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LONGEVITY: NOW AVAILABLE IN CANS! A PERFORMANCE LECTURE APPROACH TO ADDRESSING LONGEVITY ISSUES FROM A RESPONSIBLE INNOVATION PERSPECTIVE

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Abstract: This article describes the development of a theatre- and design-based Performance Lecture whose goal is to develop reflexivity around the theme of longevity and innovation in secondary and university level students. Theatre is an art form that aims at developing self-reflection and reflexivity in both audiences and participants, opening the door to reflective learning which, if combined with critical design and design fiction, offers an effective medium for addressing many dimensions of Responsible Innovation (RI). The workshop involves the presentation of a fictional "near-future" product, a drink called "Longevity". The drink contains nanobots that once ingested can be directed (with an app) to stimulate the body to produce certain compounds, allowing the user to control different properties in their blood "in flow". This innovative use of technology offers more bodily efficiency, leading to a longer life. This methodology was primarily developed during the *A Society for All Ages. Longevity-driven design* Masters course at Milan Polytechnic (2022-23) and the Interaction Design and Service Design Masters courses at Milan Domus Academy (2023), and is grounded in grassroots approaches to Responsible Innovation.

Keywords: longevity, performance lecture, critical design, esponsible innovation, theatre.

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INTRODUCTION

This article describes the experiences of developing a Performance Lecture and critical design-based teaching methodology to be used for highlighting some ethical issues related to societal change brought about by longevity. A Performance Lecture is an experience that combines elements of performance (the performance aspect can take many forms but in this case we are using theatre techniques[1]) with elements associated with a lecture, with the audience becoming participants in the performance (Cerezo 2016). Grounded in the frameworks (described in detail in act 1) that underpin Responsible Innovation (RI), which propose the need for anticipation, reflexivity, inclusion and responsiveness within innovation systems (Stilgoe et.al. 2013), and the concept of Poiesis Intensive Responsible Innovation that proposes an approach that is based upon human rather than technical ingenuity (Hankins 2019), this article offers RI practitioners, secondary school teachers and university lecturers the tools to carry out Performance Lectures or workshops aimed at highlighting and discussing societal and ethical issues related to longevity. The article includes teaching resources, a video for classroom use, examples of projects that have developed an array of theatre techniques within their RI work, and multi-disciplinary academic literature that can be built upon in an education setting to help contextualize the approach described.

This article is primarily based on the authors' experiences of delivering two theatre-based Performance-Lectures developed for the Bassetti Foundation[2], the first (2.5 hours) as part of *A Society for All Ages. Longevity-driven design*, a Masters course at Milan Polytechnic (2022-23) and the second (4 hours) conducted as part of the *Interaction Design and Service Design Masters* course at Milan Domus Academy (2023). These lectures aimed to explore ideas around responsibility within innovation by addressing several challenges raised by ongoing societal transitions, many of which seem amplified if seen through the lens of longevity: the digital divide, restricted mobility and access to services, inclusion or exclusion

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from personalized medical practices (to offer just a few examples). In a scenario within which difficulties in servicing an older population leads to the constant reduction in quality of services for younger generations (due to strain on public infrastructure), technological, political and social innovation is often seen as a road to possible solutions, creating ethical challenges within legal, political and economic choices, and as a result for the governance of such a transition. The aim of following RI approaches is to make these innovation developments as inclusive, anticipatory, reflective and responsive as possible.

Justification for the introduction of theatre technique to these courses is based upon an understanding of theatre performance as an artform that aims at developing this reflexivity and responsiveness in both audiences and participants (Kirsten 2010), opening the door to what Felt and Wynne call reflective learning (Felt, Wynne 2007). If combined with critical design and design fiction approaches (Dunne, Raby 2013) that promote learning through embodied engagement (Lingren et.al. 2016), theatre-based approaches offer an effective medium for addressing these dimensions of Responsible Innovation (for a comprehensive review see Wiarda et.al. 2021). Following grassroots responsible innovation approaches, whose aims are to analyze innovation processes from a reflective and reflexive rather than a systemic perspective, (Grasseni 2018; Randles 2011), the objective is to build reflective and reflexive capacity by discussing the release of a new drink called Longevity, with its slogan: "Longevity: Now Available in Cans!". The Performance Lectures described require the preparation of several critically designed future objects to be used as props; the drink itself, a business contract, nanobot testing kit and pill version of Longevity. Photos of these artifacts are available on Flikr[3]. During the workshop these materials are used as artifacts for retrospective design analysis and as props, used by the students during their own improvised scenes.

The "Now available in cans!" slogan (and its use as a reflective tool) has been part of the main author's working life for more than 25 years, since first contact during participation in an invisible

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theatre consumer awareness event in Manchester (UK) in the late 1990's (for more on invisible theatre and many of the approaches that have influenced the development of the authors' ideas see the Encyclopedia Britannica entry on Augusto Boal[4]). The original drink accompanying the slogan was "Happiness, Now Available in Cans!". Passers-by in Manchester city centre were asked to participate in an advertising campaign by stating (in a booth and on camera) what happiness meant for them, followed by the slogan. Once they had been unwittingly enrolled, the situation took on its theatrical character, with participants treated to a make-over during which they were humorously teased ("oh we will have to make that nose look a bit less shiny") and which resulted in strangely coloured faces and clothes. As they left after their recording, participants were given a pamphlet with data about ecological damage caused by consumption.

During the main author's years as a teacher of English as a second language (coinciding with attending evening classes in physical theatre and introduction to RI through the Bassetti Foundation) he used Happiness at secondary school level, the students discussing what the slogan and product might imply before producing their own "miracle" products. The possibility of teaching in the Milan Graduate School of Design brought a change of name and added complexity, leading to the development of the other objects and the integration of all of these fields of experience into a comprehensive approach that involves combining design and ideas of the embodiment of politics within objects (Winner 1980).

Following RI approaches that promote open science and open publication, all of the articles and resources cited or linked in this article are freely available for online consultation or download without registration, using the bibliography as search terms. Not all articles were released as open access documents though, so some might require a little imaginative thought during the search process. Influenced by Michael Reinsborough's use of theatre terminology in his academic research (cited below), the article is divided into three acts.

Act 1: "Mixing Design and Theatre with RI" offers insight and materials for educational use into the coming together of an array

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of different theatre approaches, critical design and a range of what we might describe as broader artistic approaches to promoting Responsible Innovation. Critical Design, artistic production and performative theatre aim at generating reflection and reflexivity, as does Responsible Innovation, similarities that have not been lost on several research funding bodies (see the descriptions below for links and references). The literature review of practical resources collects together many of the results.

Act 2: "Preparing the scene in Milan" describes the required preparations for carrying out a Longevity Performance Lecture. Critical Future Design is practically demonstrated before the different components of the workshop are described and the product presentation and sketches analyzed.

Act 3: "Carrying out the Performance Lecture" is an explanation of how the Milan lectures unfolded, followed by reflections and lessons learned. An annex contains the materials required to replicate the experience and an outline of the lesson plan used for the Milan events.

ACT 1: MIXING DESIGN AND THEATRE WITH RI

Recent years have seen growing interest in art and theatre used in the promotion of responsible innovation within science and innovation policy. The European Union discuss the "promise and perils of art contamination and cross fertilization with science and innovation" in the *Science and Policy Brief Doing Science with Art and Art With Science* (2022)[5]. Contemporarily, design has also been a focus of study and practice within the RI community, through questions about how values may be intentionally or unintentionally designed into innovation processes and their resulting products and artifacts (Simon 2016). Value Sensitive Design (Friedman 1996) has been prominent within RI practice with a focus on designing stakeholder values into design processes, an idea that mirrors using design fiction and critical design methodologies (designing ethically critical values into products) in order to provoke reflection.

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Now Available in Cans!

The "Now available in cans!" approach combines a theatre-based Performance Lecture with critical design (Bleecker 2009) within a Design Fiction framework (Bosch 2012[6]), in what we might call Critical Design Fiction Theatre. The props used (the Longevity products) are critically designed to embody not only the driving ideas of the society and the moment that designed them (longevity as a good, a right and maybe an obligation), but also traces of the ethical problems that it may bring. These ethical issues can be made visible (in the form of text or a green environment stamp for example) or can be narrated within a near future sketch. The props become tools, designed to provoke reflection about the social, political and economic complexity of the future world that they inhabit (Calvert, Schyfter 2017), and can be used to enable participants to imagine and narrate this possible future world (Auger 2013) and contextualize the represented topic (longevity).

Object-props from the near future should be realistic enough to understand as being possible while remaining fictional[7], and could be seen as artifacts brought back from the future for study purposes, a kind of reverse archeology of design. If they are well thought out, they lie somewhere between fact and fiction, and can be used to tell a story about the development of the product. The story remains fictional but contains elements of fact that make it (and the context surrounding it) seem plausible, allowing speculation and reflection on how things are and how things work (Bleecker 2019). This flexibility of playing with truth and fiction was exploited in the Performance Lectures and later discussed, offering the possibility to tie future structure to present day. For example, we already use apps to monitor out health and fitness, so a leap made during its presentation to suggest using one to give information to nanobots that are in our body in order to stimulate the production of different compounds (another possible scenario) could seem plausible.

Examples of visible traces of critical design fiction could be a certification stamp on the side of the can that (playing with words

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and meaning) reads "100 per cent natural bioengineering", or a line that states that the drink "does not require FDA approval" because it is not a medical treatment, does not contain any chemicals or medically active ingredients.

With this form of critically designed props, the workshop facilitators aimed to create a rich context around the new product through the performance and development of sketches based on everyday life experiences from the world that the product inhabits. The future moment that was contextualized was the launch of a drink version of an already successful product (Longevity pills), previously only available in tablet form. After the initial presentation of the new drink format, context is played out through a second "You're Just Selfish" sketch, in which a parent has an argument with her/his grandparent who wants to stop drinking Longevity and just have a "natural" life and death (further explanation and the full text can be found in the appendix). A third theatrical moment creates more context with a discussion about access to the new product as a human right, with some people campaigning to have Longevity added to household drinking water. The sketches create context by representing a possible interaction in a world in which drinking Longevity is the norm.

Theatre performance (Kupper 2017) and in particular improvisation (Kirsten, Preez 2010, TACIT 2016[8]) work towards reflection and reflexivity as one of their goals, as do Responsible Innovation and Critical Future Design, which is why they have been combined in this methodology.

Responsible Innovation, Reflection and Reflexivity

The term Responsible Innovation (RI) is in use across several academic fields and within many policy documents. Alongside the closely related Responsible Research and Innovation (RRI), the term is relatively new, coming to prominence in the early 2000's (de Saille 2015). Several definitions and associated frameworks are in use, as are a host of different approaches, but for the purposes of

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this article (based upon its use of the term RI and focus on the future), the widely used Stilgoe, Owen and MacNaghten definition provides a good starting point: "responsible innovation means taking collective care of the future, through stewardship of innovation in the present" (Stilgoe, Owen, MacNaghten 2013: 1570).

This definition appears in an article that goes on to outline 4 dimensions of RRI which have become widely accepted and built upon. Stilgoe and colleagues argue that to innovate responsibly entails a collective and continuous commitment to being: anticipatory (describing and analyzing both intended and potentially unintended impacts); reflective (on underlying purposes, motivations and potential impacts); deliberative (inclusively opening up visions, purposes, questions and dilemmas); and responsive (a collective reflexivity process sets innovation direction and influences its trajectory) (Stilgoe, Owen, MacNaghten 2013).

Rather similarly, Heras and Tabara argue that theatre practices help to promote goal-searching, open-ended, iterative and self-reflective processes of collective exploration and "re-search", active participation and inclusion (Heras, Tabara 2014), terms that the authors see as related to those used in the RI framework cited above. These similarities have not gone unnoted by several funding bodies, leading to the development of several different approaches to RI practice based on or including an array of theatre techniques[9].

Theatre within Responsible Innovation Practices: a Review

This review of practices, projects and publications does not profess to be exhaustive, but rather an attempt to offer both a set of resources and an overview of a range of approaches taken over the last decade, to set this article within practice and academic context. The EU's interest in artistic and theatrical possibilities noted above, alongside that of many other funding bodies, means that a number of EU, NWO (Netherlands) and EPSRC (UK) associated projects have been able to develop an array of approaches directly aimed at promoting RI principles. Several funded projects have

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commissioned performances and theatrical pieces, many have been documented which (thanks to open science and publication policies) has led to lots of open access publications. The following are some of the best documented examples, displaying a host of different approaches to addressing various dimensions of RI.

The Dutch Research Council (NWO) funded the Catalyst project (2018-2019) which aimed to address RI dimensions while creating "room for citizen perspectives within the smart city innovation ecosystem of Amsterdam" (Fraaije et.al. 2023: 4). The project involved developing and performing interactive street theatre performances, a group conversation tool and a theatrical dialogue event for citizens and smart city professionals, using similar improvisation techniques to those proposed in this article.

The University of Bristol Public Engagement team have collaborated several times over the last decade with Kilter theatre group[10], working on immersive theatre projects on quantum/virtual reality and synthetic biology. In the interactive play Invincible[11] (2014) part of the EC funded project Synenerge (developed in collaboration with researchers from the BBSRC/EPSRC funded BrisSynBio Research Centre), participants were encouraged to imagine a near future world in which synthetic biology treatments were commonplace, while in Futures[12] (2019), developed in collaboration with researchers working in VR and in Quantum Technology, they produced public engagement workshops exploring the ethical issues brought about by the introduction and development of quantum and virtual reality technology. Of particular interest is that the researchers were integral to the performances and workshops in a process that offered them the tools to address ethical considerations in their work, relying on their expertise to develop the story and performances. The Legacy Project[13] (2020) is a lock-down production involving Kilter and two PhD students, resulting in the publication of a series of videos in which researchers anticipate possible future scenarios influenced by contemporary academic research.

The collaboration between Kilter and the Public Engagement team has also resulted in a game cards resource set for teachers taking RI into the classroom which was developed through the EC

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funded project PERFORM[14], two of which were used during the Milan lectures, while Michael Reinsborough developed a theoretical art-science exchange and collaboration framework (Reinsborough 2020) in which he offers an overview of both the Perform[15] and Synenergene[16] projects.

While preparing this article, the authors conducted an interview with Mireia Bes Garcia from Bristol University and Oliver Langdon of Kilter Theatre in which they discussed these collaborations, video of which is available on the Bassetti Foundation website[17]. Another EU funded project RRI TOOLS promoted theatre use in several formats and across many sites (Marschalek et.al. 2017), one interesting example being through its support of the Land Rush Project[18]. Land Rush addresses how the rush for land is affecting chances for peace and stability in Central Africa, using a simulation game that can be transformed into community theatre. The Land Rush game simulates the complex reality of access to and the management of natural resources in developing countries. This methodology is based upon self-reflection and aims at conducting action research in as inclusive a manner as possible.

In a somewhat related article, Maria Heras and David Tabara offer an overview of different theatrical approaches experienced while working in sustainability awareness and practice, mainly from Southern Africa and France (Heras, Tabara 2014). They describe their Performative Methods for Sustainability approach, in which plays were co-developed and subsequently shown to audiences who then suggested policy action to be proposed to local governors. The concept of RI is closely tied to questions about governance as it poses questions about which values we want society to embed in its innovation processes and by extension which directions of development we want to try to support.

The Learning Science through Theatre initiative (Smyrnaiou 2017) was an educational project that produced 43 performances between 2014-16. Participating students dramatized scientific knowledge and concepts from their school curriculum, writing scientific stories, composing music, designing sets, costumes and developing choreographies. The initiative brought students and

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teachers together with scientists and researchers from universities and research centres so that knowledge could be shared about the concepts that they went on to dramatize. In their article, Smyrnaiou and colleagues describe the initiative, explaining how taking a theatrical approach can promote RRI principles through Embodied Learning, exploring meaning generated during theatrical performances through parameters such as gestural relevance, emotional deepening, cognitive and kinesthetic skills (sensorimotor activity), and coordinated movements of body parts or whole body.

ACT 2: PREPARING THE SCENE IN MILAN

The Milan lectures required a few home-made props. They were easy to make requiring only pens, paper, sticky tape and a can of soft drink. For workshop facilitators who may not feel comfortable carrying out a product presentation themselves, the authors have prepared a video that can be shown to the group[19].

The Props

A can of Longevity: a soft-drinks can, covered in paper which can then be drawn upon. The cans used in the Milan workshops displayed the name Longevity written in a flowing (Coca-Cola style) font, a green Natural-Biotechnology stamp, a line about it having been scientifically tested at a university and the word NANO-TECH written in a box in capital letters.

A Contract: a thick multi-page document with the Longevity Logo prominently shown across the front.

A medicine version of Longevity: the old version of the product in tablet form, a plastic pot with a lid.

A nano-testing kit: A COVID style test kit with the Longevity logo across the front.

The props were not meant to be realistic looking but pieces of art that embody their design process. Almost cartoon in style, their

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unveiling brings evidence that their presentation is fictitious. Influenced by the invisible theatre techniques cited above, the students were not told that the product was fictional before the presentation. Using a critical design approach, some of the issues that could be seen as potentially problematic and topics for discussion can easily be displayed. For example, a thick contract full of charts and technical words brings up a series of problems for discussion that may revolve around informed consent, legal definitions, customer relations and a host of others. Writing 100 per cent "natural" on the drink itself, giving it a Natural Bio-Technology or sustainability certificate or stating that it has been tested at a university opens the door to discussions of nature versus technology, health versus bionics, appropriate uses for technology, geopolitical and social conflict related to exclusion, trust in science and social justice issues (to name just a few).

Several cans were used in the Milan workshops, with the Longevity logo in several languages as they were designed for use on an international course (Italian, English and Chinese) which worked well as some students took selfies with the drink in their home languages.

The following section offers an overview of how these props were used in the workshops, starting with a description of the "Now Available in Cans!" presentation followed by a scripted scene (both of which involved all of the objects) and finally a student-led improvised scene.

Intervention 1: Longevity: Now Available in Cans! (main author)

The "Longevity: Now Available in Cans!" presentation brings the critical design aspects into the open, raising present day ethical issues that have been projected into the future. Several themes for discussion such as data collection and its security, suitable uses for technology, informed consent, inclusion and exclusion, power relationships and design and product form have been critically designed into the product and presentation. The elements used to

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build realism into the presentation involve everyday actions and objects (contracts with companies that collect our data and advise us, nanobots being used in medicine, home Covid testing and downloading an app for health reasons). This use of the everyday (today) applied to a fictional near future aims to "help us see that the way things are now is just one possibility and not necessarily the best one" (Dunne, Raby 2013: 66), an idea that can be used to discuss design (today) projected into the near future.

The invisible theatre aspect of the methodology meant that the product presentation was not announced as being design-fiction but made to look like a serious part of a typical lecture, developing into obvious fiction as it proceeded (the displaying of the obviously home-made can being what we might see as the turn).

After an introduction to the lesson from the main author that gave as little detail as possible (merely explaining that there will be an introduction, a putting it all into practice section and a reflexive conclusion), the pre-amble to the presentation began. The description that follows describes the basis of the presentation. It is not a script but a framework that contains different critical areas that can be drawn out for discussion. In comparison to the introduction, the presentation becomes high energy and animated.

"Before we can continue the workshop, I have to present a new product from our sponsors. Developed in collaboration with (the institution where the workshop takes place) I am proud to present a new high-technology product that has just been released to market. It will cause a revolution I guarantee, it is an incredible technological and social innovation. It is a refreshing new drink, "Longevity: Now Available in Cans!". The drink is revealed and held by the side of the face with a smile, this position held for clown effect before the presentation continues with a description of its properties:

This incredible drink contains nanobots that enter the body. The drinker downloads an app that allows them to adjust various different biological functions 'in flow', they can slow their metabolism down, raise or lower adrenalin levels, produce more or less endorphins, this technology

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allows us to treat the body like a fine- tuned racing machine. This gain in control can lead to 30 per cent longer life, thanks to better control over sleeping patterns and more efficiency.

The contract is taken out and shown. It is bulky and thick:

a contract can be taken out so that the drinker does not have to manage their daily routine alone. Parameters can be set as a norm and monitored 24 hours a day, and with the installation of a wi-fi type device in their home, the company (through a third-party contract) can tune their body for them. They can design their own tuning regime. Data will be securely kept, and contracts vary in length with costs reflecting the drinker's dedication to the program.

The old medicine version was taken out and shaken:

Longevity is not a medicine but now a drink. Because it has no chemical functions it does not require government approval so can be sold in the supermarket or by mail order.

The nano-testing kit was shown:

If the drinker wishes (or needs) to stop drinking Longevity they can test that the nanobots have left the body, there are no long-lasting effects, everything is safe and they are free to miss out on all of the advantages that Longevity offers.

Intervention 2: You're Just Selfish (both authors)

This intervention takes the form of a two-person sketch which is primarily aimed at bringing up social norms and governance issues around longevity. Themes that can be addressed include questions about what is normal in a society, social exclusion and possible widening of the health gap, contracting norms (also in the workplace), pressure to comply to social norms from within as well as external to the family and questions about how social life is

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organized. The effects of changing the packaging and advertising of the product and the change from solid to liquid versions is also prominent, bringing issues of health management as well as governance. This sketch is scripted, with the full text available in the appendix.

A middle-aged mother or father have come home to where their grandparent (104 years old) has spent the day looking after the great-grandchildren. A polite conversation begins in which pleasantries are exchanged, before the grandparent starts to say that (s)he does not want to drink Longevity any more, explaining that the other grandparent has been dead for many years as they could only afford one contract at the time and that s/he is tired of living alone and wants to join the partner in the afterlife.

This news causes the grandchild to reply abruptly. She responds that both parties had made an agreement. The parent has signed a work contract that if (s)he cannot honour will mean that (s)he will have to pay some course training fees back to the employer, will not be able to buy a new house and as a consequence the children will have to continue sharing a bedroom.

The grandparent replies that the Longevity experience does not feel natural, but the grandchild interjects that it is natural, everyone is doing it, and that now it's just a drink and not like medicine any more as there aren't any pills to take. The parent uses laden terms related to how little the grandparent has to do in return for longevity, stating that (s)he is paying all of the costs while "all the grandparent has to do" is look after the kids. The parent shouts about the investment, questions why the grandparent doesn't want to live longer and calls her/him "selfish and unreasonable".

In the Water

In the water moves into co-creation and is a student developed improvised scene that takes place over coffee, an idea that was first proposed by participants of the Milan Polytechnic workshop. The scenario is that a group of lawyers are trying to change national law

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to allow water companies to put longevity in household drinking water, on the basis that it is a human right to have access. They are about to present their case to the European Court of Human Rights and have been widely seen on TV and social media platforms. Their legal argument is that copyright should be suspended on both the nanobot design and the app so that governments can produce the technologies at a cost that would allow water providers to put longevity in the drinking water system, which would guarantee equal competitiveness (and therefore services) and would allow national governance of the product's use.

Topics that might arise include those surrounding social justice, cost, inclusion and geopolitical implications, the role of governance and soft-law, as well as a host of related environmental (both flora and fauna) issues.

ACT 3: CARRYING OUT THE PERFORMANCE LECTURE

As the event is a lecture and takes place in a university or school, the authors believe that it is very important that students are not pushed into doing things that are out of their comfort zone.

Collaborative performance requires trust. In a theatre school this trust is built through playing theatre games, which is not always possible in an education setting. In the first lecture, the authors included some voice and body warmup exercises, but in the second workshop (which was much longer) chose not to. The second group was smaller and was made up of two different classes, while the first cohort had been together throughout their Masters course and were more confident together. One member of the first workshop had theatre experience (a key piece of knowledge) and the group were open to playfulness, while the second group were more reserved. With such a short timeframe, building trust within the group relies on the facilitator not making anyone feel uncomfortable, so the student collaboration format should reflect the students' confidence in performing rather than try to promote or push it.

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The workshops aimed to mix a university experience with a theatrical one. The "Now Available in Cans!" presentation takes place early in the lecture, is high energy and extreme in all of its claims and promises, making it easy to understand as a performance piece delivered in an unusual setting (once again see the Augusto Boal article cited above for further discussion of his development of this technique, known as Forum Theatre). The use of humour and pushing the norms of behaviour in a strongly defined social situation (the language suddenly becoming very informal and emotional in a formal education setting) also works to disrupt the institutional norms, while at the same time building calm and confidence.

The clown technique of modelling the drink with a smile that is held longer than comfortable brings self-humiliation for the facilitator, further breaking the relationship between expert (University Professor) and lay (the students). As the presentation develops and its comical nature comes to the fore, it becomes clear that both the vague lesson description offered at the beginning of the lesson and the Professor persona of the facilitator also poke fun at institutional norms. When carried out in Milan, all of these "tricks" not only helped to create a good trusting atmosphere, but also worked towards building the reflexivity and reflection that are the workshop goals.

A game of "spot the fact, spot the fiction" taken from the Kilter Theatre group Performing Science cards (which are full of performative exercises for teachers to tackle RRI in the classroom developed for the "Perform" project[20]) drove the reflection process as the fictional aspects of the presentation were based in possibility rather than fact, which often led to more questions than answers. The students were asked to categorize different statements made as either fact or fiction, which allowed a discussion of the possibility (given current knowledge) of such things becoming reality, and then to categorize any resulting changes in society as positive or negative (or both).

Reflection and reflexivity were given plenty of space in both workshops. After each presentation or game, the students went into small groups for 5 minutes to discuss "what had just happened"

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(without any direct questions being posed) which they then reported back to the cohort. This reporting was the source of many of the topics that were discussed and set onto a timeline[21]. The timeline contained events and processes (testing, product launch, scientific research etc) that could be reframed as decision-making moments and opened up for a group discussion about how they could be approached from an RI perspective.

To develop the "You're Just Selfish" sketch, a close technique from language teaching was implemented. The dialogue is divided into speaker A (parent) and speaker B (great-grandparent). One group of students was given speaker A's text, and the other speaker B, before being asked to discuss what they thought was happening in their groups (and maybe write in some responses). The groups then reported to the cohort before going into pairs to exchange texts (spoken). This was the introduction of the performance aspect for the students, as (after some suggestions and examples) they started to put expression into their responses and enter into what we could call "play mode".

This method of constructing and thinking about the dialogue from a single speaker perspective also requires reflection and reflexivity and works towards promoting an inclusive and deliberative approach as it is driven by group conversation. Discussion was not limited to social issues but also reached into analysis on the ways the characters used (or did not use) what we might describe as "moral blackmail" to try to persuade each other. This could be seen in some of the written responses and might be evidence of the students putting themselves into the future context and constructing their responses accordingly.

In one of the workshops, after the close and discussion of the text, the main author performed the sketch with a student with previous theatre experience, while in the other the students performed it privately in pairs before the authors performed it in public. The next step would have been to work on an improvised version of the sketch after conducting an analysis of the interaction following a Stanislavski methodology (Stanislavski 1936), but this proved to be beyond the scope of the workshops. A brief analysis of the text was

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possible in the longer workshop, but time restrictions meant that an improvised sketch would have taken too much preparation and excluded the improvisation work involved in the "In the Water" interaction.

The "In the Water" improvisation was conducted in pairs, each couple having a can of Longevity or a contract. Some pairs dived into the improvisation headlong, having animated discussions that they then reported back to the cohort, with lots of new scenarios brought up including several funny ideas about fish living longer and growing so much that they caused problems for shipping whilst at the same time resolving food shortages.

Both workshops ended with a long period of reflection about the workshop process itself, how it could be improved and in updating an inventory of new scenario and ideas. The students spoke about how they had felt at different times during the workshops, expressing that the experience had built cohesion in the group with several saying that they had thought about things that had never occurred to them before. One commented that they had never thought about the fact that some people might not want to live longer, and several said they the experience would mean that they would rethink aspects of their final projects.

REFLECTIONS ON THE PROCESS, SOME OF OUR OWN CONCLUSIONS

Following the main argument throughout this article that reflection and reflexivity underpin Responsible Innovation approaches, the authors close with some personal reflections on the experience: the student response was very positive, a fact that was reflected in their end of course appraisals. Improvisation is not only to find in what we might think of a theatre setting and works as a reflective and reflexive process without having to be part of a public performance. Sitting at a table talking with a prop (without roles) will produce results. A trained facilitator with experience in theatre can entertain the students using humour and theatrical

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technique but should not expect somebody without training to feel comfortable either in a performance or even in a setting where they think they might have to perform something in public. The students should know from the start that they are not going to have to perform anything.

A well-rehearsed opening presentation is vital, and it should be a little more extreme and passionate than the audience expects so that the performance aspect of the workshop is obvious early on. A well prepared "You're Just Selfish" sketch with both authors led to increased confidence in the students, it could be performed without text in hand and also offers the chance to introduce improvisation. Timekeeping should be sharp. Too much group conversation will slow the pace down. Five minutes for reflection and response preparation is better than a longer group conversation, as the facilitators can pick the themes out and lead the students into a discussion with the whole cohort. Make plenty of props. An online translation tool and a few fancy fonts can help prepare props that feel more personal. It's good fun to do. Be prepared for the possibility that not everyone will feel comfortable.

POSTSCRIPT

Shortly after submitting this manuscript for review, the main author presented this work at a conference entitled "Longevity and Ageing, Research, Social Impact and Innovation for a Better Future" held in Milan and organized by Nucleate Italy (24/05/2023). Two articles subsequently appeared in separate trade magazines reviewing the event, both referring to the "Longevity: Now Available in Cans!" presentation as if Longevity were a real product. The authors wrote to the journals and the articles were updated, but this was a development that we had not foreseen, and which provoked a lot of self-reflection.

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NOTES

[1] For an example of Lecture Performance as a theatrical form see https://www.researchcatalogue.net/view/158044/158045, last accessed on 26/09.2023.

[2] The Bassetti Foundation website: www.fondazionebassetti.org.

[3] The Bassetti Foundation Flikr account hosts photos of the workshops and the objects used: https://www.flickr.com/photos/fondazionebassetti/albums/72177720306775296.

[4] Encyclopedia Britannica entry on the work of Augusto Boal: https://www.britannica.com/biography/Augusto-Boal#ref1272421.

[5] The EU repository holds the document: https://publications.jrc.ec.europa.eu/repository/handle/JRC130525.

[6] The Slate website hosts a blogpost about design-fiction: https://slate.com/technology/2012/03/bruce-sterling-on-design-fictions.html.

[7] Frontiers holds an article about current developments in-vitro nanorobotics: https://www.frontiersin.org/articles/10.3389/fbioe.2018.00170/full.

[8] TACIT is funded by the Erasmus Programme of the European Union improvisation.pdf.

[9] For an example see this overview of climate projects funded by the UK Research and Innovation (UKRI) and the Arts and Humanities Research Council (AHRC) on the UK Research and Innovation blog: https://www.ukri.org/news/food-theatre-and-music-engage-young-people-with-climate-research.

[10] Kilter Theatre Group: https://www.kiltertheatre.org. Last accessed 04/08/2023.

[11] Invincible from Kilter Theatre Group https://www.youtube.com/watch?v=71K6h 3wg1i8.

[12] Futures from Kilter Theatre Group https://www.youtube.com/watch?v=cQXY-tShOPnI&list=PLA51EA1D6E1A11D9B&index=3.

[13] The Legacy Project from Kilter Theatre Group https://vimeo.com/showcase/83370 25.

[14] Performing Science theatre game cards http://www.perform-research.eu/wp-content/uploads/2018/10/2-performing-science-cards-colour.pdf.

[15]The Perform Project Perform – Participatory Engagement with Scientific and Technological Research through Performance (perform-research.eu).

[16] Synenergene Project website https://www.synenergene.eu.

[17] Art in Responsible Innovation: A conversation with Mireia Bes Garcia and Oliver Langdon: https://www.fondazionebassetti.org/en/focus/2023/07/art_in_responsible_innov ation_1.html.

[18] The RRI TOOLS website contains further information https://rri-tools.eu/-/land-rush-from-simulation-to-community-theatre-as-action-resear-1.

[19] Video of a different sketch about the launch of "Longevity: Now Available in Cans!". For use in the classroom: https://youtu.be/RbdIv1Ecwn8. Due to the problems noted in the postscript this video will not show up in searches but only through the link above.

[20] The Performing Science cards are available here: http://www.perform-research.eu/wp-content/uploads/2018/10/2-performing-science-cards-colour.pdf.

[21] Photos of the timeline can be found on the Bassetti Foundation Flikr account https://www.flickr.com/photos/fondazionebassetti/albums/72177720306775296.

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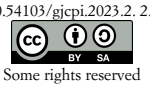

APPENDIX

Materials from the Milan Workshops: Student Preparation Materials to be sent in advance

A video about the Invincible play https://www.youtube.com/watch?v=71K6h3wg1i8.

A video about Kilter residency with VR and quantum https://www.youtube.com/watch?v=cQXYtShOPnI&list=PLA51EA1D6E1A11D9B&index=3.

The Kilter Legacy Project with PhD students https://www.kiltertheatre.org/projects/the-legacy-project.

Theatre exercises for teachers to tackle RRI in the classroom http://www.perform-research.eu/wp-content/uploads/2018/10/2-performing-science-cards-colour.pdf.

Lesson plan Ideas

The authors have put the different sections together, but each break could represent the end of the lecture with the following representing three individual lectures.

Personal introduction

Overview of the lesson in 3 parts, deliberately vague, written on the board: Introduction, Putting it into practice and Reflection.

Move into presentation (unannounced). The aim is to not let the students see that what you are talking about is fictional. For example, a lead in might be: Before we begin though, I would like to introduce a product that I have been working on and which has been endorsed by the university. It is 100 per cent natural and guaranteed, revolutionary and will change the world.

Things that can be included in the sales pitch: this product contains nanobots that can be controlled using an app "in flow". Sleep patterns can be regulated, adrenalin controlled, it can slow your heart and body down while maintaining your brain active, so your organism works more efficiently. You can put your body on a kind of standby. Boring time passes very quickly. Saves energy. Prolongs life by 30 per cent so the earlier you start drinking it the more effective it is. It's tasty and refreshing. Doesn't require certification as it is chemical free. It is not a medicine. It is pure and natural. Monitoring can be carried out 24 hours a day.

The contract: all of this can be carried out remotely. You can make an agreement with the company, decide on parameters and the company will ensure that your body remains within them. Personalized. Contracts vary in length. Data is saved in Europe, absolutely secure, abides by all regulations. Everything is explained in the contract.

Testing kit: after 6 weeks you can do a test and you will see that your body is clear of nanobots. No long-term health risks.

5 minutes in groups to collect ideas.

Discussion of ideas: write ideas on the board. Elicit which kinds of considerations (ethical and practical) should be taken into account as different topics arise and throw them open for discussion. Issues include those surrounding data collection and its security, suitable uses for technology, informed consent, inclusion and exclusion, power relationships and design and product form. Elicit negative and positive consequences and discuss them. The overarching theme is the idea that we have an object for a particular future scenario, what kind of future does it come from? Can we see the product as lying within a "techno-utopia"? The aim is to create discussion and reflection.

Put up a timeline on the board and fill it with turning points in the development process between today and the moment in the future that the drink comes from. Topics might arise such as testing, marketing, movement from pills to drink, licensing and discuss the

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issues that would have to be addressed at each point. Should it be the subject of labelling? Is it natural? How can you measure effect? This should be as open a discussion as possible.

Too good to be true: elicit from the students what is true or not from the presentation. Draw out difficulties in understanding what might be real today and projecting current understandings and knowledge into the future, what might come true or what is unlikely. What are the implications for different things coming true (or not)? What kind of society do we have based on what might or not come true? What kind of society do we want? Can our innovation processes affect that?

Break.

Putting it into Practice.

Put the students into small groups and give each group a close, either part A or part B (find them below). They discuss and write in some suggestions for the other parts. Elicit reactions once the groups are ready and ask them to explain their construction of the context.

Present them with the full text and ask them to discuss it. How does our version differ from their co-produced version? Discuss the sketch and the implications. Issues such as societal norms and pressure, structural change, economic implications, geopolitical implications.

In pairs ask the students to play out the sketch from both parts. Discuss how this makes them feel. Show the sketch if possible.

Discuss the sketch and elicit as many of the social factors as possible. Topics that may come to the fore include social pressure to abide by norms, changes in social structure (including welfare), inclusion and exclusion, taken for granted assumptions about wanting to live longer.

Break.

Explain that this section is a move into co-production.

Put the students into pairs or small groups, each group with the preprepared longevity props and ask them to play with them (the can, the contract and the testing kit). The scene can be set. They are in a bar, talking about the product that one of them has brought with them. They do not take on specific roles, the aim is for an open discussion.

Discuss the issues raised together and report to the class.

Introduce the idea of human rights and access and ask them to play again. At this point conflictual positions might arise or could be given as roles. Elicit negatives and positives from the introduction of the drink in the broadest terms possible. Ideas to elicit might be the effects on hospitals and healthcare, fish populations, social justice, the possibility of means testing for free distribution, better looking society, less poverty, more poverty, more people in the workplace, effect on geopolitics, pension reforms, housing, effects on women and reproduction, social division and inequality, the role of governance.

Break.

Allow lots of time at the end for reflection on the process.

How can we think about innovation as a future making process? Can we think about longevity in broader terms (other technologies, tech utopia, the role of science fiction and other fictional forms on innovation)? Can we apply this approach to other topics and fields? How can we improve the approach? What have we learned? Have we achieved the aim of heighten reflexivity amongst the group?

Text and Close of the You're Just Selfish sketch

Full Text.

The scene has two characters, a grandchild (A) and their Grandparent (B). The Grandchild had three children in their 40's and 50's that they are collecting from the grandparent's house where they are cared for.

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A. Hi Gran, did everything go well? How are the children?

B. Oh, they are great, but I want to speak to you about our agreement. I am tired. I don't want to look after the children anymore. I have had a great life, I'm 104 now as you know, and I want to stop.

A. But we had an agreement. You would look after the children so that I could go to work! I have signed a contract! 14 years we said. I pay for everything and you just have to keep them until they are out of school.

B. Yes, I know. But I don't want to have to take all this medication anymore. *(empties out boxes of pills from his bag).* It doesn't feel natural to live like this. I want to join your Gran in heaven. You know she would have loved playing with the children, but we just didn't have the money at that time.

A. Of course it's natural. Everyone is doing it. And it's not medication, it's a natural bio-engineered herbal recipe. And you don't even need to take all those pills anymore, it's "Now Available in Cans!". If I don't fulfill my contract, I will have to pay the training course back and we won't be able to buy the new house. The children will have to share a bedroom! And I have already paid 3 years of treatment in advance, there was a pay 2 years and you get the third free offer. So, I took it. 16 thousand euro! You are just selfish and unreasonable! You have always done everything you can to make my life more difficult! Don't you want to live longer?

Close: Text A

The scene has two characters, a grandchild (A) and their Grandparent (B). The Grandchild had three children in their 40's and 50's that they are collecting from the grandparent's house where they are cared for.

A. Hi Gran, did everything go well? How are the children?

B…..

A. But we had an agreement. You would look after the children so that I could go to work! I have signed a contract! 14 years we said. I pay for everything and you just have to keep them until they are out of school.

B…..

A. Of course it's natural. Everyone is doing it. And it's not medication, it's a natural bio-engineered herbal recipe. And you don't even need to take all those pills anymore, it's "Now Available in Cans!". If I don't fulfill my contract, I will have to pay the training course back and we won't be able to buy the new house. The children will have to share a bedroom! And I have already paid 3 years of treatment in advance, there was a pay 2 years and you get the third free offer. So, I took it. 16 thousand euro! You are just selfish and unreasonable! You have always done everything you can to make my life more difficult! Don't you want to live longer?

Close: Text B

The scene has two characters, a grandchild (A) and their Grandparent (B). The Grandchild had three children in their 40's and 50's that they are collecting from the grandparent's house where they are cared for.

A…..

B. Oh they are great, but I want to speak to you about our agreement. I am tired. I don't want to look after the children anymore. I have had a great life, I'm 104 now as you know, and I want to stop.

A…..

B. Yes, I know. But I don't want to have to take all this medication anymore. *(empties out boxes of pills from his bag).* It doesn't feel natural to live like this. I want to join your Gran in heaven. You know she would have loved playing with the children, but we just didn't have the money at that time.

A…

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