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A Just Transition to Circular Economy

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JUST2CE Internal Training on RRI

Process dimensions (AIRR), the European Commission RRI keys, and links to Circular Economy

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A Just Transition to Circular Economy

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4. UNIVERSITA DEGLI STUDI DI NAPOLI PARTHENOPE
5. CENTRO DE ESTUDOS SOCIAIS
6. UNIVERSITY OF LEEDS
7. UNIVERSITY OF CAPE TOWN
8. KENTRO EREVNON NOTIOANATOLIKIS EVROPIS ASTIKI MI KERDOSKOPIKI ETAIREIA
9. AGENCIA DE RESIDUS DE CATALUNYA
10. MEKELLE UNIVERSITY
11. KUMASI HIVE
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13. AFRICAN CIRCULAR ECONOMY NETWORK
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A Just Transition to Circular Economy

PROJECT No. 101003491

Just2ce will assess the current state of transition towards the circular economy in relevant economic sectors and analyse possible transition scenarios, as well as their outcomes and impacts. It will identify the key factors that can stimulate or hinder this transition. Natural resources are extracted and transformed into products, which are eventually discarded. As many natural resources are finite, it is important to keep materials in circulation for as long as possible. This makes the transition to circular economy more vital than ever but is a responsible, inclusive, and socially just transition to a circular economy possible or even desirable? What technical, political, and social factors can enable or hamper such transformation? The EU-funded JUST2CE project will answer these questions. It will explore the economic, societal, gender and policy implications of the circular economy paradigm. The project's findings will shed light on how to ensure democratic and participatory mechanisms when designing and managing such technology.

History Chart

Version	Date	Implemented by
V2.0		
V1.1		
V1.0	28/2/2022	Dilay Celebi Gonidis (SEERC), Tess Doezema (UAB), Mario Pansera (UAB)

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JUST2CE
A Just Transition to Circular Economy

Table of Contents

List of abbreviations

RRI	*Responsible Research & Innovation*
CE	*Circular Economy*

1. Executive Summary

This deliverable includes the RRI training material and the reports of the activities conducted in task 3.1. Task 3.1 is committed to embed RRI principles into all aspects of the project. In order to do that, the UAB and SEERC organized RRI training for the consortium members covering the following aspects:

- The 5 European Commission RRI keys: ethics, societal engagement, gender equality, open access/science and science education;
- Process dimensions (AIRR) that are often regarded as central to RRI: diversity & inclusiveness, anticipation & reflexivity, openness & transparency, and responsiveness & adaptation.

A total of three training workshops on RRI is planned during the course of the JUST2CE project. The first training workshop was held during the kick-off meeting by Dr Tess Doezema, in September, 2021, with the aim of offering introductory training on some of the basic concepts and approaches on RRI. The session was delivered online via Teams with attendance of all consortium members.

The second training workshop, which revolves around the connections of RRI and CE, will be conducted for the consortium members by the South East European Research Centre (SEERC) on March, 2022. The training will be organized in two sessions and will be conducted fully online. The first session will include a presentation that will be conducted by Dr Simeon Veloudis, a Senior Researcher at the South East European Research Centre (SEERC). It will consist of the process dimensions that are often regarded as central to RRI: anticipation, inclusiveness, reflexivity, and responsiveness (AIRR). The 5 European Commission RRI keys (ethics, societal engagement, gender equality, open access/science and science education) will also be analyzed with discussions on how they interconnect with AIRR. The first session will be followed by one hour workshop session, organized as a panel discussion with inclusion of other RRI experts. Adapting ideas drawn from the first session, this second session will seek to provide a useful starting point for better incorporating RRI dimensions into CE discourses over discussions with the participants.

A second version of this document will be delivered after the completion of the RRI training activities in the project.

2. Training Workshop 1: Responsible Research and Innovation

2.1. Scope and format

The first training session was conducted during the kick-off meeting, in September, 10th, 2022, with all the consortium's members. Dr Tess Doezema first briefly discussed the history of RRI over examples of very familiar technologies. She continued with the discussion of the dominant narratives of technological and social progress and development of RRI concept in bringing responsible innovation into the European policy space, and in theorizing it as a governing framework. Both the dimensions and the keys of RRI are discussed, with the conclusive argument that resistance to reducing the RRI concept to simplified variables and prescriptive frameworks is essential to its continued value and perhaps JUST2CE, in its focus on social justice, critical economic analysis, and broad societal transformation is well positioned to conceptualise responsible innovation more broadly than in terms of debating technical design decisions made in the boardroom or the lab. The presentation lasted about 30 minutes, followed by a question and answer session of 15 minutes.

2.2. Short biography of the trainer

Dr. Tess Doezema is a visiting researcher in the Post-growth Innovation Lab of University of Vigo and a postdoctoral researcher in the Department of Science, Technology and Society (STS) at the TUM School of Social Sciences and Technology. Her research focuses on global markets, democratic institutions, and genetic knowledge production and ownership. She completed her PhD at Arizona State University's School for the Future of Innovation in Society, focused on modes of bioeconomy-making in Brazil with a focus on the political formations. Dr Doezema was also a visiting fellow in the MCTS program at the Harvard Kennedy School (2018-2019) and a research innovation fellow in Brazil with the USAID Global Development Lab (2015-2016). She holds a master's degree in International and Intercultural Communication from the University of Denver where she worked as a Research Associate with the Estlow Center, and a bachelor's degree in English Literature from the University of Michigan.

2.3. Transcript of the Presentation

In this training I will present some history and background of Responsible Research and Innovation and how it has taken form over the last twenty years or so. Responsible Innovation is "an unfinished story," and I think that our work in the project can be, in part to advance that story somehow.

We can think about the origins of Responsible Innovation by considering three probably familiar technologies that are on first glance quite different. Roundup ready soy and of course the broader context of genetically engineered food crops; Facebook, alongside related social media applications like WhatsApp, Telegram and Twitter; and the passenger vehicle, which itself has many permutations and past and probably future variations in how it is used, fuelled and regulated.

While quite different—spanning the biological, the digital and the mechanical, these three evocatively demonstrate the contingent, contested politics of technological "innovation" as we experience them today.

Each of these technologies was constructed in the context of the dominant narrative of technological and social progress, advanced as revolutionary, and promised to make the world a better place:

Roundup ready soy has been aggressively advanced within a narrative about genetically engineered crops "feeding the world," imagined to create future abundance in a world of otherwise limited resources. Facebook and other new social media platforms were breathlessly hailed as connecting people, democratising communication, and disrupting problematic power dynamics. And near the beginning of the 20th century, the gas automobile offered adventure, excitement, independence, and an expansion of the accessible world. These technologies are all integral parts of the narrative of modern human progress.

A narrative that continues to hold power today, especially visible in the discourse of powerful organisations and fora of international agenda setting like the OECD, the World Economic Forum, and of course, the European Union. Prominent social figures, governments and intergovernmental organisations describe innovation deficits and call for more innovation to drive needed social progress and solve humanity's most pressing problems.

As Emanuela and Andrea's presentation highlighted yesterday, this discourse of innovation as driving human progress and development has and continues to be used as a colonial tool, and as a way of upholding particular socio-economic relations, especially across national settings.

This same discourse simultaneously drives deregulatory efforts, and inspires calls for the public get on board with new technologies. Innovation is advanced as the only hope for solving the problems emerging from the last century's ongoing race toward technological novelty.

In such accounts regulators, citizens and policy makers should get out of the way and free innovators to solve environmental crises, provide food security, create energy abundance and enable long healthy human lives. The public should provide resources for research, and consume new products and technologies, but not seek

to intervene in these processes, because time is running out.

The complex social and technological entanglements of human societies with the products of so called “technological innovation" belie the simple story of knowledge and novelty autonomously guiding human societies toward better futures. Deforestation and consumer rejection of GM foods, social media bubbles and political polarisation, cities congested with traffic, poor air quality and a quickly heating planet challenge the credibility of narratives of salvationary innovation. And yet they still hold sway.

Responsible Innovation was advanced by scholars thinking about how to avoid such demonstrably problematic sociotechnical outcomes, by addressing what they figured as a disconnect between society and those producing research and innovation.

An influential description of the concept by Renee von Schomberg, both theorist and long-time European Commission research policy officer, describes it as “a transparent, interactive process by which societal actors and innovators become mutually responsive to each other with a view on the (ethical) acceptability, sustainability and societal desirability of the innovation process and its marketable products (in order to allow a proper embedding of scientific and technological advances in our society)” (Von Schomberg, 2012).

Before responsible innovation ever arrived on the agenda of the European Commission, it was a term that was advanced in scholarship concerned with technology assessment, ELSI committees, and bioethics bodies—engaged in the ongoing evolution of science governance. The term “responsible innovation” was mentioned in a handful of publications in the field of Science and Technology Studies as a way of thinking about how to productively intervene in what were often closed spaces of expert calculation and world making. STS scholarship has long been preoccupied with the mutually constitutive relationship between power and knowledge, drawing significantly on the work of Michel Foucault (e.g. Foucault 1980).

It has sought to make visible the stakes of who is creating knowledge, for which purposes, and in what places (Harding, 1991; Escobar, 1996). It studies the politics of technologies and argues that local, tacit and embodied knowledges are under-valued to the detriment of societies and democracy (Winner, 1986; Wynne, 1982). STS scholars have also stressed that technological development is neither autonomous nor naturally evolving. and that technological artefacts should be understood as products of geographical and historical contexts in which they are produced, deeply shaped by human values and social conditions (Marx and Smith 2011; Bijker et. al., 2012).

Responsible Innovation seeks to mobilise such critical insights in the policy sphere, and bring them to bear on scientific practice. It wasn’t a fully formed concept and set of practices, though, before it was adopted by the European Commission. It is not definitively operationalized, and has been consistently called ambiguous and poorly defined.

A group of scholars who played no small role in the institutionalisation of RRI recounted in an oft-cited article,

“Questions of purpose, values-sensitive design, ethics, social desirability, social acceptability and governance have all coalesced around an emerging zeitgeist for ‘responsible innovation’ that may intuitively feel right, but which exhibits a lack of clarity in terms of definition, practice and, at a policy level, motivation”

Despite the abstractness of the concept, something about it was appealing to the European Commission. The authors go on,

“Although the motivations at an EU policy level were unclear, it was evident that responsible innovation was important to the EC, at least in sentiment, and that we were being asked to reflect and advise on what it meant, and how it might be defined” (Owen, Stilgoe and Macnaghten, 2012).

Richard Owen is one of the scholars who has been involved from the beginning in bringing RI into the European policy space, and in theorising it as a governing framework. Here is a clip from the RRI-Tools project website,

where he explains the approach:

[Played selection from video describing RRI from RRI Tools] https://www.youtube.com/watch?v=SIvuAfnvOBU

As Richard explains, he and his colleagues have emphasised Anticipation, Inclusivity, Reflexivity, and Responsiveness as the central premises of responsible innovation. But what does that mean in practice?

Responsible Research and Innovation, as it came to be called under the aegis of the EC, was an object of collaboration between these social scientists and the Commission. This process resulted in a kind of hybrid definition, including not only the AIRR approach, but also a set of so called "RRI keys." These are perhaps more concrete modes of responsibility, easier to operationalise, measure and count. The keys are Ethics, Science Education, Gender, Open Access, Public Engagement, and initially Governance, although governance was ultimately removed from this list.

The keys have always been a bit of a sore point in the RI research community. They are ostensibly meant to be only part of the definition, although in many instances they have become understood as themselves the central elements for communicating and enacting RRI.

Richard Owen, Renee von Schomberg and Phil Macnaghten describe this dissonance in a paper published this year. They write, "Earlier visions and frameworks for RRI, responsible innovation and responsible development had, to varying degrees, been reasonably consistent in their framing, even if they lacked guidance in terms of the specifics of practice. . . . They were certainly about opening up, but not about open access per se. They had a little to say about pedagogy, but very little to say about science education. They talked about inclusion, but not about gender, important though this most certainly is. These might be useful entry points for RRI, but somehow RRI was becoming these six quite disparate 'keys', linked in some peculiar way to one another" (Owen et. al. 2021).

This tension has been visible in the projects funded by the European Commission to implement RRI.

In projects seeking to advance new practices as part of research and innovation in Europe, RRI has been met in part by scientists unhappy to have more bureaucratic hurdles to accomplishing their work, and skeptical of the demand to spend more time doing paperwork rather than lab-work. Probably for good reason.

The broad generality of the keys also opens up a significant potential space for what has become colloquially known in certain circles as "RRI-washing." It is fairly easy to reframe existing practices under these headings, and for organisations and research units to claim they engage in RRI without making any significant changes to existing practice.

Projects to globalise RRI have also manifested problematic dynamics in research projects, since the keys have played a framing role as presumptively central elements of a better way of doing research sent from Europe to responsibilize the world.

Thus, as responsible innovation has been translated into these measurable keys, it has in its worst form been enacted as a box-ticking exercise for researchers that does not meaningfully change practice or outcomes. It easily becomes a tool of colonial relationality, advancing Eurocentric notions of responsibility across international organisations. It has also played a role in mobilising social scientists working on advancing RRI as bureaucratic auditors of these measurable units, counting male and female researchers, hours of public outreach engaged in, forms of science education institutions undertake, numbers of articles published under open access agreements, etc.

This is not the ultimate manifestation of a vision of social actors and innovators becoming mutually responsive. Responsible Innovation scholars must themselves take a reflexive posture in recognising these pitfalls, and be responsive in revising and designing approaches to responsibility.

The three examples that I introduced at the beginning may be helpful to think with again. We might consider

the kinds of RRI-Practice that could have led us to better outcomes in the design of these technologies and the knowledge that they draw from. It seems unlikely that politely asking Facebook CEO Mark Zuckerberg and his team to reflect on their actions and the world they are contributing to would have altered their course. These technologies have been prominently accompanied by promissory discourses that are explicitly forward looking and purport to be democratising—bringing passenger vehicles to the masses, feeding the world's hungry, etc. These narratives are in some sense performances of public responsibility that their makers actively engage in.

Further, the particular technological design choices that are now cause of broad social concern and which are deeply entangled with rainforest destruction, communication echo chambers, and climate change have also driven the success of these technologies, their popularity, and allowed them to be extraordinarily profitable in economic terms.

We may need more than gentle technological design interventions to refigure human futures for a better world.

Perhaps this project, in its focus on social justice, critical economic analysis, and broad societal transformation is well positioned to conceptualise responsible innovation more broadly than in terms of debating technical design decisions made in the boardroom or the lab.

Responsible Innovation has for its entire history been mobilised in a multiplicity of ways, without clearly defined parameters. The lack of a concrete agreed upon recipe for operationalising it has persisted despite the keys and the quasi-professionalization of RRI research under the EC funding schemes. Although this might be frustrating to managers and auditors, I argue—with Owen, Von Schomberg and Macnaghten—that resistance to reducing the concept to simplified variables and prescriptive frameworks is essential to its continued value. This flexibility also offers us an opportunity to ourselves think responsibility in terms of the aims of this project, and our collective commitments.

We have opportunities to develop a set of context-based approaches to responsibility related to the particularities of circular economy research, and we also have much to learn from the conceptualisations of responsibility and social change that can be developed within our case studies.

Since this project advances national co-creation workshops as central sites of responsible innovation practice, their design is one element of mobilising responsible innovation that we will need to attend to early on.

There are innumerable ways to engage publics, philosophies for why researchers might do so, and critiques of these approaches. The ways that we open up our own research to the communities in which we are conducting it will be crucial for enacting and advancing responsible research practice, and the ambitious social change vision that this project advances makes that all the more urgent.

Another thread to draw across from yesterday's workshop on decolonizing research methods is relevant here. A romanticisation of local knowledge and lack of understanding or appreciation for local power dynamics can of course reproduce structural inequalities in the process of engagement. As they mentioned yesterday, a reflexive approach to our own research design is crucial.

Public engagement activities run the gamut from:

- those aimed at fostering scientific understanding
- aimed at constructing "democratic legitimacy" in the form of micro-publics that somehow represent society and "make decisions" although these outputs are not typically legally-binding in any way
- focus group style engagements aimed at extracting information and representative public views to inform communication techniques at least, perhaps product design, and sometimes to inform knowledge production practices
- perhaps more general approaches aimed at creating public dialog around an issue without a further objective

And some are of course aimed at a combination of these. I'm hoping we can we go beyond these models. I end here with some questions that we may want to consider about our planned public engagement events:

What do we want to get out of the encounters that we set up with publics? What can these engagements offer to participants? What do we want these workshops to catalyse? Who constitutes "the public" for these engagements? How can we mobilise these fora to actively facilitate cognitive justice and to open up our own work and create spaces for an intentional politics of the circular economy? How can we integrate the findings from these workshops into our project deliverables and our own context-bound practices of responsible innovation?

3. Training Workshop 2: RRI and Circular Economy

3.1. Scope and format

The second training workshop, which revolves around the connections of RRI and CE, will be conducted for the consortium members by the South East European Research Centre (SEERC) on March, 2022. The training will be organized in two sessions and will be conducted fully online. The first session will include a 40' presentation that will be conducted by Dr Simeon Veloudis, a Senior Researcher at the South East European Research Centre (SEERC), followed by a 10'-15' question and answer session. This first session will include the process dimensions that are often regarded as central to RRI: anticipation, inclusiveness, reflexivity, and responsiveness (AIRR). The 5 European Commission RRI keys (ethics, societal engagement, gender equality, open access/science and science education) will also be analyzed with discussions on how they interconnect with AIRR. The first session will be followed by one hour workshop session, organized as a panel discussion with inclusion of other RRI experts: Prof. George Eleftherakis and Rosa Arias. Adapting ideas drawn from the first session, this second session will seek to provide a useful starting point for better incorporating RRI dimensions into CE discourses over discussions with the participants.

3.2. Short Biographies of the Trainer and Panellists

Dr Simeon Veloudis is an associate professor in the department of computer science at City College, University of York Europe Campus and a senior researcher at the South East European Research Center (SEERC). He holds a bachelor's and a PhD degree in computer science from the University of Reading. His research interests lie in the realms of cloud computing, semantic modeling and knowledge management, governance and quality control, security, and formal modeling. He has served as a program committee member in several international conferences, and as a referee for numerous journals in the areas of cloud computing, security and governance and quality control.

Prof. George Eleftherakis is a professor of Information Systems at City College, University of York Europe Campus. Since 2009 he is a member of the Faculty's Executive Research Committee and since 2017 the director of the PhD programme at City College, and a member of the University of Sheffield Postgraduate Research Studies Committee. He is a senior researcher and expert at South East European Research Center (SEERC). He received the Senate Award for Sustained Excellence in Learning and Teaching from the University of Sheffield in May 2014. He is a senior member of the Association for Computing Machinery (ACM) since 2012 and the Chair of ACM's Council of European Chapter Leaders since 2013, and also the chair of the ACM Europe Council Conferences Working Group that coordinates the ACM Europe Council Best Paper Awards to ACM conferences taking place in Europe since 2019. He has been a member of the administration board of the Greek Computer Society since 2002. His research interests are interface of computer science, biology, engineering, and information systems, with a sustained publication record, with more than 100 refereed articles in print, having publications in prestigious highly regarded international journals such as "Information Sciences", "Natural Computing", "Biosystems" etc., as well as chapters in prestigious handbooks like "The Oxford Handbook of Membrane Computing". He leads a research group which studies biological systems and a multi-disciplinary research group that focuses on responsible research and innovation, personally achieving two successful proposals in H2020, Swafs calls out of the five of the group. He was a guest editor in "Formal Aspects of Computing" journal, he is a member of the editorial board of "Innovations in Systems and Software Engineering, a NASA Journal", the "Internet Technology Letters", and the "Computer Science and Information

Systems" journal, and editor of more than 15 proceedings of International conferences he was chairing their programme committees. In the last decade he has been very active in community work aiming to address gender equality, inclusion and diversity, in relation to STEM disciplines. His main activity is through his involvement with the Association of Computing Machinery (ACM) and its special committee that focuses on women inclusion (ACM-W), but also through his involvement in several EC funded projects related to the concept of Responsible Research and Innovation (RRI).

Rosa Arias is the CEO and Founder of Science for Change, D-NOSES project coordinator at Ibercivis Foundation, and manager of Odour Collect. She has more than 10 years experience as innovation manager and environmental consultant with focus on matters of air quality, air pollution at industrial level, waste, wastewater, sustainability and energy. She is currently responsible for international and national grant management. Initiatives, including all types of industrial and chemical sectors and ICT. Her work involves the identification of funding opportunities, proposal alignment and preparation, research and innovation project design and market orientation, as well as integral management once the project is granted, together with her team. She specializes in all H2020 calls for proposals, SME-Instrument, fast track to innovation, Eurostars, LIFE+, ERA-NET, and related programmes. She is also a H2020 evaluator expert for the Research Executive Agency (Science with and for Society and ERA-NET calls). She has coordinated a research project on climate and climate change with a 6.000.000€ budget, funded by "La Caixa" Foundation. She has expressed a passion for the Responsible Research and Innovation concept (RRI), citizen science and the role of women in science. She has extensive experience in research and holds an MSc in Energy with Distinction from the Heriot-Watt University with an EPSRC Scholarship.

3.3. Training context: RRI and Circular Economy

RRI is defined as a transparent, interactive process by which societal actors and innovators become mutually responsive to each other with a view on the ethical acceptability, sustainability and societal desirability of the innovation process and its marketable products in order to allow a proper embedding of scientific and technological advances in our society (Schuijff & Dijkstra, 2020). Innovation can make a difference in addressing urgent developmental challenges such as providing access to drinking water, reducing CO2 emissions, or reducing hunger (Schroeder et al., 2019). The transfer and adaptation of technologies constructed in developed countries can often contribute significantly to these goals. Substantial research efforts are needed to find solutions that address current global challenges. Effective international cooperation that involves both public and private bodies is an important step for finding the required solutions.

RRI has been conceptualized as two distinct frameworks: (1) AIRR Dimensions (Anticipative, Inclusive, Responsive, and Reflective): This interpretation of RRI is broader and more process-oriented. It raises questions about how research is conducted, such as whether a wide variety of actors and the public are involved early in R&I practice, if efforts are made to convey the results and conclusions, and whether they are available to public examination and discourse. (2) European Union RRI Policy Keys: There are six focal areas that have been designated as RRI pillars by the EU. These are ethics, gender equality, governance, open access, public participation, and science education.

The AIRR dimensions of RRI argue that the intentional and unintentional impact and consequences of research and innovation should be assessed (Owen et al., 2012). Also, researchers and innovators should reflect upon their research process, activities, and underlying assumptions. Researchers and innovators should, furthermore, explore different perspectives from stakeholders and the public in the discourse of their studies and innovative practices. Finally, research and innovation should develop a capacity to change shape or direction in response to the stakeholder and public values and the fluctuating circumstances. These four dimensions influence research and innovation and thus impact everyone to be responsible for society's future.

In 2014 a convention conducted with the aim to reflect on the future of science, innovation and society in Europe, further defined RRI (Owen et al., 2021). It called institutions to integrate RRI systematically into the implementation of research and innovation programs. According to the conference RRI requires that all

stakeholders, including civil society are responsive to each other and take shared responsibility for the processes and results of research and innovation. In order to create common ground, six RRI keys were developed. These were distinct as engagement, gender, ethics, science education, open access and governance. Earlier visions and frameworks for responsible innovation and responsible development changed various times and usually the modifications were relatively consistent in their framework, even if they lacked guidance in terms of the specifics of practice. In process terms, they emphasized the need for innovation, and research aimed at this, to be anticipatory, ethical, reflexive, engaged with the public and stakeholders, open and mutually responsive in terms of their agendas and trajectories. But they were not efficient in connecting theory with practical changes. RRI started to become synonymous with this package of keys, and then six keys became five, as governance became too hard to implement (Fisher & Rip, 2013).

In the search for sustainable development, organizations have emerged as important factors to contribute to a transition to an economy that guarantees environmental preservation and reflects societal values. With the purpose of pursuing this transition, the circular economy concept has emerged strongly, building on previous concepts and integrating a wide range of principles into a single framework (Inigo & Blok, 2019). Businesses are essential actors in this transition although policy-makers, particularly in Europe, have additionally subsidized this framework. However, the initiation of the CE has regularly been criticized as a sustainability model for neglecting social and ethical issues, focusing on the environmental and economic pillars of. In principle, the CE aims to achieve welfare-increasing, sustainable economic growth, thus addressing intergenerational equity concerns through the preservation of natural capital, resource productivity and the removal of negative externalities (Inigo & Blok, 2019). Current CE approaches are challenged for having overly simplified objectives that prioritize bottom-line approaches over a comprehensive perspective of sustainability (Murray et al., 2017), for which current schools of thought have yet to find a solution (Inigo & Blok, 2019). Nevertheless, the concept of the CE is still under development, and many conceptualizations and frameworks to implement the CE in practice have not considered a dimension of social justice, both at the geographic and intergenerational levels. Interestingly, at the time of emergence of the CE, another framework has emerged, mostly with the support of the European Commission; RRI.

RRI aims to tackle the main challenges of our time through innovation and pave the way for a wider system transition to sustainability (Inigo & Blok, 2019). Unlike the CE framework, RRI has a much stronger focus on the inclusion of socio-ethical issues, aiming to reflect societal values in innovation under principles of transparency, democracy and mutual responsiveness. Despite its recent introduction in some other regions, RRI has found conceptual and policy support mostly in Europe (Burget et al., 2017). Both the CE and RRI ultimately aim to address problems related with sustainable development through innovation, even if their focus and means are different. The CE focuses on achieving a material and energy balanced economy, through the application of the three R principles; Reduce, Reuse, and Recycle. Through them, the aim is to tackle the environmental and economic dimensions of sustainability. In order to do so, new innovative concepts, technologies and actors are to be developed to address the complexity of sustainability problems. RRI aims to democratize the research and innovation process so that socio-ethical issues are considered and incorporated in the development of new technologies, fostering collaboration of the innovator with its stakeholders to address the grand challenges of our time, including, but not limited to, sustainable development. Hence, aside from tackling outcome associated issues it has a strong procedural aspect, proposing a democratic, transparent and inclusive innovation approach. Therefore, Incorporating RRI concepts within the CE might support to democratize the research and innovation process around CE by integrating socio-ethical factors into the development of new technologies and fostering collaboration.

Therefore, the aim of this training workshop is to provide an understanding of the connections between the CE and RRI concepts, to consider how RRI may be productive in the development of a more socially and ethically grounded CE over semi-structured discussions among the participants. The discussions in the panel session will be structured around the following questions:

Main question: How may the RRI framework help to democratize the research and innovation process around CE?

1. What are the shortcomings of CE in RRI perspective?
2. How can dimensions and keys of RRI be utilized to support to overcome the shortcomings of CE in various dimensions (political, geo-political, social (labor, gender, justice))?

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