence in leadership in different aspects of ethics and research integrity education: expertise in Moral Case Deliberation (partners 1 (VUmc), 2 (KUL) and 7 (ANKU)), in the development of ethics and research integrity courses (partners 1-6: VUmc, KUL, MEFST, OeAWI, EUREC and UiO), in the development of teaching resources and tools (partners 3 (MEFST) and 4 (OeAWI)), in training trainers (partners 1 (VUmc) and 2 (KUL), in education research (partner 10 (UL)) and in methods education (partner 1 (VUmc) and 3 (MEFST). The combined expertise will ensure the successful development of the training programme and materials, which leads to the fulfilment of objectives 3 and 4. VIRT^{2}UE's Consortium participants also complement each other in approaching ERI from a variety of research domains and representing a diversity of European political, social and cultural contexts, as detailed in Section 1. All scientific consortium partners are involved in multiple national and international ERI projects and play prominent roles in important ERI networks (see next section). These networks will facilitate successful fulfilment of objectives 1, 2, 5 and 6. In addition, an expert in online design is included as partner to ensure professional development of the blended learning platform (partner 13 (MOMKAI)). This partner will play an important role in supporting the WPs responsible for objectives 3-6. Lastly, the consortium benefits from an Advisory Board that consists of six experts from different countries within and beyond the EU. These experts will consistently provide advice on the deliverables of the VIRT^{2}UE project. The coordinating partner (VUmc) has extensive experience in H2020 project management and has a solid infrastructure facilitating this efficiently and effectively. In total, the Consortium is balanced over the objectives and is efficient, primarily aimed at achieving synergy and excluding any unnecessary overlap in expertise and resources.

Community-wide network and access to stakeholders: The inclusion of both scientific and industry partners, as well as Advisory Board members from academia and industry will ensure incorporation of various stakeholder perspectives, as well as smooth dissemination across Europe to trainers and researchers in academia and industry. Notably, the involved network organisations and all consortium partners are highly active in their respective contexts and have access to and active participation in relevant networks and organisations. Examples include the central roles of partners 1 (VUmc), 3 (MEFST), 4 (OeAWI), 5 (EUREC), 8 (NTUA) and 12 (UNINS) in research integrity networks. In addition, the scientific Advisory Board members represent a number of important ERI and industry networks. Moreover, many of the Consortium partners play important roles in large international research integrity projects. Examples include the roles of partners 1-6 (VUmc,

KUL, MEFST, OeAWI, EUREC and UIO) in EnTIRE; the roles of partner 1 (VUmc) and 5 (EUREC) in PRINTEGER; the roles of partners 4 (OeAWI), 8 (NTUA) and 10 (UL) in ENERI; and partner 3 (MEFST) in HEIRRI. Measured by current and previous participation in National, European and global networks and their active relations with important stakeholders, VIRT^{2}UE ensures capitalisation on current networks and knowledge available throughout the EU.

Track record and achieved impact: Excellence is a prerequisite for achieving impact. The VIRT^{2}UE partners individually and in partnership have repeatedly demonstrated their contribution to academic advances across and within relevant disciplines. For example, partners 1 (VUmc), 2 (KUL), 6 (UIO) and 7 (ANKU) have provided significant advances in our understanding of the relationship between empirical science and bioethics, developed innovative research methods, such as interactive empirical ethics and contributed to the development of the theory on empirical bioethics. Besides this evidence of having academic impact, the partners individually were involved in the uptake and usage of their academic results by healthcare professionals and institutions. A compelling example is the implementation of Clinical Ethics Support (especially Moral Case Deliberation) in Europe, with a leading role for partner 1 (VUmc) and 6 (UiO). Another important prerequisite for achieving impact is to have excellent communication capacities. As the track records of the involved partners show, this Consortium is well equipped to engage in societal debates, to communicate scientific results to a wider public and with that, to create support and engagement to ensure a sustainable impact. With a balanced geographical spreading, the VIRT^{2}UE Consortium consists of 14 partners from 10 different EU Member States and two associate countries. Figure 1 (Academic partners, advisory board and their associated networks) illustrates the diversification and geographical spread of the consortium partners, ensuring the expected pan-European impact.

Successful project management and delivery: The involved partners bring expertise and experience from many earlier EU-wide projects in the area of ethics and research integrity (ERI). Large scale national and regional projects not counted, the VU Amsterdam and VU Medical Centre currently coordinate over 200 projects funded by the European Commission. They have a reputation for efficient and reliable delivery of project results and effective communications.

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