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Abstract

Achieving a sustainable future involves rethinking how we live, work, and do business, and understanding the steps people and organisations can take to drive these changes. This involves having a vision of what a just and sustainable future could look like, seeing business as part of an interconnected system, taking bold decisions and collaborating with others. The Exploring Sustainable Futures game is a role-playing learning experience that teaches these skills. Participants experience how the interrelated actions of businesses, government and citizens shape the future, in the context of four possible scenarios of a sustainable future by 2050. We outline how the design and delivery of the game teaches critical competencies for sustainability. We offer practical guidance on playing the game with management students and executive leadership teams. We present emerging evidence on the impact of game play on participants, and recommend more participatory methods for evaluating learning outcomes.

Keywords

Education; sustainability; serious game; systems thinking; collaboration; scenarios

Highlights

- Managers across all functions, and particularly operations managers, need new competencies to lead their organisations to a more sustainable future, in collaboration with others in society.
- Teaching these competencies requires learning interventions which are experiential and/or play based to facilitate transformation of learners' thoughts, feelings and actions.
- The Exploring Sustainable futures game is an example of an innovative experiential learning intervention intended to teach sustainability competencies to managers.
- An evaluation of a group of players evidences an increase in participants' understanding of the systemic relationship between business and society, what sustainability means in business and the importance of relationships in effecting change.
- The findings have informed further development of the game to upweight the experiential and emotional dimensions of the game and deliver more transformative outcomes.
- Academics can use the example of the game and insights from evaluating its outcomes to inform the design of their own learning interventions. Academics and practitioners are welcome to approach us about using Cranfield's game in their own organisations.

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Introduction

In the face of global social and environmental challenges, there is increasing pressure from customers, investors, and citizens for business to be part of the solution (Edelman, 2022). The British Academy's Future of the Corporation project defines the purpose of business to be "to profitably solve problems of people and planet, and not profit from causing problems" (The British Academy, 2019). This means that managers must now respond to the changing needs and expectations of a wider set of organisational stakeholders (Maak & Pless, 2006), in the context of a volatile, uncertain, complex and ambiguous (VUCA) environment. They need to lead their organisations in ways that contribute to solving society's challenges rather than adding to them and play their part—in their value chains, communities, industry sector and wider society—in achieving systems change.

However, most organisations, tend to find it difficult to manage towards measures of success beyond profit. They tend not to be very good at looking outside their boundaries to tackle problems that are not within their direct control, or that require partnership and collaboration to solve. Many professionals do not have the skills to make this complex and unchartered journey towards more sustainable business practices (Hall & Rowland, 2016; Stoten, 2021). As individuals, we can find it difficult to imagine the radical changes we will have to make in the way we live, work and do business if we are to bring human activity back into balance with the wider living world.

Sustainability education literature speaks of an urgent need equip managers with the competencies they need to transform management practices and lead their organisations towards a more sustainable future. This includes contributing to achieving the 2030 Sustainable Development Goals and the Paris agreement's commitment to achieve Net Zero by 2050, as well responding to an ever-expanding set of sustainability-related regulations and reporting frameworks. We need leaders across all functions of business who are capable of working collaboratively to address complex sustainability challenges (Burns, Diamond-Vaught, & Bauman, 2015). Operations management professionals, in particular, have the potential to drive innovation in their organisations to deliver better social and environmental outcomes, for example by changing production processes, procurement policies or creating more circular business models.

Addressing these shortcomings requires education that "empowers learners to take informed decisions and responsible actions for environmental integrity, economic viability and a just society, for present and future generations, while respecting cultural diversity" (UNESCO, 2020). Higher Education Institutions (HEIs) have a pivotal role to play in offering sustainability education that equips leaders to respond to their rapidly changing organisational contexts. This is particularly the case at postgraduate level, where many mid-career professionals return to study, full time or alongside their work (Dzimińska, Fijalkowska, & Sulkowski, 2020). HEIs are attempting to embed sustainability into their missions and curricula, guided by international frameworks like the Principles for Responsible Management Education (PRME) initiative (PRME, 2020), and the inclusion of sustainability criteria into accreditation frameworks (e.g. AAACSB and EQUIS). However, progress is slow (Lozano, Lozano, Mulder, Huisingh, & Waas, 2013), despite evidence of growing pressure from management students; a recent report from Yale Center for Business and the Environment found that 70% of business students want more experiential learning focused on sustainability; and 65% desire more case studies highlighting sustainability issues (Franceschini, Wang, & Cort, 2015).

There is some consensus now emerging around the competencies for sustainability that need to be taught. The Advance HE/QAA Education for Sustainable Development Guidance (Advance HE/QAA, 2021) sets out eight key competencies for sustainability, based on

UNESCOs key competencies for sustainability (UNESCO, 2017), which themselves build on Wiek, Withycombe and Redman's (2011) seminal framework of competencies for sustainability. It is suggested that these competencies need to be taught and learnt though holistic, transformational learning approaches (UNESCO cited in Advance HE/QAA 2021, p. 8), because they demand relational learning and a questioning and evolution of people's values and belief systems. Sustainability skills and competencies are just as much about personal agency, influencing, leadership and critique of 'business as usual' as they are about applicable knowledge and skills to deliver more sustainable solutions.

However, there are limited examples, and little practical guidance, on how exactly this type of learning experience can be offered to business schools students (Atwood, Coperine, & Hart, 2016). In addition, there is limited research to evaluate the success of education for sustainability in delivering its intended learning outcomes.

This chapter therefore introduces Cranfield University's Exploring Sustainable Futures game (hereafter "the game") as an example of an innovative learning intervention which teaches competencies for sustainability in the context of management education. After describing the game, we outline the intended learning outcomes of the intervention, as well as the pedagogic approaches employed to achieve these. We then present the findings from a small sample empirical study of the actual impact that playing the game had on a group of 25 executive students. Finally we describe the development of the game since this evaluation and share our plans for further deepening our understanding of the impact of game play.

We hope that this practical case study will help teachers and practitioners in the field of operations management, and management more generally, to design and evaluate teaching approaches and learning interventions that develop competencies for sustainability. We invite those who would be interested in using Cranfield's game in their own organisations to contact [to be completed in a later draft].

Theoretical Background

Competencies for sustainability

The field of knowledge around sustainability as it relates to business is evolving rapidly, and intersects with many other management disciplines, with research and teaching emerging in, for example, sustainable supply chains, humanitarian logistics, sustainable entrepreneurship, sustainable finance, and sustainable entrepreneurship. The knowledge elements in each discipline are changing fast and the knowledge provided is often out of date before it can be applied (Earle & Leyva-de la Hiz, 2021). There is a therefore an argument that educators should also strive to instil more fundamental skills, values and behaviours in current and future professionals to deal with this complex field (Tarrant & Thiele, 2016).

Wiek, Withycombe and Redman (2011) synthesised the evidence on the required competencies for sustainability into a reference framework for academic program development. This highly cited framework outlines the knowledge, skills, and attitudes necessary for successful task performance and problem solving with respect to real-world sustainability challenges and opportunities in businesses and management. It is composed of five key competencies which must be integrated to successfully co-create knowledge and action for sustainability. These are: systems-thinking competence; anticipatory competence; normative competence; strategic competence, and interpersonal competence.

More recently, Advance HE/QAA published its Education for Sustainable Development Guidance (Advance HE/QAA, 2021) setting out eight key competencies for sustainability, summarised in Table 1. These competencies are based on UNESCOs key competencies for

sustainability (UNESCO, 2020). Although the guidelines are not specific to the management context, they draw closely on Wiek et al's (2011) framework which is grounded in this context.

Systems thinking, in particular, has gained prevalence as core competence for sustainability in the management literature (Williams, Kennedy, Philipp, & Whiteman, 2017). Teaching systems thinking is not just about shifting thinking to a holistic viewpoint, but about helping students to develop their understanding of the impacts and unintended consequences of decisions (Brekken, Peterson, King, & Conner, 2018), both within their value chains and beyond into a sector or global ecosystem. Operations management professionals are well positioned to understand the wider system in which their organisation operates, and the unintended negative consequences of their value chain on this wider system. They also play a key role in implementing the changes needed to make this system more sustainable and value-creating for a wider set of stakeholders.

Table 1: Key competencies for sustainability

Competence[1]	**A student who displays this competency can:**
Ways of thinking	
Systems thinking	• recognise and understand relationships • analyse complex systems • consider how systems are embedded within different domains and scales • deal with uncertainty
Anticipatory	• understand and evaluate multiple outcomes • create their own visions for the future • apply the precautionary principle[2] • assess the consequences of actions • deal with risks and changes
Critical thinking *(not included)*	• question norms, practices and opinions • reflect on one's own values, perceptions and actions • take a position in the sustainable development discourse
Ways of practicing	
Strategic	• develop and implement innovative actions that further sustainable development at the local level and further afield
Collaboration *(Interpersonal)*	• learn from others (including peers, and others inside and outside of their institution) • understand and respect the needs, perspectives and actions of others • deal with conflicts in a group • facilitate collaborative and participatory problem solving
Integrated problem-solving *(not included)*	• apply different problem-solving frameworks to complex sustainable • development problems • develop viable, inclusive and equitable solutions • utilise appropriate competencies to solve problems
Ways of being	
Self-awareness *(not included)*	• reflect on their own values, perceptions and actions • reflect on their own role in the local community and global society • continually evaluate and further motivate their actions • deal with their feelings and desires
Normative competency	• understand and reflect on the norms and values that underlie one's actions • negotiate sustainable development values, principles • goals and targets, in a context of conflicts of interests and trade-offs, uncertain knowledge and contradictions

[1] Based on the UNESCO/AdvanceHE/QAA framework. Terms in italics are labels for the equivalent competence in Weick's (2011) framework where they differ.
[2] A broad approach to innovations with potential for causing harm when extensive scientific knowledge on the matter is lacking, emphasising caution, pausing and review.

Pedagogic approaches to sustainable education

We are interested in teaching and learning practices which go beyond imparting sustainability knowledge and skills in business operations (e.g. focused on carbon accounting, life-cycle assessments, supply chain management) to develop the deeper competencies outlined above. The transformative learning literature offers some clues on how this can be done, with experiential and play-based ways of offering potential as effective learning approaches.

Transformative learning

It is argued that education for sustainable development necessitates "a deep structural shift in the basic premises of thought, feelings and actions…..a shift of consciousness that dramatically and permanently alters our way of being in the world. Such a shift involves our understanding of ourselves and our self-location: our relationships with other humans and with the natural world." (O'Sullivan et al. (2002, p.xvii). Achieving such a shift therefore requires *transformative learning* that "goes beyond acquisition of skills and knowledge, to support learners in critiquing how knowledge is acquired and communicated. This can lead to changes in thinking, perceptions, beliefs and values which can transform how the learner interprets the world around them" (Advance HE/QAA, 2021, p.4).

Transformative learning therefore involves learning experiences that not only change the way people think, but also the way they feel, how they perceive what is important (i.e. what they value), and the way they act (Förster, Zimmermann, & Mader, 2019). Even when it comes to the cognitive domain, transformative learning is oriented towards higher-order learning—in other words, teaching people 'how to think' rather than 'what to think' (Savage, Tapics, Evarts, Wilson, & Tirone, 2015). This means that educators must think beyond the transmission of knowledge to create these more holistic transformative learning experiences.

It is generally agreed that a transformative learning experience needs to stimulate an irritation, or a "disorienting dilemma" in participants, which challenges their current thinking, feeling and assumptions, making them accessible to critical reflection (Förster, Zimmermann and Mader, 2019, p. 325). Learners are said to experience a state of liminality (or transition) in which their 'old' meaning perspective is no longer valid, but the 'new' is not yet clear (Land, Rattray, & Vivian, 2014). At this point in the experience, there is a sense of destabilisation and a move outside participants' emotional 'comfort zone' as their prior sense of what is true and important is challenged. Teachers need to support learners to navigate through this liminal space, helping them to find a balance between dealing with uncomfortable challenges and activating and building resources, including the ability to process emotions, the use of creativity to explore new ways of being, and rational reflection and discourse (Förster et al., 2019).

Transformative learning theory therefore recognises the importance of the emotional journey that students often need to go on to shift mindsets (Thomas, 2009). This means business school educators incorporating this emotional effect in teaching and learning about working towards a more sustainable future, which has largely been underplayed to date (Moratis & Melissen, 2022).

Experiential learning

A second pedagogic concept that informs education for sustainability is experiential learning. Kolb (1984) describes learning as "the process whereby knowledge is created through the transformation of experience" (p. 38), with his experiential learning cycle describing a process whereby learners move from the abstract consideration of concepts, to trying them out in practice and then reflecting on their experiences and learning from them to refine their ideas

and thinking. This has parallels with transformational learning in that it is based on practical experience, which has the potential to bring about dissonance and divergence, as well as the importance of critical thinking and reflection to assimilate learning from experience into a new state of knowing.

Play-based learning

'Serious games' are increasingly being used to increase player' understanding of sustainability issues and solutions with a purpose beyond entertainment (Stanitsas, Kirytopoulos, & Vareilles, 2019). Games "are the closest we can come to actually….pre-experiencing alternative futures so as to have a wider understanding of what might be viable preferred futures" (Dator, 2017). There is an 'as if-ness' about play: 'as if' it is the real thing, but at the same time is not. Games indeed require uncertainty to hold our interest, with the struggle to master uncertainty central to their appeal (Costikyan, 2013), meaning that ambiguity and contradictions can be present in a way they could not be with more traditional teaching practices. "By enabling a sensorial and psychological distance from the urgency of "reality" and by lending a creative freedom to the participants a game is a powerful way to explore in advance possible ways forward, solutions, or preventive measures that would be impossible to come up with under the immediate pressure of real-life events as they occur" (Bontoux et al., 2020, p83).

Other teaching practices

Advance HE/QAA, (2021) offer guidance on teaching practices that facilitate this type of experiential transformative learning experiences by offering opportunities to hear alternative viewpoints, reflect on experiences, and address real-world challenges. Alongside play-based learning, these include collaborative learning, enquiry-based learning, learning through storytelling and problem-based learning. These practices are described in more detail in Table 6 where we outline how the game incorporates these practices.

The Exploring Sustainable Futures Game

Introduction

We now introduce the Exploring Sustainable Futures game (hereafter "the game") as an innovative example of a scenario-based experiential learning intervention which teaches competencies for sustainability in the context of business and management education. After introducing the game, we discuss the pedagogic approaches and teaching practices employed in its design and the intended learning outcomes of the intervention.

The game is a role-playing learning experience designed to engage participants in system-thinking with a long-term perspective and to explore alternative pathways to a sustainable future by 2050. During the game, players representing established businesses interact with players representing entrepreneurs, policy makers, civil society organizations and the general public (citizens) as they all react to changes in economy, technology, and society along alternative pathways towards a more sustainable future by 2050. Box 1 describes the origin and use of the four Sustainable Lifestyles scenarios which underpin these pathways. The 'winners' are judged not only by the number of resources they have accumulated, but also by whether they have achieved their purpose, and participants reflect on the nature of the world they have collectively created through their decisions.

Successive formats of the game have been played with over 2,000 individuals between 2018 and present. Initially, the game was used exclusively at Cranfield as part of sustainable business modules delivered on postgraduate programmes including the MSc Management

and MBA. Since 2021, the learning experience has been extended to over 600 non-student participants including sustainability practitioners, business executives and other academics (Table 2). These deliveries have helped inform the continuous development and improvement of the game, culminating in the formats described in this chapter, which are now being offered more widely to amplify their impact in business and society.

The game has been recognized by the Financial Times as being an example of best practice in teaching about sustainability and was showcased at the COP26 climate conference.

Table 2: Summary of sessions to non-student audiences since Nov 2021

Date	Event	Audience (n)	#	Format; Sector	Key developments
Nov '21	COP26	COP26 delegates; general public	150	Theatre style; Clothing	Production of multi-media content; large freestanding scoreboard
Mar '22	Edie Sustainable Leadership conference	Sustainability practitioners	30	Theatre style; Clothing	Testing with industry
June '22	Simmons & Simmons LLP	Lawyers	199	Participative theatre; Legal/finance	Trialling a short duration (60 mins) format
July '22	Warwick University	Academics	60	Board game; Multiple	
Sep '22	BAM Conference	Academics	35	Universe; Clothing	First pilot of core game
Sep '22	Kier Construction Ltd	Middle management	26	Universe; Construction	Game as part of full day sustainability workshop
Oct '22	Lucion Group Ltd	Middle management	30	Universe; Built environment	Test of digital scoreboard
Dec '22	Cranfield University	Academics and interested organisations	90	Universe; Construction	Integrated digital platform for videos, voting, scoring
Total			**620**		

Overview of the game

Participants are allocated to seven roles. Five roles each represent a different type of (fictitious) organisation in an industry sector. Two further roles represent the general public (citizens) through the vehicle of (fictitious) membership organisations. Table 3 details each of these roles and provides illustrative examples from the built environment sector.

Table 3: Player roles: With illustrative examples from the built environment sector

Groups and description	Example (built environment sector) and short description
5 sector organisations	
Established business: A large incumbent publicly listed profit-making organisation	**Solid Construction Ltd:** An international infrastructure group financing, developing, building, and maintaining innovative and efficient structures that underpin daily life. We are an award-winning contractor with 20 years of experience embedding circular economy principles in design and construction choices. Our purpose is to 'sustainably deliver infrastructure that is vital to society.' We are a large, established and publicly listed company.
Small enterprise: A smaller privately owned enterprise	**Horizon Network Ltd**: An international membership community for environmental services providers. We support our members with market intelligence so that they can offer leading edge environmentally focused solutions to their clients across a range of industry sectors. We

	convene peer-to-peer networks sharing insight and inspiring action. Our goal is to combine international market intelligence with local expertise and regulatory insight. We are an entrepreneurial, and privately-owned business, funded by membership fees.
Civil society organisation: A charity, or community interest company	**SkillBuilders Academy**: A purpose-driven training network tackling skills and capacity gaps facing the construction industry. We offer affordable, future-ready training to all construction professionals: from architects to engineers, building contractors, workers and would-be workers. Our objectives are to expand the quality and quantity of human resources available to the industry to enable large-scale sustainable construction. The industry needs skilled people to speed up the adoption of innovative materials and building technologies. We are a community interest company which means our profits are mainly reinvested in our mission.
Policy maker: A government or other policy making body (at any level)	**The Manchester Umbrella Authority:** A coalition of 10 regional authorities and the Mayor of Manchester. Our goal is to develop a prosperous and self-reliant Greater Manchester. We aim to strengthen economic growth and environmental health by accelerating public services reform. We want our region to offer everyone a good life, growing up, getting on and growing old. We do this by: (1) encouraging public bodies to buy locally; (2) giving people opportunities to own assets and take part in decision-making; (3) refocusing health, social care, and environmental services on healthy living. We are a publicly funded coalition serving the people of our city-region.
Individual influencer: A individual who has influence which is not limited to a particular organisation	**Alex Gogetem OBE**: Co-founder of charity DePollute which works in partnership with big brands and businesses to challenge and support them on their sustainability journeys. As co-founder, I have brought together a collective of freelance Expert Associates from across Europe. Together, we are delivering environmental services with the imagination the future demands - pushing the edge of practice. This mission is what earned me an OBE! I personally manage our partnerships with tech company Delicious, beauty retailer Shine, and UK distributor Sovereign. We are a charity. We receive fees from our commercial partners and reinvest it paying our experts and funding new projects. Our charity status helps us hold our partners to account and act as their good conscience.
2 membership groups representing citizens	
Citizen voice 1: A community-based union advocating for the greater good of the many	**People's Champion**: A mass membership organisation of low-income people uniting to fight for a better life. Nurses, shop workers, delivery drivers, carers, parents: we raise the young, support the elderly, and produce the country's wealth, yet itis our housing that's not good enough, our services and jobs that are cut. The economic and political set up in this country is not working for us. Wealth is being transferred upwards and the only solution is for us to get organised and win it back. We want a fairer deal for communities left behind by companies, councils, landlords and parliament.
Citizen voice 2: A membership organisation with an agenda for personal interest	**Smart Investors**: A membership organisation for institutional and private investors. Our members seek to hold greenhouse gas emitters to account by ensuring they take necessary action to support a net-zero emissions transition. Our Benchmark Report provides investors and other stakeholders with a means of assessing the alignment of company decarbonisation strategies, governance, and disclosure with the goals of the Paris Agreement, an international climate change treaty. Our goal is to engage with companies to produce wiser, more resilient investments for both parties – and ultimately for society.

The format of the game has evolved through a series of iterations over the course of many years and many game sessions with students and executives and is now played in two main

formats. The choice of format is influenced by suitability for audiences as well as resources and set-up implications (Table 4).

Box 2 describes in detail the more widely used 'Universe' format. In this format, one game is played by all participants in the context of a selected industry sector, with small groups of participants at a table together playing one role as a team, playing 'against' other tables in the room.

Box 3 outlines a second 'Multiverse' format. In this format, a game is played at each table oriented around a physical playing board. Each role is played by one person at the table playing 'against' other players on their table. There is therefore the potential for a different sector to form the context for game play at each table.

Table 4: Comparison of formats

	Universe Format	**Multiverse Format**
Sector	One sector in explored	A different sector can be explored at each table
Suitable for participants	With less knowledge of sustainability; less confident to work alone; from the same organisation or industry sector	More knowledge of sustainability; confident to decide on and pitch actions alone; from a variety of different industry sectors
Participant preparation	None. Pre-defined organisations	c. 30 mins preparation; participants define their own sector organisations
Resources	Digital resources and worksheets	Physical playing board, digital resources and worksheets
Facilitation	1 facilitator, 1 support staff	1 facilitator, 1 support staff; optional host for each table with experience of the game
Number of participants	Minimum 15, maximum 70	Any multiple of 7 or 8

Intended learning outcomes

As sustainability faculty and practitioners, the game creators recognised that achieving a sustainable future involves rethinking how we live, work, and do business, and understanding the steps people and organisations can take to drive these changes. We knew from the sustainability competency framework described above, and from our own experience, that this involves having a vision of what a just and sustainable future could look like, seeing business as part of an interconnected system, taking bold decisions, and collaborating with others. However, we also recognised that these competencies tend to take time and experience to develop, and that the urgency of the social and environmental problems we face does not allow for the luxury of time. We therefore developed this learning experience to accelerate learning through an experiential, transformational journey to the future, offering participants the opportunity to develop learning from their journey that they can bring back to influence their thinking and actions in the present.

The game was designed with Weick's competencies in mind (which correlate closely with the AdvanceHE Guidance published in 2021), with aspects of all the core competencies expected to be developed through game play, as described in Table 5.

Table 5: Features of the game intended to develop each competence

Competence	**Design features of the game intended to develop this competence**
Systems thinking	Players represent a diverse set of organisations making up the system within an industry sector; the success of their actions depends on their ability to attract

	support from other organisations and citizens; it is the interdependent actions of actors in the system which collective shape the future
Anticipatory	Players consider much longer time horizons that typical in business strategy cycles; multiple possible future scenarios unfold simultaneously; glimpses of potentially negative futures introduce concepts of future risk and taking action to mitigate those risks
Critical thinking	The stories and headlines from the future must be interpreted by the players to understand their relevance for their organisation and its future goals and success
Strategic	Players must identify and evaluate the obstacles to change and leverage driving forces to assist them in achieving positive outcomes. They engage with stakeholders to support each others' initiatives through consultation and collaboration
Collaborative	Players work together in groups to share their interpretations of unfolding events and agree on actions which help them achieve their goals; groups of players representing different organisations find areas of shared interest and complementary resources to form collaborations that drive mutual value
Integrated problem solving	Players experience the complexity and inter-disciplinary challenge of creating a more sustainable future, and how potential solutions rely on the levers and influence of multiple diverse societal actors
Self-awareness	Players experience how they can have agency as an actor within a diverse set of organisations, or as a citizen using their power as an investor, voter or consumer; they learn that agency can take multiple forms; they reflect on how emotions and motivations impact their actions
Normative	Through their role-play, players must try and embody the role of organisations that they might be unfamiliar with (e.g. business person playing a policy-maker); they reflect on biases and barriers to sustainable action, both their own, and the assumed set adopted by them in their role; they question the meaning of success from a more diverse set of perspectives.

The intended learning outcomes from both formats are broadly similar, however, there are some nuanced differences between formats. The most pronounced difference is with respect to collaboration competence. In the Universe format individuals representing the same organisation work together at their table to define actions; collaboration takes place between tables at points in the workshop, but it is less spontaneous. This arguably mirrors real life in that people work as part of an organisational group, forming their collective identity and having to break down 'us' and 'them' barriers to create the empathy and understanding to collaborate. By contrast, in the Multiverse format, the collaboration takes place between individuals representing different organisations around the table, with deeper relationships and alliances emerging on a more ongoing basis as players get to understand each other and recognise where their objectives align and where they can share or exchange their resources for mutual benefit.

We discuss in more detail our findings relating to the achievement of these intended outcomes in the evaluating learning section below.

Pegagogic learning approaches and teaching practices employed

The Sustainable Futures game is an example of a learning intervention which is designed to bring about transformative learning. It is played in the context of future scenarios which help participants visualise, and experience, alternative future visions of sustainable lifestyles in Europe by 2050. It involves discourse between individuals who must make strategic decisions about the actions they take in response to the unfolding future, guided by their own articulation of their 'adopted' organisations' purpose and values. Being successful in the game requires collaboration between diverse societal actors who must question their own assumptions and value and build empathy with other societal groups to find opportunities to create shared value. The device of 'time-travel' and the compelling audio-visual stimuli create an experience which

has a powerful emotional dimension, known to be pivotal in transformation. Crucially, there are many opportunities for reflection, both individually and in groups, between phases of game play and at the end of the experience, which to allow participants to assimilate the new ways of thinking and knowing that they have explored.

The fact that the experience is framed as a serious game, and participants are engaging in role-play representing organisations that are not their own (they may be fictitious organisations resembling their own), provides a safe space to question, challenge and experiment. Regardless of the outcomes of the game, participants know, and are reminded during the game play, that this is only a game, that the future has not yet played out, and that they can use their learning to inform their current thinking, feeling and action.

Table 6 describes in more detail how the design features of the game incorporate many of the recommended teaching practices for developing sustainability competencies.

Table 6: Definitions of teaching practices for sustainable development and their application in the game

Teaching practice	Definition	Application in Sustainable Futures game
Play-based or playful learning[3] Structured or semi-structured approaches that allow students to explore approaches, scenarios, actions and consequences in a safe learning environment	**Game-based learning:** Game mechanics to increase engagement and motivation. Goal oriented games with strong social components and replicate real-world experience are effective learning tools	The activity is framed as a game, with groups representing sector organisations 'competing' with each other to attract the most resources (represented by resource 'tokens') to 'win' the game. Players experience the interplay and tensions between achieving organisational goals and creating an acceptable outcome for society as a whole.
	Serious play: A playful mode of activity that incorporates the cognitive, social and emotional dimensions, and remains intentionally open to emergent outcome.	The activity is playful as well as serious, allowing people a safe space to 'try out' possible responses to planetary challenges knowing this is just a game. The response to the glimpse of a 2050 is designed to be particularly emotive. The outcome of the game in emergent, with participants co-creating the future of their industry sector.
	Simulation: Simulations of real-life situations through e.g. role plays and gaming encourage students to develop their thinking around ESD and can contribute to the formation of students' own attitudes and the social norms that they find acceptable	Players engage in role play representing their organisations or citizen groups, as well as in playing and winning a game. The activity enables them to question the relative importance and trade-offs between elements of sustainable development (e.g. biodiversity vs human health), and to enact changing social norms.
Learning through storytelling[3] A process in which learning is structured around a narrative or story as a means of sense-making	**Narrative-centred learning environments**: Situate learners within a story-world (sometimes using virtual or augmented reality) in which they participate in an unfolding story	The game uses video and audio stimuli to tell stories to situate learners in future worlds. In addition, story-telling emerges as a key skill for successful players who use story-telling to help take others with them towards their goals.
Problem-based learning[3]: A style of active learning, using real-world issues or problems to increase knowledge and understanding	Students work together in small groups, typically facilitated by educators. A student-centred approach in which students decide what they know, or can do already, and what they need to know or learn. Appropriate for interdisciplinary and interprofessional learning, and to support students in problem identification and envisioning and evaluating alternative outcomes. Particularly suited to complex, multi-faceted issues ('wicked problems') which are	The learning experience asks participants to propose responses to 'wicked problems,' as individual player groups and in collaboration with each other. Playing the game enables interdisciplinary understanding by asking participants to 'step into the shoes' of a range of societal actors which may not align with their own background and lived experience (for example a business leader 'playing' the leader of a civil society organisation). The game deals with some very serious societal and environmental challenges, but provides an environment for creativity and risk-taking, in the knowledge that this is only a 'test run' of the future,

[3] Practice and description from AdvanceHE/QAA Education for sustainable development guidance pp. 36-38

Teaching practice	Definition	Application in Sustainable Futures game
	not amenable to simple problem-solving. It provides an environment for creativity, risk-taking and learning through failure, as well as innovative thinking	and that participants can bring back their experiences (of success and failure) back into the present to inform their current perceptions, priorities and actions.
Collaborative learning[3] A method of learning that is often self-organised and occurs outside of the formal learning environment	Collaborative learning takes place in small groups. The needs of the group are determined by the needs of the individuals that constitute it and not by an externally imposed goal. Collaborative learning is a social process in which knowledge and meaning is co-constructed and can lead to creativity and open innovation	Although the game does provide an external structure, the interpretation of events and responses of the player groups is co-created by the members of the group. The agreed actions are the innovative responses to unfolding futures sourced from the collective experience and wisdom of the group.
Reflective Cycles: An essential part of the Kolb experiential learning cycle	A number of reflective cycles are planned into the game play to encourage students to reflect individually and in their groups	

Evaluating learning outcomes

Introduction

It is challenging to evaluate the perspective transformation of adults (Bryant, Ayers, Missimer, & Broman, 2021; Hoggan, 2016). In particular, there is a lack of evidence on the effectiveness of serious games in meeting their intended learning outcomes (Stanitsas et al., 2019). A range of approaches to evaluating the learning outcomes delivered by the game and the impact it has on participants have been piloted or are in progress. A practical challenge has been to find the time for participants to participate in the research in addition to taking part in an intense learning experience.

In this section, we present the findings from an evaluation of a group of 25 Cranfield part-time executive students playing the game as part of the Leading Corporate Sustainability module on their MSc Management and Leadership in 2019. It is important to note that the format of the game they experienced was an earlier version of the Multiverse format described in Box 3. In the version they played, the audio-visual stimuli materials had not yet been developed so all stimuli materials use were in the form of written cards with some photos/images.

Given the multi-faceted learning the game is designed to deliver, we developed a broad-based exploratory framework to capture some initial insight from this group of students on what they were learning about: 1) systems thinking 2) sustainable society, 3) leadership for sustainability and 4) sustainability in business. We then mapped these ILOs to the AdvanceHE/QAA competencies for sustainability. The intended learning outcome (ILOs) along with the competencies they map to are set out in the first two columns of Table 7.

To evaluate the achievement of these ILOs, students were asked to complete a three-part self-assessment:

1) Immediately before playing the game: written responses to two self-reflective tasks and six self-reflective questions.
2) Immediately after playing the game: written responses to two self-reflective tasks and six self-reflective questions.
3) Two weeks after playing the game: completing an online survey.

Table 7 describes the tasks, reflective questions and survey questions students were asked to complete to self-assess their learning outcomes. Of the twenty-five students participating in the game nineteen students submitted responses, with eight students providing all - or almost all - of the data requested to evaluate their learning outcomes and ten students providing partial data.

Table 7: ILOs, mapping to competency areas and related tasks, questions and survey questions

Intended learning outcomes	**Related competency**	**Questions asked before playing**	**Question asked after playing**	**Questions asked 2 weeks post in questionnaire[4]:**
ILO1: Understanding that viewing circumstances through longer/ shorter time-horizons alters our perception	Anticipatory	'What three things happening in Europe are catching your attention?' They could be social, technological, economic, environmental, political or values changes	You answered this question before you played the game. Please reflect on if and how your experience of playing the game has influenced what you are noticing in Europe right now.	…the radically different, plausible futures that could unfold over the next 30 years?
ILO2: Understanding the interrelationships between a business and the systems of which it is part - social, technological, environmental, economic, political and values/ mind-sets/ cultural	Systems thinking	What is a business? Find a way to represent the elements that make-up a business and the outside influences on it. Imagine you're explaining a business to a curious 12 year old	What is a business?' Think about what you've learned about the ways in which a business is shaped by - and has an influence in shaping - society. Update your drawing of a business to reflect this learning.	….the interrelationship between business, society and the wider living world?
ILO3a: Understanding how all parts of society are involved in processes of change - including through inaction **ILO3b**: Understanding the distributed nature of power and influence of different actors in society	Self-awareness Systems thinking	Who has the power and agency to influence society? Looking back at the six characters you have selected from, write about them in order from the most influential to the least influential in society? Write about why you have placed them in that order.	Share any changes you would now make to this ordering, and why. Consider your personal agency and 'power to make a difference' in business, in light of what you have learned.	…the role different characters play in societal change?
ILO4a: Understand that sustainable lifestyles and a sustainable society are not a 'final destination' they are a continual process of evolution. **ILO4b**: Understand that there are plural pathways and approaches to put society on a sustainable footing - each with their advantages, limitations, downsides. **ILO4c**: Consider if and how a sustainable society is compatible with the capitalist growth paradigm.	Normative Anticipatory Normative	none	none	…what might have to change in the world for sustainable development to happen?

[4] To what extent has your experience of playing the game deepened your understanding of….

Intended learning outcomes	Related competency	Questions asked before playing	Question asked after playing	Questions asked 2 weeks post in questionnaire[4]:
ILO5a: Understand the interpersonal skills necessary to exercise influence in a world that changes and grows in complex interrelationship **ILO5b**: Understand that purpose is at the heart of any actors' ability to work in relationship with others in ways that serve wider benefit	Self-awareness	What are the character traits and capacities of a change-agent? What qualities enable them? What qualities inhibit them?	Think about what you've learned about how change happens in society and the possible responses to it. Update the annotations you made in the pre-work, to describe the qualities and capabilities of a 'change agent.'	… the role of 'purpose' (and intention) in guiding people and organisations in making change in a complex world?
ILO6a: Understanding that a business exists in ever-changing relationship - 'internally' as an organisation and 'externally' with those in its value chain and beyond. **ILO6b**: Understanding the sustainability/CSR function of a business has the potential to advance 'business as usual' or to transform it - related to their mind-set.	Strategic	What is the purpose of corporate social responsibility/ corporate sustainability? Write your thoughts about the following: (i) what you understand corporate social responsibility is (ii) its value to a business; (iii) what would happen without it	What is the purpose of corporate social responsibility/ corporate sustainability? Please write about how your experience of playing the game has affected your response to this question.	…the scope for business to both regenerate and degrade society?
ILO7a: Exploring why organisations choose to collaborate to deliver their sustainability strategies, and the diverse motivations and forms this can take. **ILO7b**: Exploring how purpose (intention), responsiveness (ability to notice and interrelate) and futures thinking (engaging with long-term trends) affect organisations' strategies and impacts in society.	Collaborative Anticipatory	none	Please consider the differing effects of a 'play to win' strategy v.s. 'purpose-led' strategy on the success and societal impact of a business. To compose your response, draw on your personal experience of playing your character. Also draw-on our discussions as a whole group.	… the need for change agents to pay attention to what's unfolding around them and use futures thinking?

Findings

We now discuss the findings from both the qualitative tasks and reflections and follow-up survey in relation to the seven ILOs set out above. We have organised the findings around the four broad enquiry themes underpinning the ILOs: 1) systems thinking 2) sustainability in society, 3) leadership for sustainability and 4) sustainable business, however, we found significant connections and overlaps between these themes. Illustrative written reflections relating to each ILO and graphs depicting follow-up survey results are in Table 8. Example 'before' and 'after' drawings are shown in Figures 1 and 2.

Systems thinking (ILOs 1 and 2)

Many students seemed to gain a whole systems view of society through playing the game, with many commenting that the learning experience had widened their view of the connections at play between different agendas, including the connections between society, economy and environment. In their rankings of the relative influence of different actors in society, a minority of students reorganised their rankings to depict economic actors as having less influence than civil society actors, demonstrating a new understanding that citizens and civil society set the wider cultural context, for the economy to operate.

When reflecting on if and how the game had affected their perception of trends in Europe, a subset of students said it had revealed connections between economic and environmental factors they had not noticed before. Another group said it had expanded their understanding of how our interactions with the environment - our care for it and its health - are affected by prevailing mindsets and norms in society. One student volunteered an interrogation of the trends they had identified before playing the game. Their comments after playing the game demonstrated the application of a futures perspective, questioning the benefits and disbenefits of artificial intelligence and the potential for longer-lasting recessions as a result of climate change. Their response appears to be framed by an understanding that the future is uncertain with many plausible possibilities.

While some students made reference to the change in perspective they gained through viewing changes in society over a longer time-frame, this was not a prominent theme in students' responses. It was more prominent for students to remark on interconnections between issues and agendas revealed to them through playing the game, the need to adapt and respond as part of an ongoing process of change in society and the influence of different actors, within this.

While none of the students volunteered comments on how the future scenarios affected their understanding of sustainable development in their responses to the self-reflective questions, the follow up survey suggests most students experienced a significant increase in their conceptual understanding. Most students felt that playing the game substantially deepened their understanding of plausible futures (Graph A). Of the students who critically evaluated aspects of the future scenarios, some considered if and how the scenarios challenged their/our assumptions about the future while others took their content literally, as a prediction of the future. Many students said they gained an appreciation of the continuous, evolving nature of change and the power of belief systems and mindsets to determine what is and is not possible and acceptable at different points in time.

There was a general shift in students' perspective of CSR/sustainability in business before and after playing the game. Before playing the game, their definitions took an 'inside-out' perspective, making the business case for this function. After playing, many students' made additions to show relationships with others and the systemic benefits of business CSR/sustainability for society. Ten students added some form of wider context. Of these, five

students added a greater number of stakeholders, six students added references to the environment where this was previously absent, five students drew relationships that were previously absent or adding more interaction (see Figure 1 for example 'before' and 'after' drawings). Students' understanding of the relationships between business, society and the wider living world increased substantially through playing the game (Graph B).

Sustainability in society: ILOs 3 and 4

The game provoked an almost universal appreciation of the importance of relationships in affecting change. Many students said their understanding of different actors' influence in society was challenged by the game and had altered as a result of playing it. This was echoed in their responses to the follow-up survey with respect to the role different characters (societal actors) play in change (Graph C) and their understanding of what might have to change in the world for sustainable development to happen (Graph D).

The data analysed suggests that playing the game had a very positive influence on students' grasp of the distributed nature of influence and agency. Many students observed that the game had challenged their understanding of business' influence in society, noting business' influence on policymaking and noticing their wrong assumption that policymakers set the terms for the economy. These students emerged from the game with a revised notion of policymakers as 'responders' rather than 'directors' in the public realm and highlighted the requirement in a democracy for all actors to apply pressure on our representatives to serve our needs.

Through playing the game, a minority of students said they had come to recognise the need for understanding and respect amongst different actors, and develop a more critical understanding of power and influence amongst different types of actors in society. While there was some evidence to suggest increased feelings of empathy and respect for diverse actors amongst this group, it is unclear the extent to which people actually experienced empathy during the game.

Leadership for sustainability: ILO 5

The concept of leveraging additional influence by coordinating and collaborating with others was prominent in students' responses to questions related to leadership for sustainability. Where they made additions to their annotated drawing of a change-agent after playing the game, students' additions almost universally related to the traits and capacities needed to be, and act, in relationship on an interpersonal basis. In addition, many students highlighted characteristics related to a person's propensity and ability to innovate and adapt. There was a noticeable theme related to respecting the opinions and perspective of other actors and change-agents in society. A small group of students added 'purpose' as a positive attribute to their drawing of a change-agent and/or suggested that to be effective, a change-agent must be consistent because this would allow them to foster relationships and alignment with others, to collaborate for impact (see Figures 1 and 2 for example 'before' and 'after' drawings).

All but one student said playing the game had significantly deepened their understanding of the role of purpose in guiding people and organisations in making change in the world - one of the more decisive responses from the students (Graph E). Students' reflections about the effect of playing a second round of the game with an explicit focus on their organisation's wider societal purpose drew lots of comments about the effect of purpose on relationships. Many said having a purpose made it easier to form allegiances and sustain reciprocal relationships as the game progressed. Most students concluded that a play-to-win strategy did not necessarily lead to 'winning' the most resources overall - and was likely to rupture relationships through rapid, inconsistent changes in tactics.

Sustainable Business (ILOs 6 and 7)

Looking across their responses to the self-reflective questions and follow up survey, most students seemed to gain a wider, and more relational, view of business in society through playing the game. Many students remarked on the need for continual adaptation and change in response to wider changes in society and on the positive role CSR/sustainability functions can play in enabling business to do this in ways that respond to changing cultural expectations and norms. Many students seemed to acquire a clearer case for action for CSR/sustainability in business; both from the perspective of the business in question and wider society, and for collaborating with others to deliver this. Less clear is the extent to which students deepened their understanding of different approaches to CSR/sustainability within business. For a small minority this seems to be the case with some, for example, commenting on the need for full integration of sustainability into with the core business strategy to realise greatest value.

Many emerged with a broader concept of the issues that CSR/sustainability is concerned with, and an appreciation that a business always has a social contract with society, with society granting it licence to operate. There was a strong theme of students seeing and realising the interaction between business and society, and the role of CSR/sustainability in facilitating this social contract. When asked whether their view of CSR/sustainability in business had changed as a result of playing the game, many said that playing the game had revealed how damaging 'for-profit-only' business strategies were for society as a whole if left unchecked.

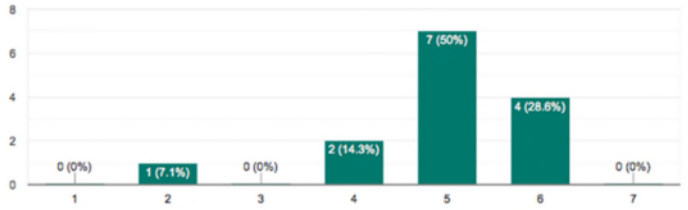
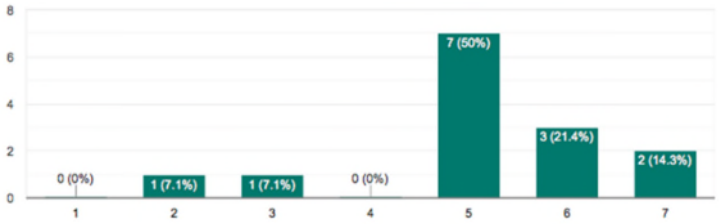
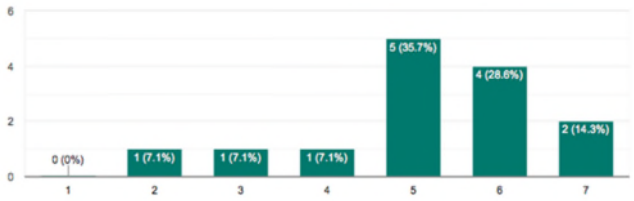
Most students gained an appreciation of the impact of business in society beyond the market and the need for 'checks-and-balances' to ensure these outcomes are positive. Many learned about the influence business is having, and can have, on government and civil society and rated the influence of small entrepreneurs more highly, big business less highly, after playing the game. They concluded from the game, that new entrants and smaller organisations have greater capacity to adapt and change, to stay relevant.

Fifty-seven percent of respondents said their understanding of the scope for a business to both regenerate and degrade society was significantly deepened through playing the game, though none to the maximum extent. Thirty-five percent of respondents said the effect of the game on their understanding was moderate. Seven percent said the game had made a small increase in their understanding (Graph F). This more diverse range of responses tallies with the wide diversity of interpretations of CSR/ sustainability strategies in business found in students' responses to the self-reflexive questions related to ILO6. The game seems to have challenged some students to re-evaluate their reasoning for the existence and role of CSR/sustainability in business while challenging others to consider how differences in businesses' CSR/sustainability strategies and their implementation may yield different benefits for those organisations and, cumulatively, for society as a whole.

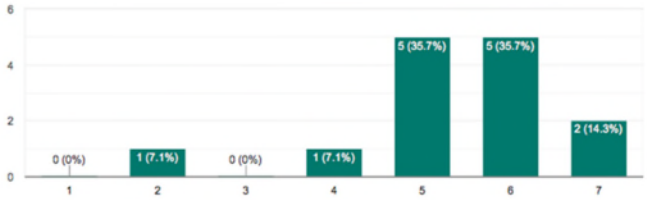
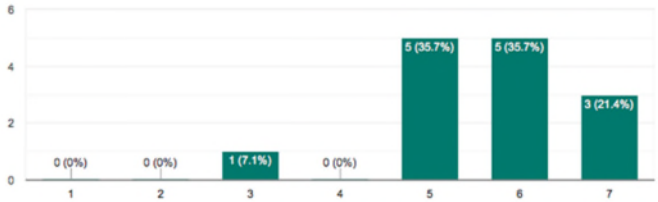
There was considerable overlap in the responses to questions related to ILO7a (why organisations chose to collaborate) and ILO5 (interpersonal skills for change). The value of cooperating and collaborating with diverse others, and the additional influence that can be leveraged this way, was a prominent theme.

Aligned to this, many reported that they now better understood to need for change-agents to pay attention to what's unfolding around them (Graph G). Students answered more positively to this survey question than the survey question about the futures that could unfold over the next 30 years. The nature of students' engagement with the future scenarios seems to have elicited more significant learning about *how* change happens than about *what* changes may occur, or are needed, for a sustainable society.

Table 8: Illustrative written reflections, drawings and survey findings relating to each ILO

Intended learning outcomes	**Illustrative written reflections & drawings**	**Survey findings:** the extent to which the learning experience deepened students' understanding of:[5]
ILO1: Understanding that viewing circumstances through longer/ shorter time-horizons alters our perception	*"The game has been interesting in highlighting how the temporal space (5-10-20 years…) could alter these perceptions..."*	Graph A: the radically different, plausible futures that could unfold over the next 30 years 
ILO2: Understanding the interrelationships between a business and the systems of which it is part - social, technological, environmental, economic, political and values/mind-sets/cultural.	***Figure 1: Example 'before and after' drawings*** *"I drew parts outside the organisation bigger as they affect the business much more than what I had anticipated before the course."* *"The game reinforced that no one institutional stakeholder wields power to the point that others can't bring about change, and that often grassroots initiatives and the public voice can be extremely powerful, especially where effective collaborations and partnerships are formed."*	Graph B: the interrelationship between business, society and the wider living world. 
ILO3a: Understanding how all parts of society are involved in processes of change - including through inaction. **ILO3b**: Understanding the distributed nature of power and influence of different actors in society.	*"The realisation that business drives much policy and influences people and society was interesting. Also the impact that the people's voice can have can be huge which I previously underestimated, this can drive change if enough people get on board."* *"I would now change the word 'power' to purpose... Identifying the purpose and allowing people to meet theirs is a far stronger position to be in. A civil society needs to expand, but needs to be mindful of their key*	Graph C: the role different characters play in change 

[5] 1 = not at all deepened; 7 = extremely deepened

Intended learning outcomes	Illustrative written reflections & drawings	**Survey findings:** the extent to which the learning experience deepened students' understanding of:[5]
	values to avoid damaging their reputation and their ability to grow... The more people who believe in your project the better, otherwise you could be in a position where you have to sacrifice aspects of your delivery which can weaken your position."	
ILO4a: Understand that sustainable lifestyles and a sustainable society are not a 'final destination' they are a continual process of evolution **ILO4b**: Understand that there are plural pathways and approaches to put society on a sustainable footing - each with their advantages, limitations, downsides **ILO4c**: Consider if and how a sustainable society is compatible with the capitalist growth paradigm	*"My focus pre-play was heavily weighted towards technological factors and the impact they might have on the future of European political, social and environmental frameworks. Whilst these innovations have certainly remained factors in my thinking, they are largely accelerators (or decelerators) for other more fundamentally pressing issues and questions – the implementation of regulation to decrease the rate of climate change in certain areas or to disaster plan for the impact of human made rates of material consumption."* *"My overall takeaway is that game reinforces the reality that in life cooperation is better for the whole however competition is better for the individual, the ever-present challenge being how to balance both for the benefit of all."*	Graph D: what might have to change in the world for sustainable development to happen 
ILO5a: Understand the interpersonal skills necessary to exercise influence in a world that changes and grows in complex interrelationship **ILO5b**: Understand that purpose is at the heart of any actors' ability to work in relationship with others in ways that serve wider benefit	***Figure 2: Example 'before and after' drawings*** *"Essentially all the skills that are required in a business need to be combined with a purpose and a commitment to making change."* *"I had a profile of a change agent in mind, but it was pretty narrow – a cliched view of an NGO or charity…. Rolling through two iterations of the game made me realise that everyone can be a change agent – for better or worse – and that influence can be massive or insignificant depending on application and approach."* *"I must find my voice and share my perspective. I need to connect my personal purpose to that of others and begin to look for ways to collaborate and partner with them. I could wait for someone else to do it but if I really want to make changes I must join with others and collectively influence policy-makers and other*	Graph E: the role of 'purpose' (and intention) in guiding people and organisations in making change in a complex world? 

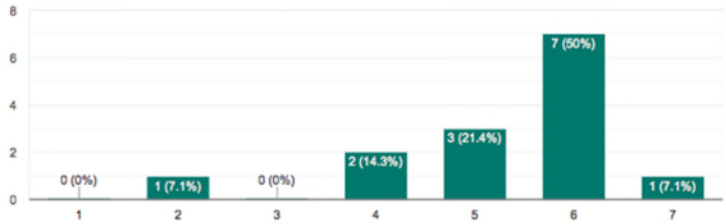
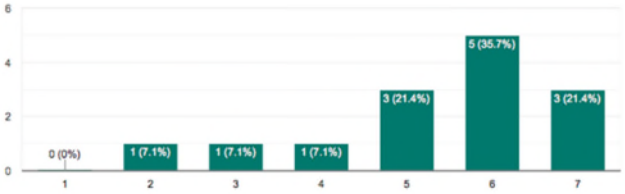
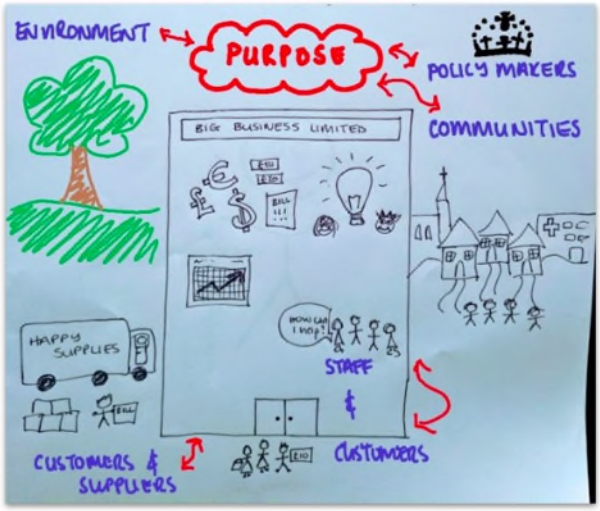
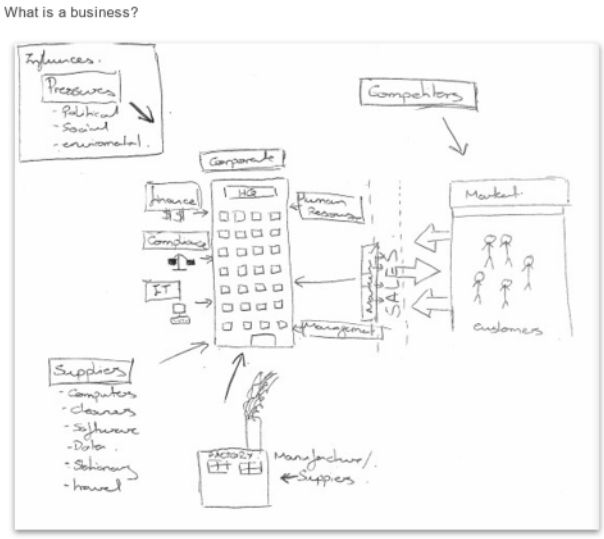
Intended learning outcomes	**Illustrative written reflections & drawings**	**Survey findings:** the extent to which the learning experience deepened students' understanding of:[5]
	businesses. I'm enthused about looking for those other agencies that feel the same way as I do."	
ILO6a: Understanding that a business exists in ever-changing relationship - 'internally' as an organisation and 'externally' with those in its value chain and beyond **ILO6b**: Understanding the sustainability/ CSR function of a business has the potential to advance 'business as usual' or to transform it - related to their mind-set.	*"It was interesting, especially in the 2nd round of the game, where we kept our business mission much more in mind, to see what the risks are if you develop a sustainability strategy which is different from your core mission, but at the same time how beneficial is it to keep the alignment strong. In a horizon of many years, the mission also needs to remain flexible and relevant."* *"What I had not considered though is the knock-on effect it could have on the wider society. If a large business is not willing to engage it could deny society a benefit that it could otherwise provide. An example would be denying an NGO the knowledge a large business had built up over decades. They would not be able to replicate this without years of work."*	Graph F: the scope for business to both regenerate and degrade society? 
ILO7a: Exploring why organisations choose to collaborate to deliver their sustainability strategies, and the diverse motivations and forms this can take. **ILO7b**: Exploring how purpose (intention), responsiveness (ability to notice and interrelate) and futures thinking (engaging with long-term trends) affect organisations' strategies and impacts in society.	*"Having a clear sense of purpose strongly influenced our behaviour and, I felt we all took a longer-term view of our actions, as opposed to a 'quick win' approach. I also felt that clear purpose guided who I felt it appropriate to collaborate with and gave me not only a clearer sense of how to play my own role but also how to best interact with other stakeholders."* *"The impact of non-financial collaboration has really stuck by me – indeed how two businesses can spark a frisson with relative low-level effort suggests that by not attempting to explore common ground, so many businesses are missing out on significant cultural – and perhaps economic – benefit."*	Graph G: the need for change-agents to pay attention to what's unfolding around them and use futures thinking 

Figure 1: Example before and after drawings in response to the question: What is a business? (ILO2)

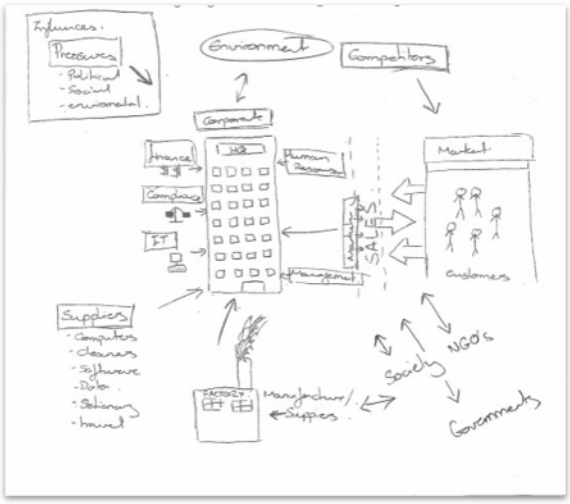
Participant X6 | Before playing



Participant X6 | After playing



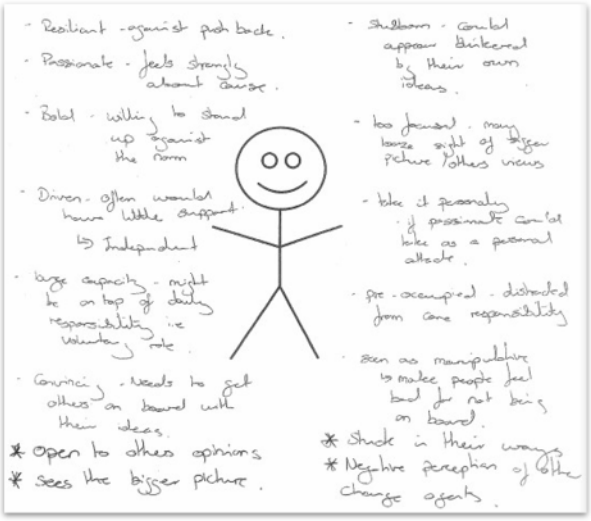
Participant X16 | Before playing



Participant X16 | After playing

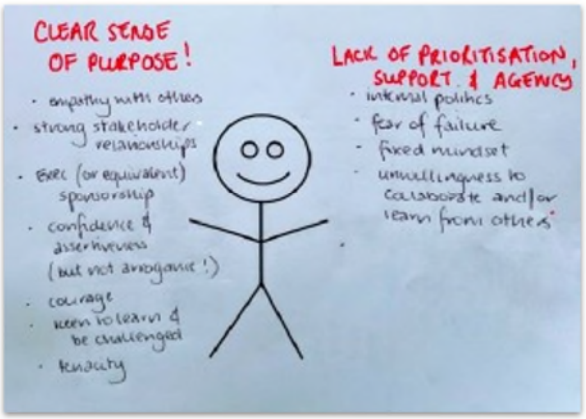
Figure 2: Example before and after drawings in response to the question: What are the character traits and capacities of a change-agent? (ILO5a): Left is enabling, right is inhibiting

Participant X16 | Before playing



Participant X16 | After playing

Participant X6 | Before playing



Participant X6 | After playing

Discussion

The findings suggest that the game did increase participants' understanding of the systemic relationship between business and society, and how change can happen collectively. It also increased understanding of what sustainability means in business and its implications for how businesses think about and conduct relationships with wider societal actors. There was increased understanding of how, when and why organisations need to collaborate and the enabling conditions for this. Although participants did gain a better understanding of the character traits required to lead for sustainability, it was not clear whether shifts in leadership practice were demonstrated or learnt during the game, or whether participants experienced transformation in their perceptions, beliefs and values.

The format of the game evaluated in the findings involved participants reading written information from a card which described emerging trends and events in each future decade they encountered. The findings suggest that this may not have meaningfully challenged players' current ways of seeing and perceiving the world. However, what did seem to challenge them, and generate learning, was the conversation and interaction that unfolded between players (representing their imagined organisations) as they responded to that written content. This emergent, and more experiential and relational, part of the game experience did appear to offer the learning outcomes we were looking for.

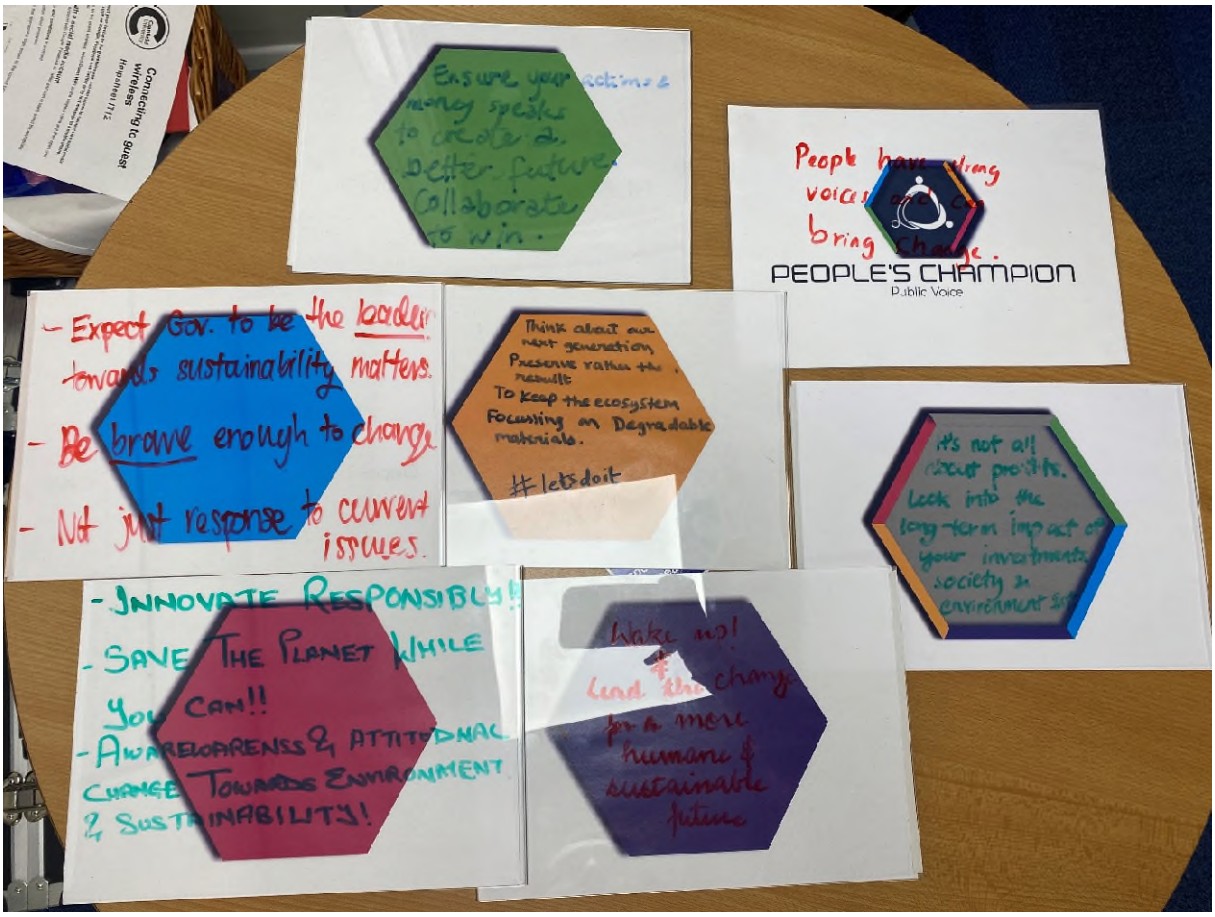
Based on this insight, the game design has since evolved (see Boxes 1 and 2) to deliberately improve players' engagement with the events unfolding in future decades, and upweight the experiential and emotional dimensions of the game. This has primarily been achieved by producing video stimuli which: 1) bring future decades to life through stories and headlines from the future; 2) offer a glimpse of a possible 2050 future which deliberately creates uncomfortable emotional responses, and a questioning of worldview; and 3) increase engagement with the possible 2050 scenarios by making them more accessible as 'visitor attractions.'

We continue to use survey-based instruments before and immediately after game play to evaluate the learning experience with larger data sets across multiple participant groups. In the research described in this chapter, we combined more extensive personal reflections before and after play with a follow-up survey. Since the game offers a learning experience in which both the experience and the learning are co-created by participants, we are now designing more participative evaluation approaches, complementing in-depth written reflections and drawings before and after game play, with focus groups with participants a few months after game play. This will be supplemented with data gathered from participants during game play, including results from polls, including those capturing the emotional impact of moments in the game (Figure 3), and personal and groups reflections during play, for example, the 'messages from the future' which players write for their current selves (see Figure 4).

Whilst we have mapped the ILOs evaluated in this research to an established framework of competencies for sustainability, the evaluation instruments employed were not closely tied to the learning outcomes underpinning each competence (see AdvanceHE/QAA pp. 24-31). Future evaluation could explicitly evaluate the contribution game play makes at the level of the specific knowledge, skills, attributes and values that underpin these competencies. An extension of this will be to look at how these are applied by learners, researching their impacts in practice in their organisations.

Figure 3: Emotions word cloud

Figure 4: Messages from the future



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BOX 1: The Sustainable Lifestyle scenarios [419 words]

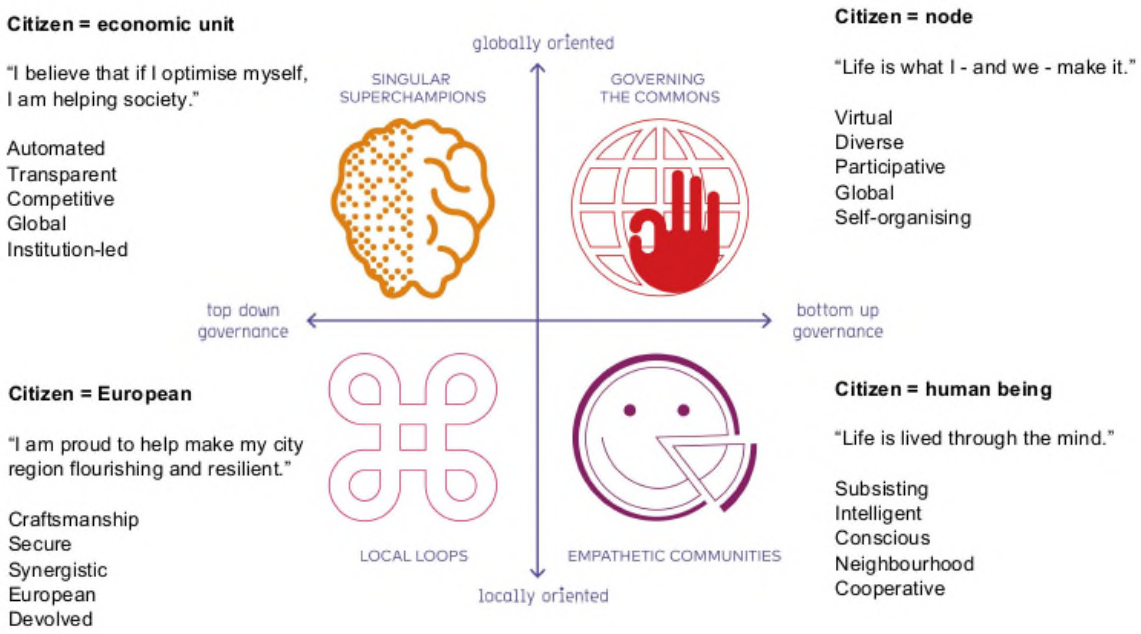
The Sustainable Futures game has evolved from the Scenario Exploration System board game format devised by the EU-Commission's Joint Research Council (JCR) (Scenario Exploration System, n.d.) to enable participants to "interact with radical social, political, and economic changes that would have to take place in society to achieve four contrasting sustainable lifestyles by 2050" (Bontoux et al., 2020, p.88). The Scenario Exploration System "can help people imagine what scenarios could mean for themselves and for the issues they are interested in. This offers the opportunity to translate what a broad future context could mean for very specific issues or stakeholders" (Bontoux et al., 2020. p.85).

The game is underpinned by four scenarios of a sustainable future in Europe by 2050. These four scenarios have their roots in the SPREAD Scenarios for Sustainable Lifestyles 2050 Scenarios created in 2012 (SPREAD, 2012) augmented by Cranfield and Forum for the Future as part of the EU-InnovatE project in 2014 (EU-InnovatE, n.d.). These augmented scenarios focus on the role of citizens in achieving sustainable lifestyles in 2050, with the following four scenarios being identified: 1) Singular super champions, 2) Governing the commons, 3) Local loops, and 4) Empathetic communities (Forum for the Future, 2017) (Figure 5).

During the game, all four scenarios are all simultaneously 'in play.' It is the responses and actions of the players, and the features of the scenarios which they pay the most attention to which 'dial up' or 'dial down' aspects and elements of each of the four scenarios. The future 'world' which emerges from the interconnected actions of players typically represents a blend of the four scenarios, however, one or two of scenarios are usually more recognisable and influential in this blend than others, and there is typically a correlation between the nature of the intent and actions of the most successful/influential players (i.e. the quality of the scenario they were bringing to life with their actions), and the nature of the emerging 2050 world. The four scenarios are brought to life in the game in the following ways:

- Four headlines from 'this day' in 2030 and 2040: One headline drawing from each of the scenario;
- Four 'visitor attractions' in 2050: One visitor attraction representing each of the scenarios;
- Participant discussion on which of the scenarios (represented by the visitor attractions) their actions and votes has taken their co-created world towards;
- Participant vote and discussion of which of the scenarios (represented by the visitor attractions) they would like to live in and therefore use their agency to work towards.

Figure 5: Four augmented Sustainable Lifestyles 2050 scenarios



BOX 2: How to play – 'Universe' Format [1542 words]

Time for play: 3.5 hours

Number of players: 25 - 70

Room set up: Flat room; 5 sector organisation tables for 4-6 people in cabaret layout; 2 citizen voice groups (ideally on straight tables towards to back of the room)

People resource: 1 facilitator; 1 support staff

Resources:

Integrated digital presentation incorporating video stimulus and digital scoreboard

- Videos include: 2030 citizen story; 2030 4 news headlines; 2040 4 news headlines; 2050 videos of 4 travel destinations.

7 printed A3 player profiles (5 organisations, 2 citizen groups);

7 printed A3 double-sided player worksheets'

7 stand-up table identifiers

5 sets of coloured resource tokens (10 per organisation)

Facilitator guide and running order

How the game is played

The game is played in the context of a chosen industry sector e.g. clothing.

Setting up for play

Participants are allocated to seven groups. Five groups each represent a different type of (fictitious) organisation in the sector. Two further groups represent citizens through the vehicle of (fictitious) membership organisations.

Each group is provided with an A3 printed character profile in the style of a LinkedIn profile. They are also given an A3 worksheet. One side of the worksheet is used by the participants to take notes in response to questions to get them to think more deeply about their organisation and what it stands for. The second side is used to provide prompts for actions they could take and space to note down each planned move. The sector organisations are each given 10 tokens which represent the resources they can invest or allocate during the game (resources representing not only financial but also social capital, reputational capital). Each table is clearly marked with a vertical identifier so all players can see who all the other tables represent.

Introducing the game

The facilitator introduces the game, covering the following key topics:

- The need for business to incorporate sustainability and a purpose beyond profit into its long-term strategy, taking into account the changing expectations of its wider societal stakeholders
- The need to consider change on a systems level. The established business is only one societal actor, whose actions and responses will be influenced by other organisations who are also part of the ecosystem for the chosen industry sector
- How the game is played and won. The sector organisation that amasses the most resources by 2040 will win the game. The resources they amass will depend on 1) the

resources they invest in their own actions 2) the resources they attract from other players in support of their action and 3) whether the two citizen groups vote in support of their actions. The facilitator then explains that the sector organisation that attracts the most resource will have had the most influence in shaping future, and that a second lens on 'winning' the game is the group's consideration of whether the world that has been shaped by the winning or dominant players is a world they would like to live in.

- The fact that participants will be travelling to the future, not as themselves, but as representatives of organisations who make up the ecosystem in the sector, and that they will have to 'step into the shoes' of the organisations they represent (which may be very different in nature to the organisations they work in or plan to work in)

Getting into character

Participants are then given time to introduce themselves in their groups, and to immerse themselves in their assigned role, guided by the player profile, and a set of probe questions, with the encouragement to note their responses on their worksheets.

- Who are you and what do you do?
- What matters most to you?
- What is your goal for 2030?

Each group then introduced their organisation to the rest of the room.

Travelling to 2030 and reacting to events

Once the pre-briefing in completed, the participants are invited to 'fasten their seatbelts' to commence time travel to 2030. A video is shown which creates the sensation of travelling through time to arrive in 2030. A short interview with an inhabitant from the 2030 world follows. Finally, participants see four headlines from 'this day' in 2030. Unknown to the audience, each of these headlines draws from one of the Sustainable Lifestyle scenarios described in Box 1.

Each of the five sector organisation groups are then given around 15 minutes to decide what action they will take as an organisation in response to the events they have seen unfolding in the headlines. They can use the hexagonal action cards as thought prompts, elaborating the action further with their own ideas. While the sector organisations are deliberating on their moves, the citizen representatives have been invited by the facilitator to 'visit' the sector organisation tables, to listen in on their deliberations, and even questions and challenge their proposed actions. Once a table group has agreed on their action, and how many of their resource tokens they will 'invest' in this action, they use the space on their A3 worksheet to it note down and communicate it in two ways:

1) Digitally (via polling software) so it appears on the screen at the front of the room;
2) Verbally, by 'pitching' their move to the rest of the participants.

Once all five groups have communicated their actions, representatives of the two citizen voice groups choose which action they want to support, based on the action align with their agendas and expectations. A spokesperson from each citizen group is invited to comment on all the sector organisations' actions, highlighting which organisation the group feels most aligned with (and which they are disappointed by), however, each representative votes independently (by scanning a QR code and voting in a polling platform) for the organisation(s) (can be single vote or ranking) they most support.

Scoring in 2030

Scores are entered and displayed for the first decade of play. An organisation's score is derived by multiplying the resources they have invested in their action by the citizen votes (across both membership organisations) in support of that action. The facilitator reviews and comments on the scores.

Glimpse of 2050

At this point, participants are shown a 'glimpse' of a 2050 future that could become a reality, shaped by their actions in 2030. Unknown to the audience, this is a glimpse of the Singular Super Champions scenario, where sustainable lifestyles have been achieved through technological solutions and big data, created and controlled top down by large corporations, but at the cost of nature and biodiversity. The glimpse typically provokes an emotional response and participants are invited to share their feelings on the polling platform and reflect on these in plenary. The facilitator guides participants to reflect on the implicit priorities and assumptions on which they may have based their play in 2030, and whether they might shift in their 2040 play.

Travelling to 2040 and reacting to events

The groups then travel forward together another decade to 2040, and watch video headlines from 'this day' in 2040, each drawing from one of the four Sustainable Lifestyle scenarios. Again, the five sector organisation groups are then given around 15 minutes to deliberate and decide on their action in this decade. In addition, the organisation groups are briefed that they can collaborate with other organisations, by only invest their remaining resource tokens in their own actions, but also investing resource in the actions of others.

Once again, each group communicates their action and associated resource investment to the wider group (digitally and verbally). Once all actions have been announced the groups are given further time (around 10 minutes) to decide which other players they want to support with their remaining resources. This may be because their agendas are aligned or because they need each other to achieve their own objectives. It is up to the player groups whether their 'investments' in each other are reciprocal or not.

The citizen groups again listen in on the deliberations throughout and cast their votes on organisations' actions as before, taking into account the nature of the partnerships they have formed.

Scoring in 2040

Scores are entered and displayed for the second decade of play. An organisation's score is derived by multiplying the total resources they have invested or attracted from others by the citizen votes in support of that action. Total scores across both decades are added up and a winner is announced. The facilitator reviews and comments on the scores, and makes the point that the highest scoring players are likely to have had the most significant influence in shaping the future we have arrived at.

Visiting 2050

A final time-travel hop is made to 2050. Here we get a taste of possible futures that we have strengthened or weakened with our play through the previous two decades, represented as four 'visitor attractions' in 2050. Each visitor attraction represents one of the four scenarios. The device of a visitor attraction is used to give participants accessible, relatable insights into relatively complex, multi-faceted scenarios in the form of short video animations.

Reflections

Reflection on play is a critical part of the learning experience. Reflections are guided by the facilitator, using prompt questions. Responses to some questions are captured by the polling platform, others are discussed at tables, with feedback and responses shared back in plenary.

Figure 6: Universe format in action

BOX 3: How to play – 'Multiverse' Format (with physical game board) [367 words]

Time for play: 3.5 hours

Number of players: any number of tables of 7-8 people each

Room set up: Flat room; tables of 7-8 in cabaret layout

People resource: 1 Facilitator; 1 support staff; optionally a person with knowledge of the game to help facilitate play at each table

Resources:

One playing board per table including:

- 7 sets of coloured resource tokens (10 per sector organisation, 15 per citizen voice)
- 5 sets of hexagonal action cards (for each sector organisation)

Integrated digital presentation incorporating video stimulus and digital scoreboard

- Videos include: 2030 citizen story; 2030 4 news headlines; 2040 4 news headlines; 2050 videos of 4 travel destinations.

Set of 7 blank player profiles per table for participants to complete prior to play (with prompt questions)

Facilitator guide and running order

Scoring spreadsheet

How the game is played

Each table either chooses or is allocated an industry sector in which to situate their game play.

Before the main workshop session (ideally the day before), participants are allocated to their groups (e.g. all from the banking sector in one group), and each participant in the group is allocated a role. Five individuals each represent a (fictitious) organisation in the chosen sector. Two further individuals represent citizen membership organisations. Each person is provided with a blank player profile (with a series of prompt questions) for their allocated role to complete to help them develop and immerse themselves in their allocated role.

On arrival at the workshop, a playing board is set up ready on each table. Players representing organisations are given 10 colour resource tokens and their set of hexagon action cards. Players representing citizen groups are given 15 red voting tokens.

Game play continues as per the Universe format with the following key differences.

- Players representing organisations announce their actions to their table only, and place their corresponding action card on the playing board.
- Citizen representatives 'vote' for the actions they support by placing tokens on the corresponding action card and verbally explaining the reason for their support
- Scoring takes place at each table using a simple scoring spreadsheet
- There is a 'winner' at each table

Figure 7: Multiverse format in action